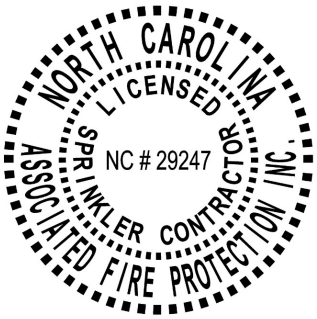
ASSOCIATED FIRE PROTECTION
Post Office Box 28022 – Raleigh, NC 27611
O: 919-553-4021 | F: 919-553-2169 | www.afp-nc.com

Product Data & Hydraulic Calculations

Cape Fear MOB - TI



Date:
November 27, 2023

Project Location:
225 Brightwater Drive
Lillington, NC

Cape Fear MOB - TI

EDW-1588

Product Data Submittal

Section 1 - Sprinklers

Series TY-FRB – 2.8, 4.2, 5.6, and 8.0 K-Factor Upright, Pendent, and Recessed Pendent Sprinklers Quick Response, Standard Coverage

General Description

The TYCO Series TY-FRB 2.8, 4.2, 5.6, and 8.0 K-factor Upright, Pendent, and Recessed Pendent Sprinklers described in herein are quick response, standard coverage, decorative 3 mm glass bulb-type spray sprinklers. They are designed for use in light or ordinary hazard, commercial occupancies such as banks, hotels, and shopping malls.

The TY-FRB Recessed Pendent Sprinkler, where applicable, is intended for use in areas with a finished ceiling. This recessed pendent sprinkler uses one of the following Recessed Escutcheons:

- A two-piece Style 10 (1/2 in. NPT) or Style 40 (3/4 in. NPT) Recessed Escutcheon with 1/2 in. (12,7 mm) of recessed adjustment or up to 3/4 in. (19,1 mm) of total adjustment from the flush pendent position.
- A two-piece Style 20 (1/2 in. NPT) or Style 30 (3/4 in. NPT) Recessed Escutcheon with 1/4 in. (6,4 mm) of recessed adjustment or up to 1/2 in. (12,7 mm) of total adjustment from the flush pendent position.

The adjustment provided by the Recessed Escutcheon reduces the accuracy to which the fixed pipe drops to the sprinklers must be cut.

Corrosion-resistant coatings, where applicable, are utilized to extend the life of copper alloy sprinklers beyond what would be obtained when exposed to corrosive atmospheres. Although corrosion-resistant coated sprinklers have passed the standard corrosion tests of the applicable approval agencies, the testing is not representative of all possible corrosive atmospheres. Consequently, it is recommended that the end user be consulted with respect to the suitability of these coatings for any given corrosive environment. The effects of ambient temperature, concentration of chemicals, and gas/chemical velocity, should be considered, as a minimum, along with the corrosive nature of the chemical to which the sprinklers will be exposed.

An intermediate level version of the Series TY-FRB Pendent Sprinklers is detailed in Technical Data Sheet TFP356. Sprinkler Guards are detailed in Technical Data Sheet TFP780.

IMPORTANT

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

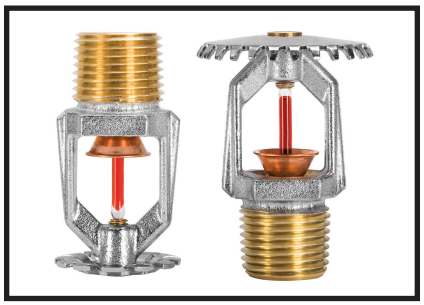
Always refer to Technical Data Sheet TFP700 for the "INSTALLER WARNING" that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the sprinkler to fail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

NOTICE

The Series TY-FRB 2.8, 4.2, 5.6, and 8.0 K-factor Upright, Pendent, and Recessed Pendent Sprinklers described herein must be installed and maintained in compliance with this document and with the applicable standards of the National Fire Protection Association (NFPA), in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of these devices.

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

NFPA 13 prohibits installation of 1/2 in. NPT sprinklers with K-factors greater than 5.6 in new construction. They are intended for retrofit in existing sprinkler systems only.



Sprinkler Identification Number (SIN)

TY1131 . . . Upright 2.8K, 1/2 in. NPT
TY1231 . . Pendent 2.8K, 1/2 in. NPT
TY2131 . . . Upright 4.2K, 1/2 in. NPT
TY2231 . . Pendent 4.2K, 1/2 in. NPT
TY3131 . . . Upright 5.6K, 1/2 in. NPT
TY3231 . . Pendent 5.6K, 1/2 in. NPT
TY4131 . . . Upright 8.0K, 3/4 in. NPT
TY4231 . . Pendent 8.0K, 3/4 in. NPT
TY4831 . . . Upright 8.0K, 1/2 in. NPT
TY4931 . . Pendent 8.0K, 1/2 in. NPT

Technical Data

Approvals
UL and C-UL Listed
FM, LPCB, and NYC Approved

Refer to Table A and B for complete approval information including corrosion-resistant status.

Maximum Working Pressure
Refer to Table C

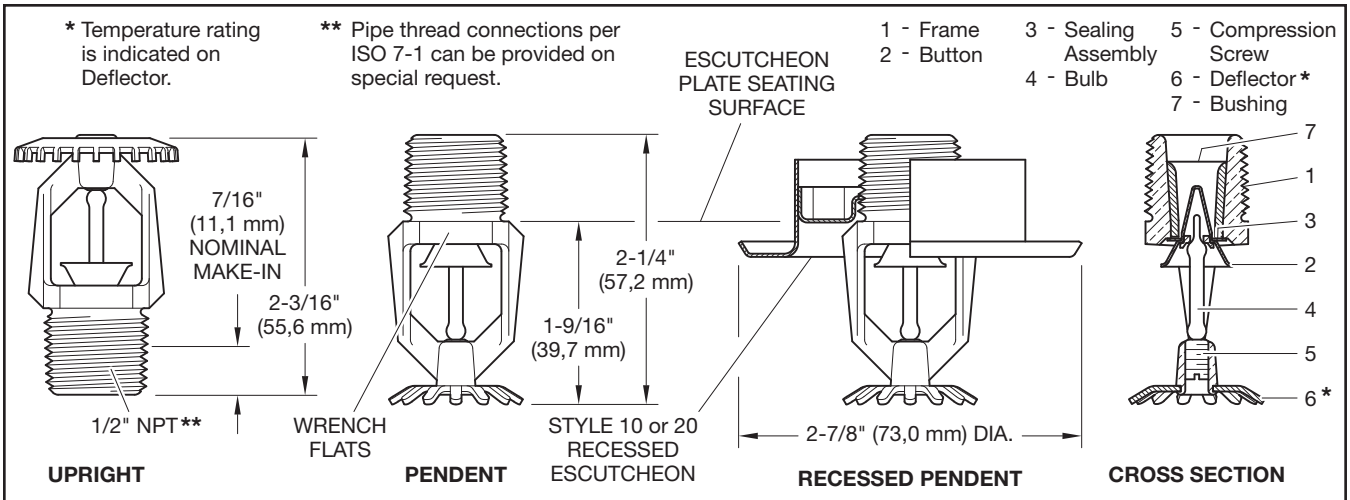


FIGURE 1
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY1131) AND PENDENT (TY1231) SPRINKLERS
2.8 K-FACTOR, 1/2 IN. NPT

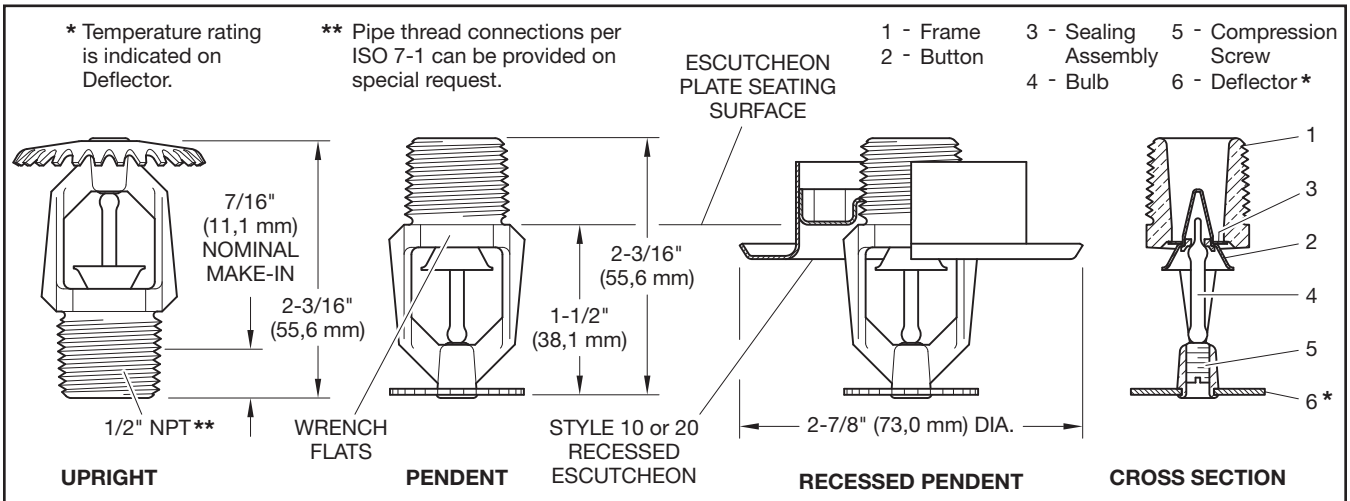


FIGURE 2
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY2131) AND PENDENT (TY2231) SPRINKLERS
4.2 K-FACTOR, 1/2 IN. NPT

Discharge Coefficient
K=2.8 GPM/psi½ (40,3 LPM/bar½)
K=4.2 GPM/psi½ (60,5 LPM/bar½)
K=5.6 GPM/psi½ (80,6 LPM/bar½)
K=8.0 GPM/psi½ (115,2 LPM/bar½)

Temperature Rating
Refer to Table A and B

Finishes
Sprinkler: Refer to Table D

Recessed Escutcheon: Signal or Pure White, Grey Aluminum, Jet Black, Chrome Plated, or Natural Brass

Physical Characteristics

Frame	Bronze
Button	Brass/Copper
Sealing Assembly	Beryllium Nickel w/TEFLON
Bulb	Glass
Compression Screw	Bronze
Deflector	Copper/Bronze
Bushing (K=2.8)	Bronze

Poly-Stainless Physical Characteristics

Frame	Bronze
Button	L316 Stainless Steel*
Bulb	Glass
Compression Screw	L316 Stainless Steel*
Deflector	Copper/Bronze
Sealing Assembly	Gold Plated Beryllium Nickel w/TEFLON

*Type L316 stainless steel (UNS 31603) per ASTM A479/479M or BS EN 1008 WN1.4404.

Operation

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

Design Criteria

The TYCO Series TY-FRB 2.8, 4.2, 5.6, and 8.0 K-factor Upright, Pendent, and Recessed Pendent Sprinklers are intended for fire protection systems designed in accordance with the standard installation rules recognized by the applicable Listing or Approval agency, such as UL Listing based on the requirements of NFPA 13 and FM Approval based on the requirements of the FM Global Loss Prevention Data Sheets. Use only the style 10, 20, 30, or 40 Recessed Escutcheon, as applicable, for recessed pendent installations.

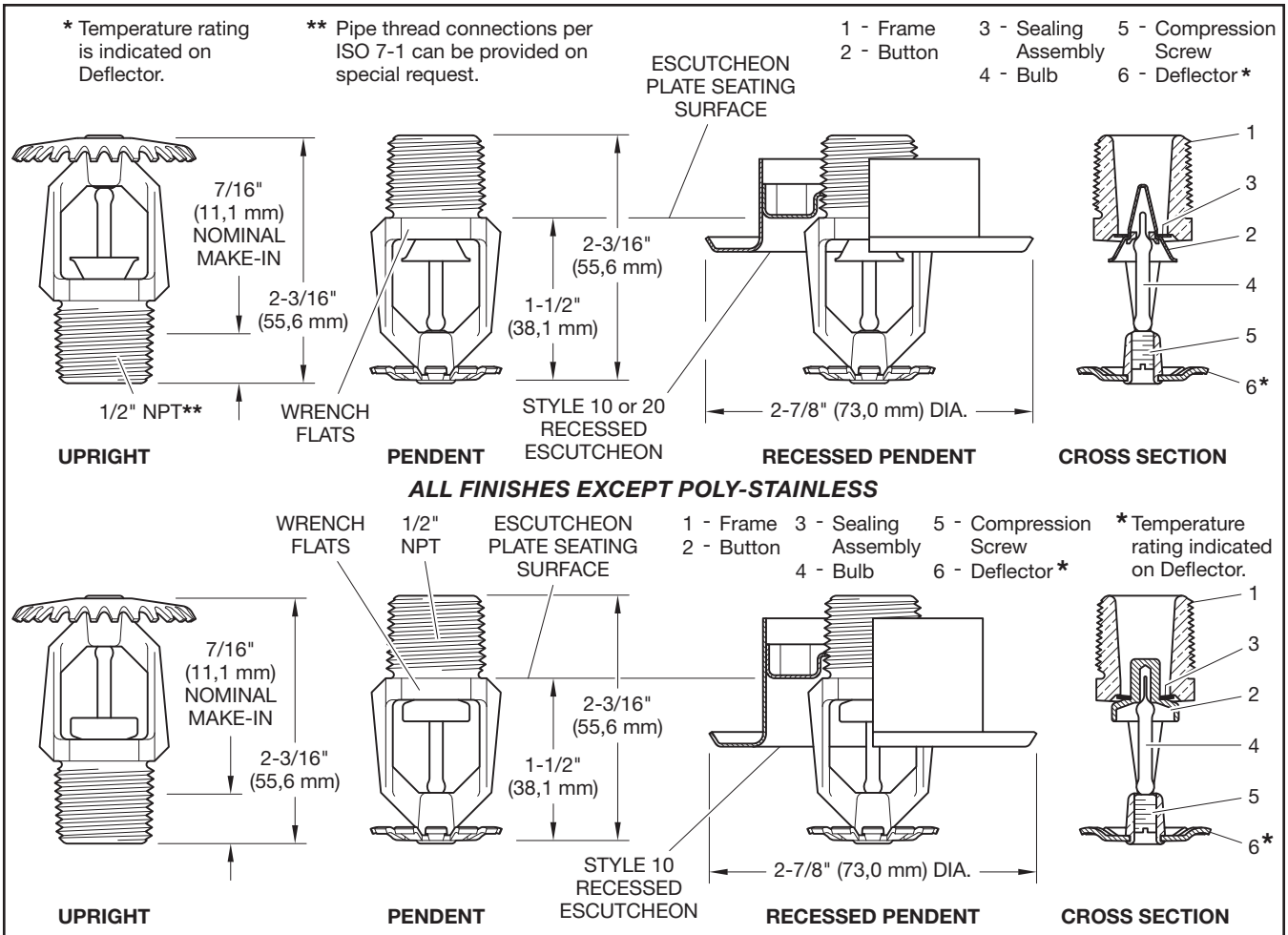


FIGURE 3
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY3131) AND PENDENT (TY3231) SPRINKLERS
5.6 K-FACTOR, 1/2 IN. NPT

Installation

The TYCO Series TY-FRB 2.8, 4.2, 5.6, and 8.0 K-factor Upright, Pendent, and Recessed Pendent Sprinklers must be installed in accordance with this section.

General Instructions
Do not install any bulb type sprinkler if the bulb is cracked or there is a loss of liquid from the bulb. With the sprinkler held horizontally, a small air bubble should be present. The diameter of the air bubble is approximately 1/16 in. (1,6 mm) for the 135°F (57°C) and 3/32 in. (2,4 mm) for the 286°F (141°C) temperature ratings. A leak-tight 1/2 in. NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 7 to 14 lb-ft (9,5 to 19,0 N·m). A leak tight 3/4 in. NPT sprinkler joint should be obtained with a torque of 10 to 20 lb-ft (13,4 to 26,8 N·m). Higher levels of torque can distort the sprinkler inlet and cause leakage or impairment of the sprinkler. Do not attempt to compensate for insufficient adjustment in the escutcheon plate by under- or over-tightening the sprinkler. Re-adjust the position of the sprinkler fitting to suit.

Series TY-FRB Upright and Pendent Sprinklers
The Series TY-FRB Upright and Pendent Sprinklers must be installed in accordance with the following instructions:

Step 1. Install pendent sprinklers in the pendent position. Install upright sprinklers in the upright position.

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

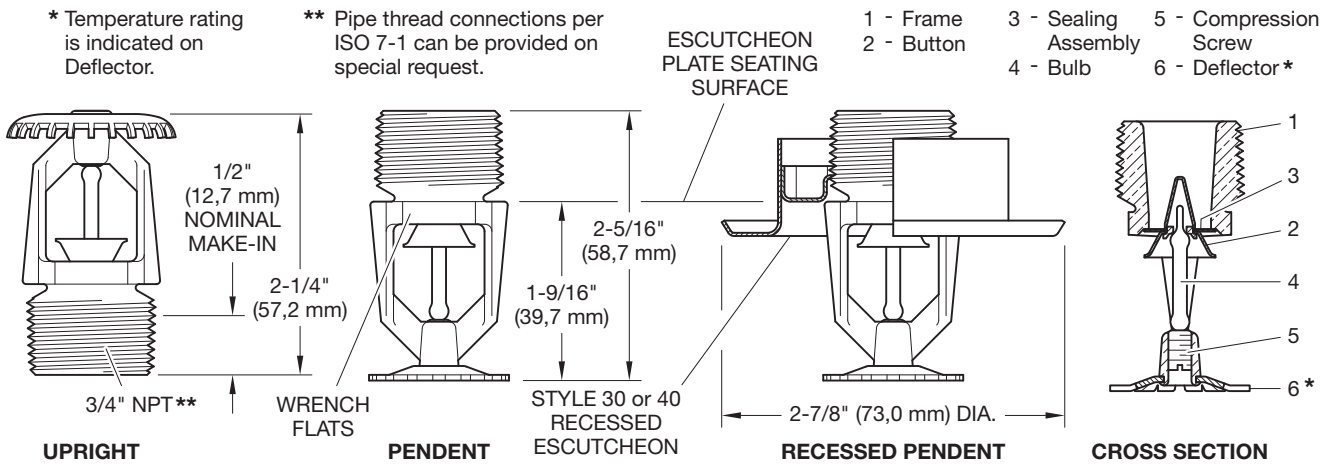
Step 3. Tighten the sprinkler into the sprinkler fitting using only the W-Type 6 Sprinkler Wrench (Ref. Figure 14). With reference to Figure 1 to Figure 5, apply the W-Type 6 Sprinkler Wrench to the sprinkler wrench flats.

Series TY-FRB Recessed Pendent Sprinklers
The Series TY-FRB Recessed Pendent Sprinklers must be installed in accordance with the following instructions:

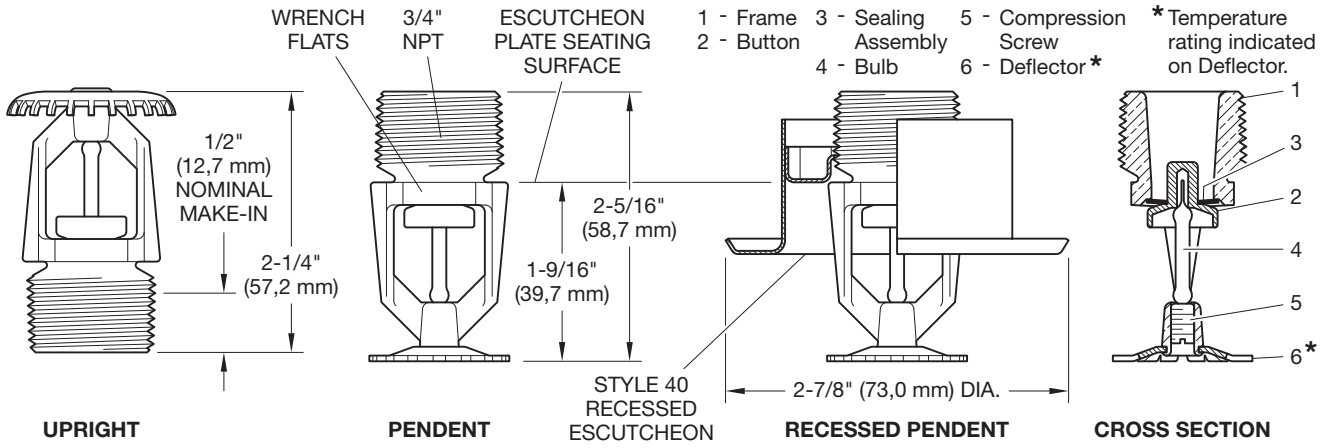
Step 1. After installing the Style 10, 20, 30, or 40 Mounting Plate, as applicable, over the sprinkler threads and with pipe-thread sealant applied to the pipe threads, hand-tighten the sprinkler into the sprinkler fitting.

Step 2. Tighten the sprinkler into the sprinkler fitting using only the W-Type 7 Recessed Sprinkler Wrench (Ref. Figure 15). With reference to Figure 1 to 4, apply the W-Type 7 Recessed Sprinkler Wrench to the sprinkler wrench flats.

Step 3. After the ceiling is installed or the finish coat is applied, slide on the Style 10, 20, 30, or 40 Closure over the Series TY-FRB Recessed Pendent Sprinkler and push the Closure over the Mounting Plate until its flange comes in contact with the ceiling.



ALL FINISHES EXCEPT POLY-STAINLESS



POLY-STAINLESS FINISH ONLY

FIGURE 4
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY4131) AND PENDENT (TY4231) SPRINKLERS
8.0 K-FACTOR, 3/4 IN. NPT

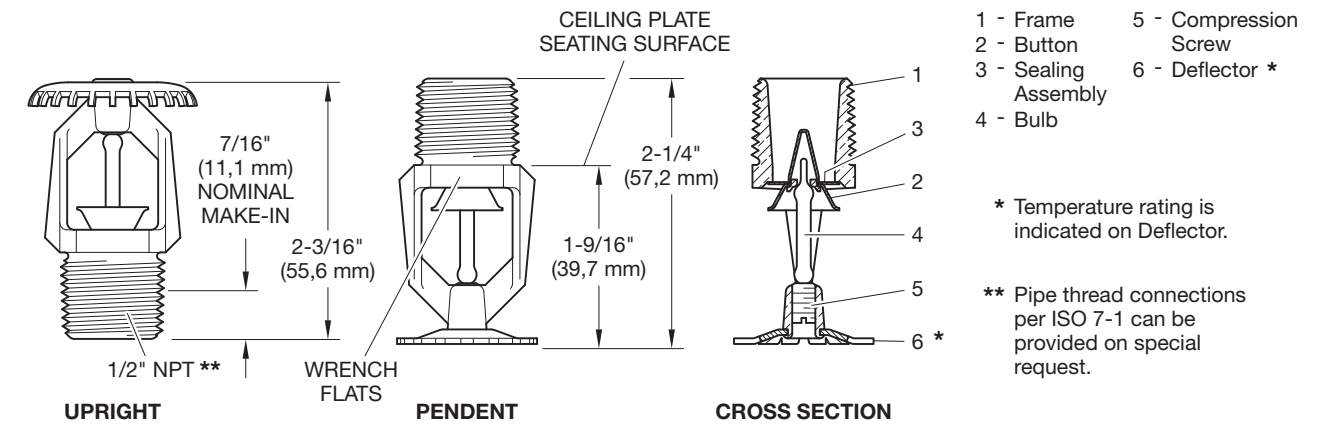


FIGURE 5
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY4831) AND PENDENT (TY4931) SPRINKLERS
8.0 K-FACTOR, 1/2 IN. NPT

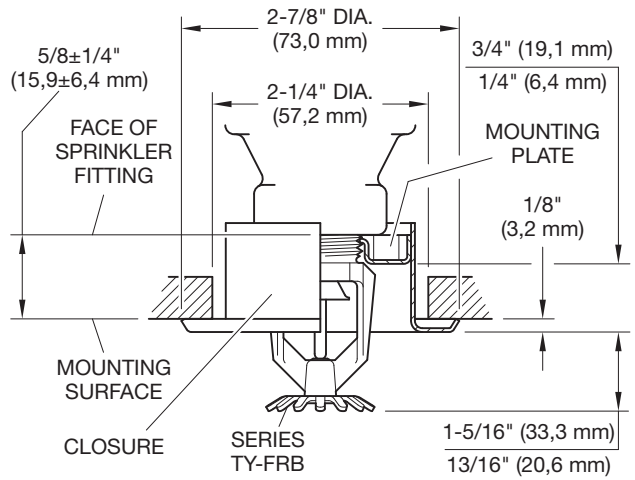


FIGURE 6
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
2.8 K-FACTOR, 1/2 IN. NPT

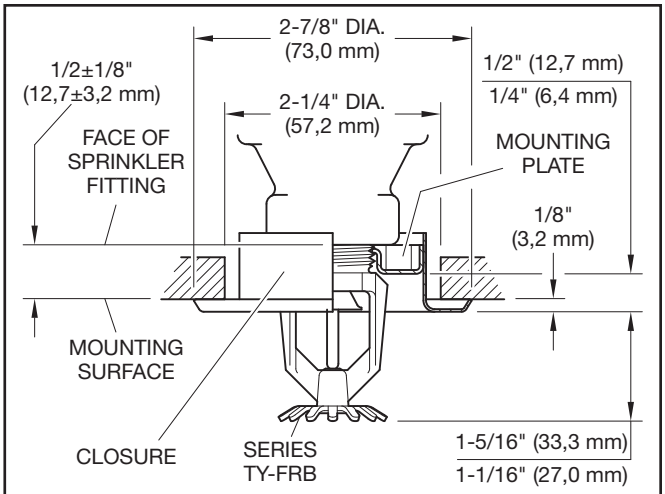


FIGURE 7
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
2.8 K-FACTOR, 1/2 IN. NPT

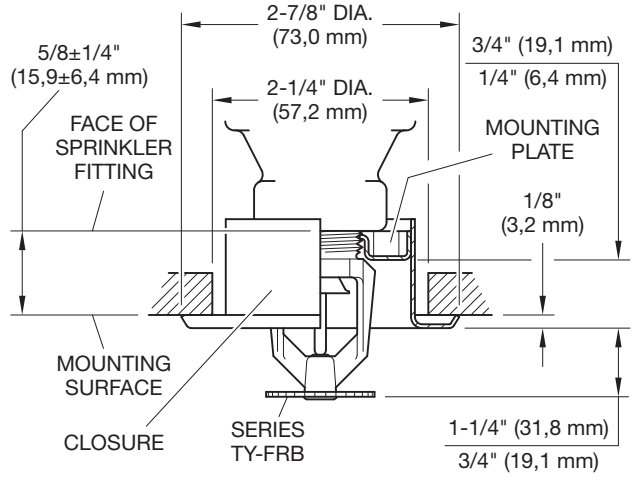


FIGURE 8
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
4.2 K-FACTOR, 1/2 IN. NPT

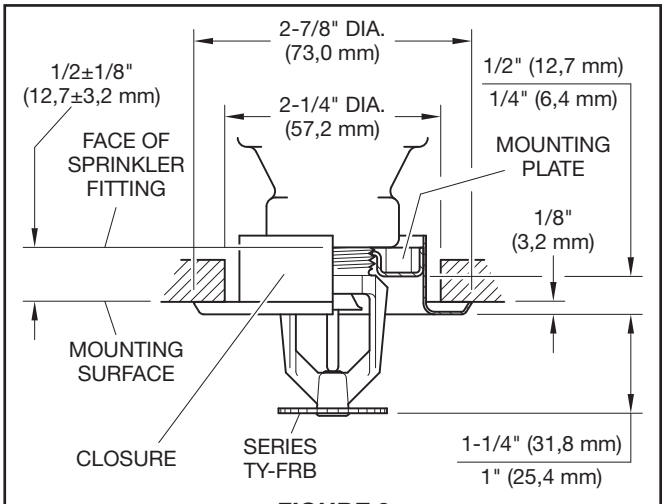


FIGURE 9
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
4.2 K-FACTOR, 1/2 IN. NPT

