18802 80th Avenue South
Kent, WA 98032
Phone: (425) 203-9800
Facsimile: (425) 203-9801

Fire Protection
Material & Equipment Submittals

Pierce College-Puyallup, new STEM building
Absher Construction Company
Project No. 200429
Shinn FP Project No. 22-3698

1601 39th Ave SE

Puyallup, WA, 98406

GENERAL CONTRACTOR

Absher Construction

PO BOX 280

Puyallup Wa, 98371

(253) 845-9544

PREPARED BY

Ben Bernard

03/26/2024

FPET NICET #106245 LEVEL IV,MSME

WASHINGTON STATE
CERTIFICATE OF COMPETENCY
FIRE PROTECTION SPRINKLER SYSTEMS
Hussein A. A. Huballa
8321-1119-C Level 3
Shinn Mechanical, Inc.
SHINNMI060QP
Signature 03/26/2024 Date
Expires 12/31/24

18802 80th Avenue South
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5. RELIABLE HEAD GUARDS
6. HEAD CABINET

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NOTE:

IF A MATERIAL INDICATED IN THIS SUBMITTAL IS NOT USED, AN EQUIVALENT PRODUCT WILL BE REQUESTED TO BE APPROVED FOLLOWING THE MATERIAL SUBSTITUTION REQUEST GUIDELINES OUTLINED IN SPECIFICATION SECTION 210000.

ANY MODIFICATIONS OR ALTERATIONS TO THE SPRINKLER SYSTEM INSTALLED BY SHINN FIRE PROTECTION (SFP) WITHOUT THE WRITTEN CONSENT OR APPROVAL OF "SFP" WILL RESULT IN THE WARRANTY TO BE NULL & VOID.

GENERAL NOTES:

1. All material & installations of this Automatic Fire Sprinkler System conforms to N.F.P.A. #13
2. Twenty-four (24) hour supervision to be provided by others.
3. The entire system to be hydraulically calculated and piping sized accordingly.
4. It is not our intent to write or give formal interpretations of any fire codes. It is rather our intent to provide general information. Under no circumstances should a person who is not qualified to work on Fire Protection Systems to make repair or modifications on the system. By doing so the warranty will be null & void.

SECTION 1

Fire Sprinkler Valves

Reliable®

Model FCA Floor Control Assembly

For Use in NFPA 13 and NFPA 13R Systems

cULus Listed

Features

- Compact design
- Grooved component connections for universal application
- Horizontal (check valve hinge up) and vertical (flow up) installation

Product Description

The Reliable Model FCA Floor Control Assembly is designed for use as a floor or zone control assembly in NFPA 13 or 13R applications. The product can also be used as a conventional wet system (shotgun) riser. Grooved connections on each component allow components to be rotated independently, providing maximum flexibility in the field. The assembly includes a butterfly control valve with integral tamper switch, a water flow detector, and a riser check valve with a pressure gauge and a Model TD Test & Drain valve. Multiple orifices and pressure relief options are available for the Model FCA Floor Control Assembly.

Model FCA Valve

Model FCA Technical Data — **Table A**

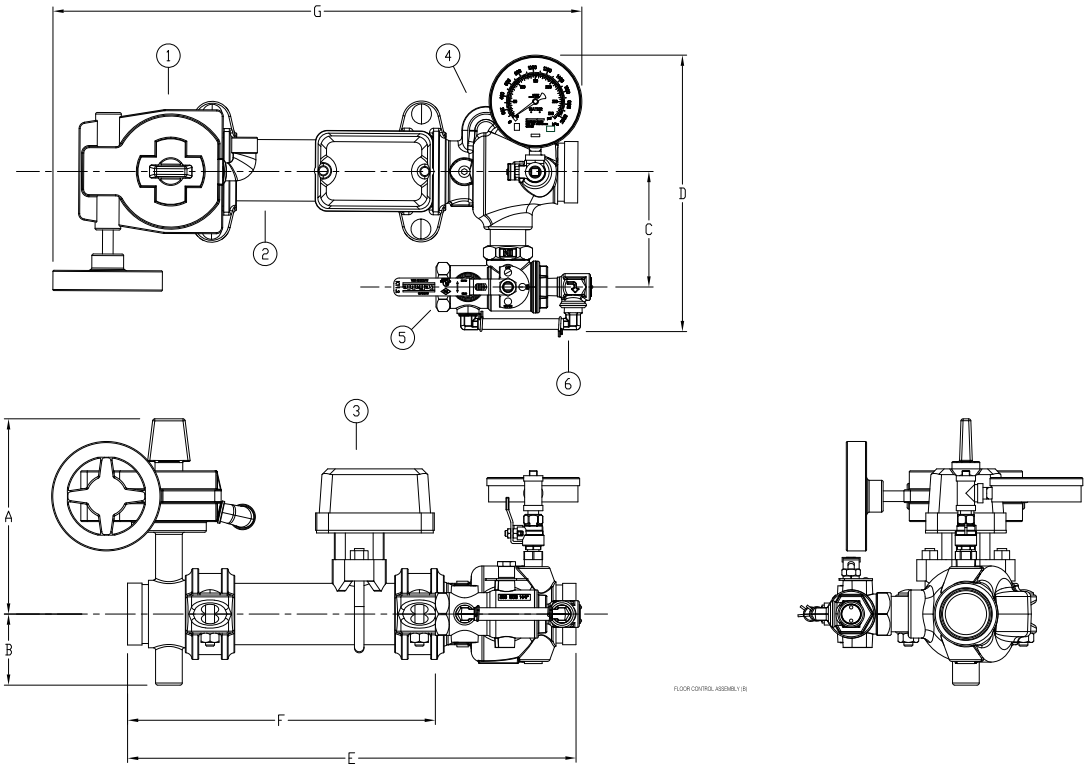
Size	Takeout (Length)	Pressure Rating	Weight
2" (50mm)	20-5/8" (524mm)	300 psi (20,7 bar)	26 lbs (11.8 kg)
2-1/2" (65mm)	21-1/4" (540mm)	250 psi (17,2 bar)	40 lbs (18.1 kg)
3" (80mm)	21-3/4" (552mm)	250 psi (17,2 bar)	46.5 lbs (21.1 kg)
4" (100mm)	23-1/2" (597mm)	250 psi (17,2 bar)	62 lbs (28.1 kg)

Model FCA Equivalent Length of Schedule 10 Pipe — **Table B**

Size	C = 120
2" (50mm)	16.6
2-1/2" (65mm)	14.0
3" (80mm)	16.3
4" (100mm)	20.1

Model FCA Dimensions (Refer to Table D)

Figure 1



Model FCA Dimensions (Refer to Figure 1)

Table C

Size	A	B	C	D	E	F	G
2” (50mm)	6-3/4” (171mm)	3” (76mm)	5” (127mm)	15-3/4” (400mm)	20-5/8” (524mm)	13-1/2” (343mm)	21-1/2” (546mm)
2-1/2” (65mm)	9-1/4” (235mm)	3-1/4” (83mm)	5-1/4” (133mm)	15-1/2” (140mm)	21-1/4” (540mm)	14-1/2” (368mm)	24-1/2” (622mm)
3” (76mm)	9-1/2” (241mm)	3-1/2” (89mm)	5-1/2” (140mm)	16-3/4” (425mm)	21-3/4” (552mm)	14-1/2” (368mm)	24-1/2” (622mm)
4” (100mm)	10-1/2” (267mm)	4-1/4” (108mm)	7” (178mm)	20” (508mm)	23-1/2” (597mm)	14-1/2” (368mm)	26-1/2” (673mm)

Components (Refer to Figure 1)

Table D

Item	Description
1	Grooved Butterfly Valve
2	Manifold
3	Water Flow Switch
4	Riser Check Valve
5	Test and Drain Valve
6	Pressure Relief Valve

Installation

The Reliable Model FCA Floor Control Assembly shall be installed in accordance with NFPA 13, NFPA13R, and the requirements of any authorities having jurisdiction. Failure to follow installation instructions and/or revisions to the arrangement of the devices may void the warranty and/or listing of the product. Prior to installation, verify compatibility of the Model FCA materials with the water supply and the environment where the valve will be installed. The Model FCA must be installed in a location where the temperature is maintained at a minimum of 40°F (4°C). Heat tracing of wet system valve assemblies is prohibited by NFPA 13.

Connect the inlet of the device to the water supply and the outlet of the device to the fire protection system. Ensure proper direction of flow using the diagrams contained in this bulletin and on the device. Drain should be piped to a location that will avoid damage to property and injury to personnel.

Maintenance

The owner is responsible for maintaining the fire protection system in proper operating condition. Any system maintenance or testing that involves placing a control valve or detection/control system out of service may eliminate the fire protection that is provided by the fire protection system. Notify any required authorities having jurisdiction and implement appropriate precautions prior to proceeding.

When required, the Reliable Model FCA Floor Control Assembly and associated equipment shall periodically be given a thorough inspection and test. NFPA 25, "Inspection, Testing and Maintenance of Water Based Fire Protection Systems," provides minimum maintenance requirements.

Replace any components found to be corroded, damaged, or worn. Increase the frequency of inspections when the valve is exposed to corrosive conditions or chemicals that could impact the valve materials.

Guarantee

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

Ordering Information

Specify:

Model
- FCA Floor Control Valve Assembly

Size
- 2", 2-1/2", 3" or 4"

Orifice Size (K Factor) for Test and Drain Valve
- 2" FCA: 2.8 (40), 4.2 (60), or 5.6 (80)
- 2-1/2" and 3" FCA: 4.2 (60), 5.6 (80), 8.0 (115), or 11.2 (160)
- 4" FCA: 4.2 (60), 5.6 (80), 8.0 (115), 11.2 (160), or 16.8 (240)

Pressure Relief Valve Kit for Test and Drain Valve
- 175, 185, 210, 260, or 310 psi for 2" FCA
- 175, 185, 210, or 260 psi for 2-1/2", 3", and 4" FCA

FCA Floor Control Assembly Ordering Information Part Number **Figure 2**

6B XX 00 P YY Z

Riser Check & Manifold Size[1] XX	Drain Valve Options[1] YY	Pressure Relief Valve Options[2] Z
20 = 2"	01 = 1" RASCO T&D Valve (K2.8) 02 = 1" RASCO T&D Valve (K4.2) 03 = 1" RASCO T&D Valve (K5.6)	1 = 175psi 2 = 185psi 3 = 210psi 4 = 260psi 5 = 310psi
25 = 2-1/2" 30 = 3"	04 = 1-1/4" RASCO T&D Valve (K4.2) 05 = 1-1/4" RASCO T&D Valve (K5.6) 06 = 1-1/4" RASCO T&D Valve (K8.0) 07 = 1-1/4" RASCO T&D Valve (K11.2)	
40 = 4"	08 = 2" RASCO T&D Valve (K5.6) 09 = 2" RASCO T&D Valve (K8.0) 10 = 2" RASCO T&D Valve (K11.2) 11 = 2" RASCO T&D Valve (K16.8) 12 = 2" RASCO T&D Valve (K4.2)	

Note:
[1] 2" FCA has a 1" drain outlet, 2-1/2" and 3" FCA have a 1-1/4" drain outlet, and 4" FCA has a 2" drain outlet.
[2] Pressure Relief Valve option #5 is not available for sizes 2-1/2", 3", and 4" FCA.

P/N 9999970533

FireLock® Check Valves
Series 717 Check Valve
Series 717H High Pressure Check Valve

10.08

Series 717H
High Pressure Check Valve
(2 – 3"/DN50 – DN80)

Series 717
(2 ½ – 3"/73 mm – DN80)

Series 717
(4 – 12"/DN100 – DN300)

1.0 PRODUCT DESCRIPTION

Available Sizes

- 2 – 3"/DN50 – DN80 (Series 717H)
- 2 ½ – 12"/73 mm – DN300 (Series 717)

Pipe Material

- Carbon Steel, Schedule 10, Schedule 40. For use with alternative material please contact Victaulic.

Maximum Working Pressure

- Up to 365 psi/2517 kPa/25 bar
- Working pressure dependent on pipe size, valve size and approval requirements.

Application

- Designed for use in Fire Protection systems.
- Prevents back flow.
- Single-disc mechanism incorporates a spring-assisted feature for non-slamming operation.
- Can be installed either vertically (flow upwards only) or horizontally.
- Valve body cast with arrow indicator to assist with proper valve orientation.
- Optional upstream and downstream pressure taps included on select sizes. See Section 3.0.
- Provided with grooved ends.
- Rated for ambient temperature use in fire protection systems.

Available End Connections

- Victaulic Original Groove System (OGS) standard groove

2.0 CERTIFICATION/LISTINGS

LPS 1186: Issue 3.1
Cert/LPCB Ref. 104h/01

BS EN 10311
CPR (UK)
2019 No. 465

EN 10311
CPR (EU)
No. 305/2011

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

2.0 CERTIFICATION/LISTINGS

Approvals/Listings

Series 717H

Size		Approval/Listing Service Pressures				
Nominal inches DN	**Actual Outside Diameter** inches mm	**cULus** psi kPa	**FM** psi kPa	**LPCB** psi kPa	**VdS** psi kPa	**CCCf** psi kPa
2 DN50	2.375 60.3	365 2517	365 2517	365 2517	363 2500	N/A
2½	2.875 73.0	365 2517	365 2517	365 2517	N/A	363 2500
DN65	3.000 76.1	365 2517	365 2517	365 2517	363 2500	363 2500
3 DN80	3.500 88.9	365 2517	365 2517	365 2517	363 2500	363 2500

Series 717

Size		Approval/Listing Service Pressures				
Nominal inches DN	**Actual Outside Diameter** inches mm	**cULus** psi kPa	**FM** psi kPa	**LPCB** psi kPa	**VdS** psi kPa	**CCCf** psi kPa
2½	2.875 73.0	250 1725	N/A	N/A	N/A	N/A
DN65	3.000 76.1	250 1725	N/A	N/A	232 1600	N/A
3 DN80	3.500 88.9	250 1725	N/A	N/A	232 1600	N/A
4 DN100	4.500 114.3	365 2517	365 2517	365 2517	363 2500	363 2500
DN125	5.500 139.7	365 2517	365 2517	365 2517	363 2500	363 2500
5	5.563 141.3	365 2517	365 2517	365 2517	N/A	N/A
	6.500 165.1	365 2517	365 2517	365 2517	N/A	363 2500
6 DN150	6.625 168.3	365 2517	365 2517	365 2517	363 2500	N/A
8 DN200	8.625 219.1	365 2517	365 2517	348 2400	247 1700	363 2500
10 DN250	10.750 273.0	250 1725	250 1725	250 1725	N/A	232 1600
12 DN300	12.750 323.9	250 1725	250 1725	250 1725	N/A	N/A

3.0 SPECIFICATIONS – MATERIAL

Body:

☐ Ductile Iron conforming to ASTM A536, Grade 65-45-12.

Body Coating:

☐ Series 717H Body: Black Paint
☐ Series 717H Endface: Electroless Nickel conforming to ASTM B733
☐ Series 717 (2 ½ – 3"/73mm – DN80): PPS Coating
☐ Standard: Series 717 (4 – 12"/DN100 – DN300): Black Paint
☐ Optional: Series 717 (4 – 12"/DN100 – DN300): PPS Coating

Body Seat:

☐ Series 717H: Nitrile O-ring installed into an Electroless Nickel plating conforming to ASTM B733
☐ Series 717 (2 ½" – 3"/73 mm – DN80): PPS Coated Ductile Iron
☐ Series 717 (4 – 12"/DN100 – DN300): Ductile Iron with Electroless Nickel plating conforming to ASTM B733

Disc Seal or Coating: (specify choice[1])

☐ **Nitrile (Series 717H only)**
☐ **EPDM**
NOT COMPATIBLE FOR PETROLEUM SERVICES.

Discs:

☐ Series 717H: CF8M Cast Stainless Steel
☐ Series 717 (2 ½ – 3"/73 mm – DN80): Aluminum bronze with elastomer seal
☐ Series 717 (4 – 12"/DN100 – DN300): Elastomer encapsulated disc.

Shaft:

☐ Series 717H: Brass
☐ Series 717 (2 ½ – 3"/73 mm – DN80): Type 416 Stainless Steel
☐ Series 717 (4 – 12"/DN100 – DN300): Type 316 Stainless Steel

Spring:

☐ Type 302/304 Stainless Steel

Shaft Plug:

☐ Series 717H: Carbon Steel Zinc Plated
☐ Series 717: Carbon Steel Zinc Plated

Pipe Plug:

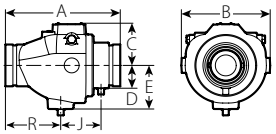
☐ Series 717H: Carbon Steel Zinc Plated
☐ Series 717: Carbon Steel Zinc Plated

Optional Pressure Taps:

☐ Series 717H: Available on all sizes
☐ Series 717: Available on sizes 4 – 12"/DN100 – DN300

4.0 DIMENSIONS

Series 717H

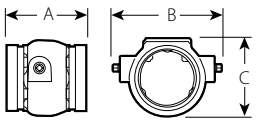


Typical 2 – 3"/50 – 80 mm

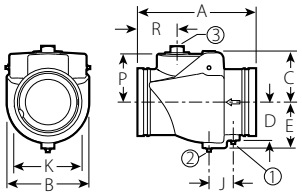
Size		Dimensions						Weight
Nominal inches DN	**Actual Outside Diameter** inches mm	**E to E** **A** inches mm	**B** inches mm	**C** inches mm	**E** inches mm	**J** inches mm	**R** inches mm	**Approx. (Each)** lb kg
2 DN50	2.375 60.3	8.66 220	6.46 165	3.23 83	3.02 77	2.80 72	4.25 108	10.7 4.9
2½	2.875 73.0	9.37 238	6.94 177	3.31 85	3.40 87	3.38 86	4.38 112	13.8 6.3
 DN65	3.000 76.1	9.37 238	6.94 177	3.31 85	3.40 87	3.38 86	4.38 112	13.8 6.3
3 DN80	3.500 88.9	9.62 244	7.44 189	3.53 90	3.65 93	3.38 86	4.63 118	20.0 9.1

4.1 DIMENSIONS

Series 717

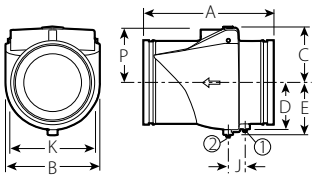


Typical 2 ½ – 3"/73 mm – DN80



① ½" NPT Upstream Drain
② ½" NPT Downstream Drain
③ 2" NPT (Drain Optional)

Typical 4 – 8"/DN100 – DN200



① ½" NPT Upstream Drain
② ½" NPT Downstream Drain

Typical 10 – 12"/DN250 – DN300

Size		Dimensions								Weight
Nominal inches DN	**Actual Outside Diameter** inches mm	**E to E** **A** inches mm	**B** inches mm	**C** inches mm	**E** inches mm	**J** inches mm	**K** inches mm	**P** inches mm	**R** inches mm	**Approx. (Each)** lb kg
2½	2.875 73.0	3.88 99	4.26 109	3.57 91	– –	– –	– –	– –	– –	3.6 1.6
DN65	3.000 76.1	3.88 99	4.26 108	3.57 91	– –	– –	– –	– –	– –	3.6 1.6
3 DN80	3.500 88.9	4.25 108	5.06 129	4.17 106	– –	– –	– –	– –	– –	4.5 2.0
4 DN100	4.500 114.3	9.63 245	6.00 152	3.88 99	3.50 89	2.00 51	4.50 114	3.50 89	3.35 85	20.0 9.1
DN125	5.500 139.7	10.50 267	6.80 173	4.50 114	4.17 106	2.15 55	5.88 149	4.08 104	3.98 101	27.0 12.2
5	5.563 141.3	10.50 267	6.80 173	4.50 114	4.17 106	2.15 55	5.88 149	4.08 104	3.98 101	27.0 12.2
	6.500 165.1	11.50 292	8.00 203	5.00 127	4.50 114	2.38 60	6.67 169	4.73 120	3.89 99	38.0 17.2
6 DN150	6.625 168.3	11.50 292	8.00 203	5.00 127	4.50 114	2.38 60	6.67 169	4.73 120	3.89 99	38.0 17.2
8 DN200	8.625 219.1	14.00 356	9.88 251	6.06 154	5.65 144	2.15 55	8.85 225	5.65 144	5.75 146	64.0 29.0
10 DN250	10.750 273.0	17.00 432	12.00 305	7.09 180	6.69 170	2.15 55	10.92 277	6.73 171	– –	100.0 45.4
12 DN300	12.750 323.9	19.50 495	14.00 356	8.06 205	7.64 194	2.51 64	12.81 325	7.73 196	– –	140.0 63.5

5.0 PERFORMANCE

Flow Characteristics

The charts below express the flow of water at 60°F/16°C through valve.

Formulas for C_v/K_v values:

$$\Delta P = \frac{Q^2}{C_v^2}$$

$$Q = C_v \times \sqrt{\Delta P}$$

Where:
Q = Flow (GPM)
ΔP = Pressure Drop (psi)
C_v = Flow Coefficient

$$\Delta P = \frac{Q^2}{K_v^2}$$

$$Q = K_v \times \sqrt{\Delta P}$$

Where:
Q = Flow (m^3/hr)
ΔP = Pressure Drop (Bar)
K_v = Flow Coefficient

Series 717H

Size		Flow Characteristics
Nominal inches DN	**Actual Outside Diameter** inches mm	**Full Open** C_v K_v
2 DN50	2.375 60.3	160 138
2½	2.875 73.0	215 186
 DN65	3.000 76.1	215 186
3 DN80	3.500 88.9	315 272

Series 717

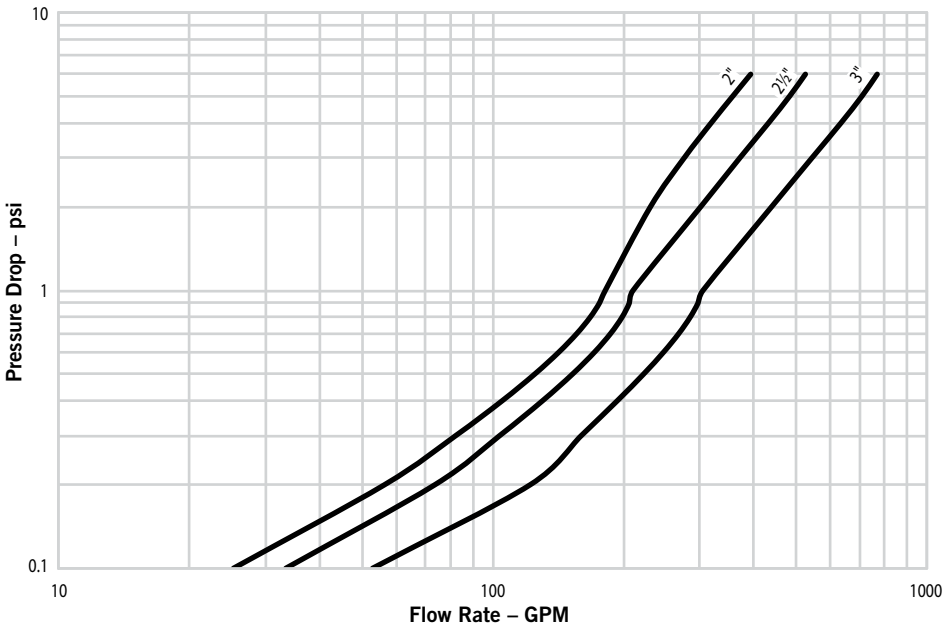
Size		Flow Characteristics
Nominal inches DN	**Actual Outside Diameter** inches mm	**Full Open** C_v K_v
2½	2.875 73.0	140 121
 DN65	3.000 76.1	140 121
3 DN80	3.500 88.9	250 216
4 DN100	4.500 114.3	390 337
 DN125	5.500 139.7	700 606
5	5.563 141.3	700 606
	6.500 165.1	1000 865
6 DN150	6.625 168.3	1000 865
8 DN200	8.625 219.1	1800 1557
10 DN250	10.750 273.0	3000 2595
12 DN300	12.750 323.9	4200 3633

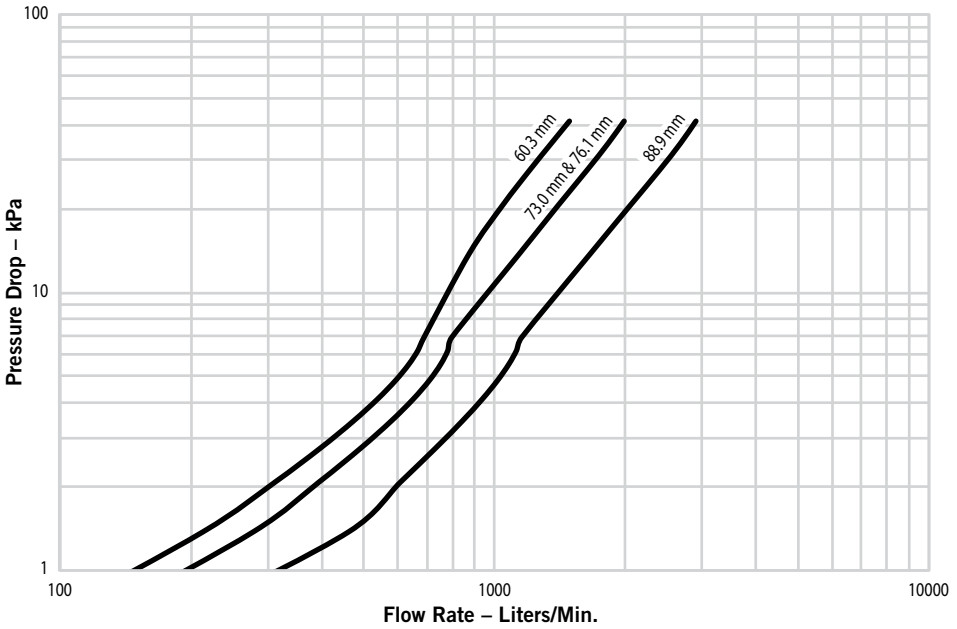
5.0 PERFORMANCE (CONTINUED)

Flow Characteristics

The charts below express the flow of water at 60°F/16°C through valve.

S717H



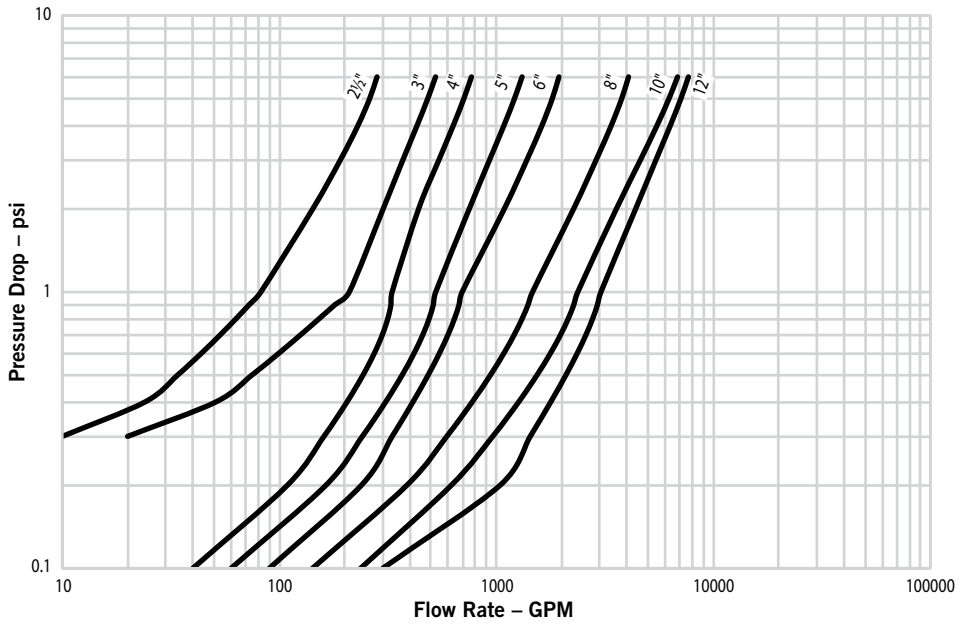


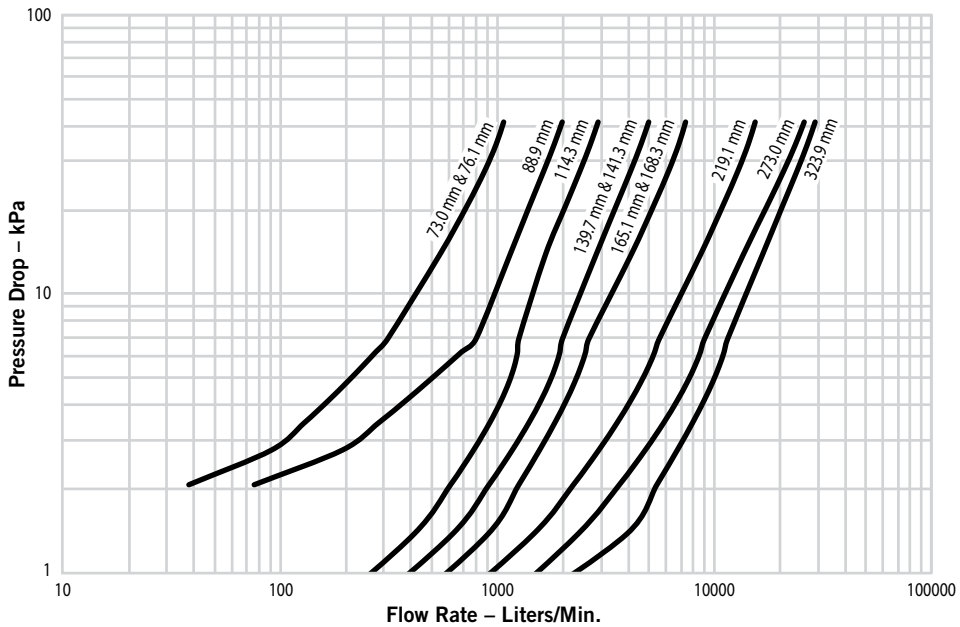
5.1 PERFORMANCE

Flow Characteristics

The charts below express the flow of water at 60°F/16°C through valve.

S717





6.0 NOTIFICATIONS

⚠ WARNING

- **Depressurize and drain the piping system before attempting to install, remove, adjust, or maintain any Victaulic piping products.**

7.0 REFERENCE MATERIALS

05.01: Seal Selection Guide
10.01: Regulatory Approval Reference Guide
29.01: Terms and Conditions/Warranty
I-100: Field Installation Handbook

Reliable®

Model BFG-300 Supervised Butterfly Valve Grooved

cULus Listed, FM Approved

Product Description

The Reliable Model BFG-300 Supervised Butterfly valves are cULus Listed and FM Approved for fire protection systems. Reliable Supervised Butterfly Valves valves have AWWA C606 grooved end connections. They are available in 2-1/2" (65mm), 3" (76mm), 4" (100mm), 6" (150mm), and 8" (203mm) nominal sizes. The valves are listed for 300 psi (20.7 bar) working pressure. The maximum working temperature for the valves is 250°F (120°C).

Maintenance

The owner is responsible for maintaining the fire protection system in proper operating condition. Any system maintenance or testing that involves placing a control valve out of service will eliminate the fire protection that is provided by the fire protection system.

The Reliable Supervised Closed Butterfly valves and associated equipment shall periodically be given a thorough inspection and test. NFPA 25, "Inspection, Testing and Maintenance of Water Based Fire Protection Systems," provides minimum maintenance requirements.

Guarantee

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

Supervised Grooved Butterfly Valve - Supervised Open

Supervised Grooved Butterfly Valve - Supervised Closed

Ordering Information

Specify the following when ordering:

Model BFG-300 Butterfly Valve

Supervision

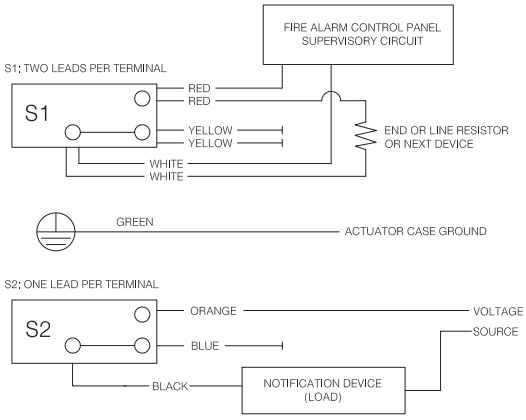
- Valve Supervised Open (yellow indicator)
- Valve Supervised Closed (white indicator)

Valve Size

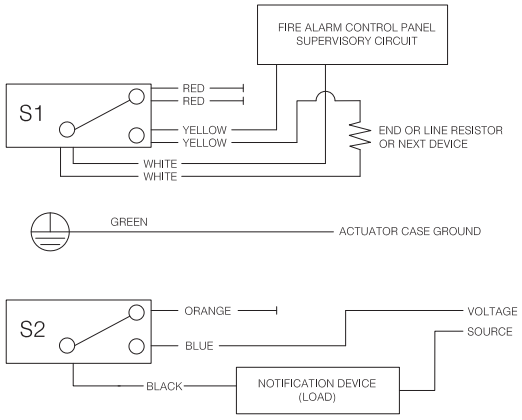
- 2-1/2" (65mm)
- 3" (76mm)
- 4" (100mm)
- 6" (150mm)
- 8" (203mm)

Reliable Supervised Butterfly Valve Wiring Diagram - Valve in Supervised Position **Figure 1**

Supervised Normally Open Valve



Supervised Normally Closed Valve



Notes: Rated: 5A-1/6HP-125/250VAC
0.5A - 125VDC
0.25A - 250DC

Reliable Model BFG-300 Supervised Butterfly Valve Grooved

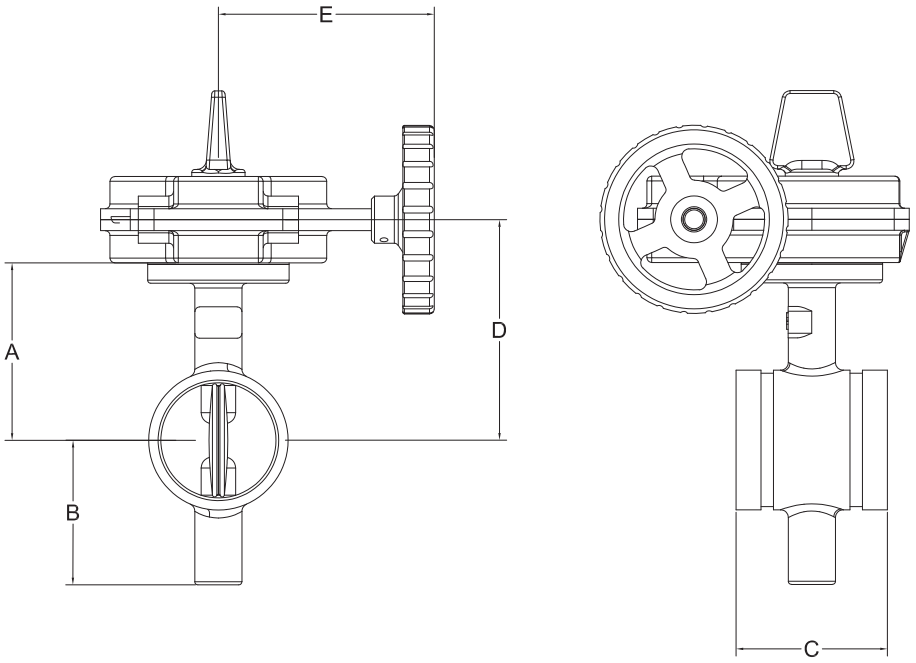
Technical Specifications
Pressure Rating:
300 psi (20.7 bar)

Material Specifications
Body: Ductile Iron ASTM A-536 Nylon-11 Coated
Disc: ASTM A-536 EPDM Encapsulated
Upper and Lower Stems: AISI 420-SS
Housing: ASTM A-536
Hand Wheel: ASTM A-536
Flag Indicator: ASTM A-536
Shear Pin: ASTM A-510
Segment Gear: ASTM B-148 or B-584
Housing Gasket: EDPM Grade E
O-Ring: EDPM Grade E

Specifications
Groove Inlet: AWWA C 606

Listings and Approvals
cULus Listed
FM Approved

Reliable Supervised Butterfly Valve Specification and Dimensions **Figure 2**



Dimensions - in. (mm) **Table B**

Valve Size	A	B	C	D	E
~~2-1/2" (65)~~	~~4-1/8 (105)~~	~~3-5/8 (92)~~	~~3-13/16 (96)~~	~~5-1/3 (135)~~	~~5-1/3 (135)~~
~~3" (76)~~	~~4 7/16 (112)~~	~~3 11/16 (95)~~	~~3 13/16 (96)~~	~~5 5/8 (142)~~	~~5 1/3 (135)~~
4" (100)	5-11/16 (145)	4-1/3 (108)	4-1/2 (115)	6-15/16 (175)	5-1/3 (135)
~~6" (150)~~	~~7 (179)~~	~~5-11/16 (146)~~	~~5-3/16 (132)~~	~~8-1/4 (209)~~	~~7-5/8 (193)~~
~~8" (203)~~	~~8 (204)~~	~~6-11/16 (170)~~	~~5-13/16 (147)~~	~~9-1/4 (234)~~	~~7-5/8 (193)~~

P/N 9999970588

Model REL-BL Full Port Ball Valves

Product Description

Reliable Model REL-BL full port ball valves are cULus Listed and FM Approved as trim and drain valves for fire protection systems. Table A indicates the rated working pressures. The valves feature a forged brass valve body with FNPT end connections.

Installation

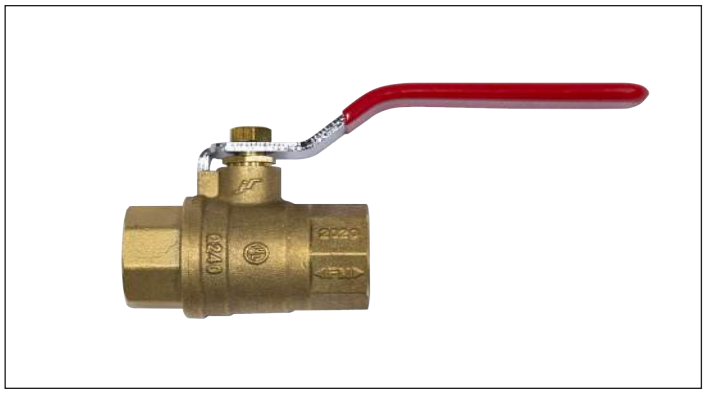
The Reliable Full Port Ball Valve shall be installed in accordance with NFPA 13, "Standard for the Installation of Sprinkler Systems," as well as the requirements of any authorities having jurisdiction. Verify compatibility of the Full Port Ball Valve materials with the water supply and the environment where the valve will be installed prior to installation.

WARNING: Model REL-BL ball valves contain lead and are not for use in systems carrying water intended for human consumption.

Maintenance

The owner is responsible for maintaining the fire protection system in proper operating condition. Any system maintenance or testing that involves placing a control valve out of service will eliminate the fire protection that is provided by the fire protection system.

The Reliable Full Port Ball Valve shall periodically be given a thorough inspection and test. NFPA 25, "Inspection, Testing and Maintenance of Water Based Fire Protection Systems," provides minimum maintenance requirements. Inspect the valve for corrosion, damage, and wear as required and replace as necessary. Increase the frequency of inspections when the valve is exposed to corrosive conditions or chemicals that could impact the valve materials.



Model REL-BL Full Port Ball

Guarantee

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

Ordering Information

Specify the following when ordering:

Reliable Model REL-BL Full Port Ball Valve
Valve Size

- 1/4" (6 mm)
- 1/2" (13 mm)
- 3/4" (19 mm)
- 1" (25 mm)
- 1-1/4" (32 mm)
- 1-1/2" (40 mm)
- 2" (50 mm)

Table A

Valve Size	Pressure Rating	Approvals
1/4" (6 mm)	600 psi (41.4 bar)	cULus Listed
1/2" (13 mm)	600 psi (41.4 bar)	cULus Listed
	300 psi (20.7 bar)	FM Approved
3/4" (19 mm)	600 psi (41.4 bar)	cULus Listed
	300 psi (20.7 bar)	FM Approved
1" (25 mm)	600 psi (41.4 bar)	cULus Listed
	300 psi (20.7 bar)	FM Approved
1-1/4" (32 mm)	600 psi (41.4 bar)	cULus Listed
	300 psi (20.7 bar)	FM Approved
1-1/2" (40 mm)	600 psi (41.4 bar)	cULUs Listed
	300 psi (20.7 bar)	FM Approved
2" (50 mm)	300 psi (20.7 bar)	cULus Listed, FM Approved

Model REL-BL Full Port Ball Valves

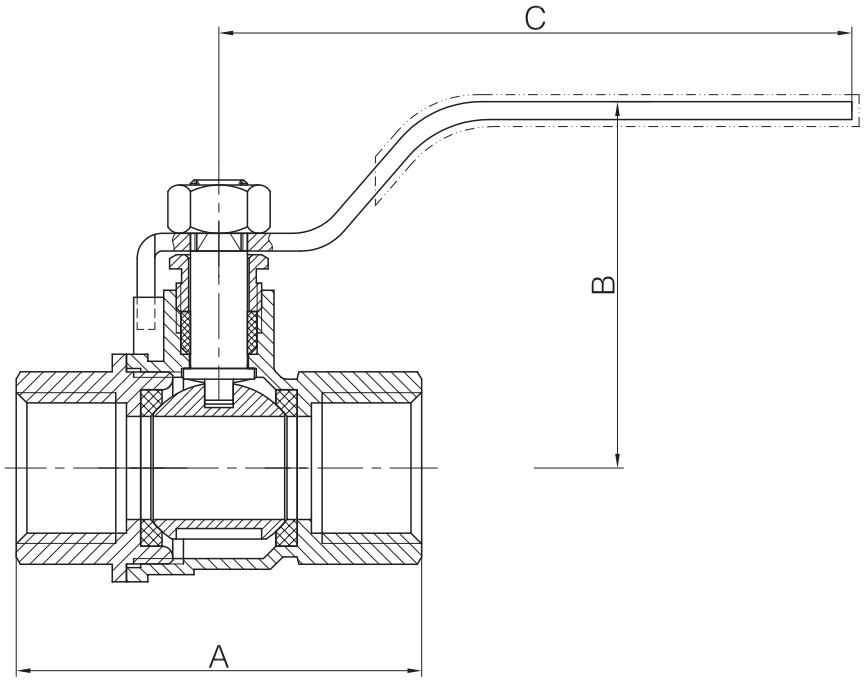
Technical Specifications
Pressure Rating:
See Table A

Material Specifications
Body: C37700 Brass Alloy
Bonnet: C37700 Brass Alloy
Seat: PTFE
Ball: C37700 Brass Alloy
Stem: HPb59-1 Brass Alloy
Packing: PTFE
Gland: C37700 Brass Alloy
Handle: Q235A Steel Alloy
Nut: Q235A Steel Alloy

End Connections
Female NPT

Listings and Approvals
cULus Listed (1/4" - 2")
FM Approved (1/2" - 2")

Model REL-BL Full Port Ball Valve Dimensions — **Figure 1**



Dimensions in. (mm) — **Table B**

Valve Size	A	B	C
1/4" (6 mm)	1-3/4" (44)	1-13/16" (46)	3-1/2" (89)
1/2" (13 mm)	2-1/4" (57)	2" (51.5)	3-1/2" (89)
3/4" (19 mm)	2-1/2" (63)	2-3/8" (61)	4-1/8" (104)
1" (25 mm)	3" (75.5)	2-1/2" (63.5)	4-5/8" (117.5)
1-1/4" (32 mm)	3-7/16" (86.5)	2-13/16" (71)	4-5/8" (117.5)
1-1/2" (40 mm)	3-11/16" (94.2)	3-3/4" (94.5)	5-11/16" (145)
2" (50 mm)	4-1/4" (108)	4" (102)	5-11/16" (145)

P/N 9999970612

PURGEnVENT™

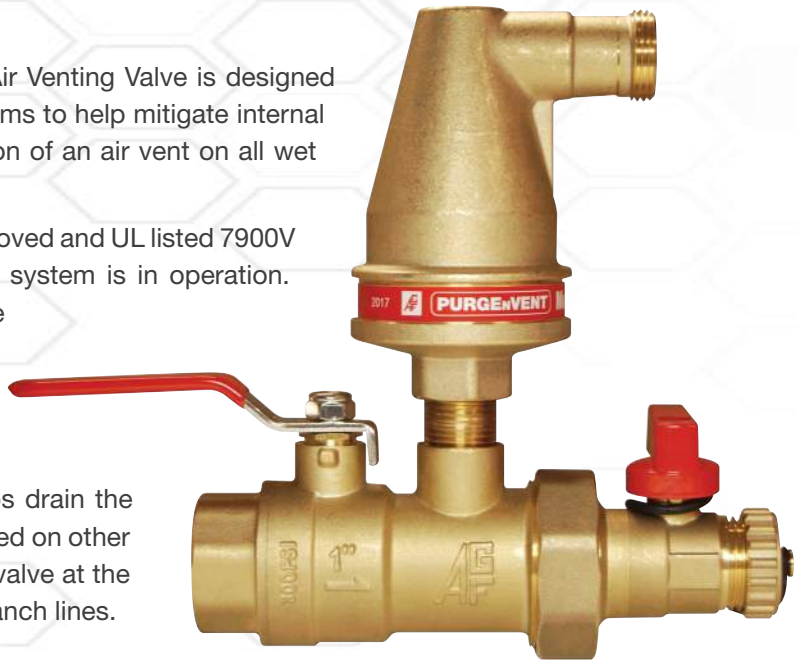
Model 7900AAV

QUALITY COMPONENTS FOR FIRE SPRINKLER SYSTEMS

Automatic Air Venting Valve

The AGF PURGEnVENT Model 7900AAV Automatic Air Venting Valve is designed to remove excess air from wet pipe fire sprinkler systems to help mitigate internal pipe corrosion. NFPA 13 standard requires the addition of an air vent on all wet pipe fire sprinkler systems that utilize metallic pipe.

The PURGEnVENT Model 7900AAV features a FM approved and UL listed 7900V automatic air vent that releases excess air while the system is in operation. It also includes an isolation valve, strainer, and purge valve with union and hose connection. The purge valve helps remove air from the system faster when filling, helps flush and clean the valve, and can be used as a vacuum break when draining the system. When being used as a vacuum break it helps drain the system faster and protects gaskets from being dislodged on other system components. AGF recommends installing the valve at the highest point in the system or at the end of system branch lines.

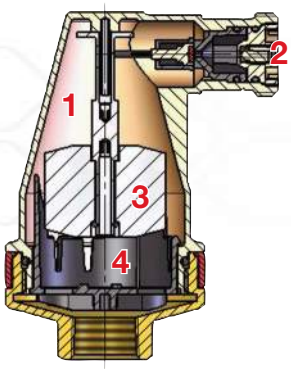


Features

- NFPA Compliant
- FM Approved and UL Listed 7900V Air Vent
- 175 PSI Rated
- Isolation Valve
- Internal Strainer
- Purge Valve with Union and Hose Connection
- System Drain Vacuum Break

7900V Air Vent Advantages

1. Conical shape maximizes clearance and protects the venting valve from contamination.
2. Recessed venting valve prevents vent redundancy and protects it from damage.
3. Single float allows only vertical movement.
4. Bubble breaker acts as a secondary filter and maximizes air passage.

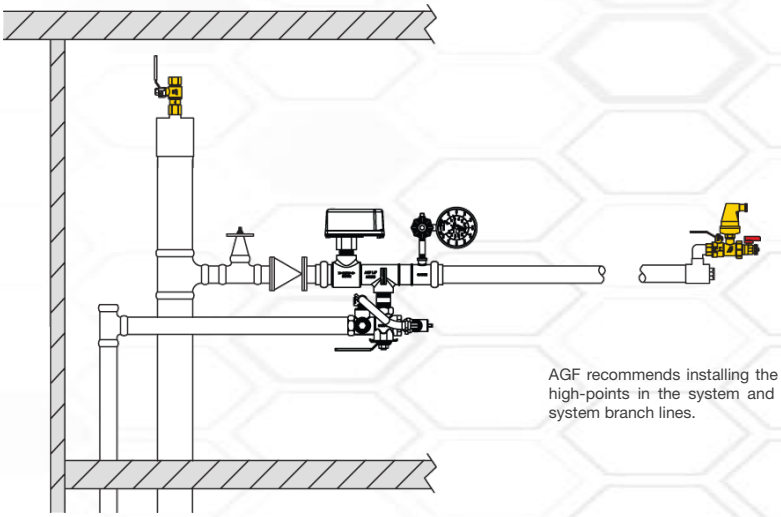


Models

Part Number
7900AAV

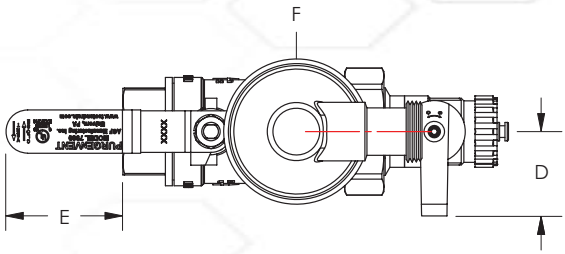
7610-2281 : 0500

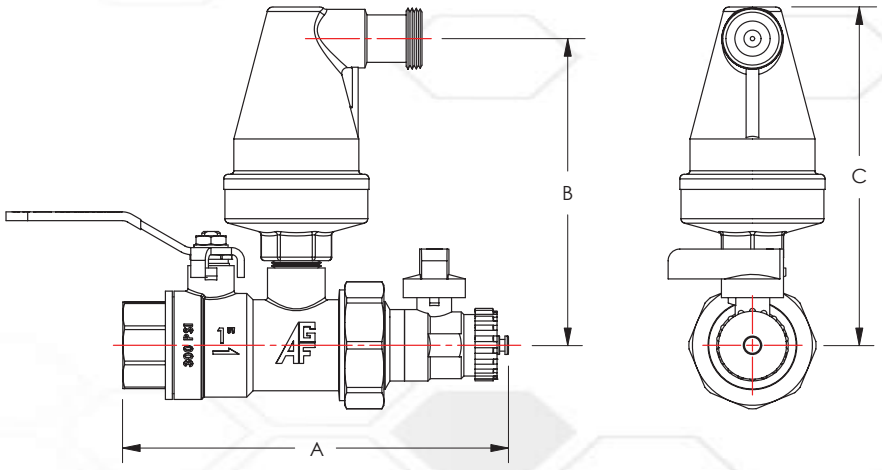
Installation



AGF recommends installing the M7900AAV at high-points in the system and at the end of system branch lines.

Dimensions





A	B	C	D	E	F
6⅝" (167 mm)	5¼" (133 mm)	5¾" (147 mm)	1½" (37 mm)	2" (51 mm)	ø2½" (63 mm)

Sizes have been rounded to the highest millimeter

USA Patent and Other Patents Pending

For use on wet fire sprinkler systems.

Valve Size

1”

Connections

Isolation Valve Inlet.....1” NPT
Purge Valve Outlet.....Hose
7900V Vent Outlet.....¾” NPT

Installation Orientation

Horizontal with 7900V in Upright Position

Electrical Requirements

None

Materials

Handle.....Steel
Stem.....Rod Brass
Ball.....C.P. Brass
Body.....Brass
Valve Seat.....PTFE
Strainer.....Stainless Steel
7900V.....Bronze

Rating

175 PSI

Compliance

NFPA 13, 13D, & 13R
NYC-BSA No. 720-87-SM

Approvals

7900V: UL/ULC (EX27596)
7900V: FM

7610-2281 : 0500

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: _____

Reliable®

Reliable Model HV Hose Valves

cULus Listed, FM Approved

Product Description

The Reliable Model HV Hose valves are cULus Listed and FM Approved for fire protection systems. Reliable Hose Valves valves have AWWA C 606 grooved inlet connections or NPT threaded inlet connections. Hose valves with a threaded inlet are available in 1-1/2" (38mm) and 2-1/2" (65mm) nominal sizes. Hose valves with a grooved inlet are available in the 2-1/2" (65mm) nominal size. Outlet threads are 1-1/2" (38mm) or 2-1/2" (65mm) National Standard Thread (NST) hose thread.The valves are listed for 300 psi (20.7 bar) working pressure.

Maintenance

The owner is responsible for maintaining the fire protection system in proper operating condition. Any system maintenance or testing that involves placing a control valve out of service will eliminate the fire protection that is provided by the fire protection system.

The Reliable Hose valves and associated equipment shall periodically be given a thorough inspection and test. NFPA 25, "Inspection, Testing and Maintenance of Water Based Fire Protection Systems," provides minimum maintenance requirements.

Guarantee

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

Ordering Information

Specify the following when ordering:

Model
- REL-HVT
- REL-HVG

Valve Size
- ~~1-1/2" (38mm) - threaded only~~
- 2-1/2" (65mm)

Accessories
- Cap with chain

Female Thread x Male Thread

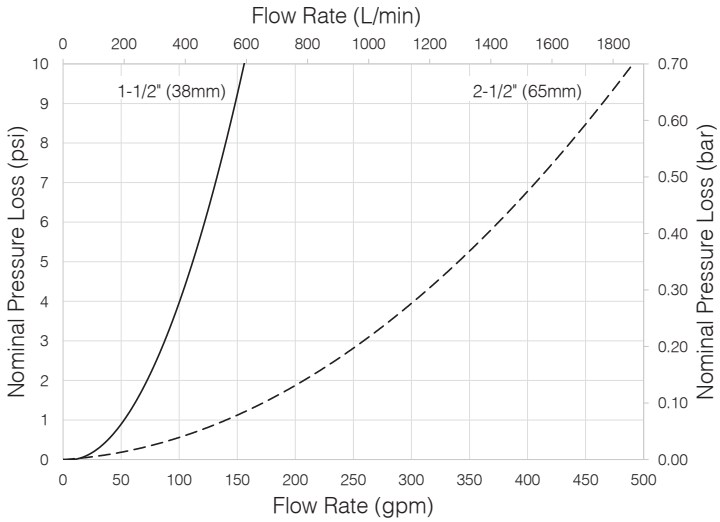
Groove x Male Thread

2-1/2"cap

1-1/2"cap

Cap with chain

Pressure Loss Graph **Figure 1**



End Configuration Options **Table A**

Model	End Connections	Sizes in (mm)	Approvals
~~REL-HVT~~	~~Female NPT Thread x Male NST Hose Thread~~	~~1-1/2" (38), 2-1/2" (65)~~	~~cULus Listed, FM Approved~~
REL-HVG	Groove x Male NST Hose Thread	2-1/2" (65)	cULus Listed, FM Approved

Reliable Model HV Hose Valves

Technical Specifications
Pressure Rating:
300 psi (20.7 bar)

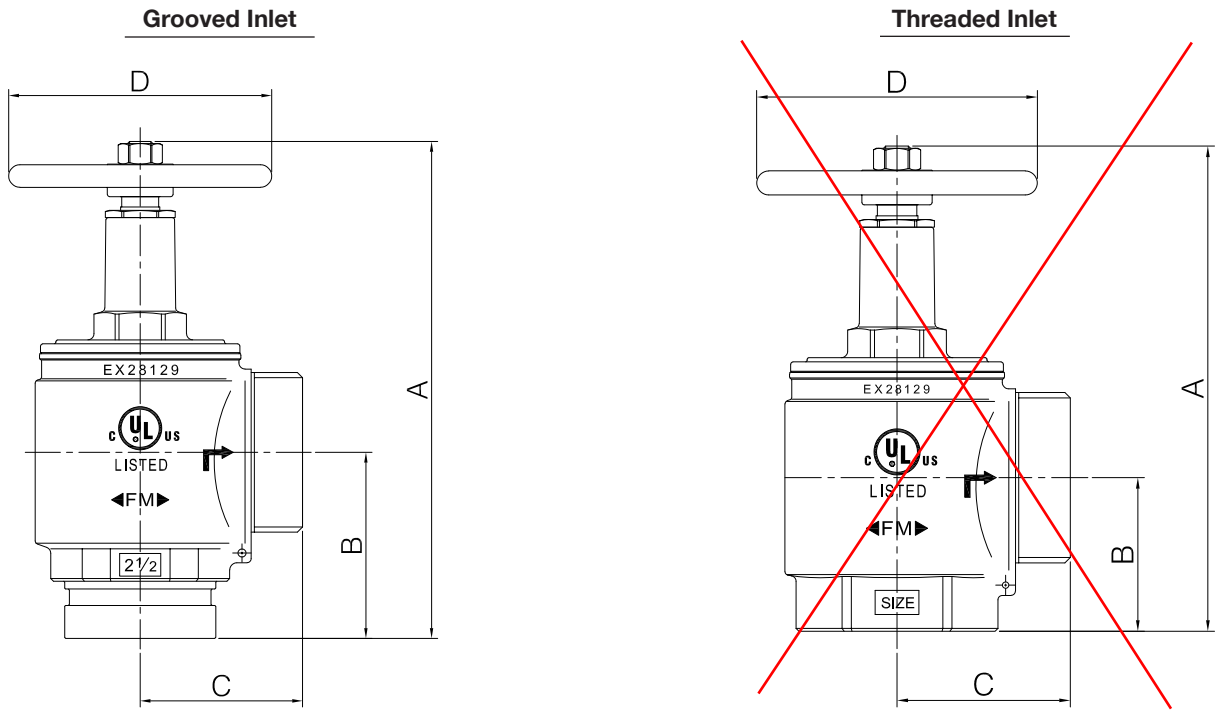
Material Specifications
Body: Brass ASTM B584
Bonnet: Brass ASTM B584
Stem: Brass
Disc Holder: Forged Brass
Disc Nut: Brass
Packing Nut: Brass
Hand Wheel: Ductile Iron
Seat: NBR
Nut: Stainless Steel
Clamping Ring: Forged Brass
Name Plate: Aluminum
O-Ring: NBR
O-Ring: NBR

End Connections
Female Thread x Male Thread (REL-HVT)
Groove x Male Thread (REL-HVG)

Specifications
Groove Inlet: AWWA C 606
Thread Inlet: NPT

Listings and Approvals
cULus Listed
FM Approved

Reliable Model HV Hose Valve Specification and Dimensions — **Figure 2**



Reliable Model HV Hose Valve Dimensions - in. (mm) — **Table B**

Valve Size	Inlet	Model	A	B	C	D
~~1-1/2" (30)~~	~~Threaded~~	~~REL-HVT~~	~~7-7/16" (188)~~	~~2" (50)~~	~~2-5/16" (58)~~	~~3-9/16" (90)~~
~~2-1/2" (65)~~	~~Threaded~~	~~REL-HVT~~	~~10-2/3" (271)~~	~~2-3/4" (70)~~	~~3-1/8" (79)~~	~~5-1/16" (128)~~
2-1/2" (65)	Grooved	REL-HVG	11-7/16" (291)	3-9/16" (91)	3-1/8" (79)	5-1/16" (128)

9999970584

SECTION 2

Pipe and Fittings

BULL MOOSE TUBE

SCHEDULE 10 & 40 SPRINKLER PIPE SUBMITTAL DATA SHEET

APPROVALS AND SPECIFICATIONS

- ASTM A135, Grade A
- ASTM A795, Type E, Grade A
- Pressure rated to 300 psi
- Underwriters Laboratories—United States of America
- Underwriters Laboratories—Canada
- Factory Mutual
- NFPA-13
- NFPA-13R
- NFPA-14
- CIVIL DEFENSE APPROVAL—United Arab Emirates
- Made in the United States of America
- UL, ULC & FM listed for roll-groove, plain-end and welded joints for wet, dry, preaction and deluge sprinkler systems.
- LEED v4 Certified

FINISHES AND COATINGS

- Schedule 10 & 40 Sprinkler Pipe receives an OD mill coating of water-based paint which has corrosion protection expected with a painted carbon steel product, i.e. it would be expected to resist corrosion for an extended and indefinite period in a clean and dry environment and, as environmental conditions deteriorate, the corrosion protection would also diminish.
- Schedule 10 & 40 Sprinkler Pipe (black) receives an ID mill coating of Eddy Guard II MIC preventative coating. EG2 has been tested at independent laboratories to resist bacterial growth and maintain minimal bacterial count after multiple flushes (25) of the pipe.
- Schedule 10 & 40 Sprinkler Pipe when Hot Dip Galvanized by ASTM A123 and supplied by Bull Moose Tube is UL listed and FM approved.

PRODUCT IDENTIFICATION

- Every length of Bull Moose fire sprinkler pipe features large, easy-to-read, continuous stenciling, clearly identifying the manufacturer, type of pipe, size, and length.

	Nominal Pipe Size (inches)	1	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"	6"	8"
Schedule 10	O.D. (in)	1.315	1.660	1.900	2.375	2.875	3.500	4.500	6.625	8.625
	I.D. (in)	1.097	1.442	1.682	2.157	2.635	3.260	4.260	6.357	8.249
	Empty Weight (lb/ft)	1.410	1.810	2.090	2.640	3.530	4.340	5.620	9.290	16.940
	Water Filled Weight (lb/ft)	1.800	2.518	3.053	4.223	5.893	7.957	11.796	23.038	40.086
	C.R.R.*	15.27	9.91	7.76	6.27	4.92	3.54	2.50	1.158	1.805
	Pieces per Lift	91	61	61	37	30	19	19	10	7
Schedule 40	O.D. (in)	1.315	1.660	1.900	2.375	2.875	3.500	4.500		
	I.D. (in)	1.049	1.380	1.610	2.067	2.469	3.068	4.026		
	Empty Weight (lb/ft)	1.680	2.270	2.720	3.660	5.800	7.580	10.800		
	Water Filled Weight (lb/ft)	2.055	2.918	3.602	5.114	7.875	10.783	16.316		
	C.R.R.*	1.00	1.00	1.00	1.00	1.00	1.00	1.00		
	Pieces per Lift	70	51	44	30	30	19	19		

*Calculated using Standard UL CRR formula, UL Fire Protection Directory, Category VIZY

SUBMITTAL INFORMATION

Project

Contractor

Engineer

Specification Reference

Date

System Type

Locations

Comments

◯ Schedule 10 - Black ◯ Schedule 10 - Hot Dip Galvanized ◯ Schedule 40 - Black ◯ Schedule 40 - Hot Dip Galvanized

BULLMOOSETUBE.COM
1819 Clarkson Road, Chesterfield, MO 63017
US: 800.325.4467 | Canada: 800.882.4666 | sales@BullMooseIndustries.com

Wheatland Tube
A DIVISION OF ZEKELMAN INDUSTRIES
700South Dock Street Sharon, PA 16146 Ph: (800) 257-8182

GUIDELINE FOR DETERMINING THE MAXIMUM WORKING PRESSURE IN PSI,

CALCULATIONS ARE BASED ON 2014 ASME B31.1 POWER PIPING CODE

CONTINUOUS WELD PIPE ASTM A 53 TYPE F GRADE A, APL5L GRADE A25 PSL 1				
	SCHEDULE 40		SCHEDULE 80	
NPS	PLAIN END	THREADED	PLAIN END	THREADED
1/4	2600	1150	3700	2100
3/8	2100	950	3000	1800
1/2	2000	850	2850	1600
3/4	1650	750	2350	1350
1	1550	650	2150	1200
1 ¼	1300	600	1750	1050
1 ½	1150	550	1600	1000
2	950	500	1400	900
2 ½	1050	500	1450	850
3	900	450	1300	800
3 ½	850	400	1200	800
4	750	400	1100	750
ELECTRIC RESISTANCE WELD PIPE ASTM A 53 GRADE B & API 5L GRADE B PSL 1				
	SCHEDULE 40		SCHEDULE 80	
NPS	PLAIN END	THREADED	PLAIN END	THREADED
2	1700	850	2500	1600
2 1/2	1900	850	2600	1550
3	1650	800	2300	1450
3 1/2	1500	750	2100	1400
4	1400	750	2000	1350
5	1200	700	1800	1300
6	1100	650	1750	1300
8	1000	650	1550	1200

A SAFETY FACTOR SHOULD ALWAYS BE INCULDED WHEN USING THE ABOVE PRESSURES. WORKING PRESSURES ARE THEORETICAL; THE ACTUAL WORKING PRESSURE MAY VARY BASED ON DESIGN CALCULATIONS.

Safety Factor	Multiplier
5	0.80
6	0.67
7	0.57
8	0.50
9	0.44
10	0.40

A safety factor of 8 would be suitable for the majority of applications, local codes or specific applications may require a higher safety factor. A piping design engineer should be consulted for specific applications. To determine a safe working pressure using a safety factor, multiply the values found in the tables by one of the above multipliers.

Note:

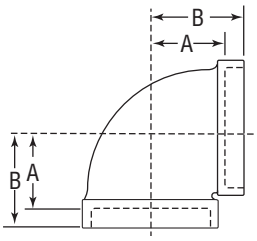
1. The pressures listed are based on the 2014 ASME B31.1 Power Piping Code.
2. No provision is made for abnormal or unusual conditions
3. No allowance for the coupling design or limitations
4. No allowance for the thinning of the pipe wall due to corrosion, bending etc.
5. Temperature rating: -20 degrees to 400 degrees Fahrenheit.
6. ERW or CW pipe may not be suitable for specific applications, consult a piping design engineer for specific applications.

SPRINKLER PIPE MAXIMUM WORKING PRESSURE

Type	Maximum Pressure in PSI
WST, Wheatland Super Tube	175
WLS, MEGA-FLOW, MLT, GL, MEGA-THREAD, SCH 10 & SCH 40	300

Class 125 (Standard)

FIGURE 351
90° Elbow



Size		A		B		Unit Weight Black	
NPS	*DN*	in	*mm*	in	*mm*	lbs	*kg*
1/4	*8*	1/2	*13*	13/16	*22*	0.16	*0.07*
3/8	*10*	9/16	*14*	15/16	*24*	0.25	*0.11*
1/2	*15*	11/16	*17*	1 1/8	*29*	0.40	*0.18*
3/4	*20*	13/16	*22*	1 15/16	*33*	0.60	*0.27*
1	*25*	15/16	*24*	1 1/2	*38*	0.92	*0.42*
1 1/4	*32*	1 1/8	*29*	1 3/4	*44*	1.44	*0.65*
1 1/2	*40*	1 5/16	*33*	1 15/16	*49*	1.95	*0.88*
2	*50*	1 9/16	*40*	2 1/4	*57*	3.13	*1.42*
2 1/2	*65*	1 13/16	*47*	2 11/16	*68*	4.94	*2.24*
3	*80*	2 3/16	*56*	3 1/8	*79*	7.21	*3.27*
3 1/2	*90*	2 7/16	*62*	3 7/16	*87*	9.67	*4.39*
4	*100*	2 11/16	*68*	3 13/16	*98*	12.17	*5.52*
5	*125*	3 5/16	*84*	4 1/2	*114*	21.46	*9.73*
6	*150*	3 7/8	*98*	5 1/8	*130*	31.33	*14.21*
8	*200*	5 3/16	*132*	6 9/16	*167*	64.56	*29.28*

Note: See following page for pressure-temperature ratings.

PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ **Approved**
Address:	☐ **Approved as noted**
Contractor:	☐ **Not approved**
Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

CAST IRON THREADED FITTINGS

Anvil standard and extra heavy cast iron threaded fittings are manufactured in accordance with ASME B16.4. Plugs and bushings are manufactured in accordance with ASME B16.14.

NOTE: Figure 367 Concentric Reducers do not meet the overall length requirement of ASME B16.4. All other dimensions are in compliance.

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Cast Iron Threaded Fittings
Pressure - Temperature Ratings

Temperature		Pressure			
		Class 125		Class 250	
(°F)	*(°C)*	psi	*bar*	psi	*bar*
-20° to 150°	*-28.9 to 65.6*	175	*12.1*	400	*27.6*
200°	*93.3*	165	*11.4*	370	*25.5*
250°	*121.1*	150	*10.3*	340	*23.4*
300°	*148.9*	140	*9.7*	310	*21.4*
350°	*176.7*	125	*8.6*	300	*20.7*
400°	*204.4*	–	–	250	*17.2*

Standards and Specifications

	Dimensions	Material	Galvanizing*	Thread	Pressure Rating
CAST IRON THREADED FITTINGS					
Class 125	ASME B16.4	ASTM A-126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.4
Class 250	ASME B16.4	ASTM A-126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.4
CAST IRON PLUGS AND BUSHINGS					
	ASME B16.14	ASTM A- 126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.14

* ASTM B 633. Type I, SC 4, may be supplied as alternate zinc coating per applicable ASME B16 product standard.

General Assembly of Threaded Fittings

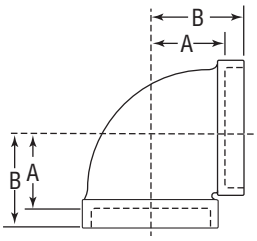
1) Inspect both male and female components prior to assembly.
   - Threads should be free from mechanical damage, dirt, chips and excess cutting oil.
   - Clean or replace components as necessary.

2) Application of thread sealant
   - Use a thread sealant that is fast drying, sets-up to a semi hard condition and is vibration resistant. Alternately, an anaerobic sealant may be utilized.
   - Thoroughly mix the thread sealant prior to application.
   - Apply a thick even coat to the male threads only. Best application is achieved with a brush stiff enough to force sealant down to the root of the threads.

3) Joint Makeup
   - For sizes up to and including 2" pipe, wrench tight makeup is considered three full turns past handtight. Handtight engagement for 1/2" through 2" thread varies from 4 1/2 turns to 5 turns.
   - For 2 1/2" through 4" sizes, wrench tight makeup is considered two full turns past handtight. Handtight engagement for 2 1/2" through 4" thread varies from 5 1/2 turns to 6 3/4 turns.

Class 125 (Standard)

FIGURE 351
90° Elbow



Size		A		B		Unit Weight Black	
NPS	*DN*	in	*mm*	in	*mm*	lbs	*kg*
1/4	*8*	1/2	*13*	13/16	*22*	0.16	*0.07*
3/8	*10*	9/16	*14*	15/16	*24*	0.25	*0.11*
1/2	*15*	11/16	*17*	1 1/8	*29*	0.40	*0.18*
3/4	*20*	13/16	*22*	1 15/16	*33*	0.60	*0.27*
1	*25*	15/16	*24*	1 1/2	*38*	0.92	*0.42*
1 1/4	*32*	1 1/8	*29*	1 3/4	*44*	1.44	*0.65*
1 1/2	*40*	1 5/16	*33*	1 15/16	*49*	1.95	*0.88*
2	*50*	1 9/16	*40*	2 1/4	*57*	3.13	*1.42*
2 1/2	*65*	1 13/16	*47*	2 11/16	*68*	4.94	*2.24*
3	*80*	2 3/16	*56*	3 1/8	*79*	7.21	*3.27*
3 1/2	*90*	2 7/16	*62*	3 7/16	*87*	9.67	*4.39*
4	*100*	2 11/16	*68*	3 13/16	*98*	12.17	*5.52*
5	*125*	3 5/16	*84*	4 1/2	*114*	21.46	*9.73*
6	*150*	3 7/8	*98*	5 1/8	*130*	31.33	*14.21*
8	*200*	5 3/16	*132*	6 9/16	*167*	64.56	*29.28*

Note: See following page for pressure-temperature ratings.

PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ **Approved**
Address:	☐ **Approved as noted**
Contractor:	☐ **Not approved**
Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

CAST IRON THREADED FITTINGS

Anvil standard and extra heavy cast iron threaded fittings are manufactured in accordance with ASME B16.4. Plugs and bushings are manufactured in accordance with ASME B16.14.

NOTE: Figure 367 Concentric Reducers do not meet the overall length requirement of ASME B16.4. All other dimensions are in compliance.

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Cast Iron Threaded Fittings
Pressure - Temperature Ratings

Temperature		Pressure			
		Class 125		Class 250	
(°F)	*(°C)*	psi	*bar*	psi	*bar*
-20° to 150°	*-28.9 to 65.6*	175	*12.1*	400	*27.6*
200°	*93.3*	165	*11.4*	370	*25.5*
250°	*121.1*	150	*10.3*	340	*23.4*
300°	*148.9*	140	*9.7*	310	*21.4*
350°	*176.7*	125	*8.6*	300	*20.7*
400°	*204.4*	–	–	250	*17.2*

Standards and Specifications

	Dimensions	Material	Galvanizing*	Thread	Pressure Rating
CAST IRON THREADED FITTINGS					
Class 125	ASME B16.4	ASTM A-126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.4
Class 250	ASME B16.4	ASTM A-126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.4
CAST IRON PLUGS AND BUSHINGS					
	ASME B16.14	ASTM A- 126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.14

* ASTM B 633. Type I, SC 4, may be supplied as alternate zinc coating per applicable ASME B16 product standard.

General Assembly of Threaded Fittings

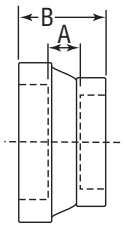
1) Inspect both male and female components prior to assembly.
   - Threads should be free from mechanical damage, dirt, chips and excess cutting oil.
   - Clean or replace components as necessary.

2) Application of thread sealant
   - Use a thread sealant that is fast drying, sets-up to a semi hard condition and is vibration resistant. Alternately, an anaerobic sealant may be utilized.
   - Thoroughly mix the thread sealant prior to application.
   - Apply a thick even coat to the male threads only. Best application is achieved with a brush stiff enough to force sealant down to the root of the threads.

3) Joint Makeup
   - For sizes up to and including 2" pipe, wrench tight makeup is considered three full turns past handtight. Handtight engagement for 1/2" through 2" thread varies from 4 1/2 turns to 5 turns.
   - For 2 1/2" through 4" sizes, wrench tight makeup is considered two full turns past handtight. Handtight engagement for 2 1/2" through 4" thread varies from 5 1/2 turns to 6 3/4 turns.

Class 125 (Standard)

☐ **FIGURE 367**
Concentric Reducer



Size				A		B*		Unit Weight Black	
NPS	*DN*	NPS	*DN*	in	*mm*	in	*mm*	lbs	*kg*
3/4	*20*	1/2	*15*	5/8	*16*	1 9/16	*40*	0.40	*0.18*
1	*25*	1/2 (Hex)	*15*	11/16	*17*	1 11/16	*43*	0.54	*0.24*
		3/4 (Hex)	*20*	7/16	*11*	1 1/2	*38*	0.63	*0.29*
1 1/4	*32*	1/2	*15*	9/16	*14*	1 5/8	*41*	0.84	*0.38*
		3/4	*20*	1	*25*	2 1/8	*54*	0.90	*0.41*
		1	*25*	15/16	*24*	2 1/8	*54*	1.07	*0.49*
1 1/2	*40*	1/2	*15*	1/2	*13*	1 5/8	*41*	1.00	*0.45*
		3/4	*20*	1/2	*13*	1 5/8	*41*	1.20	*0.54*
		1	*25*	1/2	*13*	1 3/4	*44*	1.50	*0.68*
		1 1/4	*32*	1	*25*	2 1/4	*57*	1.45	*0.66*
2	*50*	1/2	*15*	5/8	*16*	2	*51*	2.00	*0.91*
		3/4	*20*	3/4	*19*	2	*51*	1.90	*0.86*
		1	*25*	3/4	*19*	2	*51*	1.83	*0.83*
		1 1/4	*32*	13/16	*22*	2 1/8	*54*	1.78	*0.81*
		1 1/2	*40*	7/8	*22*	2 3/16	*56*	1.98	*0.90*
2 1/2	*65*	1 1/2	*40*	3/4	*19*	2	*51*	3.10	*1.41*
		2	*50*	1	*25*	2 9/16	*65*	2.98	*1.35*
3	*80*	3/4	*20*	15/16	*24*	2 1/2	*64*	4.31	*1.95*
		2	*50*	1 1/16	*27*	2 3/4	*70*	3.96	*1.80*
		2 1/2	*65*	15/16	*24*	2 13/16	*73*	4.40	*2.00*
4	*100*	2	*50*	1 3/16	*30*	2 15/16	*75*	6.50	*2.95*
		2 1/2	*65*	1 3/16	*30*	3 1/8	*79*	7.78	*3.53*
		3	*80*	1 1/16	*27*	3 1/8	*79*	7.01	*3.18*
5	*125*	4	*100*	1 1/16	*27*	3 5/16	*84*	10.48	*4.75*
6	*150*	4	*100*	1 1/8	*29*	3 7/16	*87*	13.83	*6.27*
		5	*125*	1 1/8	*29*	3 9/16	*90*	15.53	*7.04*
8	*200*	6	*150*	1 1/4	*32*	3 7/8	*98*	29.10	*13.20*

* Dimension "B" does not conform to ASME standard.

Note: See following page for pressure-temperature ratings.

PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ **Approved**
Address:	☐ **Approved as noted**
Contractor:	☐ **Not approved**
Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

CAST IRON THREADED FITTINGS

Anvil standard and extra heavy cast iron threaded fittings are manufactured in accordance with ASME B16.4. Plugs and bushings are manufactured in accordance with ASME B16.14.

NOTE: Figure 367 Concentric Reducers do not meet the overall length requirement of ASME B16.4. All other dimensions are in compliance.

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Cast Iron Threaded Fittings
Pressure - Temperature Ratings

Temperature		Pressure			
		Class 125		Class 250	
(°F)	*(°C)*	psi	*bar*	psi	*bar*
-20° to 150°	*-28.9 to 65.6*	175	*12.1*	400	*27.6*
200°	*93.3*	165	*11.4*	370	*25.5*
250°	*121.1*	150	*10.3*	340	*23.4*
300°	*148.9*	140	*9.7*	310	*21.4*
350°	*176.7*	125	*8.6*	300	*20.7*
400°	*204.4*	–	–	250	*17.2*

Standards and Specifications

	Dimensions	Material	Galvanizing*	Thread	Pressure Rating
CAST IRON THREADED FITTINGS					
Class 125	ASME B16.4	ASTM A-126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.4
Class 250	ASME B16.4	ASTM A-126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.4
CAST IRON PLUGS AND BUSHINGS					
	ASME B16.14	ASTM A- 126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.14

* ASTM B 633. Type I, SC 4, may be supplied as alternate zinc coating per applicable ASME B16 product standard.

General Assembly of Threaded Fittings

1) Inspect both male and female components prior to assembly.
   - Threads should be free from mechanical damage, dirt, chips and excess cutting oil.
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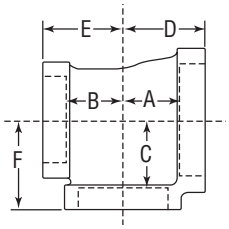
   - For 2 1/2" through 4" sizes, wrench tight makeup is considered two full turns past handtight. Handtight engagement for 2 1/2" through 4" thread varies from 5 1/2 turns to 6 3/4 turns.

Class 125 (Standard)

FIGURE 359
Tee Reducing



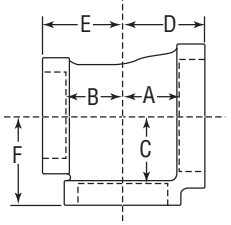
Size						A		B		C		D		E		F		Unit Weight Black	
NPS	DN	NPS	DN	NPS	DN	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kg
1/2	15	1/2	15	1/4	8	1 1/16	17	11/16	17	13/16	22	1 1/8	29	1 1/8	29	1 1/8	29	0.57	0.26
				3/8	10	1 1/16	17	11/16	17	3/4	19	1 1/8	29	1 1/8	29	1 1/8	29	0.57	0.26
				3/4	20	1 3/16	22	13/16	22	11/16	17	1 1/4	32	1 1/4	32	13/16	22	0.68	0.31
				1	25	1	25	1	25	13/16	22	1 7/16	37	1 7/16	37	1 3/8	35	1.00	0.45
3/4	20	1/2	15	1/2	15	1 1/16	17	11/16	17	13/16	22	13/16	22	1 1/8	29	1 1/4	32	0.64	0.29
				3/4	20	1 3/16	22	13/16	22	13/16	22	15/16	24	1 1/4	32	15/16	24	0.75	0.34
		3/4	20	1/4	8	9/16	14	9/16	14	7/8	22	11/16	17	11/16	17	13/16	22	0.62	0.28
				3/8	10	1 1/16	17	11/16	17	15/16	24	13/16	22	13/16	22	1 1/4	32	0.75	0.34
				1/2	15	1 1/16	17	11/16	17	13/16	22	13/16	22	13/16	22	1 1/4	32	0.76	0.34
				1	25	1 5/16	24	15/16	24	13/16	22	1 7/16	37	1 7/16	37	1 3/8	35	0.99	0.45
1	25	1/4	8	1	25	1 5/16	24	15/16	24	15/16	24	1 1/2	38	1 1/4	32	1 1/2	38	1.08	0.49
		1/2	15	1/2	15	1 1/16	17	3/4	19	15/16	24	1 1/4	32	13/16	22	1 3/8	35	0.90	0.41
				3/4	20	1 3/16	22	13/16	22	15/16	24	1 3/8	35	1 1/4	32	1 7/16	37	0.91	0.41
				1	25	1 5/16	24	15/16	24	15/16	24	1 1/2	38	1 3/8	35	1 1/2	38	1.08	0.49
		3/4	20	1/2	15	1 1/16	17	11/16	17	15/16	24	1 1/4	32	13/16	22	1 3/8	35	0.89	0.40
				3/4	20	1 3/16	22	13/16	22	15/16	24	1 3/8	35	15/16	24	1 7/16	37	1.00	0.45
				1	25	1 5/16	24	15/16	24	15/16	24	1 1/2	38	1 7/16	37	1 1/2	38	1.13	0.51
		1	25	1/4	8	1 1/16	17	11/16	17	1 1/8	29	1 1/8	29	1 1/4	32	1 3/8	35	1.01	0.46
				1/2	15	1 1/16	17	11/16	17	15/16	24	1 1/4	32	1 1/4	32	1 3/8	35	1.01	0.46
				3/4	20	1 3/16	22	13/16	22	15/16	24	1 3/8	35	1 3/8	35	1 7/16	37	1.11	0.50
				1 1/4	32	1 1/8	29	1 1/8	29	15/16	24	1 11/16	43	1 11/16	43	1 9/16	40	1.49	0.68
				1 1/2	40	1 1/4	32	1 1/4	32	1	25	1 13/16	47	1 13/16	47	1 5/8	41	1.84	0.83
				2	50	1 7/16	37	1 7/16	37	1	25	2	50	2	50	1 3/4	44	2.70	1.22

Note: See page 6 for pressure-temperature ratings.

PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ **Approved**
Address:	☐ **Approved as noted**
Contractor:	☐ **Not approved**
Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

Class 125 (Standard)

FIGURE 359
Tee Reducing

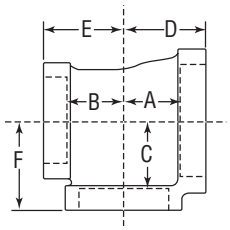


Size						A		B		C		D		E		F		Unit Weight Black	
NPS	DN	NPS	DN	NPS	DN	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kg
1¼	32	½	15	½	15	13/16	22	13/16	22	1⅛	29	1 7/16	37	15/16	24	1⅝	41	1.00	0.45
				1	25	1 5/16	24	15/16	24	1⅛	29	1 9/16	40	1⅜	35	1 11/16	43	1.38	0.63
				1¼	32	1⅛	29	1⅛	29	1⅛	29	1¾	44	1 9/16	40	1¾	44	1.64	0.74
		¾	20	¾	20	13/16	22	13/16	22	1⅛	29	1 7/16	37	15/16	24	1⅝	41	1.27	0.58
				1	25	1 5/16	24	15/16	24	1⅛	29	1 9/16	40	1 7/16	37	1 11/16	43	1.43	0.65
				1¼	32	1⅛	29	1⅛	29	1⅛	29	1¾	44	1⅝	41	1¾	44	1.73	0.78
		1	25	½	15	1 1/16	17	11/16	17	1⅛	29	15/16	24	1¼	32	1 9/16	40	1.27	0.58
				¾	20	1 3/16	22	13/16	22	1⅛	29	1 7/16	37	1⅜	35	1⅝	41	1.36	0.62
				1	25	1 5/16	24	15/16	24	1⅛	29	1 9/16	40	1 9/16	40	1 11/16	43	1.53	0.69
				1¼	32	1⅛	29	1⅛	29	1⅛	29	1¾	44	1 11/16	43	1¾	44	1.79	0.81
				1½	40	1¼	32	1¼	32	13/16	22	1 7/8	48	1 13/16	47	1 13/16	47	2.07	0.94
				2	50	1 7/16	37	1 7/16	37	13/16	22	2 1/16	52	2	50	1 7/8	48	2.66	1.21
		1¼	32	½	15	1 1/16	17	11/16	17	1⅛	29	15/16	24	15/16	24	1 9/16	40	1.47	0.67
				¾	20	1 3/16	22	13/16	22	1⅛	29	1 7/16	37	1 7/16	37	1⅝	41	1.57	0.71
				1	25	1 5/16	24	15/16	24	1⅛	29	1 9/16	40	1 9/16	40	1 11/16	43	1.73	0.78
				1½	40	1¼	32	1¼	32	13/16	22	1 7/8	48	1 7/8	48	1 13/16	47	2.29	1.04
				2	50	1 7/16	37	1 7/16	37	13/16	22	2 1/16	52	2 1/16	52	1 7/8	48	2.81	1.27
1½	40	½	15	1¼	32	13/16	22	1⅛	29	1¼	32	1 13/16	47	1 9/16	40	1 7/8	48	1.93	0.88
				1½	40	15/16	24	1¼	32	15/16	24	1 15/16	49	1 11/16	43	1 15/16	49	2.14	0.97
		¾	20	1½	40	15/16	24	1¼	32	15/16	24	1 15/16	49	1¾	44	1 15/16	49	2.18	0.99
		1	25	½	15	13/16	22	¾	19	1¼	32	1 7/16	37	15/16	24	1 11/16	43	1.75	0.79
				¾	20	⅞	22	13/16	22	1¼	32	1½	38	1⅜	35	1¾	44	1.70	0.77
				1	25	1	25	15/16	24	1¼	32	1⅝	41	1½	38	1 13/16	47	1.72	0.78
				1¼	32	13/16	22	1⅛	29	1¼	32	1 13/16	47	1 11/16	43	1 7/8	48	2.08	0.94
				1½	40	15/16	24	1¼	32	15/16	24	1 15/16	49	1 13/16	47	1 15/16	49	2.29	1.04
				2	50	1½	38	1 7/16	37	15/16	24	2⅛	54	2	50	2	51	2.91	1.32
		1¼	32	½	15	13/16	22	11/16	17	1¼	32	1 7/16	37	15/16	24	1 11/16	43	1.67	0.76
				¾	20	⅞	22	13/16	22	1¼	32	1½	38	1 7/16	37	1¾	44	1.79	0.81
				1	25	1	25	15/16	24	1¼	32	1⅝	41	1 9/16	40	1 13/16	47	1.97	0.89
				1¼	32	13/16	22	1⅛	29	1¼	32	1 13/16	47	1¾	44	⅞	48	2.28	1.03
				1½	40	15/16	24	1¼	32	15/16	24	1 15/16	49	1⅞	48	1 15/16	49	2.50	1.13
				2	50	1½	38	1 7/16	37	15/16	24	2⅛	54	2 1/16	52	2	51	3.07	1.39
		1½	40	½	15	13/16	22	13/16	22	1¼	32	1 7/16	37	1 7/16	37	1 11/16	43	1.84	0.83
				¾	20	⅞	22	⅞	22	1¼	32	1½	38	1½	38	1¾	44	1.95	0.88
				1	25	1	25	1	25	1¼	32	1⅝	41	1⅝	41	1 13/16	47	2.13	0.97
				1¼	32	13/16	22	13/16	22	1¼	32	1 13/16	47	1 13/16	47	1⅞	48	2.44	1.11
				2	50	1½	38	1½	38	15/16	24	2⅛	54	2⅛	54	2	51	3.23	1.46
				2½	65	1 13/16	47	1 13/16	47	15/16	24	2 7/16	62	2 7/16	62	2 3/16	56	4.15	1.88

Note: See page 6 for pressure-temperature ratings.

Class 125 (Standard)

FIGURE 359
Tee Reducing

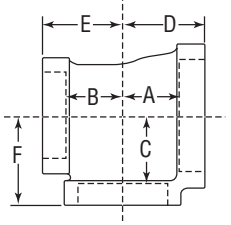


Size						A		B		C		D		E		F		Unit Weight Black	
NPS	DN	NPS	DN	NPS	DN	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kg
2	50	1/2	15	1 1/2	40	15/16	24	1 3/8	35	1 1/2	38	2	51	1 13/16	47	2 1/8	54	2.95	1.34
				2	50	1 9/16	40	1 7/16	37	1 9/16	40	2 1/4	57	1 7/8	48	2 1/4	57	3.30	1.50
		3/4	20	1 1/4	32	1 3/16	22	1 1/8	29	1 7/16	37	1 7/8	48	1 3/4	44	2 1/16	52	2.50	1.13
				1 1/2	40	1 5/16	24	15/16	24	1 1/2	38	2	51	1 13/16	47	2 1/8	54	3.40	1.54
				2	50	1 9/16	40	1 7/16	37	1 9/16	40	2 1/4	57	1 15/16	49	2 1/4	57	3.31	1.50
		1	25	1	25	11/16	17	11/16	17	1 7/16	37	1 3/4	44	1 5/8	41	2	51	2.70	1.22
				1 1/4	32	13/16	22	1 1/8	29	1 1/2	38	1 7/8	48	1 3/4	44	2 1/16	52	2.94	1.33
				1 1/2	40	15/16	24	1 1/4	32	1 1/2	38	2	51	1 13/16	47	2 1/8	54	2.85	1.29
				2	50	1 9/16	40	1 7/16	37	1 9/16	40	2 1/4	57	2	51	2 1/4	57	3.46	1.57
				2 1/2	65	1 7/8	48	1 13/16	47	1 9/16	40	2 9/16	65	2 3/8	60	2 7/16	62	4.88	2.21
		1 1/4	32	1/2	15	11/16	17	1	25	1 7/16	37	1 3/4	44	1 5/8	41	2	51	2.48	1.12
				3/4	20	7/8	22	7/8	22	1 7/16	37	1 9/16	40	1 1/2	38	1 15/16	49	2.50	1.13
				1	25	11/16	17	1	25	1 7/16	37	1 3/4	44	1 5/8	41	2	51	2.73	1.24
				1 1/4	32	13/16	22	1 1/8	29	1 7/16	37	1 7/8	48	1 3/4	44	2 1/16	52	2.90	1.32
				1 1/2	40	15/16	24	1 1/4	32	1 1/2	38	2	51	1 7/8	48	2 1/8	54	3.13	1.42
				2	50	1 9/16	40	1 7/16	37	1 9/16	40	2 1/4	57	2 1/16	52	2 1/4	57	3.71	1.68
				2 1/2	65	1 7/8	48	1 3/4	44	1 9/16	40	2 9/16	65	2 3/8	60	2 7/16	62	4.54	2.06
		1 1/2	40	1/2	15	13/16	22	13/16	22	1 7/16	37	1 1/2	38	1 7/16	37	1 7/8	48	2.34	1.06
				3/4	20	7/8	22	7/8	22	1 7/16	37	1 9/16	40	1 1/2	38	1 15/16	49	2.46	1.12
				1	25	11/16	17	1	25	1 7/16	37	1 3/4	44	1 5/8	41	2	51	2.66	1.21
				1 1/4	32	13/16	22	13/16	22	1 7/16	37	1 7/8	48	1 13/16	47	2 1/16	52	2.98	1.35
				1 1/2	40	15/16	24	15/16	24	1 1/2	38	2	51	1 15/16	49	2 1/8	54	3.24	1.47
				2	50	1 9/16	40	1 1/2	38	1 9/16	40	2 1/4	57	2 1/8	54	2 1/4	57	3.70	1.68
				2 1/2	65	1 7/8	48	1 15/16	49	1 9/16	40	2 9/16	65	2 9/16	65	2 7/16	62	5.46	2.48
		2	50	1/2	15	13/16	22	13/16	22	1 7/16	37	1 1/2	38	1 1/2	38	1 7/8	48	2.74	1.24
				3/4	20	7/8	22	7/8	22	1 7/16	37	1 9/16	40	1 9/16	40	1 15/16	49	2.86	1.30
				1	25	11/16	17	11/16	17	1 7/16	37	1 3/4	44	1 3/4	44	2	51	3.05	1.38
				1 1/4	32	13/16	22	13/16	22	1 7/16	37	1 7/8	48	1 7/8	48	2 1/16	52	3.38	1.53
				1 1/2	40	15/16	24	15/16	24	1 1/2	38	2	51	2	51	2 1/8	54	3.59	1.63
				2 1/2	65	1 7/8	48	1 7/8	48	1 9/16	40	2 9/16	65	2 9/16	65	2 7/16	62	5.17	2.34
				3	100	3	76	3	76	2 7/16	62	3 11/16	94	3 11/16	94	3 1/2	89	7.87	3.57

Note: See page 6 for pressure-temperature ratings.

Class 125 (Standard)

FIGURE 359
Tee Reducing

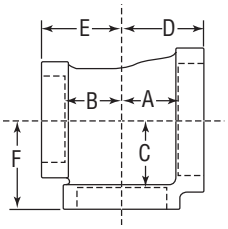


Size						A		B		C		D		E		F		Unit Weight Black	
NPS	DN	NPS	DN	NPS	DN	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kg
2 1/2	65	1/2	15	2 1/2	65	1 13/16	47	1 13/16	47	1 13/16	47	2 11/16	68	2 1/4	57	2 11/16	68	5.20	2.36
		3/4	20	2 1/2	65	1 13/16	47	1 3/4	44	1 13/16	47	2 11/16	68	2 1/4	57	2 11/16	68	5.10	2.31
		1	25	2	50	1 9/16	40	1 9/16	40	1 7/8	48	2 7/16	62	2 1/8	54	2 9/16	65	5.03	2.28
				2 1/2	65	1 13/16	47	1 3/4	44	1 13/16	47	2 11/16	68	2 5/16	59	2 11/16	68	5.36	2.43
		1 1/4	32	2	50	1 9/16	40	1 1/2	38	1 7/8	48	2 7/16	62	2 1/8	54	2 9/16	65	4.96	2.25
				2 1/2	65	1 13/16	47	1 3/4	44	1 13/16	47	2 11/16	68	2 3/8	60	2 11/16	68	5.40	2.45
		1 1/2	40	1 1/2	40	15/16	24	15/16	22	1 13/16	47	2 3/16	56	1 15/16	49	2 7/16	62	4.23	1.92
				2	50	1 9/16	40	1 1/2	38	1 7/8	48	2 7/16	62	2 1/8	54	2 9/16	65	4.85	2.20
				2 1/2	65	1 13/16	47	1 13/16	47	1 13/16	47	2 11/16	68	2 7/16	62	2 11/16	68	4.85	2.20
		2	50	1/2	15	3/4	19	13/16	22	1 3/4	44	1 11/16	43	1 1/2	38	2 3/16	56	5.82	2.64
				3/4	20	7/8	22	7/8	22	1 3/4	44	1 3/4	44	1 9/16	40	2 1/4	57	3.62	1.64
				1	25	1	25	11/16	17	1 3/4	44	1 15/16	49	1 3/4	44	2 5/16	59	3.92	1.78
				1 1/4	32	13/16	22	13/16	22	1 3/4	44	2 1/16	52	1 7/8	48	2 3/8	60	4.26	1.93
				1 1/2	40	15/16	24	15/16	24	1 13/16	47	2 3/16	56	2	51	2 7/16	62	4.42	2.00
				2	50	1 9/16	40	1 9/16	40	1 7/8	48	2 7/16	62	2 1/4	57	2 9/16	65	5.17	2.34
				2 1/2	65	1 13/16	47	1 7/8	48	1 13/16	47	2 11/16	68	2 9/16	65	2 11/16	68	6.00	2.72
				3	80	2 1/16	52	2 1/8	54	1 7/8	48	3	80	2 7/8	73	2 13/16	73	7.35	3.33
		2 1/2	65	1/2	15	3/4	19	3/4	19	1 3/4	44	1 11/16	43	1 11/16	43	2 3/16	56	4.00	1.81
				3/4	20	7/8	22	7/8	22	1 3/4	44	1 3/4	44	1 3/4	44	2 1/4	57	4.29	1.95
				1	25	1	25	1	25	1 3/4	44	1 15/16	49	1 15/16	49	2 5/16	59	4.48	2.03
				1 1/4	32	13/16	22	13/16	22	1 3/4	44	2 1/16	52	2 1/16	52	2 3/8	60	4.83	2.19
				1 1/2	40	15/16	24	15/16	24	1 13/16	47	2 3/16	56	2 3/16	56	2 7/16	62	5.14	2.33
				2	50	1 9/16	40	1 9/16	40	1 7/8	48	2 7/16	62	2 7/16	62	2 9/16	65	5.88	2.67
				3	80	2 1/16	52	2 1/16	52	1 7/8	48	3	80	3	80	2 13/16	73	8.09	3.67
				4	100	2 3/4	70	2 13/16	73	2 7/16	62	3 11/16	94	3 11/16	94	3 1/2	89	14.03	6.36
3	80	3/4	20	3	80	2 1/8	54	2 1/8	54	2 1/8	54	3 1/8	79	2 11/16	68	3 1/8	79	8.25	3.74
		1	25	3	80	2 1/8	54	2 1/8	54	2 1/8	54	3 1/8	79	2 11/16	68	3 1/8	79	8.30	3.76
		1 1/4	32	3	80	2 1/8	54	2 1/8	54	2 1/8	54	3 1/8	79	2 13/16	73	3 1/8	79	8.46	3.84
		1 1/2	40	3	80	2 1/8	54	2 3/16	56	2 1/8	54	3 1/8	79	2 13/16	73	3 1/8	79	8.13	3.69
		2	50	1 1/2	40	1 3/8	35	1 1/2	38	2 3/16	56	2 5/16	59	2 3/16	56	2 13/16	73	6.83	3.10
				2	50	1 9/16	40	1 9/16	40	2 3/16	56	2 9/16	65	2 1/4	57	2 15/16	75	7.29	3.31
				2 1/2	65	1 7/8	48	1 15/16	49	2 1/8	54	2 13/16	73	2 9/16	65	3 1/16	78	7.10	3.22
				3	80	2 1/8	54	2 3/16	56	2 1/8	54	3 1/8	79	2 15/16	75	3 1/8	79	8.79	3.99
		2 1/2	65	1	25	1	25	15/16	24	2 1/8	54	2 1/16	52	1 15/16	49	2 11/16	68	5.51	2.50
				1 1/4	32	1 1/4	32	13/16	22	2 1/8	54	2 3/16	56	2 1/16	52	2 3/4	70	5.92	2.68
				1 1/2	40	1 3/8	35	15/16	24	2 3/16	56	2 5/16	59	2 3/16	56	2 13/16	73	6.23	2.83
				2	50	1 9/16	40	1 1/2	38	2 3/16	56	2 9/16	65	2 7/16	62	2 15/16	75	6.81	3.09
				2 1/2	65	1 7/8	48	1 13/16	47	2 1/8	54	2 13/16	73	2 11/16	68	3 1/16	78	7.66	3.47
				3	80	2 1/8	54	2 1/8	54	2 1/8	54	3 1/8	79	3 1/16	78	3 1/8	79	9.13	4.14
		3	80	1/2	15	15/16	24	15/16	24	2 3/16	56	1 7/8	48	1 7/8	48	2 5/8	67	6.08	2.76
				3/4	20	15/16	24	15/16	24	2 1/8	54	1 7/8	48	1 7/8	48	2 5/8	67	6.06	2.75
				1	25	1	25	1	25	2 1/8	54	2 1/16	52	2 1/16	52	2 11/16	68	6.27	2.84
				1 1/4	32	1 1/4	32	1 1/4	32	2 1/8	54	2 3/16	56	2 3/16	56	2 3/4	70	6.75	3.06
				1 1/2	40	1 3/8	35	1 3/8	35	2 3/16	56	2 5/16	59	2 5/16	59	2 15/16	75	7.10	3.22
				2	50	1 9/16	40	1 9/16	40	2 3/16	56	2 9/16	65	2 9/16	65	2 7/8	73	7.75	3.51
				2 1/2	65	1 7/8	48	1 7/8	48	2 1/8	54	2 13/16	73	2 13/16	73	3 1/16	78	8.92	4.05
				4	100	2 11/16	68	2 11/16	68	2 7/16	62	3 11/16	94	3 11/16	94	3 1/2	89	12.80	5.80

Note: See page 6 for pressure-temperature ratings.

Class 125 (Standard)

FIGURE 359
Tee Reducing



Size						A		B		C		D		E		F		Unit Weight Black	
NPS	DN	NPS	DN	NPS	DN	in	mm	in	mm	in	mm	in	mm	in	mm	in	mm	lbs	kg
3 1/2	90	3 1/2	90	1 1/2	40	1 3/8	35	1 3/8	35	2 7/16	62	2 3/8	60	2 3/8	60	3 1/16	78	8.87	4.02
				2	50	1 5/8	41	1 5/8	41	2 7/16	62	2 5/8	67	2 5/8	67	3 3/16	81	9.94	4.51
4	100	1	25	4	100	2 3/4	70	2 15/16	75	2 3/4	70	3 3/4	95	3 1/2	89	3 3/4	95	13.52	6.13
		1 1/2	40	4	100	2 3/4	70	2 7/8	73	2 3/4	70	3 3/4	95	3 1/2	89	3 3/4	95	13.47	6.11
		2	50	2	50	1 11/16	43	1 7/8	48	2 3/4	70	2 11/16	68	2 9/16	65	3 1/2	89	11.34	5.14
				4	100	2 3/4	70	2 3/4	70	2 3/4	70	3 3/4	95	3 1/2	89	3 3/4	95	13.89	6.30
		2 1/2	65	2 1/2	65	1 7/8	48	1 13/16	47	2 5/8	67	2 15/16	75	2 13/16	73	3 9/16	90	11.78	5.34
				4	100	2 3/4	70	2 3/4	70	2 3/4	70	3 3/4	95	3 5/8	92	3 3/4	95	15.75	7.14
		3	80	2 1/2	65	1 7/8	48	1 7/8	48	2 5/8	67	2 15/16	75	2 13/16	73	3 9/16	90	11.25	5.10
				3	80	2 1/4	57	2 1/8	54	2 11/16	68	3 1/4	83	3 1/8	79	3 5/8	92	12.50	5.67
				4	100	2 3/4	70	2 11/16	68	2 3/4	70	3 3/4	95	3 5/8	92	3 3/4	95	15.04	6.82
		4	100	1	25	13/16	22	13/16	22	2 3/4	70	2 5/16	59	2 5/16	59	3 5/16	84	10.40	4.72
				1 1/4	32	15/16	24	15/16	24	2 5/8	67	2 5/16	59	2 5/16	59	3 5/16	84	10.38	4.71
				1 1/2	40	1 7/16	37	1 7/16	37	2 11/16	68	2 7/16	62	2 7/16	62	3 5/16	84	10.75	4.88
				2	50	1 11/16	43	1 11/16	43	2 3/4	70	2 11/16	68	2 11/16	68	3 1/2	89	11.63	5.27
				2 1/2	65	2	51	2	51	2 5/8	67	2 15/16	75	2 15/16	75	3 9/16	90	12.85	5.83
				3	80	2 1/4	57	2 1/4	57	2 11/16	68	3 1/4	83	3 1/4	83	3 5/8	92	14.12	6.40
				5	125	3 3/8	86	3 3/8	86	2 13/16	73	4 3/8	111	4 3/8	111	4	102	20.88	9.47
				6	150	3 7/8	98	3 7/8	98	2 7/8	73	4 15/16	125	4 15/16	125	4 1/16	103	26.36	11.95
5	125	5	125	2	50	1 3/4	44	1 3/4	44	3 7/16	87	2 15/16	75	2 15/16	75	4 1/8	105	17.43	7.90
				3	80	2 5/16	59	2 5/16	59	3 1/4	83	3 1/2	89	3 1/2	89	4 1/4	108	20.00	9.07
				4	100	2 13/16	71	2 13/16	71	3 3/8	86	4	102	4	102	4 3/8	111	23.83	10.81
6	150	4		4	100	2 7/8	73	2 13/16	71	3 7/8	98	4 1/16	103	4	102	4 15/16	125	30.00	13.61
		6	150	2 1/2	65	2	51	2	51	3 13/16	97	3 1/4	83	3 1/4	83	4 3/4	121	25.67	11.64
				3	80	2 3/8	60	2 3/8	60	3 13/16	97	3 9/16	90	3 9/16	90	4 13/16	122	27.46	12.45
				4	100	2 7/8	73	2 7/8	73	3 7/8	98	4 1/16	103	4 1/16	103	4 15/16	125	32.44	14.71
				5	125	3 3/8	86	3 3/8	86	3 13/16	97	4 5/8	117	4 5/8	117	5	127	37.00	16.78

Note: See page 6 for pressure-temperature ratings.

CAST IRON THREADED FITTINGS

Anvil standard and extra heavy cast iron threaded fittings are manufactured in accordance with ASME B16.4. Plugs and bushings are manufactured in accordance with ASME B16.14.

NOTE: Figure 367 Concentric Reducers do not meet the overall length requirement of ASME B16.4. All other dimensions are in compliance.

c UL us

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For Listings/Approval Details and Limitations, visit our website at www.anvilintl.com or contact an Anvil Sales Representative.

Cast Iron Threaded Fittings
Pressure - Temperature Ratings

Temperature		Pressure			
		Class 125		Class 250	
(°F)	*(°C)*	psi	*bar*	psi	*bar*
-20° to 150°	*-28.9 to 65.6*	175	*12.1*	400	*27.6*
200°	*93.3*	165	*11.4*	370	*25.5*
250°	*121.1*	150	*10.3*	340	*23.4*
300°	*148.9*	140	*9.7*	310	*21.4*
350°	*176.7*	125	*8.6*	300	*20.7*
400°	*204.4*	–	–	250	*17.2*

Standards and Specifications

	Dimensions	Material	Galvanizing*	Thread	Pressure Rating
CAST IRON THREADED FITTINGS					
Class 125	ASME B16.4	ASTM A-126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.4
Class 250	ASME B16.4	ASTM A-126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.4
CAST IRON PLUGS AND BUSHINGS					
	ASME B16.14	ASTM A- 126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.14

* ASTM B 633. Type I, SC 4, may be supplied as alternate zinc coating per applicable ASME B16 product standard.

General Assembly of Threaded Fittings

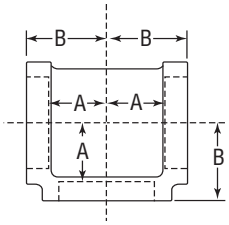
1) Inspect both male and female components prior to assembly.
   - Threads should be free from mechanical damage, dirt, chips and excess cutting oil.
   - Clean or replace components as necessary.

2) Application of thread sealant
   - Use a thread sealant that is fast drying, sets-up to a semi hard condition and is vibration resistant. Alternately, an anaerobic sealant may be utilized.
   - Thoroughly mix the thread sealant prior to application.
   - Apply a thick even coat to the male threads only. Best application is achieved with a brush stiff enough to force sealant down to the root of the threads.

3) Joint Makeup
   - For sizes up to and including 2" pipe, wrench tight makeup is considered three full turns past handtight. Handtight engagement for 1/2" through 2" thread varies from 4 1/2 turns to 5 turns.
   - For 2 1/2" through 4" sizes, wrench tight makeup is considered two full turns past handtight. Handtight engagement for 2 1/2" through 4" thread varies from 5 1/2 turns to 6 3/4 turns.

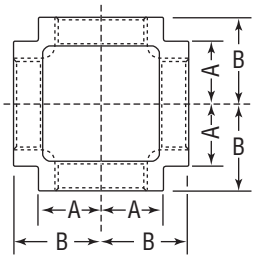
Class 125 (Standard)

FIGURE 358
Tee



Size		A		B		Unit Weight Black	
NPS	*DN*	in	*mm*	in	*mm*	lbs	*kg*
1/4	*8*	1/2	*13*	13/16	*22*	0.22	*0.10*
3/8	*10*	5/8	*16*	1	*25*	0.35	*0.16*
1/2	*15*	11/16	*17*	1 1/8	*29*	0.56	*0.25*
3/4	*20*	13/16	*22*	1 5/16	*33*	0.84	*0.38*
1	*25*	15/16	*24*	1 1/2	*38*	1.25	*0.57*
1 1/4	*32*	1 1/8	*29*	1 3/4	*44*	2.03	*0.92*
1 1/2	*40*	1 5/16	*33*	1 15/16	*49*	2.70	*1.22*
2	*50*	1 9/16	*40*	2 1/4	*57*	4.23	*1.92*
2 1/2	*65*	1 13/16	*47*	2 11/16	*68*	6.67	*3.02*
3	*80*	2 3/16	*56*	3 1/8	*79*	10.00	*4.54*
3 1/2	*90*	2 7/16	*62*	3 7/16	*87*	13.29	*6.03*
4	*100*	2 11/16	*68*	3 3/4	*95*	16.33	*7.41*
5	*125*	3 5/16	*84*	4 1/2	*114*	27.33	*12.39*
6	*150*	3 7/8	*98*	5 1/8	*130*	40.85	*18.53*
8	*200*	5 3/16	*132*	6 9/16	*167*	79.00	*35.83*

FIGURE 360
Cross



Size		A		B		Unit Weight Black	
NPS	*DN*	in	*mm*	in	*mm*	lbs	*kg*
1/2	*15*	9/16	*14*	13/16	*22*	2.80	*1.27*
3/4	*20*	13/16	*22*	1 5/16	*33*	1.03	*0.47*
1	*25*	15/16	*24*	1 1/2	*38*	1.59	*0.72*
1 1/4	*32*	1 1/8	*29*	1 3/4	*44*	2.42	*1.10*
1 1/2	*40*	1 5/16	*33*	1 15/16	*49*	3.21	*1.46*
2	*50*	1 9/16	*40*	2 1/4	*57*	5.28	*2.39*
2 1/2	*65*	1 13/16	*47*	2 11/16	*68*	8.07	*3.66*
3	*80*	2 3/16	*56*	3 1/8	*79*	11.84	*5.37*
4	*100*	2 3/4	*70*	3 13/16	*98*	19.63	*8.90*

Note: See following page for pressure-temperature ratings.

PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ **Approved**
Address:	☐ **Approved as noted**
Contractor:	☐ **Not approved**
Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

CAST IRON THREADED FITTINGS

Anvil standard and extra heavy cast iron threaded fittings are manufactured in accordance with ASME B16.4. Plugs and bushings are manufactured in accordance with ASME B16.14.

NOTE: Figure 367 Concentric Reducers do not meet the overall length requirement of ASME B16.4. All other dimensions are in compliance.

c UL us

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For Listings/Approval Details and Limitations, visit our website at www.anvilintl.com or contact an Anvil Sales Representative.

Cast Iron Threaded Fittings
Pressure - Temperature Ratings

Temperature		Pressure			
		Class 125		Class 250	
(°F)	*(°C)*	psi	*bar*	psi	*bar*
-20° to 150°	*-28.9 to 65.6*	175	*12.1*	400	*27.6*
200°	*93.3*	165	*11.4*	370	*25.5*
250°	*121.1*	150	*10.3*	340	*23.4*
300°	*148.9*	140	*9.7*	310	*21.4*
350°	*176.7*	125	*8.6*	300	*20.7*
400°	*204.4*	–	–	250	*17.2*

Standards and Specifications

	Dimensions	Material	Galvanizing*	Thread	Pressure Rating
CAST IRON THREADED FITTINGS					
Class 125	ASME B16.4	ASTM A-126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.4
Class 250	ASME B16.4	ASTM A-126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.4
CAST IRON PLUGS AND BUSHINGS					
	ASME B16.14	ASTM A- 126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.14

* ASTM B 633. Type I, SC 4, may be supplied as alternate zinc coating per applicable ASME B16 product standard.

General Assembly of Threaded Fittings

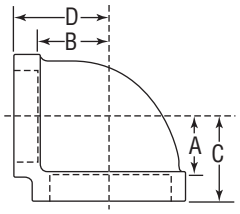
1) Inspect both male and female components prior to assembly.
   - Threads should be free from mechanical damage, dirt, chips and excess cutting oil.
   - Clean or replace components as necessary.

2) Application of thread sealant
   - Use a thread sealant that is fast drying, sets-up to a semi hard condition and is vibration resistant. Alternately, an anaerobic sealant may be utilized.
   - Thoroughly mix the thread sealant prior to application.
   - Apply a thick even coat to the male threads only. Best application is achieved with a brush stiff enough to force sealant down to the root of the threads.

3) Joint Makeup
   - For sizes up to and including 2" pipe, wrench tight makeup is considered three full turns past handtight. Handtight engagement for 1/2" through 2" thread varies from 4 1/2 turns to 5 turns.
   - For 2 1/2" through 4" sizes, wrench tight makeup is considered two full turns past handtight. Handtight engagement for 2 1/2" through 4" thread varies from 5 1/2 turns to 6 3/4 turns.

Class 125 (Standard)

FIGURE 352
90° Elbow, Reducing



Size				A		B		C		D		Unit Weight Black	
NPS	*DN*	NPS	*DN*	in	*mm*	in	*mm*	in	*mm*	in	*mm*	lbs	*kg*
1/2	*15*	1/4	*8*	5/8	*16*	3/4	*19*	1 1/16	*27*	1 1/16	*27*	0.40	*0.18*
		3/8	*10*	5/8	*16*	11/16	*17*	1 1/16	*27*	1 1/16	*27*	0.34	*0.15*
3/4	*20*	1/2	*15*	11/16	*17*	13/16	*22*	1 1/4	*32*	1 1/4	*32*	0.51	*0.23*
1	*25*	1/2	*15*	11/16	*17*	15/16	*24*	1 3/8	*35*	1 3/8	*35*	0.67	*0.30*
		3/4	*20*	13/16	*22*	15/16	*24*	1 7/16	*37*	1 7/16	*37*	0.76	*0.34*
1 1/4	*32*	1/2	*15*	11/16	*17*	1 1/16	*27*	1 1/2	*38*	1 1/2	*38*	1.07	*0.49*
		3/4	*20*	13/16	*22*	1 1/8	*29*	1 5/8	*41*	1 5/8	*41*	1.02	*0.46*
		1	*25*	15/16	*24*	1 1/8	*29*	1 11/16	*43*	1 11/16	*43*	1.21	*0.55*
1 1/2	*40*	1/2	*15*	3/4	*19*	1 1/4	*32*	1 5/8	*41*	1 5/8	*41*	1.53	*0.69*
		3/4	*20*	7/8	*22*	1 5/16	*33*	1 13/16	*47*	1 13/16	*47*	1.55	*0.70*
		1	*25*	1	*25*	1 1/4	*32*	1 13/16	*47*	1 13/16	*47*	1.44	*0.65*
		1 1/4	*32*	1 3/16	*30*	1 1/4	*32*	1 7/8	*48*	1 7/8	*48*	1.74	*0.79*
2	*50*	1/2	*15*	1 3/16	*30*	1 7/16	*37*	1 3/8	*35*	1 3/8	*35*	2.22	*1.01*
		3/4	*20*	1 5/16	*33*	1 1/2	*38*	2	*51*	2	*51*	2.20	*1.00*
		1	*25*	1 1/16	*27*	1 7/16	*37*	2	*51*	2	*51*	2.08	*0.94*
		1 1/4	*32*	1 3/16	*30*	1 7/16	*37*	2 1/16	*52*	2 1/16	*52*	2.33	*1.06*
		1 1/2	*40*	1 5/16	*33*	1 1/2	*38*	2 1/8	*54*	2 1/8	*54*	2.59	*1.17*
2 1/2	*65*	1	*25*	1	*25*	1 3/4	*44*	2 5/16	*59*	2 5/16	*59*	2.93	*1.33*
		1 1/4	*32*	1 3/16	*30*	1 3/4	*44*	2 3/8	*60*	2 3/8	*60*	3.41	*1.55*
		1 1/2	*40*	1 5/16	*33*	1 13/16	*47*	2 7/16	*62*	2 7/16	*62*	3.68	*1.67*
		2	*50*	1 9/16	*40*	1 7/8	*48*	2 9/16	*65*	2 9/16	*65*	4.01	*1.82*
3	*80*	1 1/4	*32*	1 5/8	*41*	2 5/16	*59*	2 15/16	*75*	2 15/16	*75*	5.98	*2.71*
		1 1/2	*40*	1 5/8	*41*	2 5/16	*59*	2 15/16	*75*	2 15/16	*75*	5.65	*2.56*
		2	*50*	1 5/8	*41*	2 1/4	*57*	2 15/16	*75*	2 15/16	*75*	5.25	*2.38*
		2 1/2	*65*	1 7/8	*48*	2 3/16	*56*	3 1/16	*78*	3 1/16	*78*	6.44	*2.92*
4	*100*	2	*50*	2 3/16	*56*	2 15/16	*75*	3 5/8	*92*	3 5/8	*92*	11.89	*5.39*
		2 1/2	*65*	2 3/16	*56*	2 3/4	*70*	3 5/8	*92*	3 5/8	*92*	11.27	*5.11*
		3	*80*	2 3/16	*56*	2 11/16	*68*	3 5/8	*92*	3 5/8	*92*	10.63	*4.82*
5	*125*	4	*100*	2 13/16	*73*	3 5/16	*84*	4 3/8	*111*	4 3/8	*111*	16.47	*7.47*
6	*150*	3	*80*	2 5/16	*59*	3 13/16	*98*	4 13/16	*124*	4 13/16	*124*	19.43	*8.81*
		4	*100*	2 13/16	*73*	3 7/8	*98*	4 15/16	*125*	4 15/16	*125*	23.53	*10.67*
		5	*125*	3 3/8	*86*	3 13/16	*98*	5	*127*	5	*127*	26.66	*12.09*

Note: See following page for pressure-temperature ratings.

PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ **Approved**
Address:	☐ **Approved as noted**
Contractor:	☐ **Not approved**
Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

CAST IRON THREADED FITTINGS

Anvil standard and extra heavy cast iron threaded fittings are manufactured in accordance with ASME B16.4. Plugs and bushings are manufactured in accordance with ASME B16.14.

NOTE: Figure 367 Concentric Reducers do not meet the overall length requirement of ASME B16.4. All other dimensions are in compliance.

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FM APPROVED

For Listings/Approval Details and Limitations, visit our website at www.anvilintl.com or contact an Anvil Sales Representative.

Cast Iron Threaded Fittings
Pressure - Temperature Ratings

Temperature		Pressure			
		Class 125		Class 250	
(°F)	*(°C)*	psi	*bar*	psi	*bar*
-20° to 150°	*-28.9 to 65.6*	175	*12.1*	400	*27.6*
200°	*93.3*	165	*11.4*	370	*25.5*
250°	*121.1*	150	*10.3*	340	*23.4*
300°	*148.9*	140	*9.7*	310	*21.4*
350°	*176.7*	125	*8.6*	300	*20.7*
400°	*204.4*	–	–	250	*17.2*

Standards and Specifications

	Dimensions	Material	Galvanizing*	Thread	Pressure Rating
CAST IRON THREADED FITTINGS					
Class 125	ASME B16.4	ASTM A-126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.4
Class 250	ASME B16.4	ASTM A-126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.4
CAST IRON PLUGS AND BUSHINGS					
	ASME B16.14	ASTM A- 126 (A)	ASTM A-153	ASME B1.20.1	ASME B16.14

* ASTM B 633. Type I, SC 4, may be supplied as alternate zinc coating per applicable ASME B16 product standard.

General Assembly of Threaded Fittings

1) Inspect both male and female components prior to assembly.
   - Threads should be free from mechanical damage, dirt, chips and excess cutting oil.
   - Clean or replace components as necessary.

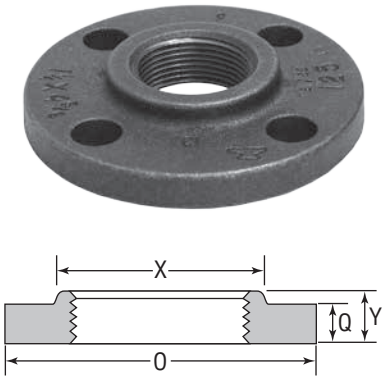
2) Application of thread sealant
   - Use a thread sealant that is fast drying, sets-up to a semi hard condition and is vibration resistant. Alternately, an anaerobic sealant may be utilized.
   - Thoroughly mix the thread sealant prior to application.
   - Apply a thick even coat to the male threads only. Best application is achieved with a brush stiff enough to force sealant down to the root of the threads.

3) Joint Makeup
   - For sizes up to and including 2" pipe, wrench tight makeup is considered three full turns past handtight. Handtight engagement for 1/2" through 2" thread varies from 4 1/2 turns to 5 turns.
   - For 2 1/2" through 4" sizes, wrench tight makeup is considered two full turns past handtight. Handtight engagement for 2 1/2" through 4" thread varies from 5 1/2 turns to 6 3/4 turns.

CAST IRON FLANGES

Class 125 (Standard)

FIGURE 1011
Companion Flange



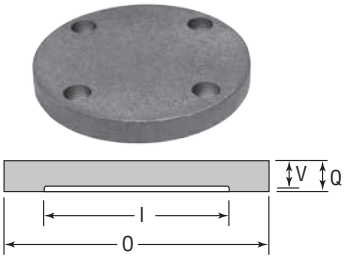
When ordering companion flanges, always give outside diameter as well as nominal pipe size.

Pipe Size		Diameter of Flange O		Min. Flange Thickness Q		Min. Diameter of Hub X		Min. Length Through Hub Y		Unit Weight			
										Black Paint		Galvanized	
NPS	*DN*	in	*mm*	in	*mm*	in	*mm*	in	*mm*	lbs	*kg*	lbs	*kg*
3/4*	*20*	3 7/8	*98*	7/16	*11*	1 3/4	*44*	5/8	*16*	1.50	*0.68*	1.50	*0.68*
1	*25*	4 1/4	*108*	7/16	*11*	1 15/16	*49*	11/16	*17*	1.75	*0.79*	1.75	*0.79*
1 1/4	*32*	4 5/8	*117*	1/2	*13*	2 5/16	*59*	13/16	*22*	2.00	*0.91*	2.00	*0.91*
1 1/2	*40*	5	*127*	9/16	*14*	2 9/16	*65*	7/8	*22*	2.25	*1.02*	2.25	*1.02*
2	*50*	6	*152*	5/8	*16*	3 1/16	*78*	1	*25*	4.00	*1.81*	4.00	*1.81*
2 1/2	*65*	7	*178*	11/16	*17*	3 9/16	*90*	1 1/8	*29*	6.00	*2.72*	6.00	*2.72*
3	*80*	7 1/2	*191*	3/4	*19*	4 1/4	*108*	1 3/16	*30*	7.63	*3.46*	7.63	*3.46*
3 1/2	*90*	8 1/2	*216*	13/16	*21*	4 13/16	*122*	1 1/4	*32*	9.00	*4.08*	–	–
4	*100*	9	*229*	15/16	*24*	5 5/16	*135*	1 5/16	*33*	11.75	*5.33*	11.75	*5.33*
5	*125*	10	*254*	15/16	*24*	6 7/16	*164*	1 7/16	*37*	14.00	*6.35*	14.00	*6.35*
6	*150*	11	*279*	1	*25*	7 9/16	*192*	1 9/16	*40*	16.50	*7.48*	16.50	*7.48*
8	*200*	13 1/2	*343*	1 1/8	*29*	9 11/16	*246*	1 3/4	*44*	26.00	*11.79*	26.00	*11.79*
10	*250*	16	*406*	1 3/16	*30*	11 15/16	*303*	1 15/16	*49*	37.75	*17.12*	37.75	*17.12*
12	*300*	19	*483*	1 1/4	*32*	14 1/16	*357*	2 3/16	*56*	50.50	*22.91*	50.50	*22.91*

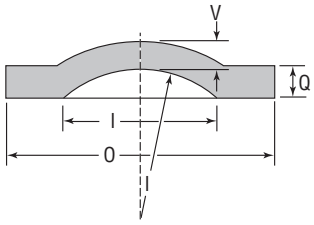
* Anvil size; not covered by ASME B16.1.

FIGURE 1018
Blind Flange

10 x 16 (NPS) and smaller



12 x 19 (NPS) and larger



Pipe Size I		Diameter of Flange O		Min. Flange Thickness Q		Wall Thickness V		Unit Weight			
								Black Paint		Galvanized	
NPS	*DN*	in	*mm*	in	*mm*	in	*mm*	lbs	*kg*	lbs	*kg*
1	*25*	4 1/4	*108*	7/16	*11*	3/8	*10*	2.00	*0.91*	2.00	*0.91*
1 1/4	*32*	4 5/8	*117*	1/2	*13*	7/16	*11*	2.25	*1.02*	2.25	*1.02*
1 1/2	*40*	5	*127*	9/16	*14*	1/2	*13*	3.75	*1.70*	–	–
2	*50*	6	*152*	5/8	*16*	9/16	*14*	4.00	*1.81*	4.00	*1.81*
2 1/2	*65*	7	*178*	11/16	*17*	5/8	*16*	6.75	*3.06*	–	–
3	*80*	7 1/2	*191*	3/4	*19*	11/16	*17*	8.00	*3.63*	8.00	*3.63*
3 1/2	*90*	8 1/2	*216*	13/16	*21*	3/4	*19*	11.00	*4.99*	–	–
4	*100*	9	*229*	15/16	*24*	7/8	*22*	14.00	*6.35*	14.00	*6.35*
5	*125*	10	*254*	15/16	*24*	7/8	*22*	18.00	*8.16*	18.00	*8.16*
6	*150*	11	*279*	1	*25*	15/16	*24*	23.00	*10.43*	23.00	*10.43*
8	*200*	13 1/2	*343*	1 1/8	*29*	1 1/16	*27*	40.00	*18.14*	40.00	*18.14*
10	*250*	16	*406*	1 3/16	*30*	1 1/8	*29*	59.00	*26.76*	–	–
12	*300*	19	*483*	1 1/4	*32*	13/16	*21*	88.00	*39.92*	–	–

All Class 125 cast iron standard flanges have a flat face. Blind Flange 12 x 19 NPS supplied dished with inside radius to the pipe diameter. When ordering blind flanges, always give the outside diameters.

Note: See following page for pressure-temperature ratings.

PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ **Approved**
Address:	☐ **Approved as noted**
Contractor:	☐ **Not approved**
Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

Victaulic® FireLock™ Fittings

10.03

1.0 PRODUCT DESCRIPTION

Available Sizes

- 1 ¼ – 8"/DN32 – DN200

Maximum Working Pressure

- Pressure ratings for Victaulic FireLock™ Fittings conform to the ratings of Victaulic FireLock EZ™ Style 009N couplings (refer to publication 10.64 for more information).

Application

- FireLock™ fittings are designed for use exclusively with Victaulic couplings that have been Listed or Approved for Fire Protection Services. Use of other couplings or flange adapters may result in bolt pad interference.
- Connects pipe, provides change in direction and adapts sizes or components

Pipe Materials

- Carbon steel

2.0 CERTIFICATION/LISTINGS

EN 10311
Regulation (EU)
No. 305/2011

3.0 SPECIFICATIONS – MATERIAL

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

Fitting Coating:

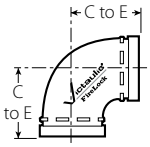
- ☐ Orange enamel.
- ☐ Red enamel in Europe, Middle East, Africa, and India.
- ☐ Optional: Hot dipped galvanized.

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

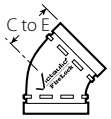
System No.		Location	
Submitted By		Date	

Spec Section		Paragraph	
Approved		Date	

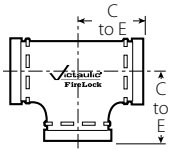
4.0 DIMENSIONS



No. 001



No. 003



No. 002

No. 006

Nominal Size inches DN	Actual Outside Diameter inches mm	No. 001 90° Elbow C to E inches mm	No. 001 90° Elbow Approximate Weight Each lb kg	No. 003 45° Elbow C to E inches mm	No. 003 45° Elbow Approximate Weight Each lb kg	No. 002 Straight Tee C to E inches mm	No. 002 Straight Tee Approximate Weight Each lb kg	No. 006 Cap T inches mm	No. 006 Cap Approximate Weight Each lb kg
1 ¼ DN32	1.660 42.4	— —	— —	— —	— —	— —	— —	0.82 21	0.3 0.1
1 ½ DN40	1.900 48.3	— —	— —	— —	— —	— —	— —	0.82 21	0.4 0.2
2 DN50	2.375 60.3	2.75 70	1.7 0.8	2.00 51	1.8 0.8	2.75 70	2.4 1.1	0.88 22	0.6 0.3
2 ½	2.875 73.0	3.00 76	3.1 1.4	2.25 57	2.2 1.0	3.00 76	3.6 1.6	0.88 22	1.0 0.5
DN65	3.000 76.1	3.00 76	3.30 1.5	2.25 57	2.4 1.1	3.00 76	3.8 1.7	—	—
3 DN80	3.500 88.9	3.38 86	4.0 1.8	2.50 64	3.1 1.4	3.38 86	5.3 2.4	0.88 22	1.2 0.5
	4.250 108.0	4.00 102	5.7 2.6	3.00 76	5.1 2.3	4.00 102	7.5 3.4	—	—
4 DN100	4.500 114.3	4.00 102	6.7 3.0	3.00 76	5.6 2.5	4.00 102	8.7 3.9	1.00 25	2.4 1.1
5	5.563 141.3	4.88 124	12.6 5.7	3.25 83	8.3 3.8	4.88 124	15.7 7.1	1.00 25	4.1 1.9
DN125	5.500 139.7	4.88 124	12.4 5.6	3.25 82.6	8.2 3.7	4.88 124	15.4 6.9	—	—
	6.250 158.8	5.50 140	12.6 5.7	3.50 89	9.2 4.2	5.50 140	17.9 8.0	—	—
6 DN150	6.625 168.3	5.50 140	18.3 8.3	3.50 89	11.7 5.3	5.50 140	22.7 10.3	1.00 25	5.9 2.7
	6.500 165.1	5.43 140	17.6 7.9	3.50 89	11.4 5.2	5.50 140	22.0 9.9	—	—
8 DN200	8.625 219.1	6.81 173	25.5 11.6	4.25 108	20.4 9.3	6.94 176	38.7 17.6	1.13 29	12.7 5.8
	8.515 216.3	6.81 173	23.1 10.5	— —	— —	6.94 176	33.6 15.2	— —	— —

5.0 PERFORMANCE

Flow Data

Size		Frictional Resistance Equivalent of Straight Pipe[1]			
		Elbows		No. 002 Straight Tee	
Nominal Size inches DN	Actual Outside Diameter inches mm	No. 001 90° Elbow feet meters	No. 003 45° Elbow feet meters	Branch feet meters	Run feet meters
1 ¼ DN32	1.660 42.4	— —	— —	— —	— —
1 ½ DN40	1.900 48.3	— —	— —	— —	— —
2 DN50	2.375 60.3	3.5 1.1	1.8 0.5	8.5 2.6	3.5 1.1
2 ½	2.875 73.0	4.3 1.3	2.2 0.7	10.8 3.3	4.3 1.3
DN65	3.000 76.1	4.5 1.4	2.3 0.7	11.0 3.4	4.5 1.4
3 DN80	3.500 88.9	5.0 1.5	2.6 0.8	13.0 4.0	5.0 1.5
	4.250 108.0	6.4 2.0	3.2 0.9	15.3 4.7	6.4 2.0
4 DN100	4.500 114.3	6.8 2.1	3.4 1.0	16.0 4.9	6.8 2.1
5	5.563 141.3	8.5 2.6	4.2 1.3	21.0 6.4	8.5 2.6
DN125	5.500 139.7	8.3 2.5	4.1 1.3	20.6 6.3	8.3 2.5
	6.250 158.8	9.4 2.9	4.9 1.5	25.0 7.6	9.6 2.9
6 DN150	6.625 168.3	10.0 3.0	5.0 1.5	25.0 7.6	10.0 3.0
	6.500 165.1	9.8 3.0	4.9 1.5	24.5 7.5	9.8 3.0
8 DN200	8.625 219.1	13.0 4.0	5.0 1.5	33.0 10.1	13.0 4.0
	8.515 216.3	13.0 4.0	— —	33.0 10.1	13.0 4.0

[1] The flow data listed is based upon the pressure drop of Schedule 40 pipe.