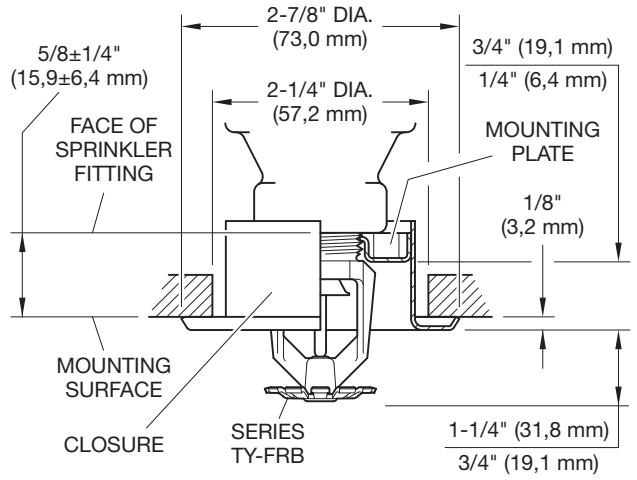


FIGURE 10
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
5.6 K-FACTOR, 1/2 IN. NPT

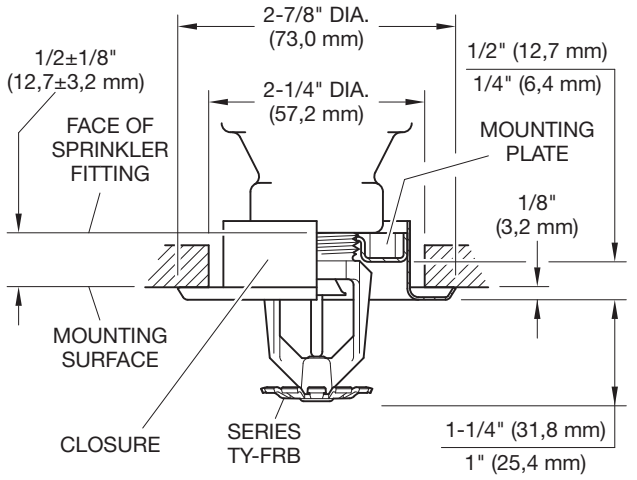


FIGURE 11
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
5.6 K-FACTOR, 1/2 IN. NPT

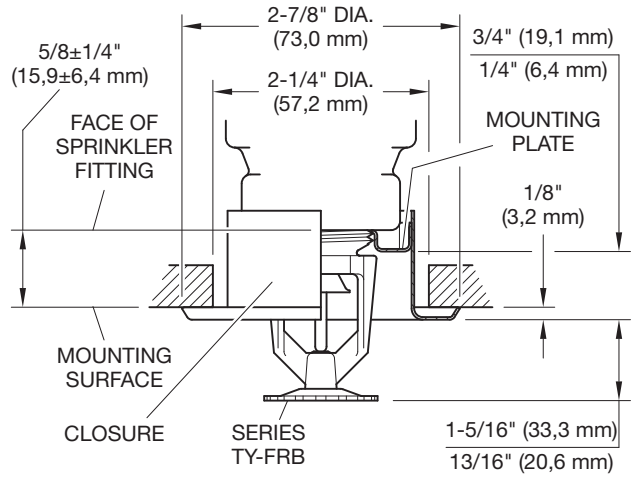


FIGURE 12
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 40 RECESSED ESCUTCHEON
8.0 K-FACTOR, 3/4 IN. NPT

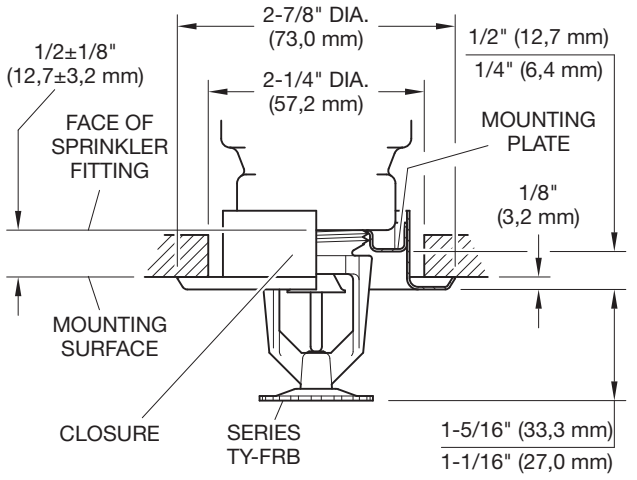


FIGURE 13
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 30 RECESSED ESCUTCHEON
8.0 K-FACTOR, 3/4 IN. NPT

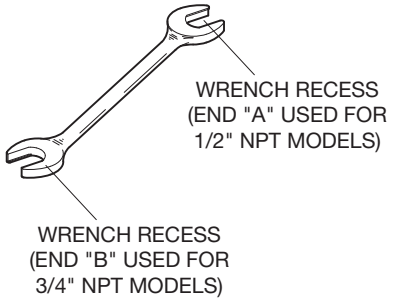


FIGURE 14
W-TYPE 6 SPRINKLER
WRENCH

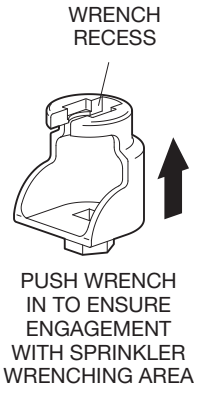


FIGURE 15
W-TYPE 7 RECESSED
SPRINKLER WRENCH

K-Factor	Type	Temperature	Sprinkler Finish[5]			
			Bulb Liquid Color	Natural Brass	Chrome Plated	Polyester[c]
2.8 1/2 in. NPT	Pendent (TY1231) and Upright (TY1131)	135°F (57°C)	Orange	1, 2, 3, 4		
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
		286°F (141°C)	Blue			
	Recessed Pendent (TY1231)[a] Figure 6	135°F (57°C)	Orange	1, 2, 4		
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
	Recessed Pendent (TY1231)[b] Figure 7	135°F (57°C)	Orange			
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
4.2 1/2 in. NPT	Pendent (TY2231) and Upright (TY2131)	135°F (57°C)	Orange	1, 2		
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
		286°F (141°C)	Blue			
	Recessed Pendent (TY2231)[a] Figure 8	135°F (57°C)	Orange			
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
	Recessed Pendent (TY2231)[b] Figure 9	135°F (57°C)	Orange			
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			

NOTES
a. Installed with Style 10 (1/2 in. NPT) or Style 40 (3/4 in. NPT) 3/4 in. Total Adjustment Recessed Escutcheon, as applicable.
b. Installed with Style 20 (1/2 in. NPT) or Style 30 (3/4 in. NPT) 1/2 in. Total Adjustment Recessed Escutcheon, as applicable.
c. Frame and Deflector only.
1. Listed by Underwriters Laboratories, Inc., (UL) as Quick Response Sprinklers.
2. Listed by Underwriters Laboratories, Inc., for use in Canada (C-UL) as Quick Response Sprinklers.
3. Approved by Factory Mutual Research Corporation (FM) as Quick Response Sprinklers.
4. Approved by the City of New York under MEA 354-01-E.
5. Where Polyester Coated Sprinklers are noted to be UL and C-UL Listed, the sprinklers are UL and C-UL Listed, the sprinklers are UL and C-UL Listed as corrosion-resistant sprinklers.

TABLE A
LABORATORY LISTINGS AND APPROVALS FOR
2.8 AND 4.2 K-FACTOR SPRINKLERS

			Sprinkler Finish[8]					
K-Factor	**Type**	**Temperature**	**Bulb Liquid Color**	**Natural Brass**	**Chrome Plated**	**Polyester[c]**	**Poly-Stainless[c]**	**Lead Coated**
5.6 1/2 in. NPT	**Pendent (TY3231) and Upright (TY3131)**	135°F (57°C)	Orange	1, 2, 3, 4, 5, 6, 7			1, 2	1, 2, 3, 5
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					
	Recessed Pendent (TY3231)[a] Figure 10	135°F (57°C)	Orange	1, 2, 4, 5			1, 2	N/A[d]
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					
	Recessed Pendent (TY3231)[b] Figure 11	135°F (57°C)	Orange	1, 2, 3, 4, 5			N/A	N/A
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					
8.0 3/4 in. NPT	**Pendent (TY4231) and Upright (TY4131)**	135°F (57°C)	Orange	1, 2, 3, 4, 5, 6, 7			1, 2	1, 2, 5
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					
	Recessed Pendent (TY4231)[a] Figure 12	135°F (57°C)	Orange	1, 2, 5			1, 2	N/A
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					
	Recessed Pendent (TY4231)[b] Figure 13	135°F (57°C)	Orange	1, 2, 3, 5			N/A	N/A
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					
8.0 1/2 in. NPT	**Pendent (TY4931) and Upright (TY4831)**	135°F (57°C)	Orange	1, 2, 4, 5, 6			N/A	1, 2, 5
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					

NOTES
a. Installed with Style 10 (1/2 in. NPT) or Style 40 (3/4 in. NPT) 3/4 in. Total Adjustment Recessed Escutcheon, as applicable.
b. Installed with Style 20 (1/2 in. NPT) or Style 30 (3/4 in. NPT) 1/2 in. Total Adjustment Recessed Escutcheon, as applicable.
c. Frame and Deflector only.
d. Not Available (N/A)
1. Listed by Underwriters Laboratories, Inc., (UL) as Quick Response Sprinklers.
2. Listed by Underwriters Laboratories, Inc., for use in Canada (C-UL) as Quick Response Sprinklers.
3. Approved by Factory Mutual Research Corporation (FM) as Quick Response Sprinklers.
4. Approved by the Loss Prevention Certification Board (LPCB Ref. No. 007k/04) as Quick Response Sprinklers. However, LPCB does not rate the thermal sensitivity of recessed sprinklers.
5. Approved by the City of New York under MEA 354-01-E.
6. VdS Approved (For details, contact Johnson Controls, Enschede, Netherlands, Tel. 31-53-428-4444/Fax 31-53-428-3377.)
7. Approved by the Loss Prevention Certification Board (LPCB Ref. No. 094a/06) as Quick Response Sprinklers.
8. Where Polyester Coated and Lead-Coated Sprinklers are noted to be UL and C-UL Listed, the sprinklers are UL and C-UL Listed as Corrosion-Resistant Sprinklers. Where Lead-Coated Sprinklers are noted to be FM Approved, the sprinklers are FM Approved as a Corrosion-Resistant Sprinklers.

TABLE B
LABORATORY LISTINGS AND APPROVALS FOR
5.6 AND 8.0 K-FACTOR SPRINKLERS

K-Factor	Type	Sprinkler Finish			
		Natural Brass	Chrome Plated	Polyester	Lead Coated
2.8 1/2 in. NPT	Pendent (TY1231) and Upright (TY1131)	175 psi (12,1 bar)			N/A[2]
	Recessed Pendent (TY1231)				
4.2 1/2 in. NPT	Pendent (TY2231) and Upright (TY2131)	175 psi (12,1 bar)			N/A
	Recessed Pendent (TY2231)				
5.6 1/2 in. NPT	Pendent (TY3231) and Upright (TY3131)	250 psi (17,2 bar) or 175 psi (12,1 bar)[1]			
	Recessed Pendent (TY3231)				
8.0 3/4 in. NPT	Pendent (TY4231) and Upright (TY4131)	175 psi (12,1 bar)			175 psi (12,1 bar)
	Recessed Pendent(TY4231)				N/A
8.0 1/2 in. NPT	Pendent (TY4931) and Upright (TY4831)	175 psi (12,1 bar)			175 psi (12,1 bar)

NOTES
1. The maximum working pressure of 250 psi (17,2 bar) only applies to the Listing by Underwriters Laboratories Inc. (UL); the Listing by Underwriters Laboratories, Inc. for use in Canada (C-UL); and, the Approval by the City of New York.
2. Not applicable (N/A).

TABLE C
MAXIMUM WORKING PRESSURE

Care and Maintenance

The TYCO Series TY-FRB 2.8, 4.2, 5.6, and 8.0 K-factor Upright, Pendent, and Recessed Pendent Sprinklers must be maintained and serviced in accordance with this section. Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, obtain permission to shut down the affected fire protection systems from the proper authorities and notify all personnel who may be affected by this action.

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

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

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

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

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

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

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

Initial and frequent visual inspections of random samples are recommended for corrosion-resistant sprinklers to verify the integrity of the corrosion-resistant material of construction. Thereafter, annual inspections per NFPA 25 should suffice.Inspections of corrosion-resistant sprinklers are recommended at close range, instead of from the floor level per NFPA. Inspection at close range can better determine the exact sprinkler condition and the long-term integrity of the corrosion-resistant material, which can be affected by the corrosive conditions present.

P/N 57 – XXX – X – XXX

		SIN
330	2.8K UPRIGHT (1/2 in. NPT)	TY1131
331	2.8K PENDENT (1/2 in. NPT)	TY1231
340	4.2K UPRIGHT (1/2 in. NPT)	TY2131
341	4.2K PENDENT (1/2 in. NPT)	TY2231
370	5.6K UPRIGHT (1/2 in. NPT)	TY3131
371	5.6K PENDENT (1/2 in. NPT)	TY3231
390	8.0K UPRIGHT (3/4 in. NPT)	TY4131
391	8.0K PENDENT (3/4 in. NPT)	TY4231
360	8.0K UPRIGHT (1/2 in. NPT)	TY4831
361	8.0K PENDENT (1/2 in. NPT)	TY4931

	SPRINKLER FINISH
1	NATURAL BRASS
2	POLY-STAINLESS GREY ALUMINUM (RAL9007)[1] POLYESTER
3	PURE WHITE POLYESTER (RAL9010)[2]
4	SIGNAL WHITE POLYESTER (RAL9003)
5	JET BLACK POLYESTER (RAL9005)[3]
7	LEAD COATED
9	CHROME PLATED

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

NOTES
1. Available only on TY3131, TY3231, TY4131, and TY4231
2. Eastern Hemisphere sales only.
3. Available in only 2.8K, 4.2K, and 8.0K, 155°F (68°C) and 200°F (93°C); requires longer lead time to manufacture.

TABLE D
SERIES TY-FRB PENDENT AND UPRIGHT SPRINKLERS
PART NUMBER SELECTION

Limited Warranty

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

Ordering Procedure

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

Sprinkler Assemblies with NPT Thread Connections
Specify: Series TY-FRB (Specify SIN), (specify K-factor), (specify Pendent or Upright) Sprinkler (specify) temperature rating, (specify) finish or coating, P/N (specify from Table D)

Recessed Escutcheon
Specify: Style (10, 20, 30, or 40) Recessed Escutcheon with (specify*) finish, P/N (specify*)

* Refer to Technical Data Sheet TFP770

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

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

1400 Pennbrook Parkway, Lansdale, PA 19446 | Telephone +1-215-362-0700

Series TY-FRB – 2.8, 4.2, 5.6, and 8.0 K-Factor Upright, Pendent, and Recessed Pendent Sprinklers Quick Response, Standard Coverage

General Description

The TYCO Series TY-FRB 2.8, 4.2, 5.6, and 8.0 K-factor Upright, Pendent, and Recessed Pendent Sprinklers described in herein are quick response, standard coverage, decorative 3 mm glass bulb-type spray sprinklers. They are designed for use in light or ordinary hazard, commercial occupancies such as banks, hotels, and shopping malls.

The TY-FRB Recessed Pendent Sprinkler, where applicable, is intended for use in areas with a finished ceiling. This recessed pendent sprinkler uses one of the following Recessed Escutcheons:

- A two-piece Style 10 (1/2 in. NPT) or Style 40 (3/4 in. NPT) Recessed Escutcheon with 1/2 in. (12,7 mm) of recessed adjustment or up to 3/4 in. (19,1 mm) of total adjustment from the flush pendent position.
- A two-piece Style 20 (1/2 in. NPT) or Style 30 (3/4 in. NPT) Recessed Escutcheon with 1/4 in. (6,4 mm) of recessed adjustment or up to 1/2 in. (12,7 mm) of total adjustment from the flush pendent position.

The adjustment provided by the Recessed Escutcheon reduces the accuracy to which the fixed pipe drops to the sprinklers must be cut.

Corrosion-resistant coatings, where applicable, are utilized to extend the life of copper alloy sprinklers beyond what would be obtained when exposed to corrosive atmospheres. Although corrosion-resistant coated sprinklers have passed the standard corrosion tests of the applicable approval agencies, the testing is not representative of all possible corrosive atmospheres. Consequently, it is recommended that the end user be consulted with respect to the suitability of these coatings for any given corrosive environment. The effects of ambient temperature, concentration of chemicals, and gas/chemical velocity, should be considered, as a minimum, along with the corrosive nature of the chemical to which the sprinklers will be exposed.

An intermediate level version of the Series TY-FRB Pendent Sprinklers is detailed in Technical Data Sheet TFP356. Sprinkler Guards are detailed in Technical Data Sheet TFP780.

IMPORTANT

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

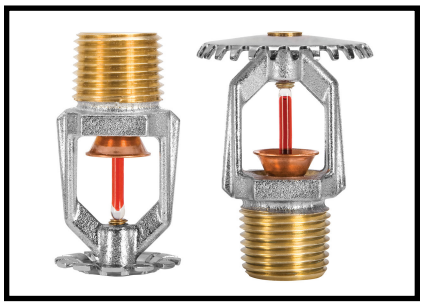
Always refer to Technical Data Sheet TFP700 for the "INSTALLER WARNING" that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the sprinkler to fail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

NOTICE

The Series TY-FRB 2.8, 4.2, 5.6, and 8.0 K-factor Upright, Pendent, and Recessed Pendent Sprinklers described herein must be installed and maintained in compliance with this document and with the applicable standards of the National Fire Protection Association (NFPA), in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of these devices.

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

NFPA 13 prohibits installation of 1/2 in. NPT sprinklers with K-factors greater than 5.6 in new construction. They are intended for retrofit in existing sprinkler systems only.



Sprinkler Identification Number (SIN)

TY1131 . . . Upright 2.8K, 1/2 in. NPT
TY1231 . . Pendent 2.8K, 1/2 in. NPT
TY2131 . . . Upright 4.2K, 1/2 in. NPT
TY2231 . . Pendent 4.2K, 1/2 in. NPT
TY3131 . . . Upright 5.6K, 1/2 in. NPT
TY3231 . . Pendent 5.6K, 1/2 in. NPT
TY4131 . . . Upright 8.0K, 3/4 in. NPT
TY4231 . . Pendent 8.0K, 3/4 in. NPT
TY4831 . . . Upright 8.0K, 1/2 in. NPT
TY4931 . . Pendent 8.0K, 1/2 in. NPT

Technical Data

Approvals
UL and C-UL Listed
FM, LPCB, and NYC Approved

See Tables A, B, C and D for complete approval information including corrosion-resistant status.

Maximum Working Pressure
See Table E

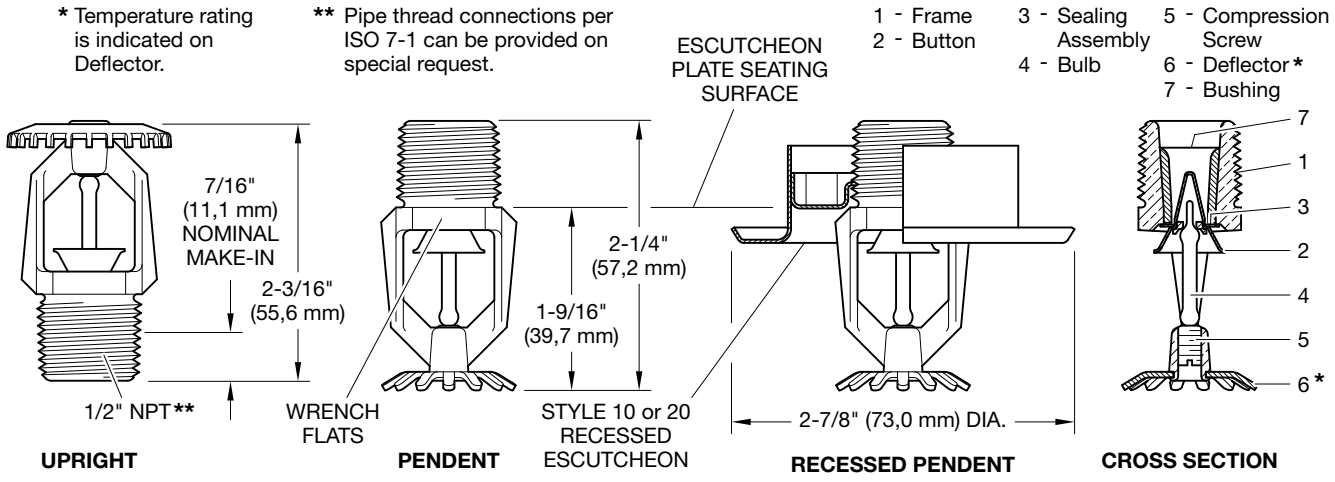


FIGURE 1
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY1131) AND PENDENT (TY1231) SPRINKLERS
2.8 K-FACTOR, 1/2 IN. NPT

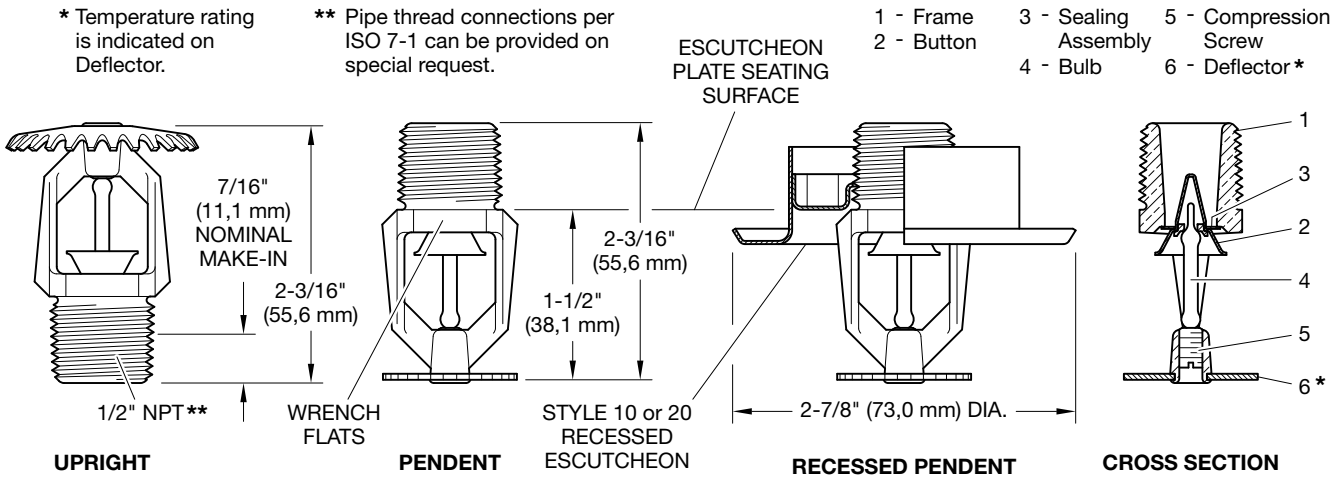


FIGURE 2
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY2131) AND PENDENT (TY2231) SPRINKLERS
4.2 K-FACTOR, 1/2 IN. NPT

Discharge Coefficient
K=2.8 GPM/psi½ (40,3 LPM/bar½)
K=4.2 GPM/psi½ (60,5 LPM/bar½)
K=5.6 GPM/psi½ (80,6 LPM/bar½)
K=8.0 GPM/psi½ (115,2 LPM/bar½)

Temperature Rating
See Tables A and B

Finishes
Sprinkler: See Table D

Recessed Escutcheon: Signal or Pure White, Grey Aluminum, Jet Black, Chrome Plated, or Natural Brass

Physical Characteristics
Frame . . . . . Bronze
Button . . . . . Brass/Copper
Sealing Assembly . . Beryllium Nickel w/TEFLON
Bulb . . . . . Glass
Compression Screw . . . . . Bronze
Deflector . . . . . Copper/Bronze
Bushing (K=2.8) . . . . . Bronze

Poly-Stainless
Physical Characteristics
Frame . . . . . Bronze
Button . . . . . L316 Stainless Steel*
Bulb . . . . . Glass
Compression Screw . . . . . L316 Stainless Steel*
Deflector . . . . . Copper/Bronze
Sealing Assembly . Gold Plated Beryllium Nickel w/TEFLON

*Type L316 stainless steel (UNS 31603) per ASTM A479/479M or BS EN 1008 WN1.4404.

Operation

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

Design Criteria

The TYCO Series TY-FRB 2.8, 4.2, 5.6, and 8.0 K-factor Upright, Pendent, and Recessed Pendent Sprinklers are intended for fire protection systems designed in accordance with the standard installation rules recognized by the applicable Listing or Approval agency, such as UL Listing based on the requirements of NFPA 13 and FM Approval based on the requirements of the FM Global Loss Prevention Data Sheets. Use only the style 10, 20, 30, or 40 Recessed Escutcheon, as applicable, for recessed pendent installations.

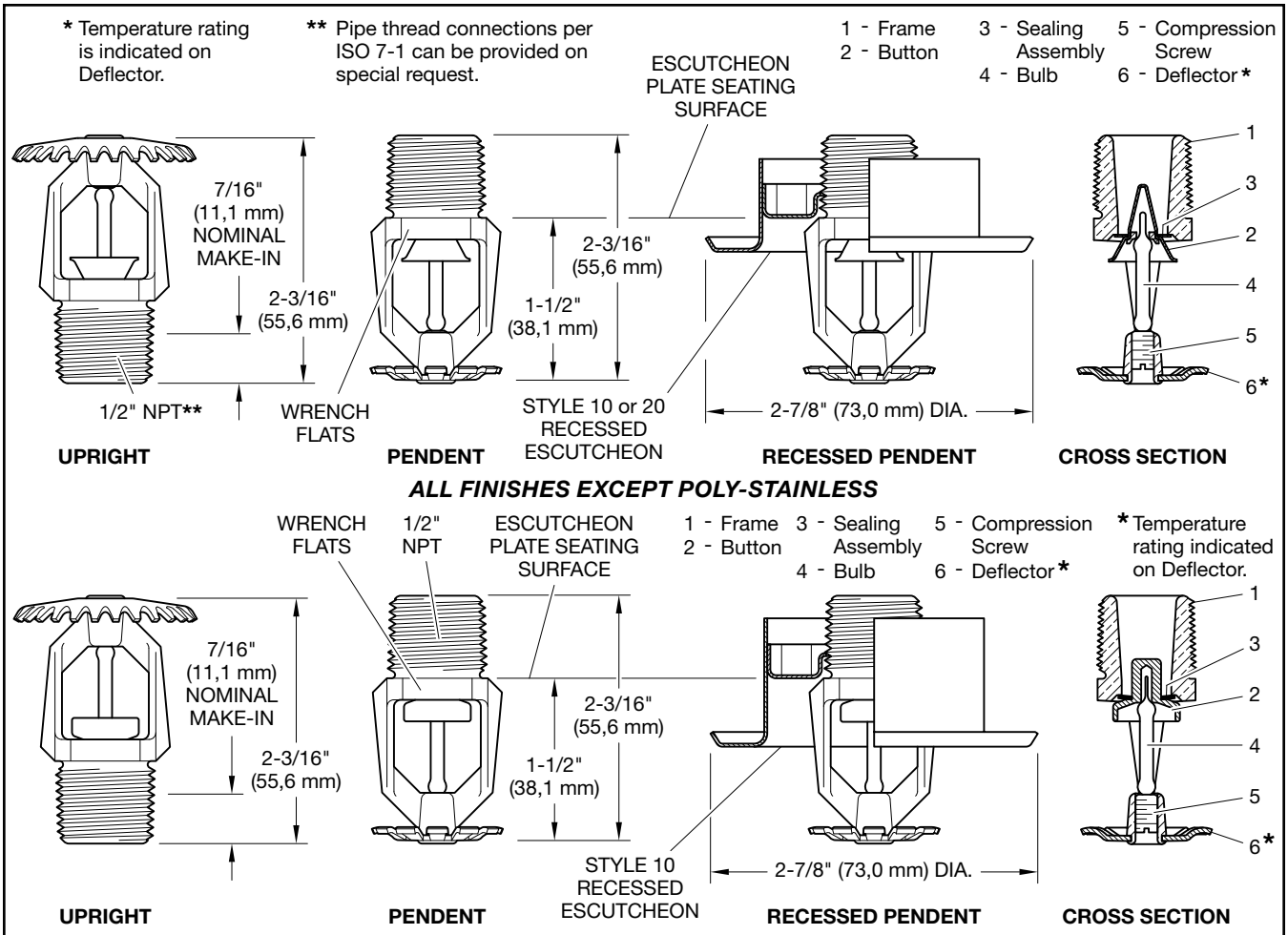


FIGURE 3
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY3131) AND PENDENT (TY3231) SPRINKLERS
5.6 K-FACTOR, 1/2 IN. NPT

Installation

The TYCO Series TY-FRB 2.8, 4.2, 5.6, and 8.0 K-factor Upright, Pendent, and Recessed Pendent Sprinklers must be installed in accordance with this section.