6.0 NOTIFICATIONS

General Notes

NOTE: When assembling FireLock EZ™ couplings onto end caps, take additional care to make certain the end cap is fully seated against the gasket end stop. For FireLock EZ™ Style 009N/009H couplings, use FireLock™ No. 006 end caps containing the “EZ” marking on the inside face or No. 60 end caps containing the “QV EZ” marking on the inside face. Non-Victaulic end cap products shall not be used with Style 009/009V/009H/009N couplings.

7.0 REFERENCE MATERIALS

10.64: Victaulic® FireLock™ Rigid Coupling Style 009N

10.02: Victaulic® FireLock™ Rigid Coupling Style 005H with Vic-Plus™ Gasket System

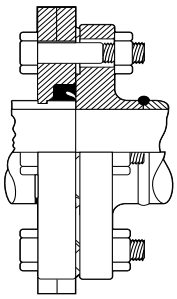
29.01: Victaulic® Terms and Conditions of Sale

Style 744 FireLock® Flange Adapter

with Vic-Plus™ Gasket System

PRODUCT DESCRIPTION

2 - 8" Sizes



(Exaggerated for clarity)

Style 744 FireLock Flange adapter is designed for directly incorporating flanged components with ANSI CL. 125 or CL. 150 bolt hole patterns into a grooved pipe system. Sizes 2 - 8" (50 - 200 mm) are hinged for easy handling with integral end tabs which facilitate assembly.

The design incorporates small teeth inside the key shoulder I.D. to prevent rotation.

Because of the outside flange dimension, FireLock Flange adapters should not be used on FireLock fittings. When wafer or lug-type valves are used adjoining a Victaulic fitting, check disc dimensions to assure proper clearance.

FireLock Flange adapters should not be used as anchor points for tie-rods across nonrestrained joints. Mating rubber faced flanges, valves, etc., require the use of a FireLock Flange washer.

FireLock Flange adapters with Vic-Plus gaskets do not require lubrication. The gasket must always be assembled with the color coded lip on the pipe and the other lip facing the mating flange.

Style 744 FireLock Flange Adapters with the Vic-Plus™ Gasket System are designed and recommended for use ONLY on fire protection systems.

Vic-Plus Gasket System:
Victaulic® now offers a gasket system which requires no field lubrication on wet pipe systems. The Vic-Plus™ System (patented) is dry, clean, and non-toxic. It reduces assembly time substantially and eliminates the mess and chance of over-lubrication. Please refer to the latest copy of the Victaulic Field Installation Handbook (I-100) for supplemental lubrication requirements.

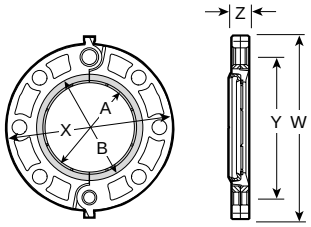
UL ULC FM

See Victaulic publication 10.01 for details.

DIMENSIONS

Style 744

Sizes 2 - 8" (50 - 200 mm)
ANSI Class 125 and 150 Flange



Note: Gray area of mating face must be free from gouges, undulations or deformities of any type for effective sealing.

Pipe Size		Max. Work Press.* PSI kPa	Max. End Load* Lbs. N	No. Bolts † Req'd.	Bolt Size † Inches	Sealing Surface Inches/mm		Dimensions Inches/millimeters				Aprx. Wgt. Each Lbs. kg
Nominal Diameter In./mm	Actual Outside Diameter In./mm					"A" Max.	"B" Min.	W	X	Y	Z	
2 50	2.375 60,3	175 1200	775 3450	4	5/8 X 2 3/4	2.38 60	3.41 87	6.75 172	6.00 152	4.75 121	0.75 19	2.7 1,2
2 1/2 65	2.875 73,0	175 1200	1135 5050	4	5/8 X 3	2.88 73	3.91 99	7.88 200	7.00 178	5.50 140	0.88 22	4.2 1,9
3 80	3.500 88,9	175 1200	1685 7500	4	5/8 X 3	3.50 89	4.53 115	8.44 214	7.50 191	6.00 152	0.94 24	4.8 2,2
4 100	4.500 114,3	175 1200	2780 11045	8	5/8 X 3	4.50 114	5.53 141	9.94 252	9.00 229	7.50 191	0.94 24	7.1 3,2
5 125	5.563 141,3	175 1200	4250 18920	8	3/4 X 3 1/2	5.56 141	6.71 171	11.00 279	10.00 254	8.50 216	1.00 25	8.3 3,8
6# 150	6.625 168,3	175 1200	6030 26840	8	3/4 X 3 1/2	6.63 168	7.78 198	12.00 305	11.00 279	9.50 241	1.00 25	9.3 4,2
8# 200	8.625 219,1	175 1200	10219 45475	8	3/4 X 3 1/2	8.63 219	9.94 252	14.63 372	13.50 343	11.75 298	1.13 29	13.9 6,3

*Refer to notes below.

†Total bolts required to be supplied by installer. Bolt sizes for conventional flange-to-flange connection. Larger bolts are required when Vic-Flange adapter is utilized with wafer-type valves.

Not available with Vic-Plus gasket system. Lubrication is required.

NOTES

* Working Pressure and End Load are total, from all internal and external loads, based on standard weight steel pipe, standard roll or cut grooved in accordance with Victaulic specifications. Contact Victaulic for performance on other pipe.

WARNING: FOR ONE TIME FIELD TEST ONLY, the Maximum Joint Working Pressure may be increased to 1½ times the figures shown.

Style 744 FireLock Flange adapters provide rigid joints when used on pipe with standard roll or cut groove dimensions and consequently allow no linear or angular movement at the joint.

WARNING: Depressurize and drain the piping system before attempting to install, remove, or adjust any Victaulic piping products.

Victaulic Company of America • Phone: 1-800-PICK-VIC (1-800-742-5842) • Fax: 610-250-8817 • e-mail:pickvic@victaulic.com
Victaulic Company of Canada • Phone: 905-884-7444 • Fax: 905-884-9774 • e-mail: viccanada@victaulic.com
Victaulic Europe • Phone:32-9-381-1500 • Fax: 32-9-380-4438 • e-mail: viceuro@victaulic.be
Victaulic America Latina • Phone: 610-559-3300 • Fax: 610-559-3608 • e-mail: vical@victaulic.com
Victaulic Asia Pacific • Phone: 65-6235-3035 • Fax: 65-6235-0535 • e-mail: vicap@victaulic.com

VIC-FLANGE ADAPTER NOTES

1 The Style 744 (2 - 8"/50 - 200 mm) design incorporates small teeth inside the key shoulder I.D. to prevent rotation.

2 FireLock Flange adapter should not be used on FireLock fittings. When wafer or lug-type valves are used adjoining a Victaulic fitting, check disc dimensions to assure proper clearance.

3 FireLock Flange adapters should not be used as anchor points for tie-rods across nonrestrained joints. Mating rubber faced flanges, valves, etc. require the use of a FireLock Flange washer.

4 Area A-B noted in the above drawing must be free from gouges, undulations or deformities of any type for effective sealing.

5 FireLock Flange adapter gaskets must always be assembled with the color coded lip on the pipe and the other lip facing the mating flange.

6 Flange Washers: FireLock Flange adapters require a smooth hard surface at the mating flange face for effective sealing. Some applications for which the Vic-Flange adapter is otherwise well suited do not provide an adequate mating surface. In such cases, it is recommended that a metal Flange Washer be inserted between the FireLock Flange adapter and the mating flange to provide the necessary sealing surface.

Typical applications where a Flange Washer should be used are:

A When mating to a serrated flange: a standard flat flange gasket should be used adjacent to the serrated flange and then the Flange Washer is inserted between the FireLock Flange adapter and the flange gasket.

B When mating to a wafer valve: where typical valves are rubber lined and partially rubber faced (smooth or not), the Flange Washer is placed between the valve and the FireLock Flange adapter.

C When mating a rubber faced flange: the Flange Washer is placed between the FireLock Flange adapters and the rubber faced flange.

D When mating AWWA cast flanges to IPS flanges: the Flange Washer is placed between two FireLock Flanges. The hinge points must be oriented approximately 90° to each other. If one flange is not a FireLock Flange adapter (e.g. flanged valve), then a standard flat flange gasket must be placed adjacent to that flange and the Flange Washer inserted between the flange gasket and the FireLock Flange adapter.

E When mating to components (valves, strainers, etc.) where the component flange face has an insert: follow the same arrangement as in Application 1.

F When mating to a Series 705-W Butterfly valve, Style 744 may only be used on one side of the connection.

When ordering Flange Washers, always specify product style (Style 744) and size to assure proper Flange Washer is supplied.

MATERIAL SPECIFICATIONS

Flange Housing: Ductile iron conforming to ASTM A-536, grade 65-45-12. Ductile iron conforming to ASTM A-395, grade 65-45-15, is available upon special request.

Coating: Black enamel

- **Optional:** Hot dipped galvanized

Bolts/Nuts: Supplied by installer

Gasket:

- **Grade “E” EPDM - Type A Vic-Plus Gasket System Δ**
  (Violet color code). FireLock products have been Listed by Underwriters Laboratories Inc. and Approved by Factory Mutual Research for wet and dry (oil free air) sprinkler services up to the rated working pressure using the Grade “E” Type A Vic-Plus Gasket System, requiring no field lubrication for most installation conditions.

Δ Standard gasket approved for dry pipe systems to –40°F (–40°C). Based on “typical” pipe surface conditions, supplemental lubricant is recommended for services installed below 0°F (-18°C) and for all dry pipe systems or systems to be subjected to air tests prior to being filled with water. Supplemental lubrication may also be rquired on pipe with raised or undercut weld seams or pipe that has voids and/or cracks at the weld seams.

Victaulic® FireLock™ Installation-Ready™ Rigid Couplings Style 009N and Style 109

10.64

Patented

Patented

1.0 PRODUCT DESCRIPTION

Available Sizes

- Style 009N: 1 ¼ – 12"/DN32 – DN300
- ~~Style 109: 1 ¼ – 2 ½"/DN32 – 73.0 mm~~

Pipe Material

- Schedule 10, Schedule 40 or specialty carbon steel pipe listed in Section 5. For use with alternative materials and wall thicknesses please contact Victaulic.

Maximum Working Pressure

- Up to 365 psi/2517 kPa.

Function

- Joins carbon steel pipe with grooved ends conforming to publication 25.01.
- Provides a rigid pipe joint designed to restrict axial or angular movement.

2.0 CERTIFICATION/LISTINGS

c UL us LISTED · FM · LPCB · VdS · CE

C104-1a/36

EN 10311
Regulation (EU)
No. 305/2011

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

System No.		Location	
Submitted By		Date	

Spec Section		Paragraph	
Approved		Date	

3.0 SPECIFICATIONS – MATERIAL

Housing: Ductile iron conforming to ASTM A 536, Grade 65-45-12. Ductile iron conforming to ASTM A 395, Grade 65-45-15, is available upon special request.

Housing Coating: (specify choice)

- ☐ Orange enamel (North America, Asia Pacific)
- ☐ Red enamel (Europe)
- ☐ Optional for Style 009N: Hot dipped galvanized

Gasket: (specify choice)

- ☐ **Grade "E" EPDM (Type A) Vic-Plus™ Pre-lubricated Gasket**
  EPDM (Violet Color Code). Applicable for wet and dry (oil-free air) fire protection systems only. Listed/Approved for continuous use in wet and dry systems. Listed/Approved for dry systems at -40°F/-40°C and above. Not compatible for use with hot water services or steam services.

NOTES

- Reference should always be made to publication I-100, Victaulic Field Installation Handbook for gasket lubrication instructions.
- Services listed are General Service Guidelines only. It should be noted that there are services for which these gaskets are not compatible. Reference should always be made to publication 05.01, Victaulic Gasket Selection Guide for specific gasket service guidelines and for a listing of services which are not compatible.

Bolts/Nuts: (specify choice)

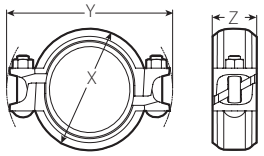
- ☐ Standard: Carbon steel oval neck track bolts meeting the mechanical property requirements of ASTM A449 (imperial) and ISO 898-1 Class 9.8 (M10-M16) Class 8.8 (M20 and greater). Carbon steel hex nuts meeting the mechanical property requirements of ASTM A563 Grade B (imperial) and ASTM A563M Class 9 (metric). Track bolts and hex nuts are zinc electroplated per ASTM B633 Fe/Zn 5, finish Type III (imperial) or Type II (metric).
- ☐ Optional for Style 009N: Stainless steel oval neck track bolts meeting the requirements of ASTM F593, Group 2 (316 stainless steel), condition CW. Stainless steel Heavy Hex nuts meeting the requirements of ASTM F594, Group 2 (316 stainless steel), condition CW, with galling-resistant coating.[1]

[1] Optional bolts/nuts are available in imperial size only.

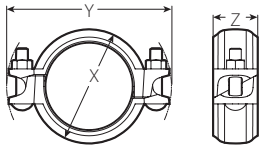
Coupling Linkage: High Strength Steel with comparable physical properties to that of the Track Bolt (ASTM A449). Linkage is zinc electroplated per ASTM B633 Fe/Zn 5, Type III Finish.

4.0 DIMENSIONS

Style 009N Two-Bolt *Installation-Ready* Coupling



Style 009N Pre-Assembled



Style 009N Joint Assembled

Size		Maximum Working Pressure[2]	Maximum End Load[2]	Allow. Pipe End Separation[3]	Bolt/Nut		Dimensions					Weight
							Pre-assembled		Joint Assembled			
Nominal inches DN	Actual Outside Diameter inches mm	psi kPa	lb N	inches mm	Qty.	Size inches mm	X inches mm	Y inches mm	X inches mm	Y inches mm	Z inches mm	Approx. (Each) lb kg
1 ¼ DN32	1.660 42.4	365 2517	790 3514	0.10 2.54	2	⅜ × 2 M10 x 51	3.13 79	5.00 127	2.75 70	5.00 127	2.00 51	1.4 0.6
1 ½ DN40	1.900 48.3	365 2517	1035 4604	0.10 2.54	2	⅜ × 2 M10 x 51	3.38 86	5.13 130	3.00 76	5.13 130	2.00 51	1.5 0.7
2 DN50	2.375 60.3	365 2517	1617 7193	0.12 3.05	2	⅜ × 2 ½ M10 x 63	4.00 102	5.63 143	3.50 89	5.63 143	2.00 51	1.9 0.9
2 ½	2.875 73.0	365 2517	2370 10542	0.12 3.05	2	⅜ × 2 ½ M10 x 63	4.50 114	6.13 156	4.00 102	6.13 156	2.00 51	2.1 1.0
DN65	3.000 76.1	365 2517	2580 11476	0.12 3.05	2	⅜ × 2 ½ M10 x 63	4.63 118	6.00 152	4.13 105	6.13 156	2.00 51	2.1 1.0
3 DN80	3.500 88.9	365 2517	3512 15622	0.12 3.05	2	⅜ × 2 ½ M10 x 63	5.13 130	6.75 171	4.63 117	6.75 171	2.00 51	2.3 1.0
4 DN100	4.500 114.3	365 2517	5805 25822	0.17 4.32	2	⅜ × 2 ½ M10 x 63	6.00 152	7.88 200	5.63 143	7.50 191	2.13 54	2.9 1.3
	4.250 108.0	365 2517	5178 23020	0.17 4.32	2	⅜ × 2 ½ M10 x 63	5.63 152	7.38 1.87	5.38 137	7.38 187	2.13 54	3.1 1.4
5	5.563 141.3	365 2517	8872 39456	0.17 4.32	2	½ × 3 M12 x 76	7.25 184	9.25 235	6.75 171	9.13 232	2.25 57	5.0 2.3
	5.250 133.0	365 2517	7901 35106	0.17 4.32	2	½ × 3 M12 x 76	6.63 168	9.00 229	6.38 162	9.00 229	2.25 57	4.8 2.2
DN125	5.500 139.7	365 2517	8672 38529	0.17 4.32	2	½ × 3 M12 x 76	6.88 175	9.25 235	6.75 171	9.13 232	2.25 57	4.9 2.2
6 DN150	6.625 168.3	365 2517	12582 44469	0.17 4.32	2	½ × 3 ¼ M12 x 83	8.38 213	10.38 264	7.88 200	10.13 257	2.25 57	6.0 2.7
	6.250 159.0	365 2517	11198 49753	0.17 4.32	2	½ × 3 ¼ M12 x 83	7.88 200	10.00 254	7.38 187	9.88 251	2.25 57	5.6 2.5
	6.500 165.1	365 2517	12112 53813	0.17 4.32	2	½ × 3 ¼ M12 x 83	8.00 203	10.25 260	7.75 197	10.13 257	2.25 57	6.0 2.7
8 DN200	8.625 219.1	365 2517	21326 94863	0.17 4.32	2	⅝ × 4 M16 x 101	10.88 276	13.38 340	10.25 260	13.13 333	2.50 64	11.4 5.2
	8.500 216.0	365 2517	20712 55968	0.17 4.32	2	⅝ × 4 M16 x 101	10.63 270	13.25 337	10.25 260	10.13 257	2.63 67	11.4 5.2
10 DN250	10.750 273.0	300 2068	27229 121121	0.25 6.4	2	⅞ × 6 ½ M22 x 165	13.75 349	17.00 432	13.25 337	17.13 435	2.75 70	22.6 10.3
12 DN300	12.750 323.9	300 2068	38303 170380	0.25 6.4	2	⅞ × 6 ½ M22 x 165	16.00 406	19.00 483	15.50 394	19.13 486	2.75 70	27.6 12.5

[2] Working Pressure and End Load are total, from all internal and external loads, based on standard weight (ANSI) steel pipe, standard roll or cut grooved in accordance with Victaulic specifications. See the Listings/Approvals section of this publication for ratings on other pipe.

[3] The allowable pipe separation dimension shown is for system layout purposes only. Style 009N couplings are considered rigid connections and will not accommodate expansion or contraction of the piping system.

NOTES

- When assembling Style 009N or Style 109 couplings onto end caps, take additional care to make certain the end cap is fully seated against the gasket end stop. For Style 009N or Style 109 couplings, use FireLock No. 006 end caps containing the "EZ" marking on the inside face or No. 60 end caps containing the "QV EZ" marking on the inside face. Non-Victaulic end cap products shall not be used with Style 009N or Style 109 couplings. IMPORTANT: Gaskets intended for the Style 009 or Style 009V couplings cannot be used with the Style 009N or Style 109 coupling. There is no interchanging of gaskets or housings between coupling styles.
- **Use Of FlushSeal Gaskets For Dry Pipe Systems** Style 009N or Style 109 couplings are supplied with Grade "E" Type A gaskets. These gaskets include an integral pipe stop, that once installed provides the similar benefits as a FlushSeal gasket for dry pipe systems. It should be noted that standard Victaulic FlushSeal gaskets cannot be used with the Style 009N or Style 109 couplings.

5.0 PERFORMANCE

Style 009N Two-Bolt *Installation-Ready* Coupling Listings/Approvals[6]

The information provided below is based on the latest listing and approval data at the time of publication. Listings/Approvals are subject to change and/or additions by the approval agencies. Contact Victaulic for performance on other pipe and the latest listings and approvals.

Size		cULus[11]		FM[11]		VdS	LPCB
Nominal inches DN	**Actual Outside Diameter** inches mm	**Sch. 10** psi kPa bar	**Sch. 40** psi kPa bar	**Sch. 10** psi kPa bar	**Sch. 40** psi kPa bar	psi kPa bar	psi kPa bar
1 ¼ DN32	1.660 42.4	365 2517 25	365 2517 25	363 2503 25	363 2503 25	363 2500 25	363 2500 25
1 ½ DN40	1.900 48.3	365 2517 25	365 2517 25	363 2503 25	363 2503 25	363 2500 25	363 2500 25
2 DN50	2.375 60.3	365 2517 25	365 2517 25	363 2503 25	363 2500 25	363 2500 25	363 2500 25
2 ½	2.875 73.0	365 2517 25	365 2517 25	363 2503 25	363 2500 25	363 2500 25	363 2500 25
DN65	3.000 76.1	365[7] 2517[7] 25[7]	N/A	363[8] 2503[8] 25[8]	N/A	363 2500 25	363 2500 25
3 DN80	3.500 88.9	365 2517 25	365 2517 25	363 2503 25	363 2503 25	363 2500 25	363 2500 25
4 DN100	4.500 114.3	365 2517 25	365 2517 25	363 2503 25	363 2503 25	363 2500 25	363 2500 25
	4.250 108.0	N/A	N/A	363 2503 25	363 2503 25	N/A	N/A
5	5.563 141.3	290 2000 20	365 2517 25	363 2503 25	363 2503 25	232 1600 16	363 2500 25
	5.250 133.0	N/A	N/A	363[8] 2503[8] 25	N/A	N/A	N/A
DN125	5.500 139.7	290[9] 2000[9] 20[9]	N/A	363[8] 2503[8] 25[8]	N/A	232 1600 25	363 2500 25
6 DN150	6.625 168.3	300 2068 20	365 2517 25	363 2503 25[7]	363 2503 25	232 1600 16	363 2500 25
	6.250 159.0	N/A	N/A	363[8] 2503[8] 25	N/A	N/A	N/A
	6.500 165.1	290[10] 2000[10] 20	N/A	363[8] 2503[8] 25[8]	N/A	N/A	363 2500 25

6 Listed/Approved for continuous use in wet and dry systems. Listed/Approved for dry systems -40° F/C and above. Please see the Victaulic Installation Manual I-009N for details concerning when supplemental lubrication is required.

7 cULus listed for DIN 2458 (EN 10220) 2.6 mm pipe wall.

8 FM approved for BS 1387 (EN 10255) Medium 3.6 mm pipe wall.

9 cULus listed for EN 10220 4.0 mm pipe wall.

10 cULus listed for EN 10255 4.5 mm pipe wall.

11 With optional stainless steel fasteners, cULus Listed to 175psi/1207 kPa/12 bar and FM Approved to the FM ratings shown in the above table. The stainless steel fasteners have a marking designation of "316" on the end face of the bolt.

12 cUL listed to 250 psi/1720 kPa /17 bar.

5.0 PERFORMANCE (CONTINUED)

Style 009N Two-Bolt *Installation-Ready* Coupling Listings/Approvals[6]

The information provided below is based on the latest listing and approval data at the time of publication. Listings/Approvals are subject to change and/or additions by the approval agencies. Contact Victaulic for performance on other pipe and the latest listings and approvals.

Size		cULus[11]		FM[11]		VdS	LPCB
Nominal inches DN	**Actual Outside Diameter** inches mm	**Sch. 10** psi kPa bar	**Sch. 40** psi kPa bar	**Sch. 10** psi kPa bar	**Sch. 40** psi kPa bar	psi kPa bar	psi kPa bar
8 DN200	8.625 219.1	300 2068 20	365 2517 25	363 2503 25	363 2503 25	232 1600 16	363 2500 25
	8.500 216.0	290 2000 20	N/A	363[8] 2503[8] 25[7]	N/A	N/A	N/A
10 DN250	10.750 273.0	300 2068 20	300 2068 20	300 2068 20	300 2068 20	N/A	N/A
12 DN300	12.750 323.9	300[12] 2068[12] 20[12]	300 2068 25	250 1720 17	300 2068 20	N/A	N/A

6 Listed/Approved for continuous use in wet and dry systems. Listed/Approved for dry systems -40° F/C and above. Please see the Victaulic Installation Manual I-009N for details concerning when supplemental lubrication is required.

7 cULus listed for DIN 2458 (EN 10220) 2.6 mm pipe wall.

8 FM approved for BS 1387 (EN 10255) Medium 3.6 mm pipe wall.

9 cULus listed for EN 10220 4.0 mm pipe wall.

10 cULus listed for EN 10255 4.5 mm pipe wall.

11 With optional stainless steel fasteners, cULus Listed to 175psi/1207 kPa/12 bar and FM Approved to the FM ratings shown in the above table. The stainless steel fasteners have a marking designation of "316" on the end face of the bolt.

12 cUL listed to 250 psi/1720 kPa /17 bar.

5.1 PERFORMANCE

Style 109 One-Bolt *Installation-Ready* Coupling Listings/Approvals[13]

The information provided below is based on the latest listing and approval data at the time of publication. Listings/Approvals are subject to change and/or additions by the approvals agencies. Contact Victaulic for performance on other pipe and the latest listings and approvals.

Size		cULus		FM	
Nominal inches DN	**Actual Outside Diameter** inches mm	**Sch. 10** psi kPa bar	**Sch. 40** psi kPa bar	**Sch. 10** psi kPa bar	**Sch. 40** psi kPa bar
1 ¼ DN32	1.660 42.4	365 2517 25	365 2517 25	365 2517 25	365 2517 25
1 ½ DN40	1.900 48.3	365 2517 25	365 2517 25	365 2517 25	365 2517 25
2 DN50	2.375 60.3	365 2517 25	365 2517 25	365 2517 25	365 2517 25
2½	2.875 73.0	365 2517 25	365 2517 25	365 2517 25	365 2517 25

13 Listed/Approved for continuous use in wet and dry systems. Listed/Approved for dry systems -40° F/C and above. Please see the Victaulic Installation Manual I-109 for details concerning when supplemental lubrication is required.

5.2 PERFORMANCE

Specialty Pipe
Style 009N Two-Bolt *Installation-Ready* Coupling Listings/Approvals

Pipe Type	Size inches DN	Pressure Rating cULus psi kPa bar	Pressure Rating FM psi kPa bar
EF	1 ¼ – 4 DN32 – DN100	300 2068 20	N/A
EL	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2068 20
ET40	1 ¼ – 2 DN32 – DN50	300 2068 20	N/A
EZF	3 – 4 DN80 – DN100	300 2068 20	N/A
EZT	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2068 20
FF	1 ½ – 4 DN40 – DN100	300 2068 20	N/A
GL	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2068 20
MF	1 ¼ – 4 DN32 – DN100	300 2068 20	300 2068 20
	6 DN150	175 1205 12	175 1205 12
MT	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2068 20
MLT	1 ¼ – 2 DN32 – DN50	N/A	300 2068 20
TF	2 ½ – 4 73.0 mm – DN100	N/A	300 2068 20
WG5, WG5E, WF5, WG7, WG7E, WL7	1 ¼ – 4 DN32 – DN100	175 1205 12	300 2068 20
WLS	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2068 20

NOTES

- EF = EDDY FLOW steel pipe manufactured by Bull Moose Tube Co.
- EL = EDDYLITE steel pipe manufactured by Bull Moose Tube Co.
- ET40 = Eddythread 40 steel pipe manufactured by Bull Moose Tube Co.
- EZF = EZ-Flow steel pipe manufactured by Northwest Pipe Co.
- EZT = EZ-Thread steel pipe manufactured by Youngstown Tube Co.
- FF = Fire-Flo steel pipe manufactured by Youngstown Tube Co.
- GL = GL steel pipe manufactured by Wheatland Tube Co.
- MF = Mega-Flow steel pipe manufactured by Wheatland Tube Co.
- MT = Mega-Thread steel pipe manufactured by Wheatland Tube Co.
- MLT = MLT steel pipe manufactured by Wheatland Tube Co
- TF = Tex-Flow steel pipe manufactured by Tex-Tube Co.
- WG5, WG5E, WF5 = WGalweld 5, WGalweld 5E, WFlow 5 steel pipe manufactured by Wuppermann Stahl GmbH.
- WG7, WG7E, WL7 = WGalweld 7, Wgalweld 7E, WLight 7 steel pipe manufactured by Wuppermann Stahl GmbH
- WLS = WLS steel pipe manufactured by Wheatland Tube Co.

5.3 PERFORMANCE

Specialty Pipe
Style 109 One-Bolt *Installation-Ready* Coupling Listings/Approvals

Pipe Type	Size inches DN	Pressure Rating cULus psi kPa bar	Pressure Rating FM psi kPa bar
EF	1 ¼ – 2 ½ DN32 – 73.0 mm	N/A	300 2068 20
	1 ½ – 2 ½ DN40 – 73.0 mm	300 2068 20	N/A
Easy-Flow	1 ¼ – 2 DN32 – DN50	N/A	300 2068 20
EL	1 ¼ – 2 DN32 – DN50	N/A	300 2068 20
ET40	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2068 20
EZT	1 ¼ – 2 DN32 – DN50	N/A	300 2068 20
	1 ½ – 2 DN40 – DN50	300 2068 20	N/A
FF	1 ½ – 2 ½ DN40 – 73.0 mm	300 2068 20	300 2068 20
GL	1 ¼ – 2 DN32 – DN50	N/A	300 2068
MF	1 ¼ – 2 ½ DN32 – 73.0 mm	300 2068 20	300 2068 20
MT	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2068 20
MLT	1 ¼ – 2 DN32 – DN50	300 2068 20	300 2068 20
TF	2 ½ 73.0 mm	N/A	300 2068 20
WG7, WG7E	1 ¼ – 2 DN32 – DN50	N/A	300 2068 20
WLS	1 ¼ – 2 DN32 – DN50	N/A	300 2068 20

NOTES

- EF = EDDY FLOW steel pipe manufactured by Bull Moose Tube Co.
- Easy-Flow = Easy-Flow steel pipe manufactured by Borusan Mannesmann Boru.
- EL = EDDYLITE steel pipe manufactured by Bull Moose Tube Co.
- ET40 = Eddythread 40 steel pipe manufactured by Bull Moose Tube Co.
- EZT = EZ-Thread steel pipe manufactured by Youngstown Tube Co.
- FF = Fire-Flo steel pipe manufactured by Youngstown Tube Co.
- GL = GL steel pipe manufactured by Wheatland Tube Co.
- MF = Mega-Flow steel pipe manufactured by Wheatland Tube Co.
- MT = Mega-Thread steel pipe manufactured by Wheatland Tube Co.
- MLT = MLT steel pipe manufactured by Wheatland Tube Co.
- TF = Tex-Flow steel pipe manufactured by Tex-Tube Co.
- WG7, WG7E = WGalweld 7 and WGalweld 7E steel pipe manufactured by Wuppermann Stahl GmbH.
- WLS = WLS steel pipe manufactured by Wheatland Tube Co.

6.0 NOTIFICATIONS

⚠ WARNING

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

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

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

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

7.0 REFERENCE MATERIALS

05.01: Seal Selection Guide

25.01: Original Groove System (OGS) Groove Specifications

I-009N: Installation Instructions FireLock EZ™ Rigid Coupling Style 009N

I-100: Victaulic Field Installation Handbook

I-109: Installation Instructions FireLock™ One-Bolt Rigid Coupling Style 109

I-ENDCAP: Victaulic End Caps Installation Instructions

Victaulic® Standard Flexible Coupling Style 77

06.04

¾ – 12"/DN20 – DN300 sizes

14 – 24"/DN350 – DN600 sizes

1.0 PRODUCT DESCRIPTION

Available Sizes

- ¾ – 24"/DN20 – DN600

Maximum Working Pressure

- Accommodates pressures ranging from full vacuum (29.9 in Hg/760 mm Hg) up to 1000 psi/6894 kPa.
- Working pressure dependent on material, wall thickness and size of pipe.

Application

- Joins standard roll grooved and cut grooved pipe, as well as grooved fittings, valves and accessories.
- Provides a flexible pipe joint which allows for expansion, contraction and deflection.
- Operating temperature dependent upon gasket and/or seal selection - see Section 3.0.
- Exclusively for use with pipe and Victaulic products which feature ends formed with the Victaulic OGS groove profile (See section 7.0 for Reference Materials).

Pipe Material

- Carbon steel.
- For use with stainless steel pipe, refer to Victaulic publication 17.09 for pressure ratings and end loads.

2.0 CERTIFICATION/LISTINGS

NOTE

- See publication 02.06: Victaulic Potable Water Approvals ANSI/NSF for potable water approvals if applicable.

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

System No.		Location	
Submitted By		Date	

Spec Section		Paragraph	
Approved		Date	

3.0 MATERIAL SPECIFICATIONS

Housing: Ductile iron conforming to ASTM A536, Grade 65-45-12. Ductile iron conforming to ASTM A395, Grade 65-45-15, is available upon special request.

Housing Coating: (specify choice)

- ☐ Standard: Orange enamel.
- ☐ Optional: Hot dipped galvanized and others.
- ☐ Optional: Contact Victaulic with your requirements for other coatings.

Gasket: (specify choice[1])

- ☐ **Grade "E" EPDM**
  EPDM (Green stripe color code). Temperature range –30°F to +230°F/–34°C to +110°C. May be specified for cold and hot water service within the specified temperature range plus a variety of dilute acids, oil-free air and many chemical services. UL Classified in accordance with ANSI/NSF 61 for cold +73°F/+23°C and hot +180°F/+82°C potable water service and ANSI/NSF 372. NOT COMPATIBLE FOR PETROLEUM SERVICES OR STEAM SERVICES.
- ☐ **Grade "T" Nitrile**
  Nitrile (Orange stripe color code). Temperature range -20°F to +180°F/-29°C to +82°C. May be specified for petroleum products, air with oil vapors, vegetable and mineral oils within the specified temperature range. Not compatible for hot water services over +150°F/+66°C or for hot dry air over +140°F/+60°C.
- ☐ **Others**
  For alternate gasket selection, reference publication 05.01: Victaulic Seal Selection Guide - Elastomeric Seal Construction.

[1] Services listed are General Service Guidelines only. It should be noted that there are services for which these gaskets are not compatible. Reference should always be made to the latest Victaulic Seal Selection Guide for specific gasket service guidelines and for a listing of services which are not compatible.

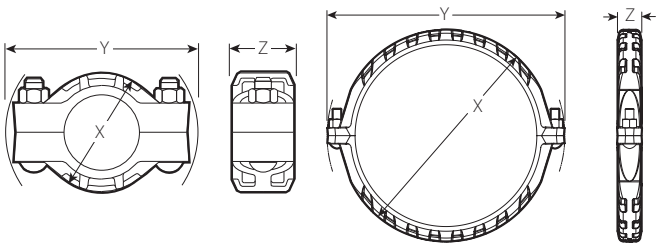
Bolts/Nuts: (specify choice[2])

- ☐ Standard: Carbon steel oval neck track bolts meeting the mechanical property requirements of ASTM A449 (imperial) and ISO 898-1 Class 9.8 (M10-M16) Class 8.8 (M20 and greater). Carbon steel hex nuts meeting the mechanical property requirements of ASTM A563 Grade B (imperial - heavy hex nuts) and ASTM A563M Class 9 (metric - hex nuts). Track bolts and hex nuts are zinc electroplated per ASTM B633 ZN/FE5, finish Type III (imperial) or Type II (metric).
- ☐ Optional: Stainless steel oval neck track bolts meeting the mechanical property requirements of ASTM F593, Group 2 (316 stainless steel), condition CW. Stainless steel heavy hex nuts meeting the mechanical property requirements of ASTM F594, Group 2 (316 stainless steel), condition CW, with galling reducing coating.

[2] Optional bolts/nuts are available in imperial size only.

4.0 DIMENSIONS

Style 77



¾ – 12"/DN20 – DN300 sizes 14 – 24"/DN350 – DN600 sizes

Size		Pipe End Separation[3]	Deflection from Centerline[3]		Bolt/Nut		Dimensions			Weight
Nominal inches DN	Actual Outside Diameter inches mm	Allowable inches mm	Per Cplg. Degrees	Pipe inches/ft. mm/m	Qty.	Size inches	X inches mm	Y inches mm	Z inches mm	Approx. (Each) lb kg
¾ DN20	1.050 26.7	0–0.06 0–1.6	3º–24′	0.72 60	2	⅜ x 2	2.13 54	4.00 102	1.75 44	1.1 0.5
1 DN25	1.315 33.4	0–0.06 0–1.6	2º–43′	0.57 48	2	⅜ x 2	2.38 61	4.12 105	1.75 44	1.2 0.5
1¼ DN32	1.660 42.2	0–0.06 0–1.6	2º–10′	0.45 38	2	½ x 2½	2.65 67	5.00 127	1.88 48	2.0 0.9
1½ DN40	1.900 48.3	0–0.06 0–1.6	1º–56′	0.40 33	2	½ x 2½	3.13 79	5.38 137	1.88 48	2.1 1.0
2 DN50	2.375 60.3	0–0.06 0–1.6	1º–31′	0.32 26	2	½ x 2½	3.63 92	5.88 149	1.88 48	2.6 1.2
	2.664 57.0	0–0.06 0–1.6	1º–34′	0.33 27	2	½ x 2½	3.43 87	5.73 146	1.90 48	3.0 1.4
2½	2.875 73.0	0–0.06 0–1.6	1º–15′	0.26 22	2	½ x 2¾	4.25 108	6.50 165	1.88 48	3.1 1.4
DN65	3.000 76.1	0–0.06 0–1.6	1º–12′	0.26 22	2	½ x 2¾	4.38 111	6.63 168	1.88 48	3.2 1.5
3 DN80	3.500 88.9	0–0.06 0–1.6	1º–2′	0.22 18	2	½ x 2¾	5.00 127	7.13 181	1.88 48	3.7 1.7
3½ DN90	4.000 101.6	0–0.06 0–1.6	0º–54′	0.19 16	2	⅝ x 3¼	5.63 143	8.25 210	1.88 48	5.6 2.5
4 DN100	4.500 114.3	0–0.13 0–3.2	1º–36′	0.34 28	2	⅝ x 3¼	6.13 156	8.88 226	2.13 54	6.7 3.0
	4.250 108.0	0–0.13 0–3.2	1º–41′	0.35 29	2	16 x 82.5	6.00 152	8.63 219	2.13 54	11.0 5.0
5	5.563 141.3	0–0.13 0–3.2	1º–18′	0.27 23	2	2– ¾ x 4¼	7.75 197	10.65 270	2.13 54	10.6 4.8

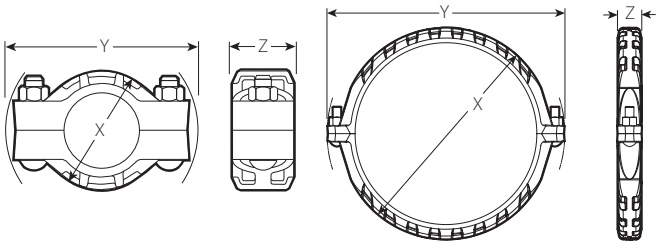
[3] Allowable Pipe End Separation and Deflection figures show the maximum nominal range of movement available at each joint for standard **roll** grooved pipe. Figures for standard **cut** grooved pipe may be doubled. These figures are maximums; for design and installation purposes these figures should be reduced by: 50% for ¾ – 3 ½"/DN20 – DN90; 25% for 4"/DN100 and larger.

NOTE

- Metric thread size bolts are available (color coded gold) for all coupling sizes upon request. Contact Victaulic for details.

4.0 DIMENSIONS (CONTINUED)

Style 77



¾ – 12"/DN20 – DN300 sizes 14 – 24"/DN350 – DN600 sizes

Size		Pipe End Separation[3]	Deflection from Centerline[3]		Bolt/Nut		Dimensions			Weight
Nominal inches DN	Actual Outside Diameter inches mm	Allowable inches mm	Per Cplg. Degrees	Pipe inches/ft. mm/m	Qty.	Size inches	X inches mm	Y inches mm	Z inches mm	Approx. (Each) lb kg
	5.250 133.0	0–0.13 0–3.2	1°–21′	0.28 24	2	20 x 108	7.63 194	10.38 264	2.13 54	10.0 4.5
DN125	5.500 139.7	0–0.13 0–3.2	1°–18′	0.28 24	2	20 x 108	8.63 219	10.65 270	2.13 54	10.0 4.5
6 DN150	6.625 168.3	0–0.13 0–3.2	1°–5′	0.23 18	2	¾ x 4¼	8.63 219	11.88 302	2.13 54	12.0 5.4
	6.250 159.0	0–0.13 0–3.2	1°–9′	0.24 20	2	20 x 108	8.63 219	11.50 292	2.13 54	13.2 6.0
	6.500 165.1	0–0.13 0–3.2	1°–6′	0.23 19	2	¾ x 4¼	8.88 226	11.63 295	2.13 54	13.2 6.0
8[4] DN200	8.625 219.1	0–0.13 0–3.2	0°–50′	0.18 14	2	⅞ x 5	11.00 279	14.75 375	2.50 63	20.8 9.4
10[4] DN250	10.750 273.0	0–0.13 0–3.2	0°–40′	0.14 12	2	1 x 6	13.63 346	17.13 435	2.63 67	27.8 12.6
12[4] DN300	12.750 323.9	0–0.13 0–3.2	0°–34′	0.12 9	2	1 x 6½	15.63 397	19.25 489	2.63 67	31.1 14.1
14[5] DN350	14.000 355.6	0–0.13 0–3.2	0°–31′	0.11 9	2	1 x 3½	16.75 425	20.25 514	3.00 76	39.2 17.8
	14.842 377.0	0–0.13 0–3.2	0°–31′	0.11 9	2	1 x 3½	17.39 442	20.96 531	2.80 71	48.8 22.1
16[5] DN400	16.000 406.4	0–0.13 0–3.2	0°–27′	0.10 9	2	1 x 3½	18.75 476	22.25 565	3.00 76	45 20.4
	16.772 426.0	0–0.13 0–3.2	0°–27′	0.10 9	2	1 x 3½	19.69 500	22.92 581	2.92 74	56.7 25.7
18[5] DN450	18.000 457.2	0–0.13 0–3.2	0°–24′	0.08 7	2	1⅛ x 4	21.56 548	25.00 635	3.13 80	64.1 29.1
	18.898 480.0	0–0.13 0–3.2	0°–24′	0.08 7	2	1⅛ x 4	22.38 569	25.86 655	3.04 77	77.2 35

3 Allowable Pipe End Separation and Deflection figures show the maximum nominal range of movement available at each joint for standard **roll** grooved pipe. Figures for standard **cut** grooved pipe may be doubled. These figures are maximums; for design and installation purposes these figures should be reduced by: 50% for ¾ – 3 ½"/DN20 – DN90; 25% for 4"/DN100 and larger.

4 Couplings 8, 10, 12"/DN200, DN250, DN300 sizes available to JIS standards. Refer to Victaulic publication 06.17 for details.

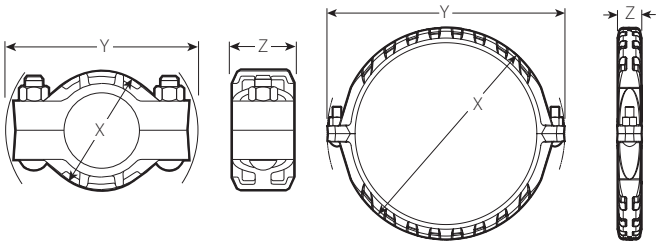
5 For 14 – 72"/DN350 – DN1800 Roll Groove systems Victaulic offers the Advanced Groove System (AGS) line of products. Refer to Victaulic publication 20.03 for information on the Style W77 flexible AGS coupling.

NOTE

- Metric thread size bolts are available (color coded gold) for all coupling sizes upon request. Contact Victaulic for details.

4.0 DIMENSIONS (CONTINUED)

Style 77



¾ – 12"/DN20 – DN300 sizes 14 – 24"/DN350 – DN600 sizes

Size		Pipe End Separation[3]	Deflection from Centerline[3]		Bolt/Nut		Dimensions			Weight
Nominal inches DN	Actual Outside Diameter inches mm	Allowable inches mm	Per Cplg. Degrees	Pipe inches/ft. mm/m	Qty.	Size inches	X inches mm	Y inches mm	Z inches mm	Approx. (Each) lb kg
20[5] DN500	20.000 508.0	0–0.13 0–3.2	0º–22′	0.08 7	2	1⅛ x 4	23.63 600	27.00 686	3.13 80	74.8 34
22[5] DN550	22.000 559.0	0–0.13 0–3.2	0º–19′	0.07 6	2	1⅛ x 4	25.63 651	29.13 740	3.13 80	82.6 37.5
	20.866 530.0	0–0.13 0–3.2	0º–22′	0.08 7	2	1⅛ x 4	24.29 617	27.80 704	3.07 77	91.7 41.6
	22.835 580.0	0–0.13 0–3.2	0º–19′	0.07 6	2	1⅛ x 4	26.76 680	30.01 762	3.12 79	92.8 42.2
24[5] DN600	24.000 609.6	0–0.13 0–3.2	0º–18′	0.07 6	2	1⅛ x 4	27.75 705	31.00 787	3.19 81	89.6 40.7
	24.803 630.0	0–0.13 0–3.2	0º–18′	0.07 6	2	1⅛ x 4	28.42 722	32.16 817	3.12 79	96.8 44
14–72 DN350– DN1800	**AGS See Style W77, refer to Victaulic** publication 20.03									

[3] Allowable Pipe End Separation and Deflection figures show the maximum nominal range of movement available at each joint for standard **roll** grooved pipe. Figures for standard **cut** grooved pipe may be doubled. These figures are maximums; for design and installation purposes these figures should be reduced by: 50% for ¾ – 3 ½"/DN20 – DN90; 25% for 4"/DN100 and larger.

[5] For 14 – 72"/DN350 – DN1800 Roll Groove systems Victaulic offers the Advanced Groove System (AGS) line of products. Refer to Victaulic publication 20.03 for information on the Style W77 flexible AGS coupling.

NOTE

- Metric thread size bolts are available (color coded gold) for all coupling sizes upon request. Contact Victaulic for details.

5.0 PERFORMANCE

Style 77

Size		Working Pressure[6]	End Load[6]
Nominal inches DN	**Actual Outside Diameter** inches mm	**Maximum** psi kPa	**Maximum** lb N
¾ DN20	1.050 26.7	1000 6894	865 3,850
1 DN25	1.315 33.4	1000 6894	1360 6,050
1¼ DN32	1.660 42.2	1000 6894	2160 9,610
1½ DN40	1.900 48.3	1000 6894	2835 12,615
2 DN50	2.375 60.3	1000 6894	4430 19,715
	2.664 57.0	1000 6894	3955 17,592
2½	2.875 73.0	1000 6894	6490 28,880
DN65	3.000 76.1	1000 6894	7070 31,460
3 DN80	3.500 88.9	1000 6894	9620 42,810
3½ DN90	4.000 101.6	1000 6894	12565 55,915
4 DN100	4.500 114.3	1000 6894	15900 70,755
	4.250 108.0	1000 6894	14180 63,100
5	5.563 141.3	1000 6894	24300 108,135

[6] Working Pressure and End Load are total, from all internal and external loads, based on standard weight (ANSI) steel pipe, standard **roll** or **cut** grooved in accordance with Victaulic specifications. Contact Victaulic for performance on other pipe.

NOTE

- WARNING: FOR ONE TIME FIELD TEST ONLY, the Maximum Joint Working Pressure may be increased to 1½ times the figures shown.

5.0 PERFORMANCE (CONTINUED)

Style 77

Size		Working Pressure[6]	End Load[6]
Nominal inches DN	**Actual Outside Diameter** inches mm	**Maximum** psi kPa	**Maximum** lb N
	5.250 133.0	1000 6894	21635 96,275
DN125	5.500 139.7	1000 6894	23745 105,665
6 DN150	6.625 168.3	1000 6894	34470 153,390
	6.250 159.0	1000 6894	30665 136,460
	6.500 165.1	1000 6894	33185 147,660
8[4] DN200	8.625 219.1	800 5515	46740 207,995
10[4] DN250	10.750 273.0	800 5515	73280 326,100
12[4] DN300	12.750 323.9	800 5515	102000 453,900
14[5] DN350	14.000 355.6	300 2068	46180 205,500
	14.842 377.0	300 2068	51875 230,845
16[5] DN400	16.000 406.4	300 2068	60320 268,425
	16.772 426.0	300 2068	66245 294,795
18[5] DN450	18.000 457.2	300 2068	76340 339,710
	18.898 480.0	300 2068	84105 374,265
20[5] DN500	20.000 508.0	300 2068	94000 418,300
22[5] DN550	22.000 559.0	300 2068	114000 507,300
	20.866 530.0	300 2068	102535 456,280
	22.835 580.0	300 2068	102380 455,591
24[5] DN600	24.000 609.6	250 1723	113000 502,850
	24.803 630.0	250 1723	102790 457,416
14–72 DN350–DN1800	**AGS See Style W77, refer to Victaulic** publication 20.03 AGS™		

4 Couplings 8, 10, 12"/DN200, DN250, DN300 sizes available to JIS standards. Refer to Victaulic publication 06.17 for details.

5 For 14 – 72"/DN350 – DN1800 Roll Groove systems Victaulic offers the Advanced Groove System (AGS) line of products. Refer to Victaulic publication 20.03 for information on the Style W77 flexible AGS coupling.

6 Working Pressure and End Load are total, from all internal and external loads, based on standard weight (ANSI) steel pipe, standard **roll** or **cut** grooved in accordance with Victaulic specifications. Contact Victaulic for performance on other pipe.

NOTE

- WARNING: FOR ONE TIME FIELD TEST ONLY, the Maximum Joint Working Pressure may be increased to 1½ times the figures shown.

6.0 NOTIFICATIONS

- For 14 – 72"/DN350 – DN1800 flexible roll groove systems, Victaulic recommends Style W77 AGS couplings. For more information, refer to Victaulic publication 20.03.

⚠ WARNING

- **Victaulic RX roll sets must be used when grooving light-wall/thin-wall stainless steel pipe for use with Victaulic Couplings.**

Failure to use Victaulic RX roll sets when grooving light-wall/thin-wall stainless steel pipe may cause joint failure, resulting in serious personal injury and/or property damage.

NOTICE

- **Victaulic RX grooving rolls must be ordered separately. They are identified by a silver color and the designation RX on the front of the roll sets.**

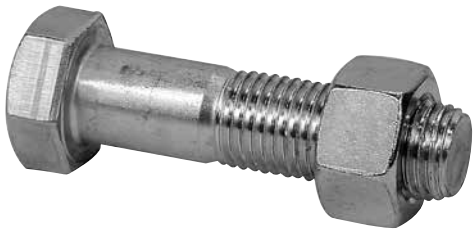
7.0 REFERENCE MATERIALS

I-100: Victaulic Field Installation Handbook
02.06: Victaulic Potable Water Approvals ANSI/NSF
05.01: Victaulic Seal Selection Guide
06.15: Victaulic Pressure Ratings and End Loads for Victaulic® Couplings on Steel Pipe
06.17: Victaulic Couplings and Fittings for JIS Pipe
10.01: Victaulic Products for Fire Protection Piping Systems - Regulatory Approval
17.01: Victaulic Pipe Preparation for Use on Stainless Steel Pipe With Victaulic Products
17.09: Victaulic Ductile Iron Grooved Couplings Performance Data for Stainless Steel Pipe
20.03: Victaulic AGS Flexible Coupling Style W77
25.01: Victaulic Original Groove System (OGS) Groove Specifications
26.01: Victaulic Design Data
26.04: Victaulic Couplings Vibration Attenuation Characteristics
29.01: Victaulic Terms and Conditions of Sale
I-ENDCAP: Victaulic End Caps Installation Instructions

06.04 1469 Rev U Updated 12/2018

☐ Machine Bolts

Size Range: American Standard hexagon head bolts with American Standard hexagon nuts are stocked in sizes 3/8" through 1 1/8" UNC thread series. Other sizes are available upon request. Lengths of bolts are measured from under head to extreme point.
Finish: ☐ Plain or ☐ Electroplated
Ordering: Specify bolt size, name and length.



☐ Hexagon Nuts

Size Range:

- American Standard hexagon nuts - sizes 1/4" thru 1 1/2".
- American Standard heavy hexagon flat nuts - sizes 1 3/4" thru 3 3/4".

Finish: ☐ Plain or ☐ Electroplated
Ordering: Specify bolt or rod size and name.

HEX NUTS: DIMENSIONS (IN)		
Bolt /Rod Size	Width	Thickness
1/4	7/16	15/64
3/8	9/16	11/32
1/2	3/4	29/64
5/8	15/16	9/16
3/4	1 1/8	43/64
7/8	1 5/16	25/32
1	1 1/2	57/64
1 1/4	1 7/8	1 3/32
1 3/8	2 1/16	1 13/64
1 1/2	2 1/4	1 5/16

HEAVY HEX NUTS: DIMENSIONS (IN)		
Bolt /Rod Size	Width	Thickness
1 3/4	2 3/4	1 25/32
2	3 1/8	2 1/32
2 1/4	3 1/2	2 19/64
2 1/2	3 7/8	2 35/64
2 3/4	4 1/4	2 13/16
3	4 5/8	3 1/16
3 1/4 ■	5	3 5/16
3 1/2 ■	5 3/8	3 9/16
3 3/4 ■	5 3/4	3 13/16

■ Furnished with 8 UN or 4 UN threads as required.

PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ Approved
Address:	☐ Approved as noted
Contractor:	☐ Not approved
Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

Fig. B3034 - C-Clamp (TOLCO Fig. 68S)

Size Range: 3/8"-16 thru 3/4"-10 rod

Material: Cast Malleable Steel with hardened cup point set screw and jam nut

Function: Recommended for hanging from steel beam where flange thickness does not exceed 3/4" (19.0mm).

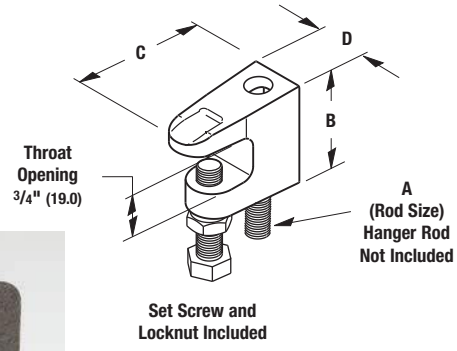
Features: May be used on top or bottom flange of the beam. Beveled lip allows hanging from top flange where clearance is limited. May be installed with the set screw in the up or down position. Offset design permits unlimited rod adjustment by allowing the rod to be threaded completely through the clamp. The rear window design permits inspection of thread engagement.

Approvals: Underwriters Laboratories Listed **(cULus)** and Factory Mutual Engineering Approved **(FM)** for 3/8"-16 and 1/2"-13 rod sizes. Conforms to Federal Specification WW-H-171E & A-A-1192A, Type 23 and Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 19.
3/8"-16 is **(cULus)** Listed to support up to 4" (100mm) pipe with the set screw in the down position, up to 3" (75mm) pipe with the set screw in the up position.
1/2"-13 is **(cULus)** Listed to support up to 8" (200mm) pipe with the set screw in the down position, up to 6" (150mm) pipe with the set screw in the up position.
Factory Mutual Engineering Approved only with the setscrew in the down position.

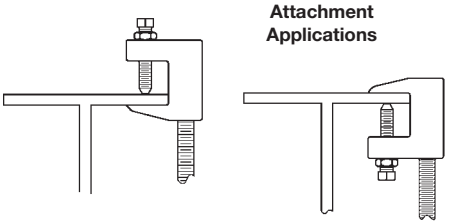
Finish: Plain. Contact Cooper B-Line for alternative finishes and materials.

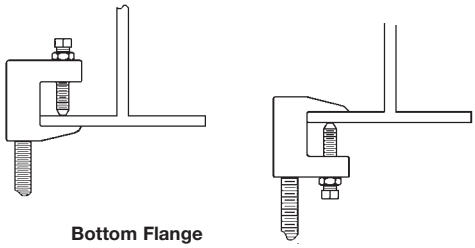
Order By: Figure number, rod size and finish

Setscrew Torque: Per MSS SP-58 14.2.5
3/8" -16 set screws = 5 ft./lbs. • 1/2" -13 set screws = 11 ft./lbs.
Caution should be taken not to over-tighten set screws.



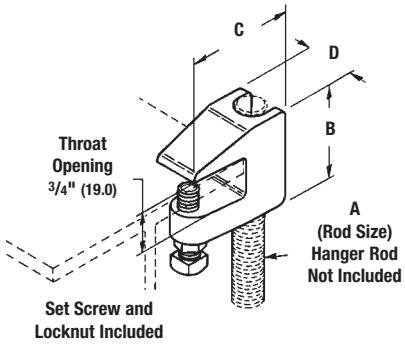
Top Flange Attachment Applications





Bottom Flange Attachment Applications

B3034-5/8" and B3034-3/4" sizes Attach only as shown.



Part No.	Rod Size A	Set Screw Size	B in.	B (mm)	C in.	C (mm)	D in.	D (mm)	Maximum Iron Pipe Size Per UL in.	Maximum Iron Pipe Size Per UL (mm)	Approx. Wt./100 Lbs.	Approx. Wt./100 (kg)
B3034-3/8	3/8"-16	3/8"-16 x 1 1/2"	1 5/8"	(41.3)	2"	(50.8)	7/8"	(19.0)	4"	(100)	30	(13.6)
B3034-1/2	1/2"-13	1/2"-13 x 1 1/2"	1 13/16"	(46.0)	2 3/16"	(55.6)	1 3/16"	(30.2)	8"	(200)	47	(21.3)
B3034-5/8	5/8"-11	1/2"-13 x 2"	1 3/4"	(44.5)	2 1/8"	(54.0)	1 1/4"	(31.7)	--	--	58	(26.3)
B3034-3/4	3/4"-10	1/2"-13 x 2"	2"	(50.8)	2 1/4"	(57.2)	1 1/4"	(31.7)	--	--	77	(35.0)

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

Fig. 69 - Beam Clamp Retaining Strap (Cooper B-Line B3367)

Size Range: 3/8"-16 thru 3/4"-10 rod
4" (101.6mm) thru 16" (406.4mm) lengths
Note: longer lengths are available consult factory

Material: Pre-Galvanized Steel

Function: To offer more secure fastening of various types of beam clamps to beam where danger of movement might be expected. NFPA 13 requires the use of retaining straps with all beam clamps installed in earthquake areas. Satisfies requirements of NFPA 13.

Important Note: Good installation practice of a retaining strap requires that the strap be held tightly and securely to all component parts of the assembly. Therefore a locking mechanism of some kind, such as a hex for the Fig. 69 will provide a more secure reliable installation.

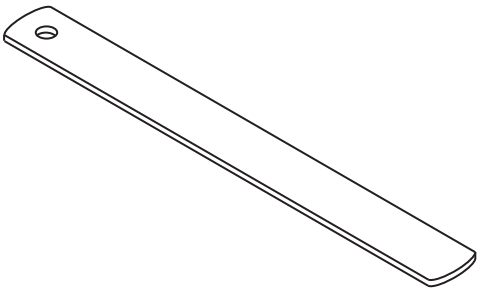
Approvals: Underwriters Laboratories Listed in the USA **(UL)** and Canada **(cUL).** Approved for use with any listed beam clamp.

Finish: Pre-Galvanized

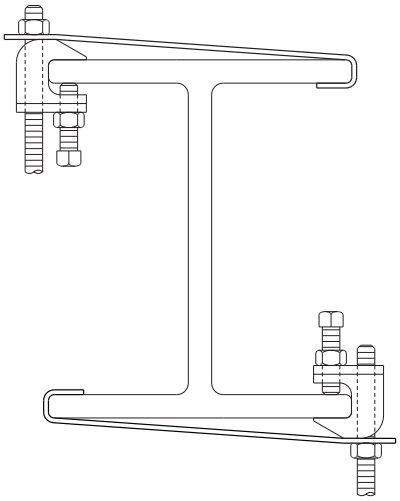
Order By: Figure number, length (L), and finish.

Note: Minimum return on strap is 1" (25.4mm)

For Use With: Any Cooper B-Line or TOLCO beam clamp.

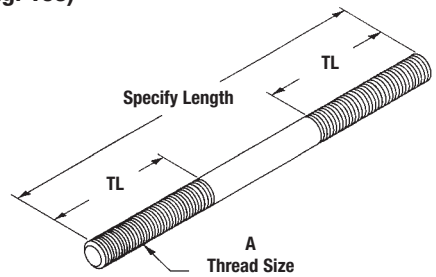


Part No.	Hole Dia. D in.	(mm)	Length
69-3/8-L	7/16"	(30.1)	Specify
69-1/2-L	9/16"	(30.1)	Specify
69-5/8-L	11/16"	(50.8)	Specify
69-3/4-L	13/16"	(63.5)	Specify



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

Fig. B3205 - Threaded Rod (right-hand threads - both ends) (TOLCO Fig. 103)
Fig. B3205L - Threaded Rod (right & left hand threads)



Size Range: 3/8"-16 thru 3"-4 rod

Material: Steel

Function: Recommended for use as a hanger support in hanger assemblies. Rod is threaded on both ends with right hand threads of the length shown. Also available with left and right hand threads - specify Fig. B3205L when ordering.

Maximum Temperature: 750°F (399°C)

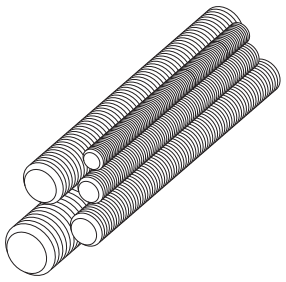
Finish: Plain. Contact Cooper B-Line for alternative finishes and materials.

Order By: Figure number, rod size, length and finish

Part No.	Thread Size A	Standard Thread Length TL		Design Load 650°F (343°C)		Design Load 750°F (399°C)	
		in.	(mm)	Lbs.	(kN)	Lbs.	(kN)
B3205-3/8 x 'L'	3/8"-16	2 1/2"	(63.5)	730	(3.25)	572	(2.54)
B3205-1/2 x 'L'	1/2"-13	2 1/2"	(63.5)	1350	(6.00)	1057	(4.70)
B3205-5/8 x 'L'	5/8"-11	2 1/2"	(63.5)	2160	(9.61)	1692	(7.52)
B3205-3/4 x 'L'	3/4"-10	3"	(76.2)	3230	(14.37)	2530	(11.25)
B3205-7/8 x 'L'	7/8"-9	3 1/2"	(88.9)	4480	(19.93)	3508	(15.60)

For larger sizes consult full line pipe hanger catalog.

Fig. ATR - All Threaded Rod (TOLCO Fig. 99 & Fig. 100)



Size Range: 3/8"-16 thru 1 1/2"-6 rod in 10' (3.05m) lengths

Material: Steel

Maximum Temperature: 750°F (399°C)

Finish: Plain. Contact Cooper B-Line for alternative finishes and materials.

Order By: Figure number, rod size, length and finish

Note: Fig. 99 is cut to length all threaded rod. Fig. 100 is full length.

Part No. & Size	Threads Per Inch	Recommended Load Lbs.	(kN)	Approx. Wt./100 Ft. Lbs.	(kg)
ATR 1/4" x 'L'	20	240	(1.07)	12	(5.44)
ATR 3/8" x 'L'	16	730	(3.24)	29	(13.15)
ATR 1/2" x 'L'	13	1350	(6.00)	53	(24.04)
ATR 5/8" x 'L'	11	2160	(9.60)	89	(40.37)
ATR 3/4" x 'L'	10	3230	(14.37)	123	(55.79)
ATR 7/8" x 'L'	9	4480	(19.93)	170	(77.11)

For larger sizes consult full line pipe hanger catalog.

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 (Cooper B-Line Fig. B3170NF)
Fig. 200F - "Trimline" Adjustable Band Hanger with Felt Lining (Cooper B-Line Fig. B3170NFF)
Fig. 200C - "Trimline" Adjustable Band Hanger with Plastic Coated (Cooper B-Line Fig. B3170NFC)
Fig. 200S - "Trimline" Adjustable Band Hanger with Non-Captured Nut

TOLCO

c UL us LISTED

FM APPROVED

Size Range:
Fig. 200 - 1/2" (15mm) thru 8" (200mm) pipe

Material: Steel, Pre-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" (15mm) thru 2" (50mm)) 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.
  For hanger with non-captured nut order Fig. 200S.
- (2 1/2" (65mm) thru 8" (200mm)) Spring tension on nut holds it securely in hanger before installation. Adjusting nut is easily removed.

Approvals: Underwriters Laboratories listed (1/2" (15mm) thru 8" (200mm)) in the USA **(UL)** and Canada **(cUL)** for steel and CPVC plastic pipe and Factory Mutual Engineering Approved **(FM)** (3/4" (20mm) thru 8" (200mm)). Conforms to Federal Specifications WW-H-171E & A-A-1192A, Type 10 and Manufacturers Standardization Society ANSI/MSS SP-69 & SP-58, Type 10.

Maximum Temperature: 650°F (343°C)

Finish: Pre-Galvanized. Stainless Steel materials will be supplied with (2) hex nuts in place of a knurl nut.

Order By: Figure number and pipe size

Designed to meet or exceed requirements of FM DS 2-0.

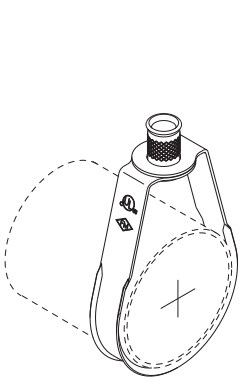


Fig. 200-1 to 200-2

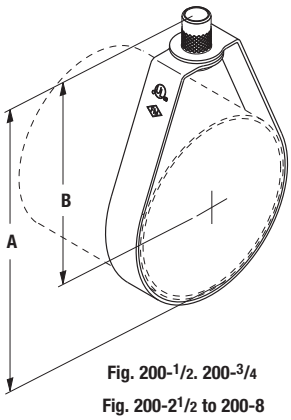


Fig. 200-1/2. 200-3/4
Fig. 200-2 1/2 to 200-8

Fig. 200C

Fig. 200F

Fig. 200

Part No.	Pipe Size in.	(mm)	Rod Size	A in.	(mm)	B in.	(mm)	Approx. Wt./100 lbs.	(kg)
200-1/2	1/2"	(15)	3/8"-16	3 1/8"	(79.4)	2 5/8"	(66.7)	11	(5.0)
200-3/4	3/4"	(20)	3/8"-16	3 1/8"	(79.4)	2 1/2"	(63.5)	11	(5.0)
200-1	1"	(25)	3/8"-16	3 3/8"	(85.7)	2 5/8"	(66.7)	12	(5.5)
200-1 1/4	1 1/4"	(32)	3/8"-16	3 3/4"	(94.0)	2 7/8"	(73.0)	13	(5.9)
200-1 1/2	1 1/2"	(40)	3/8"-16	3 7/8"	(98.4)	2 7/8"	(73.0)	14	(6.4)
200-2	2"	(50)	3/8"-16	4 1/2"	(114.3)	3"	(76.3)	15	(6.9)
200-2 1/2	2 1/2"	(65)	3/8"-16	5 5/8"	(142.9)	4 1/8"	(104.7)	27	(12.3)
200-3	3"	(75)	3/8"-16	5 7/8"	(149.1)	4"	(101.6)	29	(13.3)
200-3 1/2	3 1/2"	(90)	3/8"-16	7 3/8"	(187.3)	5 1/4"	(133.3)	34	(15.6)
200-4	4"	(100)	3/8"-16	7 3/8"	(187.3)	5"	(127.0)	35	(16.0)
200-5	5"	(125)	1/2"-13	9 1/8"	(231.8)	6 1/4"	(158.7)	66	(30.2)
200-6	6"	(150)	1/2"-13	10 1/8"	(257.2)	6 3/4"	(171.4)	73	(33.4)
200-8	8"	(200)	1/2"-13	13 1/8"	(333.4)	8 3/4"	(222.2)	136	(62.3)

Fig. 200S

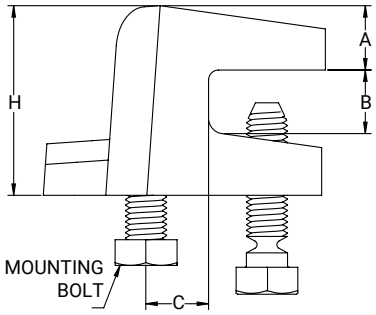
All dimensions in charts and on drawings are in inches. Dimensions shown in parentheses are in millimeters unless otherwise specified.

SECTION 3

Hanger and Bracing

ASC Engineered Solutions

Universal Structural Brace Attachment
Fig. AF720



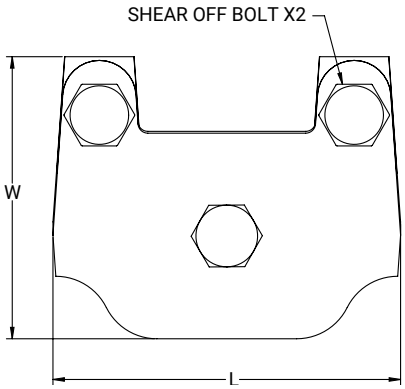


FIG. AF720: Weight and Installation Torque

Mounting Bolt Size (diam.)	A	B	L	W	H	Weight
	In./mm	In./mm	In./mm	In./mm	In./mm	Lbs/kg
½	0.78 19.8	0.75 19.1	4.22 107.2	3.43 87	2.31 58.7	3.28 1.49

Notes:

ASC Engineered Solutions™ brand bracing components are designed to be compatible ONLY with other ASC Engineered Solutions brand bracing components, resulting in a Listed seismic bracing assembly. Updated UL listing information may be viewed at www.ul.com and updated FM approval information may be viewed at www.approvalguide.com.

Material Specifications

Size Range
Flange Thickness: ⅛" – ¾"

Material
Ductile Iron with Carbon Steel Hardware

Finish
☐ Plain
☐ Electro-Galvanized per ASTM B633

Service
A seismic structural attachment designed to attach to steel I-beams, steel columns and joists. The AF720 rigidly braces piping systems subjected to horizontal and vertical seismic loads.

Approvals
cULus Listed (ANSI/UL 203a) & FM Approved (FM 1950-13). Complies with NFPA 13, ASCE 7, IBC, & MSS SP-127 bracing requirements.

Features
- The set screw provides a visual indication that proper installation has been achieved
- May be used as an acceptable alternative to the Fig. AF778 in all applications
- May be installed anywhere a Fig 92 standard throat beam clamp may be installed.
- Includes all hardware needed for installation to structure and to swivel attachment

Ordering
Specify figure number, åfinish, and description.

Seis Brace® Seismic Fire Protection Design Tool may be accessed at www.seisbrace.com

AFCON
An ASC Engineered Solution

PROJECT INFORMATION	APPROVAL STAMP
Project: Peirce CO. STEM Building	☐ Approved
Address: 1601 39th Ave SE, puyallup, WA 98374	☐ Approved as noted
Contractor: Shinn Fire protection Phone: 425-203-9800	☐ Not approved
Engineer: Ben Bernard Phone: 425-204-3945	Remarks:
Submittal Date: July 26, 2022	
Notes 1:	
Notes 2:	

Universal Structural Brace Attachment
Fig. AF720

FIG. AF720 cULus Listing per ANSI/UL 203a (ASD)

Structure	Load Orientation	Flange Thickness	Horizontal Load Rating at Brace Angle			
			30°-44°	45°-59°	60°-90°	Listed
		In./(mm)	Lbf/(kN)	Lbf/(kN)	Lbf/(kN)	Lbf/kN
Horizontal Steel Flange and Vertical Steel Flange	Parallel to Flange Perpendicular to Flange	0.1875–0.750 (4.76–19.05)	800 (3.56)	1131 (5.03)	1385 (6.16)	1600 (7.12)

1) Listed for installation with Fig. AF700, AF771, and AF076
2) Brace Angles are determined from Vertical.
3) Listed load ratings reduced for angle ranges in accordance with NFPA 13-2019 Table 18.5.2.3.
4) Minimum safety factor of 2.2 in accordance with NFPA 13-2019 Section A.18.5.2.3.

FIG. AF720 FM Approved (Listing) per FM 1950-13 (ASD)

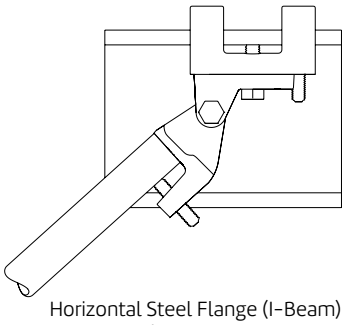
Structure	Load Orientation	Flange Thickness	Horizontal Load Rating at Brace Angle			
			30°-44°	45°-59°	60°-74°	75°-90°
		In./(mm)	Lbf/(kN)	Lbf/(kN)	Lbf/(kN)	Lbf/kN
Horizontal Steel Flange	Parallel to Flange	0.125–0.750 (3.18–19.05)	1280 (5.69)	1840 (8.18)	2210 (9.83)	2470 (10.99)
	Perpendicular to Flange		1570 (6.98)	1490 (6.63)	1040 (4.63)	1150 (5.12)
Vertical Steel Flange	Parallel to Flange		870 (3.87)	1440 (6.41)	1230 (5.47)	1360 (6.05)
	Perpendicular to Flange		1038 (4.58)	2260 (10.05)	2490 (11.08)	2750 (12.23)

1) Listed for installation with Fig. AF700 & AF771
2) Brace Angles are determined from Vertical.
3) Listed load ratings reduced for angle ranges in accordance with NFPA 13-2019 Table 18.5.2.3.
4) Minimum safety factor of 1.5 in accordance with NFPA 13-2016 Section A.9.3.5.2.3. To convert the load ratings above to a safety factor of 2.2 per NFPA 13-2019 Section A.18.5.2.3, multiply load ratings by a factor of 0.68.
5) To convert to LRFD Load Ratings, ASD Load Ratings may be multiplied by a factor of 1.5.

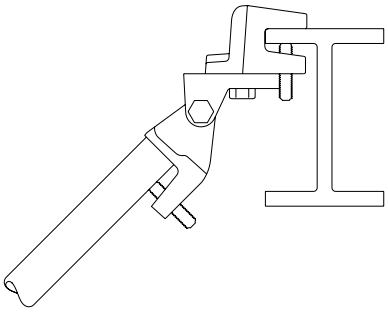
Installation Instructions

1. Place the AF720 on a horizontal or vertical steel flange.
2. Hand tighten the set screws until they contact the flange. Continue to torque the set screws until the heads break off.
3. Mount the AF700, AF771, or AF076 to the ½" mounting bolt. The mounting bolt shall be installed wrench tight (typically finger tight plus ¼ to ½ turns).

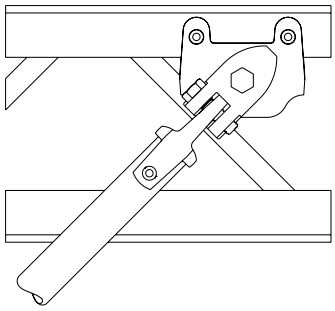
Notes: When installed with the AF700, AF771, or AF076, the lowest load rating at angle shall control the load rating of the assembly.



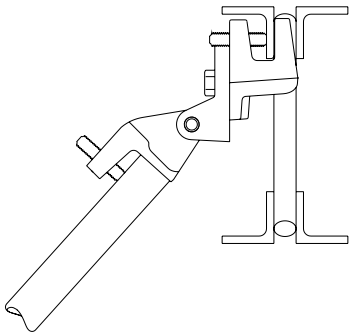
Horizontal Steel Flange (I-Beam)
Seismic Load Parallel to the Flange



Horizontal Steel Flange (I-Beam)
Seismic Load Perpendicular to the Flange



Vertical Steel Flange (Joist)
Seismic Load Parallel to the Flange



Vertical Steel Flange (Joist)
Seismic Load Perpendicular to the Flange

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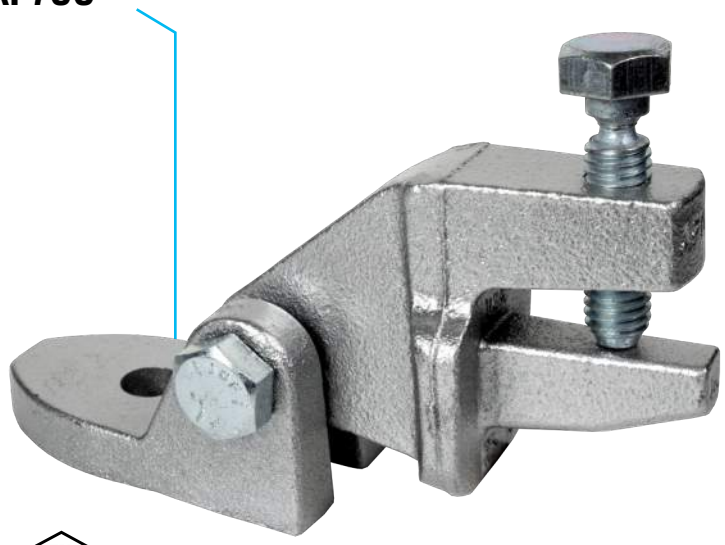
ASC Engineered Solutions

Universal Swivel Attachment
Fig. AF700



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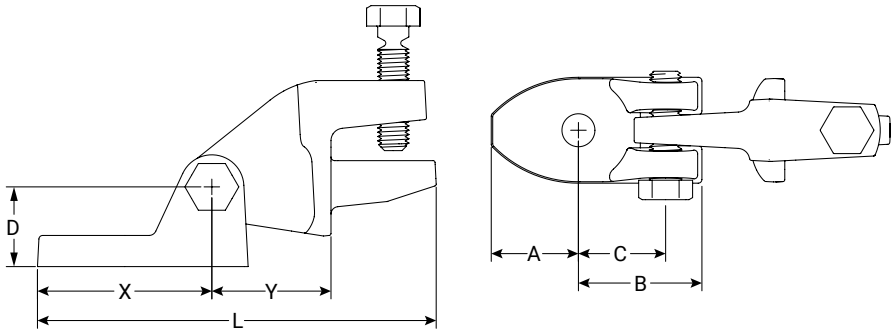

FIG. AF700 Dimensions and Weight

A	B	C	D	L	X	Y	Weight
In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	In./mm	lbs/kgs
1.40 35.56	1.983 50.37	1.400 35.56	1.280 32.51	6.40 162.6	2.80 71.1	1.91 48.5	2.25 1.02

Notes:

ASC Engineered Solutions™ brand bracing components are designed to be compatible ONLY with other ASC Engineered Solutions brand bracing components, resulting in a Listed seismic bracing assembly. Updated UL listing information may be viewed at www.ul.com and updated FM approval information may be viewed at www.approvalguide.com.

Material Specifications

Size Range
Brace Member: See Table
Anchors: ½"- ¾" (M12—M18)

Material
Ductile Iron with Carbon Steel Hardware

Finish
☐ Plain
☐ Electro-Galvanized per ASTM B633

Service
A seismic swivel attachment designed to connect a brace member to the building structure or to a seismic structural attachment. The AF700 rigidly braces piping systems subjected to horizontal and vertical seismic loads.

Approvals
cULus Listed (ANSI/UL 203a)), FM Approved (FM 1950-13), & FM Tested (FM 1950-16). FM Tested (ANSI/FM 1950-16). Complies with NFPA 13, ASCE 7, IBC, & MSS SP-127 bracing requirements.

Features
- The set screw provides a visual indication that proper installation has been achieved
- Eliminates brace member eccentricity by concentrically loading 1" and 1 ¼" brace pipes

Ordering
Specify figure number, fastener size, finish and description.

Seis Brace® Seismic Fire Protection Design Tool may be accessed at www.seisbrace.com

AFCON
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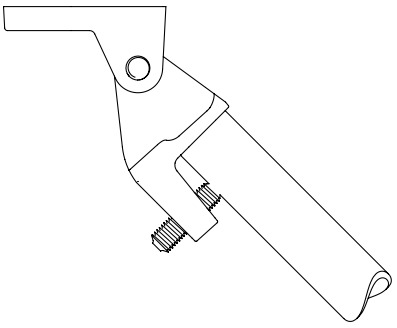
PROJECT INFORMATION	APPROVAL STAMP
Project: Peirce CO. STEM Building	☐ Approved
Address: 1601 39th Ave SE, puyallup, WA 98374	☐ Approved as noted
Contractor: Shinn Fire protection Phone: 425-203-9800	☐ Not approved
Engineer: Ben Bernard Phone: 425-204-3945	Remarks:
Submittal Date: July 26, 2022	
Notes 1:	
Notes 2:	

Universal Swivel Attachment
Fig. AF700

FIG. AF700 cULus Listing per ANSI/UL 203a (ASD)

Brace Member	Fastener Size	Horizontal Load Rating at Brace Angle			
		30°- 44°	45°- 59°	60°- 90°	Listed
1" – 2" Sch 40 Pipe (DN25 – DN50)	½"- ¾" (M12-M18)	942 lbf (4.19 kN)	1333 lbf (5.93 kN)	1632 lbf (7.26 kN)	1885 lbf (8.38 kN)

1) Load ratings may apply to NPFA 13 fastener orientations A, B, C, D, E, F, G, H, or I.
2) Brace Angles are determined from Vertical.
3) Listed load ratings reduced for angle ranges in accordance with NFPA 13-2019 Table 18.5.2.3.
4) See table below for listed brace members.
5) Minimum safety factor of 2.2 in accordance with NFPA 13-2019 Section A.18.5.2.3.

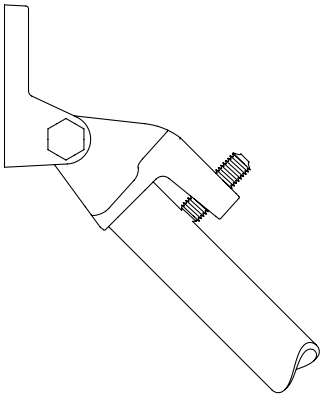


NFPA 13 Orientations A, B, or C

FIG. AF700 FM Approved (Listing) per FM 1950-13 (ASD)

Brace Member	Fastener Size	Horizontal Load Rating at Brace Angle			
		30°-44°	45°-59°	60°-74°	74°-90°
1" – 2" Sch 40 Pipe (DN25 – DN50)	½"- ¾" (M12-M18)	1780 lbf (7.92 kN)	2510 lbf (11.17 kN)	3080 lbf (13.70 kN)	3440 lbf (15.30 kN)

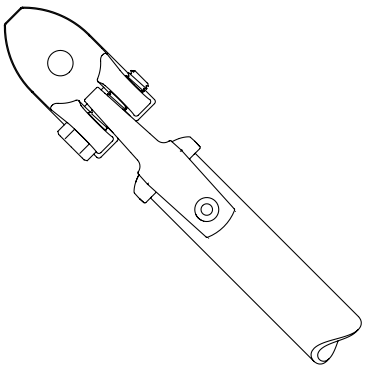
1) Load ratings may apply to NPFA 13 fastener orientations A, B, C, D, E, F, G, H, or I.
2) Brace Angles are determined from Vertical.
3) Listed load ratings reduced for angle ranges in accordance with NFPA 13-2019 Table 18.5.2.3.
4) See table below for listed brace members.
5) Minimum safety factor of 1.5 in accordance with NFPA 13-2016 Section A.9.3.5.2.3. To convert the load ratings above to a safety factor of 2.2 per NFPA 13-2019 Section A.18.5.2.3, multiply load ratings by a factor of 0.68.
6) To convert to LRFD Load Ratings, ASD Load Ratings may be multiplied by a factor of 1.5.



NFPA 13 Orientations D, E, or F

FIG. AF700 FM Listed, Approved & Tested Brace Members

Brace Member	Brace Size	Standard (or Equivalent)	UL	FM
Sch. 40 NPS Pipe	1", 1¼", 1½", 2"	ASTM A53, A106,A135, or A795	✓	✓
Sch. 40 Metric Pipe	DN25	KS S 3562	✓	✓
	DN32	EN10255H		✓
Metric Pipe	DN40	GB/T 3091		✓
	DN50	JIS G3454		✓



NFPA 13 Orientations G, H, or I

FIG AF700 Horizontal Prying Factors (Pr) Per NFPA 13: Angles (Deg)

Fastener Orientation	A	B	C	D	E	F	G	H	I
Brace Angle	30°-44°	45°-59°	60°-90°	30°-44°	45°-59°	60°-90°	30°-44°	45°-59°	60°-90°
AF700	2.55	1.09	0.91	1.41	1.45	2.00	1.83	1.29	1.06
AF700 w/ Metal Deck[1]	2.55	1.09	1.14	–	–	–	–	–	–
AF700 w/ Metal Deck[2]	2.75	1.11	1.14	–	–	–	–	–	–

1) Prying factors reflect the baseplate "B" dimension overhanging the edge of the metal deck. Used for DeWalt anchor loads.
2) Prying factors reflect the baseplate "A" or "B" dimension overhanging the edge of the metal deck. Used for NFPA & Hilti anchor loads.
3) Prying Factors calculated in accordance with NFPA 13-2019 Section A.18.5.12.2.

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Universal Swivel Attachment
Fig. AF700

Method 1 – Connection to Brace Member First

1. Slide the brace member over the lower jaw until it contacts the back wall.
2. Hand tighten the set screw until it contacts the brace member. Continue to torque the set screw until the head breaks off.
3. Rotate the brace assembly up to the fastener or the related seismic structural attachment and connect through the mounting hole.
4. Tighten per the fastener or structural attachment specifications.
5. Ensure the brace angle is within the range specified.

Notes: The cross bolt should be hand tight. For visual inspection, at least one thread should be exposed.

Method 2 – Connection to Structure First

1. Connect the AF700 to the fastener or the related seismic structural attachment.
2. Tighten per the fastener or structural attachment specifications.
3. Slide the brace member over the lower jaw until it contacts the back wall.
4. Hand tighten the set screw until it contacts the brace member. Continue to torque the set screw until the head breaks off.
5. Rotate the brace member until the brace angle is within the specified range.

Notes: The cross bolt should be hand tight. For visual inspection, at least one thread should be exposed..

Structural Attachments, Anchors, & Fasteners Listed, Approved, & Tested with the AF700

Structural Attachment	Structure
AF085	Steel Joist (Top Chord)
AF086	Horizontal Steel Flange (I-Beam Bottom Flange)
AF772	Horizontal Steel Flange (I-Beam Bottom Flange)
AF778	Horizontal Steel Flange (I-Beam Top or Bottom Flange) C-Channel (Top or Bottom Flange) Vertical Flange of a Joist (Top Chord)
AF779	All Structures with the Applicable Approved Anchor or Fastener
DeWalt Power-Stud®+ SD1	Cracked Concrete Cracked Concrete Filled Metal Deck
DeWalt Power-Stud®+ SD2	Cracked Concrete Cracked Concrete Filled Metal Deck
DeWalt Wood-Knocker®II+	Cracked Concrete
DeWalt Bang-It®+	Cracked Concrete Filled Metal Deck
DeWalt DDI+™	Cracked Concrete Filled Metal Deck
Anchors & Fasteners Per NFPA 13	Cracked Concrete Cracked Concrete Filled Metal Deck Steel Wood Saw Lumber or Glue-Laminated Timbers

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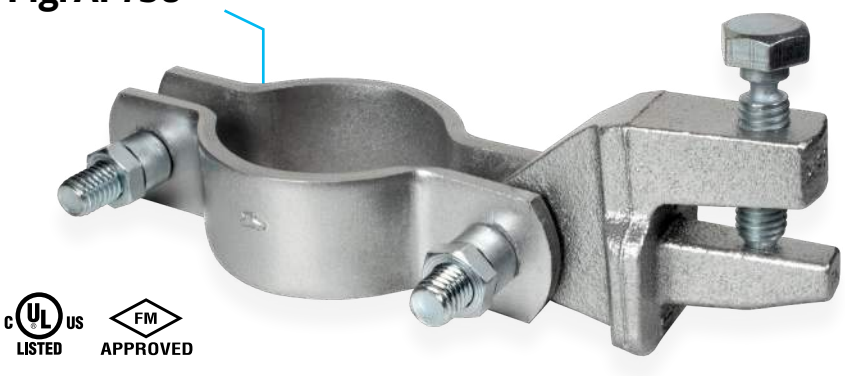
Longitudinal & Lateral Seismic Clamp
Fig. AF730



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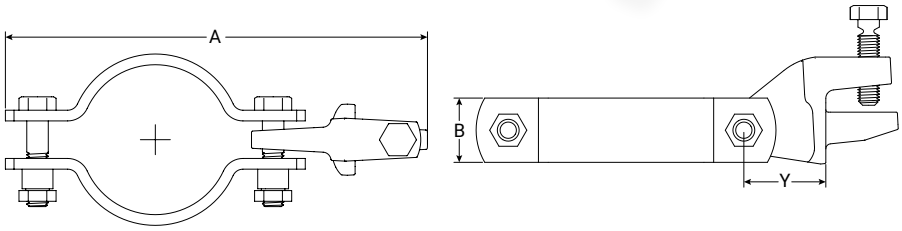

FIG. AF730 Dimensions and Weight

Size	A In./mm	B In./mm	Y In./mm	Weight lbs/kgs
1" (DN25)	7.6 193	1.50 38.1	1.91 48.5	2.49 1.13
1½" (DN32)	8.0 203			2.55 1.13
1½" (DN40)	8.2 208			2.64 1.20
2" (DN50)	8.7 221			2.78 1.26
2½"	9.2 234			2.92 1.32
3" (DN80)	9.8 249			3.13 1.42
4" (DN100)	10.8 274			3.38 1.53
5"	12.1 307			3.81 1.73
6"	13.2 335			4.12 1.87
8"	15.2 386			6.40 2.90
10"	18.1 460			7.60 3.45
12"	20.1 511			8.60 3.90

Notes:
ASC Engineered Solutions™ brand bracing components are designed to be compatible ONLY with other ASC Engineered Solutions brand bracing components, resulting in a Listed seismic bracing assembly. Updated UL listing information may be viewed at www.ul.com and updated FM approval information may be viewed at www.approvalguide.com.

Material Specifications

Size Range
Service Pipe Size: 1" – 12", DN25–DN100

Material
Carbon Steel Clamp and Hardware. Ductile Iron Brace Member Attachment Fitting.

Finish
- ☐ Plain
- ☐ Clamp: Hot Dipped Galvanized per ASTM A153
- ☐ Brace Member Attachment Fitting: Electro-Galvanized per ASTM B633

Service
A seismic longitudinal and lateral brace clamp designed to connect a piping system to a brace member. The AF730 rigidly braces piping systems subjected to horizontal and vertical seismic loads.

Approvals
cULus Listed (ANSI/UL 203a) and FM Approved (FM 1950–13). FM Tested (ANSI/FM 1950–16). Complies with NFPA 13, ASCE 7, IBC, & MSS SP–127 bracing requirements.

Features
- Torque off set screw and nuts provide a visual indication that the desired installation torque values have been achieved.

Ordering
Specify figure number, service pipe size, finish, and description.

Seis Brace® Seismic Fire Protection Design Tool may be accessed at www.seisbrace.com

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PROJECT INFORMATION	APPROVAL STAMP
Project: Peirce CO. STEM Building	☐ Approved
Address: 1601 39th Ave SE, puyallup, WA 98374	☐ Approved as noted
Contractor: Shinn Fire protection Phone: 425-203-9800	☐ Not approved
Engineer: Ben Bernard Phone: 425-204-3945	Remarks:
Submittal Date: July 26, 2022	
Notes 1:	
Notes 2:	

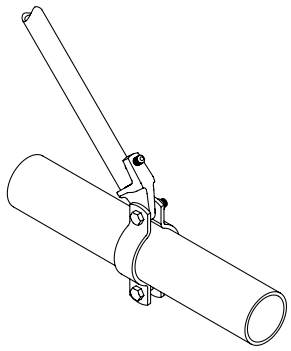
ASC Engineered Solutions

Longitudinal & Lateral Seismic Clamp
Fig. AF730

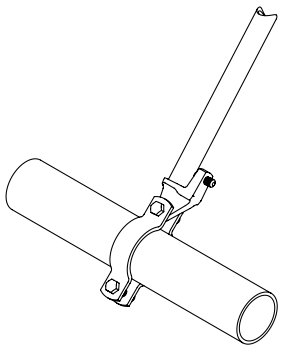
FIG. AF730 cULus Listing per ANSI/UL 203a (ASD)

Service Pipe Size	Standard Service Pipe	Specialty Service Pipe	Horizontal Load Rating at Brace Angle							
			Longitudinal Load Rating				Lateral Load Rating			
			30°-44°	45°-59°	60°-90°	Listed	30°-44°	45°-59°	60°-90°	Listed
			lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN
1" (DN25)	Sch. 10 Sch. 40 Metric Pipe	Mega-Thread MLT / GL Eddy Thread EZ-Thread	340 1.51	480 2.14	588 2.62	680 3.02	340 1.51	480 2.14	588 2.62	680 3.02
1¼" (DN32)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread EZ-Thread								
1½" (DN40)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread Fire-Flo EZ-Thread	375 1.67	530 2.36	649 2.89	750 3.34	375 1.67	530 2.36	649 2.89	750 3.34
2" (DN50)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread Fire-Flo EZ-Thread								
2½"	Sch. 10 Sch. 40	Mega-Flow Eddy Flow Fire-Flo	545 2.42	770 3.43	943 4.19	1090 4.85	545 2.42	770 3.43	943 4.19	1090 4.85
3" (DN80)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow Eddy Flow Fire-Flo								
4" (DN100)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow Eddy Flow Fire-Flo								
5"	Sch. 10 Sch. 40	–								
6"	Sch. 10 Sch. 40	Mega-Flow	942 4.19	1333 5.93	1632 7.26	1885 8.38	942 4.19	1333 5.93	1632 7.26	1885 8.38
8"	Sch. 10 0.188" Wall Sch. 40	–								
10"	0.188" Wall Sch. 40	–								

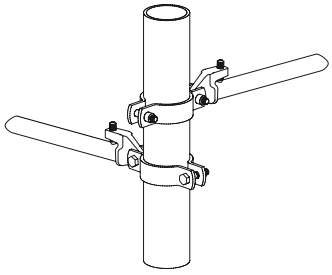
Brace Angles are determined from Vertical.
Sch. 10 & 0.188" Wall Load Ratings may be used for any thicker wall pipe of the same diameter.
Listed load ratings reduced for angle ranges in accordance with NFPA 13-2019 Table 18.5.2.3.
See table on page 4 for UL listed specialty pipes & UL Listed metric service pipes.
See table on page 4 for UL listed brace members.
Load ratings include a minimum safety factor of 2.2 in accordance with NFPA 13-2019 Section A.18.5.2.3.
All load ratings may be used for NFPA 13-2016 designs.



Longitudinal Application



Lateral Application



Riser Application

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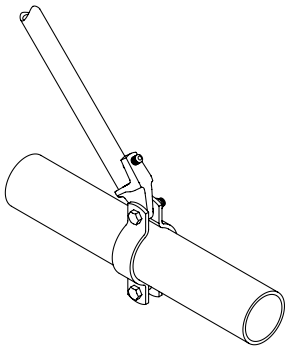
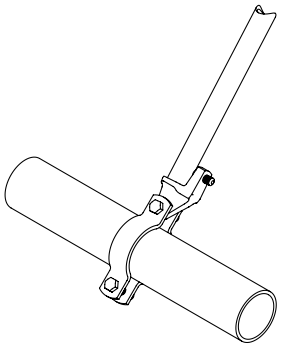
Longitudinal & Lateral Seismic Clamp
Fig. AF730

FIG. AF730 FM Approved (Listing) per FM 1950-13 (ASD)

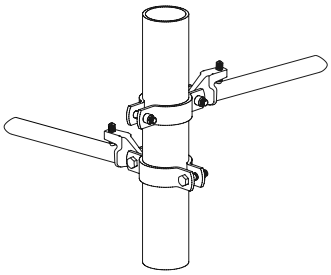
Service Pipe Size	Standard Service Pipe	Specialty Service Pipe	Horizontal Load Rating at Brace Angle							
			Longitudinal Load Rating				Lateral Load Rating			
			30°-44°	45°-59°	60°-74°	75°-90°	30°-44°	45°-59°	60°-74°	75°-90°
			lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN	lbf/kN
1" (DN25)	Sch. 10 Sch. 40 Metric Pipe	Mega-Thread MLT / GL Eddy Thread EZ-Thread	550 2.24	640 2.84	670 2.98	740 3.29	1740 7.74	2460 10.94	3010 13.39	3360 14.95
1¼" (DN32)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread EZ-Thread	740 3.29	680 3.02	820 3.65	1620 7.21	1430 6.36	2020 8.99	2480 11.03	2770 12.32
1½" (DN40)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread Fire-Flo EZ-Thread	800 3.56	650 2.89	790 3.51	1800 8.01	1790 7.96	2530 11.25	3100 13.79	3460 15.39
2" (DN50)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow MLT / GL Mega-Thread Eddy Flow Eddy Thread Fire-Flo EZ-Thread	830 3.69	990 4.4	1190 5.29	1620 7.21	1820 8.1	2580 11.48	3160 14.06	3530 15.7
2½"	Sch. 10 Sch. 40	Mega-Flow Eddy Flow Fire-Flo	800 3.65	700 3.11	850 3.78	1930 8.59	1610 7.16	2280 10.14	2790 12.41	3120 13.88
3" (DN80)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow Eddy Flow Fire-Flo	960 4.27	1330 5.92	1540 6.85	1700 7.56	1550 6.89	2200 9.79	2690 11.97	3010 13.39
4" (DN100)	Sch. 10 Sch. 40 Metric Pipe	Mega-Flow Eddy Flow Fire-Flo	760 3.38	1040 4.63	1270 5.65	1400 6.23	1260 5.6	1790 7.96	2190 9.74	2440 10.85
5"	Sch. 10 Sch. 40	–	890 3.96	1230 5.47	1410 6.27	1550 6.89	1260 5.6	1790 7.96	2190 9.74	2440 10.85
6"	Sch. 10 Sch. 40	Mega-Flow	700 3.11	940 4.18	1140 5.07	1310 5.83	950 4.23	1340 5.96	1640 7.3	1830 8.14
8"	0.188" Wall Sch. 40	–	990 4.4	1130 5.03	1360 6.05	1520 6.76	1540 6.85	2170 9.65	2660 11.82	2970 13.21
10"	0.188" Wall Sch. 40	–	1020 4.54	850 3.78	1000 4.45	1100 4.89	1700 7.56	2410 10.72	2950 13.12	3290 14.63
12"	0.188" Wall Sch. 40	–	970 4.31	1010 4.49	1220 5.43	1430 6.36	1690 7.52	2390 10.63	2930 13.03	3270 14.55



Longitudinal Application



Lateral Application



Riser Application

Brace Angles are determined from Vertical.

Sch. 10 & 0.188" Wall Load Ratings may be used for any thicker wall pipe of the same diameter.

Load ratings include a minimum safety factor of 1.5 in accordance with NFPA 13-2016 Section A.9.3.5.2.3. To convert the load ratings above to a safety factor of 2.2 per NFPA 13-2019 Section A.18.5.2.3, multiply load ratings by a factor of 0.68.

To convert to LRFD Load Ratings, ASD Load Ratings may be multiplied by a factor of 1.5.

See table on page 4 for FM approved metric service pipes.

See table on page 4 for FM approved brace members.

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Building connections that last™

Longitudinal & Lateral Seismic Clamp
Fig. AF730

Method 1 – Connection to Brace Member First

1. Slide the brace member over the lower jaw until it contacts the back wall of the brace member attachment fitting.
2. Hand tighten the set screw until it contacts the brace member. Continue to torque the set screw until the head breaks off.
3. Rotate the brace assembly to the service pipe. Unbolt the back nut & bolt and rotate the clamp halves over the service pipe. Re-assemble the nut and bolt.
4. Hand tighten the nuts on both sides of the clamp. Evenly and alternately torque the nut until the head breaks off. It is best practice to tighten the nut at the jaw side first.
5. Ensure the brace angle is within the range specified.

Method 2 – Connection to Service Pipe First

1. Unbolt the back nut & bolt and rotate the clamp halves over the service pipe. Re-assemble the nut and bolt.
2. Hand tighten the nuts on both sides of the clamp. Evenly and alternately torque the nut until the head breaks off. It is best practice to tighten the nut at the jaw side first.
3. Slide the brace member over the lower jaw until it contacts the back wall of the brace member attachment fitting.
4. Hand tighten the set screw until it contacts the brace member. Continue to torque the set screw until the head breaks off.

FIG. AF730 cULus Listed & FM Approved Brace Members

Brace Member	Sizes	Standards (or Equivalent)	UL Listed	FM Approved
Sch. 40 NPS Pipe	1", 1¼", 1½", 2"	ASTM A53, A106, A135, or A795	✓	✓
Sch. 40 Metric Pipe	DN25, DN32, DN40, DN50	KS D 3562	✓	✓
Metric Pipe		EN10255H		✓
		GB/T 3091		✓
		JIS G3454		✓

FIG. AF730 cULus Listed & FM Approved Metric Service Pipes

Brace Member	Service Pipe Sizes	UL Listed	FM Approved
KS D 3507 KS D 3537	DN25, DN32, DN40, DN50, DN 80, DN100	✓	✓
KS D 3562 Sch. 40		✓	✓
GB/T 3091 GB/T 3092			✓
JIS G3452			✓
EN 10255M			
EN 10255H			

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Building connections that last™

SAMMYS®

Sammy X-Press®

Installs into Metal Deck, Purlin, or Tubular Steel

DESCRIPTION/SUGGESTED SPECIFICATIONS

Sammy X-Press Revolutionizes The Pipe Handing Trades—

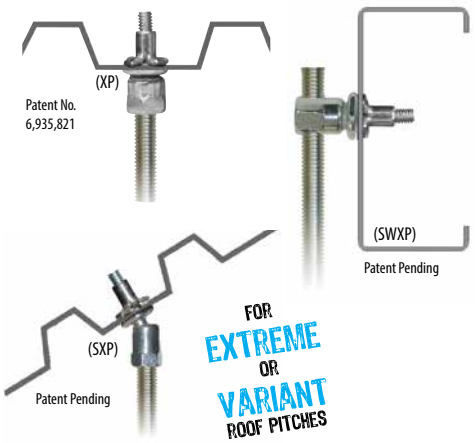
The Sammy X-Press® System is designed to provide direct attachment of threaded rod in metal deck (22-16 gauge) and thin gauge purlin (18-16 gauge), while providing reduced installation costs in terms of time and materials. The X-Press Anchors eliminate the need for costly "armovers" in pipe hanging installations. Current methods offered for thin gauge purlin require use of a time-consuming retaining nut on the threaded portion of the fastener to prevent pullout and are not designed for use in metal deck. In many instances, access to the backside of the installed fastener is prohibited by panel liner or roofing insulation. Sammy X-Press® anchors deliver the performance installers require without the use of a retaining nut!

The patent-pending X-Press Anchors consist of a threaded fastener and expandable sleeve. The X-Press System features an easy-to-install anchor with expanding anchoring strips that collapse to prevent pullout after installation. The Sammy X-Press® It Installation Tool assures a perfect installation every time offering the added convenience of one-tool efficiency – just drill and drive in seconds! SECONDS!

ADVANTAGES

- Installs in seconds, saving time & installation costs.
- Use in applications where access to the back of the installed fastener is prohibited. ie. metal roof deck, tubular steel, or vapor barrier fabric.
- Less jobsite material needed.
- No retaining nut required.
- Provides design flexibility.

Sammy's X-Press, Swivel and Sidewinder



The **Sammy X-Press** expands to provide direct vertical attachment in:

- Metal Deck (22-16 gauge)
- Z-Purlin (18-16 gauge)

The **Sammy X-Press Swivel** allows you to hang plumb in extreme roof pitches:

- 89° in Z-Purlin
- 45° in metal deck for 12/12 pitch

The **Sammy X-Press Sidewinder** expands to provide horizontal attachment in:

- 16 ga - 3/16" steel - purlin, tubular steel.

Sammy X-Press

APPLICATIONS

Sprinkler Systems

Pipes/Plumbing

Electrical Lighting and Fixtures

HVAC Equipment and Fixtures

APPROVALS

The X-Press System has earned the 9R21 and 25ES UL Listing.

INSTALLATION INSTRUCTIONS

1. Pre-Drill.

2. Insert Anchor.

3. Install.

INSTALLATION TOOL

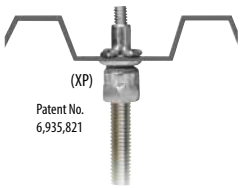
SAMMY X-PRESS IT® INSTALLATION TOOL

PART NUMBER	MODEL	DESCRIPTION	EACH QTY
8194910	UXPIT*	Universal X-Press It Tool	1
8152910	XPDB	25/64" Drill Bit	1

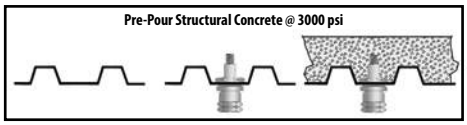
*Tool Includes: Sleeve, Bit Receiver, Hex Wrench, and 25/64" Drill Bit.

SELECTION CHART

SAMMYS X-Press Vertical Mount



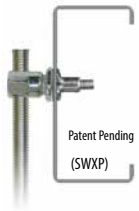
ROD SIZE	PART NUMBER	MODEL	DESCRIPTION	ULTIMATE PULLOUT (LBS)	TEST LOAD (LBS)	UL MIN THICK	TEST LOAD (LBS)	FM MIN THICK	MAX THICK	BOX QTY	CASE QTY	APPLICATION
1/4"	8181922	XP 200	X-Press 200	1146 (22 ga)	185 (Luminaire) 250 (Luminaire)	.027" .056"			.125"	25	125	Metal Deck
3/8"	8150922	XP 20	X-Press 20	1146 (22 ga)	850 (2½" Pipe) 185 (Luminaire) 250 (Luminaire) 283 (Conduit & Cable)	.027" .027" .056" .029"	940 (2" Pipe) 1475 (4" Pipe)	.029" .104"	.125"	25	125	Metal Deck
3/8"	8153922	XP 35	X-Press 35	1783 (16 ga)	1500 (4" Pipe) 85 (Luminaire) 250 (Luminaire) 416 (Conduit & Cable)	.060" .029" .056" .059"	940 (2" Pipe) 1475 (4" Pipe)	.029" .104"	.125"	25	125	Purlin
3/8"	8150922	XP 20	X-Press 20	1146 (22 ga)	850 (2½ Pipe)		Pre-Pour Structural Concrete@ 3000 psi Post-Pour Range II LWC≤ 35 PCF (lbs/ ft^3)			25	125	Metal Deck (Pre-Pour) Metal Deck (Post-Pour)



SAMMYS X-Press Swivel Head®

ROD SIZE	PART NUMBER	MODEL	DESCRIPTION	ULTIMATE PULLOUT (LBS)	TEST LOAD (LBS)	UL MIN THICK	TEST LOAD (LBS)	FM MIN THICK	MAX THICK	BOX QTY	CASE QTY	APPLICATION
3/8"	8295922	SXP 35	Swivel X-Press 35	1675 (16 ga Vertical) 1558 (89° Off Vertical)	1250 (3-1/2" Pipe) 250 vertical (Luminaire) 80 @ 90° (Luminaire) 500 vertical (Conduit & Cable) 333 @ 89° (Conduit & Cable)	.059"	635 (2" Pipe)	.029"	.125"	25	125	Purlin

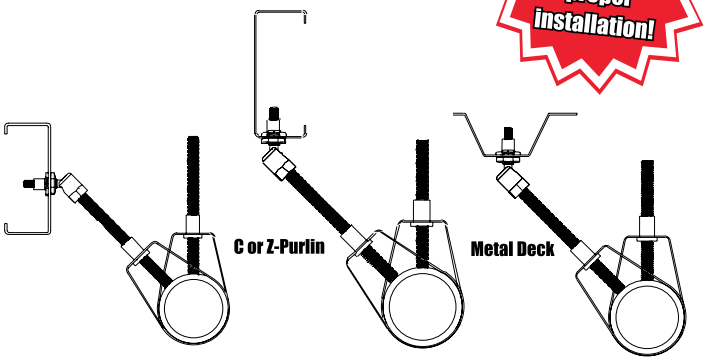
SAMMYS X-Press Horizontal Mount



ROD SIZE	PART NUMBER	MODEL	DESCRIPTION	ULTIMATE PULLOUT (LBS)	TEST LOAD (LBS)	TEST LOAD (LBS)	MIN THICK	MAX THICK	BOX QTY	CASE QTY	APPLICATION
3/8"	8293957	SWXP 35	Sidewinder X-Press 35	1798 (16 ga)	1250 (3½" Pipe) 80 (Luminaire) 416 (Conduit & Cable)		.060"	.125"	25	125	Purlin

SAMMYS X-Press for Seismic Restraint

Swivels to 45° to ensure proper installation!



DESCRIPTION

FEATURES

- Structural attachment and restraint component combined; ready for selected rod.
- Access to the back of fastener not required.
- Does not require use of a retaining nut.
- Quick and easy installation.

BENEFITS

- Reduced installation cost.
- Design flexibility.
- Less on site material (GO GREEN).
- Less material coordination.
- Aesthetically pleasing.

FOR 3/8" AND 1/2" RODS

SXP 35 FOR 3/8" ROD

Structural attachment for installation of branch/end of line restraint using 3/8" all thread (.299" OD) or end thread rod (.374" OD).

SXP 35 for 3/8" Rod: Designed for use in steel purlin ranging from 16 ga. through 1/8" in low slope or pitched roof designs (12/12).

The Swivels may be used to attach short length of rod to eliminate lateral sway bracing per NFPA 13, 9.3.5.3.8, (2007).

SPECIFICATIONS

TESTED TO ZONE 4 REQUIREMENTS
RICHTER 8.4 SCALE
TESTED TO SEISMIC DESIGN CATEGORIES C.D.E. & F

FOR 3/8" ROD

Restrained Pipe Size: Up to Schedule 40 pipe 2" or less

Max Length of Restraint Material: See Maximum Horizontal Load Tables below.

Maximum Angle: 45° from horizontal

Material: Carbon Steel

Screw Description: 1/4"-20 x 1-1/8" with expandable sleeve

Finish: Electro-Zinc

Testing: Tested to GR-63-CORE Standard for performance in structural steel in seismic restraint applications as outlined for use in NFPA 13 (2007), 9.3 at an independent test lab. The calculated force used for the testing was equal to that found in a Zone 4 and an 8.4 Richter scale seismic event.

Listing for 3/8" Rod: UL 203 listed as pipe hanger File EX 5098
- SXP 35 (16 ga.) 0-90° from horizontal - 3-1/2" Schedule 40 pipe
UL 203A File EX 15565

SELECTION CHART

SAMMYS X-Press Swivels – Seismic Restraint

ROD SIZE	PART NUMBER	MODEL	MIN THICKNESS	MAX THICKNESS	APPLICATION	BOX QTY	CASE QTY	INSTALLATION TOOL
3/8"	8295922	SXP 35	16 ga	1/8"	Purlin	25	125	The SWXP 35 must be installed with UXPIT Tool (Part No. 8194910); pre-drilling required.

PERFORMANCE TABLES

Maximum Rod Length for l/r=100, 200, 300, and 400

RESTRAINT SHAPE AND SIZE	NOMINAL DIAMETER	AREA (in.²)	LEAST RADIUS OF GYRATION, r (in.)	MAXIMUM ROD LENGTH FOR l/r (ft)			
				l/r = 100	l/r = 200	l/r = 300	l/r = 400*
Rods (all thread)	3/8 in.	0.07	0.075	0.6	1.3	1.9	2.5
	1/2 in.	0.129	0.101	0.8	1.7	2.5	3.4
Rods (threaded at ends only)	3/8 in.	0.11	0.094	0.8	1.6	2.4	3.1
	1/2 in.	0.196	0.125	1.0	2.1	3.1	4.2

Reference: NFPA 13, (2007) * Reference: NFPA 13, (2010)

DESCRIPTION (SIDEWINDER)

SWXP 35 FOR 3/8" ROD

Structural attachment for installation of branch/end of line restraint using 3/8" threaded rod. Used primarily in purlin, bar joist, or other steel structural members. These fastening systems provide a secure and economical attachment to the structure.

The SWXP 35 model provides upper structural attachment in a range of steel thicknesses, from 16 ga. through 1/8". An expandable sleeve is included with each fastener, eliminating need for retaining nut.

SPECIFICATIONS

Restrained Pipe Size:	Up to Schedule 40 pipe 2" or less
Max Length of Restraint Material:	See Maximum Horizontal Load Tables below.
Maximum Angle:	45° from horizontal
Material:	Carbon Steel
Screw Description:	1/4"-20 X 1-1/8" with expandable sleeve
Finish:	Electro-Zinc (cap & screw)
Testing:	BX Report # R-1362
Listing:	UL 203 as a pipe hanger UL 203A pending

SELECTION CHART

SAMMYS Sidewinders for Steel – Seismic Restraint

ROD SIZE	PART NUMBER	MODEL	MIN THICKNESS	MAX THICKNESS	APPLICATION	BOX QTY	CASE QTY	INSTALLATION TOOL
3/8"	8293957	SWXP 35	16 ga.	1/8"	Steel Purlin or Bar Joist	25	125	The SWXP 35 must be installed with UXPIT Tool (Part No. 8194910); pre-drilling required.

PERFORMANCE TABLES

Maximum Horizontal Loads for Restraint with l/r=100, 200, 300, and 400

RESTRAINT SHAPE AND SIZE	NOMINAL DIAMETER	AREA (in.^{2})	LEAST RADIUS OF GYRATION, r (in.)	MAXIMUM ROD LENGTH FOR l/r (ft)			
				l/r = 100	l/r = 200	l/r = 300	l/r = 400*
Rods (all thread)	3/8 in.	0.07	0.075	0.6	1.3	1.9	2.5
	1/2 in.	0.129	0.101	0.8	1.7	2.5	3.4
Rods (threaded at ends only)	3/8 in.	0.11	0.094	0.8	1.6	2.4	3.1
	1/2 in.	0.196	0.125	1.0	2.1	3.1	4.2

Reference: NFPA 13, (2007) * Reference: NFPA 13, (2010)

HILTI TECHNICAL BULLETIN

Date; February 28, 2018

Subject: KWIK HUS-EZ 3/8 X 2-1/8 I 1/2

Hilti has introduced a new version of the KWIK HUS-EZ I anchor. The KWIK HUS-EZ 3/8"X2 ½" I ½" anchor is a 3/8-in. diameter screw anchor with an internally threaded head for attachment of 1/2-in. diameter threaded rods. The tables below provide installation parameters and design load data in Normal Weight Concrete and Lightweight Concrete Over Metal Deck. The anchor is also approved by Factory Mutual for sprinkler pipe up to 8-in. in diameter. This product will be included in the next revision of ESR-3027.

The design tables in Tables 2 to 6 are Hilti Simplified Design Tables. The load values were developed using the design parameters and variables that are expected to be included in ESR-3027 and the equations of ACI 318-14 Chapter 17. For a detailed explanation of the Hilti Simplified Design Tables, refer to section 3.1.8 of Hilti Product Technical Guide Vol. 2 Ed. 17. Tables 7 to 11 are based on Canadian Limit State Design. Table 12 contains allowable loads for installations in Hollow Core Concrete Panels.

Figure 1 – KWIK HUS-EZ 3/8" X 2 1/8" I ½"

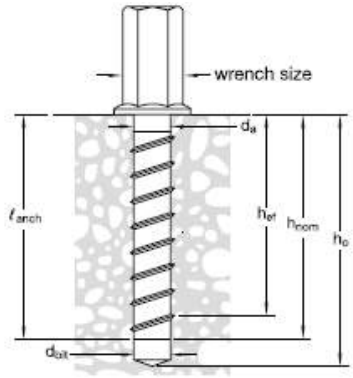


Figure 2 – KWIK HUS-EZ anchor installation details

Table 1 – KWIK HUS EZ I installation specifications

Setting information	Symbol	Units	Nominal anchor diameter
			3/8
Nominal bit diameter	d_{bit}	in.	3/8
Nominal embedment	h_{nom}	in.	2-1/8
Effective embedment	h_{ef}	in.	1.54
Minimum hole depth	h_o	in.	2-3/8
Minimum Base Material Thickness	h_{min}	in.	3-5/8
Installation torque	T_{inst}	ft.-lb.	40
Wrench size	-	in.	11/16
Hilti impact setting tools	-	-	SID 4-A22/18-A and SIW 22/18-A
Insert diameter	-	in.	1/2

Table 2 - Hilti KWIK HUS-EZ I design strength with concrete / pullout failure in uncracked concrete [1,2,3,4]

Nominal anchor diameter in.	Nominal embed. depth in. (mm)	Tension - ϕN_n				Shear - ϕV_n			
		f'_c = 2500 psi (17.2 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 6000 psi (41.4 MPa) lb (kN)	f'_c = 2500 psi (17.2 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 6000 psi (41.4 MPa) lb (kN)
3/8	2-1/8	1,490	1,630	1,885	2,305	1,605	1,755	2,030	2,485
	(54)	(6.6)	(7.3)	(8.4)	(10.3)	(7.1)	(7.8)	(9.0)	(11.1)

Table 3 - Hilti KWIK HUS-EZ I design strength with concrete / pullout failure in cracked concrete [1,2,3,4,5]

Nominal anchor diameter in.	Nominal embed. depth in. (mm)	Tension - ϕN_n				Shear - ϕV_n			
		f'_c = 2500 psi (17.2 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 6000 psi (41.4 MPa) lb (kN)	f'_c = 2500 psi (17.2 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 6000 psi (41.4 MPa) lb (kN)
3/8	2-1/8	1,055	1,155	1,335	1,635	1,135	1,245	1,435	1,760
	(54)	(4.7)	(5.1)	(5.9)	(7.3)	(5.0)	(5.5)	(6.4)	(7.8)

1 See Section 3.1.8.6 of Hilti Product Technical Guide Ed. 17 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Tabulated values are for a single anchor with a minimum edge distance 2-3/4 inches and minimum spacing of 4-5/8 inches. Compare table value to the steel value in Table 4. The lesser of the values is to be used for the design.

4 Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: For sand-lightweight, λ_a = 0.68. For all-lightweight, λ_a = 0.60.

5 Tabular values are for static loads only. For seismic tension loads, multiply cracked concrete tabular values by $\alpha_{N,seis}$ = 0.75: No reduction needed for seismic shear. See Section 3.1.8.7 of Hilti Product Technical Guide Ed 17 for additional information on seismic applications.

Table 4 - Steel design strength for Hilti KWIK HUS-EZ I anchors [1,2,6]

Nominal anchor diameter in.	Nominal internal thread diameter in.	Tensile [3] ϕN_{sa} lb (kN)	Shear [4] ϕV_{sa} lb (kN)	Seismic Shear [5] ϕV_{sa} lb (kN)
3/8	1/2-13 UNC	5,990 (26.6)	1,130 (5.0)	1,130 (5.0)

1 See Section 3.1.8.6 of Hilti Product Technical Guide Ed. 17 to convert design strength value to ASD value.

2 Hilti KWIK HUS-EZ I anchors are to be considered brittle steel elements.

3 Tensile $\phi N_{sa} = \phi A_{se,N} f_{uta}$ as noted in ACI 318-14 Ch. 17.

4 Shear values determined by static shear tests with $\phi V_{sa} < \phi\ 0.60\ A_{se,V} f_{uta}$ as noted in ACI 318-14 Ch. 17.

5 Seismic shear values determined by seismic shear tests with $\phi V_{sa} \leq \phi\ 0.60\ A_{se,V} f_{uta}$ as noted in ACI 318-14 Ch. 17. See Section 3.1.8.7 of Hilti Product Technical Guide Ed 17 for additional information on seismic applications.

6 Values are for threaded rod or insert with $F_u \geq 125$ ksi. For use with inserts with Fu less than 125 ksi multiply the shear values by the ratio of Fu of insert and 125 ksi.

Table 5 - Hilti KWIK HUS-EZ I in the soffit of uncracked lightweight concrete over metal deck [1,2,3,4,5,6]

Nominal anchor diameter in.	Nominal internal thread diameter in.	Nominal embed. depth in. (mm)	Installation in lower flute				Installation in upper flute			
			Tension - ϕN_n		Shear - ϕV_n		Tension - ϕN_n		Shear - ϕV_n	
			f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)
3/8	1/2-13 UNC	2-1/8 (54)	1,225 (5.4)	1,415 (6.3)	1,565 (7.0)	1,565 (7.0)	1,895 (8.4)	2,190 (9.7)	2,400 (10.7)	2,400 (10.7)

Table 6 - Hilti KWIK HUS-EZ I in the soffit of cracked lightweight concrete over metal deck [1,2,3,4,5,6]

Nominal anchor diameter in.	Nominal internal thread diameter in.	Nominal embed. depth in. (mm)	Installation in lower flute				Installation in upper flute			
			Tension - ϕN_n [7]		Shear - ϕV_n [7,8]		Tension - ϕN_n [7]		Shear - ϕV_n [7,8]	
			f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)	f'_c = 3000 psi (20.7 MPa) lb (kN)	f'_c = 4000 psi (27.6 MPa) lb (kN)
3/8	1/2-13 UNC	2-1/8 (54)	855 (3.8)	985 (4.4)	1,565 (7.0)	1,565 (7.0)	1,325 (5.9)	1,530 (6.8)	2400 (10.7)	2,400 (10.7)

1 See Section 3.1.8.6 of Hilti Product Technical Guide Ed. 17 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Tabular value is for one anchor per flute. Minimum spacing along the length of the flute is 6-3/8 inches.

4 Tabular values are lightweight concrete and no additional reduction factor is needed.

5 No additional reduction factors for spacing or edge distance need to be applied.

6 Comparison of the tabular values to the steel strength is not necessary. Tabular values control.

7 Tabular values are for static loads only. For seismic conditions $\alpha_{N,seis}$ = 0.75.

8 For seismic shear, an additional factor must be applied to the cracked concrete tabular values for seismic conditions: $\alpha_{V,seis}$, = 0.85
See Section 3.1.8.6 of Hilti Product Technical Guide Ed. 17 for additional information on seismic applications.

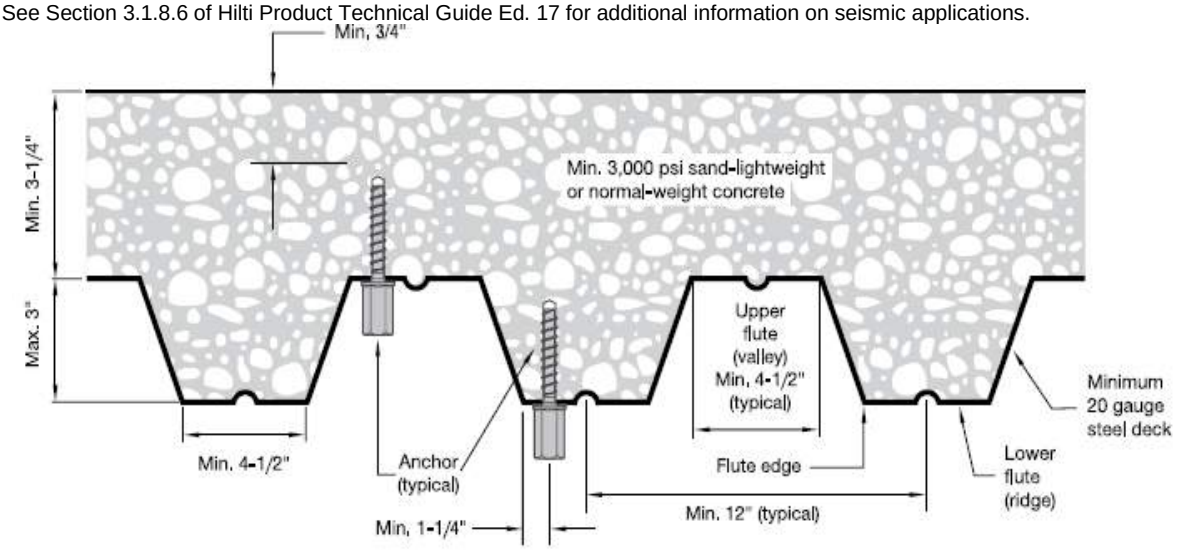


Figure 3 – Installations of KWIK HUS EZ I (KH-EZ I) in soffit of concrete over metal deck assemblies

Canadian Limit State Design

Limit State Design of anchors is described in the provisions of CSA A23.3-14 Annex D for post -installed anchors tested and assessed in accordance with ACI 355.2 for mechanical anchors and ACI 355.4 for adhesive anchors. Tables 7 to 11 of this section contains the Limit State Design tables with factored characteristic loads that are based on the loads that are expected to be published in ESR-3027. The factored resistance tables have characteristic design loads that are pre-factored by the applicable reduction factors for a single anchor with no anchor-to-anchor spacing or edge distance adjustments for the convenience of the user of this document. All the figures in the previous ACI 318-14 Chapter 17 design section are applicable to Limit State Design and the tables will reference these figures.

For a detailed explanation of the tables developed in accordance with CSA A23.3-14 Annex D, refer to Section 3.1.8 of the Hilti Product Technical Guide Ed. 17.

Table 7 - Hilti KWIK HUS-EZ I carbon steel screw anchor factored resistance with concrete / pullout failure in uncracked concrete [1,2,3,4,5]

Nominal anchor diameter in.	Nominal anchor diameter in.	Nominal embed. in. (mm)	Tension - N_r				Shear - V_r			
			f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)
3/8	3/8 (9.5)	2-1/8 (54)	1,595 (7.1)	1,785 (7.9)	1,955 (8.7)	2,260 (10.0)	1,595 (7.1)	1,785 (7.9)	1,955 (8.7)	2,260 (10.0)

Table 8 - Hilti KWIK HUS-EZ I carbon steel screw anchor factored resistance with concrete / pullout failure in cracked concrete [1,2,3,4,5]

Nominal anchor diameter in.	Nominal anchor diameter in.	Nominal embed. in. (mm)	Tension - N_r				Shear - V_r			
			f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 25 MPa (3,625 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 40 MPa (5,800 psi) lb (kN)
3/8	3/8 (9.5)	2-1/8 (54)	1,120 (5.0)	1,250 (5.6)	1,370 (6.1)	1,580 (7.0)	1,120 (5.0)	1,250 (5.6)	1,370 (6.1)	1,580 (7.0)

1 See Section 3.1.8.6 of Hilti Product Technical Guide Ed 17 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Tabulated values are for a single anchor with a minimum edge distance of 70mm (2-3/4 inches) and minimum spacing of 117mm (4-5/8 inches). Compare table value to the steel value in Table 9. The lesser of the values is to be used for the design.

4 Tabular values are for normal weight concrete only. For lightweight concrete multiply design strength by λ_a as follows: For sand-lightweight, λ_a = 0.68. For all-lightweight, λ_a = 0.60.

5 Tabular values are for static loads only. For seismic tension loads, multiply cracked concrete tabular values by $\alpha_{N,seis}$ = 0.75: No reduction needed for seismic shear. See Section 3.1.8.7 of Hilti Product Technical Guide Ed 17 for additional information on seismic applications.

Table 9 - Steel resistance for Hilti KWIK HUS-EZ I carbon steel screw anchor [1,2,6]

Nominal anchor diameter in.	Internal thread diameter (UNC)	Tensile[3] N_{sar} lb (kN)	Shear[4] V_{sar} lb (kN)	Seismic Shear[5] $V_{sar,eq}$ lb (kN)
3/8	1/2-13 UNC	5,515 (24.5)	1,040 (4.6)	1,040 (4.6)

1 See Section 3.1.8.6 of Hilti Product Technical Guide Ed 17 to convert factored resistance value to ASD value.

2 Hilti KWIK HUS-EZ I carbon steel screw anchors are to be considered brittle steel elements.

3 Tensile $N_{sar} = A_{se,N}\ \phi_s\ f_{uta}$ R as noted in CSA A23.3-14 Annex D.

4 Shear determined by static shear tests with $V_{sar} < 0.6\ A_{se,V}\ \phi_s\ f_{uta}$ R as noted in CSA A23.3-14 Annex D.

5 Seismic shear values determined by seismic shear tests with $V_{sar,eq} \leq 0.60\ A_{se,V}\ \phi_s\ f_{uta}$ R as noted in CSA A23.3-14 Annex D. See Section 3.1.8.7 of Hilti Product Technical Guide Ed17 for additional information on seismic applications.

6 Values are for threaded rod or insert with $F_u \geq 125$ ksi. For use with inserts with Fu less than 125 ksi multiply the shear values by the ratio of Fu of insert and 125 ksi.

Table 10 - Hilti KWIK HUS-EZ I in the soffit of uncracked lightweight concrete over metal deck [1,2,3,4,5,6]

Nominal anchor diameter in.	Nominal internal thread diameter in.	Nominal embed. depth in. (mm)	Installation in lower flute				Installation in upper flute			
			Tension - N_r		Shear - V_r		Tension - N_r		Shear - V_r	
			f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)
3/8	1/2-13 UNC	2-1/8 (54)	1,205 (5.4)	1,475 (6.6)	1,440 (6.4)	1,440 (6.4)	1,865 (8.3)	2,280 (10.1)	2,210 (9.8)	2,210 (9.8)

Table 11 - Hilti KWIK HUS-EZ I in the soffit of cracked lightweight concrete over metal deck [1,2,3,4,5,6]

Nominal anchor diameter in.	Nominal internal thread diameter in.	Nominal embed. depth in. (mm)	Installation in lower flute				Installation in upper flute			
			Tension - N_r		Shear - V_r		Tension - N_r		Shear - V_r	
			f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)	f'_c = 20 MPa (2,900 psi) lb (kN)	f'_c = 30 MPa (4,350 psi) lb (kN)
3/8	1/2-13 UNC	2-1/8 (54)	845 (3.8)	1,030 (4.6)	1,440 (6.4)	1,440 (6.4)	1,305 (5.8)	1,595 (7.1)	2,210 (9.8)	2,210 (9.8)

1 See Section 3.1.9.4 of Hilti Product Technical Guide Ed 17 to convert design strength value to ASD value.

2 Linear interpolation between embedment depths and concrete compressive strengths is not permitted.

3 Tabular value is for one anchor per flute across the flute. Minimum spacing along the length of the flute is the greater of 1.5 X flute width or 4 5/8 inches.

4 Tabular value is for lightweight concrete and no additional reduction factor is needed.

5 No additional reduction factors for spacing or edge distance need to be applied.

6 Comparison of the tabular values to the steel strength is not necessary. Tabular values control.

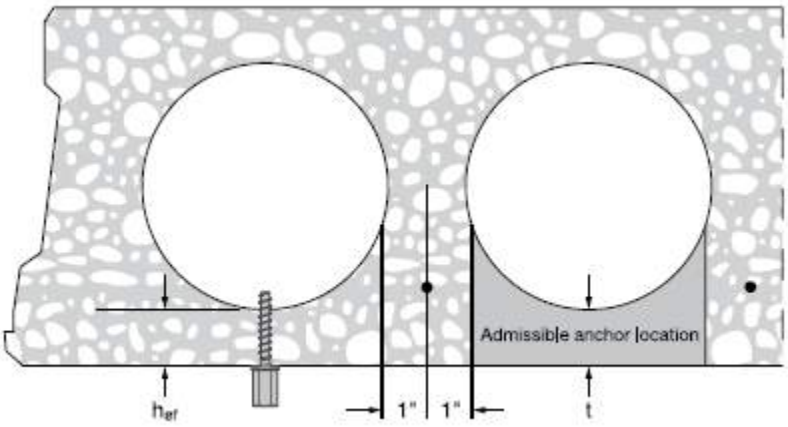
7 Tabular values are for static loads only. For seismic conditions $\alpha_{N,seis} = 0.75$

8 For seismic shear, an additional factor must be applied to the cracked concrete tabular values for seismic conditions: $\alpha_{v,seis}$, = 0.85 See Section 3.1.8.6 of Hilti Product Technical Guide Ed. 17 for additional information on seismic applications.