General Instructions
Do not install any bulb type sprinkler if the bulb is cracked or there is a loss of liquid from the bulb. With the sprinkler held horizontally, a small air bubble should be present. The diameter of the air bubble is approximately 1/16 in. (1,6 mm) for the 135°F (57°C) and 3/32 in. (2,4 mm) for the 286°F (141°C) temperature ratings. A leak-tight 1/2 in. NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 7 to 14 lb-ft (9,5 to 19,0 N·m). A leak tight 3/4 in. NPT sprinkler joint should be obtained with a torque of 10 to 20 lb-ft (13,4 to 26,8 N·m). Higher levels of torque can distort the sprinkler inlet and cause leakage or impairment of the sprinkler. Do not attempt to compensate for insufficient adjustment in the escutcheon plate by under- or over-tightening the sprinkler. Re-adjust the position of the sprinkler fitting to suit.

Series TY-FRB Upright and Pendent Sprinklers
The Series TY-FRB Upright and Pendent Sprinklers must be installed in accordance with the following instructions:

Step 1. Install pendent sprinklers in the pendent position. Install upright sprinklers in the upright position.

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

Step 3. Tighten the sprinkler into the sprinkler fitting using only the W-Type 6 Sprinkler Wrench (Ref. Figure 14). With reference to Figure 1 to Figure 5, apply the W-Type 6 Sprinkler Wrench to the sprinkler wrench flats.

Series TY-FRB Recessed Pendent Sprinklers
The Series TY-FRB Recessed Pendent Sprinklers must be installed in accordance with the following instructions:

Step 1. After installing the Style 10, 20, 30, or 40 Mounting Plate, as applicable, over the sprinkler threads and with pipe-thread sealant applied to the pipe threads, hand-tighten the sprinkler into the sprinkler fitting.

Step 2. Tighten the sprinkler into the sprinkler fitting using only the W-Type 7 Recessed Sprinkler Wrench, see Figure 15. With reference to Figure 1 to 4, apply the W-Type 7 Recessed Sprinkler Wrench to the sprinkler wrench flats.

Step 3. After the ceiling is installed or the finish coat is applied, slide on the Style 10, 20, 30, or 40 Closure over the Series TY-FRB Recessed Pendent Sprinkler and push the Closure over the Mounting Plate until its flange comes in contact with the ceiling.

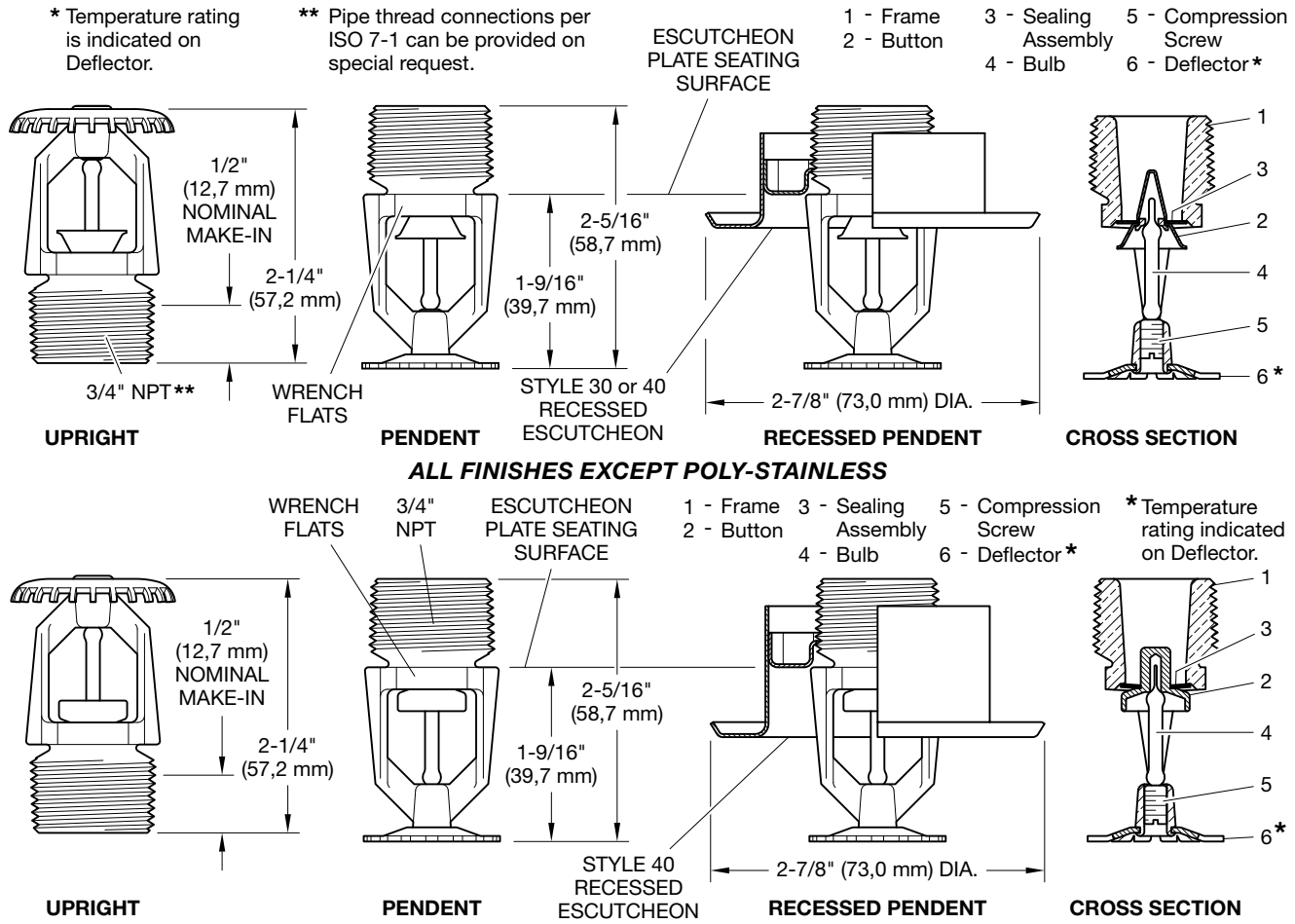


FIGURE 4
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY4131) AND PENDENT (TY4231) SPRINKLERS
8.0 K-FACTOR, 3/4 IN. NPT

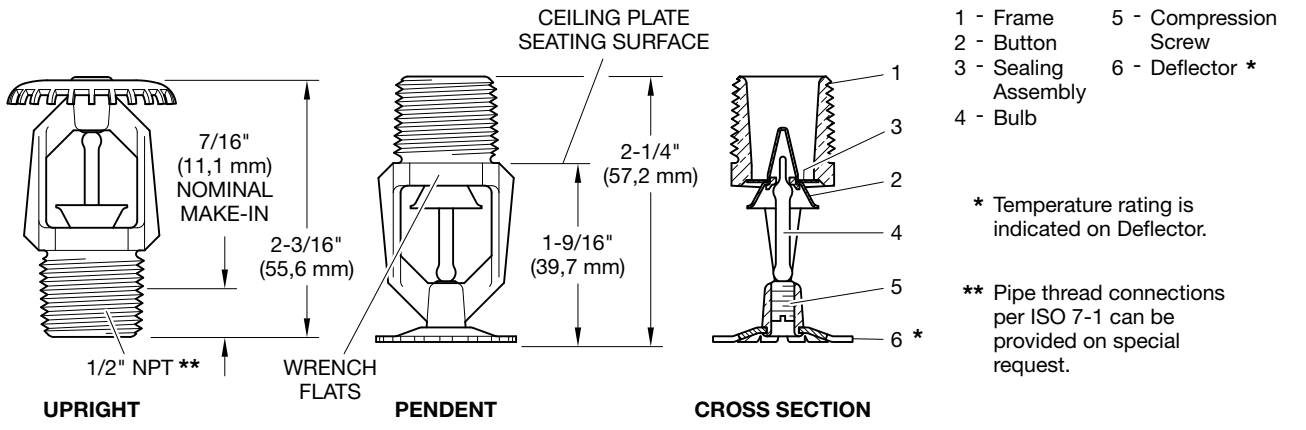


FIGURE 5
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY4831) AND PENDENT (TY4931) SPRINKLERS
8.0 K-FACTOR, 1/2 IN. NPT

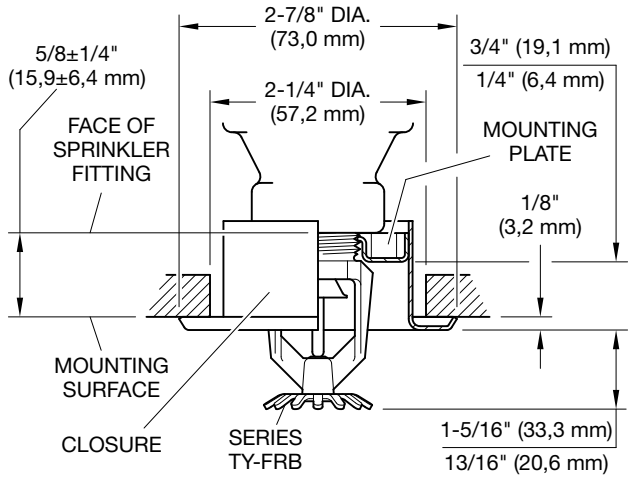


FIGURE 6
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
2.8 K-FACTOR, 1/2 IN. NPT

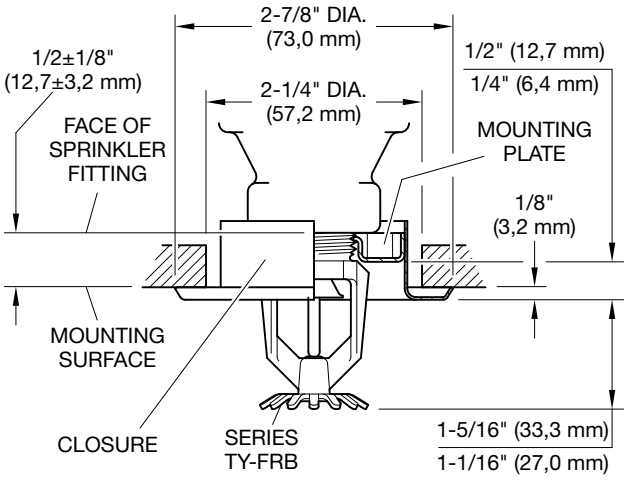


FIGURE 7
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
2.8 K-FACTOR, 1/2 IN. NPT

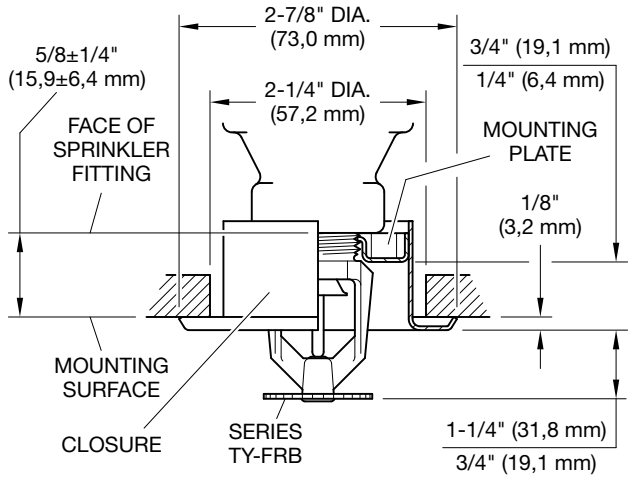


FIGURE 8
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
4.2 K-FACTOR, 1/2 IN. NPT

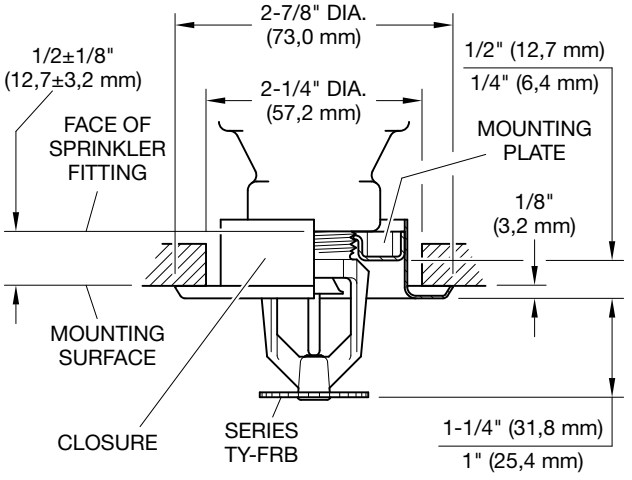


FIGURE 9
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
4.2 K-FACTOR, 1/2 IN. NPT

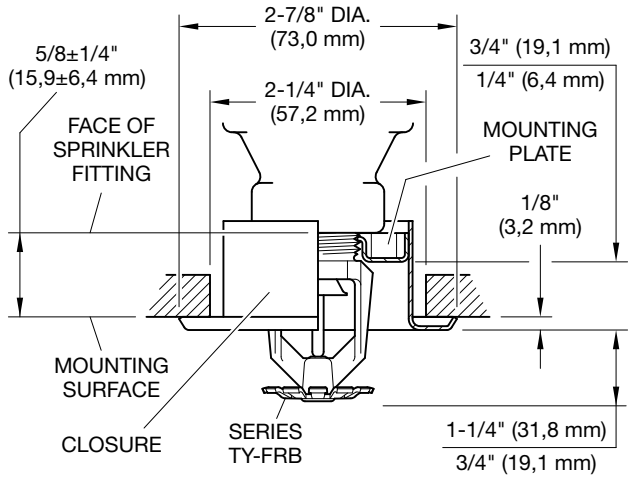


FIGURE 10
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
5.6 K-FACTOR, 1/2 IN. NPT

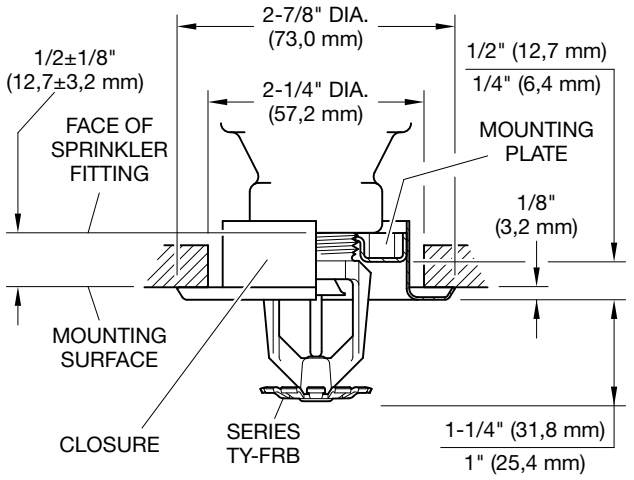


FIGURE 11
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
5.6 K-FACTOR, 1/2 IN. NPT

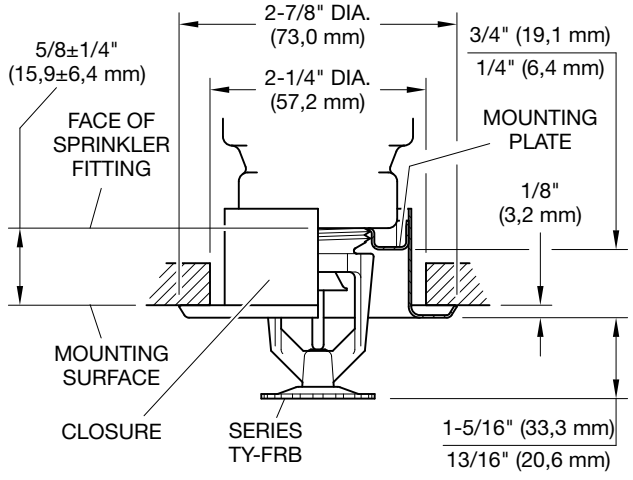


FIGURE 12
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 40 RECESSED ESCUTCHEON
8.0 K-FACTOR, 3/4 IN. NPT

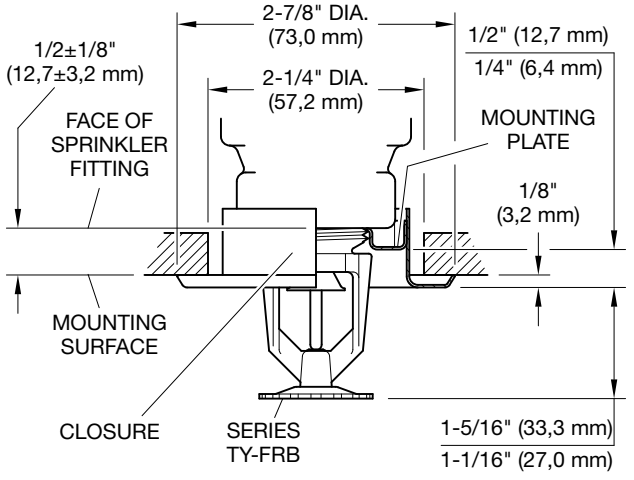


FIGURE 13
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 30 RECESSED ESCUTCHEON
8.0 K-FACTOR, 3/4 IN. NPT

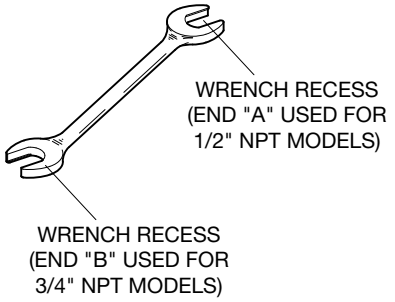


FIGURE 14
W-TYPE 6 SPRINKLER
WRENCH

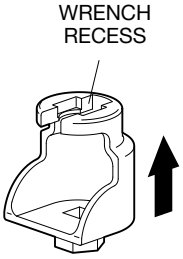


FIGURE 15
W-TYPE 7 RECESSED
SPRINKLER WRENCH

K-Factor	Type	Temperature	Bulb Liquid Color	Sprinkler Finish[5]		
				Natural Brass	Chrome Plated	Polyester[c]
2.8 1/2 in. NPT	Pendent (TY1231)	135°F (57°C)	Orange	1, 2, 3, 4		
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
		286°F (141°C)	Blue			
	Upright (TY1131)	135°F (57°C)	Orange			
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
		286°F (141°C)	Blue			
	Recessed Pendent (TY1231)[a] Figure 6	135°F (57°C)	Orange	1, 2, 4		
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
	Recessed Pendent (TY1231)[b] Figure 7	135°F (57°C)	Orange			
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			

NOTES
a. Installed with Style 10 (1/2 in. NPT) or Style 40 (3/4 in. NPT) 3/4 in. Total Adjustment Recessed Escutcheon, as applicable.
b. Installed with Style 20 (1/2 in. NPT) or Style 30 (3/4 in. NPT) 1/2 in. Total Adjustment Recessed Escutcheon, as applicable.
c. Frame and Deflector only.
1. Listed by Underwriters Laboratories, Inc., (UL) as Quick Response Sprinklers.
2. Listed by Underwriters Laboratories, Inc., for use in Canada (C-UL) as Quick Response Sprinklers.
3. Approved by Factory Mutual Research Corporation (FM) as Quick Response Sprinklers.
4. Approved by the City of New York under MEA 354-01-E.
5. Where Polyester Coated Sprinklers are noted to be UL and C-UL Listed, the sprinklers are UL and C-UL Listed, the sprinklers are UL and C-UL Listed as corrosion-resistant sprinklers.

TABLE A
LABORATORY LISTINGS AND APPROVALS FOR
2.8 K-FACTOR SPRINKLERS

K-Factor	Type	Temperature	Bulb Liquid Color	Sprinkler Finish[3]		
				Natural Brass	Chrome Plated	Polyester[c]
4.2 1/2 in. NPT	Pendent (TY2231)	135°F (57°C)	Orange	1, 2		
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
		286°F (141°C)	Blue			
	Upright (TY2131)	135°F (57°C)	Orange			
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
		286°F (141°C)	Blue			
	Recessed Pendent (TY2231)[a] Figure 8	135°F (57°C)	Orange			
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			
	Recessed Pendent (TY2231)[b] Figure 9	135°F (57°C)	Orange			
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
		200°F (93°C)	Green			

NOTES
a. Installed with Style 10 (1/2 in. NPT) or Style 40 (3/4 in. NPT) 3/4 in. Total Adjustment Recessed Escutcheon, as applicable.
b. Installed with Style 20 (1/2 in. NPT) or Style 30 (3/4 in. NPT) 1/2 in. Total Adjustment Recessed Escutcheon, as applicable.
c. Frame and Deflector only.
1. Listed by Underwriters Laboratories, Inc., (UL) as Quick Response Sprinklers.
2. Listed by Underwriters Laboratories, Inc., for use in Canada (C-UL) as Quick Response Sprinklers.
3. Where Polyester Coated Sprinklers are noted to be UL and C-UL Listed, the sprinklers are UL and C-UL Listed, the sprinklers are UL and C-UL Listed as corrosion-resistant sprinklers.

TABLE B
LABORATORY LISTINGS AND APPROVALS FOR
4.2 K-FACTOR SPRINKLERS

K-Factor	Type	Temperature	Bulb Liquid Color	Sprinkler Finish[8]				
				Natural Brass	Chrome Plated	Polyester[c]	Poly-Stainless[c]	Lead Coated
5.6 1/2 in. NPT	Pendent (TY3231)	135°F (57°C)	Orange	1, 2, 3, 4, 5, 6, 7			1, 2	1, 2, 3, 5
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					
	Upright (TY3131)	135°F (57°C)	Orange	1, 2, 3, 5, 6			1, 2	1, 2, 3, 5
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					
	Recessed Pendent (TY3231)[a] Figure 10	135°F (57°C)	Orange	1, 2, 4, 5			1, 2	N/A[d]
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					
	Recessed Pendent (TY3231)[b] Figure 11	135°F (57°C)	Orange	1, 2, 3, 4, 5			N/A	N/A
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					

NOTES
a. Installed with Style 10 (1/2 in. NPT) or Style 40 (3/4 in. NPT) 3/4 in. Total Adjustment Recessed Escutcheon, as applicable.
b. Installed with Style 20 (1/2 in. NPT) or Style 30 (3/4 in. NPT) 1/2 in. Total Adjustment Recessed Escutcheon, as applicable.
c. Frame and Deflector only.
d. Not available (N/A).
1. Listed by Underwriters Laboratories, Inc., (UL) as Quick Response Sprinklers.
2. Listed by Underwriters Laboratories, Inc., for use in Canada (C-UL) as Quick Response Sprinklers.
3. Approved by Factory Mutual Research Corporation (FM) as Quick Response Sprinklers.
4. Approved by the Loss Prevention Certification Board (LPCB Ref. No. 007k/04) as Quick Response Sprinklers. However, LPCB does not rate the thermal sensitivity of recessed sprinklers.
5. Approved by the City of New York under MEA 354-01-E.
6. VdS Approved (For details, contact Johnson Controls, Enschede, Netherlands, Tel. 31-53-428-4444/Fax 31-53-428-3377.)
7. Approved by the Loss Prevention Certification Board (LPCB Ref. No. 094a/06) as Quick Response Sprinklers.
8. Where Polyester Coated and Lead-Coated Sprinklers are noted to be UL and C-UL Listed, the sprinklers are UL and C-UL Listed as Corrosion-Resistant Sprinklers. Where Lead-Coated Sprinklers are noted to be FM Approved, the sprinklers are FM Approved as a Corrosion-Resistant Sprinklers.

TABLE C
LABORATORY LISTINGS AND APPROVALS FOR
5.6 K-FACTOR SPRINKLERS

K-Factor	Type	Temperature	Bulb Liquid Color	Sprinkler Finish[8]				
				Natural Brass	Chrome Plated	Polyester[c]	Poly-Stainless[c]	Lead Coated
8.0 3/4 in. NPT	Pendent (TY4231)	135°F (57°C)	Orange	1, 2, 3, 4, 5, 6, 7			1, 2	1, 2, 5
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					
	Upright (TY4131)	135°F (57°C)	Orange					
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					
	Recessed Pendent (TY4231)[a] Figure 12	135°F (57°C)	Orange	1, 2, 5			1, 2	N/A[d]
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					
	Recessed Pendent (TY4231)[b] Figure 13	135°F (57°C)	Orange	1, 2, 3, 5			N/A	N/A
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					
8.0 1/2 in. NPT	Pendent (TY4931)	135°F (57°C)	Orange	1, 2, 4, 5, 6			N/A	1, 2, 5
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					
	Upright (TY4831)	135°F (57°C)	Orange					
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					

NOTES
a. Installed with Style 10 (1/2 in. NPT) or Style 40 (3/4 in. NPT) 3/4 in. Total Adjustment Recessed Escutcheon, as applicable.
b. Installed with Style 20 (1/2 in. NPT) or Style 30 (3/4 in. NPT) 1/2 in. Total Adjustment Recessed Escutcheon, as applicable.
c. Frame and Deflector only.
d. Not available (N/A).
1. Listed by Underwriters Laboratories, Inc., (UL) as Quick Response Sprinklers.
2. Listed by Underwriters Laboratories, Inc., for use in Canada (C-UL) as Quick Response Sprinklers.
3. Approved by Factory Mutual Research Corporation (FM) as Quick Response Sprinklers.
4. Approved by the Loss Prevention Certification Board (LPCB Ref. No. 007k/04) as Quick Response Sprinklers. However, LPCB does not rate the thermal sensitivity of recessed sprinklers.
5. Approved by the City of New York under MEA 354-01-E.
6. VdS Approved (For details, contact Johnson Controls, Enschede, Netherlands, Tel. 31-53-428-4444/Fax 31-53-428-3377.)
7. Approved by the Loss Prevention Certification Board (LPCB Ref. No. 094a/06) as Quick Response Sprinklers.
8. Where Polyester Coated and Lead-Coated Sprinklers are noted to be UL and C-UL Listed, the sprinklers are UL and C-UL Listed as Corrosion-Resistant Sprinklers. Where Lead-Coated Sprinklers are noted to be FM Approved, the sprinklers are FM Approved as a Corrosion-Resistant Sprinklers.

TABLE D
LABORATORY LISTINGS AND APPROVALS FOR
5.6 AND 8.0 K-FACTOR SPRINKLERS

K-Factor	Type	Sprinkler Finish			
		Natural Brass	Chrome Plated	Polyester	Lead Coated
2.8 1/2 in. NPT	Pendent (TY1231) and Upright (TY1131)	175 psi (12,1 bar)			N/A[2]
	Recessed Pendent (TY1231)				
4.2 1/2 in. NPT	Pendent (TY2231) and Upright (TY2131)	175 psi (12,1 bar)			N/A
	Recessed Pendent (TY2231)				
5.6 1/2 in. NPT	Pendent (TY3231) and Upright (TY3131)	250 psi (17,2 bar) or 175 psi (12,1 bar)[1]			
	Recessed Pendent (TY3231)				
8.0 3/4 in. NPT	Pendent (TY4231) and Upright (TY4131)	175 psi (12,1 bar)			175 psi (12,1 bar)
	Recessed Pendent(TY4231)				N/A
8.0 1/2 in. NPT	Pendent (TY4931) and Upright (TY4831)	175 psi (12,1 bar)			175 psi (12,1 bar)

NOTES
1. The maximum working pressure of 250 psi (17,2 bar) only applies to the Listing by Underwriters Laboratories Inc. (UL); the Listing by Underwriters Laboratories, Inc. for use in Canada (C-UL); and, the Approval by the City of New York.
2. Not available (N/A).

TABLE E
MAXIMUM WORKING PRESSURE

Care and Maintenance

The TYCO Series TY-FRB 2.8, 4.2, 5.6, and 8.0 K-factor Upright, Pendent, and Recessed Pendent Sprinklers must be maintained and serviced in accordance with this section. Before closing a fire protection system main control valve for maintenance work on the fire protection system that it controls, obtain permission to shut down the affected fire protection systems from the proper authorities and notify all personnel who may be affected by this action.