Table 12 - Hilti KWIK HUS-EZ I allowable stress tension design values for installation into hollow core concrete panels[1,2]

Hanger rod size	Minimum effective embedment h_{ef} in.	Allowable Tension Load[3] lb.	Ultimate Tension Load lb.
1/2-13 UNC	1-1/8	435	1750

Figure 4 – Installation of KWIK HUS-EZ I (KH-EZ I) in hollow core concrete panels



1 The admissible anchor location must be established to prevent damage to the prestressed cable during the drilling process. Verify the location and height of the cable with the hollow core plank supplier to confirm admissible anchor location.
2 Minimum compressive strength of prestressed concrete is 7,000 psi. Published ultimate loads represent the average results conducted in local base materials. Due to variations in materials and dimensional configurations, on-site testing is required to determine the actual performance.
3 Allowable loads calculated with a factor of safety of 4

Please feel free to contact our Engineering Technical Services department for more information or any questions.

Hilti Engineering Technical Services – United States
(877) 749-6337 toll free
hnatechnicalservices@hilti.com

Hilti Engineering Technical Services – Canada
(800) 363-4458 toll free
CATechnicalServices@hilti.com

SECTION 4

Miscellaneous

POTTER
The Symbol of Protection

BELLS

PBA-AC & PDC-DC

Features

- Listed for indoor and outdoor use
- Outdoor use requires BBK-1 or HC-BB weatherproof back box
- Indoor use mounts directly to standard 4” box
- Low current draw
- High dB output
- AC and DC models
- DC models are motor driven, polarized, and have built in transient protection for supervised alarm circuits
- Available in 6”, 8” and 10” sizes

UL, ULC*, FM** APPROVED

* ULC on PDC-DC Only
** FM on PBA-AC Only

Description

These vibrating type bells are designed for use as fire or general signaling devices. They have low power consumption and high decibel ratings. The unit mounts on a standard 4” (101mm) square electrical box for indoor use or on a model BBK-1 or HC-BB weatherproof backbox for outdoor applications. Weatherproof backbox model BBK-1 or HC-BB, Stock No. 1500001.

Notes

1. Minimum dB ratings are calculated from integrated sound pressure measurements made at Underwriters Laboratories as specified in UL Standard 464. UL temperature range is -30° to 150°F (-34° to 66°C)
2. Typical dB ratings are calculated from measurements made with a conventional sound level meter and are indicative of output levels in an actual installation.
3. ULC only applies to PDC-DC bells.

Size inches (mm)	Voltage	Model Number	Stock Number	Current (Max.)	Typical dB at 10 ft. (3m) (2)	Minimum dB at 10 ft. (3m) (1)
6 (150)	12VDC	PDC-6-12	1750500	200mA	96	76
8 (200)	12VDC	PDC-8-12	1750502	.200mA	96	77
10 (250)	12VDC	PDC-10-12	1750504	.200mA	96	78
6 (150)	24VDC	PDC-6-24	1750501	.20mA	95	77
8 (200)	24VDC	PDC-8-24	1750503	20mA	83	79
10 (250)	24VDC	PDC-10-24	1750505	20mA	85	80
6 (150)	24VAC	PBA246	1806024*	.17A	91	78
8 (200)	24VAC	PBA248	1808024*	.17A	94	77
10 (250)	24VAC	PBA2410	1810024*	.17A	94	78
6 (150)	120VAC	PBA1206	1806120*	.05A	92	83
8 (200)	120VAC	PBA1208	1808120*	.05A	99	84
10 (250)	120VAC	PBA12010	1810120*	.05A	99	86

All DC bells are polarized and have built-in transient protection. * Does not have ULC listing.

Technical Specifications

Dimensions	6” (150mm), 8” (200mm) and 10” (250mm)
Enclosure	Cover: Steel Finish: Red Powder Coat Base: non-corrosive composite material All parts have corrosion resistant finishes Model BBK-1 or HC-BB weatherproof backbox (optional)
Voltages Available	24VAC 120VAC 12VDC (10.2 to 15.6) Polarized 24VDC (20.4 to 31.2) Polarized
Environmental Limitations	Indoor or outdoor use (See Note 1) -40° to 150°F (-40° to 66°C) (Outdoor use requires weatherproof backbox.)
Termination	AC Bells - 4 No. 18 AWG stranded wires DC Bells - 18 AWG stranded wire
Service Use	NFPA 13, 72, local AHJ

*Specifications subject to change without notice.

⚠ WARNING

- Installation must be performed by qualified personnel and in accordance with all national and local codes and ordinances.
- Shock hazard. Disconnect power source before servicing. Serious injury or death could result.
- Risk of explosion. Not for use in hazardous locations. Serious injury or death could result.

⚠ WARNING

In outdoor or wet installations, bell must be mounted with weatherproof backbox, BBK-1 or HC-BB. Standard electrical boxes will not provide a weatherproof enclosure. If the bell and/or assembly is exposed to moisture, it may fail or create an electrical hazard.

Installation

The bell shall be installed in accordance with NFPA 13, 72, or local AHJ. The top of the device shall be no less than 90" AFF and not less than 6" below the ceiling.

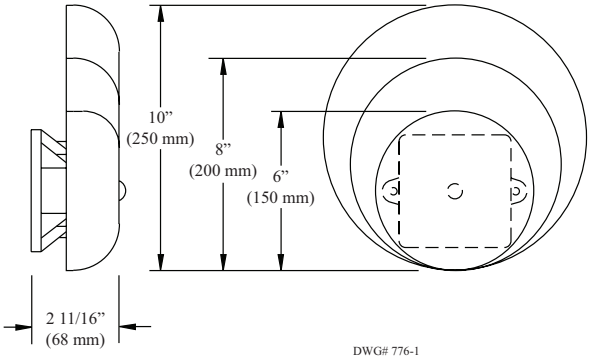
1. Remove the gong.
2. Connect wiring (see Fig. 3).
3. Mount bell mechanism to backbox (bell mechanism must be mounted with the striker pointing down).
4. Reinstall the gong (be sure that the gong positioning pin, in the mechanism housing, is in the hole in the gong).
5. Test all bells for proper operation and observe that they can be heard where required (bells must be heard in all areas as designated by the authority having jurisdiction).

⚠ WARNING

Failure to install striker down will prevent bell from ringing.

Bell Dimension Inches (mm)

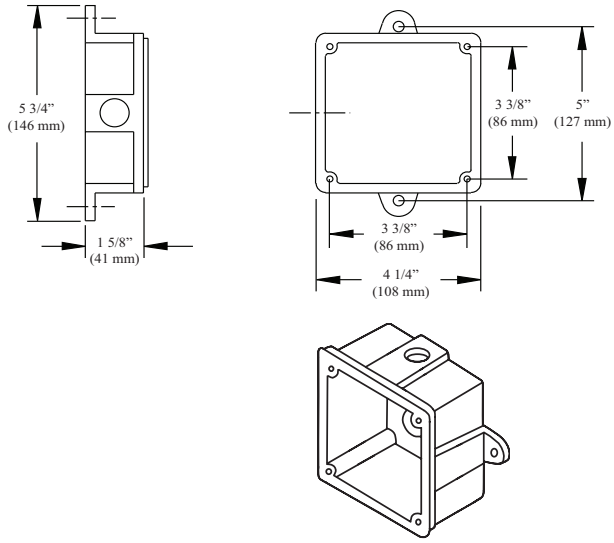
Fig 1



Weatherproof Backbox Dimensions Inches (mm)

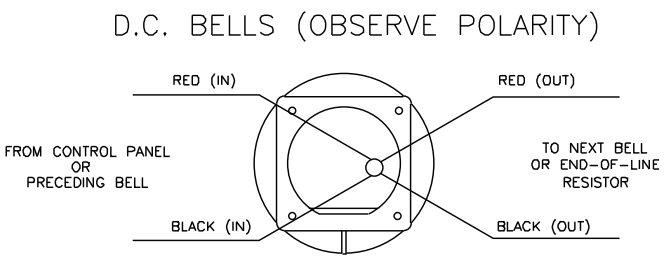
MODEL BBK-1 OR HC-BB

Fig 2



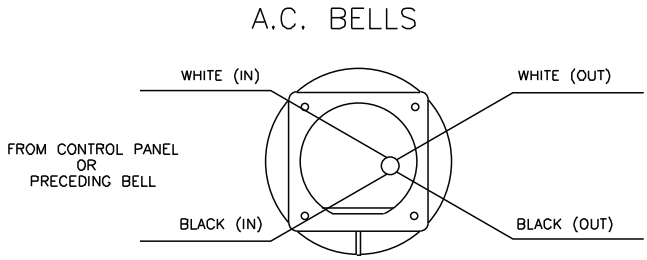
Wiring Rear View

Fig 3



NOTES:

1. OBSERVE POLARITY TO RING D.C. BELLS.
2. RED WIRES POSITIVE (+).
3. BLACK WIRES NEGATIVE (-).
4. EOL RESISTOR IS SUPPLIED BY FIRE ALARM CONTROL PANEL.



NOTES:

1. WHEN USING A.C. BELLS, TERMINATE EACH EXTRA WIRE SEPERATELY AFTER LAST BELL.
2. END-OF-LINE RESISTOR IS NOT REQUIRED ON AC BELLS .

Victaulic® VicFlex™ Sprinkler Fittings
Series AH1 and AH1-CC Braided Flexible Hose

10.95

Series AH1

Series AH1-CC

1.0 PRODUCT DESCRIPTION

Available Sizes by Component

- **Series AH1 0.8"/DN20 Nominal ID Braided Hose:** 31, 36, 48, 60, 72"/790, 914, 1220, 1525, 1830 mm. Note: length includes adapter nipple and 5.75"/140 mm straight reducer.
- **Series AH1-CC 0.8"/DN20 Nominal ID Braided Hose:** 31, 36, 48, 60, 72"/790, 914, 1219, 1525, 1830 mm. Note: length includes captured coupling and 5.75"/140 mm straight reducer.
- **Sprinkler Reducers**:
  - **Sprinkler Connections:** ½ and ¾"/15 and 20mm
  - **Straight Lengths:** 5.75, 9, 13"/140, 230, 330 mm
  - **90° Elbows:**
    - Short (typically used with concealed sprinklers)
    - Long (typically used with recessed pendent sprinklers)
    - Low Profile Short (for use with Style AB5, AB11, AB12, ABBA and ABMM Bracket)
    - Low Profile Long (for use with Style AB5, AB11, AB12, ABBA and ABMM Bracket)
- **Inlet Connections:**
  - 1"/25 mm Grooved IGS
  - 1"/25 mm NPT or BSPT adapter nipples for attaching to pipe and fittings outlined in NFPA standards.
  - ¾"/20 mm NPT or BSPT adapter nipples available for VdS.
  - 1 ¼"/32mm BSPT adapter nipples available for LPCB.

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

System No.		Location	
Submitted By		Date	

Spec Section		Paragraph	
Approved		Date	

1.0 PRODUCT DESCRIPTION (Continued)

- **Brackets:**
  - Style AB1 for suspended and hard-lid ceilings, allows installation before most ceiling tiles in place
  - Style AB2 for suspended and hard-lid ceilings, allows for vertical sprinkler adjustment, and installation before most ceiling tiles in place
  - Style AB3 for surface mount applications, wood, metal and block walls or ceilings
  - Style AB4 for hard-lid ceilings with hat furr ing channel grid systems, allows for vertical sprinkler adjustment
  - Style AB5 for hard-lid ceilings, allows for vertical sprinkler adjustment
  - Style AB7 for suspended and hard-lid ceilings
  - Style AB7 Adjustable for suspended and hard-lid ceilings
  - Style AB8 for hard-lid ceilings with CD 60/27 profile metal studs (regionally available)
  - Style AB10 for Armstrong® TechZone™ ceilings
  - Style AB11 for lay-in panel suspended t-grid ceilings or drywall suspended t-grid ceilings, allows for low profile installations (use only with 90° low profile elbows)
  - Style AB12 for suspended and hard-lid ceilings, allows for vertical sprinkler adjustment, and allows for low profile installation down to 4"/100mm
  - Style ABBA bracket for suspended, exposed, and hard-lid ceilings
  - Style ABMM bracket for surface mount and stand off-mount applications, wood, metal and block walls, or ceilings and hard-lid ceilings

Maximum Working Temperature

- 225°F/107°C

Maximum Working Pressure

- 200 psi/1375 kPa (FM Approval)
- 175 psi/1206 kPa (cULus Listed)
- 1600 kPa/232 psi (VdS/LPCB Approved)
- 1.4 MPa (CCC Approval)

Connections

- To adapter nipple (inlet) via
  - 1"/25.4 mm Grooved IGS
  - 1"/25.4 mm NPT or BSPT male thread
  - ¾"/20 mm BSPT male thread (VdS only)
  - 1 ¼"/32 mm BSPT male thread (LPCB only)
- To sprinkler head (outlet) via ½" or ¾"/15 mm or 20 mm

Minimum Bend Radius

- 7"/178 mm (FM/CCC Approval)
- 3"/76.2 mm (cULus Listed)
- 3"/76.2 mm (VdS/LPCB Approved)

Maximum Allowable Sprinkler K-Factors

- FM (½"/15mm reducer) K5.6/8,1 (S.I.), (¾"/20mm reducer) K14.0/20,2 (S.I.)
- cULus (½"/15mm reducer) K8.0/11,5 (S.I.), (¾"/20mm reducer) K14.0/20,2 (S.I.)
- VdS/LPCB (½"/15mm reducer) K5.6/8,1 (S.I.), (¾"/20mm reducer) K8.0/11,5 (S.I.)

2.0 CERTIFICATION/LISTINGS

3.0 SPECIFICATIONS – MATERIAL

Series AH1

- **Flexible Hose:** 300-series Stainless Steel
- **Collar/Weld Fitting:** 300-series Stainless Steel
- **Gasket Seal:** Victaulic EPDM
- **Isolation Ring:** Nylon
- **Nut and Nipple:** Carbon Steel, Zinc Plated
- **Reducer (½ or ¾"):** Carbon Steel, Zinc-Plated

Brackets: Carbon Steel, Zinc-Plated

Series AH1-CC

- **Flexible Hose:** 300-series Stainless Steel
- **Collar/Weld Fitting:** 300-series Stainless Steel
- **Gasket Seal:** Victaulic EPDM
- **Isolation Ring:** Nylon
- **Coupling Retainer Ring:** Polyethelene
- **Nut and Nipple:** Carbon Steel, Zinc Plated
- **Reducer (½"/15 mm or ¾"/20 mm):** Carbon Steel, Zinc-Plated
- **Housing:** Ductile iron conforming to ASTM A 536, Grade 65-45-12. Ductile iron conforming to ASTM A 395, Grade 65-45-15, is available upon special request.

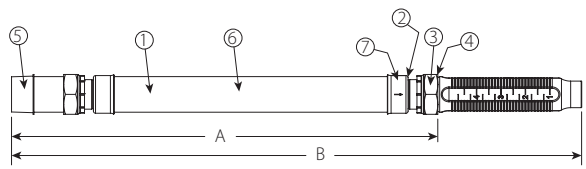
  Coupling Housing Coating:
  - Orange enamel (North America, Asia Pacific).
  - Red enamel (Europe).
  - Hot dipped galvanized.

  Gasket:[1]
  - **Grade "E" EPDM (Type A)**
    FireLock EZ products have been Listed by Underwriters Laboratories Inc., Underwriters Laboratories of Canada Limited, and Approved by Factory Mutual Research for wet and dry (oil free air) sprinkler services within the rated working pressure.

  [1] Services listed are General Service Guidelines only. It should be noted that there are services for which these gaskets are not compatible. Reference should always be made to the latest Victaulic Gasket Selection Guide for specific gasket service guidelines and for a listing of services which are not compatible.
- **Bolts/Nut:** Zinc electroplated carbon steel, trackhead meeting the physical and chemical requirements of ASTM A 449 and physical requirements of ASTM A 183.
- **Linkage:** CrMo Alloy Steel zinc electroplated per ASTM B633 Zn/Fe 5, Type III Finish.

4.0 DIMENSIONS

Product Details - Series AH1 Braided Hose

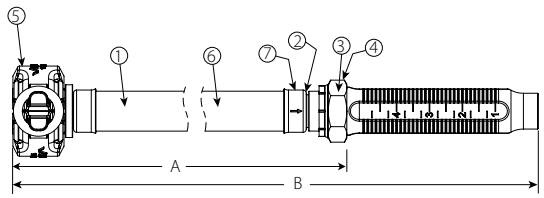


Item	Description
1	Flexible Hose
2	Isolation Ring
3	Gasket
4	Nut
5	Branch Line Nipple
6	Braid
7	Collar/Weld Fitting

Hose Length Dimensions

Hose Length inches mm	A inches mm	B inches mm
31/790	25.25/641	31/790
36/915	31.25/794	36/915
48/1220	42.25/1073	48/1220
60/1525	54.25/1378	60/1525
72/1830	66.25/1683	72/1830

Series AH1-CC



Item	Description
1	Flexible Hose
2	Isolation Ring
3	Gasket
4	Nut
5	Style 108 Coupling
6	Braid
7	Collar/Weld Fitting

Hose Length Dimensions

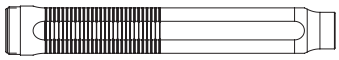
Hose Length inches mm	A inches mm	B inches mm
31/790	24.5/622	29.8/757
36/915	29.5/749	34.8/884
48/1220	41.5/1054	46.8/1189
60/1525	53.5/1359	58.8/1494
72/1830	65.5/1664	70.8/1798

4.1 DIMENSIONS

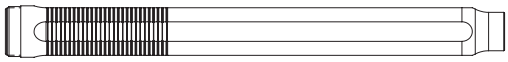
Standard Reducer

5.75"/140 mm straight reducer

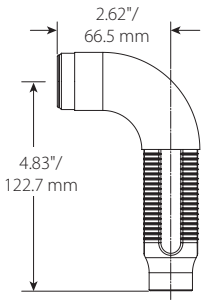
Optional Reducers



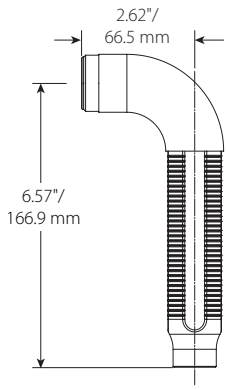
9.0"/229 mm straight reducer



13.0"/330 mm straight reducer



Short 90° elbow reducer

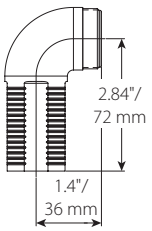


Long 90° elbow reducer

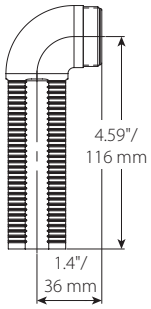
NOTE

- The Short 90° elbow reducer is typically used with concealed sprinklers while the longer 90 elbow is typically used in the installation of recessed pendent sprinklers.
- FM/VdS Approved Only.

Low Profile



Short 90° elbow reducer



Long 90° elbow reducer

NOTE

- Style AB11: When low profiles elbows are used with the Style AB11 bracket, the Low Profile Short Elbow is typically used with concealed sprinklers while the Low Profile Long Elbow is typically used in the installation of recessed pendent sprinklers.

4.2 DIMENSIONS

VicFlex Brackets

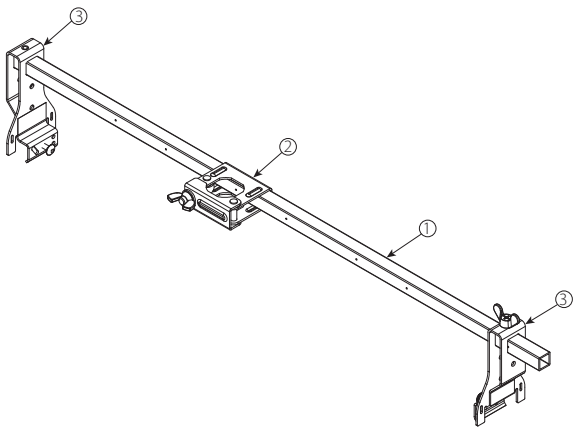
Style AB1

- Suspended Ceilings
- Hard-Lid Ceilings (FM Only)

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented Center Bracket
3	End Bracket

NOTE

- Both sizes FM/VdS/LPCB approved, cULus listed



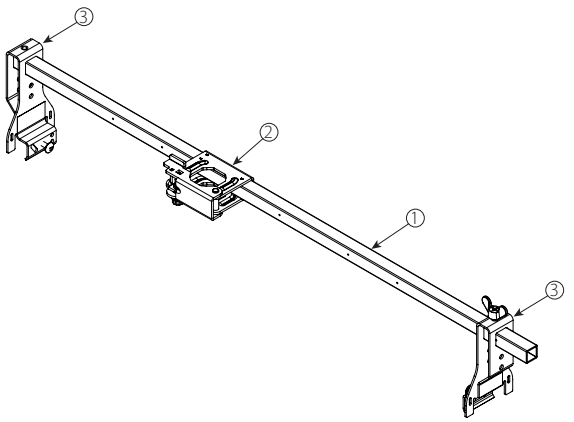
Style AB2

- Suspended Ceilings
- Hard-Lid Ceilings

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented Vertically Adjustable Center Bracket
3	End Bracket

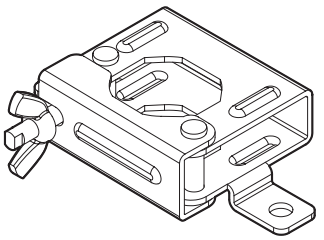
NOTE

- Both sizes FM/VdS/LPCB approved, cULus listed



Style AB3

- Surface Mount Applications
- FM/LPCB Approved



4.3 DIMENSIONS

VicFlex Brackets

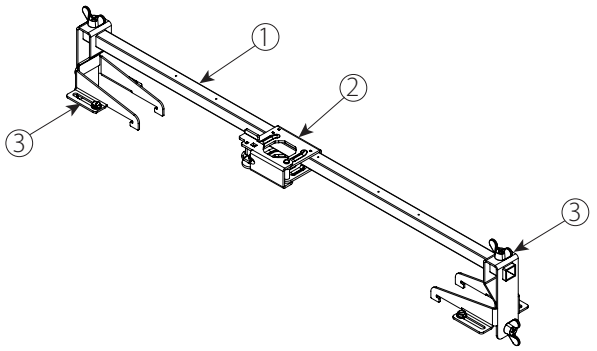
Style AB4

- Hard-Lid Ceilings with Hat furring channel grid system

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented Vertically Adjustable Center Bracket
3	End Bracket for Hat Furring Channel

NOTE

- Both sizes FM/VdS/LPCB approved, cULus listed



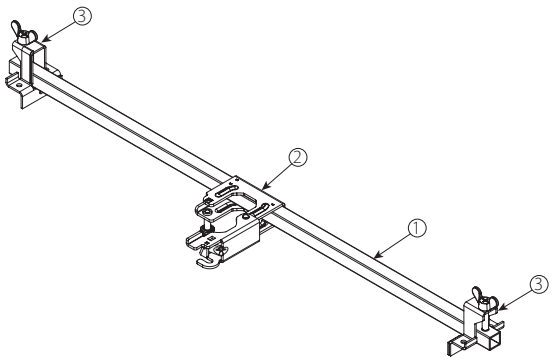
Style AB5

- Hard-Lid Ceilings

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented Vertically Adjustable Center Bracket
3	End Bracket

NOTE

- Both sizes FM/VdS/LPCB approved, cULus listed



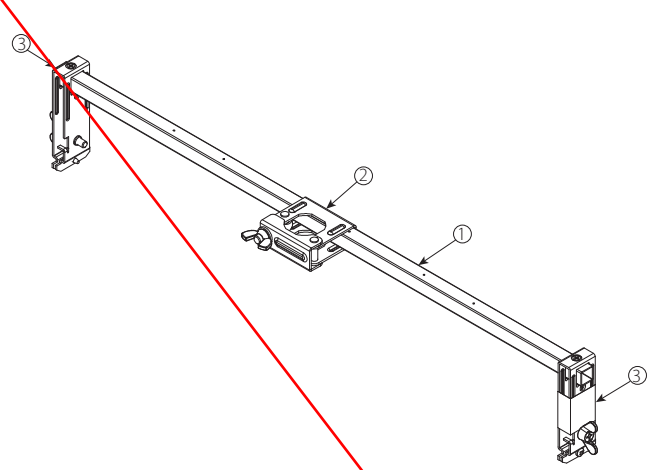
Style AB7

- Suspended Ceilings
- Hard-Lid Ceilings

Item	Description
1	24"/610 mm or 48"/1220 mm Square Bar
2	Patented 1-Bee2® Center Bracket
3	End Bracket

NOTE

- Both sizes FM/VdS/LPCB approved.



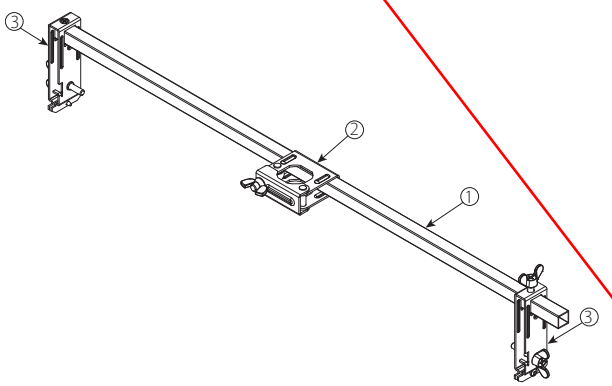
Style AB7 Adjustable

- Suspended Ceilings
- Hard-Lid Ceilings

Item	Description
1	700 mm or 1400 mm Square Bar
2	Patented 1-Bee2® Center Bracket
3	End Bracket (adjustable)

NOTE

- Both sizes FM/VdS/LPCB approved.

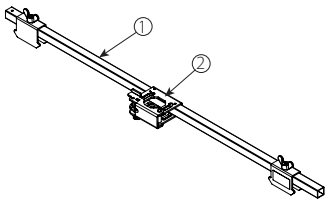


4.4 DIMENSIONS

VicFlex Brackets

Style AB8

- Hard-Lid Ceilings



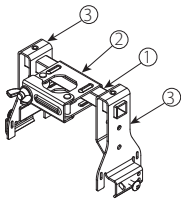
Item	Description
1	700 mm or 1400 mm Square Bar*
2	Patented Vertically Adjustable Center Bracket
3	*Both sizes FM/VdS

NOTE

- Both sizes FM/VdS/LPCB approved.

Style AB10

- Suspended ceilings
- Armstrong® TechZone™



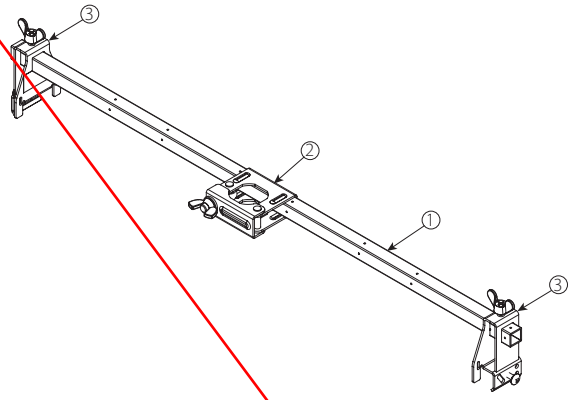
Item	Description
1	6"/152 mm Square Bar*
2	Patented 1-Bee2® Center Bracket
3	End Bracket

NOTE

- FM/VdS/LPCB approved, cULus listed.

Style AB11

- Suspended ceilings
- Hard-Lid ceilings



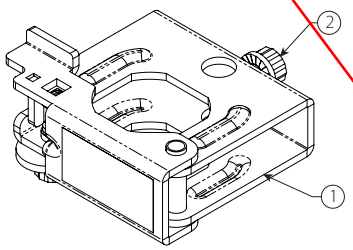
Item	Description
1	24"/610 mm or 48"/1219 mm Square Bar
2	Patented 1-Bee2® Center Bracket
3	End Bracket

NOTE

- FM/VdS Approved, cULus listed.

Style AB12

- Suspended ceilings
- Hard-Lid ceilings



Item	Description
1	Style AB12 Bracket Body
2	#2 Square Drive Set Screw

NOTE

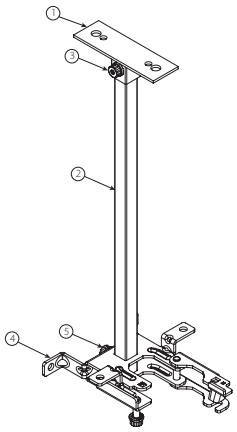
- FM/VdS Approved.

4.5 DIMENSIONS

VicFlex Brackets

Style ABBA

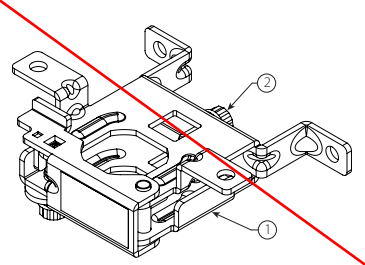
- Floor-above mount
- Cantilever mount
- Temporary mount in exposed ceilings



Item	Description
1	Style ABBA Mounting Plate
2	Style ABBA Square Bar
3	Cap Screw, Serated Flange, M6 x 1 x 20, T25 Torx Drive Recessed
4	Style ABMM Bracket Body
5	Cap Screw, Serated Flange, M6 x 1 x 15.24, T25 Torx Drive Recessed

Style ABMM

- Surface mount
- Stand-off mount



Item	Description
1	Style ABMM Bracket Body
2	Cap Screw, Serated Flange, M6 x 1 x 15.24, T25 Torx Drive Recessed

6.0 NOTIFICATIONS

WARNING

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

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

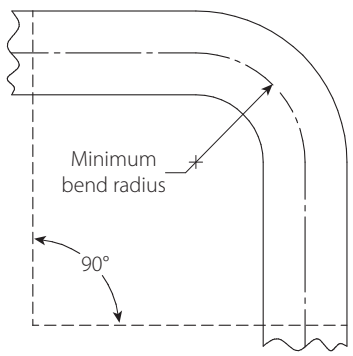
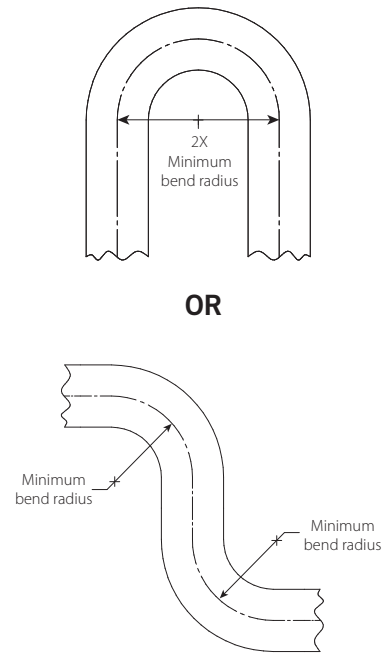
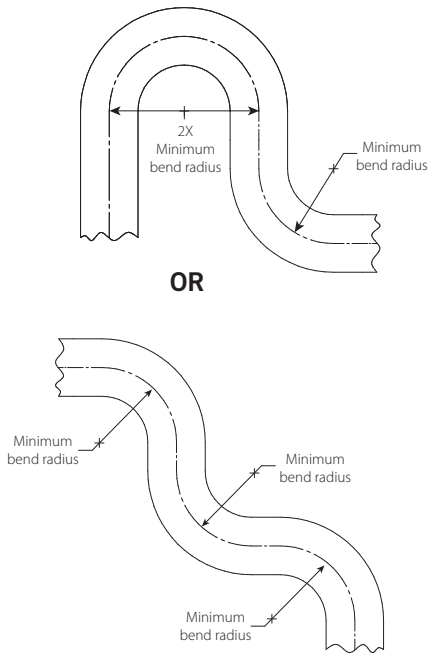
WARNING

- **It is the responsibility of the system designer to verify suitability of 300-series stainless steel flexible hose for use with the intended fluid media within the piping system and external environments.**
- **The effect of chemical composition, pH level, operating temperature, chloride level, oxygen level, and flow rate on 300-series stainless steel flexible hose must be evaluated by the material specifier to confirm system life will be acceptable for the intended service.**

Failure to follow these instructions could cause product failure, resulting in serious personal injury and/or property damage.

7.0 REFERENCE MATERIALS – CHARACTERISTICS

Flexible Hose In-Plane Bend Characteristics

One Bend	Two Bends	Three Bends
		

NOTE

- For out-of-plane (three-dimensional) bends, care must be taken to avoid imparting torque on the hose.

I-VicFlex-AB1-AB2-AB10

I-VicFlex-AB3

I-VicFlex-AB4

I-VicFlex-AB7

I-VicFlex-AB8

I-VicFlex-AB12

I-VicFlex-ABBA

I-VicFlex-ABMM

Inspectors Test Connections

Installed in the test line of sprinkler systems to test alarms by simulating the flow of water through a sprinkler.

• Model A — Blind Test Connection

Designed for installation in test lines of sprinkler systems that connect to open drains. Made of bronze with 1" NPT female pipe connections. Orifice gives flow equivalent to one nominal 1/2" (15mm) orifice sprinkler.
Length: 1 7/8" (48mm).
Maximum working pressure: 175psi (12bar).

• Model B — Sight Test Connection

Designed for installation on the drain side of the test valve in a test line that connects to a closed drain.
Made of cast iron with clear tube. Smooth bore non–corrosive orifice gives flow equivalent to one nominal 1/2" (15mm) orifice sprinkler. Has 1" NPT pipe connections.
Length: 5 1/16" (129mm).

• Model UA — Water Pressure Gauge

Range 0 to 300psi in 5psi increments, and 0 to 2000 kPa in 50kPa increments. 1/4" NPT (R1/4) male pipe connection. Case: 3¾" diameter (95mm). Height: 4 3/4" (121mm). Also available (not shown) with a range of 0 to 600psi (4000kPa) with 10psi (100kPa) increments.

Accuracy: ANSI B40.1 Grade B (3–2–3%)
Underwriters Laboratories Listed, UL file EX26795
Factory Mutual Approved

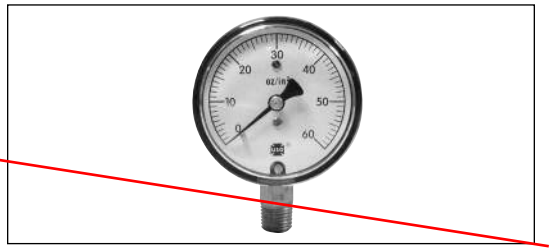
• Model UA — Air Pressure Gauge

Range 0 to 80psi in 1psi increments, and 0 to 550kPa in 10kPa increments. Retard to 250psi and 1750kPa. 1/4" NPT (R1/4) male pipe connection. Case: 3¾" diameter (95mm). Height: 4 3/4" (121mm).

Accuracy: ANSI B40.1 Grade B (3–2–3%)
Underwriters Laboratories Listed, UL file EX26795
Factory Mutual Approved

• Low Air Pressure Diaphragm Gauge

Range 0 to 60 oz. in 1 oz. increments, and 1/4" NPT (R 1/4) male pipe connection. Case: 1/2" diameter (63.5mm). Height: 3 1/2" (88.9mm).



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

Products manufactured and distributed by Reliable have been protecting life and property for almost 100 years.

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POTTER ROEMER FIRE PRO™
Member of Morris Group International™

CABINETS
VALVE CABINETS

Model/Series No.
1810 SERIES

SPECIFICATIONS

Manufactured of Galvannealed Steel, 20ga. recessed box (18ga. surface mounted box); 22ga. tubular steel door with 20ga. frame and continuous steel hinge. All components are powder-coated with an electrostatically-applied, thermally-fused, recoatable white polyester finish. All glass door styles provided with clear tempered safety glass. Wall mounting and size of cabinet as selected by model number.

REGULARLY FURNISHED

1810 Series - For use with 2-1/2" Fire Department Valve and 2 1/2" Cap

1810-10 Series - For 2 1/2" Valve, 2 1/2" x 1 1/2" Reducer and 1 1/2" Cap

1830 Series - For use with 2-1/2" Pressure Regulating Valve

MODEL SELECTION

- ☒ **1810** Recessed
- ☐ **1810-10** Recessed
- ☐ **1811** Trimless
- ☐ **1811-10** Trimless
- ☐ **1812** Semi-Recessed
- ☐ **1812-10** Semi-Recessed
- ☐ **1815** Surface
- ☐ **1830** Recessed
- ☐ **1831** Trimless
- ☐ **1832** Semi-Recessed
- ☐ **1835** Surface

PRODUCT OPTIONS

DOOR AND FRAME MATERIAL:

- ☒ -AL ALUMINUM: Clear Anodized Finish
- ☐ -SS STAINLESS STEEL: 304 w/ #4 Finish
- ☐ -PB BRASS: Polished Finish
- ☐ -BZ BRONZE: Call for Options

OPTIONAL FINISHES TO DOOR AND FRAME ABOVE:

- ☐ -ALUMINUM: Duranodic Finish
  - ☐ Light ☐ Medium ☐ Dark
- ☐ -STAINLESS STEEL: Finish as Specified
  - ☐ 304 w/ #6 Dull Satin ☐ 304 w/ #8 Mirror
- ☐ -RED: Powder Coat
- ☐ -CUSTOMER COLORS _____(Specify)

MODEL 1810-A (Shown)

PRODUCT OPTIONS (cont.)

CABINET MODIFICATIONS:

- ☒ -DANA TYPE: Frameless Concealed Hinge and Handle Construction (recessed cabinet only)
- ☐ -DP Duplex Cabinet
- ☐ -12 12" Deep Box

DOOR STYLES:

- ☐ -A Full Glass, w/ Tempered Safety Glass
- ☐ -B Break-Glass, w/ Lock & Break Rite® Handle
- ☐ -D Duo-Panel w/ Tempered Safety Glass
- ☐ -DV Duo-Vertical Panel w/ Tempered Safety Glass
- ☐ -DVL Duo-Vertical Panel w/ Lock, TSG & Break Rite® Handle
- ☐ -E Tempered Safety Glass (25 sq. in.) w/ Break Rite® Handle
- ☒ -F Flush Solid Metal
- ☐ -FS Flush Solid Metal w/ lock
- ☐ -J Insert Panel
- ☐ (Specify) Optional inserts for glass-style doors

**NOTE: DOOR STYLES -A, -D, -DV, -F, & -J PROVIDED w/ LEVER HANDLE/CAM LATCH

**NOTE: ALL GLASS DOOR STYLES PROVIDED WITH CLEAR TEMPERED SAFETY GLASS IN COMPLIANCE WITH ANSI Z97-1-1984

1810 SERIES Date: 11/18/2021

MEMBERSHIP

POTTER ROEMER/FIRE PRO
Headquarters:
P.O. Box 3527
City of Industry, CA
91744 U.S.A.
Los Angeles Area
800-366-3473
626-855-4890

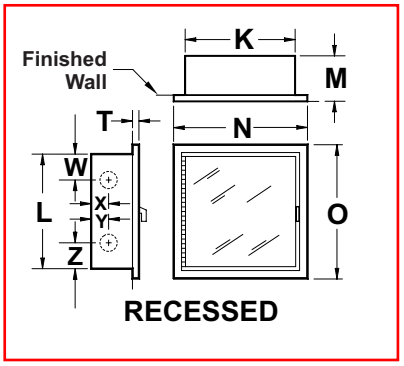
Also in:
New York (800) 526-4592
Chicago (800) 547-3473
Atlanta (800) 762-0542
Miami (833) 744-3473
Dallas (866) 644-3473

www.potterroemer.com

MODEL DIMENSIONS

Model No.	Wall Mounting	Inside Box Dimensions			Overall Frame		Wall Opening Required			Trim	Inlet Location				ADA
		K	L	M	N	O	WIDTH	HEIGHT	DEPTH	T	W	X	Y	Z	
1810	Reccessed	18	18	8	21-3/4	21-3/4	19	19	8-1/2	5/8	4	4	4	9	Yes
1811	Trimless	18	18	8-3/4	21	21	19	19	9-1/4	-	4	4	4	9	Yes
1812	Semi-Reccessed	18	18	8	21-1/2	21-1/2	19	19	6-1/2	2	4	4	4	9	Yes
1810-10	Reccessed	18	18	10	21-3/4	21-3/4	19	19	10-1/2	5/8	4	4	4	9	Yes
1811-10	Trimless	18	18	10	21	21	19	19	11-1/4	-	4	4	4	9	Yes
1812-10	Semi-Reccessed	18	18	10	21-1/2	21-1/2	19	19	12-1/2	2	4	4	4	9	Yes
1815	Surface	20	20	9-1/4	-	-	-	-	-	-	-	-	-	-	No
1830	Reccessed	24	24	10	27-3/4	27-3/4	25	25	10-1/2	5/8	12	4-3/4	-	-	Yes
1831	Trimless	24	24	10-3/4	27	27	25	25	11-1/4	-	12	4-3/4	-	-	Yes
1832	Semi-Reccessed	24	24	10	27-3/4	27-3/4	25	25	8-1/2	2	12	4-3/4	-	-	Yes
1835	Surface	26	26	11-1/4	-	-	-	-	-	-	-	-	-	-	No

ALL DIMENSIONS ARE IN INCHES UNLESS OTHERWISE NOTED



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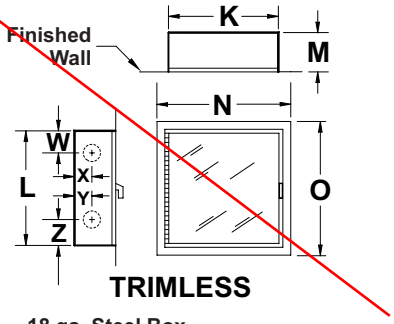

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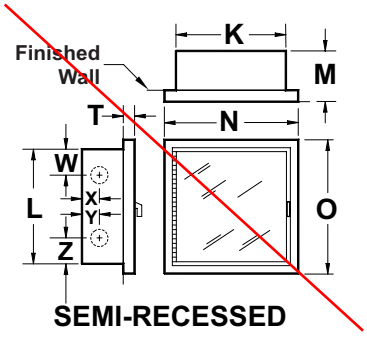

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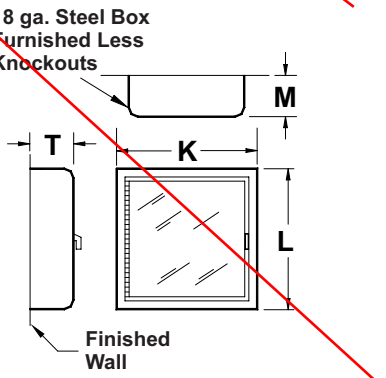

SURFACE

1810 SERIES

MEMBERSHIP

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P.O. Box 3527
City of Industry, CA
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www.potterroemer.com

August 2023

freezemaster™ ANTIFREEZE

TECHNICAL DATA SHEET

DESCRIPTION

Lubrizol's freezemaster™ antifreeze is a non-toxic, premixed antifreeze that is UL listed for use in wet fire sprinkler systems. It has a freezing point of -15°F(-26.1°C), and is formulated for corrosion protection in all piping systems including metal pipe and fittings. freezemaster™ antifreeze has been developed to meet stringent UL 2901 and NFPA 13, 13R, 13D and 25 fire standards.

Refer to the freezemaster™ antifreeze Installation Guide for specific listings, approvals, directions and limitations.

Minimum Use Temperature: -12°F (-24.4°C)
Maximum Use Temperature: 150°F (65.6°C)

NOTE: freezemaster™ antifreeze solution should only be used in areas subject to freezing unless otherwise permitted by the authority having jurisdiction (AHJ).

DESIGN APPLICATIONS

Flow rates, pipe sizing, sprinkler spacing, hanging methods and system design must be in accordance with NFPA 13, 13R and 13D. freezemaster™ antifreeze is not listed for use in protecting extra hazard occupancies or flammable liquids, or use with ESFR sprinklers.

SYSTEM LIMITATIONS

Fire sprinkler systems utilizing freezemaster™ antifreeze shall meet the system size limitations as follows:

Designation	Use Temp Range	Application	Max Volume of Antifreeze in Sprinkler System
Antifreeze	-12°F to 150° F (-24°C to 66°C)	NFPA 13D [1]	≤500 gal; in accordance with NFPA 13D design criteria
		NFPA 13R – Residential Only (including corridors, garages that serve only a single dwelling unit, and compartmented Ordinary Hazard areas ≤500 sq ft) [1] Where NFPA 13R requires the use of NFPA 13 design criteria, refer to the NFPA 13 applications and volume limitations.	≤500 gal; in accordance with NFPA 13R design criteria Where NFPA 13 design criteria is required in areas of an NFPA 13R Occupancy, such as an attic, use the applicable volume limitation for the hazard area for NFPA 13.
		NFPA 13 - Light Hazard [1]	≤200 gal; in accordance with NFPA 13 design criteria or >200 gal to ≤500 gal; in accordance with NFPA 13 using the dry system hydraulic design criteria, where the system hydraulics are designed as a dry system even though the system is filled with antifreeze.
		NFPA 13 – Ordinary Hazard Groups 1 & 2 [1]	≤40 gal; in accordance with NFPA 13 design criteria or >40 gal to ≤500 gal; in accordance with NFPA 13 using the dry system hydraulic design criteria, where the system hydraulics are designed as a dry system even though the system is filled with antifreeze
		NFPA 13 – Storage [1]	≤40 gal; in accordance with NFPA 13 design criteria

[1] The antifreeze solution is intended to be installed in accordance with the manufacturer's instructions. For all systems, the following requirements shall apply:(a) the use of the antifreeze solution is limited to the aboveground system piping only except for a limited length of underground piping that connects sections of the aboveground system, (b) the viscosity of the antifreeze solution at the lowest anticipated temperature of the system shall be considered in the hydraulic design, (c) the friction loss shall be determined using the Hazen-Williams formula for water and the Darcy-Weisbach formula to account for the antifreeze solution fluid properties, and (d) the K-factor of the sprinkler shall be adjusted to account for the density of the antifreeze.

freezemaster™ ANTIFREEZE

TECHNICAL DATA SHEET

PACKAGING

WEIGHT PER U.S. GALLON
9.1 lbs (4.1 kg)

PART NUMBER	DESCRIPTION
FRZ27-PP5P	freezemaster™ antifreeze -12°F 5-gallon pail
FRZ27-PTH55W	freezemaster™ antifreeze -12°F 55-gallon drum
FRZ27-T275B	freezemaster™ antifreeze -12°F 275-gallon tote

MAINTENANCE

freezemaster™ antifreeze can remain in the system all year. NFPA 25 requires that antifreeze be tested annually. A portable hydrometer or refractometer can be used to see if the solution has changed appreciably.

Store freezemaster™ antifreeze indoors in a cool, dry place. freezemaster™ antifreeze is non-hazardous. Dispose accordingly per SDS instructions.

TYPICAL PROPERTIES

APPEARANCE
Clear blue liquid

FREEZE POINT
-15°F (-26.1°C)

MINIMUM USE TEMPERATURE
-12°F (-24.4°C)

POUR POINT
-22.4°F (-30.2°C)

BURST POINT
-58°F (-50°C)

DENSITY AT 77°F (25°C)
1.085 g/cc

REFRACTIVE INDEX AT 77°F (25°C)
1.390

SPECIFIC GRAVITY AT 77°F (25°C)
1.088

FLUID EXPANSION/CONTRACTION
<5%

FBC SYSTEM COMPATIBLE

FBC™ System Compatible indicates that this product has been tested, and is monitored on an ongoing basis, to assure its chemical compatibility with FlowGuard Gold®, BlazeMaster® and Corzan® piping systems and products made with TempRite® Technology. The FBC System Compatible Logo, FBC™, FlowGuard Gold®, BlazeMaster®, Corzan®, and TempRite® are trademarks of Lubrizol Advanced Materials, Inc. or its affiliates.
20-0249050

UL CERTIFIED SAFETY

Lubrizol

freezemaster™ ANTIFREEZE

freezemaster™ Antifreeze UL-Listed Solution for Fire Sprinkler Systems

Product Summary

freezemaster™ antifreeze is a premixed freeze protection solution designed and UL-listed for use in wet sprinkler systems in residential and commercial applications. freezemaster™ antifreeze has an expanded listing based on additional testing at UL. freezemaster™ antifreeze is designed for use in freezing temperatures that can cause damage to equipment or prevent proper function of the sprinkler system. freezemaster™ antifreeze was developed to meet the requirements of UL 2901 for compliance with the current editions of NFPA 13, 13R, 13D and 25.

freezemaster™ antifreeze remains in a liquid state at temperatures as low as -12°F (-24.4°C). Once the sprinkler system activates, freezemaster™ antifreeze immediately discharges from the sprinklers and is followed by water. This technology provides a much more cost effective solution than dry pipe or heat trace systems. Moreover, there is not the delay that occurs between activation of the sprinkler and water reaching the sprinkler head in dry pipe systems. Lastly, freezemaster™ antifreeze provides superior corrosion resistance relative to other antifreeze products.

Allowable Temperature Range

Minimum use temperature: -12°F (-24.4°C)

Maximum use temperature: 150°F (65.6°C)

Note: freezemaster™ antifreeze solution should only be used in areas subject to freezing unless otherwise permitted by the authority having jurisdiction (AHJ).

Fire Performance

All fire protection systems using freezemaster™ antifreeze shall conform to local, state and NFPA requirements.

Safe Handling Procedures

freezemaster™ antifreeze has been formulated to reduce risks to humans and the environment. Gloves and eye protection are recommended when handling freezemaster™ antifreeze. For additional product information and a Safety Data Sheet, refer to freezemaster.com.

Typical Properties

Appearance

Blue liquid

Note: freezemaster™ antifreeze may slightly discolor due to exposure to higher temperatures and sunlight; however, this will not affect the performance of the solution.

Freeze Point

-15°F (-26.1°C)

Note: Freeze point is the temperature at which the first ice crystal forms in the fluid.

Pour Point

-22.4°F (-30.2°C)

Note: Pour point is the lowest temperature at which movement of the specimen is observed.

Burst Point

-58°F (-50°C)

Note: Burst point is the temperature at which frozen solution expands and may burst the vessel.

Density

See Table C, measured at atmospheric pressure of 760 mm

pH

7 – 8

Conductivity

4500 – 5500 µS/cm

Refractive Index

See Table A

Specific Gravity

See Table A

Viscosity

See Table B, measured at atmospheric pressure of 760 mm

Technical Data

Approvals

UL- and cUL-Certified
UL- and cUL-Listed
FBC™ System Compatible
FBC™ System Compatible indicates that this product has been tested, and is monitored on an ongoing basis, to assure its chemical compatibility with FlowGuard Gold®, BlazeMaster® and Corzan® piping systems and products made with TempRite® Technology. The FBC System Compatible logo, FBC™, FlowGuard Gold®, BlazeMaster®, Corzan®, and TempRite® are trademarks of Lubrizol Advanced Materials, Inc. or its affiliates.

Compatibility

The following materials have been tested per UL 2901 and are compatible with freezemaster™ antifreeze:

- Steel piping
- Galvanized steel piping
- Brass materials
- Stainless steel piping
- Black steel
- Copper
- Bronze
- Cast iron
- Fusion bonded epoxy coated ductile iron
- CPVC
- PEX
- EPDM
- Butyl rubber
- Natural rubber
- Nitrile rubber (NBR)
- Styrene-butadiene rubber (SBR)

NOTE

For use with other materials, contact your Piping System Consultant.

Table A:
Acceptable Property Ranges of freezemaster™ Antifreeze for Minimum Use Temperature -12°F (-24.4°C)

Concentration of freezemaster™ Antifreeze %	Specific Gravity at 68°F (20°C)	Refractive Index at 68°F (20°C)
100	1.087 – 1.093	1.390 – 1.394

Table B:
freezemaster™ Antifreeze Viscosity Across Temperature Ranges

Temperature °F (°C)	Viscosity, Centipoise
-12 (-24.4)	104
-10 (-23.3)	91
-5 (-20.6)	72
0 (-17.7)	55
5 (-15)	43
10 (-12.2)	36
15 (-9.4)	30
20 (-6.7)	25
25 (-3.9)	21
30 (-1.1)	19
35 (1.7)	16
40 (4.4)	13
45 (7.2)	11
50 (10)	9
55 (12.8)	8
60 (15.6)	7
68 (20)	6
150 (65.6)	2

Table C:
freezemaster™ Antifreeze Density

Temperature °F (°C)	Density		
	lb/gal	kg/m³	lb/ft³*
-12 (-24.4)	9.3	1115.3	69.6
-10 (-23.3)	9.3	1114.6	69.6
-5 (-20.6)	9.3	1112.9	69.5
0 (-17.7)	9.3	1111.2	69.4
5 (-15)	9.3	1109.5	69.3
10 (-12.2)	9.2	1107.8	69.2
15 (-9.4)	9.2	1106.2	69.1
20 (-6.7)	9.2	1104.5	69
25 (-3.9)	9.2	1102.8	68.8
30 (-1.1)	9.2	1101.1	68.7
35 (1.7)	9.2	1099.4	68.6
40 (4.4)	9.2	1097.7	68.5
45 (7.2)	9.1	1096	68.4
50 (10)	9.1	1094.4	68.3
55 (12.8)	9.1	1092.7	68.2
60 (15.6)	9.1	1091	68.1
68 (20)	9.1	1088.3	67.9
104 (40)	9	1076.2	67.2
150 (65.6)	8.9	1060.6	66.2

NOTES

*This column is used in the K-factor equation provided in the Hydraulic Calculations section.

Table D:
freezemaster™ Antifreeze Expansion

Tubing Size	Approximate Gallons of Fluid/100 ft			
	Steel Schedule 40 Pipe	PEX Tube	CPVC Pipe	Copper Pipe Type L
1/2 in.	–	1	–	1.5
3/4 in.	–	2	3.5	2.5
1 in.	4.5	3	5	4.5
1 1/4 in.	8	4.5	8	6.5
1 1/2 in.	11	6.5	10.5	9.5
2 in.	17.5	11	16.5	16.0
2 1/2 in.	25	–	24.0	25
3 in.	38.5	–	35.5	–
4 in.	66.5	–	–	–

NOTES

- Interpolation and extrapolation can be calculated for values outside temperatures and volumes listed in Table E.
- For examples on calculating fluid expansion and contraction, see the sections titled Expansion Example and Contraction Example, respectively.
- Values are approximate.

Table E:

freezemaster™ Antifreeze Approximate Fluid Expansion/Contraction in Gallons (and Litres)

Initial Fluid Volume		Temperature Change															
		20°F (11.1°C)		40°F (22.2°C)		60°F (33.3°C)		80°F (44.4°C)		100°F (55.6°C)		120°F (66.7°C)		140°F (77.8°C)		160°F (88.9°C)	
		Approximate Fluid Expansion/Contraction in Gallons (and Litres)															
gal	(L)	gal	(L)	gal	(L)	gal	(L)	gal	(L)	gal	(L)	gal	(L)	gal	(L)	gal	(L)
25	(95)	0.2	(0.6)	0.3	(1.3)	0.5	(1.9)	0.7	(2.5)	0.8	(3.2)	1.0	(3.8)	1.2	(4.4)	1.3	(5.1)
50	(189)	0.3	(1.3)	0.7	(2.5)	1.0	(3.8)	1.3	(5.0)	1.7	(6.3)	2.0	(7.6)	2.3	(8.8)	2.7	(10.1)
75	(284)	0.5	(1.9)	1.0	(3.8)	1.5	(5.7)	2.0	(7.6)	2.5	(9.5)	3.0	(11.3)	3.5	(13.2)	4.0	(15.1)
100	(379)	0.7	(2.5)	1.3	(5.0)	2.0	(7.6)	2.7	(10.1)	3.3	(12.6)	4.0	(15.1)	4.7	(17.7)	5.3	(20.2)
150	(568)	1.0	(3.8)	2.0	(7.6)	3.0	(11.3)	4.0	(15.1)	5.0	(18.9)	6.0	(22.7)	7.0	(26.5)	8.0	(30.3)
200	(757)	1.3	(5.0)	2.7	(10.1)	4.0	(15.1)	5.3	(20.2)	6.7	(25.2)	8.0	(30.2)	9.3	(35.3)	10.7	(40.3)
250	(946)	1.7	(6.3)	3.3	(12.6)	5.0	(18.9)	6.7	(25.2)	8.3	(31.5)	10.0	(37.8)	11.7	(44.1)	13.3	(50.4)
300	(1136)	2.0	(7.6)	4.0	(15.1)	6.0	(22.7)	8.0	(30.3)	10.0	(37.8)	12.0	(45.4)	14.0	(53.0)	16.0	(60.5)

Expansion Example

In the winter, a sprinkler system is filled with 150 gal (568 L) of freezemaster™ antifreeze at an ambient temperature of -12°F (-24.4°C), but the system reaches a temperature of 88°F (31.1°C) in the summer months. The temperature change is 100°F (55.5°C), and the fluid will expand in the summer approximately 5 gal or (19 L).

Contraction Example

In October, a sprinkler system is filled with 50 gal (189 L) of freezemaster™ antifreeze at a room temperature of 68°F (20°C). In February, the system reaches a temperature of 32°F (0°C). The temperature change is 36°F (20°C), and the fluid will contract roughly 0.7 gal (2.5 L). When the system heats back up in the summer months, it will expand back to its original volume.

Design Requirements

Flow rates, pipe sizing, sprinkler spacing, hanging methods and system design must be in accordance with NFPA 13, 13R and 13D.
freezemaster™ antifreeze is not listed for use in protecting extra hazard occupancies or flammable liquids, or use with ESFR sprinklers.

System Limitations

Fire sprinkler systems utilizing freezemaster™ antifreeze shall meet the system size limitations as follows:

Designation	Use Temp Range	Application	Max Volume of Antifreeze in Sprinkler System
Antifreeze	-12°F to 150°F (-24°C to 66°C)	NFPA 13D[1]	≤500 gal; in accordance with NFPA 13D design criteria
		NFPA 13R – Residential Only (including corridors, garages that serve only a single dwelling unit, and compartmented Ordinary Hazard areas ≤500 sq ft)[1] Where NFPA 13R requires the use of NFPA 13 design criteria, refer to the NFPA 13 applications and volume limitations.	≤500 gal; in accordance with NFPA 13R design criteria Where NFPA 13 design criteria is required in areas of an NFPA 13R Occupancy, such as an attic, common and large garages, or a clubhouse; use the applicable volume limitation for the hazard area for NFPA 13.
		NFPA 13 – Light Hazard[1]	≤200 gal; in accordance with NFPA 13 design criteria or >200 gal to ≤500 gal; in accordance with NFPA 13 using the dry system hydraulic design criteria, where the system hydraulics are designed as a dry system even though the system is filled with antifreeze.
		NFPA 13 – Ordinary Hazard Groups 1 & 2[1]	≤40 gal; in accordance with NFPA 13 design criteria or >40 gal to ≤500 gal; in accordance with NFPA 13 using the dry system hydraulic design criteria, where the system hydraulics are designed as a dry system even though the system is filled with antifreeze.
		NFPA 13 – Storage[1]	≤40 gal; in accordance with NFPA 13 design criteria

[1] The antifreeze solution is intended to be installed in accordance with the manufacturer's instructions. For all systems, the following requirements shall apply: (a) the use of the antifreeze solution is limited to the aboveground system piping only except for a limited length of underground piping that connects sections of the aboveground system, (b) the viscosity of the antifreeze solution at the lowest anticipated temperature of the system shall be considered in the hydraulic design, (c) the friction loss shall be determined using the Hazen-Williams formula for water and the Darcy-Weisbach formula to account for the antifreeze solution fluid properties, and (d) the K-factor of the sprinkler shall be adjusted to account for the density of the antifreeze.

Hydraulic Calculations

For all systems, the following requirements shall apply:

- The use of the antifreeze solution is limited to the aboveground system piping only except for a limited length of underground piping that connects sections of the aboveground system.
- The viscosity of the antifreeze solution at the lowest anticipated temperature of the system shall be considered in the hydraulic design.
- The friction loss shall be determined using the Hazen-Williams formula for water and the Darcy-Weisbach formula to account for the antifreeze solution fluid properties.
- The K-factor of the sprinkler shall be adjusted to account for the density of the antifreeze.

The flowing pressures are to be based upon a K-factor calculated using the following equation:

$$K_A = 7.94 K_W \sqrt{\frac{1}{\gamma_A}}$$

K_A = sprinkler K-factor discharging the antifreeze solution

K_W = sprinkler K-factor discharging water

γ_A = density of the antifreeze solution at the temperature used for testing in lb/ft^3

Note: See Table C for density in lb/ft^3

Where the use of antifreeze in accordance with the listing requires the hydraulic design to be based on the dry system hydraulic design criteria, the hydraulic calculations are to be performed in accordance with the applicable NFPA Standard dry system design even though the system is filled with antifreeze. The following points are examples of dry system design criteria:

1. All applicable design area increases shall apply, such as:
   a. The 30 percent increase for dry systems.
   b. The 30 percent increase for sloped ceiling applications, where applicable.
2. Where using QR sprinklers, the QR reduction in design area shall not apply.
3. Where a system is being designed using specific application attic or concealed space sprinklers, the dry system hydraulic design criteria in the manufacturers installation instructions shall be used.

The friction loss coefficient (c-factor or c values) for a wet system is permitted to be used for the dry system hydraulic calculation using antifreeze. It is not required to use the c-factor for the dry system.

Minimum Design Pressure

The minimum design pressure of the sprinkler system must be the minimum required pressure for the sprinklers used.

Fluid Sampling Valve Connection

The riser must be installed in an area not subject to freezing with a minimum temperature of 40°F (4°C). A fluid sampling valve connection must be located at the top of each system riser. The sampling valves should be located for ease of access to the valve by contractors.

The sampling connection will facilitate implementing the service requirements outlined in the Care and Maintenance section.

Fluid Contraction and Expansion

Fluids expand and contract when exposed to changes in temperatures, resulting in changes in fluid density. Thermal expansion shall be taken into account when designing or retrofitting a sprinkler system that will use freezemaster™ antifreeze by use of an expansion tank. Table E shows the thermal expansion or contraction of the solution at different temperatures in sprinkler system volumes, using the equation for sizing the expansion chamber due to thermal expansion outlined in NFPA 13.

These values and the NFPA 13, 13R and 13D Standards for the Installation of Sprinkler Systems can be used by the installer to determine the proper expansion or contraction arrangement of a sprinkler system containing freezemaster™ antifreeze.

Expansion Tank

It is highly recommended for all systems, including existing, that an expansion tank be used. Without an expansion tank there is potential for system damage and the possibility for water to enter the system and alter the performance of freezemaster™ antifreeze. Reference NFPA 13 for guidance on the addition of expansion tanks in new and existing systems. Vessel sizing should be based on anticipated operating conditions and associated expansion values in Table D. Note: Reference NFPA 13, System Requirements for Antifreeze Systems for alternate methods.

Installation

freezemaster™ antifreeze is premixed at the factory; do not dilute with water. Diluting with water or any other ingredients at any time can adversely affect the properties and performance of freezemaster™ antifreeze. Carrying freezemaster™ antifreeze to the site in a container other than the original can introduce contaminants and reduce the solution's functional life. Functional life can also be affected by the environmental conditions of the end use. Only use freezemaster™ antifreeze in closed systems to avoid the corrosive effects of oxygen exposure.

New Systems

Use the following guidelines when preparing a new sprinkler system for freezemaster™ antifreeze installation:

1. The system shall be installed with materials as indicated in the compatibility list.
2. Verify the required backflow prevention and cross connection control is in accordance with state and local requirements.
3. The system shall be outfitted with air vent valve(s) and fluid sampling valve connections as required by the applicable NFPA standard.
4. The system should be determined to be airtight prior to introducing freezemaster™ antifreeze into the system to prevent loss or spillage of product.
5. A pressure test shall be conducted in accordance with the applicable NFPA standard. This pressure test may be performed with water or freezemaster™ antifreeze. It is recommended that systems with drops be tested with freezemaster™ antifreeze to prevent the accumulation of water in the drops.
6. For systems hydrostatically tested with water, the system must be drained after the test in accordance with the applicable NFPA standard.
7. It is recommended that prior to filling the system with freezemaster™ antifreeze, the antifreeze is tested to verify that the specific gravity or refractive index is within the ranges specified in Table A. If the antifreeze solution is from a new, unopened factory container, this test verification is not required. If the solution is discolored or the container has dirt present, contact Customer Services.

8. Fill the system with freezemaster™ antifreeze. Avoid the use of contaminated hoses and equipment that have come into contact with fluids other than freezemaster™ antifreeze or water. The use of a pump with a backflow preventer and pressure capabilities to get the system to the supply pressure is recommended. For freezemaster™ antifreeze to work correctly, purge as much air as possible from the system. Accelerated corrosion may occur where air pockets exist in the system.
9. After filling the system with freezemaster™ antifreeze, test samples from the system to verify the solution has not been diluted. Take samples of the solution from a high and low point in the system. If not done so beforehand with water, perform the hydrostatic pressure test as applicable.