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

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

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

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

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association such as NFPA 25, in addition to the standards of any other authorities having jurisdiction. Contact the installing contractor or sprinkler manufacturer regarding any questions.

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

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

Initial and frequent visual inspections of random samples are recommended for corrosion-resistant sprinklers to verify the integrity of the corrosion-resistant material of construction. Thereafter, annual inspections per NFPA 25 should suffice. Inspections of corrosion-resistant sprinklers are recommended at close range, instead of from the floor level per NFPA. Inspection at close range can better determine the exact sprinkler condition and the long-term integrity of the corrosion-resistant material, which can be affected by the corrosive conditions present.

P/N 57 – XXX – X – XXX

		SIN
330	2.8K UPRIGHT (1/2 in. NPT)	TY1131
331	2.8K PENDENT (1/2 in. NPT)	TY1231
340	4.2K UPRIGHT (1/2 in. NPT)	TY2131
341	4.2K PENDENT (1/2 in. NPT)	TY2231
370	5.6K UPRIGHT (1/2 in. NPT)	TY3131
371	5.6K PENDENT (1/2 in. NPT)	TY3231
390	8.0K UPRIGHT (3/4 in. NPT)	TY4131
391	8.0K PENDENT (3/4 in. NPT)	TY4231
360	8.0K UPRIGHT (1/2 in. NPT)	TY4831
361	8.0K PENDENT (1/2 in. NPT)	TY4931

	SPRINKLER FINISH
1	NATURAL BRASS
2	POLY-STAINLESS GREY ALUMINUM (RAL9007)[1] POLYESTER
3	PURE WHITE POLYESTER (RAL9010)[2]
4	SIGNAL WHITE POLYESTER (RAL9003)
5	JET BLACK POLYESTER (RAL9005)[3]
7	LEAD COATED
9	CHROME PLATED

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

NOTES
1. Available only on TY3131, TY3231, TY4131, and TY4231
2. Eastern Hemisphere sales only.
3. Available in only 2.8K, 4.2K, and 8.0K, 155°F (68°C) and 200°F (93°C); requires longer lead time to manufacture.

TABLE F
SERIES TY-FRB PENDENT AND UPRIGHT SPRINKLERS
PART NUMBER SELECTION

Limited Warranty

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

Ordering Procedure

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

Sprinkler Assemblies with NPT Thread Connections
Specify: Series TY-FRB (Specify SIN), (specify K-factor), (specify Pendent or Upright) Sprinkler (specify) temperature rating, (specify) finish or coating, P/N (specify from Table F)

Recessed Escutcheon
Specify: Style (10, 20, 30, or 40) Recessed Escutcheon with (specify*) finish, P/N (specify*)

* Refer to Technical Data Sheet TFP770

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

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

1400 Pennbrook Parkway, Lansdale, PA 19446 | Telephone +1-215-362-0700

Victaulic® FireLock Model FL-QR/C Standard Coverage, Quick Response Concealed Pendent Sprinklers, K5.6 (8.1)

41.03



1.0 PRODUCT DESCRIPTION

QUICK RESPONSE CONCEALED PENDENT SPRINKLERS			
SIN	**V5606**	**V3802**	**V3808**
ORIENTATION	Concealed Pendent	Concealed Pendent	Concealed Pendent
K-FACTOR[1]	5.6 Imp./8.1 S.I.	5.6 Imp./8.1 S.I.	5.6 Imp./8.1 S.I.
CONNECTION	½" NPT/15mm BSPT	½" NPT/15mm BSPT	½" NPT/15mm BSPT
MAX. WORKING PRESSURE	175 psi (1200 kPa)	175 psi (1200 kPa)	300psi (2068 kPa)
ESCUTCHEON	Concealed	Concealed	Concealed
GLOBE RE-DESIGNATED	GL5606		
GLOBE EQUIVALENT		GL5604	GL5605

AVAILABLE WRENCHES			
SPRINKLER	**1" ADJ Concealed**	**V38 Concealed**	**V38 Concealed**
PENDENT	■	■	■

CLEAN ROOM GASKET			
SPRINKLER	**1" ADJ Concealed**	**V38 Concealed**	**V38 Concealed**
PENDENT		■	■

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

Min. Operating Pressure: UL/FM: 7psi/48 kPa/.5 bar

Temperature Rating: See tables in section 2.0

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

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

2.0 CERTIFICATION/LISTINGS

APPROVALS/LISTINGS					
SIN	**V5606**	**Cover Plate**	**V3802**	**V3808**	**Cover Plate**
Nominal K Factor Imperial	5.6	–	5.6	5.6	–
Nominal K Factor S.I.[2]	8.1	–	8.1	8.1	–
Orientation	Pendent	–	Pendent	Pendent	–
Escutcheon	Concealed	–	Concealed	Concealed	–
	APPROVED TEMPERATURE RATINGS F°/C°				
cULus	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C	135°F/57°C 135°F /57°C | 155°F/68°C 155°F/68°C 155°F/68°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C	135°F/57°C 135°F/57°C 165°F/74°C 165°F/74°C
FM Standard Response Only	–	–	155°F/68°C 175°F/79°C 200°F/93°C	–	135°F/57°C 135°F/57°C | 165°F/74°C 165°F/74°C
LPCB	–	–	155°F/68°C 175°F/79°C 200°F/93°C	–	138°F/59°C 165°F/74°C 165°F/74°C
CE	–	–	155°F/68°C 175°F/79°C 200°F/93°C	–	138°F/59°C 165°F/74°C 165°F/74°C
CCC K ZSTDY	–	–	155°F/68°C 200°F/93°C	–	135°F/57°C 135°F/57°C | 165°F/74°C

APPROVALS/LISTINGS WITH CLEAN ROOM GASKET			
SIN	**V3802[3]**	**V3808[3]**	**Cover Plate**
Nominal K Factor Imperial	5.6	5.6	–
Nominal K Factor S.I.[2]	8.1	8.1	–
Orientation	Pendent	Pendent	–
Escutcheon	Concealed	Concealed	–
	APPROVED TEMPERATURE RATINGS F°/C°		
cULus	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C	135°F/57°C 135°F/57°C 165°F/74°C 165°F/74°C

2 For K-Factor when pressure is measured in Bar, multiply S.I. units by 10.

3 Recognized as standard response when clean room gasket is installed.

NOTES

- Listings and approval as of printing.
- New York City Acceptance - All UL Listed and/or FM Approved sprinklers acceptable to NYC per section 28-113 of the Administrative Code and the OTCR Rule.

3.0 SPECIFICATIONS – MATERIAL

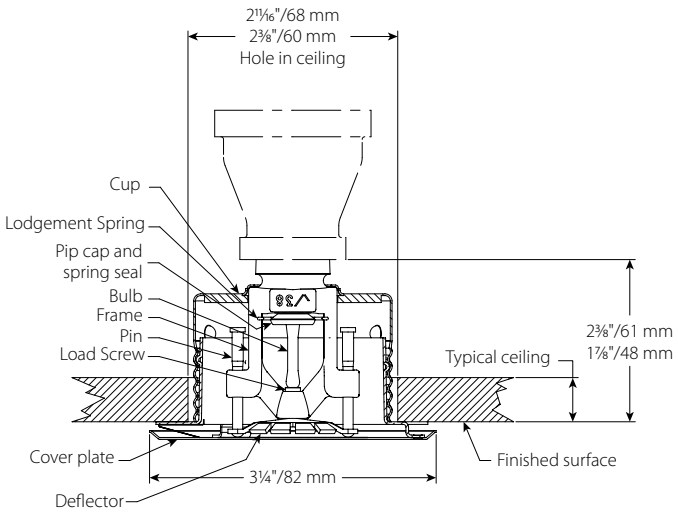
Deflector: Bronze
Bulb Nominal Diamter: 3.0 mm
Load Screw: Brass
Pip Cap: Brass
Spring Seal: PTFE coated Beryllium nickel alloy
Frame: Brass
Concealed Cup: Steel
Cover Plate: Steel
Lodgement Spring: Stainless Steel
Pin: Stainless Steel
Installation Wrench: Ductile Iron
Sealing Gasket: White nitrile (CLEAN ROOM USE ONLY)
Cover Plate Finishes:

- Chrome plated
- White painted
- Flat black painted
- Custom painted

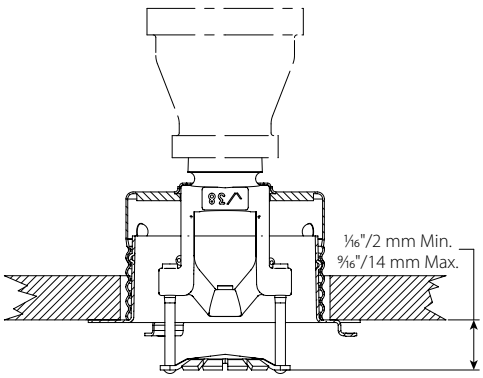
NOTE

- For cabinets and other accessories refer to separate sheet.

4.0 DIMENSIONS

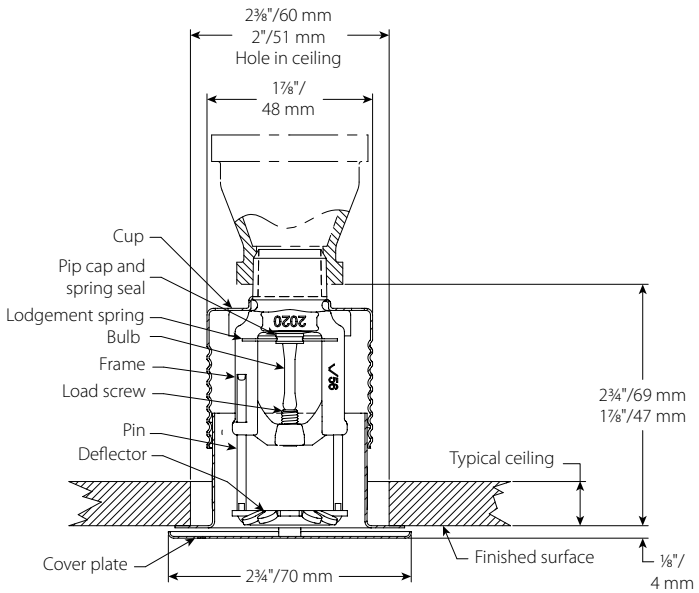


V3802, V3808

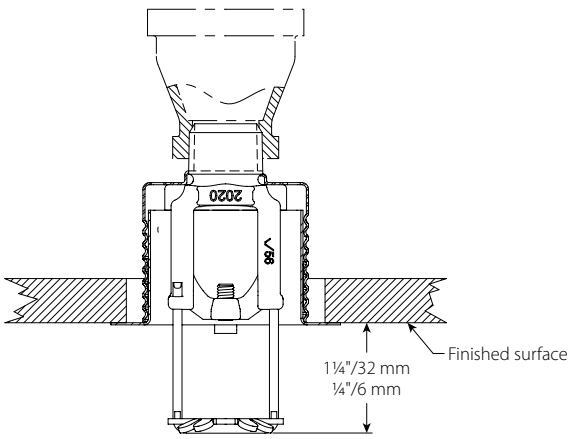


V3802, V3808

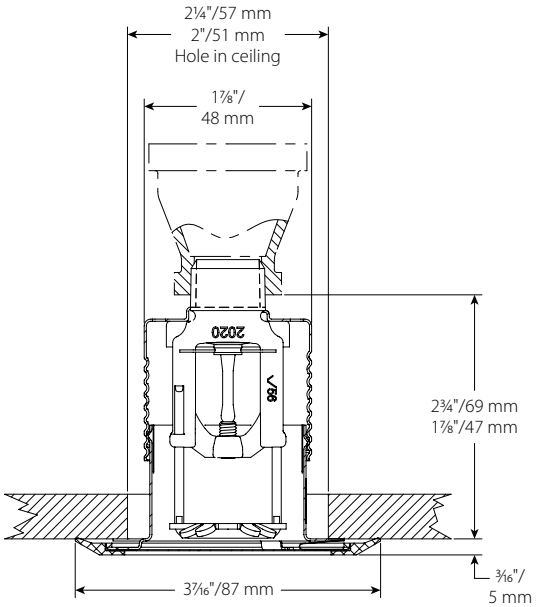
4.0 DIMENSIONS (CONTINUED)



V5606

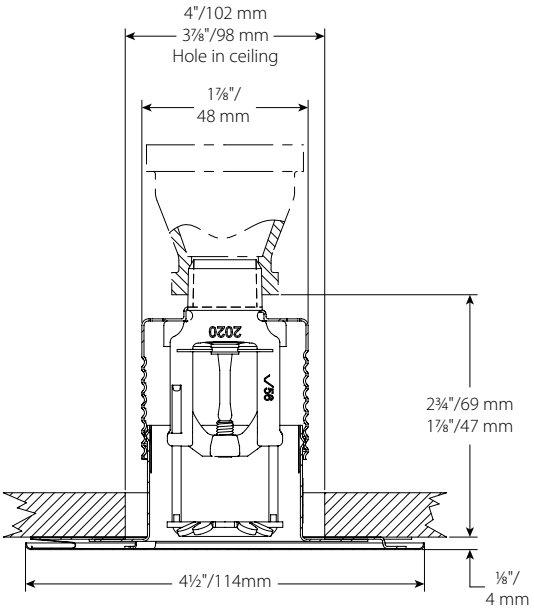


Activated Position
V5606

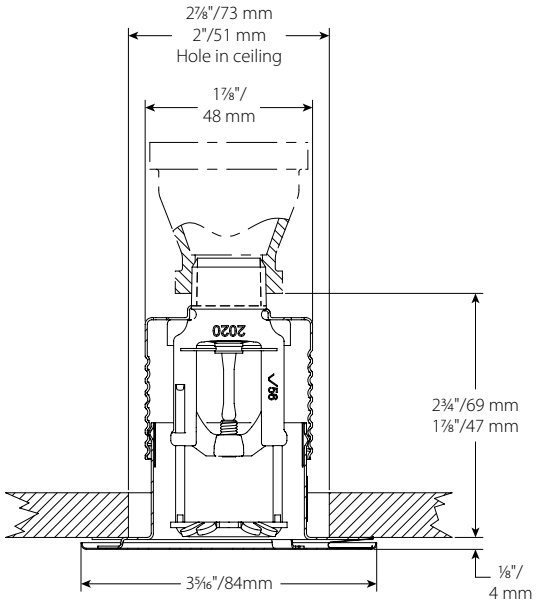


Clean Room Coverplate
V5606

4.0 DIMENSIONS (CONTINUED)



Seismic Coverplate
V5606



Large Coverplate
V5606

5.0 PERFORMANCE

Sprinkler is to be installed and designed as per NFPA, FM Datasheets, or any local standards.

6.0 NOTIFICATIONS

⚠ WARNING

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

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

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

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

7.0 REFERENCE MATERIALS

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

1-40: Victaulic FireLock™ Automatic Sprinklers Installation and Maintenance Instructions

I-V9: Style V9 Victaulic FireLock™ IGS™ Installation-Ready™ Sprinkler Coupling Installation Instructions

Victaulic® FireLock™ Series FL-QR/SW
Standard Coverage, Quick Response
Horizontal Sidewall and Recessed Horizontal Sidewall
Sprinklers K2.8 (4.0), K4.2 (6.1), K5.6 (8.1), K8.0 (11.5)




1.0 PRODUCT DESCRIPTION

QUICK RESPONSE HORIZONTAL SIDEWALL				
SIN	**V2826**	**V4226**	**V2710**	**V3410**
ORIENTATION	Horizontal Sidewall	Horizontal Sidewall	Horizontal Sidewall	Horizontal Sidewall
K-FACTOR[1]	2.8 Imp./4.0 S.I.	4.2 Imp./6.1 S.I.	5.6 Imp./8.1 S.I.	8.0 Imp./11.5 S.I.
CONNECTION	½" NPT/15mm BSPT	½" NPT/15mm BSPT	½" NPT/15mm BSPT/IGS	¾" NPT/ 20mm BSPT/IGS
MAX. WORKING PRESSURE	175 psi/1200 kPa	175 psi/1200 kPa	175 psi/1200 kPa	175 psi/1200 kPa
GLOBE RE-DESIGNATION	GL2826	GL4226		
GLOBE EQUIVALENT			GL5626	GL8127

QUICK RESPONSE RECESSED HORIZONTAL SIDEWALL				
SIN	**V2826**	**V4226**	**V2710**	**V3410**
ORIENTATION	Horizontal Sidewall	Horizontal Sidewall	Horizontal Sidewall	Horizontal Sidewall
K-FACTOR[1]	2.8 Imp./4.0 S.I.	4.2 Imp./6.1 S.I.	5.6 Imp./8.1 S.I.	8.0 Imp./11.5 S.I.
CONNECTION	½" NPT/15mm BSPT	½" NPT/15mm BSPT	½" NPT/15mm BSPT	¾" NPT/ 20mm BSPT
MAX. WORKING PRESSURE	175 psi/1200 kPa	175 psi/1200 kPa	175 psi/1200 kPa	175 psi/1200 kPa
ESCUTCHEON	Recessed	Recessed	Recessed	Recessed
GLOBE RE-DESIGNATION	GL2826	GL4226		
GLOBE EQUIVALENT			GL5626	GL8127
AVAILABLE GUARDS				
SPRINKLER	**V28**	**V42**	**V27**	**V34**
Horizontal Sidewall			■	

AVAILABLE WRENCHES							
Sprinkler	**V56-2 Recessed**	**V56 Open End**	**V27-2 Recessed**	**V27 Open End**	**V34-2 Recessed**	**V34 Open End**	**3/16 Hex-Bit**
V2826 and V4226	■	■					
V2710			■	■			■
V3410					■	■	■

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

Min. Operating Pressure: UL/FM: 7psi/48 kPa/.5 bar

Temperature Rating: See tables in section 2.

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

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

2.0 CERTIFICATION/LISTINGS

HORIZONTAL SIDEWALL APPROVALS/LISTINGS				
SIN	**V2826**	**V4226**	**V2710**	**V3410**
Nominal K Factor Imperial	2.8	4.2	5.6	8
Nominal K Factor S.I.[2]	4.0	6.1	8.1	11.5
Orientation	Horizontal Sidewall	Horizontal Sidewall	Horizontal Sidewall	Horizontal Sidewall
Escutcheon	Flush | Extended	Flush | Extended	Flush | Extended	Flush | Extended
	Approved Temperature Ratings F°/C°			
cULus 4" – 12" Deflector Distance	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C
FM	–	–	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	–
LPCB	–	–	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	–
CE	–	–	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	–

RECESSED HORIZONTAL SIDEWALL APPROVALS/LISTINGS				
SIN	**V2826**	**V4226**	**V2710**	**V3410**
Nominal K Factor Imperial	2.8	4.2	5.6	8
Nominal K Factor S.I.[2]	4.0	6.1	8.1	11.5
Orientation	Horizontal Sidewall	Horizontal Sidewall	Horizontal Sidewall	Horizontal Sidewall
Escutcheon	RECESSED	RECESSED	RECESSED	RECESSED
	Approved Temperature Ratings F°/C°			
cULus 4" – 12" Deflector Distance ½" and ¾" Adjustment Escutcheon "	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C 286°F/141°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C
FM ½" Adjustment Escutcheon Only	–	–	135°F/57°C 155°F/68°C 175°F/79°C 200°F/93°C	–

[2] For K-Factor when pressure is measured in Bar, multiply S.I. units by 10.

NOTES

- Listings and approval as of printing.
- Where cULus Listed, Polyester and VC-250 Coatings Listed as Corrosion Resistant
- Where FM Approved, VC-250 Coating Approved as Corrosion Resistant
- New York City Acceptance - All UL Listed and/or FM Approved sprinklers acceptable to NYC per section 28-113 of the Administrative Code and the OTCR Rule

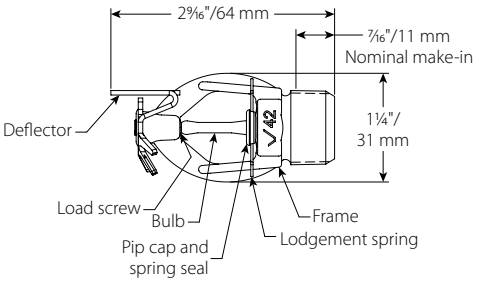
3.0 SPECIFICATIONS – MATERIAL

Deflector: Bronze
Bulb Nominal Diameter: 3.0mm
Load Screw: Bronze
Pip Cap: Bronze
Spring Seal: PTFE coated Beryllium nickel alloy
Frame: Brass
Lodgement Spring: Stainless steel
Installation Wrench: Ductile iron
Sprinkler Frame Finishes:

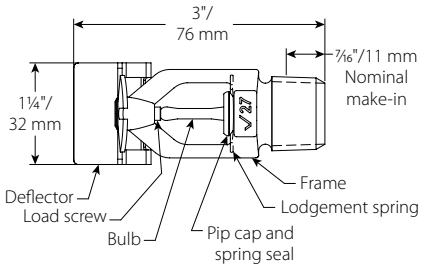
- Plain brass
- Chrome plated
- White polyester painted[3, 4]
- Flat black polyester painted[3, 4]
- Custom polyester painted[3, 4]
- VC-250[5]

[3] Not available on the Intermediate Level Style Pendent.
[4] UL Listed for corrosion resistance.
[5] UL Listed and FM Approved for corrosion resistance.

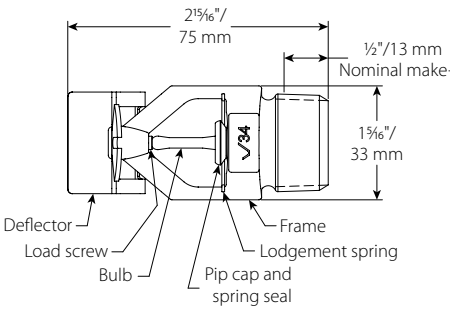
NOTE
- For cabinets and other accessories refer to separate sheet.



V2826, V4226

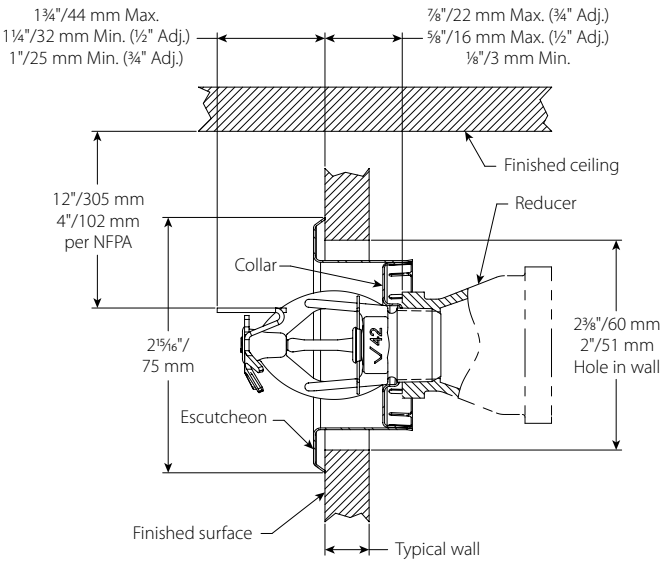


V2710



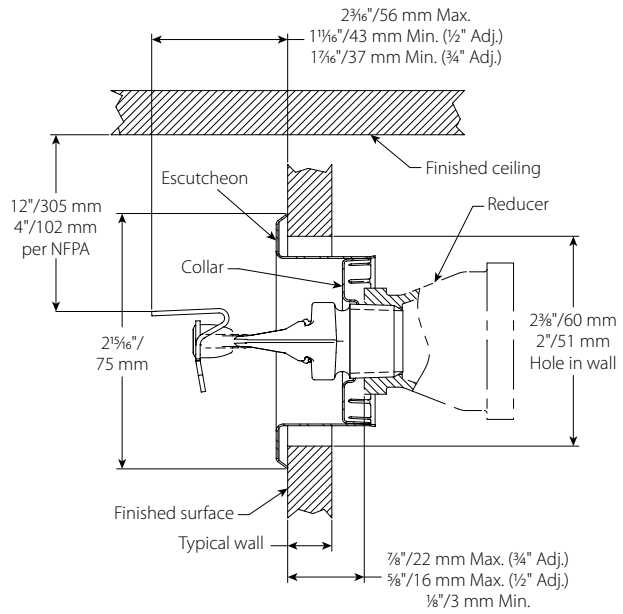
V3410

4.0 DIMENSIONS

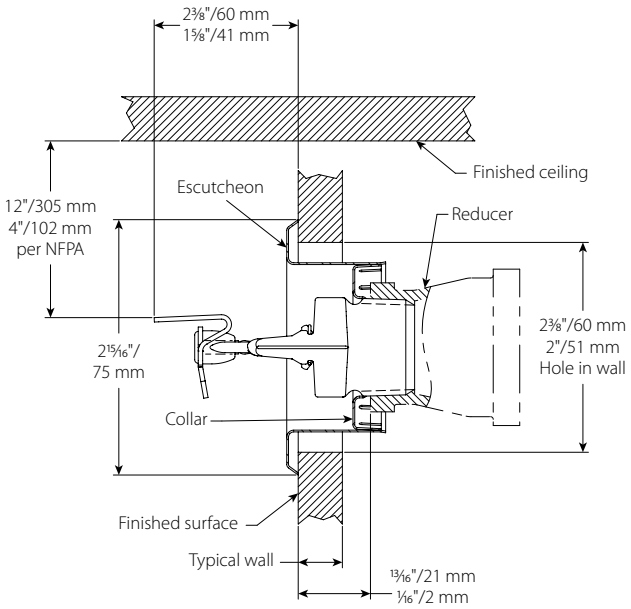


V2826, V4226

4.0 DIMENSIONS (CONTINUED)



V2710



V3410

5.0 PERFORMANCE

Sprinkler is to be installed and designed as per NFPA, FM Datasheets, or any local standards.

6.0 NOTIFICATIONS

⚠ WARNING

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

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

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

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

7.0 REFERENCE MATERIALS

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

1-40: Victaulic FireLock™ Automatic Sprinklers Installation and Maintenance Instructions

I-V9: Style V9 Victaulic FireLock™ IGS™ Installation-Ready™ Sprinkler Coupling Installation Instructions

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 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 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.

Connections

- **From Branchline**
  - ¾"/20mm BSPT female thread (VdS only)
  - 1"/25mm NPT or BSPT female Thread
  - 1"/25mm Grooved IGS (refer to Publication 10.54 for additional IGS connections)
    - No. 116 CPVC Adapter (1"/25mm Female CPVC Socket x 1"/25mm Grooved IGS)
    - No. 142 Welded Outlet
    - Style 922 Outlet-T
    - Style 920N Mechanical-T Outlet
    - No. 65 Grooved End of Run Fitting
- **Hose Inlet**
  - 1"/25mm Grooved IGS
  - 1"/25mm NPT or BSPT male thread
  - ¾"/20mm BSPT male thread (VdS only)

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

1.0 PRODUCT DESCRIPTION (CONTINUED)

- **Sprinkler Reducer**
  - Sprinkler Connection: ½" and ¾"/15 mm and 20 mm NPT or BSPT
  - Straight Lengths: 5.75, 9, 13"/140, 230, 330 mm
  - 90˚ Elbows
    - Standard Short
    - Low Profile Short
    - Standard Long
    - Low Profile Long

    (Short elbows typically used with concealed sprinklers. Long elbows typically used with recessed pendent sprinklers)

Brackets

- 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 furring 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 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
- Strut channel and pipe clamp, not supplied by Victaulic

Maximum Working Temperature

- 225°F/107°C
- 150°F/65°C (No. 116 CPVC Adapter)

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)
- 175 psi/1206 kPa (No. 116 CPVC Adapter)

Minimum Bend Radius

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

1.0 PRODUCT DESCRIPTION (CONTINUED)

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

LPS 1261: Issue 1.2
Cert/LPCB Ref. 104l/02
104l/03

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
Low Profile Elbows: Ductile Iron, 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: Carbon Steel, Zinc-Plated
Reducer (½"/15 mm or ¾"/20 mm): Carbon Steel, Zinc-Plated
Low Profile Elbows: Ductile Iron, 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.