Existing Systems

Use the following guidelines when preparing an existing sprinkler system for freezemaster™ antifreeze installation:

1. Inspect all sprinklers for mechanical damage, corrosion and evidence of leakage. If any of these conditions are present, replace the sprinkler per NFPA 25.
2. Verify the required backflow prevention and cross connection control is in accordance with state and local requirements.
3. The system should be airtight to prevent leakage. Air vents are recommended to reduce the oxygen in the system.
4. Drain the existing antifreeze from the system in accordance with NFPA 25.
5. It is recommended that prior to filling the system with freezemaster™ antifreeze, the antifreeze is tested to verify that the specific gravity or refractive index is within the ranges specified in Table A. If the antifreeze solution is from a new, unopened factory container, this test verification is not required. If the solution is discolored or the container has dirt present, contact Customer Services.
6. Fill the system with freezemaster™ antifreeze. Avoid the use of contaminated hoses and equipment that have come into contact with fluids other than freezemaster™ antifreeze or water. The use of a pump with a backflow preventer and pressure capabilities to get the system to the supply pressure is recommended. For freezemaster™ antifreeze to work correctly, purge as much air as possible from the system. Accelerated corrosion may occur where air pockets exist in the system.
7. After filling the system with freezemaster™ antifreeze, test the system to verify the solution has not been diluted. Take samples of the solution from a high and low point in the system.

If the specific gravity or refractive index is not within the allowable range, drain the system and repeat the steps or add freezemaster™ antifreeze to displace the non-compliant antifreeze and achieve the required purity. Repeat the required tests to verify the specific gravity or refractive index are within the acceptable range. Repeat this process until the specific gravity or refractive index are within the acceptable range.

System Tag

A system tag must be present on an antifreeze system main valve identifying the following:

- Type and manufacturer of the antifreeze solution used
- Volume of antifreeze used
- Percent concentration by volume of antifreeze used

If using freezemaster™ antifreeze, the percent concentration by volume would be 100% since it is a premixed solution. A tag for inspection, testing and maintenance can also be hung at the system riser to record annual testing data. Tag design is available on freezemaster.com.

Storage

Store the product in original container and at a temperature between 30°F (-1.1°C) minimum and 100°F (37.7°C) maximum. Do not mix the product with other liquids. Eye and hand protection are recommended when handling the antifreeze solution.

Care and Maintenance

The sprinkler system 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 NFPA standards, in addition to the standards of any AHJ. Contact the installing contractor or product manufacturer with any questions.

Periodic testing of systems is critical to maintaining the proper concentration and freeze point of the fluid. Leaks, pressure surges and temperature changes to the system can cause antifreeze to flow out of the system or water to flow into the system, changing the freeze temperature. It is recommended that automatic sprinkler antifreeze systems be inspected, tested and maintained by a qualified inspection, testing and maintenance service, as required by NFPA 25 or the local AHJ.

Fluid Test

At least once a year, an inspection, testing and maintenance service shall take a measurement of the specific gravity or refractive index of the freezemaster™ antifreeze in the system.

The fluid must be replaced if either property deviates from that originally supplied within the allowed tolerance, as specified in Table A.

To test the freeze protection level, the correct instrument must be used. For measuring specific gravity, a laboratory grade hydrometer is used. For measuring refractive index, either an analog or a digital refractometer can be used. A detailed description of an appropriate hydrometer or refractometer can be found in the sections titled Using a Hydrometer and Using a Refractometer, respectively. These and accessories are available for purchase, as listed in the Ordering Procedure section.

It is required to have test equipment calibrated per device manufacturer's recommendation to reduce the risk of incorrect test results. Two test methods are acceptable per NFPA 25, and either may be used to verify that the antifreeze is within the specification limits.

NFPA requires a tag to be affixed to the riser indicating the date tested or replaced, the type and concentration by volume of fluid used, system capacity (in volume), contractor name and license number, and a statement indicating if the entire system was drained and replaced with antifreeze.

Using a Hydrometer

1. Ensure that your hydrometer measures specific gravity. The range of specific gravity measurements should cover the acceptable specific gravity range listed in Table A and the hydrometer should have increments of, at most, 0.002.

2. Ensure the main supply valve is closed prior to taking a sample to test. If the valve is open, supply water will be pulled into the system when the first sample is removed. Test separate samples from the top of each system and at the bottom of each system, or otherwise required by applicable NFPA standards. If the most remote portion of the system or the interface with the wet pipe system is not near the top or the bottom of the system, additional samples must be checked.
3. Discharge 1/2 gal (2 L) of fluid from the fluid sampling valve connection. Collect and seal the sample in a clean and dry container. Allow the sample to warm until it reaches the minimum temperature in Table C.
4. Once the solution reaches the minimum temperature, fill the 500 ml calibrated cylinder with the solution and gently insert the hydrometer into the cylinder to allow it to float. Fluid may be added to the cylinder until the hydrometer is floating. Note the specific gravity as shown on the hydrometer. Check the temperature using an appropriate thermometer.
5. Verify the specific gravity falls within the acceptable range listed in Table A. If the test results for all the samples are within the acceptable ranges, the inspection is complete.
6. If the test results from any of the samples fall outside of the acceptable ranges, drain out the system and pump in new freezemaster™ antifreeze. Take samples and test again. If the samples continue to fall outside of the acceptable specifications, the system shall be emptied and vacuumed clean of any remaining fluid. Recharge the system per the Existing System Installation section. If the samples fall within the acceptable range, top off the system to replace the liquid removed for the samples.

Using a Refractometer

1. Ensure that your refractometer is temperature compensating and that it measures refractive index. **Make sure device is set to RI scale and not brix, glycol or glycerin scales.** The range of refractive index measurements should cover the acceptable refractive index range listed in Table A and the refractometer should have increments of, at most, 0.0001.
2. Ensure the antifreeze system isolation valve is closed prior to taking a sample to test. If the valve is open, supply water will be pulled into the system when the first sample is removed. Test separate samples from the top of each system and at the bottom of each system, or otherwise required by applicable NFPA standards. If the most remote portion of the system or the interface with the wet pipe system is not near the top or the bottom of the system, additional samples must be checked.
3. Discharge 1/2 gal (2 L) of fluid from the fluid sampling valve connection. Collect and seal the sample in a clean and dry container.
4. To measure the refractive index, use a digital refractometer that is temperature compensating. Ensure the lens is clean and dry, fill the well in the refractometer with solution and shut the cover, if applicable. Note the refractive index as shown on the refractometer. The device should be calibrated using distilled water.
5. Verify the refractive index falls within the acceptable range listed in Table A. If the test results for all the samples are within the acceptable ranges, the inspection is complete.
6. If the test results from any of the samples fall outside of the acceptable ranges, drain out the system and pump in new freezemaster™ antifreeze. Take samples and test again. If the samples continue to fall outside of the acceptable specifications, the system shall be emptied and vacuumed clean of any remaining fluid. Recharge the system per the Existing System Installation section. If the samples fall within the acceptable range, top off the system to replace the liquid removed for the samples.

NOTE

Contaminants or other foreign materials within a sprinkler system may adversely impact the properties and performance of freezemaster™ antifreeze. See the Installation section for instructions on flushing and recharging the system if the solution falls outside of the acceptable range since the last inspection.

NOTE

All fire protection sprinkler systems that use freezemaster™ antifreeze should conform to local, state and NFPA requirements. The use of antifreeze within these systems should also conform to all state and local health and environmental regulations for the locations where installed. Please contact your local health authorities if you have any questions concerning the codes in your area.

Disposal

Any disposal of freezemaster™ antifreeze shall be in conformance with all federal, state and local waste regulations. Refer to the freezemaster™ antifreeze Safety Data Sheet for more details.

If a small amount of antifreeze solution is spilled, absorbent towels are recommended to clean up the spill. Towels used to clean up the spill can be disposed of in the garbage. Use caution following a spill as the floor may remain slippery in the area. Consult with a local wastewater treatment plant or council for information on procedures to follow for the disposal of large amounts of wastewater.

Ordering Procedure

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

freezemaster™ antifreeze

Specify: freezemaster™ antifreeze, (specify net contents), P/N (specify):

5 gal (19 L) pails FRZ27-PP5P
55 gal (208 L) drums FRZ27-PTH55W
275 gal (1,041 L) IBC FRZ27-T275B

Testing Instruments

Recommended instruments for testing freezemaster™ antifreeze for installation or maintenance can be purchased through the following companies using the following part numbers:

FISHER SCIENTIFIC
Hydrometer 13202421
Graduated Cylinder 115822
Thermometer.....13201647

REICHERT
Refractometer 13940000
Protective Holster.....139410000

SECTION 5

Fire Sprinklers

Bulletin 014 October 2020

Model F1FR Series Quick Response Glass Bulb Sprinklers

Model F1FR56 Sprinkler Types
Standard Spray Upright
Standard Spray Pendent
Conventional Upright/Pendent
Vertical Sidewall
Horizontal Sidewall

Model F1FR56 Recessed Sprinkler Types
Standard Spray Pendent
Horizontal Sidewall

Model F1FR56 Concealed Sprinkler Types
Standard Spray Pendent

Model F1FR42, F1FRXLH & F1FR28 Sprinkler Types
Standard Spray Upright
Standard Spray Pendent

Model F1FR40 Sprinkler Types
Standard Spray Pendent

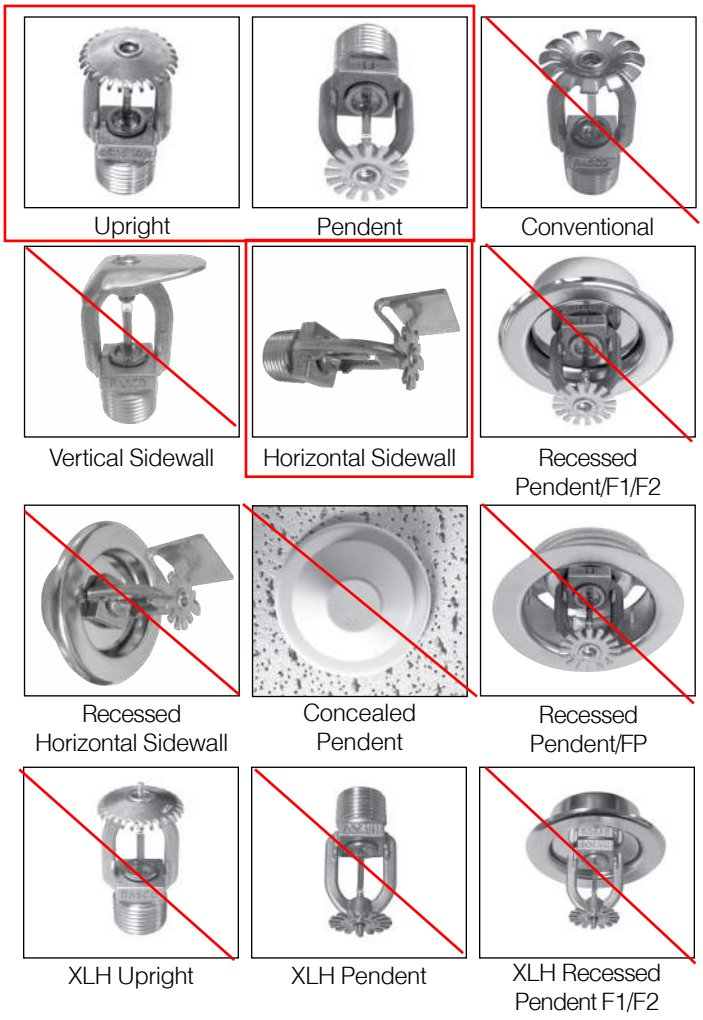
Model F1FR42, F1FR40, F1FRXLH & F1FR28 Recessed Sprinkler Types
Standard Spray Pendent

Model F1FR56LL & F1FR42LL Low Lead Sprinkler Types
Standard Spray Pendent with less than 0.25% Lead Content

Listing & Approvals
The following organizations provide Listings or Approvals for various Model F1FR series sprinklers. See the Design and Installation table in this Bulletin for information on specific listings and approvals applicable to each sprinkler.

1. Underwriters Laboratories Inc. and Certified for Canada (cULus) in accordance with ANSI/UL199.
2. FM Approvals (FM)
3. Loss Prevention Certification Board (LPCB)
4. VdS Schadenverhütung GmbH (VdS)
5. Underwriters Laboratories Inc. and Underwriters Laboratories of Canada Certified for Health Effects to NSF/ANSI Standard 61 Annex G (ULH)
6. EC Certificate: 0786-CPD-40239 (RA1414), 0786-CPD-40251 (RA1425), 0786-CPD-40252 (RA1475) (EC)
7. WaterMark certified. Certificate Number 23347. (WM)

UL Listing Category
Sprinklers, Automatic & Open (VNIV)
Quick Response Sprinkler



Product Description
Reliable Model F1FR series sprinklers are quick-response automatic sprinklers with a glass bulb thermal element. Model F1FR series sprinklers are Standard Spray sprinklers, with the exception of the Model F1FR56 Conventional sprinkler which is an Old-style/Conventional sprinkler.

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

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

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

Model F1FR Series sprinklers provide a wide range of options where quick-response, glass bulb sprinklers are used:

- Pendent, recessed pendent, upright, horizontal sidewall, and vertical sidewall deflectors
- K-factors of 2.8 (40 metric), 4.0 (57 metric), 4.2 (60 metric), and 5.6 (80 metric)
- Flush, recessed, and concealed installations

See the Design and Installation Information table in this Bulletin for information on the approvals and availability of specific Model F1FR series sprinkler configurations.

Model F1FR Recessed Pendent and Recessed Horizontal Sidewall sprinklers are required to be used with Reliable Model F1, F2, or FP recessed escutcheons. See the Recessed Escutcheon Data table in this Bulletin for listing and approval information with each specific Model F1FR series sprinkler. Model F1 and F2 recessed escutcheons, shown in Fig. 1 and 3, are a friction fit assembly allowing for 3/4-inch (19mm) and 1/2-inch (12.7mm) of adjustment, respectively. Model FP recessed escutcheons, shown in Fig. 2, provide a 1/2-inch (12.7mm) threaded adjustment.

Model F1FR56 Concealed Pendent and Model F1FR56LL Concealed Pendent sprinklers are required to be used with Model CCP cover plates. A standard profile Model CCP cover plate is available that provides up to 1/2-inch (12.7mm) of cover plate adjustment. In addition, a low profile Model CCP cover plate is also available that provides up to 5/16-inch (8.0mm) of cover plate adjustment. See the Design and Installation Information and Listed and Approved Temperature Ratings tables in this Bulletin for further information on approved cover plate options.

Application

Model F1FR Series sprinklers are intended for use in accordance with NFPA 13, FM Property Loss Prevention Data Sheets, and the requirements of the Authority Having Jurisdiction. Care must be exercised that the k-factor, temperature rating, deflector style, and sprinkler type are in accordance with the requirements of the applicable design and installation standards. In addition, Model F1FR Series sprinklers must be used in accordance with their listings and approvals, as well as the information provided in this Bulletin.

Installation

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.

Model F1FR Series sprinklers must be installed with the Reliable sprinkler installation wrench identified in the Design and Installation Information table 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.

Recessed Sprinklers

Model F1FR Series Recessed sprinklers are to be installed as shown in Fig. 1, Fig. 2, or Fig. 3, as applicable to the specific model being installed. The Recessed Escutcheon Data table in the Bulletin identifies the only recessed escutcheons that are permitted to be used with each Model F1FR Series Recessed sprinkler. The use of any other recessed escutcheon will void all approvals and negate all warranties.

Concealed Sprinklers

Model F1FR Series Concealed Pendent sprinklers are to be installed as shown in Fig. 4 or Fig. 5, as applicable to the selected cover plate. Model F1FR56 Concealed Pendent and Model F1FR56LL Concealed Pendent sprinklers have a factory-installed Model CCP cup. A protective cap is installed at the factory that should remain on the sprinkler until the sprinkler is installed and should then be reinstalled on the sprinkler until the cover plate is installed. The concealed sprinkler assemblies are completed by the installation of a Model CCP push-on/thread-off cover plate assembly. The cover plate and sprinkler cup assemblies are joined using a cover plate skirt with flexible tabs for threaded engagement. A choice of two Model CCP cover plate assemblies provides either 1/2-inch (13mm) or 5/8-inch (8mm) of cover adjustment. Do not install Model F1FR Series Concealed Pendent sprinklers in ceilings which have positive pressure in the space above.

Model F1FR Series Concealed Pendent sprinklers require a 2-5/8-inch (67mm) diameter hole to be cut in the ceiling. The Model GFR2 wrench is used to engage the sprinkler wrenching surfaces and to install the sprinkler in the fitting. Remove the protective cap to install the sprinkler, then reinstall the protective cap until the cover plate is installed. When inserting or removing the wrench from the sprinkler/cup assembly, care should be taken to prevent damage to the sprinkler. Do not wrench any other part of the sprinkler/cup assembly. Installation is completed by removing the protective cap from the sprinkler and pushing the cover plate onto the cup. Final adjustment is made by hand turning the cover plate until the skirt flange makes full contact with the ceiling. Cover plate removal requires turning the cover plate in the counter clockwise direction. After installation, inspect all sprinklers to ensure that there is a gap between the cover plate and ceiling and that the four cup slots are open and free from any air flow impediment to the space above.

Concealed cover plate/cup assemblies are listed only for use with specific sprinklers. The use of any concealed cover plate/cup assembly other than the Reliable Model CCP with Model F1FR56 Concealed Pendent and Model F1FR56LL Concealed Pendent sprinklers or the use of the Model CCP Concealed cover plate assembly on any sprinkler with which it is not specifically listed my prevent good fire protection and will void all guarantees, warranties, listings and approvals.

Technical Data:

Sensitivity: Quick-response
Thread Size: 1/2-inch NPT standard; ISO 7-R1/2 optional
Maximum Working Pressure: 175 psi (12 bar) - 100% Factory tested hydrostatically to 500 psi (34.5 bar)
SIN RA1425, RA1414 & RA1435 cULus listed for 250 psi (17 bar)

Design and Installation Information											
Model	Nominal K-factor		Nominal Orifice Diameter		Deflector/ Orientation	Nominal Sprinkler Height		Installation Wrench	SIN	Listings and Approvals	Approval Notes
	US	Metric	inches	mm		inches	mm				
F1FR28	2.8	40	3/8	10	Pendent	2.25	57	W2	RA1411	cULus	2
					Recessed Pendent	2.25	57	GFR2	RA1411	cULus	2
					Upright	2.25	57	W2	RA1421	cULus	1,2
F1FR40	4.0	57	3/8	10	Pendent	2.25	57	W2	RA1418	VdS	
					Recessed Pendent	2.25	57	GFR2	RA1418	VdS	
F1FR42	4.2	60	7/16	10	Pendent	2.25	57	W2	RA1413	cULus	2
					Recessed Pendent	2.25	57	GFR2	RA1413	cULus	2
					Upright	2.25	57	W2	RA1423	cULus	1,2
F1FR42LL	4.2	60	7/16	10	Pendent	2.25	57	W2	RA1410	cULus, ULH	
					Recessed Pendent	2.25	57	GFR2	RA1410	cULus, ULH	
F1FRXLH (F1FR42 with Pintle)	4.2	60	7/16	10	Pendent	2.25	57	W2	RA1413	cULus	2
					Recessed Pendent	2.25	57	GFR2	RA1413	cULus	2
					Upright	2.25	57	W2	RA1423	cULus	1,2
F1FR56	5.6	80	1/2	15	Pendent	2.25	57	W2	RA1414	cULus, FM, LPCB, VdS, EC, WM	1,2,3,4
					Recessed Pendent	2.25	57	GFR2	RA1414	cULus, FM, LPCB, VdS, EC, WM	1,2,3,4
					Concealed Pendent	2.25	57	GFR2	RA1414	cULus,VdS,EC, WM	5,6
					Upright	2.25	57	W2	RA1425	cULus, FM, LPCB, VdS, EC, WM	1,2,3,4
					"Conventional (Pendent or Upright)"	2.25	57	W2	RA1475	LPCB, VdS, EC, WM	4
F1FR56LL	5.6	80	1/2	15	Pendent	2.25	57	W2	RA1415	cULus, ULH	1
					Recessed Pendent	2.25	57	GFR2	RA1415	cULus, ULH	
					Concealed Pendent	2.25	57	GFR2	RA1415	cULus, ULH	6
F1FR56	5.6	80	1/2	15	Horizontal Sidewall	2.63	67	W2	RA1435	cULus, FM	1,2,3,7
					Recessed Horizontal Sidewall	2.63	67	GFR2	RA1435	cULus, FM	8
F1FR56	5.6	80	1/2	15	Vertical Sidewall (Pendent or Upright)	2.25	57	W2	RA1485	cULus, FM, LPCB	1,2,3,9

(1) cULus Listed Corrosion Resistant sprinkler when ordered with available Polyester coating.
(2) cULus Listed Corrosion Resistant sprinkler when ordered with available Electroless Nickel PTFE plating.
(3) Available with FM approved Polyester coating in black or white.
(4) Available with LPCB and VdS approved Polyester coating.
(5) VdS and EC approvals of the F1FR56 Concealed Pendent sprinkler are for 155°F (68°C) temperature rated sprinklers only. VdS approved sprinklers must use Norbulb brand glass bulbs with the 1/2-inch (12.7mm) adjustment Model CCP cover plate only.
(6) Model F1FR56 Concealed Pendent and Model F1FR56LL Concealed Pendent sprinklers must be used with Reliable Model CCP cover plates, available as either standard depth with 1/2-inch (12.7mm) of adjustment or low profile with 5/16-inch (8.0 mm) of adjustment.
(7) cULus Listing of the F1FR56 Horizontal Sidewall sprinkler is for Light and Ordinary Hazard occupancies only. Minimum to maximum deflector to ceiling distance shall be 4 inches to 12 inches (102mm to 305mm). FM Approval of the F1FR56 Horizontal Sidewall sprinkler is for Light Hazard occupancies only.
(8) cULus Listing and FM Approval of the F1FR56 Recessed Horizontal Sidewall sprinkler is for Light Hazard occupancies only.
(9) The F1FR56 Vertical Sidewall sprinkler is listed and approved for use only in Light Hazard occupancies. LPCB approval of the F1FR56 Vertical Sidewall sprinkler is for installation in the Pendent position only.

Listed and Approved Temperature Ratings

Model	Deflector/ Orientation	Ordinary Temp. Classification 100°F (38°C) Max. Ambient Temp.		Intermediate Temp. Classification 150°F (65°C) Max. Ambient Temp.		High Temp. Classification 225°F (107°C) Max. Ambient Temp.
		135°F (57°C) Temp. Rating	155°F (68°C) Temp. Rating	175°F (79°C) Temp. Rating	200°F (93°C) Temp. Rating	286°F (141°C) Temp. Rating
		Orange Bulb	Red Bulb	Yellow Bulb	Green Bulb	Blue Bulb
F1FR28	Pendent	cULus				
	Recessed Pendent	cULus				
	Upright	cULus				
F1FR40	Pendent	VdS				
	Recessed Pendent	VdS				
F1FR42	Pendent	cULus				
	Recessed Pendent	cULus				
	Upright	cULus				
F1FR42LL	Pendent				cULus, ULH	
	Recessed Pendent				cULus, ULH	
F1FRXLH	Pendent	cULus				
	Recessed Pendent	cULus				
	Upright	cULus				
F1FR56	Pendent	cULus, FM, LPCB, VdS, EC, WM				
	Recessed Pendent	cULus, FM, LPCB, VdS, EC, WM				
	Concealed Pendent*	cULus, WM	cULus,VdS,EC, WM	cULus, WM		
	Upright	cULus, FM, LPCB, VdS, EC, WM				
	"Conventional (Pendent or Upright)"	LPCB, VdS, EC, WM				
F1FR56LL	Pendent				cULus, ULH	
	Recessed Pendent				cULus, ULH	
	Concealed Pendent*				cULus, ULH	
F1FR56	Horizontal Sidewall	cULus, FM				
	Recessed Horizontal Sidewall	cULus, FM				
F1FR56	Vertical Sidewall (Pendent or Upright)	cULus, FM, LPCB				

* Model F1FR56 Concealed Pendent and F1FR56LL Concealed Pendent sprinklers must be used with Reliable Model CCP cover plates. For Ordinary Temperature Classification sprinklers use a 135°F (57°C) temperature rated cover plate. For Intermediate Temperature Classification sprinklers use a 165°F (74°C) temperature rated cover plate.

Recessed Escutcheon Data

Model	Deflector/ Orientation	Listed and Approved Recessed Escutcheons			SIN
		Model F1 (Fig. 1 & 3) 3/4-inch (19mm) adjustment	Model F2 (Fig. 1 & 3) 1/2-inch (12.7mm) adjustment	Model FP (Fig. 2) 1/2-inch (12.7mm) adjustment	
F1FR28	Recessed Pendent	cULus	cULus	cULus	RA1411
F1FR40	Recessed Pendent	VdS	VdS	VdS	RA1418
F1FR42	Recessed Pendent	cULus	cULus	cULus	RA1413
F1FR42LL	Recessed Pendent	cULus, ULH	cULus, ULH	cULus, ULH	RA1410
F1FR42XLH	Recessed Pendent	cULus	cULus	cULus	RA1413
F1FR56	Recessed Pendent	cULus, LPCB, VdS, EC, WM	cULus, FM, LPCB, VdS, EC, WM	cULus, VdS, EC, WM	RA1414
F1FR56LL	Recessed Pendent	cULus, ULH	cULus, ULH	cULus, ULH	RA1415
F1FR56	Recessed Horizontal Sidewall	cULus	cULus, FM	cULus	RA1435

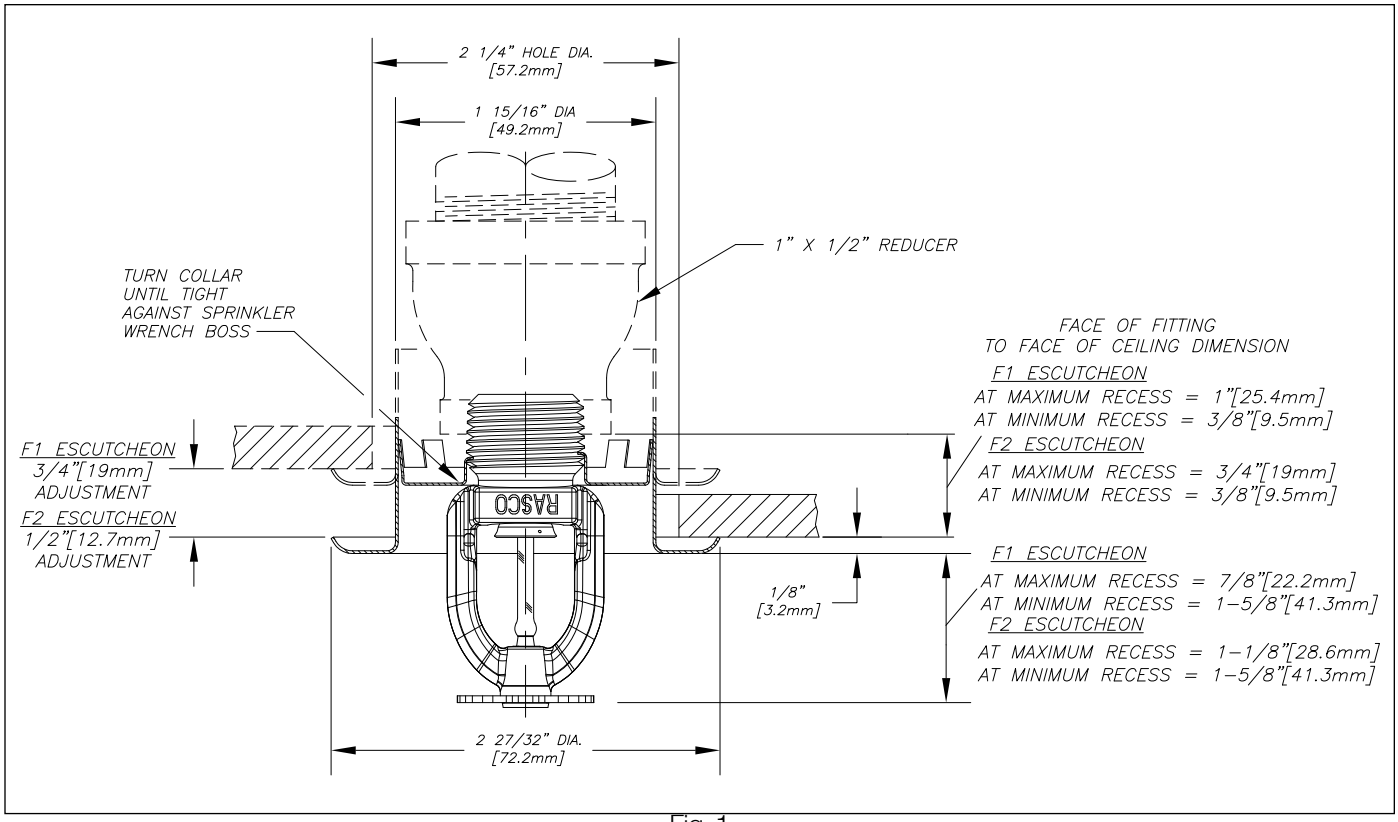


Fig. 1
Model F1FR56, F1FR56LL, F1FR42, F1FR40, F1FR42LL, F1FRXLH & F1FR28
Recessed Pendent sprinkler with Model F1 or F2 escutcheon

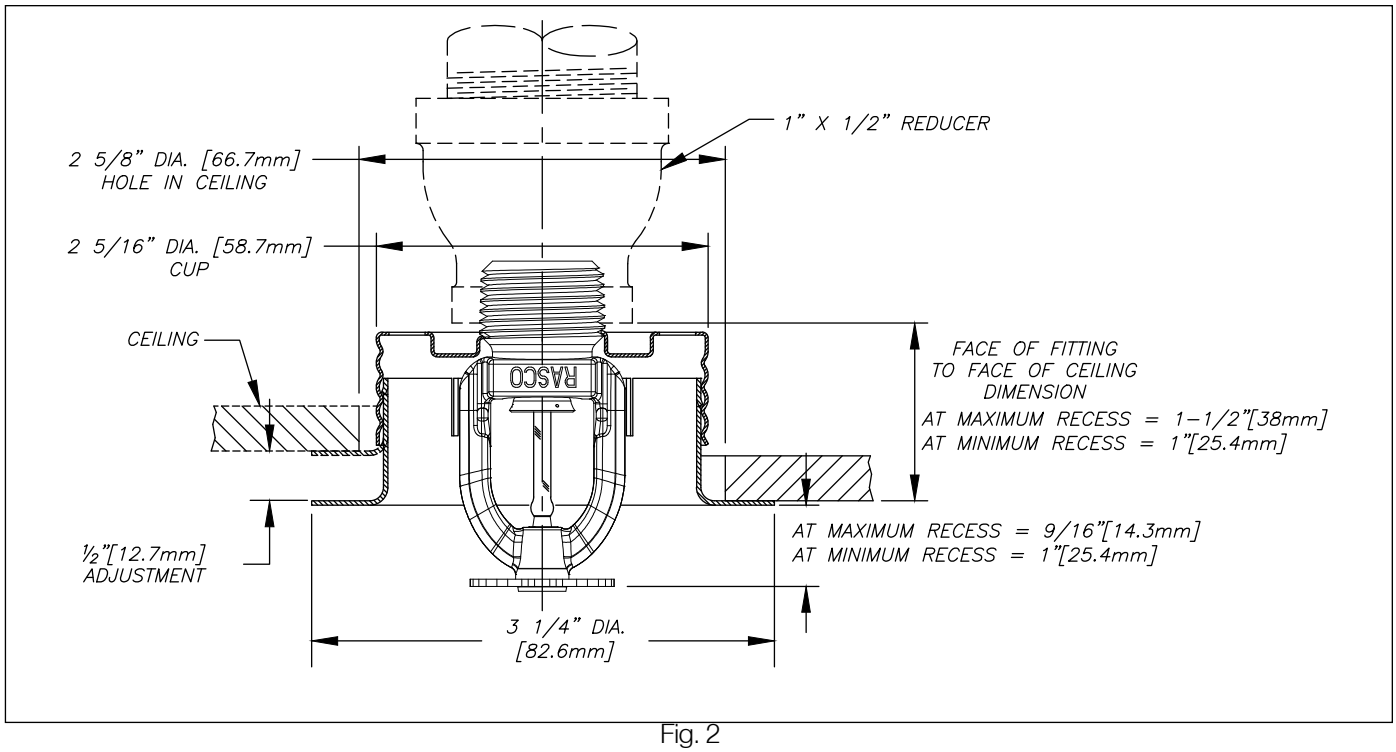


Fig. 2
Model F1FR56, F1FR56LL, F1FR42, F1FR40, F1FR42LL, F1FRXLH & F1FR28
Recessed Pendent sprinkler with Model FP escutcheon

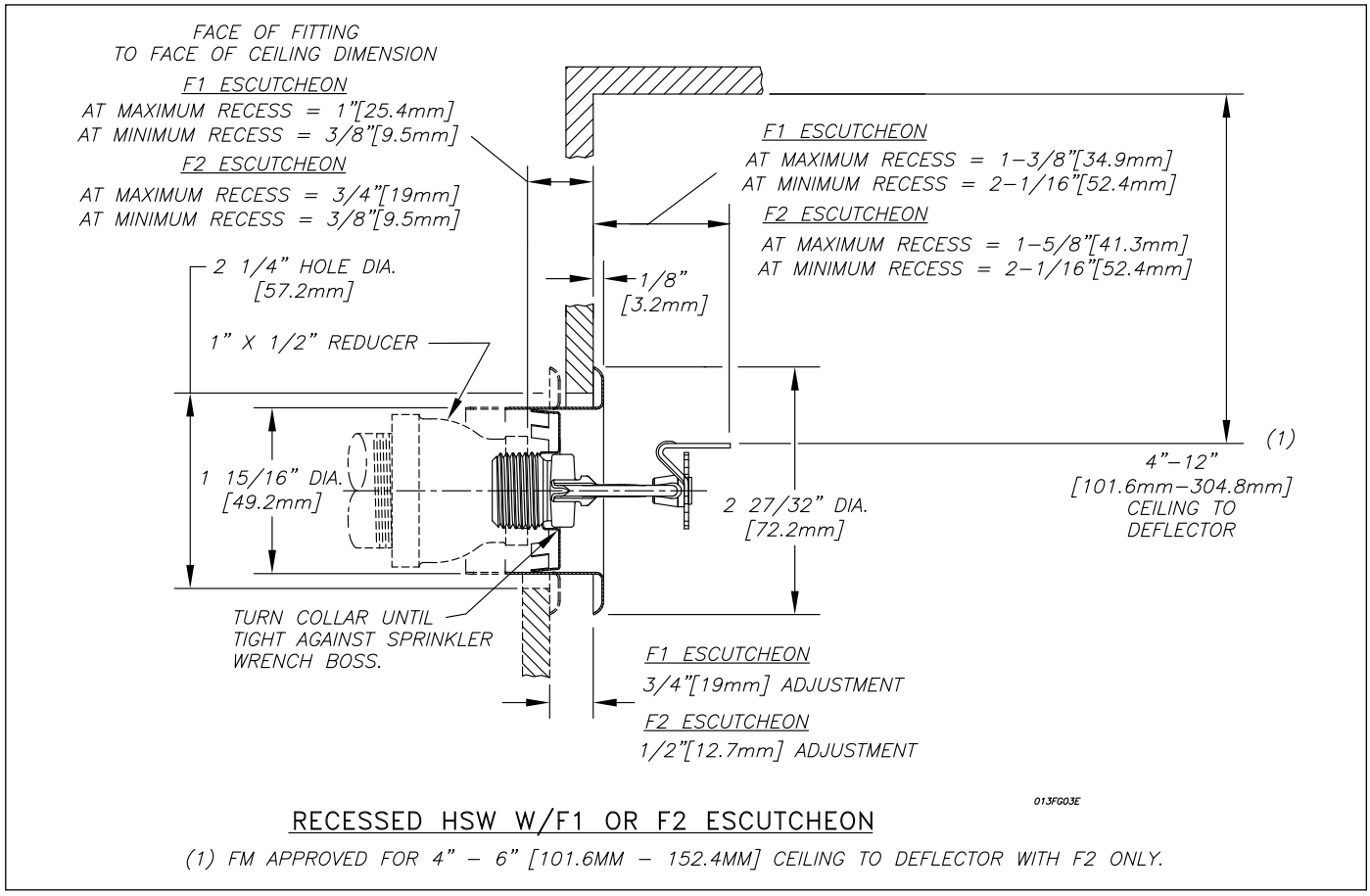


Fig. 3
Model F1FR56 Recessed Horizontal Sidewall sprinkler with Model F1 or F2 escutcheon

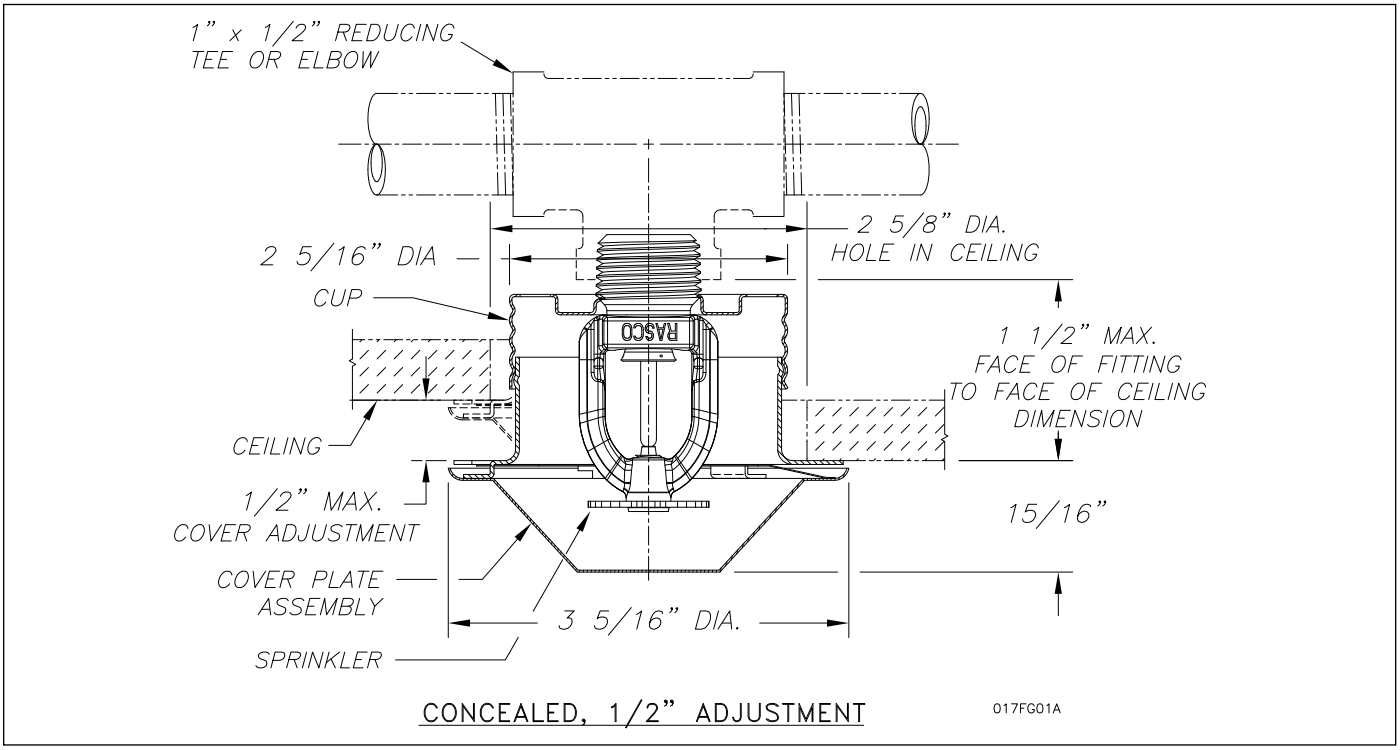


Fig. 4
Model F1FR56/F1FR56LL Concealed Pendent sprinkler with standard depth
1/2-inch (12.7mm) adjustment - Model CCP cover plate

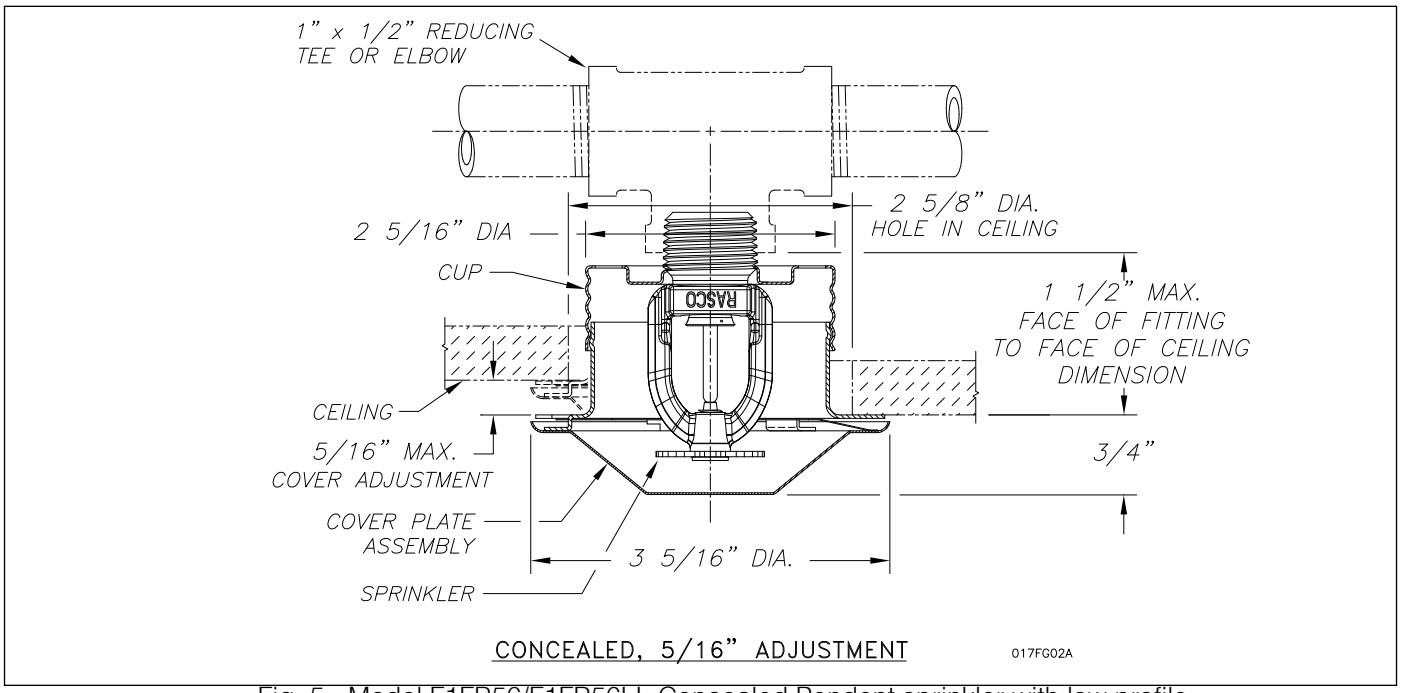


Fig. 5 - Model F1FR56/F1FR56LL Concealed Pendent sprinkler with low profile 5/16-inch (8.0mm) adjustment - Model CCP cover plate

Maintenance

The Model F1FR Series sprinklers should be inspected and the sprinkler system maintained in accordance with NFPA 25. Do not clean sprinklers with soap and water, ammonia or any other cleaning fluids. Remove dust by using a soft brush or gentle vacuuming. Replace any sprinkler which has been painted (other than factory applied) or damaged in any way. A stock of spare sprinklers should be maintained to allow quick replacement of damaged or operated sprinklers.

Finishes [1]

Standard Finishes		
Sprinkler	**Escutcheon**	**Cover plate[1]**
Bronze	Brass	Chrome
Chrome Plated	Chrome Plated	White
Polyester Coated [4][5][6]	White Painted	
Special Application Finishes		
Sprinkler	**Escutcheon**	**Cover plate[1]**
Electroless Nickel PTFE[7]	Electroless Nickel PTFE	Bright Brass
Bright Brass[3]	Bright Brass	Black Plating
Black Plated	Black Plated	Black Paint
Black Paint[2][6]	Black Paint	Off White
Off White[2][6]	Off White	Satin Chrome
Chrome Dull	Chrome Dull	

[1] Other finishes and colors are available on special order. Consult the factory for details. Custom color painted sprinklers may not retain their UL Corrosion resistance listing. Coverplate custom paint is semi-gloss, unless specified otherwise.

[2] cULus Listed only.

[3] 200°F (93°C) maximum.

[4] cULus listed "corrosion resistance" applies to SIN Numbers RA1435 (HSW), RA1485(VSW), RA1425 (Upright), RA1414 (Pendent) and RA1415 (Pendent) in standard black or white. Corrosion resistance in other polyester colors is available upon request.

[5] FM Approvals finish as "Polyester coated" applies to SIN Number RA1414, RA1435 and RA1425 in standard black or white.

[6] LPCB and VdS Approved finish applies only to RA1425, RA1414, RA1418 (VdS) and RA1475.

[7] cULus listed Corrosion Resistant

Material Data	
Frame:	DZR Brass, QM Brass, or Low Lead Brass
Deflector:	CDA Alloy 220, 260, or 510
Load Screw\Pintle:	CDA Alloy 360 or 544
Cup:	CDA Alloy 651 or 693
Washer:	Nickel Alloy 440 or 360, coated with PTFE Adhesive Tape
Bulb:	Glass

Ordering Information

Specify:

1. Sprinkler Model: [F1FR28][F1FR40][F1FR42] [F1FR42LL][F1FRXLH][F1FR56][F1FR56LL]
2. Sprinkler Deflector/Orientation: [Pendent][Recessed Pendent][Upright][Conventional][Horizontal Sidewall] [Recessed Horizontal Sidewall][Vertical Sidewall]
3. Sprinkler threads: [1/2-inch NPT][ISO 7-R1/2]
4. Sprinkler Temperature Rating: [135°F (57°C)][155°F (68°C)][175°F (79°C)][200°F (93°C)][286°F (141°C)]
5. Sprinkler Finish
6. Escutcheon Model: [F1][F2][FP]
7. Escutcheon Finish (where applicable)
8. Cover plate Model: [standard profile CCP 1/2-inch (12.7mm) adjustment][low profile CCP 5/16-inch (8.0mm) adjustment]
9. Cover plate Temperature Rating: [135°F (57°C) for use with Ordinary Temperature sprinklers][165°F (74°C) for use with Intermediate Temperature sprinklers]
10. Cover plate Finish

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

Reliable...For Complete Protection

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

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

The equipment presented in this bulletin is to be installed in accordance with the latest published Standards of the National Fire Protection Association, Factory Mutual Research Corporation, or other similar organizations and also with the provisions of governmental codes or ordinances whenever applicable. Products manufactured and distributed by Reliable have been protecting life and property for over 100 years.

Manufactured by

Reliable®

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

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Revision lines indicate updated or new data.

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Reliable®

F1FR28 Series
Quick-Response Sprinklers

K-factor 2.8 (40)

Features

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

Model F1FR28 Pendent

Model F1FR28 Upright

Product Description

Reliable Model F1FR 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, the Model F1FR28 series sprinklers are specifically listed with and may only be installed with listed Reliable escutcheons. Refer to the technical information on the following pages for specific listings for recessed installations and refer to Figure 3 for dimensional information.

When fitted with an approved water shield, these sprinklers may 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.

Note: This bulletin may contain information on New and Legacy sprinklers that reflects a dimensional change only. Sprinkler Identification Number (SIN), application, performance, and listings/approval are not otherwise affected. Sprinklers with new frames can be identified by a rotoclip indent on one side of the wrench boss and in some cases an installed rotoclip. Sprinklers with new frames will include the suffix “N” in the order. For reference only, legacy version of this sprinkler can be found on Technical Bulletin 014.

F1FR28 Series Sprinklers 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)
F1FR28	2.8 (40)	Upright	cULus	175 (12)	RA1421
		Pendent		175 (12)	RA1411

Model F1FR28 Upright Sprinkler — SIN RA1421

Technical Specifications
Style: Upright
Threads: 1/2" NPT or ISO 7-R1/2
Nominal K-Factor: 2.8 (40 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)

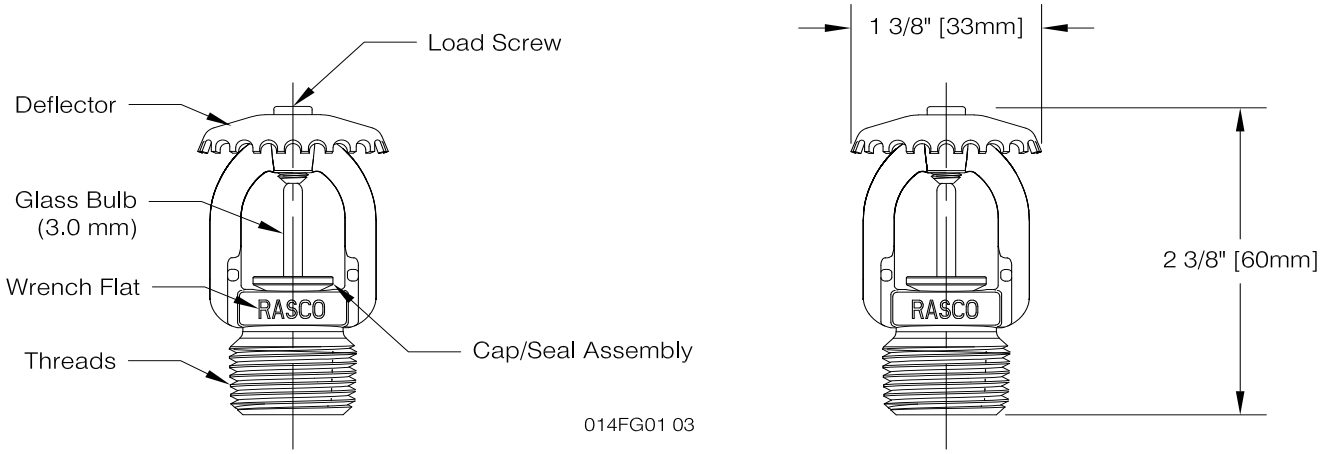
Guards & Shields (New Frames)
F-1 Guard
F-3 Guard with Shield

Guards & Shields (Legacy Frames)
D-1 Guard

Sprinkler Wrench
Model W2
Model J (New frame with guard installed)
Model JD (Legacy frame with guard installed)

Listings and Approvals
cULus

Model F1FR28 Upright Sprinkler Components and Dimensions — **Figure 1**



Model F1FR28 Pendent Sprinkler — SIN RA1411

Technical Specifications
Style:
Pendent
Recessed Pendent
Threads: 1/2" NPT or ISO 7-R1/2
Nominal K-Factor: 2.8 (40 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)(1)

Recessed Escutcheons
Model F1
Model F2
Model FP

Guards & Shields (New Frames)(2)
F-7 Guard
F-8 Guard/Shield Kit

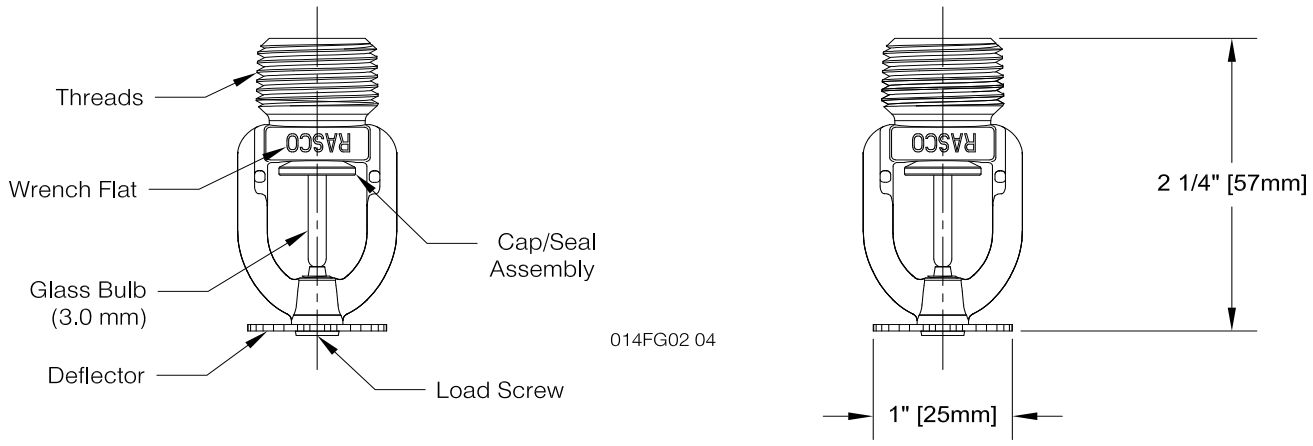
Guards & Shields (Legacy Frames)(2)
D-1 Guard

Sprinkler Wrenches
Model W2 (pendent)
Model W4 (recessed)
Model J (New frame with guard installed)
Model JD (Legacy frame with guard installed)

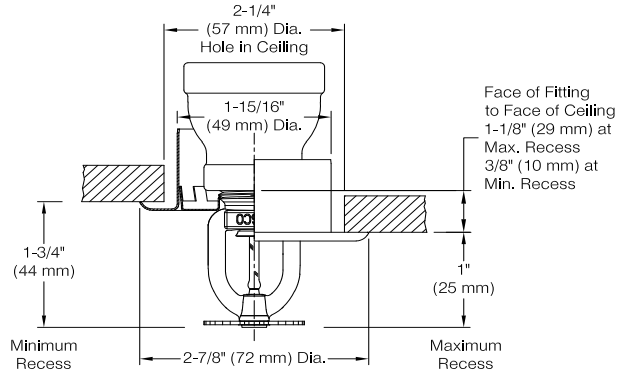
Listings and Approvals
cULus

Notes:
1. 286°F (141°C) and higher temperature rated sprinklers not listed for recessed use.
2. Not suitable for recessed pendent installations.

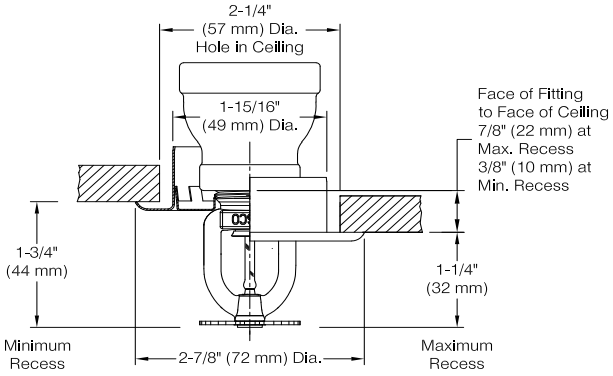
Model F1FR28 Pendent Sprinkler Components and Dimensions — **Figure 2**



Note: Please refer to Figure 3 for recessed installation.



Model F1FR Pendent Sprinkler
with Model F1 Recessed Escutcheon



Model F1FR Pendent Sprinkler
with Model F2 Recessed Escutcheon

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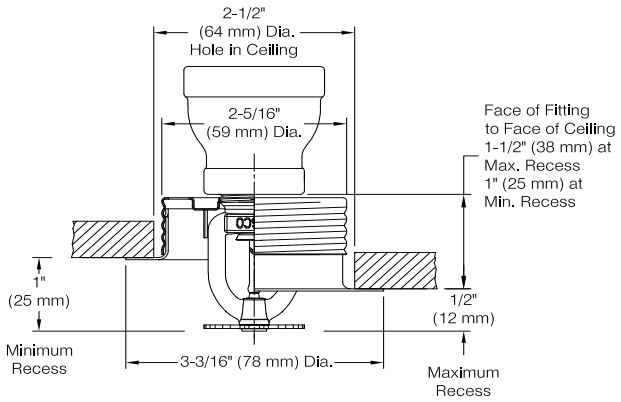


Model F1FR Pendent Sprinkler
with Model FP Recessed Escutcheon

F1 Escutcheon
(F2 similar)

FP Escutcheon

Wrenches

Model W2 (upright, pendent)

Model W4 (recessed pendent)

Model J (New frame with guard installed)

Model JD (Legacy frame with guard installed)

Finishes[1][2]

Table B

Standard Finishes		Special Application Finishes	
Sprinkler	**F1, F2 and FP[3] Escutcheons**	**Sprinkler**	**F1, F2 and FP[3] Escutcheons**
Bronze	Brass	Electroless Nickel PTFE[4]	Bright Brass
Chrome Plated	Chrome Plated	Bright Brass[5]	Black Paint
White Polyester[4]	White Polyester	Black Paint	Off White
		Off White	Chrome Dull
		Chrome Dull	Chrome Dull

Notes:

1. Other finishes and colors are available on special order. Consult your Reliable sales representative for details.
2. Paint or any other coating applied over the factory finish will void all approvals and warranties.
3. The Model FP assembly consists of a sprinkler mounted in a galvanized steel cup with a finished trim ring or cover plate.
4. cULus Listed 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 6 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.

Maintenance

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

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

Ordering Information

Specify the following when ordering:

Model
- F1FR28

Deflector/Orientation
- Upright
- Pendent
- Pendent - FP

Temperature Rating
- See sprinkler technical specifications

Sprinkler Finish
- See Table B

Recessed Escutcheon*
- F1
- F2
- FP

Escutcheon Finish
- See Table B

Sprinkler Wrench
- Model W2 (upright and pendent)
- Model W4 (recessed)
- Model J (New Frame with guard installed)
- Model JD (Legacy frame with guard installed)

***Notes:** 286°F (141°C) sprinklers are not listed to be used recessed.

P/N 9999970621

Reliable®

F1-80 Series
Standard-Response Sprinklers

K-factor 8.0 (115)

Features

- Standard coverage standard-response sprinklers
- Upright and pendent orientations
- Low profile, compact design
- Available in a wide variety of finishes
- Available as Intermediate Level sprinklers

Product Description

Reliable Model F1 series sprinklers are standard-response standard spray automatic fire sprinklers utilizing a 5mm glass bulb thermal element.

Pendent 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, the Model F1-80 series sprinklers are specifically listed with and may only be installed with listed Reliable recessed escutcheons. Refer to the technical information on the following pages for specific listings for recessed installations and refer to Figure 3 for dimensional information.

When fitted with an approved Reliable water shield, these sprinklers may 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 F1 series sprinkler configurations. Additional technical information for each sprinkler model is provided on the following pages.

Model F1-80 Upright

Model F1-80 Pendent

F1-80 Series Sprinklers Summary — **Table A**

Sprinkler Model	K-Factor gpm/psi$^{1/2}$ (lpm/bar$^{1/2}$)	Max. Working Pressure psi (bar)	Listings & Approvals	Orientation	Sprinkler Identification Number (SIN)
F1-80	8.0 (115)	175 (12) 250 (17) (cULus only)	cULus, FM, LPCB, VdS, CE	Upright	RA6222
				Pendent	RA6212

Model F1-80 Upright Sprinkler — SIN RA6222

Technical Specifications
- **Style:** Upright
- **Threads:** 3/4" NPT or ISO 7-R3/4
- **Nominal K-Factor:** 8.0 (115)
- **Max. Working Pressure:**
  - 175 psi (12 bar)
  - 250 psi (17 bar) (cULus only)

Material Specifications
- **Thermal Sensor:** 5mm 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
Standard response

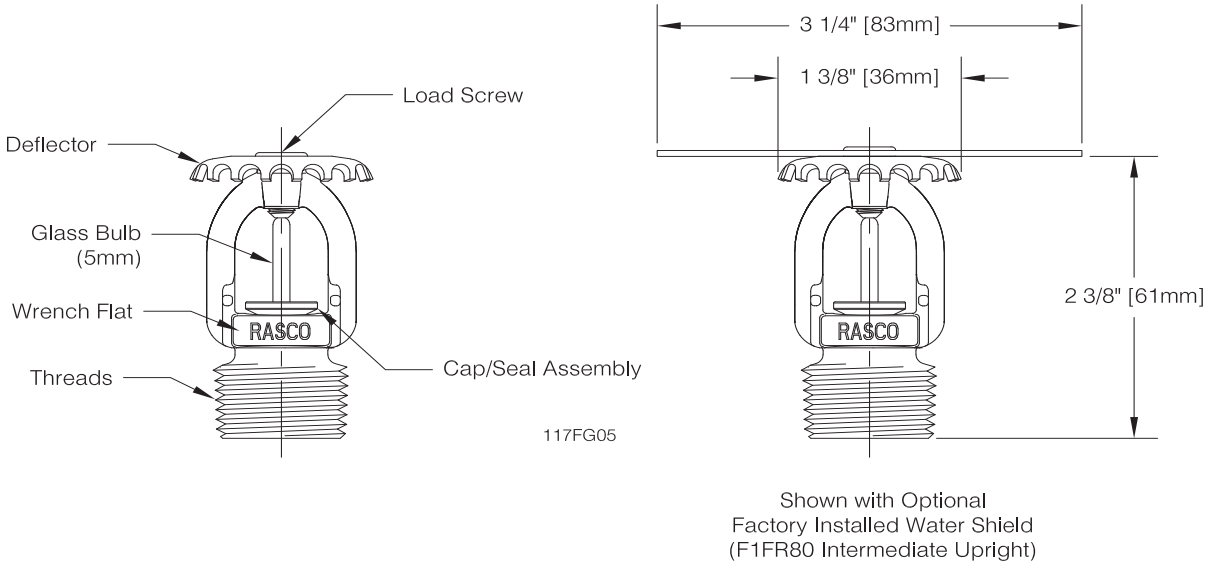
Temperature Ratings
- 135°F (57°C)
- 155°F (68°C)
- 175°F (79°C)
- 200°F (93°C)
- 286°F (141°C)
- 360°F (182°C)

Guards & Shields
- F-1 Guard (cULus)
- F-2 Guard (FM)
- F-3 Guard with Shield (cULus, FM)

Sprinkler Wrenches
- Model W2
- Model J (with guard installed)

Listings and Approvals
- cULus
- FM
- LPCB
- VdS
- CE

Model F1-80 Upright Sprinkler Components and Dimensions — Figure 1



Shown with Optional
Factory Installed Water Shield
(F1FR80 Intermediate Upright)

Model F1-80 Pendent Sprinkler — SIN RA6212

Technical Specifications
Style:
Pendent
Recessed Pendent
Threads: 3/4" NPT or ISO 7-R3/4
Nominal K-Factor: 8.0 (115)
Max. Working Pressure:
175 psi (12 bar)
250 psi (17 bar) (cULus only)

Material Specifications
Thermal Sensor: 5mm 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
Standard response

Temperature Ratings
135°F (57°C)
155°F (68°C)
175°F (79°C)
200°F (93°C)
286°F (141°C) (1)
360°F (182°C) (1)

Recessed Escutcheons
Model F1 (cULus)
Model F2 (cULus, FM)
Model FP (cULus)

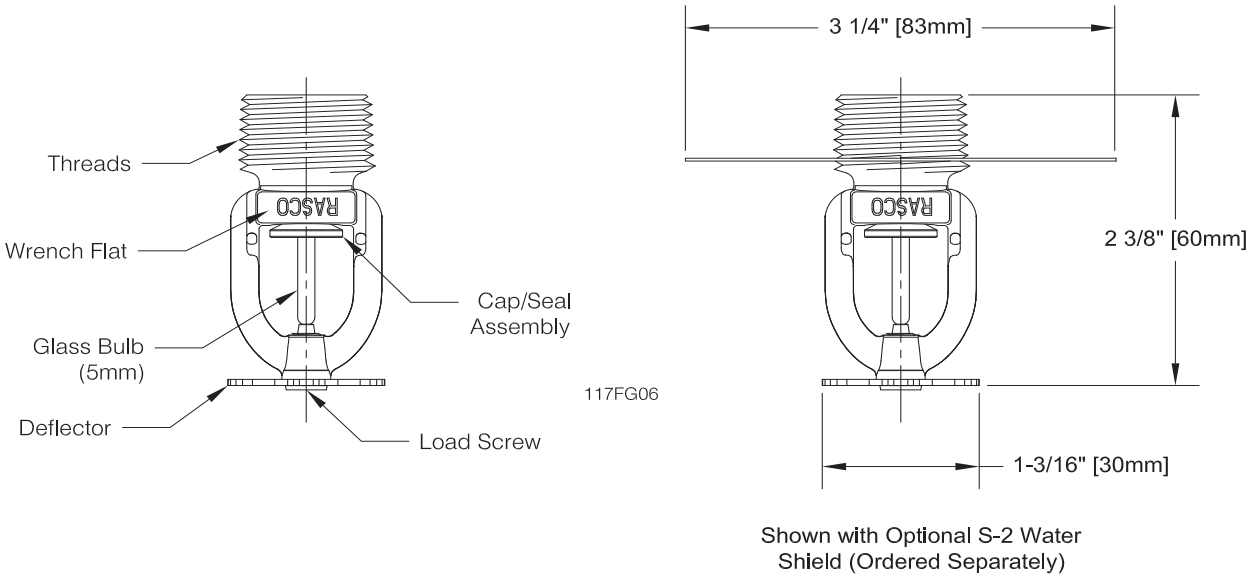
Guards & Shields(2)
F-2 Guard (FM)
F-6 Guard/Shield Kit (FM)
F-7 Guard (cULus)
F-8 Guard/Shield Kit (cULus)
S-2 Shield (cUlus, FM)

Sprinkler Wrenches
Model W2 (pendent)
Model W4 (recessed)
Model J (with guard installed)

Listings and Approvals(3)
cULus Listed
FM Approved
LPCB
VdS
CE

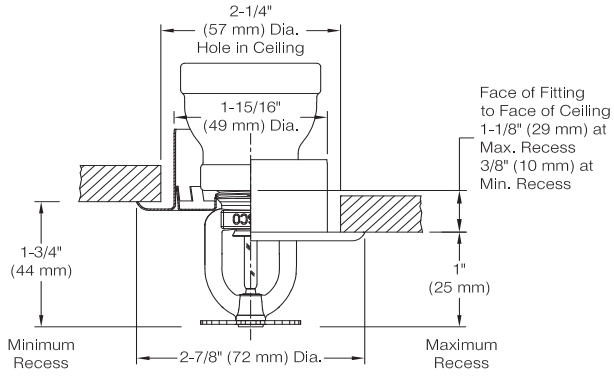
Notes:
1. 286°F (141°C) and higher temperature rated sprinklers not listed for recessed use.
2. Not suitable for use with recessed pendent installations.
3. When used surface mounted or exposed. See Recessed Escutcheon section for specific approvals when installed recessed.

Model F1-80 Pendent Sprinkler Components and Dimensions — **Figure 2**

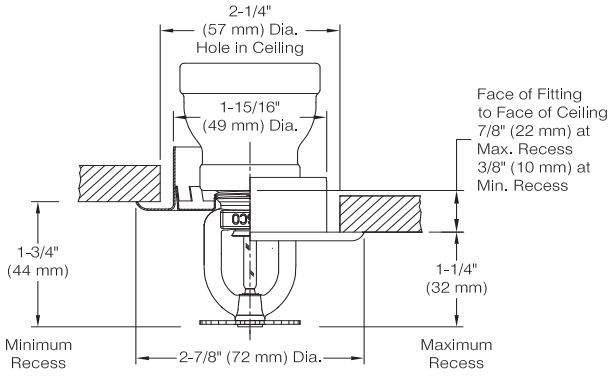


Shown with Optional S-2 Water Shield (Ordered Separately)

Note: Please refer to Figure 3 for recessed installation.



Model F1 Pendent Sprinkler
with Model F1 Recessed Escutcheon



Model F1 Pendent Sprinkler
with Model F2 Recessed Escutcheon

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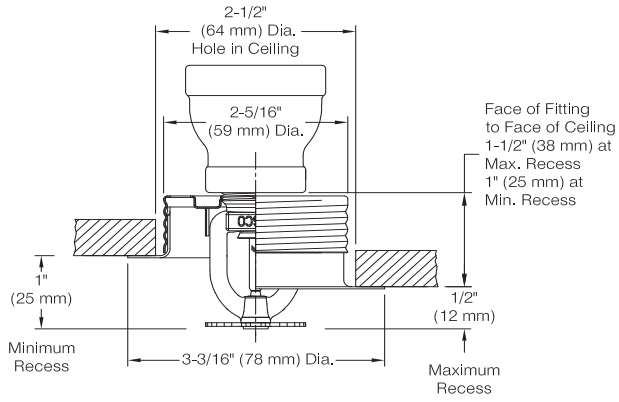


Model F1 Pendent Sprinkler
with Model FP Recessed Escutcheon

FP Escutcheon

F1 Escutcheon
(F2 Similar)

Wrenches

Model W2 (upright, pendent)

Model J (with guard installed)

Model W4
(recessed pendent)

Sprinkler and Escutcheon Finishes[1][2]

Table B

Standard Finishes		Special Application Finishes	
Sprinkler	**F1, F2 and FP[3] Escutcheons**	**Sprinkler**	**F1, F2 and FP[3] Escutcheons**
Bronze	Brass	Electroless Nickel PTFE[4][5]	Bright Brass
Chrome Plated	Chrome Plated	Bright Brass[6]	Black Paint
White Polyester[4]	White Polyester	Black Paint[7]	Off White
		Off White[7]	Chrome Dull
		Chrome Dull	
		Lead Plated[4][8]	
		Wax Coated[4][8]	
		Wax Over Lead[4][8]	

Notes:

1. Other finishes and colors are available on special order. Consult your Reliable sales representative for details.
2. Paint or any other coating applied over the factory finish will void all approvals and warranties.
3. The Model FP assemblies consist of a sprinkler mounted in a galvanized steel cup with a finished trim ring.
4. cULus Listed as corrosion resistant.
5. FM Approved as corrosion resistant.
6. For 200°F (93°C) maximum temperature rated sprinklers only.
7. cULus only.
8. Clear wax used on ordinary temperature rated sprinklers; brown wax used on intermediate temperature rated sprinklers. Brown wax may be used on high temperature rated sprinklers where the ambient temperature does not exceed 150°F (66°C).

Installation

Model F1 Series sprinklers must be installed in accordance with NFPA13 and the requirements of all applicable authorities having jurisdiction. Model F1 Series sprinklers must be installed with the Reliable sprinkler installation wrench identified in this Bulletin. Any other wrench may damage the sprinkler. The Models W2 and W4 wrenches have two sets of jaws. Use the smallest set of jaws that fit on the wrench flats of 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.

Maintenance

Reliable Model F1 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 guarantee, terms, and conditions, visit www.reliablesprinkler.com.

Ordering Information

Specify the following when ordering:

Model
- F1-80

Deflector/Orientation
- Upright
- Upright Intermediate
- Pendent

Temperature Rating
- See sprinkler technical specifications

Sprinkler Finish
- See Table B

Recessed Escutcheon
- F1
- F2
- FP

Escutcheon Finish
- See Table B

Sprinkler Wrench
- Model W2 (upright and pendent)
- Model W4 (recessed)
- Model J (with guard installed)

P/N 9999970502

Reliable®

Horizontal Si
(See P

Inlet fittings are available with 1" NPT, ISO 7-1R1, 3/4" NPT, or ISO7-1R3/4 threads. Sprinklers with 3/4" NPT and ISO7-1R3/4 inlet fittings are intended primarily for replacement of existing 3/4" or ISO7-1R3/4 inlet dry sprinklers, but may also be used in new installations.

See the Available Configurations, Listings, and Approvals table in this Bulletin for further information on Model F3QR56 Dry sprinklers.

Available Configurations, Listings, and Approvals

Sprinkler Model	Escutcheon or Cover Plate	Available Length (See Figs. 1-9)	Listings and Approvals[1]	Inlet Threads	Sprinkler Identification Number (SIN)
F3QR56 Dry Pendent	Standard Escutcheon	2" to 36" (50 to 900 mm)	cULus, NYC	3/4" NPT or ISO7-1R3/4	R5714
	HB Extended Escutcheon	3-1/2" to 36" (90 to 900 mm)			
	F1 Recessed Escutcheon				
	FP Recessed Escutcheon				
	CCP Cover Plate				
	Standard Escutcheon	2" to 48" (50 to 1200 mm)	cULus, FM, NYC	1" NPT or ISO7-1R1	
	HB Extended Escutcheon	3-1/2" to 48" (90 to 1200 mm)			
	F1 Recessed Escutcheon				
	FP Recessed Escutcheon				
	CCP Cover Plate				
F3QR56 Dry Horizontal Sidewall	Standard Escutcheon	2" to 48" (50 to 1200 mm)	cULus[2], NYC[2]	3/4" NPT or ISO7-1R3/4	R5734
	HB Extended Escutcheon	3-1/2" to 48" (90 to 1200 mm)			
	F1 Recessed Escutcheon				
	FP Recessed Escutcheon				
	Standard Escutcheon	2" to 48" (50 to 1200 mm)	cULus[2], FM[3], NYC[2]	1" NPT or ISO7-1R1	
	HB Extended Escutcheon	3-1/2" to 48" (90 to 1200 mm)			
	F1 Recessed Escutcheon	3-1/2" to 48" (90 to 1200 mm)	cULus[2], FM[3][4], NYC[2]		
	FP Recessed Escutcheon				
F3QR56 Dry Upright	N/A	5" to 48" (127 to 1200 mm)	cULus[2]	1" NPT or ISO7-1R1	R5724

[1] For available temperature ratings and finishes see the Temperature Ratings and Finishes tables, respectively, in this Bulletin.
[2] cULus Listing and NYC for Light Hazard and Ordinary Hazard only.
[3] FM Approved for Light Hazard only.
[4] Model F3QR56 Dry Horizontal Sidewall with Model F1 or Model FP recessed escutcheon are FM Approved as Standard Response.

Listing and Approval Agencies

See the Available Configurations, Listings, and Approvals table in this Bulletin for listings and approvals applicable to each available configuration.

1. Listed by Underwriters Laboratories, Inc. and UL Certified for Canada (cULus)
2. Certified by FM Approvals (FM)
3. Permitted in New York City based on UL Listing per Local Law 33/2007 (NYC)

Technical Data

Nominal K-Factor: 5.6 gpm/psi$^{1/2}$ (80 L/min/bar$^{1/2}$)

Sprinkler	Listing or Approval	Deflector to Ceiling Distance	Maximum Working Pressure
F3QR56 Dry Pendent	cULus, NYC	See note below	250 psi (17.2 bar)
	FM	See note below	175 psi (12 bar)
F3QR56 Dry Horizontal Sidewall	cULus, NYC	4" to 6 "	250 psi (17.2 bar)
		4" to 12"	175 psi (12 bar)
	FM	See note below	175 psi (12 bar)
F3QR56 Dry Upright	cULus	See note below	175 psi (12 bar)

Note: Deflector distance to be in accordance with applicable NFPA, FM, or other agency requirements. Information is provided only when additional clarification is necessary.

Temperature Classification	Glass Bulb Color	Sprinkler Temperature Rating	Cover Plate Temperature Rating	Maximum Ceiling Temperature	Listings and Approvals[1]
Ordinary	Orange	135°F (57°C)	135°F (57°C)	100°F (38°C)	cULus, FM, NYC
	Red	155°F (68°C)			
Intermediate	Yellow	175°F (79°C)	165°F (74°C)	150°F (66°C)	cULus, NYC
Intermediate	Green	200°F (93°C)	165°F (74°C)	150°F (66°C)	cULus, FM, NYC
High	Blue	286°F (141°C)	None	225°F (107°C)	cULus, FM[2], NYC
			165°F (74°C)	150°F (66°C)	cULus, NYC

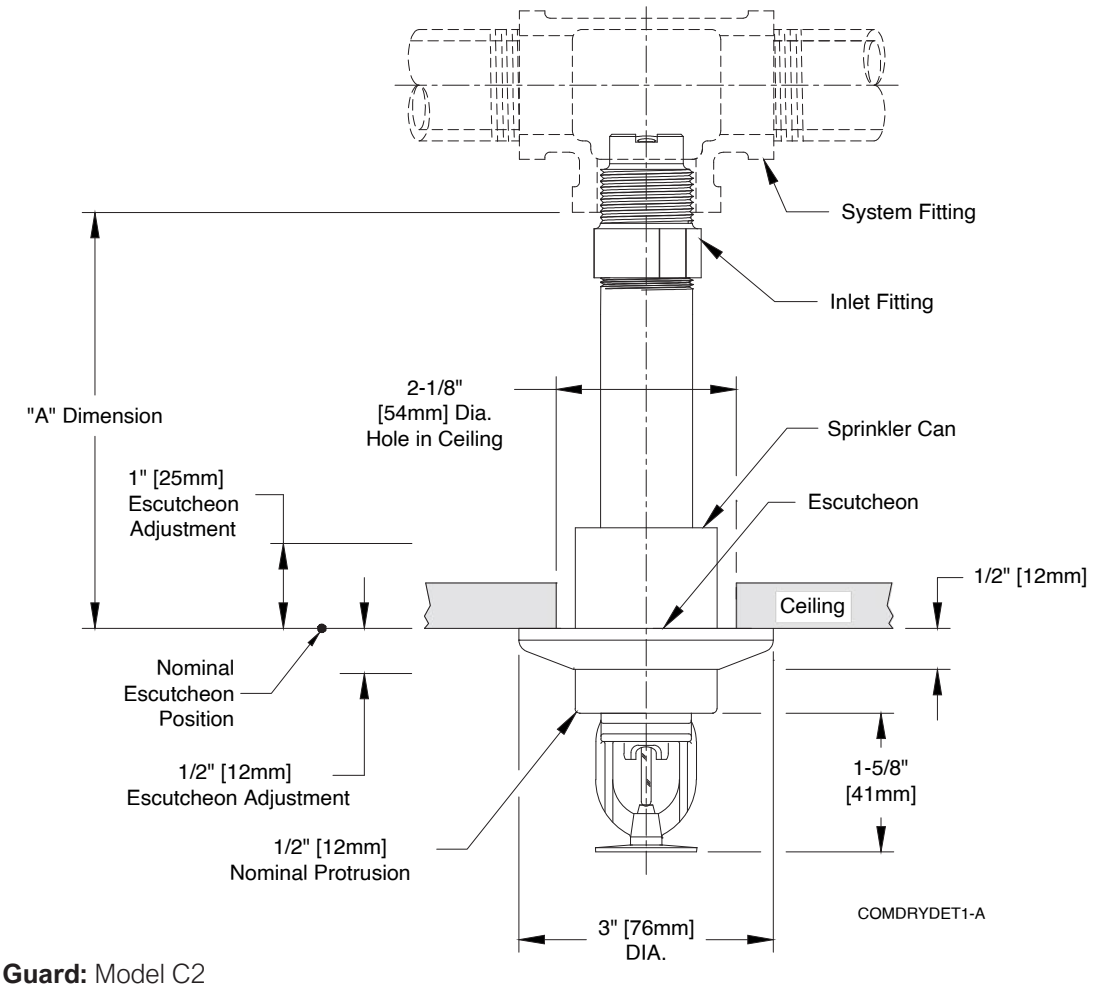
[1] For listed and approved sprinkler, escutcheon, and inlet configurations see the Available Configurations, Listings, and Approvals table in this Bulletin.
[2] High temperature classification is FM Approved with Standard and Model HB escutcheons only.

Finish Notes

1. Finishes vary with type of trim selected. See table provided with each sprinkler detail for finish combinations.
2. Paint or any other coating applied over the factory finish will void all approvals and warranties.
3. Other finishes and colors may be available on special order. Consult your Reliable sales representative for details.
4. For Standard, Model HB, and Model F1 trims, both components of escutcheon are finished.
5. For Model FP and CCP trims, only the trim ring and cover plate are finished. The threaded sprinkler cup is unfinished.

Model F3QR56 Dry Pendent Sprinkler with Standard Escutcheon (SIN R5714)

"A" Dim.	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



Sprinkler Guard: Model C2

Fig. 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[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 Sprinkler with Model HB Extended Escutcheon (SIN R5714)

"A" Dim.	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

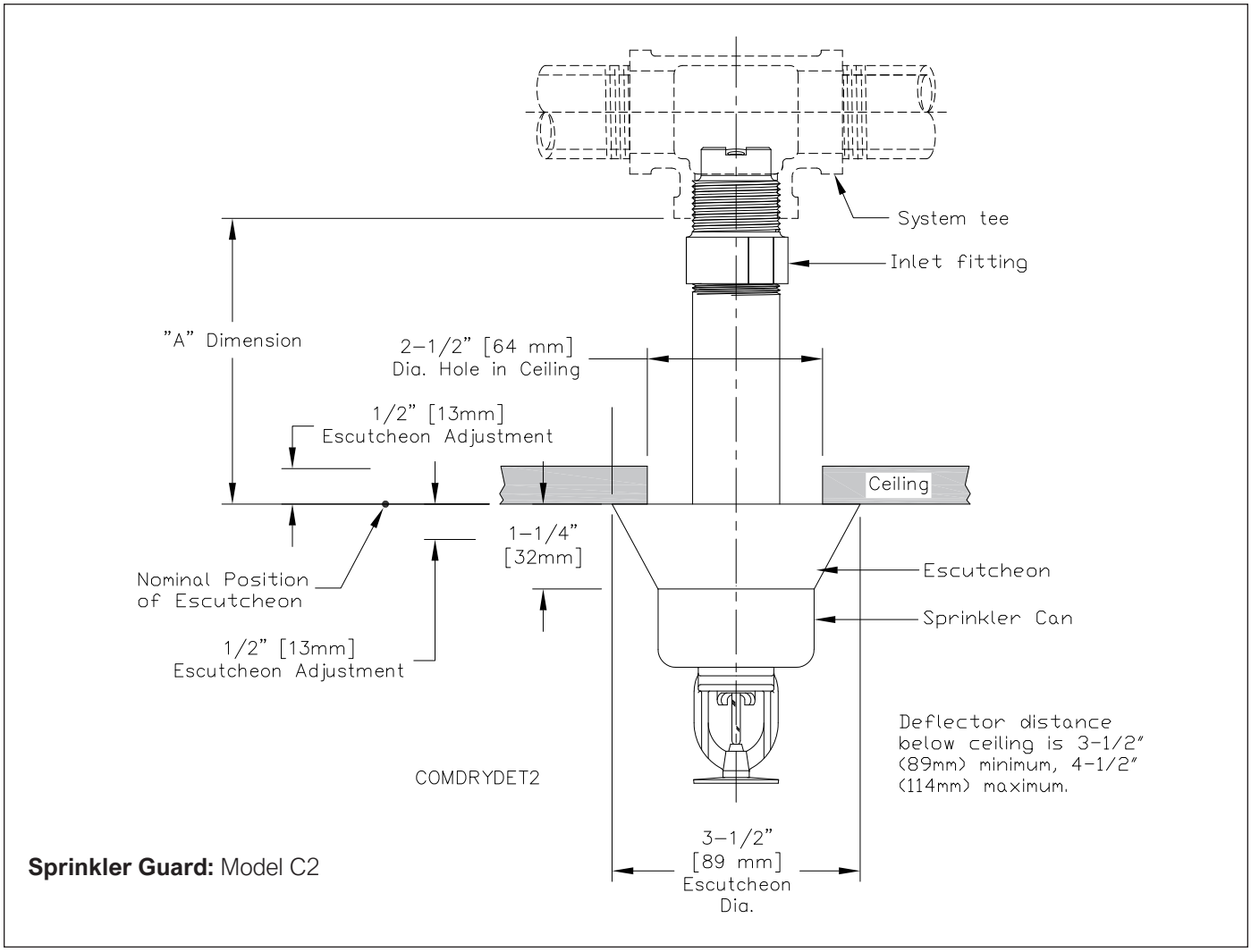


Fig. 2

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 Sprinkler with Model FP Recessed Escutcheon (SIN R5714)

"A" Dim.	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

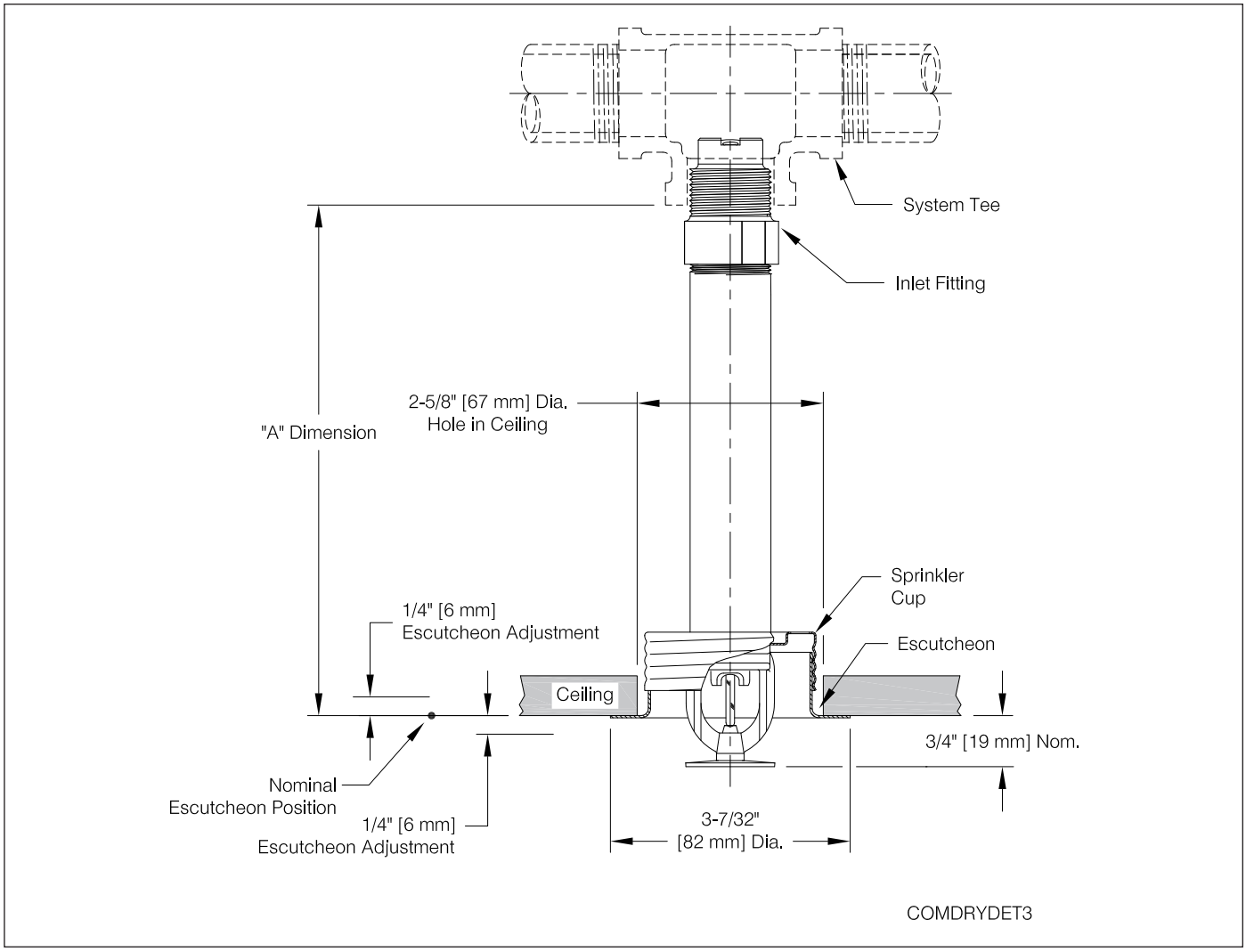


Fig. 3

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 Escutcheon	
Sprinkler[1]	**Escutcheon[3][4]**
Bronze	Chrome
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 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.
5. FM Approved as Corrosion Resistant.

Model F3QR56 Dry Pendent Sprinkler with Model CCP Cover Plate (SIN R5714)

"A" Dim.	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

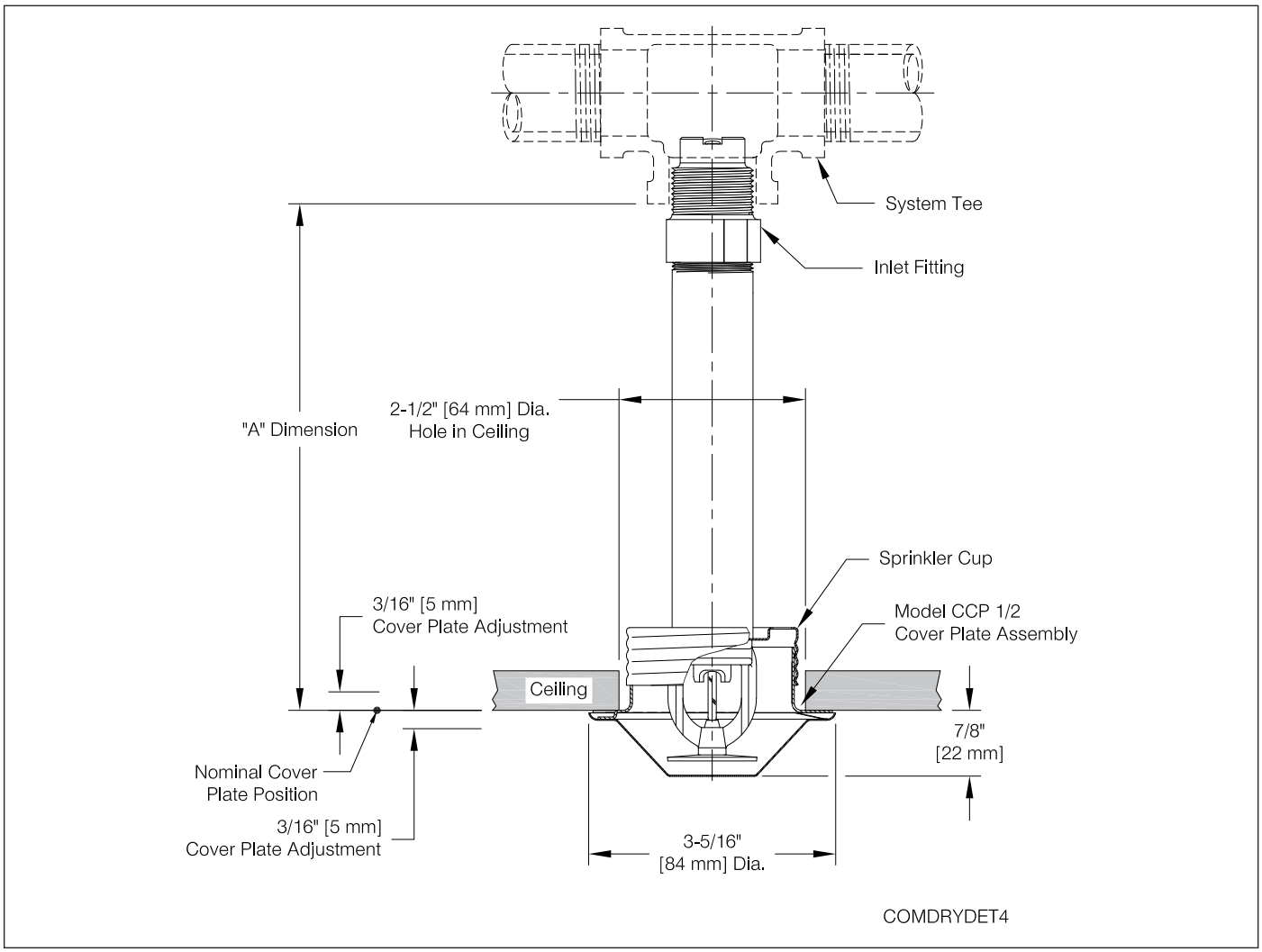


Fig. 4

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.

Finish Combinations: CCP Conical Cover Plate	
Sprinkler	**Cover Plate[2]**
Bronze	White Polyester
	Chrome Bright
	Chrome Dull
	Bright Brass
	Unfinished Bronze
	Custom Color

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

Model F3QR56 Dry Pendent Sprinkler with Model F1 Recessed Escutcheon (SIN R5714)

"A" Dim.	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.

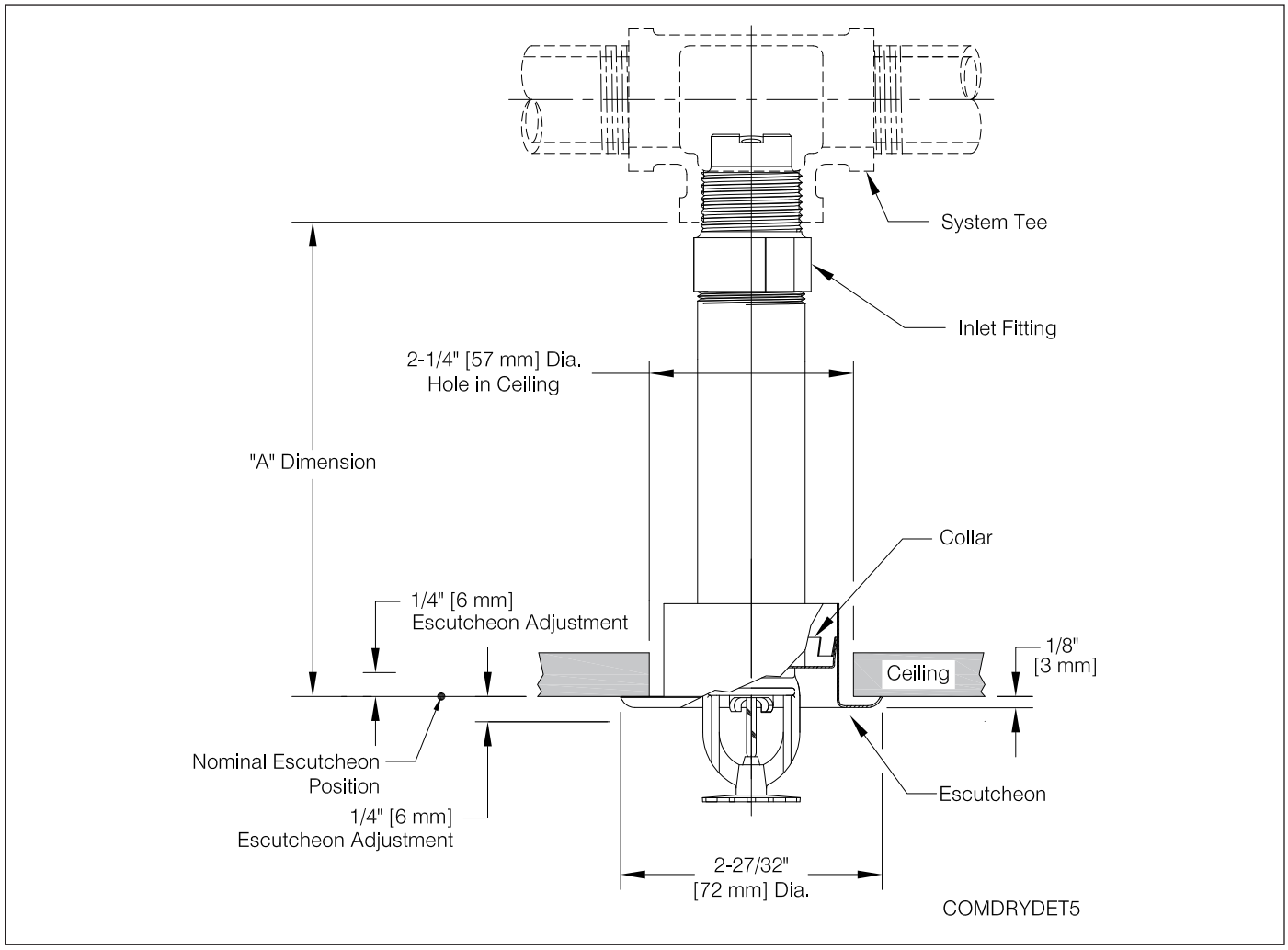


Fig. 5

Finish Combinations: F1 Recessed Escutcheon	
Sprinkler	**Escutcheon[2][3]**
Bronze	Chrome
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.

Finish Combinations: Standard Escutcheon	
Sprinkler	**Escutcheon[2][3]**

Model F3QR56 Dry Horizontal Sidewall Sprinkler with Model HB Escutcheon (SIN R5734)

"A" Dim.	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

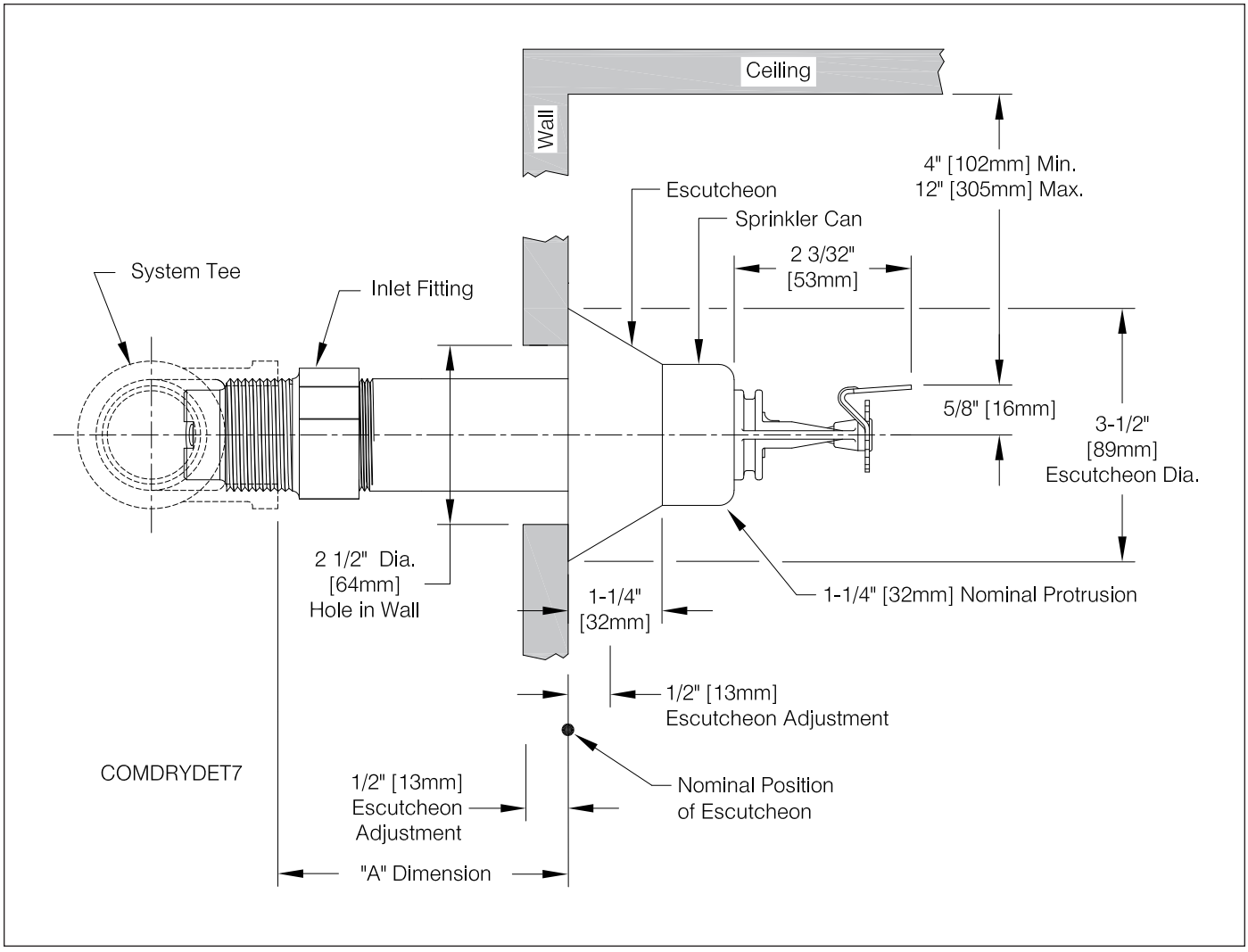


Fig. 7

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 Horizontal Sidewall Sprinkler with Model FP Recessed Escutcheon (SIN R5734)

"A" Dim.	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

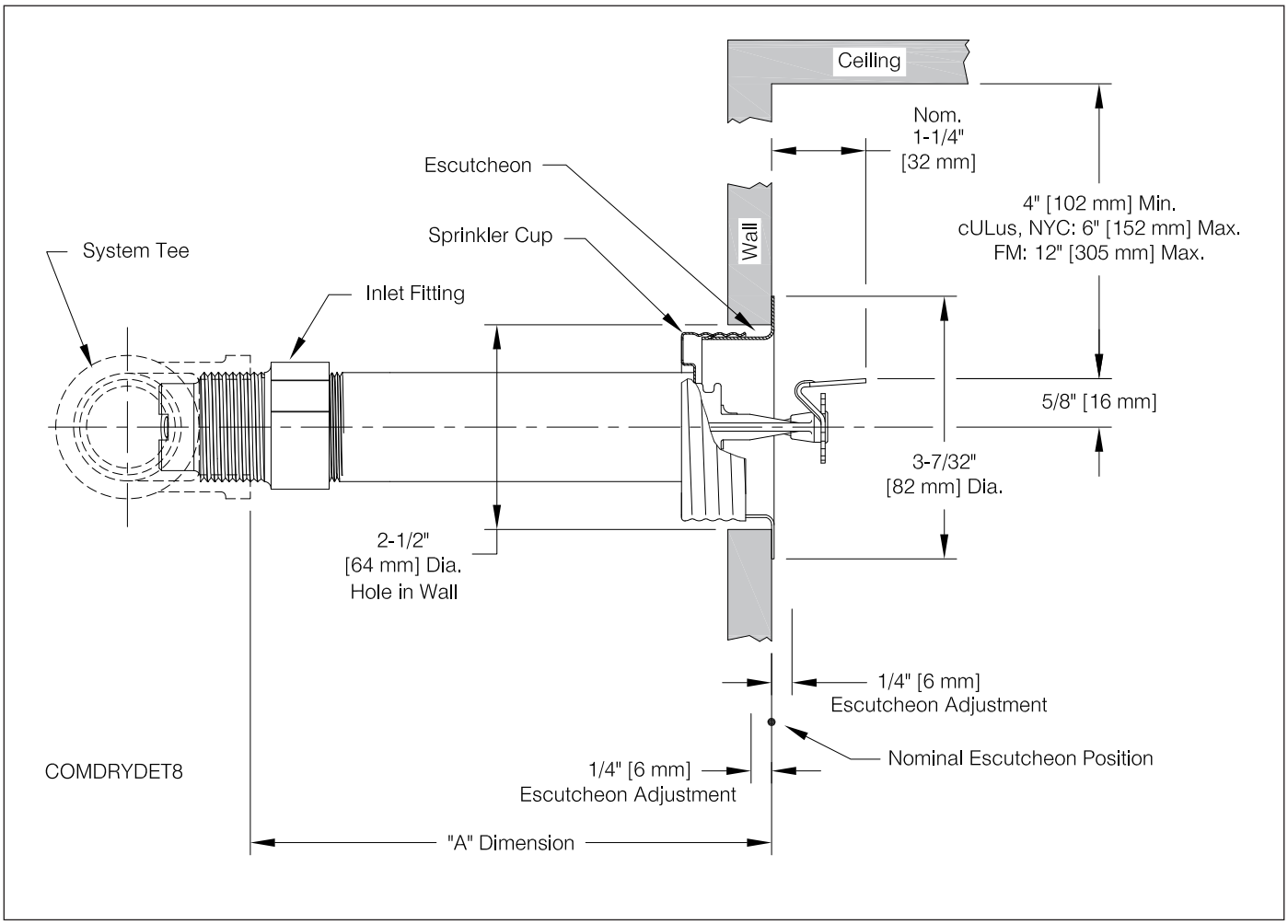


Fig. 8

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.

Finish Combinations: FP Recessed Escutcheon	
Sprinkler[1]	**Escutcheon[3][4]**
Bronze	Chrome
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 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.
5. FM Approved as Corrosion Resistant.

Model F3QR56 Dry Horizontal Sidewall Sprinkler with Model F1 Recessed Escutcheon (SIN R5734)

"A" Dim.	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

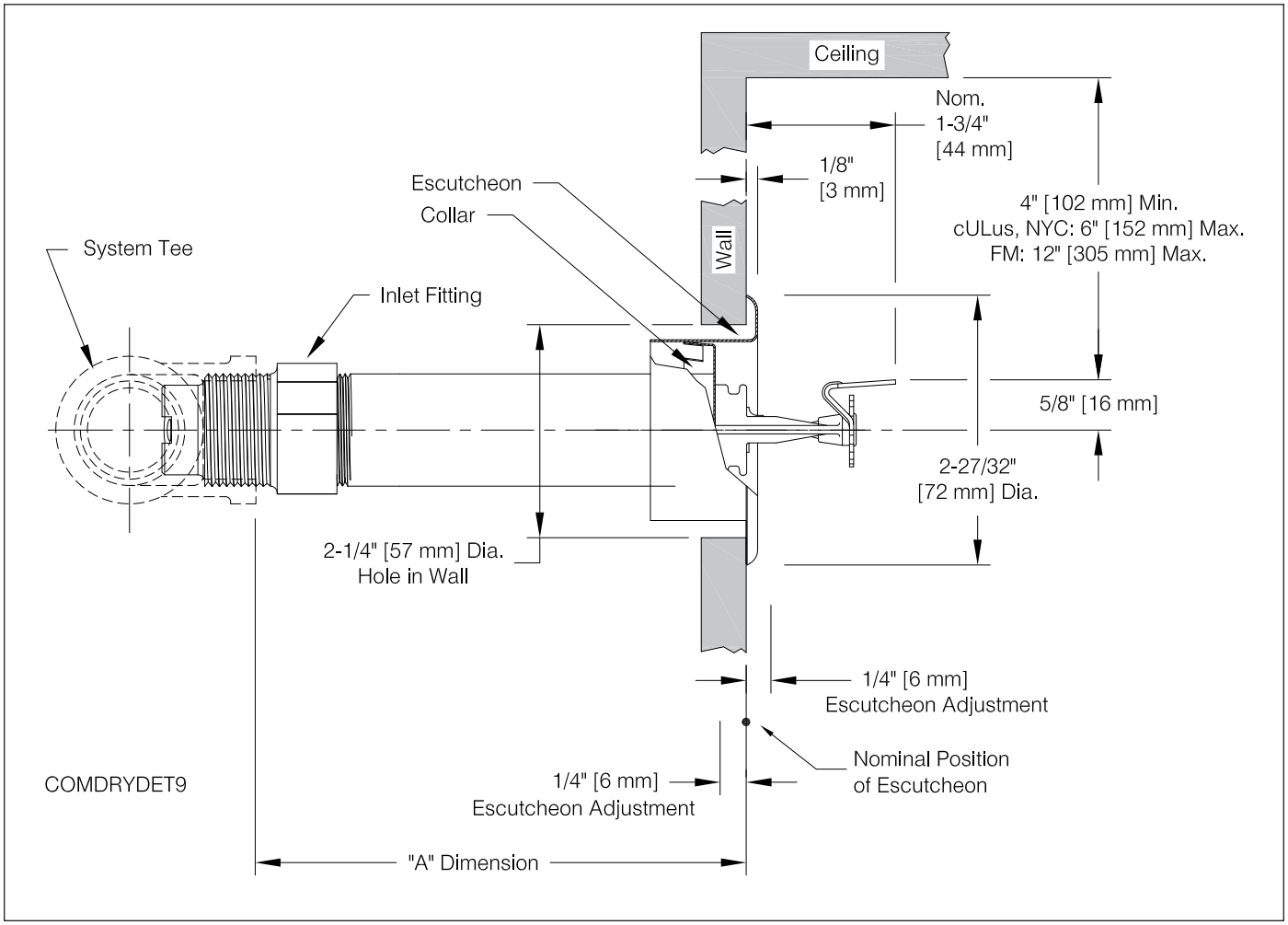


Fig. 9

Finish Combinations: F1 Recessed Escutcheon	
Sprinkler	**Escutcheon[2][3]**
Bronze	Chrome
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 Upright (SIN 5724)

Order Dimensions 5” to 48” (127 mm to 1219 mm)

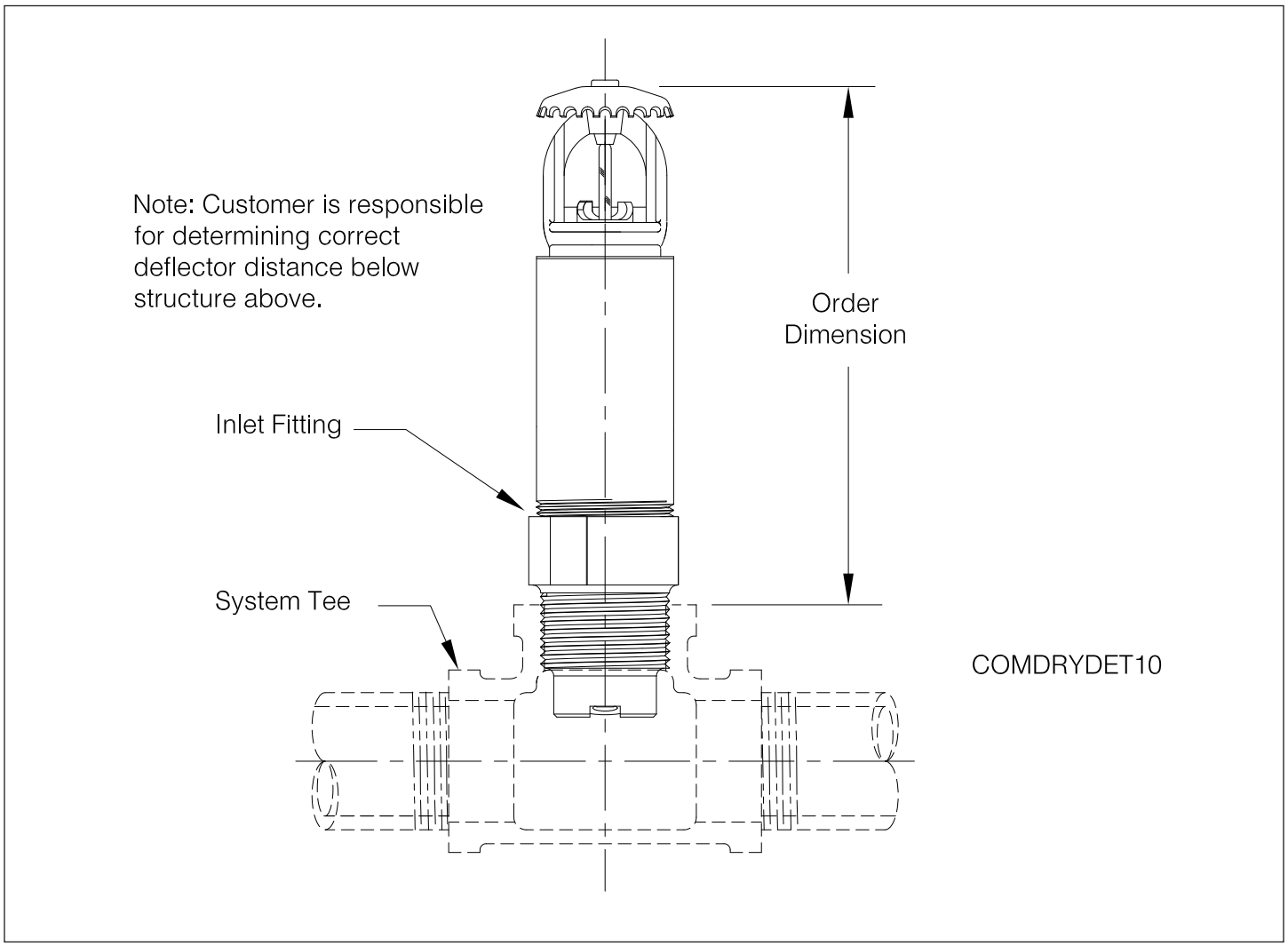


Fig. 10

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

Notes:

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

MINIMUM EXPOSED BARREL LENGTH WHEN CONNECTED TO WET PIPE SPRINKLER SYSTEM

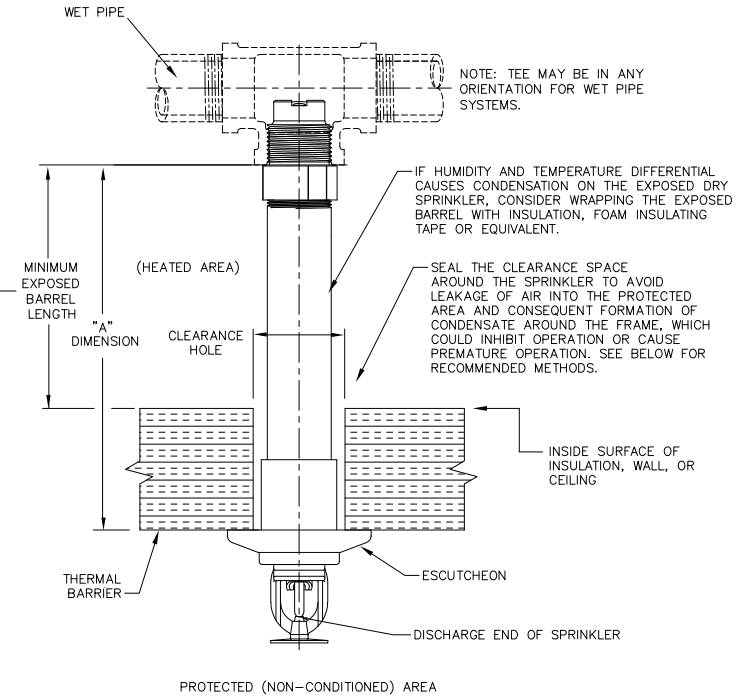
NOTE: STANDARD DRY PENDENT IS SHOWN, HOWEVER, MINIMUM EXPOSED BARREL LENGTH APPLIES TO ALL STYLES OF DRY SPRINKLERS CONNECTED TO A WET PIPE SYSTEM.

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)

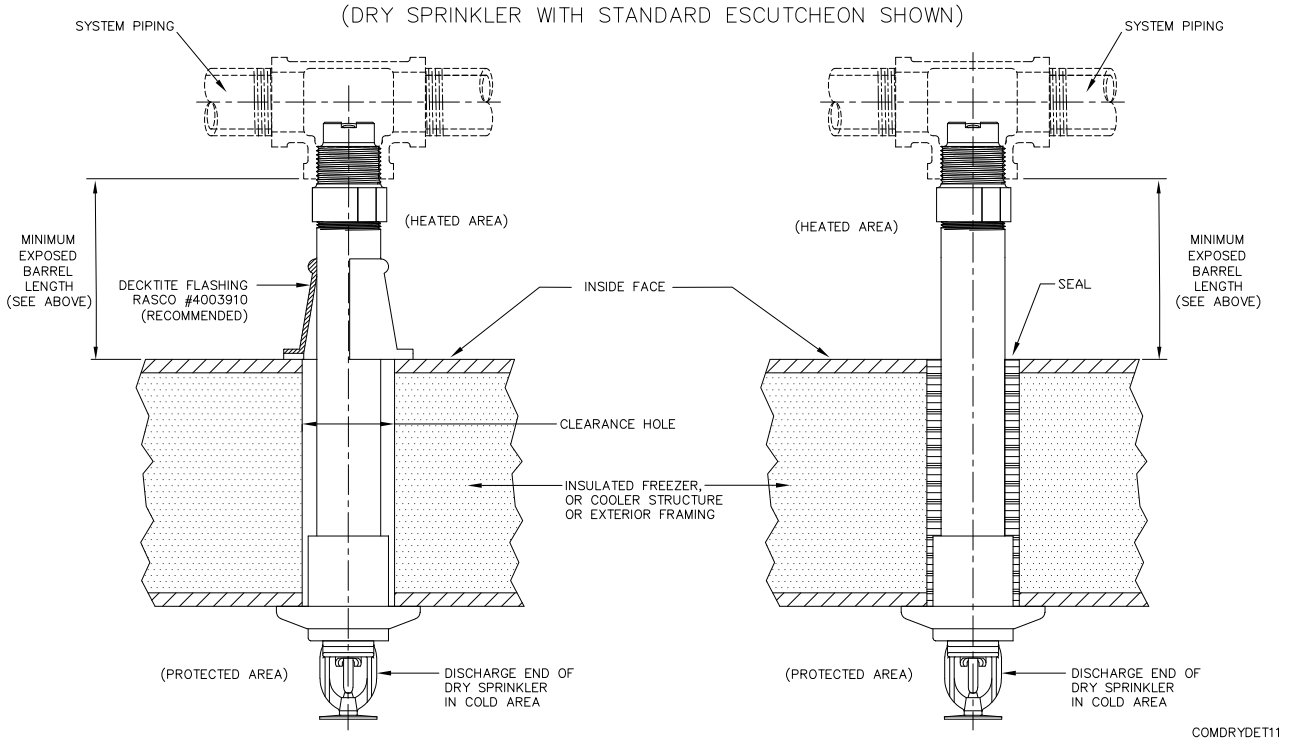


Fig. 11

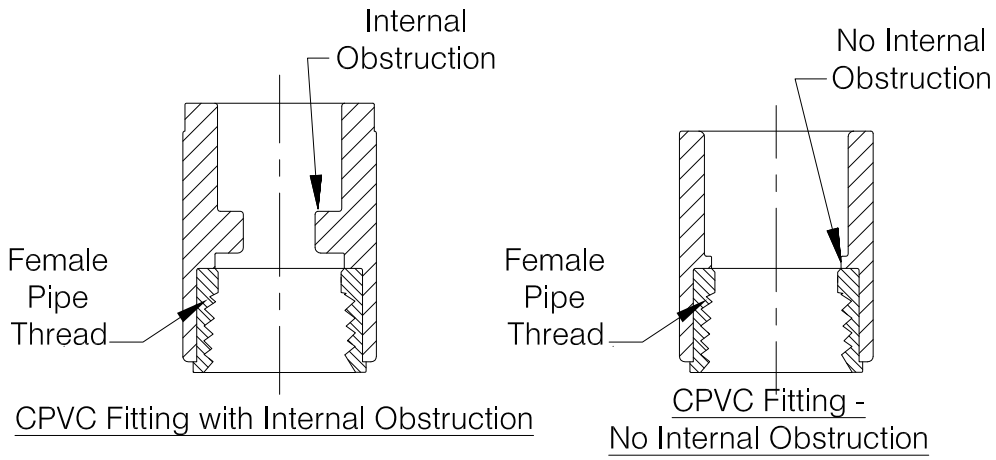
CAUTION

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.

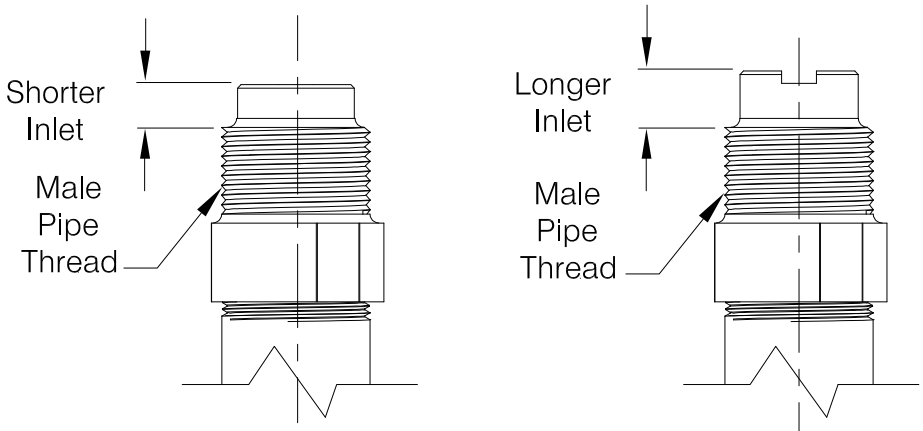
Short inlet ("PL") versions of Reliable dry sprinklers are available that may or may not be compatible with fittings having internal obstructions in existing installations. Sprinklers with the short inlet ("PL") should only be installed in CPVC fittings of wet-pipe systems.

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



CPVC Fitting with Internal Obstruction

CPVC Fitting -
No Internal Obstruction



Dry Sprinkler
Short Inlet ("PL")

Dry Sprinkler
Standard Inlet

BE SURE TO ORDER THE CORRECT SPRINKLERS FOR YOUR APPLICATION

COMDRYDET2

Fig. 12

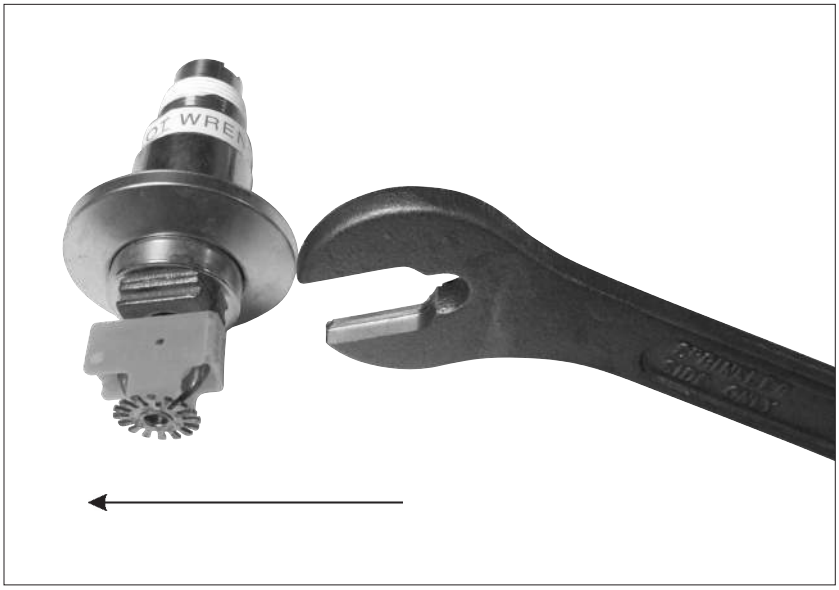


Fig. 13 - Model F3R Wrench

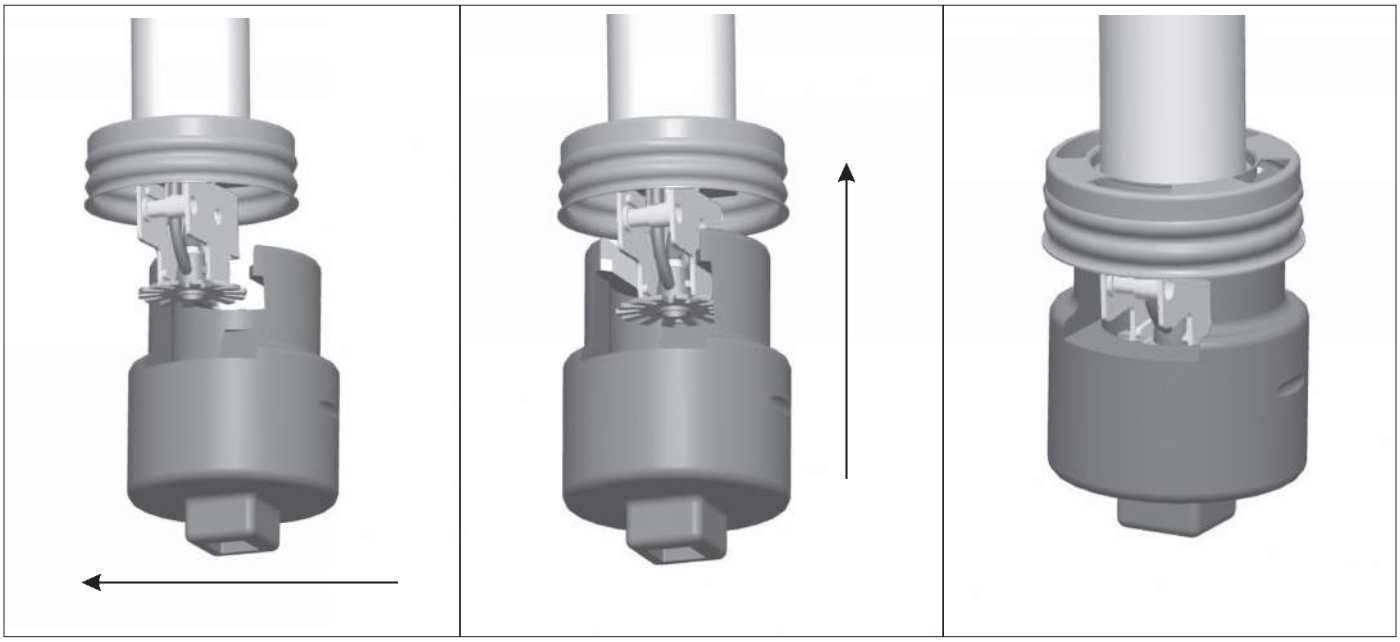
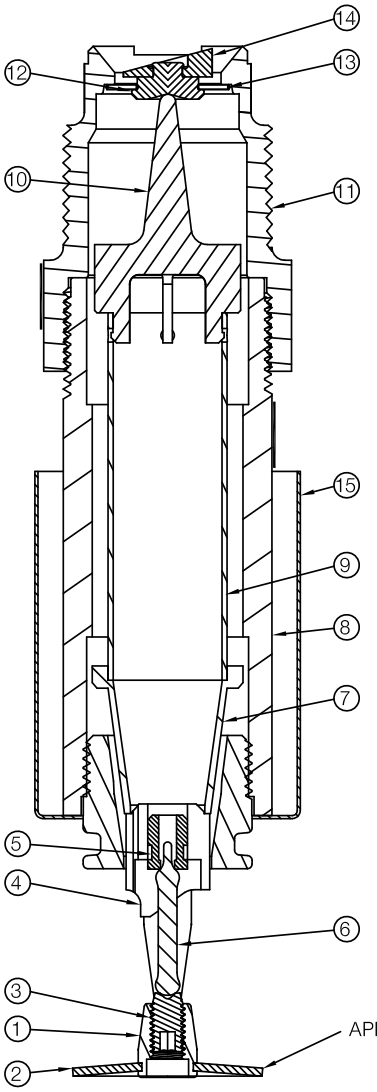


Fig. 14 - Model XLO2 Wrench

MATERIAL SPECIFICATIONS



ITEM #	DESCRIPTION	MATERIAL SPECIFICATION
1	FRAME	BRASS PER UNS C83600
2	DEFLECTOR	BRONZE PER UNS C51000
3	LOAD SCREW	BRASS PER UNS C22000
4	SEAT ADAPTOR	BRASS ALLOY PER UNS C36000
5	BULB INSERT	COPPER ALLOY PER UNS C31400
6	GLASS BULB	GLASS W/GLYCERIN SOLUTION
7	ORIFICE ADAPTOR	BRASS ALLOY PER UNS C36000
8	OUTER TUBE	GALVANIZED STEEL
9	INNER TUBE	BRASS ALLOY PER UNS C23000
10	YOKE	BRASS ALLOY PER UNS C38000
11	INLET	BRASS ALLOY PER UNS C35330
12	CAP	BRASS ALLOY PER UNS C54400
13	SPRING WASHER/SEAL	PTFE COATED BERYLLIUM NICKEL
14	FLIP DISK	BRASS ALLOY PER UNS C54400
15	CAN/ESCUTCHEON	PAINTED OR PLATED MILD STEEL, EXCEPT FOR TYPE 316 STAINLESS STEEL FOR SPRINKLERS WITH ENT FINISH

(PIPE WRENCH MAY ONLY BE USED ON OUTER STEEL PIPE OF SPRINKLER)

COMDRYDET13

APPEARANCE OF DEFLECTOR MAY VARY DEPENDING ON MODEL

Fig. 15

Installation Instructions

When used on wet pipe systems, Reliable Model F3QR56 dry 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 12).

When used on dry pipe systems, Reliable Model F3QR56 dry pendent sprinklers MUST ONLY BE installed in the outlets of ductile or malleable cast iron threaded tees on horizontal pipe such that the inlet of the sprinkler protrudes above the bottom level of the pipe.

When used on dry pipe systems, Reliable Model F3QR56 dry sidewall and dry upright 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 12).

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

Dry sprinklers connected to wet pipe systems must be installed as indicated in Figure 11 and as required by NFPA 13 with the Exposed Minimum Barrel Length located in a heated area.

An orange protective clip is factory installed on the sprinkler to protect the glass bulb thermal element from damage. The clip should remain in place during installation of the sprinkler and be removed when the sprinkler system is placed in service. Sprinklers with 3/4" NPT and ISO7-1R3/4 inlets are supplied with a protective cap on the inlet that must be removed before installation.

Use the following steps for installation:

1. Cut a hole in the wall or ceiling directly in-line with the outlet of the fitting. See the Installation Data table for the recommended hole diameter based on the escutcheon or cover plate option selected.
2. Apply pipe joint compound or PTFE tape to the male threads of the sprinkler's inlet fitting.
3. Install the sprinkler in the fitting using the installation wrench specified in the Installation Data table. The Model F3R wrench is designed to be inserted into the groves in the sprinkler's wrench boss as shown in Fig. 13. The Model XLO2 wrench is designed to fit into the cup and engage the wrench boss as shown in Fig. 14. Do NOT wrench any part of the sprinkler assembly other than the wrench boss. When inserting or removing the wrench from the sprinkler, care should be taken to prevent damage to the sprinkler. The sprinkler is then tightened into the pipe fitting to achieve a leak free connection. The recommended minimum to maximum installation torque is 22 - 30 lb-ft (30 – 40 N-m) for 1" NPT and ISO7-1R1 sprinklers, and 14 - 20 lb-ft (19 – 27 N-m) for 3/4" NPT and ISO7-1R3/4 sprinklers.

3a. Alternatively, where access to the outer tube of the sprinkler is available, the Model F3QR56 Dry sprinkler may be installed using a pipe wrench. The pipe wrench shall only be permitted to interface with the galvanized steel outer tube portion of the sprinkler (Item #8 in Fig. 15). Do NOT wrench any other portion of the sprinkler assembly. A pipe wrench can install the sprinkler into the fitting with a large amount of torque; consideration should be given to the need for future removal of the sprinkler because the installation torque will have to be matched or exceeded to remove the sprinkler. The recommended minimum to maximum installation torque is 22 - 30 lb-ft (30 – 40 N-m) for 1" NPT and ISO7-1R1 sprinklers, and 14 - 20 lb-ft (19 – 27 N-m) for 3/4" NPT and ISO7-1R3/4 sprinklers.

4. Standard and Model HB escutcheons can be installed by slipping the escutcheon over the can until the escutcheon is seated against the ceiling or wall. Model F1 escutcheons are installed by pressing the escutcheon onto the collar until the escutcheon is seated against the ceiling or wall. The Model FP escutcheon is installed by pressing or threading the escutcheon into the cup by hand; the escutcheon can be tightened against the ceiling or wall by turning the escutcheon in a clockwise direction and removed by turning the escutcheon in a counter-clockwise direction. To install the Model CCP cover plate, first remove the protective clip. Install the Model CCP cover plate on the sprinkler by pressing or threading the cover plate into the cup by hand; the cover plate can be tightened against the ceiling by turning the cover plate in a clockwise direction and removed by turning the cover plate in a counter-clockwise direction.
5. Remove the orange protective clip when placing the sprinkler system in service.