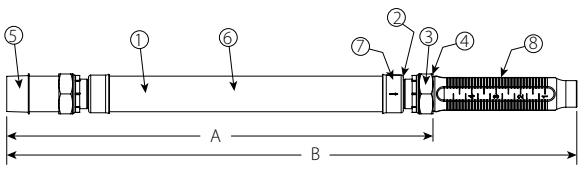
Bolts/Nut: Zinc electroplated carbon steel, trackhead meeting the physical and chemical requirements of ASTM A 449 and physical requirements of ASTM A 183.

Linkage: CrMo Alloy Steel zinc electroplated per ASTM B633 Zn/Fe 5, Type III Finish.

No. 116 Adapter Fitting: CPVC and Brass
Seal: Victaulic EPDM

4.0 DIMENSIONS

Product Details - Series AH1 Braided Hose

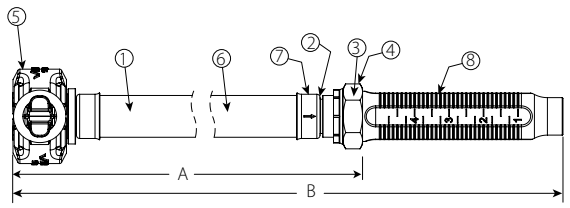


Item	Description
1	Flexible Hose
2	Isolation Ring
3	Gasket
4	Nut
5	Branch Line Nipple
6	Braid
7	Collar/Weld Fitting
8	Reducer

Hose Length Dimensions

Hose	Dimensions	
Model	A inches mm	B inches mm
AH1-31	25.7 653	31.0 788
AH1-36	31.7 806	36.0 915
AH1-48	42.7 1085	48.0 1220
AH1-60	54.7 1390	60.0 1524
AH1-72	66.7 1695	72.0 1829

Series AH1-CC



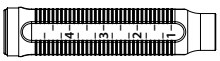
Item	Description
1	Flexible Hose
2	Isolation Ring
3	Gasket
4	Nut
5	Style 108 Coupling
6	Braid
7	Collar/Weld Fitting
8	Reducer

Hose Length Dimensions

Hose	Dimensions	
Model	A inches mm	B inches mm
AH1-CC-31	24.5 623	29.8 757
AH1-CC-36	29.5 750	34.8 884
AH1-CC-48	41.5 1055	46.8 1189
AH1-CC-60	53.5 1359	58.8 1494
AH1-CC-72	65.5 1664	70.8 1799

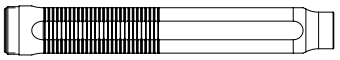
4.1 DIMENSIONS (CONTINUED)

Standard Reducer

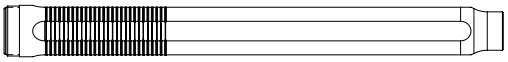


5.75"/140 mm straight reducer

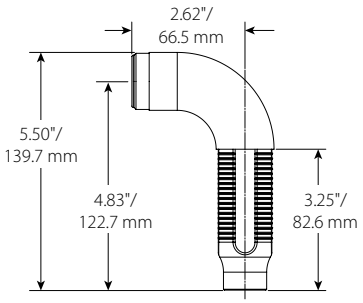
Optional Reducers



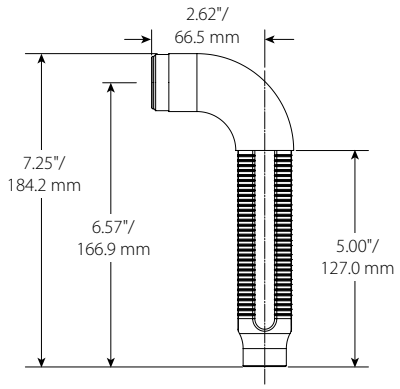
9.0"/229 mm straight reducer



13.0"/330 mm straight reducer



Short 90° elbow reducer

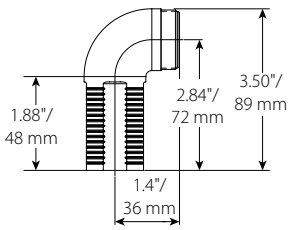


Long 90° elbow reducer

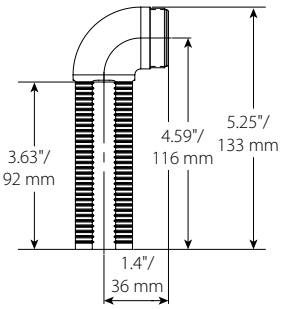
NOTES

- 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

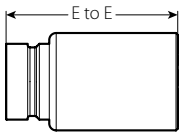


Long 90° elbow reducer

NOTE

- Style AB11: When low profiles elbows are 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.

No. 116 CPVC Adapter



NOTES

- E to E is 3.0"/76.0 mm
- The No. 116 CPVC Adapters have 2 ft (0.6 m). EQL of 1" Schedule 40 pipe

4.2 DIMENSIONS

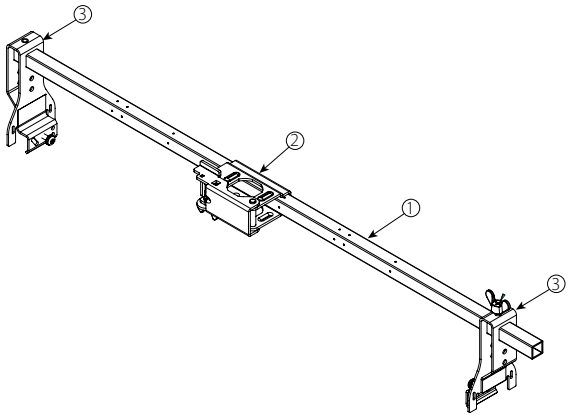
Style AB2

- 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

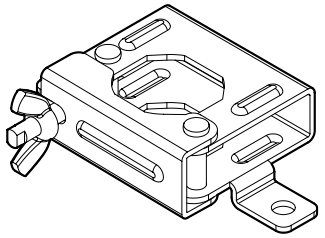
NOTE

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



Style AB3

- Surface Mount Applications
- FM/LPCB Approved



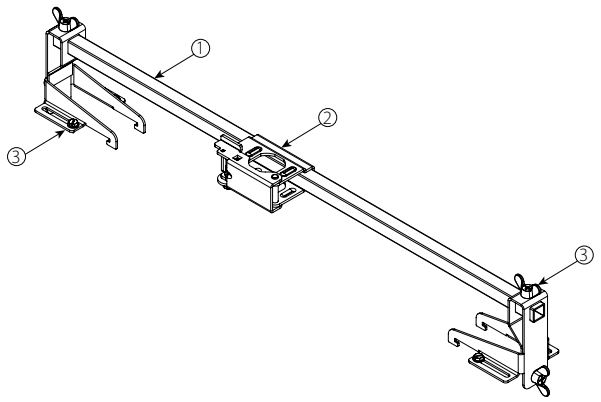
Style AB4

- 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



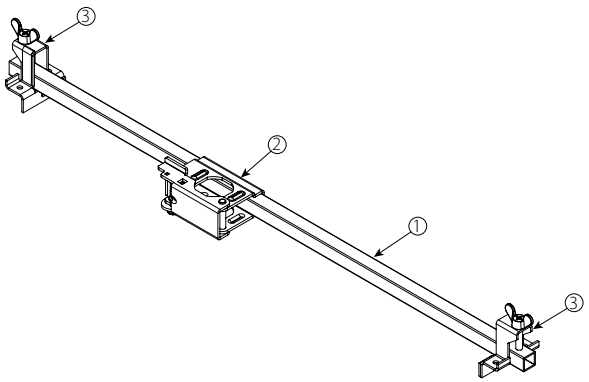
4.3 DIMENSIONS

VicFlex Brackets

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



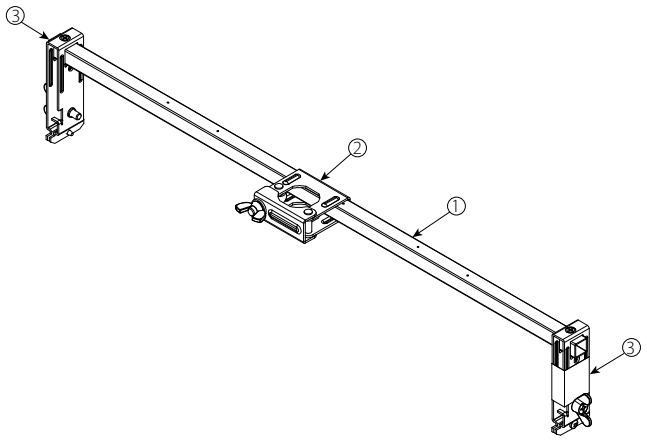
NOTE

- 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



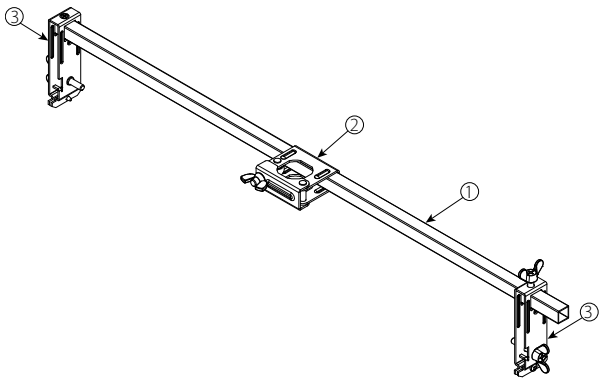
NOTE

- 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

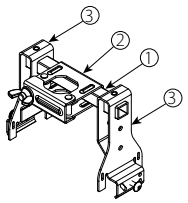
- Both sizes FM/VdS/LPCB approved.

4.4 DIMENSIONS

VicFlex Brackets

Style AB10

- Suspended ceilings
- Armstrong® TechZone™



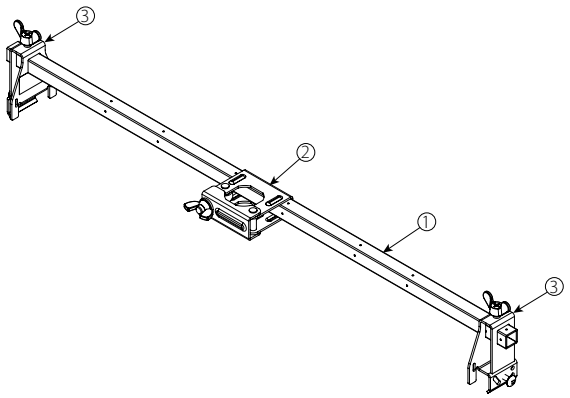
Item	Description
1	6"/152 mm Square Bar
2	Patented 1-Bee2® Center Bracket
3	End Bracket

NOTE

- FM/VdS/LPCB approved, cULus listed.

Style AB11

- Suspended ceilings
- Hard-Lid ceilings



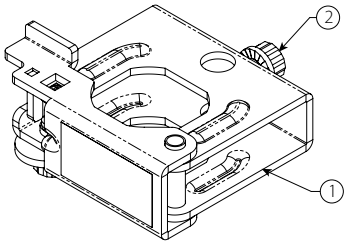
Item	Description
1	24"/610 mm or 48"/1219 mm Square Bar
2	Patented 1-Bee2® Center Bracket
3	End Bracket

NOTE

- FM/VdS Approved, cULus listed.

Style AB12

- Suspended ceilings
- Hard-Lid ceilings



Item	Description
1	Style AB12 Bracket Body
2	T25 Drive Set Screw

NOTE

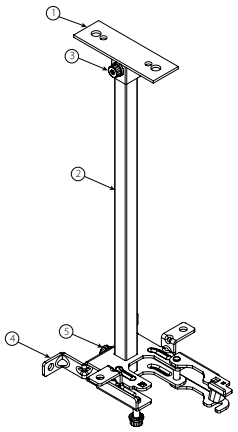
- FM/VdS Approved.

4.5 DIMENSIONS

VicFlex Brackets

Style ABBA

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



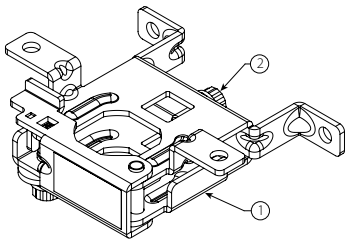
Item	Description
1	Style ABBA Mounting Plate
2	Style ABBA Square Bar
3	Cap Screw, Serated Flange, M6 x 1 x 20, T25 Torx Drive Recessed
4	Style ABMM Bracket Body
5	Cap Screw, Serated Flange, M6 x 1 x 15.24, T25 Torx Drive Recessed

NOTE

- FM Approved.

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

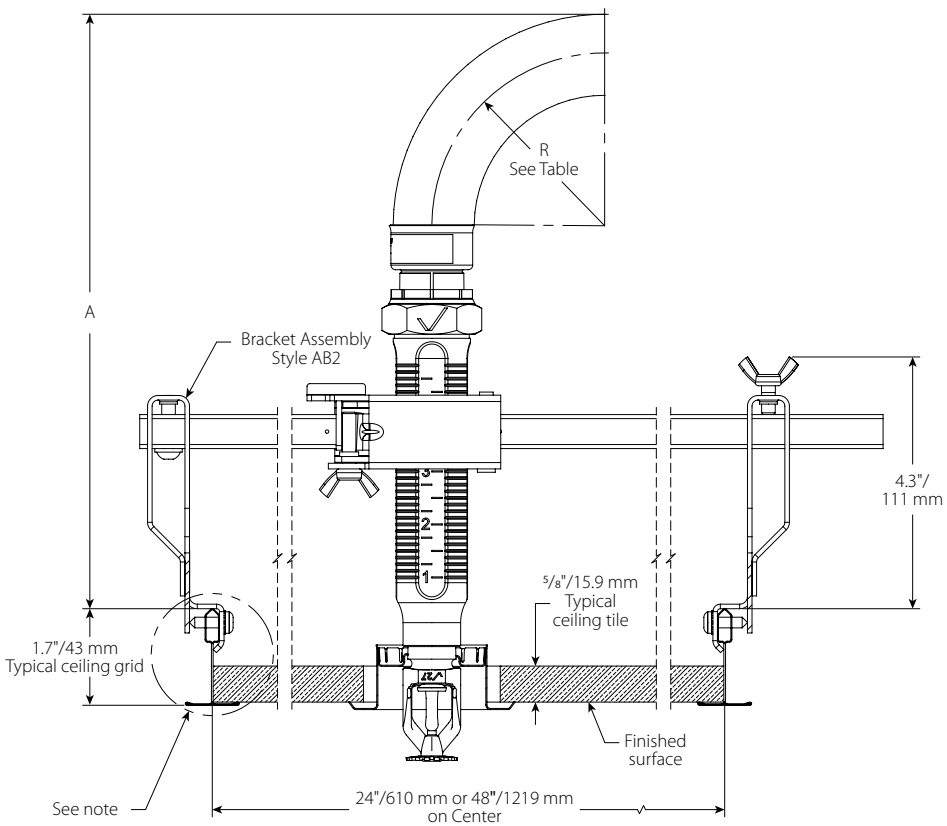
NOTE

- FM Approved.

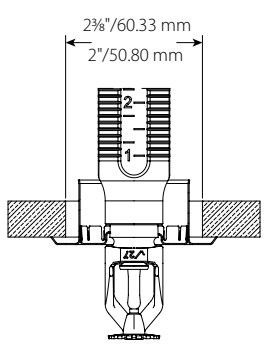
4.6 DIMENSIONS

Clearances

Series AH2 Braided Hose and Style AB2 Bracket



V2707 ¾"/19 MM MAX. RECESS



V2707 MAX. EXTENSION

Hose Clearance Chart						
	Straight Reducer				Long Elbow	Short Elbow
	V2707 ¾" Max Recess inches mm	**V3802 ½" Max Recess** inches mm	**V2707 ¾" Max Recess** inches mm	**V3802 ½" Max Recess** inches mm	**V2707 ¾" Max Recess** inches mm	**V3802 ½" Max Recess** inches mm
"R" Minimum Bend Radius	3.0 76.2		7.0 177.8		–	
"A" Minimum Required Installation Space	9.6 244	11.1 282	13.6 345	15.1 384	5.8 147	5.8 147

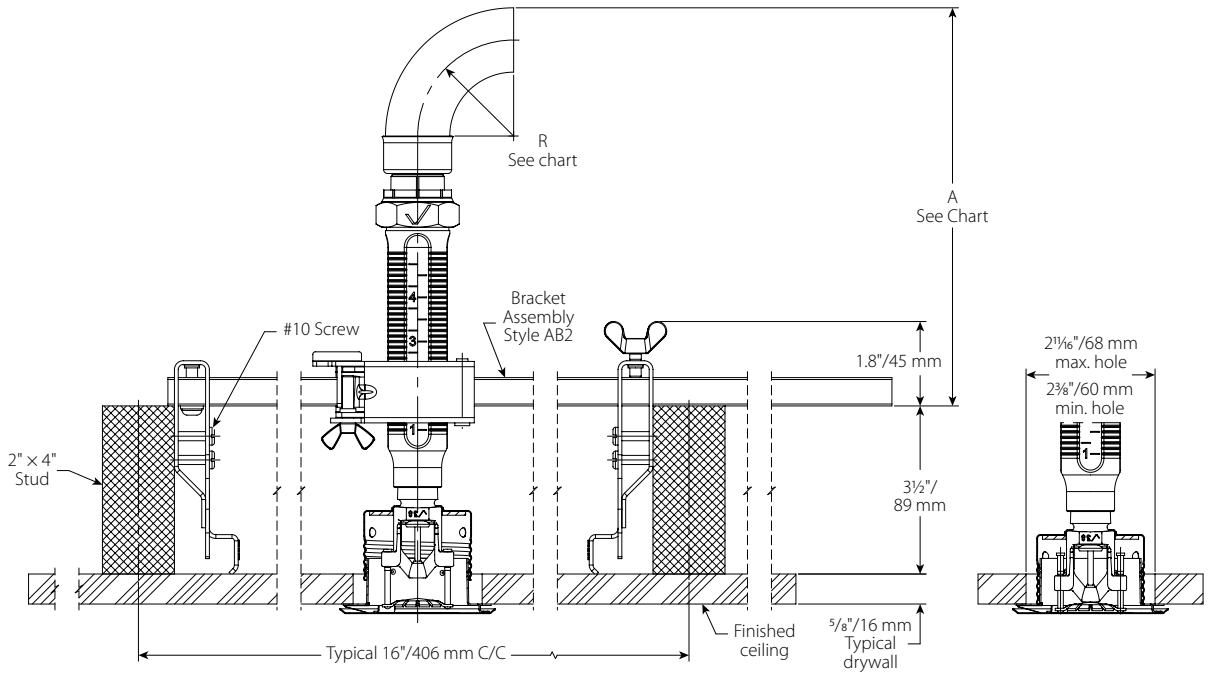
NOTE

- Variations of ceiling grids, sprinkler heads, brackets, and hoses are permitted but may result in clearance differences from the figures above.

4.7 DIMENSIONS

Clearances

Series AH2 Braided Hose and Style AB2 Bracket



V38 ½"/13 mm MAX. RECESS **V38 MAX. EXTENSION**

Hose Clearance Chart						
	Straight Reducer					
	V2707 ¾" I 20 mm Max Recess inches mm	**V3802 ½" I 13 mm Max Recess** inches mm	**V2709 ¾" I 20 mm Sidewall** inches mm	**V2707 ¾" I 20 mm Max Recess** inches mm	**V3802 ½" I 13 mm Max Recess** inches mm	**V2709 ¾" I 20 mm Sidewall** inches mm
"R" Minimum Bend Radius	3.0 80			7.0 175		
"A" Minimum Required Installation Space	7.2 183	8.6 218	7.1 180	11.2 285	12.6 320	11.1 282

Hose Clearance Chart			
	Long Elbow		Short Elbow
	V2707 ¾" I 20 mm Max Recess inches mm	**V2709 ¾" I 20 mm Sidewall** inches mm	**V3802 ½" I 13 mm Max Recess** inches mm
"R" Minimum Bend Radius	–		
"A" Minimum Required Installation Space	3.3 84	3.6 91	3.3 84

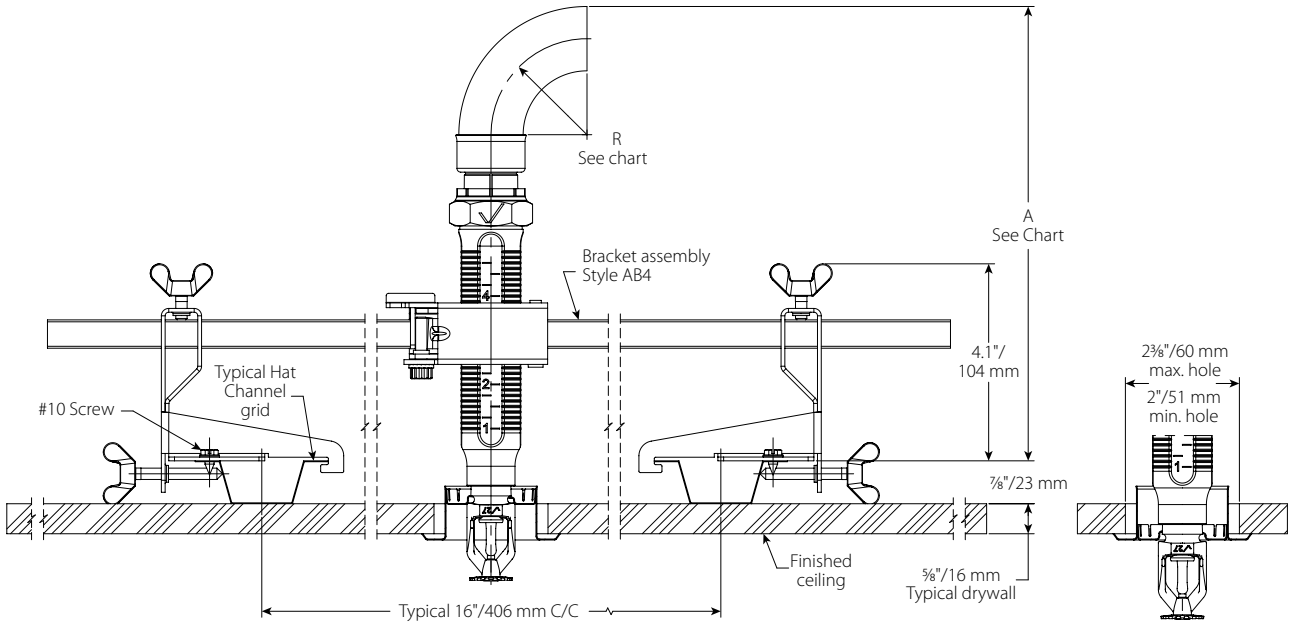
NOTE

- Variations of ceiling grids, sprinkler heads, brackets, and hoses are permitted but may result in clearance differences from the figures above.

4.8 DIMENSIONS

Clearances

Series AH2 Braided Hose and Style AB4 Bracket



V27 ¾"/19 mm MAX. RECESS

V27 MAX. EXTENSION

Hose Clearance Chart						
					Long Elbow	**Short Elbow**
	V2707 ¾" Max Recess inches mm	**V3802 ½" Max Recess** inches mm	**V2707 ¾" Max Recess** inches mm	**V3802 ½" Max Recess** inches mm	**V2707 ¾" Max Recess** inches mm	**V3802 ½" Max Recess** inches mm
"R" Minimum Bend Radius	3.0 80	3.0 80	7.0 175	7.0 175	–	
"A" Minimum Required Installation Space	9.8 249	11.2 285	13.8 351	15.2 386	8.0 203	5.9 150

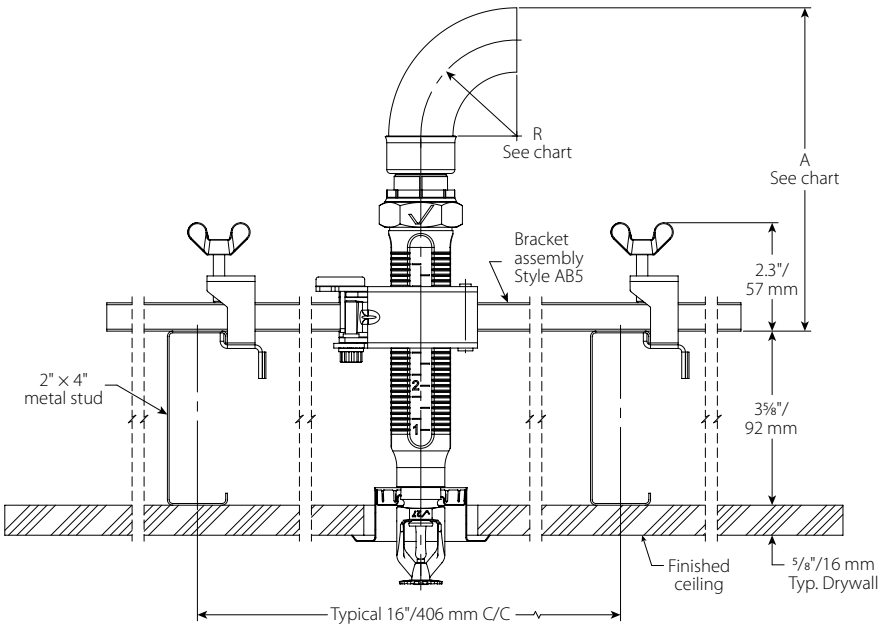
NOTE

- Variations of ceiling grids, sprinkler heads, brackets, and hoses are permitted but may result in clearance differences from the figures above.

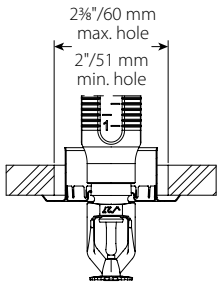
4.9 DIMENSIONS

Clearances

Series AH2 Braided Hose and Style AB5 Bracket



V27 ¾"/19 mm MAX. RECESS



V27 MAX. EXTENSION

Hose Clearance Chart						
	V2707 ¾" I 20 mm Max Recess inches mm	**V3802 ½" I 13 mm Max Recess** inches mm	**V2709 ¾" I 20 mm Sidewall** inches mm	**V2707 ¾" I 20 mm Max Recess** inches mm	**V3802 ½" I 13 mm Max Recess** inches mm	**V2709 ¾" I 20 mm Sidewall** inches mm
"R" Minimum Bend Radius	3.0 80			7.0 175		
"A" Minimum Required Installation Space	7.0 178	8.7 221	7.1 180	11.0 279	12.7 323	11.1 282

Hose Clearance Chart					
	Long Elbow			**Low-Profile Long Elbow**	**Short Elbow**
	V2707 ¾" I 20 mm Max Recess inches mm	**V3802 ½" I 13 mm Max Recess** inches mm	**V2709 ¾" I 20 mm Sidewall** inches mm	**V3802 ½" I 13 mm Max Recess** inches mm	**V3802 ½" I 13 mm Max Recess** inches mm
"R" Minimum Bend Radius	–				
"A" Minimum Required Installation Space	3.5 89	4.9 124	3.6 91	2.9 74	3.3 84

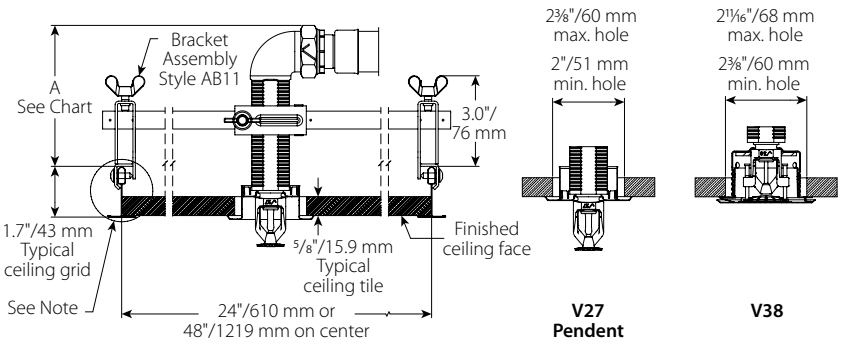
NOTE

- Variations of ceiling grids, sprinkler heads, brackets, and hoses are permitted but may result in clearance differences from the figures above.

4.10 DIMENSIONS

Clearances

Series AH2 Braided Hose and Style AB11 Bracket (LOW PROFILE SOLUTION)



Hose Clearance Chart		
	Low-Profile Long Elbow	**Low-Profile Short Elbow**
	V2707 ¾" I 20 mm Max Recess" inches mm	**V3802 ½" I 13 mm Max Recess** inches mm
"A" Minimum Required Installation Space	4.0 102	3.9 99

NOTE

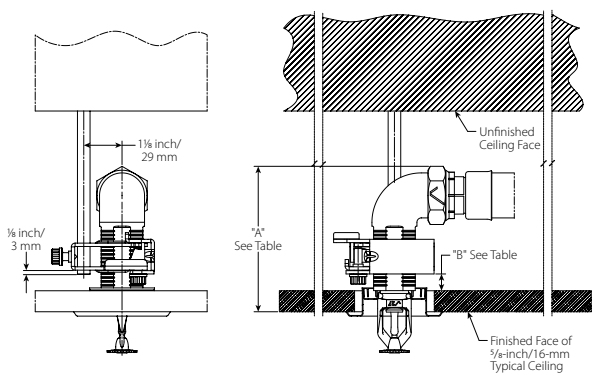
- Variations of ceiling grids, sprinkler heads, brackets, and hoses are permitted but may result in clearance differences from the figures above.

4.11 DIMENSIONS

CLEARANCES ABOVE CEILING

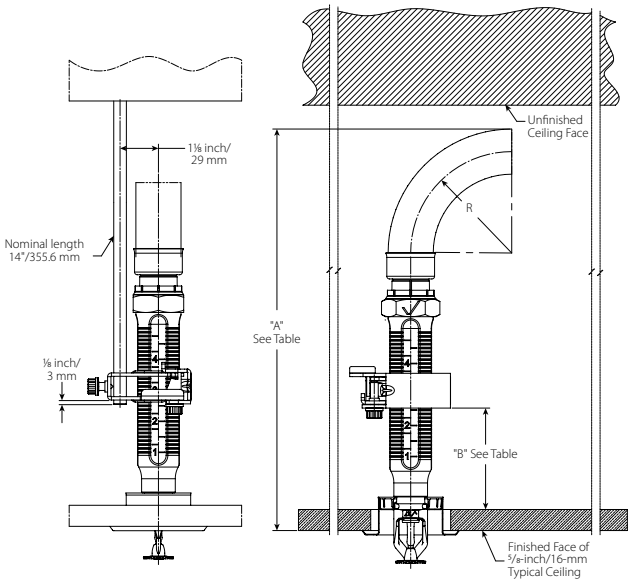
Series AH1 Braided Hose and Style AB12 and ABBA Bracket

Suspended Ceiling Grid with Recessed Sprinkler with Low Profile Short Elbow



V2707 ½"/12.7 mm MAX. RECESS

Suspended Ceiling Grid with Recessed Sprinkler and Straight 5.75"/140mm Reducer



V2707 ¾"/19 mm MAX. RECESS

Dimension		Low Profile Short Elbow		Low Profile Long Elbow		Standard Short Elbow		Standard Long Elbow		Standard Straight Reducer	
		¾"/19mm Recessed* inches mm	Concealed inches mm	¾"/19mm Recessed inches mm	Concealed inches mm	¾"/19mm Recessed inches mm	Concealed inches mm	¾"/19mm Recessed inches mm	Concealed inches mm	¾"/ 19mm Recessed inches mm	Concealed inches mm
A	Minimum Required Installation Space	4.0 101.6	5.5 139.7	5.6 142.2	7.2 182.9	5.9 149.9	7.5 190.5	7.7 195.6	9.3 236.2	15.0 381.0	16.6 421.6
B	Distance from Top of Typical Ceiling Tile to Bottom of Gate	0.5 12.7	2.0 50.8	1.5 38.1	1.5 38.1	1.5 38.1	1.5 38.1	3.0 76.2	3.0 76.2	3.0 76.2	3.0 76.2

* Adjustability will be limited

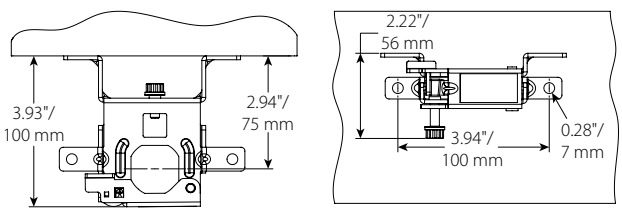
NOTE

- Variations of ceiling grids, sprinkler heads, brackets, and hoses are permitted but may result in clearance differences from the figures above.

4.12 DIMENSIONS

Style ABMM Bracket

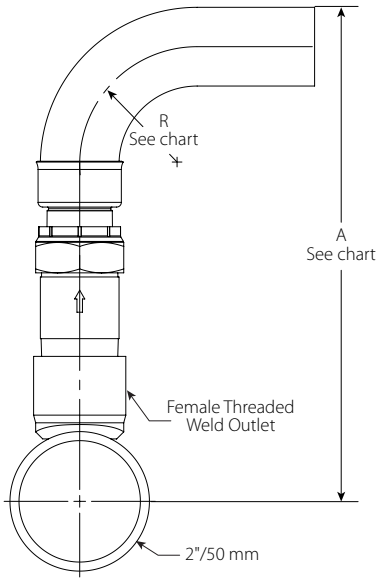
Stand-off Dimensions



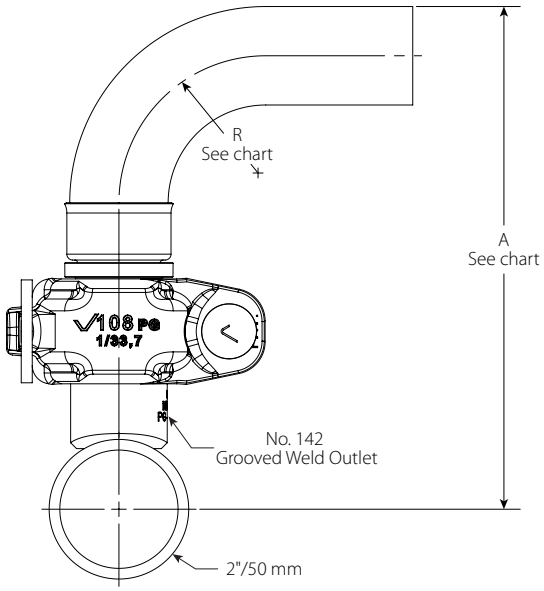
4.13 DIMENSIONS

BRANCHLINE CLEARANCES

Series AH1 Braided Hose with female threaded outlet



Series AH1-CC Braided Hose with grooved outlet



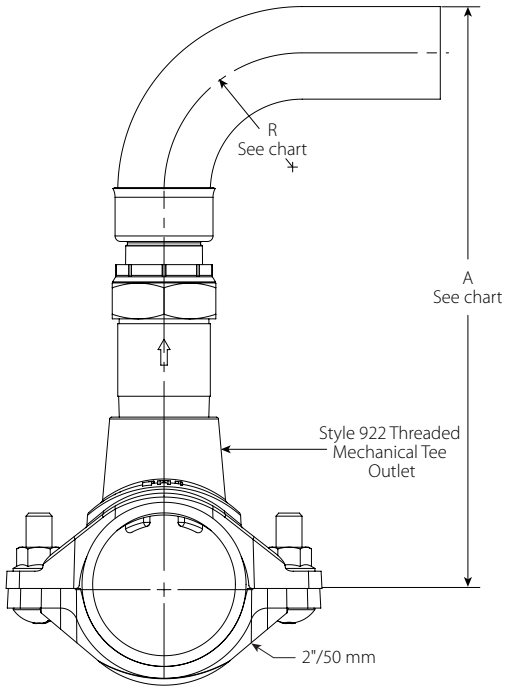
Hose Clearance Chart						
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	3 80	4 100	5 125	6 150	7 175
A	Min.	9.4 239	10.4 264	11.4 290	12.4 315	13.41 341

Hose Clearance Chart						
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	3 80	4 100	5 125	6 150	7 175
A	Min.	8.1 205	9.1 231	10.1 256	11.1 281	12.1 307

4.14 DIMENSIONS

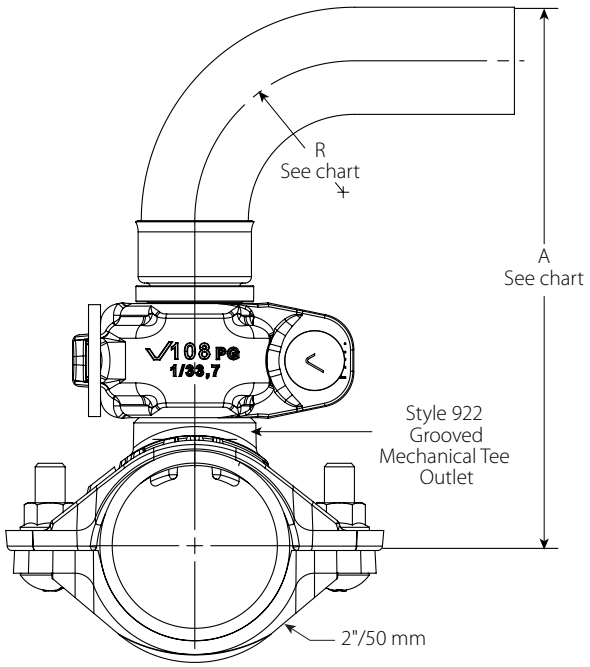
BRANCHLINE CLEARANCES

Series AH1 Braided Hose with Style 922 threaded outlet



Hose Clearance Chart						
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	3 80	4 100	5 125	6 150	7 175
A	Min.	9.4 238	10.4 263	11.4 289	12.4 314	13.4 339

Series AH1-CC Braided Hose with Style 922 grooved outlet



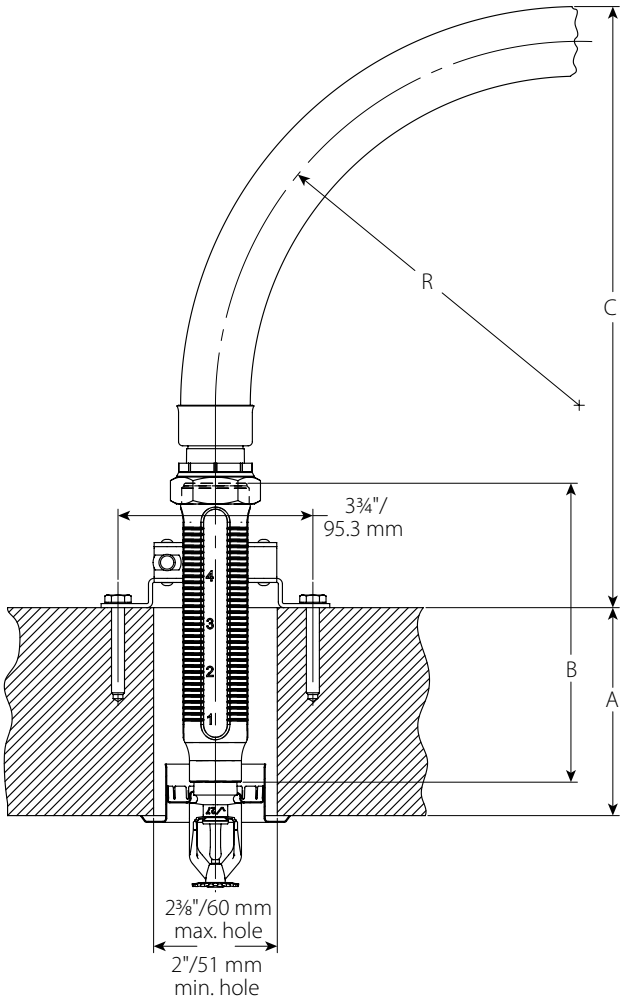
Hose Clearance Chart						
Dimension		inches mm	inches mm	inches mm	inches mm	inches mm
R	Minimum Bend Radius	3 80	4 100	5 125	6 150	7 175
A	Min.	7.7 197	8.7 222	9.7 247	10.7 273	11.7 298

4.15 DIMENSIONS

CLEARANCES ABOVE CEILING

Series AH1 Braided Hose and Style AB3 and ABMM Bracket

Surface Mount Application with Recessed Sprinkler



Hose Clearances																	
Wall Thickness "A"	4 100			6 150		8 200	10 250	2 50			4 100			6 150		8 200	10 250
Outlet Length "B"	5.75 146.1	9 228.6	13 330.2	9 228.6	13 330.2	13 330.2	13 330.2	5.75 146.1	9 228.6	13 330.2	5.75 146.1	9 228.6	13 330.2	9 228.6	13 330.2	13 330.2	13 330.2
Hose Clearance "C"	9.6 243	12.8 325	16.8 427	10.8 275	14.8 376	12.8 325	10.8 275	12.6 319	15.8 402	19.8 503	10.6 268	13.8 351	17.8 452	11.8 300	15.8 402	13.8 351	11.8 300
Bend Radius "R"	7 175							8 200									

NOTE

- Variations of ceiling grids, sprinkler heads, brackets, and hoses are permitted but may result in clearance differences from the figures above.
- See installation instructions for mounting screw type and size.

5.0 PERFORMANCE – FRICTION LOSS DATA

Series AH1 and AH1-CC Braided Hose with Straight 5.75" Reducers
Style AB2, AB4, AB5 and AB10 Brackets

Length inches mm	**Type**	**Nominal Outlet Size** inches DN	**Equivalent Length of 1"/33.7mm Sch. 40 pipe** feet meters	**Max Bends**
31 790	Straight	½ DN15	41.0 12.5	3
31 790	Straight	¾ DN20	39.0 11.9	3
36 915	Straight	½ DN15	49.0 14.9	4
36 915	Straight	¾ DN20	48.0 14.6	4
48 1220	Straight	½ DN15	62.0 18.9	4
48 1220	Straight	¾ DN20	59.0 18.0	4
60 1525	Straight	½ DN15	72.0 21.9	4
60 1525	Straight	¾ DN20	73.0 22.3	4
72 1830	Straight	½ DN15	87.0 26.5	5
72 1830	Straight	¾ DN20	90.0 27.4	5

5.0 PERFORMANCE – FRICTION LOSS DATA (CONTINUED)

Series AH1 Braided Hose with 90° Low Profile Elbows
Style AB11 VicFlex Bracket

Hose	Reducer		UL	
Length inches mm	**Type**	**Nominal Outlet Size** inches DN	**Equivalent Length of 1"/33.7mm Sch. 40 pipe** feet meters	**Max Bends**
31 790	LP Elbow	½ DN15	37.0 11.3	3
31 790	LP Elbow	¾ DN20	44.0 13.4	3
36 915	LP Elbow	½ DN15	47.0 14.3	4
36 915	LP Elbow	¾ DN20	53.0 16.2	4
48 1220	LP Elbow	½ DN15	58.0 17.7	4
48 1220	LP Elbow	¾ DN20	68.0 20.7	4
60 1525	LP Elbow	½ DN15	70.0 21.3	4
60 1525	LP Elbow	¾ DN20	77.0 23.5	4
72 1830	LP Elbow	½ DN15	83.0 25.3	5
72 1830	LP Elbow	¾ DN20	99.0 30.2	5

5.0 PERFORMANCE – FRICTION LOSS DATA

Series AH1 Braided Hose Equivalent Length Design Guide

Equivalent length values at various numbers of 90 degree bends at 3"/76.2 mm center line bend radius

Hose		Bends				
Length inches mm	**Nominal Outlet Size** inches DN	**1 Bend** feet meters	**2 Bends** feet meters	**3 Bends** feet meters	**4 Bends** feet meters	**5 Bends** feet meters
31 790	½ DN15	28.0 8.5	34.0 10.4	41.0 12.5	–	–
31 790	¾ DN20	28.0 8.5	33.0 10.1	39.0 11.9	–	–
36 915	½ DN15	34.0 10.4	39.0 11.9	44.0 13.4	49.0 14.9	–
36 915	¾ DN20	33.0 10.1	39.0 11.9	44.0 13.4	48.0 14.6	–
48 1220	½ DN15	44.0 13.4	50.0 15.2	56.0 17.1	62.0 18.9	–
48 1220	¾ DN20	44.0 13.4	50.0 15.2	55.0 16.8	59.0 18.0	–
60 1525	½ DN15	55.0 16.8	61.0 18.6	66.0 20.1	72.0 21.9	–
60 1525	¾ DN20	55.0 16.8	61.0 18.6	67.0 20.4	73.0 22.3	–
72 1830	½ DN15	68.0 20.7	72.0 21.9	76.0 23.2	82.0 25.0	87.0 26.5
72 1830	¾ DN20	67.0 20.4	71.0 21.6	75.0 22.9	83.0 25.3	90.0 27.4

NOTES

- Values for use with 5.75" straight reducers.
- The values in this table are provided by the manufacturer for reference only. For friction loss data in accordance with the UL Certification, please refer to page 17 of this publication.

How to use this Design Guide:

- For some systems, it may be advantageous for the designer to calculate the system hydraulics using shorter equivalent lengths associated with fewer than the maximum allowable number of bends. In this case, the designer may select a design number of bends for the job and use the associated equivalent length from the design guide to determine the system hydraulics.
- It is possible that the actual installed condition of some of the flexible drops may have more bends than the designer selected. When this happens, the design guide may be used to find equivalent lengths based on the actual installed number of bends for particular sprinkler installations. The system hydraulics can be recalculated using actual equivalent lengths to verify the performance of the system.

5.0 PERFORMANCE – FRICTION LOSS DATA

Series AH1 and AH1-CC Braided Hose
Style AB2, AB3, AB4, AB5, AB7, AB7 Adj., AB8, AB10, AB12, ABBA and ABMM VicFlex Brackets

Hose	Reducer		Sprinkler	FM	
Length inches mm	Type	Nominal Outlet Size inches DN	K-factor Imperial S.I.	Equivalent Length of 1"/33.7mm Sch. 40 pipe feet meters	Max Bends
31 790	Straight	½ DN15	5.6 8.1	35.7 10.9	2
31 790	Elbow	½ DN15	5.6 8.1	30.4 9.3	2
36 915	Straight	½ DN15	5.6 8.1	42.1 12.8	2
36 915	Elbow	½ DN15	5.6 8.1	36.9 11.2	2
48 1220	Straight	½ DN15	5.6 8.1	57.5 17.5	3
48 1220	Elbow	½ DN15	5.6 8.1	52.2 15.9	3
60 1525	Straight	½ DN15	5.6 8.1	72.9 22.2	4
60 1525	Elbow	½ DN15	5.6 8.1	68.2 20.8	4
72 1830	Straight	½ DN15	5.6 8.1	88.4 26.9	4
72 1830	Elbow	½ DN15	5.6 8.1	83.8 25.5	4
31 790	Straight	¾ DN20	8.0 11.5	32.9 10.0	2
31 790	Elbow	¾ DN20	8.0 11.5	32.4 9.9	2
36 915	Straight	¾ DN20	8.0 11.5	39.2 11.9	2
36 915	Elbow	¾ DN20	8.0 11.5	38.9 11.9	2
48 1220	Straight	¾ DN20	8.0 11.5	54.4 16.6	3
48 1220	Elbow	¾ DN20	8.0 11.5	54.5 16.6	3
60 1525	Straight	¾ DN20	8.0 11.5	69.5 21.2	4
60 1525	Elbow	¾ DN20	8.0 11.5	70.1 21.4	4
72 1830	Straight	¾ DN20	8.0 11.5	84.7 25.8	4
72 1830	Elbow	¾ DN20	8.0 11.5	85.7 26.1	4

FM NOTES

- Series AH1 has been tested and Approved by FM Global for use in wet, dry and preaction systems per NFPA 13, 13R, and 13D and FM data sheets 2-0, 2-5, and 2-8. FM 1637 and Vds standards for safety include, but are not limited to, pressure cycling, corrosion resistance, flow characterisitics, vibration resistance, leakage, mechanical and hydrostatic strength.
- EXAMPLE: A 48-inch hose installed with two 30° bends and two 90° bends is permitted and considered equivalent to the data in the table shown above. In this example, the total number of degrees is 240°, which is less than the allowable 270°.

5.0 PERFORMANCE – FRICTION LOSS DATA (CONTINUED)

FM

Series AH1 and AH1-CC Braided Hose
Style AB2, AB3, AB4, AB5, AB7, AB7 Adj., AB8, AB10, AB12, ABBA and ABMM VicFlex Brackets

Hose	Reducer		Sprinkler	FM	
Length inches mm	Type	Nominal Outlet Size inches DN	K-factor Imperial S.I.	Equivalent Length of 1"/33.7mm Sch. 40 pipe feet meters	Max Bends
31 790	Straight	¾ DN20	11.2 16.1	32.9 10.0	2
31 790	Elbow	¾ DN20	11.2 16.1	32.4 9.9	2
36 915	Straight	¾ DN20	11.2 16.1	39.2 11.9	2
36 915	Elbow	¾ DN20	11.2 16.1	38.9 11.9	2
48 1220	Straight	¾ DN20	11.2 16.1	54.4 16.6	3
48 1220	Elbow	¾ DN20	11.2 16.1	54.5 16.6	3
60 1525	Straight	¾ DN20	11.2 16.1	69.5 21.2	4
60 1525	Elbow	¾ DN20	11.2 16.1	70.1 21.4	4
72 1830	Straight	¾ DN20	11.2 16.1	84.7 25.8	4
72 1830	Elbow	¾ DN20	11.2 16.1	85.7 26.1	4
31 790	Straight	¾ DN20	14.0 20.2	32.9 10.0	2
31 790	Elbow	¾ DN20	14.0 20.2	32.4 9.9	2
36 915	Straight	¾ DN20	14.0 20.2	39.2 11.9	2
36 915	Elbow	¾ DN20	14.0 20.2	38.9 11.9	2
48 1220	Straight	¾ DN20	14.0 20.2	54.4 16.6	3
48 1220	Elbow	¾ DN20	14.0 20.2	54.5 16.6	3
60 1525	Straight	¾ DN20	14.0 20.2	69.5 21.2	4
60 1525	Elbow	¾ DN20	14.0 20.2	70.1 21.4	4
72 1830	Straight	¾ DN20	14.0 20.2	84.7 25.8	4
72 1830	Elbow	¾ DN20	14.0 20.2	85.7 26.1	4

FM NOTES

- Series AH1 has been tested and Approved by FM Global for use in wet, dry and preaction systems per NFPA 13, 13R, and 13D and FM data sheets 2-0, 2-5, and 2-8. FM 1637 and Vds standards for safety include, but are not limited to, pressure cycling, corrosion resistance, flow characterisitics, vibration resistance, leakage, mechanical and hydrostatic strength.
- EXAMPLE: A 48-inch hose installed with two 30° bends and two 90° bends is permitted and considered equivalent to the data in the table shown above. In this example, the total number of degrees is 240°, which is less than the allowable 270°.

5.0 PERFORMANCE – FRICTION LOSS DATA

Series AH1 Braided Hose with 90° Low Profile Elbows
Style AB5, AB11, AB12, ABBA and ABMM VicFlex Bracket

Hose	Reducer		Sprinkler	FM	
Length inches mm	**Type**	**Nominal Outlet Size** inches DN	**K-factor** Imperial S.I.	**Equivalent Length of 1"/33.7mm Sch. 40 pipe** feet meters	**Max Bends**
31 790	LP Elbow	¾ DN20	5.6 8.1	31.4 9.6	2
36 915	LP Elbow	¾ DN20	5.6 8.1	37.7 11.5	2
48 1220	LP Elbow	¾ DN20	5.6 8.1	52.8 16.1	3
60 1525	LP Elbow	¾ DN20	5.6 8.1	67.8 20.7	4
72 1830	LP Elbow	¾ DN20	5.6 8.1	82.9 25.3	4
31 790	LP Elbow	¾ DN20	8.0 11.5	32.3 9.8	2
36 915	LP Elbow	¾ DN20	8.0 11.5	38.8 11.8	2
48 1220	LP Elbow	¾ DN20	8.0 11.5	54.4 16.6	3
60 1525	LP Elbow	¾ DN20	8.0 11.5	70.1 21.4	4
72 1830	LP Elbow	¾ DN20	8.0 11.5	85.7 26.1	4
31 790	LP Elbow	¾ DN20	11.2 16.1	32.3 9.8	2
36 915	LP Elbow	¾ DN20	11.2 16.1	38.8 11.8	2
48 1220	LP Elbow	¾ DN20	11.2 16.1	54.4 16.6	3
60 1525	LP Elbow	¾ DN20	11.2 16.1	70.1 21.4	4
72 1830	LP Elbow	¾ DN20	11.2 16.1	85.7 26.1	4
31 790	LP Elbow	¾ DN20	14.0 20.2	32.3 9.8	2
36 915	LP Elbow	¾ DN20	14.0 20.2	38.8 11.8	2
48 1220	LP Elbow	¾ DN20	14.0 20.2	54.4 16.6	3
60 1525	LP Elbow	¾ DN20	14.0 20.2	70.1 21.4	4
72 1830	LP Elbow	¾ DN20	14.0 20.2	85.7 26.1	4

FM NOTES

- Series AH1 has been tested and Approved by FM Global for use in wet, dry and preaction systems per NFPA 13, 13R, and 13D and FM data sheets 2-0, 2-5, and 2-8. FM 1637 and Vds standards for safety include, but are not limited to, pressure cycling, corrosion resistance, flow characterisitics, vibration resistance, leakage, mechanical and hydrostatic strength.
- Differences in equivalent lengths are due to varying test methods, per FM 1637 and VdS standards. Refer to these standards for additional information regarding friction loss test methods.
- EXAMPLE: A 48-inch hose installed with two 30° bends and two 90° bends at a 7-inch bend radius is permitted and considered equivalent to the data in the table shown above. In this example, the total number of degrees is 240°, which is less than the allowable 270°.

5.0 PERFORMANCE – FRICTION LOSS DATA

Series AH1 and AH1-CC Braided Hose
Style AB2, AB4, AB5, AB7, AB7 Adj., AB8, AB10, AB11 and AB12 Brackets

Hose	Reducer	VdS	
Length mm inches	**Nominal Outlet Size** DN inches	**Equivalent Length according to EN 10255 DN 20 (26.9 x 2.65mm)** meters feet	**Max Bends**
790 31	DN15 ½	3.2 10.5	3
790 31	DN20 ¾	3.2 10.5	3
915 36	DN15 ½	3.7 12.1	3
915 36	DN20 ¾	3.7 12.1	3
1220 48	DN15 ½	4.9 16.1	3
1220 48	DN20 ¾	4.9 16.1	3
1525 60	DN15 ½	6.1 20.0	4
1525 60	DN20 ¾	6.1 20.0	4
1830 72	DN15 ½	7.3 24.0	4
1830 72	DN20 ¾	7.3 24.0	4

VDS CEILING MANUFACTURERS LIST

AB1, AB2, AB7, AB10, AB11, AB12

1. AMF
2. Armstrong
3. Chicago Metallic
4. Dipling
5. Durlum
6. Geipel
7. Gema-Armstrong
8. Hilti
9. Knauf
10. Lafarge
11. Linder
12. Odenwald
13. Richter
14. Rigips
15. Rockfon Pagos
16. Suckow & Fischer
17. USG Donn

AB4

No specific approval

AB8

1. Hilti
2. Knauf
3. Lafarge
4. Lindner
5. Rigips

5.0 PERFORMANCE – FRICTION LOSS DATA (continued)

LPS 1261: Issue 1.2
Cert/LPCB Ref. 104I/02
104I/03

Series AH1 and AH1-CC Braided Hose
Style AB2, AB3, AB4, AB5, AB7, AB8 and AB10 Brackets

Hose	Reducer	LPCB	
Length mm inches	Nominal Outlet Size DN inches	Equivalent Length according to EN 10255 DN 25 (33.7 x 3.25mm) meters feet	Max Bends
790 31	DN15 ½	10.4 34.1	2
790 31	DN20 ¾	11.3 37.1	2
915 36	DN15 ½	13.4 44.0	3
915 36	DN20 ¾	13.9 45.6	3
1220 48	DN15 ½	16.2 53.1	3
1220 48	DN20 ¾	16.5 54.1	3
1525 60	DN15 ½	19.2 63.0	3
1525 60	DN20 ¾	19.7 64.6	3
1830 72	DN15 ½	22.8 74.8	3
1830 72	DN20 ¾	23.5 77.1	3

Series AH1 Flexible Hose Friction Loss Data

Model	Length of Flexible Hose mm inches	Equivalent Length	
		Straight Configuration meters feet	Bend Configuration meters feet
AH1-31	790 31	4.78 15.7	5.80 19.0
AH1-36	915 36	5.59 18.3	10.15 33.3
AH1-48	1220 48	9.75 32.0	16.25 53.3
AH1-60	1525 60	12.15 39.9	22.94 75.3
AH1-72	1830 72	14.26 46.8	25.98 85.2

NOTE

- Friction loss data is in accordance with GB5135.16 tested at a flow rate of 114 liters per minute (30 gallons per minute).