Installation Data

Sprinkler Model	Escutcheon or Cover Plate	Suggested Hole Diameter in Wall or Ceiling	Installation Wrench	Required Centerline of Sprinkler Tube/Inlet to Finished Ceiling Vertical Dimension*
F3QR56 Dry Pendent	Standard Escutcheon	2-1/8" (54 mm)	F3R	Not Applicable
	HB Extended Escutcheon	2-1/2" (64 mm)	F3R	
	F1 Recessed Escutcheon	2-1/4" (57 mm)	XLO2	
	FP Recessed Escutcheon	2-1/2" (64 mm)	XLO2	
	CCP Cover Plate		XLO2	
F3QR56 Dry Horizontal Sidewall	Standard Escutcheon	2-1/8" (54 mm)	F3R	4-5/8" to 12-5/8" (118 mm to 321 mm)
	HB Extended Escutcheon	2-1/2" (64 mm)	F3R	
	F1 Recessed Escutcheon	2-1/4" (57 mm)	XLO2	cULus, NYC 4-5/8" to 6-5/8" (118 mm to 168 mm)
	FP Recessed Escutcheon	2-1/2" (64 mm)	XLO2	
	F1 Recessed Escutcheon	2-1/4" (57 mm)	XLO2	FM 4-5/8" to 12-5/8" (118 mm to 321 mm)
	FP Recessed Escutcheon	2-1/2" (64 mm)	XLO2	
F3QR56 Dry Upright	N/A	1-1/2" (38mm)	F3R	Not Applicable

***Note:** Based on 5/8" (16 mm) centerline of sprinkler tube/inlet to defector vertical distance.

Maintenance

The Model F3QR56 Dry Sprinklers should be inspected and the sprinkler system maintained in accordance with NFPA 25. Do not remove the factory applied thermally sensitive wax fillet between the bulb supporting cup and the wrenching boss. Do not replace this wax with a substitute substance.

An Alternate substance may interfere with proper operation of the sprinkler. Do not clean sprinklers with soap and water, ammonia or any other cleaning fluids. Remove dust by using a soft brush or gently vacuuming. Replace any sprinkler which has been painted (other than factory applied) or damaged in any way. A stock of spare sprinklers should be maintained to allow quick replacement of damaged or operated sprinklers. Prior to installation, sprinklers should be maintained in the original cartons and packaging until used to minimize the potential for damage to sprinklers that would cause improper operation or non-operation.

Ordering Information

Specify:

1. Sprinkler: [Model F3QR56 Dry Pendent SIN R5714] [Model F3QR56 Dry Horizontal Sidewall SIN R5734] [Model F2QR Dry Upright SIN R5724]
2. Escutcheon/Cover Plate: [None][Standard escutcheon] [Model HB extended escutcheon][Model F1 recessed escutcheon][Model FP recessed escutcheon][Model CCP cover plate – pendent only]
3. Inlet Threads: [1" NPT][ISO7-1R1][3/4" NPT][ISO7-1R3/4]
4. Inlet Fitting: [Long – Standard Inlet Fitting][Short "PL" – Wet Pipe Systems only]
5. Sprinkler Temperature Rating: See Temperature Ratings Table
6. Sprinkler Finish: See Finish Combinations Table
7. Escutcheon/Cover Plate Finish: See Finish Combinations Table
8. Length:
   *For dry pendents and dry sidewalls: "A" Dimension is from face of tee to face of finished ceiling or wall in 1/4" (6mm) increments. See Fig. 1 through Fig. 9.
   *For dry uprights: Order dimension is from face of tee to top of deflector in 1/4" (6mm) increments. See Fig. 10.

Notes:

1. For Dry Upright, customer is responsible for determining the correct deflector distance from structure above.
2. Length is based on normally gauged pipe thread "make-up" of .600" (15mm) per ANSI B2.1 (approximately 7-1/2 threads).

Installation Wrench

Model F3R Sprinkler Wrench (Standard and HB escutcheons)
Model XLO2 Sprinkler Wrench (FP Recessed and CCP Concealed)

Manufactured by

Reliable®

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

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Reliable®

Sprinkler Guards, Guards with Shields, and Water Shields

Product Description

Sprinkler guards and water shields in this bulletin are independent components which are Listed or Approved with specific fire sprinklers. Sprinkler guards are designed to protect the sprinkler from damage due to incidental contact. Water shields are intended for use in racks or under grated walkways and prevent water from above from cooling and thereby delaying activation of the shielded sprinkler.

Refer to the guard selection table in this bulletin and sprinkler technical bulletins for listing and approval information regarding sprinkler and guard combinations.

Model C Guards and Guard/Shield Assemblies

Model C-1 Guard
This guard is used with pendent, upright, horizontal sidewall, and vertical sidewall sprinklers and does not incorporate a water shield.

Model C-2 Guard
This guard is used with non-recessed dry pendent sprinklers.

Model C-3 Guards
This guard has a built-in water shield. When assembled to an upright sprinkler, the combination forms an upright intermediate sprinkler with guard.

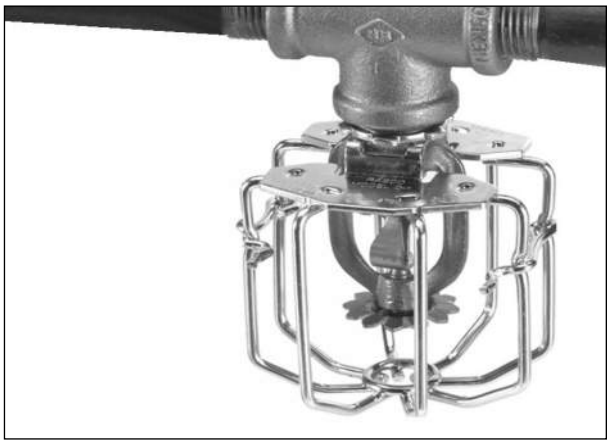
Model C-5 Guard/Shield Assembly
This assembly is a Model C-1 guard supplied with either an S-1 water shield threaded onto 1/2"" sprinkler threads, or an S-2 water shield threaded onto 3/4" threads. The combination forms a pendent intermediate level sprinkler with guard.

Model D Guards and Guard/Shield Assemblies

Model D-1 Guard
These guards are used with pendent, upright, and horizontal sidewall sprinklers and do not incorporate a water shield.

Model D-3, D-6, and D-7 Guards
These guards have a built-in water shield. When assembled to an upright sprinkler, the combination forms an upright intermediate sprinkler with guard.

Model D-4 and D-5 Guard/Shield Assembly
These assemblies are model D-1 guards supplied with either an S-1 water shield threaded onto 1/2"" sprinkler threads, or an S-2 water shield threaded onto 3/4" threads. The combination forms a pendent intermediate level sprinkler with guard.



Example: Model D1 Sprinkler Guard

Model D-8 Guard
This guard is used with pendent and upright sprinklers and does not incorporate a water shield.

Model D-9 Guard/Shield Assembly
This assembly is a Model D-8 guard supplied with an S-2 water shield that is threaded onto 3/4" sprinkler threads. The combination forms a pendent intermediate level sprinkler with guard.

Model S Water Shields

Model S Shields are threaded water shields designed to create a pendent intermediate level sprinkler when installed on an approved sprinkler. The water shields are UL listed and/or FM Approved with the sprinklers listed in Table A, Listed and Approved Sprinkler, Guard, and Water Shield Combinations.

Model S-1
Model S-1 (3-1/4" [83mm] diameter) water shields are threaded onto 1/2" sprinkler inlet threads prior to installation

Model S-2 and S-3
Model S-2 (3-1/4" [83mm] diameter) and S-3 (3-3/4" [95mm] diameter) water shields are threaded onto 3/4" sprinkler inlet threads prior to installation.

Note: Model S-3 water shields are intended and listed for use on Model JL14 and JL17 ESFR storage sprinklers.

Model S-5
Model S-5 (4-1/2" [114mm] diameter) water shields are threaded onto 1" sprinkler inlet threads prior to installation.

Model 22 and 25 Sprinkler Guards

Model 22 and 25 sprinkler guards are FM Approved for in-rack installation only. Each guard is supplied with a 1" locknut that must be threaded onto the sprinkler prior to sprinkler installation. Where permitted by Table A, the guards may also be used in combination with the S-5 water shield which replaces the locknut. The guard is assembled to the sprinkler following installation of the sprinkler.

Model F Guards and Guards with Shields

Model F guards and guards with shields are specifically designed for use with KFR sprinklers and various F1 and F1FR sprinklers being transitioned to KFR frames. These sprinklers are designated as "NEW" in Table A, "Listed and Approved Sprinkler, Guard, and Water Shield Combinations."

Model F-1, F-2, F-4, and F-7
These guards are used with pendent, upright, horizontal sidewall, and vertical sidewall sprinklers and do not incorporate a water shield.

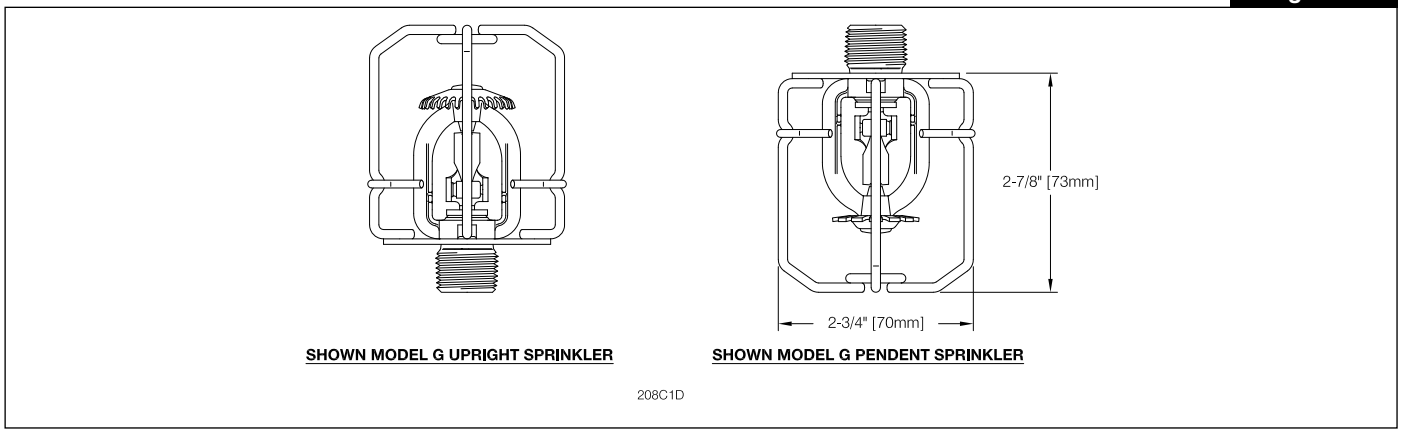
Model F-3 Guard
This guard has a built-in water shield. When assembled to an upright sprinkler, the combination forms an upright intermediate sprinkler with guard.

Model F-5 Guard/Shield Assembly
This assembly is a Model F-1 guard supplied with an S-1 water shield that is threaded onto 1/2" sprinkler threads. The combination forms a pendent intermediate level sprinkler with guard.

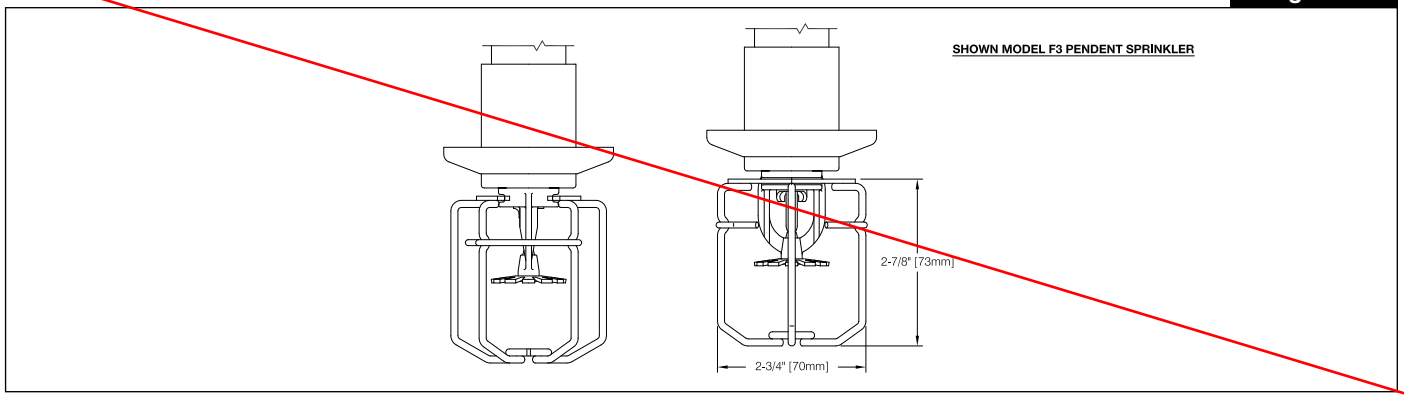
Model F-6 Guard/Shield Assembly
This assembly is a Model F-2 guard supplied with an S-2 water shield that is threaded onto 3/4" sprinkler threads. The combination forms a pendent intermediate level sprinkler with guard.

Model F-8 Guard/Shield Assembly
This assembly is a model F-7 guard supplied with either an S-1 water shield which is threaded onto 1/2"" sprinkler threads, or an S-2 water shield threaded onto 3/4" threads. The combination forms a pendent intermediate level sprinkler with guard.

Model C-1 Guards **Figure 1**

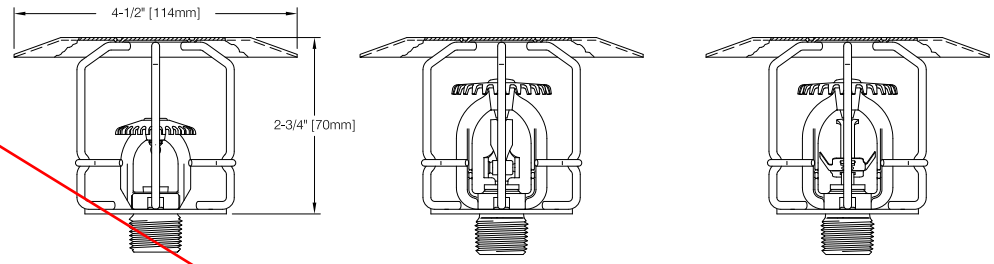


Model C-2 Guards **Figure 2**



Model C-3 Guards and Water Shield

Figure 3

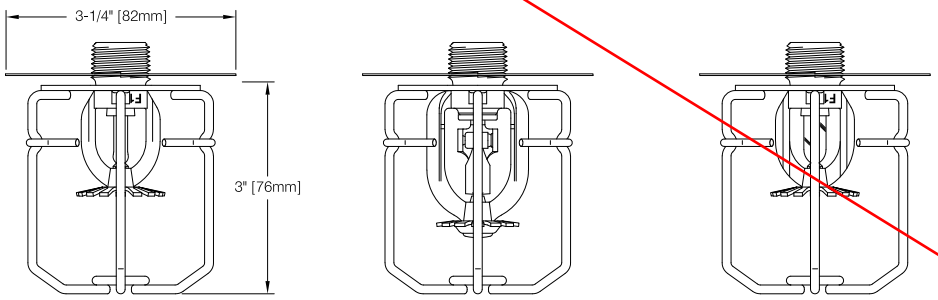


SHOWN MODEL F1FR UPRIGHT SPRINKLER | SHOWN MODEL G UPRIGHT SPRINKLER | SHOWN MODEL GFR UPRIGHT SPRINKLER

208C3D

Model C-5 Guards and Water Shield

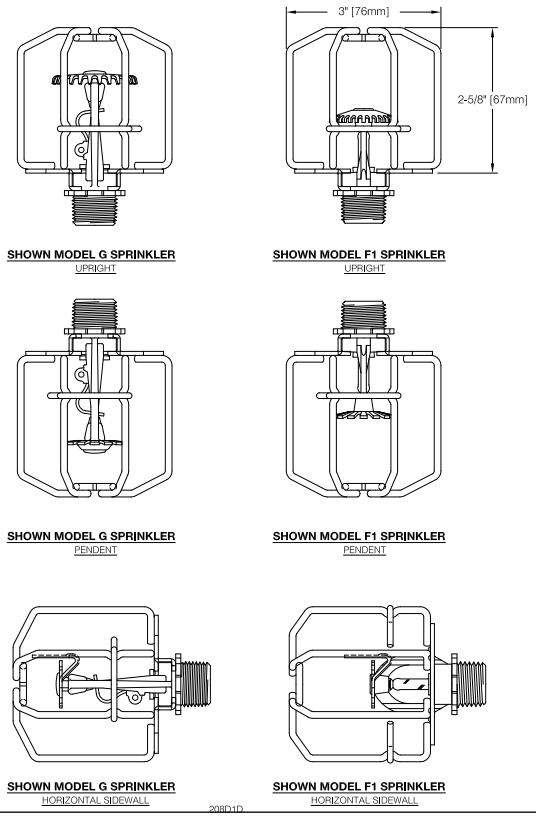
Figure 4



SHOWN MODEL F1FR PENDENT SPRINKLER | SHOWN MODEL G PENDENT SPRINKLER | SHOWN MODEL F1 PENDENT SPRINKLER

Model D-1 Guard

Figure 5



SHOWN MODEL G SPRINKLER
UPRIGHT

SHOWN MODEL F1 SPRINKLER
UPRIGHT

SHOWN MODEL G SPRINKLER
PENDENT

SHOWN MODEL F1 SPRINKLER
PENDENT

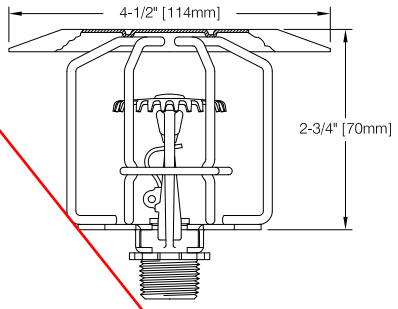
SHOWN MODEL G SPRINKLER
HORIZONTAL SIDEWALL

SHOWN MODEL F1 SPRINKLER
HORIZONTAL SIDEWALL

208D1D

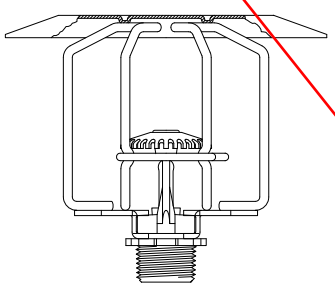
Model D-3 Guards and Water Shield

Figure 6



SHOWN MODEL G SPRINKLER
UPRIGHT

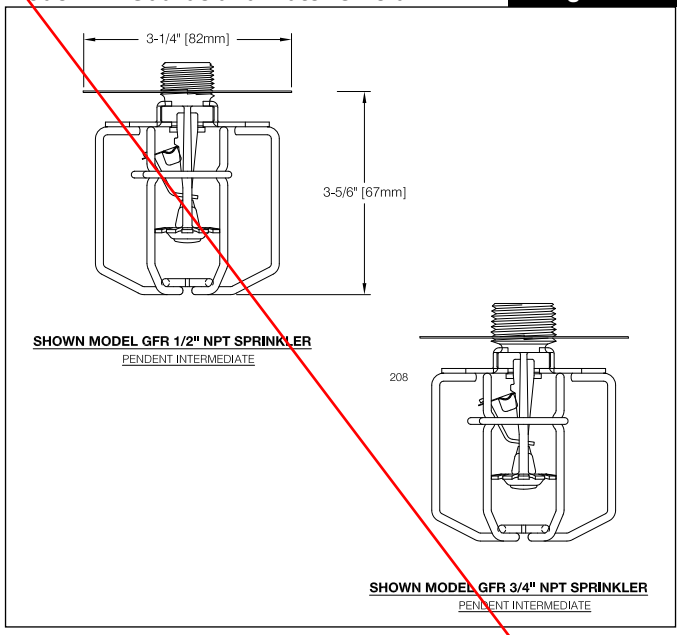
208D3D



SHOWN MODEL F1 SPRINKLER
UPRIGHT

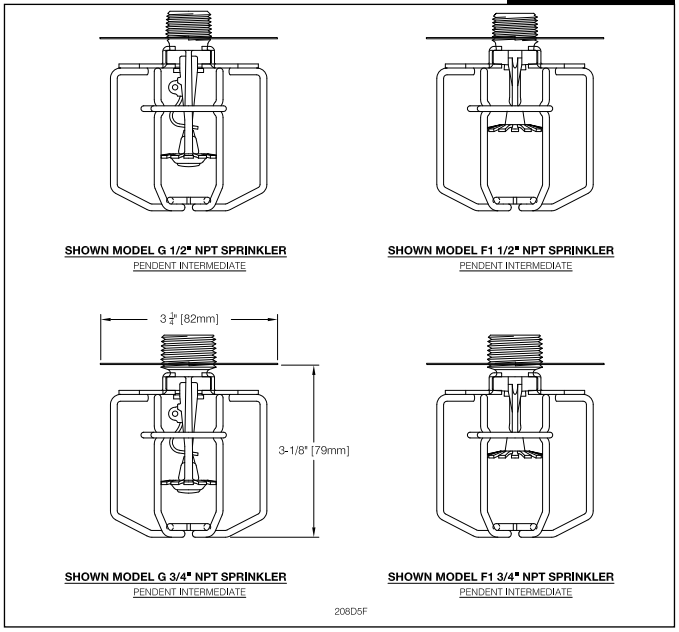
Model D-4 Guards and Water Shield

Figure 7



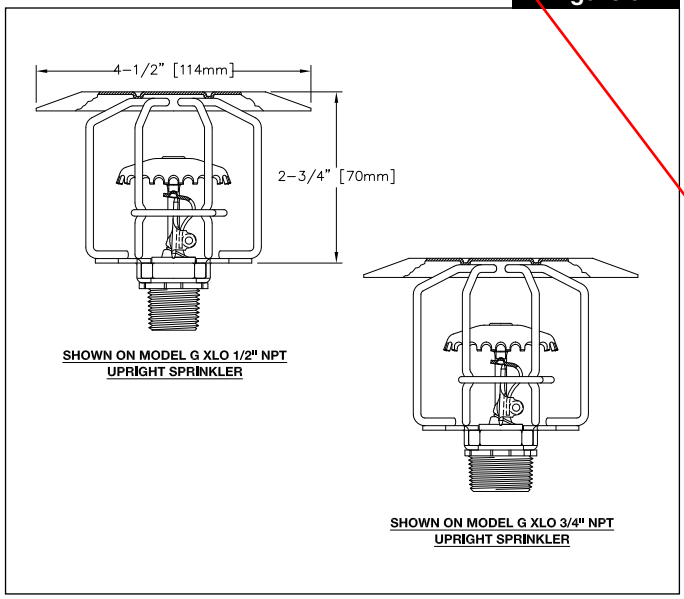
Model D-5 Guards and Water Shield

Figure 8



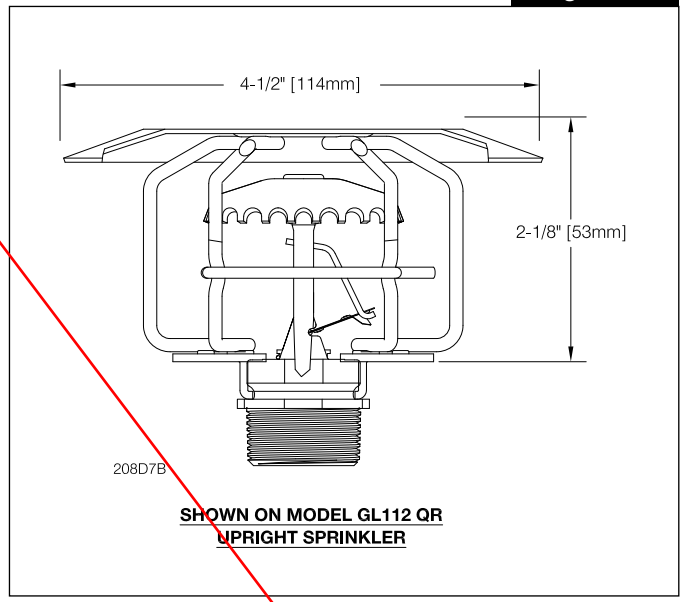
Model D-6 Guards and Water Shield

Figure 9



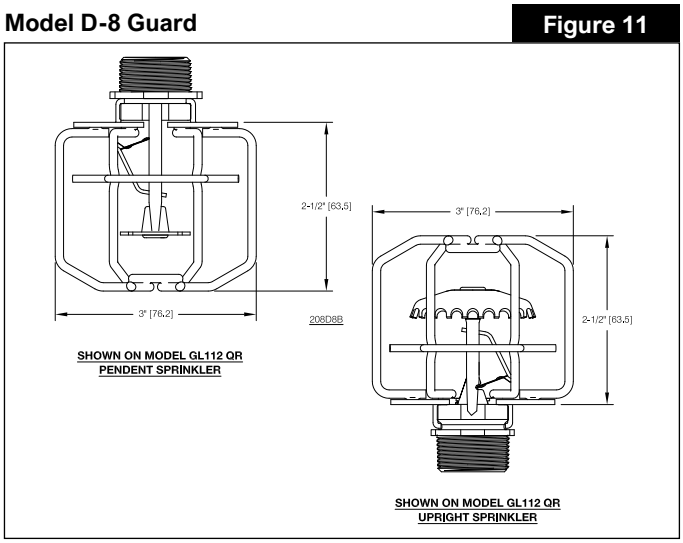
Model D-7 Guards and Water Shield

Figure 10



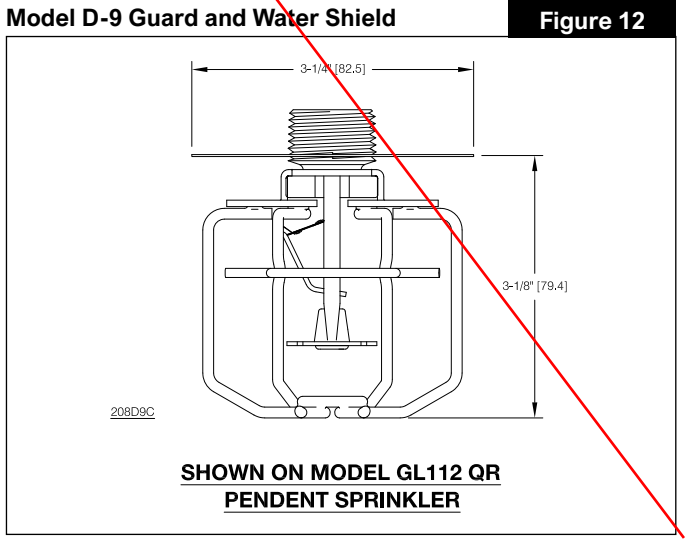
Model D-8 Guard

Figure 11

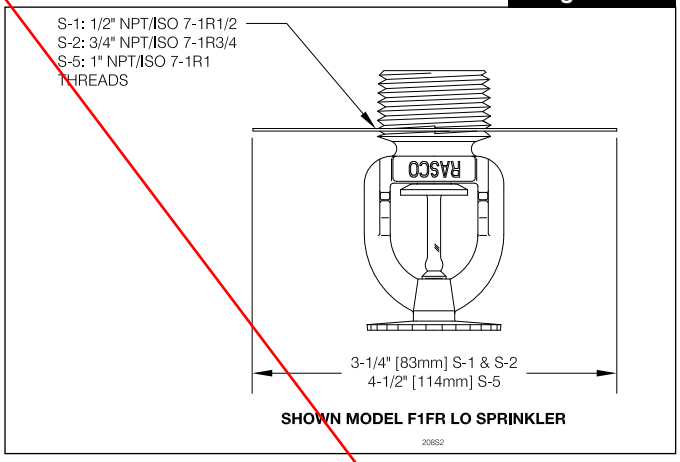


Model D-9 Guard and Water Shield

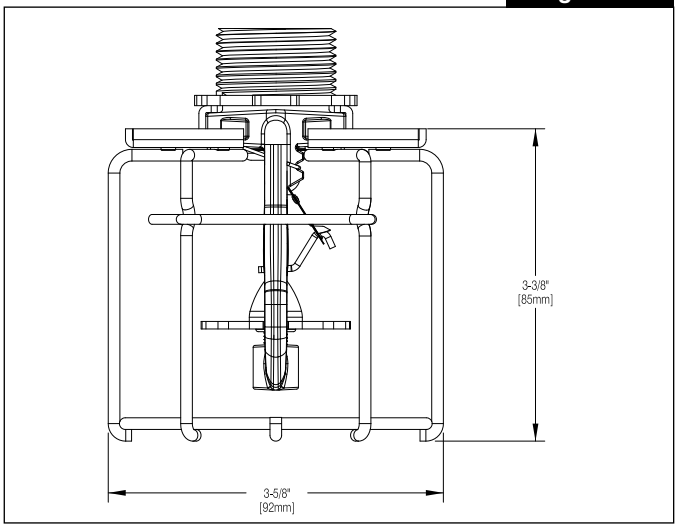
Figure 12



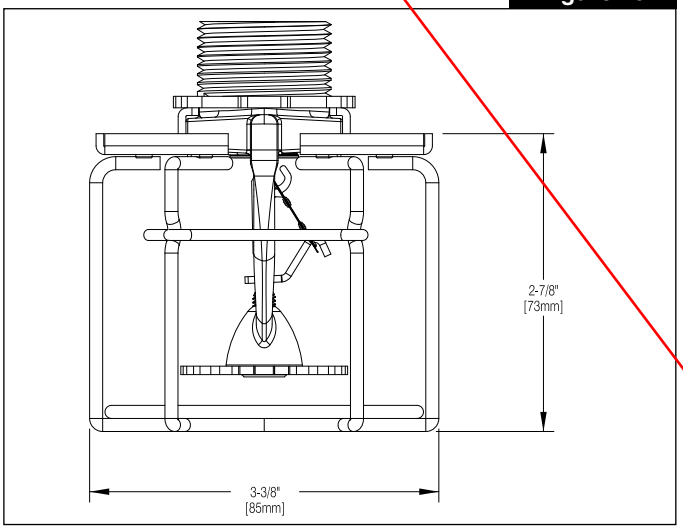
Model S Water Shield **Figure 13**



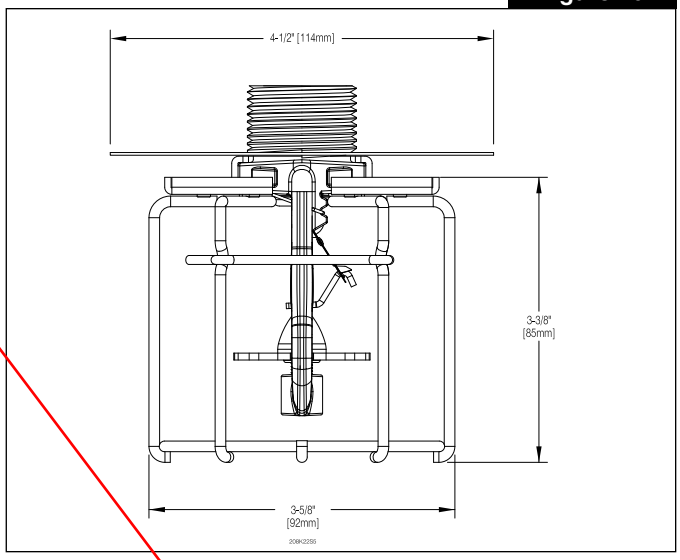
Model 22 Guard **Figure 14**



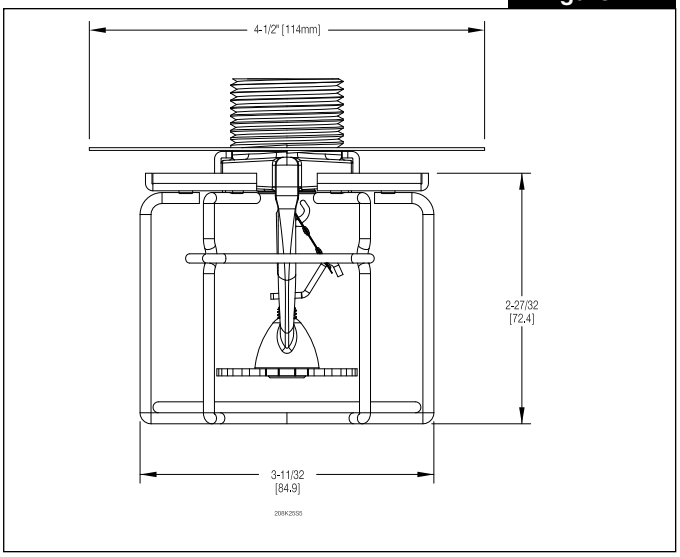
Model 25 Guard **Figure 15**



Model 22 Guard w/ S-5 Shield **Figure 16**

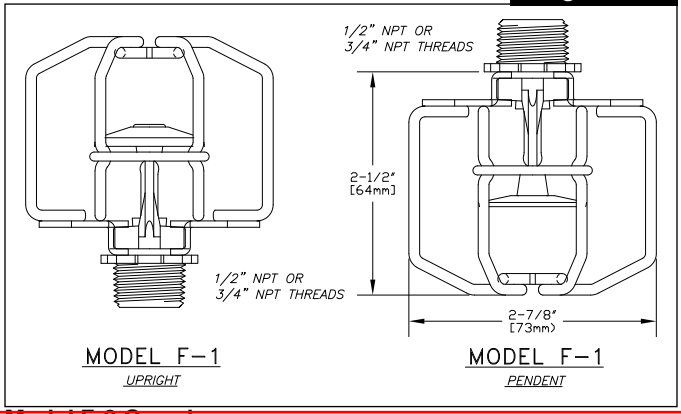


Model 25 Guard w/ S-5 Shield **Figure 17**



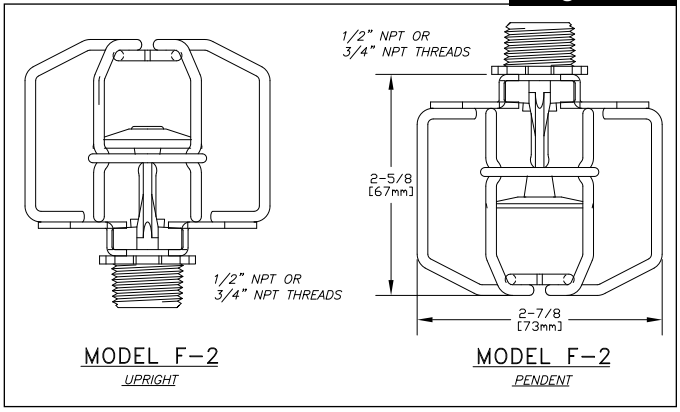
Model F-1 Guard

Figure 18



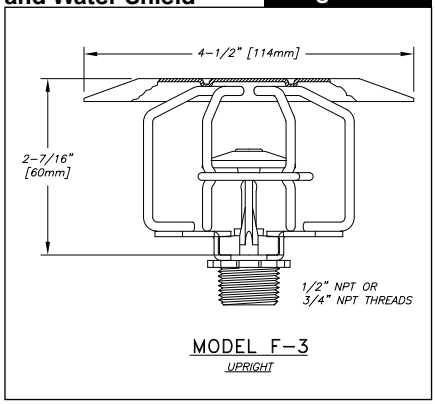
Model F-2 Guard

Figure 19



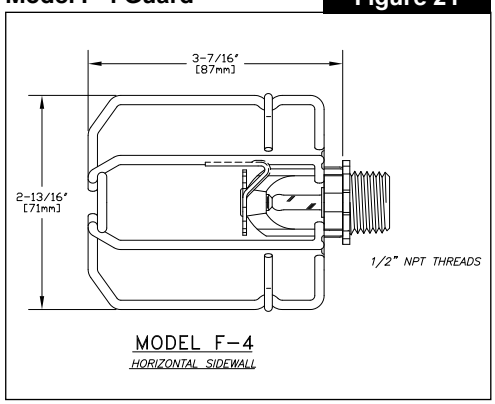
Model F-3 Guard and Water Shield

Figure 20



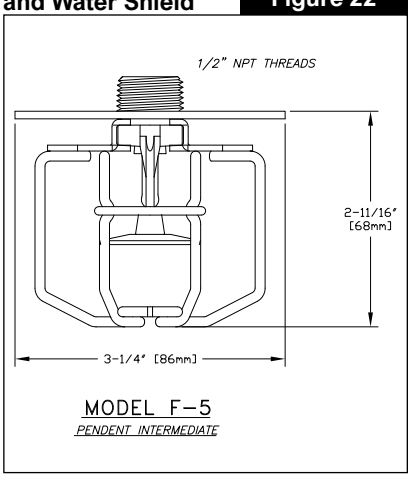
Model F-4 Guard

Figure 21



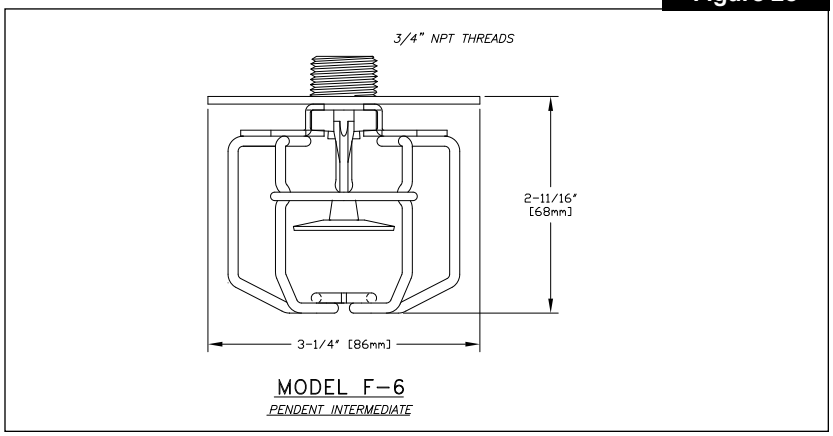
Model F-5 Guard and Water Shield

Figure 22



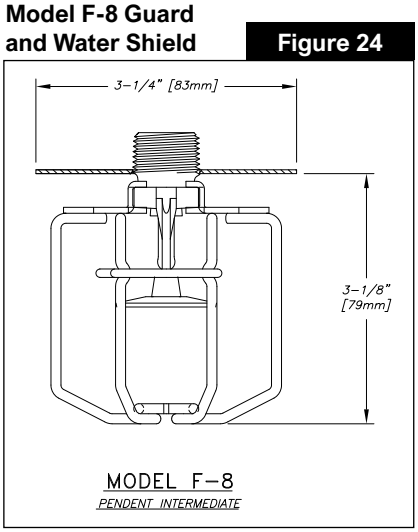
Model F-6 Guard and Water Shield

Figure 23



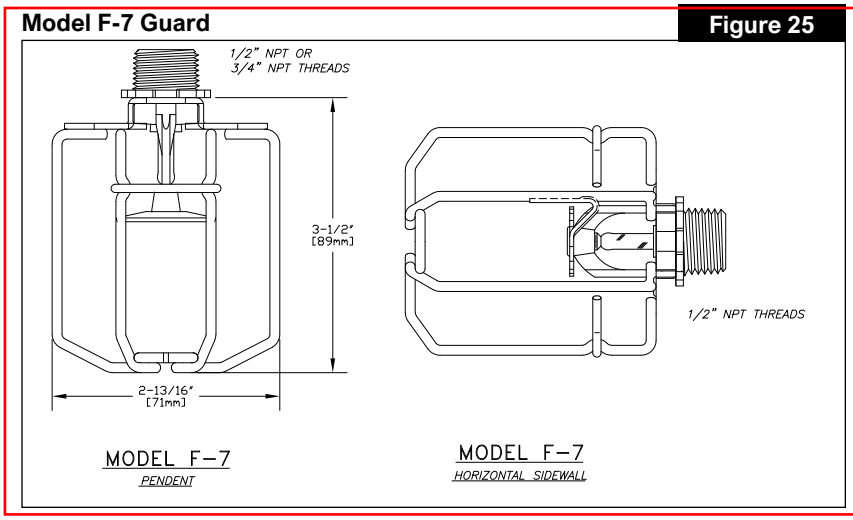
Model F-8 Guard and Water Shield

Figure 24



Model F-7 Guard

Figure 25



Listed and Approved Sprinkler, Guard, and Water Shield Combinations **Table A**

Sprinkler Model[1]	Type[2]	Sprinkler Identification Number (SIN)	Nominal K-Factor gpm/psi½ (L/min/bar½)	Sensitivity[3]	Threads NPT or ISO-7R	Approvals[4]	Guard, Guard and Shield, or Water Shield Model
F1LO	Pendent	R1712	8.0 (115)	SR	3/4	cULus	D-1 Guard D-5 Guard and Shield S-2 Shield
						FM	C-1 Guard C-5 Guard and Shield S-2 Shield
	Upright	R1722	8.0 (115)	SR	3/4	cULus	D-1 Guard C-3 Guard and Shield D-3 Guard and Shield
F1LO-300	Pendent	RA5512	8.0 (115)	SR	3/4	cULus	D-1 Guard D-5 Guard and Shield S-2 Shield
	Upright	RA5522	8.0 (115)	SR	3/4	cULus	D-1 Guard C-3 Guard and Shield D-3 Guard and Shield
F1-28	Pendent	RA1311	2.8 (40)	SR	1/2	cULus	D-1 Guard
	Upright	RA1321	2.8 (40)	SR	1/2	cULus	D-1 Guard
F1-28 NEW[8]	Pendent	RA1311	2.8 (40)	SR	1/2	cULus	F-7 Guard F-8 Guard and Shield S-1 Shield
	Upright	RA1321	2.8 (40)	SR	1/2	cULus	F-1 Guard F-3 Guard and Shield
F1-42	Pendent	RA1313	4.2 (60)	SR	1/2	cULus	D-1 Guard
	Upright	RA1323	4.2 (60)	SR	1/2	cULus	D-1 Guard
F1-42 NEW[8]	Pendent	RA1313	4.2 (60)	SR	1/2	cULus	F-7 Guard F-8 Guard and Shield S-1 Shield
	Upright	RA1323	4.2 (60)	SR	1/2	cULus	F-1 Guard F-3 Guard and Shield
F1-56	HSW	RA1335	5.6 (80)	SR	1/2	cULus	D-1 Guard
						FM	C-1 Guard
	Pendent	RA1314	5.6 (80)	SR	1/2	cULus	D-1 Guard D-5 Guard and Shield S-1 Shield
						FM	C-1 Guard C-5 Guard and Shield D-1 Guard D-4 Guard and Shield D-5 Guard and Shield S-1 Shield
	Upright	RA1325	5.6 (80)	SR	1/2	cULus	D-1 Guard C-3 Guard and Shield D-3 Guard and Shield
						FM	C-1 Guard C-3 Guard and Shield
	VSW	RA1385	5.6 (80)	SR	1/2	FM	C-1 Guard
F1-56 NEW[8]	HSW	RA1335	5.6 (80)	SR	1/2	cULus	F-7 Guard
						FM	F-4 Guard
	Pendent	RA1314	5.6 (80)	SR	1/2	cULus	F-7 Guard F-8 Guard and Shield S-1 Shield
						FM	F-1 Guard F-5 Guard and Shield S-1 Shield
	Upright	RA1325	5.6 (80)	SR	1/2	cULus	F-1 Guard F-3 Guard and Shield
						FM	F-1 Guard F-3 Guard and Shield
	VSW	RA1385	5.6 (80)	SR	1/2	cULus	NA
						FM	F-2 Guard

Note: see table notes on page 12.

Table A cont.

Sprinkler Model[1]	Type[2]	Sprinkler Identification Number (SIN)	Nominal K-Factor gpm/psi½ (L/min/bar½)	Sensitivity[3]	Threads NPT or ISO-7R	Approvals[4]	Guard, Guard and Shield, or Water Shield Model
F1-56-300	Pendent	RA2514	5.6 (80)	SR	1/2	cULus	D-1 Guard D-5 Guard and Shield S-1 Shield
	Upright	RA2525	5.6 (80)	SR	1/2	cULus	D-1 Guard C-3 Guard and Shield D-3 Guard and Shield
F1-56-300 NEW[8]	Pendent	RA2514	5.6 (80)	SR	1/2	cULus	F-7 Guard F-8 Guard and Shield S-1 Shield
	Upright	RA2525	5.6 (80)	SR	1/2	cULus	F-1 Guard F-3 Guard and Shield
F1-56SS	Pendent	RA6414	5.6 (80)	SR	1/2	cULus	D-1 Guard D-5 Guard and Shield S-1 Shield
						FM	C-1 Guard C-5 Guard and Shield D-1 Guard D-4 Guard and Shield D-5 Guard and Shield S-1 Shield
	Upright	RA6424	5.6 (80)	SR	1/2	cULus	D-1 Guard C-3 Guard and Shield D-3 Guard and Shield
						FM	C-1 Guard C-3 Guard and Shield
F1-80 NEW[8]	Pendent	RA6212	8.0 (115)	SR	3/4	cULus	F-7 Guard F-8 Guard and Shield S-2 Shield
						FM	F-2 Guard F-6 Guard and Shield S-2 Shield
	Upright	RA6222	8.0 (115)	SR	3/4	cULus	F-1 Guard F-3 Guard and Shield
						FM	F-2 Guard F-3 Guard and Shield
F1-80SS	Pendent	RA6412	8.0 (115)	SR	3/4	cULus	D-1 Guard D-5 Guard and Shield S-2 Shield
						FM	C-1 Guard C-5 Guard and Shield S-2 Shield
	Upright	RA6422	8.0 (115)	SR	3/4	cULus	D-1 Guard C-3 Guard and Shield D-3 Guard and Shield
F1FRLO	Pendent	R3612	8.0 (115)	QR	3/4	cULus	D-1 Guard D-5 Guard and Shield S-2 Shield
						FM	C-1 Guard C-5 Guard and Shield S-2 Shield
	Upright	R3622	8.0 (115)	QR	3/4	cULus	D-1 Guard D-3 Guard and Shield C-3 Guard and Shield
						FM	C-1 Guard C-3 Guard and Shield
F1FR28	Pendent	RA1411	2.8 (40)	QR	1/2	cULus	D-1 Guard
	Upright	RA1421	2.8 (40)	QR	1/2	cULus	D-1 Guard
F1FR28 NEW[8]	Pendent	RA1411	2.8 (40)	QR	1/2	cULus	F-7 Guard F-8 Guard and Shield S-1 Shield
	Upright	RA1421	2.8 (40)	QR	1/2	cULus	F-1 Guard F-3 Guard and Shield
F1FR-300	Pendent	R5612	8.0 (115)	QR	3/4	cULus	D-1 Guard D-5 Guard and Shield S-2 Shield
	Upright	R5622	8.0 (115)	QR	3/4	cULus	D-1 Guard

Note: see table notes on page 12.

Table A cont.

Sprinkler Model[1]	Type[2]	Sprinkler Identification Number (SIN)	Nominal K-Factor gpm/psi^{½} (L/min/bar^{½})	Sensitivity[3]	Threads NPT or ISO-7R	Approvals[4]	Guard, Guard and Shield, or Water Shield Model
F1FR42	Pendent	RA1413	4.2 (60)	QR	1/2	cULus	D-1 Guard
	Upright	RA1423	4.2 (60)	QR	1/2	cULus	D-1 Guard
F1FR42 NEW[8]	Pendent	RA1413	4.2 (60)	QR	1/2	cULus	F-7 Guard F-8 Guard and Shield S-1 Shield
	Upright	RA1423	4.2 (60)	QR	1/2	cULus	F-1 Guard F-3 Guard and Shield
F1FR56	HSW	RA1435	5.6 (80)	QR	1/2	cULus	D-1 Guard
						FM	C-1 Guard
	Pendent	RA1414	5.6 (80)	QR	1/2	cULus	D-1 Guard D-5 Guard and Shield S-1 Shield
						FM	C-1 Guard C-5 Guard and Shield D-1 Guard D4 Guard and Shield D-5 Guard and Shield S-1 Shield
	Upright	RA1425	5.6 (80)	QR	1/2	cULus	D-1 Guard C-3 Guard and Shield D-3 Guard and Shield
						FM	C-1 Guard C-3 Guard and Shield
	VSW	RA1485	5.6 (80)	QR	1/2	FM	C-1 Guard
F1FR56 NEW[8]	HSW	RA1435	5.6 (80)	QR	1/2	cULus	F-7 Guard
						FM	F-4 Guard
	Pendent	RA1414	5.6 (80)	QR	1/2	cULus	F-7 Guard F-8 Guard and Shield S-1 Shield
						FM	F-1 Guard F-5 Guard and Shield S-1 Shield
	Upright	RA1425	5.6 (80)	QR	1/2	cULus	F-1 Guard F-3 Guard and Shield
						FM	F-1 Guard F-3 Guard and Shield
	VSW	RA1485	5.6 (80)	QR	1/2	cULus	NA
						FM	F-2 Guard
F1FR56-300	HSW	RA2634	5.6 (80)	QR	1/2	cULus	D-1 Guard
						FM	C-1 Guard
	Pendent	RA2614	5.6 (80)	QR	1/2	FM	C-1 Guard C-5 Guard and Shield D-1 Guard D4 Guard and Shield D-5 Guard and Shield S-1 Shield
	Upright	RA2625	5.6 (80)	QR	1/2	cULus	D-1 Guard C-3 Guard and Shield D-3 Guard and Shield
						FM	C-1 Guard C-3 Guard and Shield
F1FR56-300 NEW[8]	HSW	RA2634	5.6 (80)	QR	1/2	cULus	F-7 Guard
	Pendent	RA2614	5.6 (80)	QR	1/2	cULus	F-7 Guard F-8 Guard and Shield S-1 Shield
	Upright	RA2625	5.6 (80)	QR	1/2	cULus	F-1 Guard F-3 Guard and Shield

Note: see table notes on page 12.

Table A cont.

Sprinkler Model[1]	Type[2]	Sprinkler Identification Number (SIN)	Nominal K-Factor gpm/psi½ (L/min/bar½)	Sensitivity[3]	Threads NPT or ISO-7R	Approvals[4]	Guard, Guard and Shield, or Water Shield Model
F1FR56SS	Pendent	RA6514	5.6 (80)	QR	1/2	cULus	D-1 Guard D-5 Guard and Shield
						FM	C-1 Guard C-5 Guard and Shield D-1 Guard D-4 Guard and Shield D-5 Guard and Shield
	Upright	RA6524	5.6 (80)	QR	1/2	cULus	D-1 Guard C-3 Guard and Shield D-3 Guard and Shield
						FM	C-1 Guard C-3 Guard and Shield
F1FR80 NEW[8]	Pendent	RA6312	8.0 (115)	QR	3/4	cULus	F-7 Guard F-8 Guard and Shield S-2 Shield
						FM	F-2 Guard F-6 Guard and Shield S-2 Shield
	Upright	RA6322	8.0 (115)	QR	3/4	cULus	F-1 Guard F-3 Guard and Shield
						FM	F-2 Guard F-3 Guard and Shield
F1FR80-300 NEW[8]	Pendent	RA5612	8.0 (115)	QR	3/4	cULus	F-7 Guard F-8 Guard and Shield S-2 Shield
	Upright	RA5622	8.0 (115)	QR	3/4	cULus	F-1 Guard F-3 Guard and Shield
F1FR80SS	Pendent	RA6412	8.0 (115)	QR	3/4	cULus	D-1 Guard D-5 Guard and Shield S-2 Shield
						FM	C-1 Guard C-5 Guard and Shield S-2 Shield
	Upright	RA6522	8.0 (115)	QR	3/4	cULus	C-1 Guard C-3 Guard and Shield
						FM	C-1 Guard
F3-56 Dry	Pendent	R5314	5.6 (80)	SR	1	cULus, FM	C-2 Guard [5]
	HSW	R5334	5.6 (80)	SR	1	FM	C-2 Guard [5]
F3QR56 Dry	Pendent	R5714	5.6 (80)	QR	1	cULus, FM	C-2 Guard [5]
	HSW	R5734	5.6 (80)	QR	1	FM	C-2 Guard [5]
G	HSW	R1231	2.8 (40)	SR	1/2	cULus	D-1 Guard
		R1233	4.2 (60)	SR	1/2	cULus	D-1 Guard
		R1235	5.6 (80)	SR	1/2	cULus	D-1 Guard
						FM	C-1 Guard
		R1236	8.0 (115)	SR	1/2	cULus	D-1 Guard
		R1237	8.0 (115)	SR	3/4	cULus	D-1 Guard
	Pendent	R1011	2.8 (40)	SR	1/2	cULus	D-1 Guard
						FM	C-1 Guard
		R1013	4.2 (60)	SR	1/2	cULus	D-1 Guard
		R1015	5.6 (80)	SR	1/2	cULus	D-1 Guard D-5 Guard and Shield S-1 Shield
						FM	C-1 Guard C-5 Guard and Shield S-1 Shield
		R1016	8.0 (115)	SR	1/2	cULus	D-1 Guard D-5 Guard and Shield
						FM	C-1 Guard
		R1017	8.0 (115)	SR	3/4	cULus	D-1 Guard D-5 Guard and Shield S-2 Shield
						FM	C-1 Guard C-5 Guard and Shield S-2 Shield

Note: see table notes on page 12.

Table A cont.

Sprinkler Model[1]	Type[2]	Sprinkler Identification Number (SIN)	Nominal K-Factor gpm/psi½ (L/min/bar½)	Sensitivity[3]	Threads NPT or ISO-7R	Approvals[4]	Guard, Guard and Shield, or Water Shield Model
G (cont.)	Upright	R1021	2.8 (40)	SR	1/2	cULus	D-1 Guard
						FM	C-1 Guard
		R1023	4.2 (60)	SR	1/2	cULus	D-1 Guard
		R1025	5.6 (80)	SR	1/2	cULus	D-1 Guard C-3 Guard and Shield D-3 Guard and Shield
						FM	C-1 Guard C-3 Guard and Shield
		R1026	8.0 (115)	SR	1/2	cULus	D-1 Guard C-3 Guard and Shield D-3 Guard and Shield
						FM	C-1 Guard C3 Guard and Shield
		R1027	8.0 (115)	SR	3/4	cULus	D-1 Guard C-3 Guard and Shield D-3 Guard and Shield
						FM	C-1 Guard C-3 Guard and Shield
	VSW	R1285	5.6 (80)	SR	1/2	FM	C-1 Guard
GFR	HSW	R3131	2.8 (40)	QR	1/2	cULus	D-1 Guard
		R3133	4.2 (60)	QR	1/2	cULus	D-1 Guard
		R3135	5.6 (80)	QR	1/2	cULus	D-1 Guard
		R3137	8.0 (115)	QR	3/4	cULus	D-1 Guard
	Pendent	R3111	2.8 (40)	QR	1/2	cULus	D-1 Guard
		R3113	4.2 (60)	QR	1/2	cULus	D-1 Guard
		R3115	5.6 (80)	QR	1/2	cULus	D-1 Guard D-4 Guard and Shield S-1 Shield
		R3117	8.0 (115)	QR	3/4	cULus	D-1 Guard D-4 Guard and Shield S-2 Shield
						FM	C-5 Guard and Shield
	Upright	R3121	2.8 (40)	QR	1/2	cULus	D-1 Guard
		R3123	4.2 (60)	QR	1/2	cULus	D-1 Guard
		R3125	5.6 (80)	QR	1/2	cULus	C-3 Guard and Shield D-1 Guard D-3 Guard and Shield
		R3127	8.0 (115)	QR	3/4	cULus	C-3 Guard and Shield D-1 Guard D-3 Guard and Shield
						FM	C-3 Guard and Shield
GL112	Pendent	R3216	11.2 (160)	QR	3/4	FM	D-8 Guard D-9 Guard and Shield S-2 Shield
	Upright	R3226	11.2 (160)	QR	3/4	FM	D-7 Guard and Shield D-8 Guard
GXLO	Pendent	R2916	11.2 (160)	SR	3/4	FM	D-8 Guard D-9 Guard and Shield S-2 Shield
	Upright	R2921	11.2 (160)	SR	3/4	cULus	D-6 Guard and Shield
						FM	D-7 Guard and Shield D-8 Guard
HL22 Threaded	Pendent	RA1011	22.4 (320)	ESFR	1	FM	22 Guard [6] S-5 Shield [6][7]
JL14	Pendent	RA1812	14.0 (200)	ESFR	3/4	FM	S-3 Shield
JL17	Pendent	RA1914	16.8 (240)	ESFR	3/4	FM	S-3 Sheild

Note: see table notes on page 12.

Table A cont.

Sprinkler Model[1]	Type[2]	Sprinkler Identification Number (SIN)	Nominal K-Factor gpm/psi½ (L/min/bar½)	Sensitivity[3]	Threads NPT or ISO-7R	Approvals[4]	Guard, Guard and Shield, or Water Shield Model
KFR56	Pendent	RA3614	5.6 (80)	QR	1/2	cULus	F-7 Guard F-8 Guard and Shield S-1 Shield
						FM	F-1 Guard F-5 Guard and Shield S-1 Shield
	Upright	RA3624	5.6 (80)	QR	1/2	cULus	F-1 Guard F-3 Guard and Shield
						FM	F-1 Guard F-3 Guard and Shield
	HSW	RA3634	5.6 (80)	QR	1/2	cULus	F-7 Guard
						FM	F-4 Guard
KFR56-300	Pendent	RA3914	5.6 (80)	QR	1/2	cULus	F-7 Guard F-8 Guard/Water Shield S-1 Water Shield
	Upright	RA3924					F-1 Guard F-3 Guard/Water Shield
	HSW	RA3934					F-7 Guard
KFR80	Pendent	RA5412	8.0 (115)	QR	3/4	cULus	F-7 Guard F-8 Guard and Shield S-2 Shield
						FM	F-2 Guard F-6 Guard and Shield S-2 Shield
	Upright	RA5422	8.0 (115)	QR	3/4	cULus	F-1 Guard F-3 Guard and Shield
						FM	F-2 Guard F-3 Guard and Shield
N25 Threaded	Pendent	RA0912	25.2 (360)	ESFR	1	FM	25 Guard [6] S-5 Shield [6][7]
N252EC	Pendent	RA0842	25.2 (360)	QR	1	FM	25 Guard [6]

Notes:

[1] Sprinkler guards and water shields are listed and approved only for use with specific sprinklers. The use of any other guards or water shields on these sprinklers may impede their operation or distribution and negate all approvals and warranties.

[2] HSW: Horizontal Sidewall; VSW: Vertical Sidewall

[3] QR: Quick-response; SR: Standard-response; ESFR: Early Supression Fast Response.

[4] In addition, SSL Approval for C-1, C-2, and C-3 guards and water shields.

[5] Model C-2 guards are listed and work only with standard and HB type escutcheons. Model C-2 guards cannot be used with FP or F1 recessed escutcheons

[6] FM Approved for intermediate-level use only, such as in-rack, under conveyors, mezzanines, or other similar obstructions. Only for use with threaded sprinklers.

[7] When used in combination with the 22 or 25 Guard, the S-5 Shield replaces the 1" lock washer provided with the guard.

[8] Sprinklers designated as "NEW" are updated versions of legacy sprinklers and MUST use F-series guards and guards with shields. These sprinklers will be designated with the suffix "N" on orders.

Listings & Approvals

Refer to Table A. Listed and Approved Sprinkler, Guard, and Water Shield Combinations for information on Listings and Approvals applicable to each guard and water shield.

1. Listed by Underwriters Laboratories, Inc. and UL certified for Canada (cULus)
2. Certified by FM Approvals
3. Scientific Services Laboratories (SSL, Australia)*

* For Models C1, C2, C3 guards.

Installation

Model C-1, C-2, and C-3 Guards

Install the sprinkler in accordance with the applicable sprinkler installation instructions prior to installing the Model C guard. With both clips unhooked, slightly spread open the guard. Insert steel plate into the installed sprinkler between the threads and the wrench flats. The steel plate tabs should face the sprinkler wrench flats and four contact points engage the sprinkler neck.

For Model C-2, the steel plate fits into the groove in each wrench flat and the guard is located by the notch in both steel plates. Snap the upper locking clip into place, then close the near clip. The guard is now securely installed in place. If locking clip requires too much force to snap closed or open, slightly flex the wires on both sides of the clip and either close or open the clip.

Model C-5 Guard/Shield Assembly
Prior to installing sprinkler into fitting, thread the Model S-1 (1/2") or S-2 (3/4") water shield onto the sprinkler. After installing sprinkler into fitting, install the Model C-1 Guard per the instructions above.

Model D Guards
Model D series guards and water shields are designed to be installed on the sprinkler prior to sprinkler installation. Assemble the guard on the sprinkler using the following technique:

With both cups unhooked, slightly spread open the guard. Insert steel plate into the installed sprinkler between the threads and the wrench flats. The steel plate tabs should face the sprinkler wrench flats and four contact points should engage the sprinkler neck.

Snap the upper locking clip (steel plates) into place. Close the lower clip at the top of the guard and slide it down to the notch. After installing the guard, thread EITHER a 1/2" or 3/4" lock nut (for guard only) OR an S-1 (1/2") or S-2 (3/4") water shield (for guard/shield assembly) onto the sprinkler threads. The final assembly can then be installed into a fitting using only the wrench indicated in Table B "Wrench for Installation of Guard, Water Shield, and Sprinkler Assembly." The guard is more securely installed. Install the lock nut on to the NPT threads until the nut is securely against the guard.

Model F Guards
Model F series guards and guards with shields are designed to be installed on the sprinkler prior to installation. The assembly is then installed with the wrench indicated in Table B, Wrench for Installation of Guard, Water Shield, and Sprinkler Assembly.

Models F-1, F-2, F-3, F-4 & F-7
Assemble the guard on the sprinklers using the technique described for the Model D-1, then install a 1/2" or 3/4" locking nut on the NPT threads until the nut is tight against the guard.

Models F-5, F-6, & F-8
Assemble the guard on the sprinklers using the technique described for the Model D-1, then install a 1/2" or 3/4" threaded water shield on the NPT threads until the shield is tight against the guard.

Model 22 & 25 Guards
Install the provided locknut on the sprinkler threads prior to installation of the sprinkler. Install the sprinkler in accordance with the applicable sprinkler installation instructions. With both clips unhooked, slightly spread open the guard. Insert the guard over the installed sprinkler so that the base plate of the guard attaches to the wrench flats of the sprinkler. Connect both locking clips to the adjacent tines of the guard. Tighten the locknut against the base plate of the guard.

Model S Water Shields
Model S water shields are designed to be installed on the sprinkler prior to installation. Thread the Model S water shield onto the sprinkler by hand, making sure that the shield does not pass by the end of the threads near the wrench boss. Install the sprinkler/shield assembly with the wrench indicated in the appropriate Technical Bulletin for the sprinkler.

Installation Notes
1. For all products incorporating a lock-nut feature, the lock-nut is part of the listed assembly. Failure to install the lock-nut will void the listing of the product and may lower the impact tolerance of the device.
2. The products in this bulletin are NOT compatible with recessed or concealed sprinkler installations.

Wrench for Installation of Guard, Water Shield, and Sprinkler Assembly — **Table B**

Guard/ Water Shield	Required Wrench for Installation of Guard, Water Shield, and Sprinkler Assembly
D-1	Model JD
D-3	
D-4	
D-5	
D-1	Model J
D-3	
D-4	
D-5	
D-6	Model JV
D-7	
D-8	
D-9	
F (All)	Model J

Finishes

Guard Finishes — **Table C**

Standard	Special Application
Zinc plated with clear chromate	Enamel red paint White paint Black paint Custom color paint Bright Chrome Dull Chrome

Water Shield Finishes — **Table D**

S Series Water Shields	
Standard	**Special Application**
Galvanized	Enamel red paint White paint Black paint Custom color paint

Ordering Information

Specify:
- Guard, Guard with Shield, or Shield Model
- Sprinkler Thread Size (required for Model D-4 and D-5 only)
- Finish (See tables C and D)
- Wrench (See table B)

Note: Factory installation of Models D and F guards is available at additional cost. Please contact your Reliable representative for details.

P/N 9999970152

Reliable®

Model A Spare Sprinkler Cabinets

Features

- Red enamel finish
- Constructed of lightweight steel
- Mounting holes provided
- Five models available

Product Description

Reliable Model A Spare Sprinkler Cabinets are designed to meet the requirements of NFPA 13 and NFPA 13R that state: "A supply of at least six spare sprinklers shall be maintained on the premises so that any sprinklers that have operated or been damaged in any way can be promptly replaced." These lightweight steel, red enamel finished cabinets are quickly mounted using the holes provided.

Table 1

Model	Capacity	Max. Sprinkler Thread Size (inches)	Size of Cabinet inches (mm)		
			Width	Depth	Height
A3	12	1	16-3/4 (425)	4 (101)	14-1/4 (361)
A4	3	3/4	7-3/8 (187)	2-3/8 (60)	5-1/4 (133)
A4	6	3/4	14-1/4 (361)	2-3/8 (60)	5-1/4 (133)
A4 Large	6	1	14-1/4 (361)	6-1/2 (165)	3-1/8 (79)
A4	12	3/4	14-1/4 (361)	4 (101)	5-1/4 (133)

Installation

Location must be coordinated with, and installation made in accordance with, the requirements of NFPA 13 or NFPA 13R, and all authorities having jurisdiction.

Guarantee

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

Ordering Information

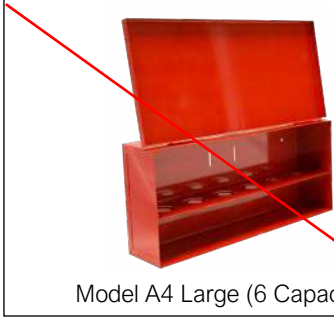
Specify:

Cabinet Model
Capacity (A4 Models)

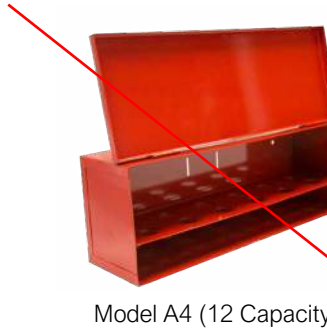
Model A3 (12 Capacity)

Model A4 (3 Capacity)

Model A4 (6 Capacity)



Model A4 Large (6 Capacity)



Model A4 (12 Capacity)

P/N 9999970529