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.**
- **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.**

⚠ WARNING

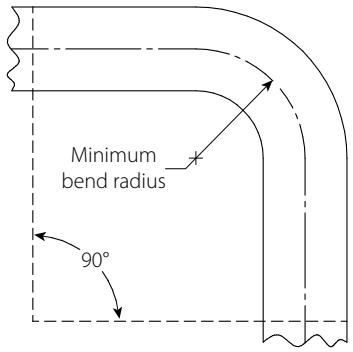
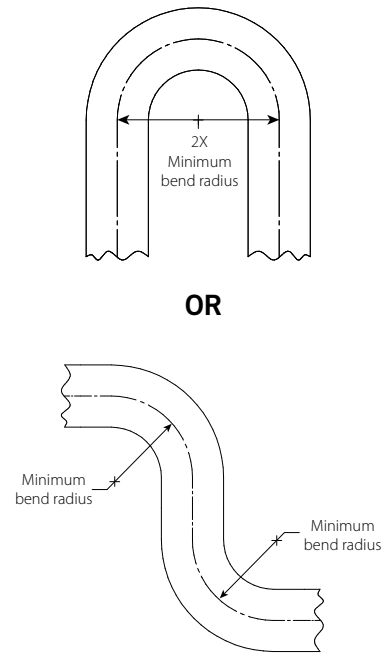
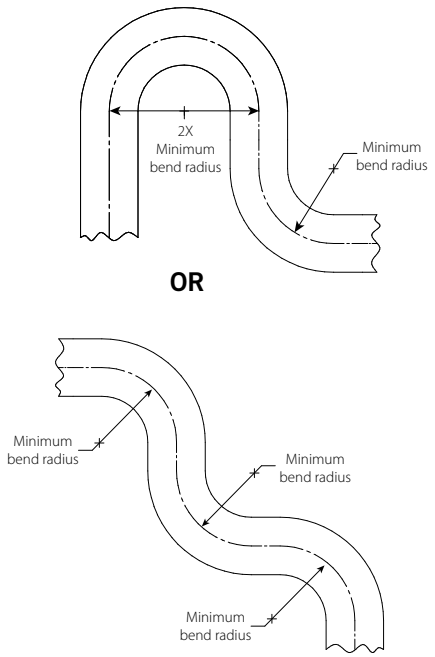
- **It is the responsibility of the system designer to verify suitability of 300-series stainless steel flexible hose for use with the intended fluid media within the piping system and external environments.**
- **The effect of chemical composition, pH level, operating temperature, chloride level, oxygen 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.**
- **It is the responsibility of the owner of a building or their authorized agent to provide the sprinkler system installer with any knowledge that the water supply might be contaminated with or conducive to the development of microbiologically influenced corrosion (MIC), including as required by NFPA 13. Failure to identify adverse water quality issues may affect the VicFlex product and void the manufacturer's warranty.**

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

Victaulic VicFlex Series AH1 and AH1-CC Flexible Sprinkler Fittings may be painted provided the paint is compatible with stainless steel and zinc-plated carbon steel or ductile iron. Care should be taken to ensure the sprinkler and associated escutcheon or coverplate are not painted.

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: Field Installation Handbook

I-RES: Field Installation Handbook

Section 2 – Pipe & 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 **Not Eddy Guard II treated/Not produced by BMT

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

FIG. 74FP SlideLOK® Ready for Installation Coupling

GRUVLOK®

The patented SlideLOK coupling is the most rigid ready for installation coupling designed to reduce installation time. The slide action eases assembly and reduces installation time. The patented gasket provides four separate sealing surfaces for added protection.

The SlideLOK coupling is designed to be used with roll, cut or swage grooved steel pipe, Gruvlok® and SPF® grooved-end fittings, and valves.

The SlideLOK coupling allows for a maximum working pressure of 450 psi on roll or cut grooved carbon steel standard wall pipe. The SlideLOK coupling provides a rigid connection allowing pipe hanging practices per ASME B31 Pipe Codes.

* Patents: 8282136; 8550502; 8615865; 9039046; 9168585; 9194516; 9297482; 9297484; 9500307; 9534715; 9631746; D680629; D680630; D696751

Patented*

SlideLOK Pressure Responsive Gasket

c UL us LISTED FM APPROVED

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

MATERIAL SPECIFICATIONS

HOUSING:
Ductile Iron conforming to ASTM A-536, Grade 65-45-12

BOLTS:
☐ SAE J429, Grade 5, Zinc Electroplated (standard)
☐ SAE J429, Grade 5, Thermo-Diffusion Coated (special order)

HEAVY HEX NUTS:
☐ ASTM A563, Grade A, Zinc Electroplated, Violet Dyed (standard)
☐ ASTM A563, Grade A, Thermo-Diffusion Coated (special order)

HARDWARE KITS:
☐ 304 Stainless Steel (available in sizes up to 3/4")
Kit includes: (2) Bolts per ASTM A193, Grade B8 and
(2) Heavy Hex Nuts per ASTM A194, Grade 8.

COATINGS:
☐ Rust inhibiting paint Color: ORANGE (standard)
☐ Hot Dipped Zinc Galvanized (optional)

GASKET: Material
Properties as designated in accordance with ASTM D-2000.

Pre-Lubricated Grade "E" EPDM, Type A Gasket (Violet color code)
-40°F to 150°F (Service Temperature Range)(-40°C to 66°C)
Recommended for wet and dry (oil free air) pipe fire protection sprinkler systems. For dry pipe systems and freezer applications, Gruvlok Xtreme™ Lubricant is required.

GASKET TYPE:
SlideLOK (1" - 8")

LUBRICATION:
Gruvlok Xtreme™

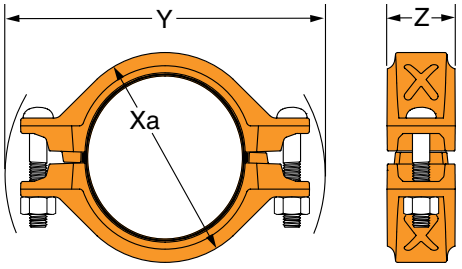
PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ **Approved**
Address:	☐ **Approved as noted**
Contractor:	☐ **Not approved**
Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

FIG. 74FP SlideLOK® Ready for Installation Coupling

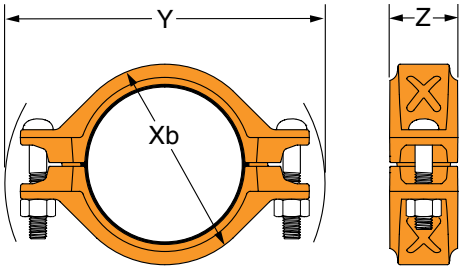
GRUVLOK®

ANVIL® INTERNATIONAL

UNINSTALLED VIEW



INSTALLED VIEW



74FP SLIDELOK COUPLING

Figure Number	Nominal Size	Pipe O.D.	Max. Working Pressure▲	Max. End Load	Range of Pipe End Separation	Coupling Dimensions				Coupling Bolts		Approx. Wt. Ea.
						Xa	Xb	Y	Z	Qty.	Size	
	In./DN(mm)	*In./mm*	*PSI/bar*	*Lbs./kN*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*		*In./mm*	*Lbs./Kg*
74FP	1 *25*	1.315 *33.4*	450 *31.0*	611 *2.72*	0-3/16 *0-4.8*	2 11/16 *68*	2 1/2 *64*	5 *127*	2 *51*	2	3/8 x 2 1/4 *M10 x 57*	1.5 *0.7*
74FP	1 1/4 *32*	1.660 *42.2*	450 *31.0*	973 *4.33*	0-3/16 *0-4.8*	2 29/32 *74*	2 1/2 *64*	5 17/32 *140*	2 *51*	2	1/2 x 2 3/4 *M12 x 70*	1.9 *0.9*
74FP	1 1/2 *40*	1.900 *48.3*	450 *31.0*	1,275 *5.67*	0-3/16 *0-4.8*	3 5/32 *80*	2 3/4 *70*	5 11/16 *144*	2 *51*	2	1/2 x 2 3/4 *M12 x 70*	2.1 *1.0*
74FP	2 *50*	2.375 *60.3*	450 *31.0*	1,993 *8.87*	0-3/16 *0-4.8*	4 13/32 *112*	4 *102*	6 15/32 *164*	2 *51*	2	1/2 x 2 3/4 *M12 x 70*	2.5 *1.1*
74FP	2 1/2 *65*	2.875 *73.0*	450 *31.0*	2,921 *12.99*	0-3/16 *0-4.8*	4 3/16 *106*	3 11/16 *94*	6 11/16 *170*	2 *51*	2	1/2 x 2 3/4 *M12 x 70*	2.6 *1.2*
74FP	3 *80*	3.500 *88.9*	450 *31.0*	4,329 *19.26*	0-3/16 *0-4.8*	4 29/32 *125*	4 13/32 *112*	7 3/8 *187*	2 *51*	2	1/2 x 3 *M12 x 76*	3.1 *1.4*
74FP	4 *100*	4.500 *114.3*	400 *27.6*	6,361 *28.30*	0-1/4 *0-6.3*	5 31/32 *152*	5 13/32 *137*	8 11/16 *221*	2 *51*	2	1/2 x 3 1/2 *M12 x 89*	3.1 *1.4*
74*	5 *125*	5.563 *141.3*	300 *20.7*	7,291 *32.43*	0-5/16 *0-7.9*	7 1/4 *184*	6 3/4 *171*	10 1/2 *267*	2 *51*	2	5/8 x 3 1/2 *M16 x 89*	5.5 *2.5*
74*	6 *150*	6.625 *168.3*	300 *20.7*	10,341 *46.00*	0-5/16 *0-7.9*	8 5/16 *211*	7 3/4 *197*	11 *279*	2 *51*	2	5/8 x 3 1/2 *M16 x 89*	6.3 *2.9*
74*	8 *200*	8.625 *219.1*	300 *20.7*	17,527 *77.96*	0-5/16 *0-7.9*	10 3/4 *273*	10 1/8 *273*	14 *356*	2 1/2 *64*	2	3/4 x 4 1/2 *M20 x 115*	14.3 *6.5*

Range of Pipe End Separation values are for system layout reference only. Actual installation spacing may vary based on pipe condition.

* When ordering, refer to product as FP74.

▲ – Maximum Working Pressure Rating is for Schedule 40 pipe.

For use in Dry Pipe Systems: The SlideLOK pressure responsive gasket is featured with four sealing surfaces to increase protection in low temperature applications. Once the SlideLOK gasket is installed, the performance of the gasket is equivalent to the Gruvlok Flush Gap Gasket. Note: The Flush Gap Gasket is not interchangeable with the SlideLOK gasket.

⚠ WARNING

For dry pipe systems and freezer applications lubrication of the gasket is required, Gruvlok® Xtreme™ Lubricant is required.

LISTINGS AND APPROVALS

Manufacturer	Pipe	Groove	NPS Size Range	Pressure Rating	
				cULus	FM
			In./DN(mm)	*PSI/bar*	*PSI/bar*
Schedule 40*		Roll, Cut	1 - 4	450	450
			25 - 100	*31.0*	*31.0*
			5 - 6	300	300
			125 - 150	*20.7*	*20.7*
			8	400	400
			200	*27.6*	*27.6*
Schedule 30*		Roll	8	400	400
			200	*27.6*	*27.6*
Schedule 10*		Roll	1 - 4	365	365
			25 - 100	*25.2*	*25.2*
			5 - 6	300	300
			125 - 150	*20.7*	*20.7*
			8	400	NR
			200	*27.6*	–
0.188 inch Wall		Roll	8	NR	400
			200	–	*27.6*
Wheatland Tube	Schedule 10	Swage	1¼ - 4	365	300
			32 - 100	*25.2*	*20.7*
	Mega-Flow	Swage	1¼ - 4	NR	300
			32 - 100	–	*20.7*
		Roll	1¼ - 4, 6	300	300
			32 - 100, 150	*20.7*	*20.7*
	Mega-Thread	Roll	1 - 2	300	300
			25 - 50	*20.7*	*20.7*
	GL	Roll	1 - 2	300	300
			25 - 50	*20.7*	*20.7*
	MLT	Roll	1 - 2	300	300
			25 - 50	*20.7*	*20.7*
	WLS	Roll	1 - 2	300	NR
			25 - 50	*20.7*	–
Youngstown	Fire-Flow	Roll	1½ - 4	300	300
			40 - 100	*20.7*	*20.7*
	EZ-Thread	Roll	1 - 2	300	300
			25 - 50	*20.7*	*20.7*
Bull Moose Tube	Eddy-Flow	Roll	1¼ - 4	300	300
			32 - 100	*20.7*	*20.7*
	Eddy-Thread 40	Roll	1 - 2	300	300
			25 - 50	*20.7*	*20.7*

For the latest cULus pressure ratings, FM pressure ratings, and pipe approvals, please visit anvilintl.com or contact your local Anvil Representative.

* Schedule 40/30 pipe to ASTM A795/A53/ASME B36.10 in accordance with NFPA-13.

* Schedule 10 pipe to ASTM A135/A795/A53 in accordance with NFPA-13.

FIG. 74FP SlideLOK® Ready for Installation Coupling

GRUVLOK®

⚠ WARNING

- Read and understand all instructions before use.
- Ensure system is drained and depressurized before installation or service.
- Use appropriate personal protective equipment.

INSTALLATION INSTRUCTIONS

READY FOR INSTALLATION - RIGHT OUT OF THE BOX

Do not disassemble the SlideLOK Coupling. The 74FP coupling is ready for installation. The bolt and gasket do not need to be removed.

1 Pipe Preparation

Pipe ends are to be cut, rolled or swage grooved according to Anvil specifications. Not for use on "EG" grooved pipe ends. The pipe end must be smooth and free from metal burrs, sharp edges or projections.

2 Gasket Preparation

Ensure the gasket is suitable for the intended application by referring to the Anvil gasket compatibility chart.

SlideLOK pre-lubricated gasket does not require lubrication.

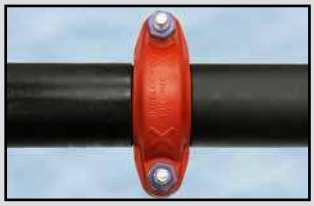
NOTICE: Gruvlok Xtreme Lubricant must be applied when used in dry pipe systems or freezer applications.

3 Assembly

The SlideLOK Fig. 74FP may be installed by one of two methods. The preferred method depends on the type of pipe components being joined and their orientation. Please review both methods before installing.

STEP 3 – METHOD #1

Slide the SlideLOK coupling completely over the grooved pipe end. This will allow a clear and un-obstructed view of the pipe for correct alignment.



A. Slide the coupling on the pipe past the groove. The bolts and nuts can be hand tightened to position the coupling in place.

B. Align the mating pipe end. Align the two adjoining pipes together.

C. Slide the coupling back over the grooves so that the coupling keys are located over the respective grooves on both pipe ends.

D. Follow the instructions on fastening the coupling as shown in Step 4.

STEP 3 – METHOD #2

Slide the SlideLOK coupling half way onto the pipe end or fitting. This will better accommodate fitting, and valve accessories during installation.

A. Slide the coupling on the fitting so that the groove and keys are aligned.

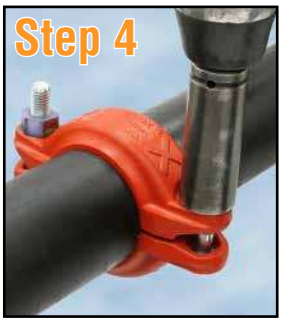
B. Bring the pipe end or fitting towards the coupling and insert so that the groove and coupling keys are aligned.

C. Hand tighten the nuts to correctly position the couplings keys over the respective grooved ends.

D. Follow the instructions on fastening the coupling as shown in Step 4.

4 Tighten Nuts

Securely tighten nuts alternately and equally, keeping the gaps at the bolt pads evenly spaced.



ANSI Specified Bolt Torque

Bolt Size	Wrench Size	Specified Bolt Torque*
In.	*In.*	*Ft.-Lbs*
3/8	11/16	40-50
1/2	7/8	80-100
5/8	1 1/16	100-130
3/4	1 1/4	130-180

* Non-lubricated bolt torque

NOTICE: Uneven tightening may cause the gasket to pinch. Gasket should not be visible between segments after bolts are tightened.

5 Assembly is complete

Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves. The bolt pads are to have equal gaps on each side of the coupling.

NOTICE: Visually inspect both sides of the coupling to ensure gaps between bolt pads are evenly spaced and are parallel. Any deviations must be corrected before placing coupling into service.

CORRECT

INCORRECT

FIG. 74FP SlideLOK® Ready for Installation Coupling

GRUVLOK®

⚠ WARNING

- Read and understand all instructions before use.
- Ensure system is drained and depressurized before installation or service.
- Use appropriate personal protective equipment.

RE-INSTALLATION INSTRUCTIONS

REINSTALLATION OF THE 74FP SLIDELOK COUPLING

The SlideLOK coupling is designed to be installed in the ready for installation assembly position once. After the initial assemble the following steps are to be taken to re-install the 74FP SlideLOK coupling.

1 De-Pressurize the System

De-pressurize the system before removing the SlideLOK Coupling. Disassemble the couplings by removing the nuts, bolts and gasket from the housing halves. A wrench is required to overcome the epoxy used to secure the nuts on the bolts.

2 Pipe Preparation

Pipe ends are to be cut, rolled or swage grooved according to Anvil specifications. Not for use on "EG" grooved pipe ends. The pipe end must be smooth and free from metal burrs or projections.

3 Gasket Preparation

Ensure the gasket is suitable for the intended application by referring to the Anvil gasket compatibility chart. A light coating of Gruvlok® XTreme™ lubricant must be applied to the gasket prior to installation.

4 Pipe Alignment and Gasket Installation

Slide the gasket onto the pipe then align the two pipe ends together. Pull the gasket into position, centering it between the grooves on each pipe. Gasket should not extend into the groove on either pipe.

5 Housing Assembly

Place each of the housing halves on the pipe making sure the housing key fits into the groove. Be sure that the tongue and recess portions of the housing mate properly. Insert the bolts.

6 Tighten Nuts

Securely tighten nuts alternately and equally, keeping the gaps at the bolt pads evenly spaced.

ANSI Specified Bolt Torque

Bolt Size	Wrench Size	Specified Bolt Torque*
In.	*In.*	*Ft.-Lbs*
3/8	11/16	40-50
1/2	7/8	80-100
5/8	1 1/16	100-130
3/4	1 1/4	130-180

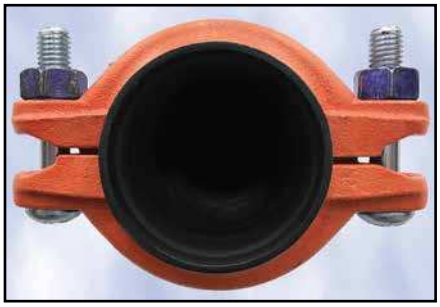
* Non-lubricated bolt torque

NOTICE: Uneven tightening may cause the gasket to pinch. Gasket should not be visible between segments after bolts are tightened.

7 Assembly is complete

Visually inspect the pipe joint to assure the coupling keys are fully engaged in the pipe grooves. The bolt pads are to have equal gaps on each side of the coupling.

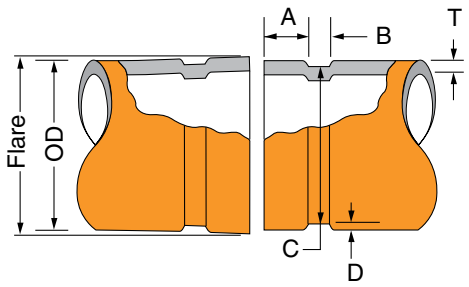
NOTICE: Visually inspect both sides of the coupling to ensure gaps between bolt pads are evenly spaced and are parallel. Any deviations must be corrected before placing coupling into service.



CORRECT

INCORRECT

FIG. 74FP SlideLOK® Ready for Installation Coupling



SWAGE GROOVE SPECIFICATION

-1-	-2-			-3-	-4-	-5-		-6-	-7-	-8-
Nominal Pipe Size	O.D.			"A" ±0.030/ ±0.76	"B" ±0.030/ ±0.76	"C" Actual	"C" Tol. +0.000	"D" (Ref. Only)	"T" Min. Allow. Wall Thick	Max. Flare Dia.
	Actual	Tolerance								
In./DN(mm)	*In./mm*	*+In./mm*	*-In./mm*	*In./mm*	*In./mm*	*In./mm*	*-In./mm*	*In./mm*	*In./mm*	*In./mm*
1¼	1.660	+0.016	-0.016	0.625	0.281	1.535	-0.015	0.063	0.065	1.770
32	*42.2*	*+0.41*	*-0.41*	*15.88*	*7.14*	*38.99*	*-0.38*	*1.60*	*1.7*	*45.0*
1½	1.900	+0.019	-0.019	0.625	0.281	1.775	-0.015	0.063	0.065	2.010
40	*48.3*	*+0.48*	*-0.48*	*15.88*	*7.14*	*45.09*	*-0.38*	*1.60*	*1.7*	*51.1*
2	2.375	+0.024	-0.024	0.625	0.344	2.250	-0.015	0.063	0.065	2.480
50	*60.3*	*+0.61*	*-0.61*	*15.88*	*8.74*	*57.15*	*-0.38*	*1.60*	*1.7*	*63.0*
2½	2.875	+0.029	-0.029	0.625	0.344	2.720	-0.018	0.078	0.083	2.980
65	*73.0*	*+0.74*	*-0.74*	*15.88*	*8.74*	*69.09*	*-0.46*	*1.98*	*2.1*	*75.7*
3	3.500	+0.035	-0.031	0.625	0.344	3.344	-0.018	0.078	0.083	3.600
80	*88.9*	*+0.89*	*-0.79*	*15.88*	*8.74*	*84.94*	*-0.46*	*1.98*	*2.1*	*91.4*
4	4.500	+0.045	-0.031	0.625	0.344	4.334	-0.020	0.083	0.083	4.600
100	*114.3*	*+1.14*	*-0.79*	*15.88*	*8.74*	*110.08*	*-0.51*	*2.11*	*2.1*	*116.8*

COLUMN 1- Nominal IPS Pipe size.

COLUMN 2 - IPS outside diameter.

COLUMN 3 - Gasket seat must be free from scores, seams, chips, rust or scale which may interfere with proper sealing of the gasket. Gasket seat width (Dimension A) is to be measured from the pipe end to the vertical flank in the groove wall.

COLUMN 4 - Groove width (Dimension B) is to be measured between vertical flank of the groove size walls.

COLUMN 5 - The groove must be of uniform depth around the entire pipe circumference. (See column 6).

COLUMN 6 - Groove depth: for reference only. Groove must conform to the groove diameter "C" listed in column 5.

COLUMN 7 - Minimum allowable wall thickness which may be roll grooved.

COLUMN 8 - Maximum allowable pipe end flare diameter. Measured at the most extreme pipe end diameter of the gasket seat area.

Out of roundness: Difference between maximum O.D. and minimum O.D. measured at 90° must not exceed total O.D. tolerance listed (reference column 2).

For IPS pipe, the maximum allowable tolerance from square cut ends is 0.03" for 1" thru 3½"; and 0.045" for 4".

Weld Seams must be ground flush with the pipe O.D. and ID prior to roll grooving. Failure to do so may result in damage to the roll grooving machine and unacceptable roll grooves may be produced.

▼ "A" tolerance +0.030" / -0.060" (+0.77 / -1.54 mm)

FIG. 7050S* Standard 90° Elbow for Fire Protection

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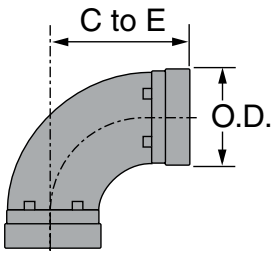

FIGURE 7050S* STANDARD 90° ELBOW

Nominal Size	O.D.	Max. Rated Pressure	Center to End	Approx. Wt. Ea.
In./DN(mm)	*In./mm*	*PSI/bar*	*In./mm*	*Lbs./Kg*
1 *25*	1.315 *33.4*	300 *20.7*	2¼ *57*	0.6 *0.3*
1¼ *32*	1.660 *42.2*	300 *20.7*	2¾ *70*	1.0 *0.5*
1½ *40*	1.900 *48.3*	300 *20.7*	2¾ *70*	1.2 *0.5*
2 *50*	2.375 *60.3*	300 *20.7*	3¼ *83*	1.7 *0.8*
2½ *65*	2.875 *73.0*	300 *20.7*	3¾ *95*	2.6 *1.2*
3 O.D. 76.1	*2.996* 76.1	*300* 20.7	*4* 102	*3.6* 1.6
3 *80*	3.500 *88.9*	300 *20.7*	4¼ *108*	4.0 *1.8*
4 *100*	4.500 *114.3*	300 *20.7*	5 *127*	7.7 *3.5*
5½ O.D. 139.7	*5.500* 139.7	*300* 20.7	*5¼* 133	*10.9* 4.9
5 *125*	5.563 *141.3*	300 *20.7*	5½ *140*	11.1 *5.0*
6½ O.D. 165.1	*6.500* 165.1	*300* 20.7	*6½* 165	*17.4* 7.9
6 *150*	6.625 *168.3*	300 *20.7*	6½ *165*	16.5 *7.5*
8 *200*	8.625 *219.1*	300 *20.7*	7¾ *197*	30.6 *13.9*
10 *250*	10.750 *273.1*	300 *20.7*	9 *229*	53.5 *24.3*
12 *300*	12.750 *323.9*	300 *20.7*	10 *254*	82 *37.2*

For additional sizes, see Fig. 7050 in the Gruvlok Catalog or contact an Anvil Representative.

These fittings are designed to provide minimal pressure drop and uniform strength.

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

– Available galvanized.

* When ordering, refer to product as FP7050S.

MATERIAL SPECIFICATIONS

CAST FITTINGS:

Ductile Iron conforming to ASTM A-536

COATINGS:

☐ Rust inhibiting paint Color: ORANGE (standard) or
☐ Hot Dipped Zinc Galvanized conforming to ASTM A-153 (optional)
☐ Other available options: Example: RAL3000 or RAL9000 Series

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

FIG. 7051* Standard 45˚ Elbow for Fire Protection

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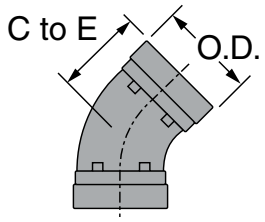

FIGURE 7051* STANDARD 45˚ ELBOW

Nominal Size	O.D.	Max. Rated Pressure	Center to End	Approx. Wt. Ea.
In./DN(mm)	*In./mm*	*PSI/bar*	*In./mm*	*Lbs./Kg*
1¼	1.660	300	1¾	0.7
32	*42.2*	*20.7*	*44*	*0.3*
1½	1.900	300	1¾	0.9
40	*48.3*	*20.7*	*44*	*0.4*
2	2.375	300	2	1.5
50	*60.3*	*20.7*	*51*	*0.7*
2½	2.875	300	2¼	1.9
65	*73.0*	*20.7*	*57*	*0.9*
3	3.500	300	2½	3.3
80	*88.9*	*20.7*	*64*	*1.5*
4	4.500	300	3	5.4
100	*114.3*	*20.7*	*76*	*2.4*
5	5.563	300	3¼	9.0
125	*141.3*	*20.7*	*83*	*4.1*
6	6.625	300	3½	11.2
150	*168.3*	*20.7*	*89*	*5.1*
8	8.625	300	4¼	19.8
200	*219.1*	*20.7*	*108*	*9.0*

Additional sizes available, see Gruvlok Catalog or contact an Anvil Representative.

These fittings are designed to provide minimal pressure drop and uniform strength.

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Available as a fabricated fitting.
– Available galvanized.
* When ordering, refer to product as FP7051.

MATERIAL SPECIFICATIONS

CAST FITTINGS:
Ductile Iron conforming to ASTM A-536

COATINGS:
☐ Rust inhibiting paint Color: ORANGE (standard) or
☐ Hot Dipped Zinc Galvanized conforming to ASTM A-153 (optional)
☐ Other available options: Example: RAL3000 or RAL9000 Series

PROJECT INFORMATION	APPROVAL STAMP
Project: Performance Partnership	☐ **Approved**
Address: 3523 Jetstream Drive, Wilson, NC	☐ **Approved as noted**
Contractor:	☐ **Not approved**
Engineer:	**Remarks:**
Submittal Date: February 26, 2021	
Notes 1:	
Notes 2:	

FIG. 7060S* Standard Tee for Fire Protection

GRUVLOK

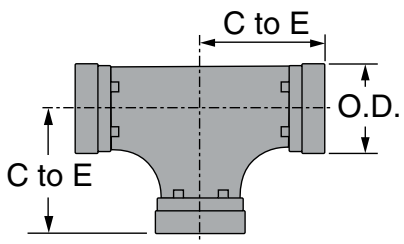

FIGURE 7060S* STANDARD TEE

Nominal Size	O.D.	Max. Rated Pressure	Center to End	Approx. Wt. Ea.
In./DN(mm)	*In./mm*	*PSI/bar*	*In./mm*	*Lbs./Kg*
1 *25*	1.315 *33.4*	300 *20.7*	2¼ *57*	0.9 *0.4*
1¼ *32*	1.660 *42.2*	300 *20.7*	2¾ *70*	1.5 *0.7*
1½ *40*	1.900 *48.3*	300 *20.7*	2¾ *70*	1.8 *0.8*
2 *50*	2.375 *60.3*	300 *20.7*	3¼ *83*	2.4 *1.1*
2½ *65*	2.875 *73.0*	300 *20.7*	3¾ *95*	4.0 *1.8*
3 O.D. 76.1	*2.996* 76.1	*300* 20.7	*4* 101	*4.6* 2.1
3 *80*	3.500 *88.9*	300 *20.7*	4¼ *108*	5.8 *2.6*
4 *100*	4.500 *114.3*	300 *20.7*	5 *127*	10.3 *4.7*
5½ O.D. 139.7	*5.500* 139.7	*300* 20.7	*5½* 140	*16.1* 7.3
5 *125*	5.563 *141.3*	300 *20.7*	5½ *140*	16.2 *7.3*
6½ O.D. 165.1	*6.500* 165.1	*300* 20.7	*6½* 165	*24.4* 11.1
6 *150*	6.625 *168.3*	300 *20.7*	6½ *165*	25.7 *11.7*
8 *200*	8.625 *219.1*	300 *20.7*	7¾ *197*	41.1 *18.6*
10 *250*	10.750 *273.1*	300 *20.7*	9 *229*	74.5 *33.8*
12 *300*	12.750 *323.9*	300 *20.7*	10 *254*	94.7 *43.0*

Additional sizes available, see Gruvlok Catalog or contact an Anvil Representative.

These fittings are designed to provide minimal pressure drop and uniform strength.

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– Available galvanized.

* When ordering, refer to product as FP7060S.

MATERIAL SPECIFICATIONS

CAST FITTINGS:

Ductile Iron conforming to ASTM A-536

COATINGS:

☐ Rust inhibiting paint Color: ORANGE (standard) or
☐ Hot Dipped Zinc Galvanized conforming to ASTM A-153 (optional)
☐ Other available options: Example: RAL3000 or RAL9000 Series

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

FIG. 7074* Cap

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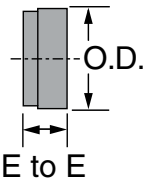

FIGURE 7074 CAP

Nominal Size	O.D.	End to End	Approx. Wt. Ea.
In./DN(mm)	*In./mm*	*In./mm*	*Lbs./Kg*
1 *25*	1.315 *33.4*	1¼ *32*	0.3 *0.1*
1¼ *32*	1.660 *42.2*	1¼ *32*	0.4 *0.2*
1½ *40*	1.900 *48.3*	1¼ *32*	0.5 *0.2*
2 *50*	2.375 *60.3*	1 *25*	0.5 *0.2*
2½ *65*	2.875 *73.0*	1 *25*	0.7 *0.3*
3 O.D. 76.1	*2.996* 76.1	*1* 25	*0.8* 0.4
3 *80*	3.500 *88.9*	1 *25*	1.1 *0.5*
4 *100*	4.500 *114.3*	1⅛ *29*	2.8 *1.3*
5 1/2 O.D. 139.7	*5.500* 139.7	*1 1/8* 29	*4.0* 1.8
5 *125*	5.563 *141.3*	1⅛ *29*	4.0 *1.8*
6 1/2 O.D. 165.1	*6.500* 165.1	*1 1/8* 29	*6.0* 2.7
6 *150*	6.625 *168.3*	1 5/16 *33*	6.0 *2.7*
8 *200*	8.625 *219.1*	1½ *38*	12.5 *5.7*
10 *250*	10.750 *273.1*	1½ *38*	21.9 *9.9*
12 *300*	12.750 *323.9*	1½ *38*	33.8 *15.3*

Additional sizes available, see Gruvlok Catalog or contact an Anvil Representative.

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– Available galvanized.

* When ordering, refer to product as FP7074.

MATERIAL SPECIFICATIONS

CAST FITTINGS:

Ductile Iron conforming to ASTM A-536

COATINGS:

☐ Rust inhibiting paint Color: ORANGE (standard) or
☐ Hot Dipped Zinc Galvanized conforming to ASTM A-153 (optional)
☐ Other available options: Example: RAL3000 or RAL9000 Series

PROJECT INFORMATION	APPROVAL STAMP
Project: Performance Partnership	☐ **Approved**
Address: 3523 Jetstream Drive, Wilson, NC	☐ **Approved as noted**
Contractor:	☐ **Not approved**
Engineer:	**Remarks:**
Submittal Date: February 26, 2021	
Notes 1:	
Notes 2:	

FIG. 7072 Concentric Reducer

GRUVLOK®

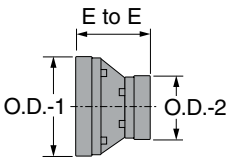
Available as a fabricated fitting.
– Available galvanized.

MATERIAL SPECIFICATIONS

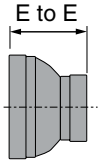
CAST FITTINGS:
Ductile Iron conforming to ASTM A-536

FABRICATED FITTINGS:
1"-10" Carbon Steel, Schedule 40, conforming to ASTM A-53, Grade B
12" and above Carbon Steel, Standard Wall, conforming to ASTM A-53, Grade B

COATINGS:
☐ Rust inhibiting paint Color: ORANGE (standard) or
☐ Hot Dipped Zinc Galvanized conforming to ASTM A-153 (optional)
☐ Other available options: Example: RAL3000 or RAL9000 Series



Cast



Weld

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VdS

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FIGURE 7072 CONCENTRIC REDUCER (GROOVE BY GROOVE)

Nominal Size	O.D.-1	O.D.-2	End to End	Approx. Wt. Ea.
In./DN(mm)	*In./mm*	*In./mm*	*In./mm*	*Lbs./Kg*
1¼ x 1 *32 x 25*	1.660 *42.2*	1.315 *33.4*	2½ *64*	0.6 *0.3*
1½ x 1 *40 x 25*	1.900 *48.3*	1.315 *33.4*	2½ *64*	0.6 *0.3*
1½ x 1¼ *40 x 32*	1.900 *48.3*	1.660 *42.2*	2½ *64*	0.6 *0.3*
2 x 1 *50 x 25*	2.375 *60.3*	1.315 *33.4*	2½ *64*	0.8 *0.4*
2 x 1¼ ■ *50 x 32*	2.375 *60.3*	1.660 *42.2*	2½ *64*	1.3 *0.6*
2 x 1½ ■ *50 x 40*	2.375 *60.3*	1.900 *48.3*	2½ *64*	1.3 *0.6*
2½ x 1 *65 x 25*	2.875 *73.0*	1.315 *33.4*	2½ *64*	1.0 *0.5*
2½ x 1¼ *65 x 32*	2.875 *73.0*	1.660 *42.2*	2½ *64*	1.0 *0.5*
2½ x 1½ *65 x 40*	2.875 *73.0*	1.900 *48.3*	2½ *64*	1.3 *0.6*
2½ x 2 ■ *65 x 50*	2.875 *73.0*	2.375 *60.3*	2½ *64*	1.6 *0.7*
3 x 1 *80 x 25*	3.500 *88.9*	1.315 *33.4*	2½ *64*	1.2 *0.5*
3 x 1¼ *80 x 32*	3.500 *88.9*	1.660 *42.2*	2½ *64*	1.3 *0.6*
3 x 1½ *80 x 40*	3.500 *88.9*	1.900 *48.3*	2½ *64*	1.3 *0.6*
3 x 2 ■ *80 x 50*	3.500 *88.9*	2.375 *60.3*	2½ *64*	1.4 *0.6*
3 x 2½ ■ *80 x 65*	3.500 *88.9*	2.875 *73.0*	2½ *64*	1.6 *0.7*
3½ x 3 *90 x 80*	4.000 *101.6*	3.500 *88.9*	3 *76*	1.8 *0.8*
4 x 1 *100 x 25*	4.500 *114.3*	1.315 *33.4*	3 *76*	2.2 *1.0*
4 x 1¼ *100 x 32*	4.500 *114.3*	1.660 *42.2*	3 *76*	2.2 *1.0*
4 x 1½ *100 x 40*	4.500 *114.3*	1.900 *48.3*	3 *76*	2.3 *1.0*
4 x 2 ■ *100 x 50*	4.500 *114.3*	2.375 *60.3*	3 *76*	2.4 *1.1*
4 x 2½ ■ *100 x 65*	4.500 *114.3*	2.875 *73.0*	3 *76*	2.6 *1.2*
4 x 3 ■ *100 x 80*	4.500 *114.3*	3.500 *88.9*	3 *76*	3.2 *1.5*
4 x 3½ *100 x 90*	4.500 *114.3*	4.000 *101.6*	3 *76*	3.6 *1.6*
5 x 2 *125 x 50*	5.563 *141.3*	2.375 *60.3*	3½ *89*	4.6 *2.1*
5 x 2½ *125 x 65*	5.563 *141.3*	2.875 *73.0*	3½ *89*	4.5 *2.0*
5 x 3 *125 x 80*	5.563 *141.3*	3.500 *88.9*	3½ *89*	4.4 *2.0*
5 x 4 ■ *125 x 100*	5.563 *141.3*	4.500 *114.3*	3½ *89*	4.5 *2.0*
6 x 1 *150 x 25*	6.625 *168.3*	1.315 *33.4*	4 *102*	6.8 *3.1*
6 x 1½ *150 x 40*	6.625 *168.3*	1.900 *48.3*	4 *102*	6.9 *3.1*
6 x 2 ■ *150 x 50*	6.625 *168.3*	2.375 *60.3*	4 *102*	6.0 *2.7*
6 x 2½ *150 x 65*	6.625 *168.3*	2.875 *73.0*	4 *102*	6.0 *2.7*
6 x 3 ■ *150 x 80*	6.625 *168.3*	3.500 *88.9*	4 *102*	5.4 *2.4*
6 x 4 ■ *150 x 100*	6.625 *168.3*	4.500 *114.3*	4 *102*	5.6 *2.5*
6 x 5 ■ *150 x 125*	6.625 *168.3*	5.563 *141.3*	4 *102*	6.0 *2.7*
8 x 3 *200 x 80*	8.625 *219.1*	3.500 *88.9*	5 *127*	12.0 *5.5*
8 x 4 ■ *200 x 100*	8.625 *219.1*	4.500 *114.3*	5 *127*	9.0 *4.1*
8 x 5 *200 x 125*	8.625 *219.1*	5.563 *141.3*	5 *127*	11.5 *5.2*
8 x 6 ■ *200 x 150*	8.625 *219.1*	6.625 *168.3*	5 *127*	15.5 *7.0*
10 x 4 *250 x 100*	10.750 *273.1*	4.500 *114.3*	6 *152*	20.0 *9.1*
10 x 5 *250 x 125*	10.750 *273.1*	5.563 *141.3*	6 *152*	20.0 *9.1*
10 x 6 ■ *250 x 150*	10.750 *273.1*	6.625 *168.3*	6 *152*	20.0 *9.1*
10 x 8 *250 x 200*	10.750 *273.1*	8.625 *219.1*	6 *152*	23.9 *10.8*
12 x 4 *300 x 100*	12.750 *323.9*	4.500 *114.3*	7 *178*	25.0 *11.3*
12 x 6 *300 x 150*	12.750 *323.9*	6.625 *168.3*	7 *178*	29.0 *13.2*
12 x 8 *300 x 200*	12.750 *323.9*	8.625 *219.1*	7 *178*	29.0 *13.2*
12 x 10 *300 x 250*	12.750 *323.9*	10.750 *273.1*	7 *178*	32.4 *14.7*

Additional sizes available, see Gruvlok Catalog or contact an Anvil Representative.
■ – Cast fittings, all others are fabricated steel.

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

FIG. 7045 Clamp-T®, FPT Branch

GRUVLOK®

c UL us LISTED FM APPROVED LPCB VdS

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

– Available galvanized.

The Gruvlok® Clamp-T provides a quick and easy outlet at any location along the pipe. A hole drilled or cut in the pipe to receive the locating collar of the Clamp-T is all that is required. The full, smooth outlet area provides for optimum flow characteristics.

The Clamp-T housing is specially engineered to conform to the pipe O.D. and the Clamp-T gasket providing a leak tight reliable seal in both positive pressure and vacuum conditions. Working pressure ratings shown are for reference only and are based on Schedule 40 pipe. For the latest UL/ULC listed, LPCB, VdS and FM Approved pressure ratings versus pipe schedule, see www.anvilintl.com or contact your local Anvil Representative.

The Gruvlok Clamp-T provides for a branch or cross connection in light wall or standard wall steel pipe.

The Fig. 7045 Clamp-T female pipe thread branch is available with NPT or ISO 7/1 connection and the Fig. 7046 Clamp-T has grooved-end branch connection.

Clamp-T cross connections are available in various sizes allowing greater versatility in piping design.

NOTE: Variable End Configurations are Possible — 2" x 1/2" through 8" x 4" Thd x Thd and Gr. x Thd. Sizes

MATERIAL SPECIFICATIONS

HOUSING:
Ductile Iron conforming to ASTM A-536, Grade 65-45-12

ANSI BOLTS & HEAVY HEX NUTS:
Heat treated, oval neck track head bolts conforming to ASTM A-183 Grade 2 with a minimum tensile strength of 110,000 psi and heavy hex nuts of carbon steel conforming to ASTM A-563 Grade A or Grade B, or J995 Grade 2. Bolts and nuts are provided zinc electroplated as standard.

METRIC BOLTS & HEAVY HEX NUTS:
Heat treated, zinc electroplated oval-neck track head bolts made of carbon steel with mechanical properties per ISO 898-1 Class 8.8. Hex nuts and bolts are zinc electroplated followed by a yellow chromate dip.

U-BOLT:
Cold drawn steel and zinc plated.

COATINGS:
☐ Rust inhibiting paint Color: ORANGE (standard)
☐ Hot Dipped Zinc Galvanized (optional)
☐ Other available options: Example: RAL3000 or RAL9000 Series
For other coating requirements contact an Anvil Representative.

LUBRICATION:
☐ Standard Gruvlok
☐ Gruvlok Xtreme™ required for dry pipe systems and freezer applications.

GASKETS: Materials
Properties as designated in accordance with ASTM D-2000.

☐ **Grade "E" EPDM** (Green color code)
-40°F to 230°F (Service Temperature Range)(-40°C to 110°C)
Recommended for water service, diluted acids, alkalies solutions, oil-free air and many chemical services.
NOT FOR USE IN PETROLEUM APPLICATIONS.

☐ **Grade "EP" EPDM** (Green and Red color code)
-40°F to 250°F (Service Temperature Range)(-40°C to 121°C)
Recommended for water service, diluted acids, alkalies solutions, oil-free air and many other chemical services.
NOT FOR USE IN PETROLEUM APPLICATIONS.

CLAMP-T FLOW DATA (FRICTIONAL RESISTANCE)

Branch Size	Fig. 7045 Threaded Branch	
	C.V. Value	Equiv. Pipe Length
In./DN(mm)		*Ft./m*
1/2 *15*	22 -	1.0 *0.3*
3/4 *20*	25 -	2.0 *0.6*
1 *25*	44 -	2.0 *0.6*
1 1/4 *32*	76 -	2.5 *0.8*
1 1/2 *40*	89 -	4.0 *1.2*

Branch Size	Fig. 7045 Threaded Branch	
	C.V. Value	Equiv. Pipe Length
In./DN(mm)		*Ft./m*
2 *50*	164 -	3.5 *1.1*
2 1/2 *65*	152 -	12.5 *3.8*
3 *80*	318 -	8.5 *2.6*
4 *100*	536 -	8.0 *2.4*

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

FIG. 7045 Clamp-T®, FPT Branch

GRUVLOK®

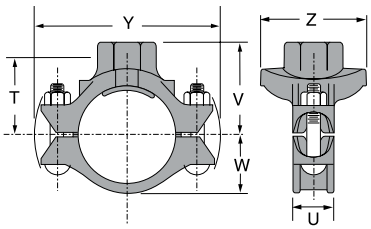

Fig. 7045

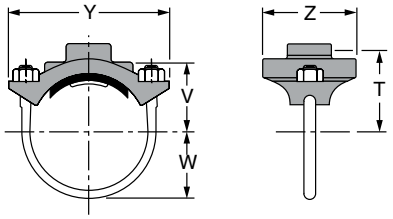

Fig. 7045 (U-Bolt)

⚠ WARNING

For dry pipe systems and freezer applications lubrication of the gasket is required, Gruvlok® Xtreme™ Lubricant is required.

FIGURE 7045 FPT BRANCH (TABLE CONTINUES TO NEXT PAGE)

Nominal Size	O.D.	Hole Dimensions		Max. Working Pressure▲	Clamp-T Dimensions						Bolt Size	Specified Torque §		Approx. Wt. Ea.
		Min. Diameter	Max. Diameter		T	U	V Threaded	W	Y	Z		Min.	Max.	
In./DN(mm)	*In./mm*	*In./mm*	*In./mm*	*PSI/bar*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*Ft.-Lbs./N-m*		*Lbs./Kg*
2 x ½ *50 x 15*	2.375 x 0.840 *60.3 x 21.3*	1½ *38*	1⅝ *41*	500 *34.5*	2 3/16 *56*	9/16 *14*	2⅝ *67*	½ *12*	5½ *140*	3 *76*	½ U-Bolt -	30	40	2.3 *1.0*
2 x ¾ *50 x 20*	2.375 x 1.050 *60.3 x 26.7*	1½ *38*	1⅝ *41*	500 *34.5*	2 1/16 *52*	9/16 *14*	2⅝ *67*	1½ *38*	5½ *140*	3 *76*	½ U-Bolt -	30	40	2.3 *1.0*
2 x 1 *50 x 25*	2.375 x 1.315 *60.3 x 33.7*	1½ *38*	1⅝ *41*	500 *34.5*	1 15/16 *51*	9/16 *14*	2⅝ *67*	1½ *38*	5½ *140*	3 *76*	½ U-Bolt -	30	40	2.6 *1.2*
2 x 1¼ *50 x 32*	2.375 x 1.660 *60.3 x 42.4*	2 *51*	2⅛ *54*	500 *34.5*	2 3/16 *55*	9/16 *14*	2⅞ *73*	1½ *38*	5½ *140*	3½ *89*	½ U-Bolt -	30	40	2.7 *1.2*
2 x 1½ *50 x 40*	2.375 x 1.900 *60.3 x 48.3*	2 *51*	2⅛ *54*	500 *34.5*	2 3/16 *55*	9/16 *14*	2⅞ *73*	1½ *38*	7 *178*	3½ *89*	½ U-Bolt -	30	40	2.5 *1.1*
2½ x ½ *65 x 15*	2.875 x 0.840 *73.0 x 21.3*	1½ *38*	1⅝ *41*	500 *34.5*	2 7/16 *62*	9/16 *14*	2⅞ *73*	1¾ *44*	5½ *140*	3 *76*	½ U-Bolt -	30	40	3.0 *1.4*
2½ x ¾ *65 x 20*	2.875 x 1.050 *73.0 x 26.7*	1½ *38*	1⅝ *41*	500 *34.5*	2 5/16 *59*	9/16 *14*	2⅞ *73*	1¾ *44*	5½ *140*	3 *76*	½ U-Bolt -	30	40	2.9 *1.3*
2½ x 1 *65 x 25*	2.875 x 1.315 *73.0 x 33.7*	1½ *38*	1⅝ *41*	500 *34.5*	2 3/16 *55*	9/16 *14*	2⅞ *73*	1¾ *44*	6⅛ *156*	3 *76*	½ U-Bolt -	30	40	2.9 *1.3*
2½ x 1¼ *65 x 32*	2.875 x 1.660 *73.0 x 42.4*	2 *51*	2⅛ *54*	500 *34.5*	2 7/16 *62*	9/16 *14*	3⅛ *79*	1¾ *44*	6⅛ *156*	3⅜ *86*	½ U-Bolt -	30	40	3.4 *1.5*
2½ x 1½ *65 x 40*	2.875 x 1.900 *73.0 x 48.3*	2 *51*	2⅛ *54*	500 *34.5*	2 7/16 *62*	9/16 *14*	3⅛ *79*	1¾ *44*	6⅛ *156*	3⅜ *86*	½ U-Bolt -	30	40	3.4 *1.5*
3 x ½ *80 x 15*	3.500 x 0.840 *88.9 x 21.3*	1½ *38*	1⅝ *41*	500 *34.5*	2 9/16 *65*	9/16 *14*	3 *76*	2⅛ *54*	7 *178*	3¾ *95*	½ U-Bolt -	30	40	2.8 *1.2*
3 x ¾ *80 x 20*	3.500 x 1.050 *88.9 x 26.7*	1½ *38*	1⅝ *41*	500 *34.5*	2 7/16 *62*	9/16 *14*	3 *76*	2⅛ *54*	7 *178*	3¾ *95*	½ U-Bolt -	30	40	2.7 *1.2*
3 x 1 *80 x 25*	3.500 x 1.315 *88.9 x 33.7*	1½ *38*	1⅝ *41*	500 *34.5*	2 5/16 *59*	9/16 *14*	3 *76*	2⅛ *54*	7 *178*	3¾ *95*	½ U-Bolt -	30	40	2.7 *1.2*
3 x 1¼ *80 x 32*	3.500 x 1.660 *88.9 x 42.4*	2 *51*	2⅛ *54*	500 *34.5*	2 11/16 *68*	1½ *38*	3⅜ *86*	2⅛ *54*	6⅞ *175*	3¾ *95*	½ x 2¾ -	80	100	3.4 *1.5*
3 x 1½ *80 x 40*	3.500 x 1.900 *88.9 x 48.3*	2 *51*	2⅛ *54*	500 *34.5*	2 11/16 *68*	1½ *38*	3⅜ *86*	2⅛ *54*	6⅞ *175*	3¾ *95*	½ x 2¾ -	80	100	4.4 *2.0*
3 x 2 *80 x 50*	3.500 x 2.375 *88.9 x 60.3*	2½ *64*	2⅝ *67*	500 *34.5*	2 11/16 *68*	1½ *38*	3⅜ *86*	2⅛ *54*	6⅞ *175*	4⅛ *105*	½ x 2¾ -	80	100	4.6 *2.1*
4 x ½ *100 x 15*	4.500 x 0.840 *114.3 x 21.3*	1½ *38*	1⅝ *41*	500 *34.5*	3 1/16 *76*	9/16 *14*	3½ *89*	2⅝ *67*	7¾ *197*	3¾ *95*	½ U-Bolt -	30	40	2.9 *1.3*
4 x ¾ *100 x 20*	4.500 x 1.050 *114.3 x 26.7*	1½ *38*	1⅝ *41*	500 *34.5*	3 1/16 *78*	9/16 *14*	3½ *89*	2⅝ *67*	7¾ *197*	3¾ *95*	½ U-Bolt -	30	40	2.8 *1.3*
4 x 1 *100 x 25*	4.500 x 1.315 *114.3 x 33.7*	1½ *38*	1⅝ *41*	500 *34.5*	2 13/16 *73*	9/16 *14*	3½ *89*	2⅝ *67*	7¾ *197*	3¾ *95*	½ U-Bolt -	30	40	2.7 *1.2*
4 x 1¼ *100 x 32*	4.500 x 1.660 *114.3 x 42.4*	2 *51*	2⅛ *54*	500 *34.5*	3 3/16 *81*	1⅞ *48*	3⅞ *98*	2⅝ *67*	7½ *191*	3¾ *95*	½ x 2¾ -	80	100	4.5 *2.0*
4 x 1½ *100 x 40*	4.500 x 1.900 *114.3 x 48.3*	2 *51*	2⅛ *54*	500 *34.5*	3 3/16 *81*	1⅞ *48*	3⅞ *98*	2⅝ *67*	7½ *191*	3¾ *95*	½ x 2¾ -	80	100	4.6 *2.1*

NOTE: 2½", 5" and 6" Nominal size run pipe may be used on 3" O.D., 5½" O.D. and 6½" O.D. pipe.

▲ – Working Pressure Ratings are for reference only and based on Sch. 40 pipe. For the latest UL/ULC, FM, VdS and LPCB pressure ratings versus pipe schedule, please visit anvilintl.com or contact your local Anvil Representative.

Not for use in copper systems.

§ – For additional Bolt Torque information, see Technical Data Section.
(Additional larger sizes on next page)

FIG. 7045 Clamp-T®, FPT Branch

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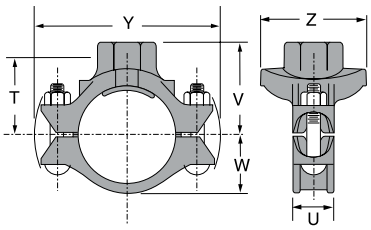


Fig. 7045

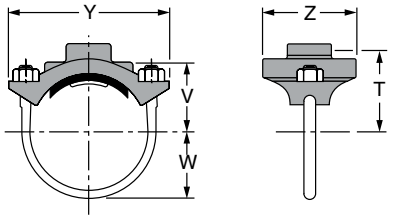


Fig. 7045 (U-Bolt)

⚠ WARNING

For dry pipe systems and freezer applications lubrication of the gasket is required, Gruvlok® Xtreme™ Lubricant is required.

FIGURE 7045 FPT BRANCH (CONTINUED FROM PREVIOUS PAGE)

Nominal Size	O.D.	Hole Dimensions		Max. Working Pressure▲	Clamp-T Dimensions						Bolt Size	Specified Torque §		Approx. Wt. Ea.
		Min. Diameter	Max. Diameter		T	U	V Threaded	W	Y	Z		Min.	Max.	
In./DN(mm)	*In./mm*	*In./mm*	*In./mm*	*PSI/bar*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*Ft.-Lbs./N-m*		*Lbs./Kg*
4 x 2	4.500 x 2.375	2½	2⅝	500	3 5/16	1⅞	4	2⅝	7½	4⅛	½ x 2¾	80	100	7.7
100 x 50	*114.3 x 60.3*	*64*	*67*	*34.5*	*84*	*48*	*102*	*67*	*191*	*105*	-			*3.5*
4 x 2½	4.500 x 2.875	2¾	2⅞	500	3 11/16	1⅞	4	2⅝	7½	4⅜	½ x 2¾	80	100	5.2
100 x 65	*114.3 x 73.0*	*70*	*73*	*34.5*	*78*	*48*	*102*	*67*	*191*	*111*	-			*2.4*
4 x 3 O.D.	*4.500 x 2.996*	*2¾*	*2⅞*	*500*	*3*	*1⅞*	*4*	*2⅝*	*7½*	*4⅜*	*½ x 2¾*	*80*	*100*	*5.2*
100 x 80	114.3 x 76.1	70	73	34.5	76	48	102	67	191	111	-			2.4
4 x 3	4.500 x 3.500	3½	3⅝	500	3¼	1⅞	4¼	2⅝	7½	5¼	½ x 3½	80	100	6.5
100 x 80	*114.3 x 88.9*	*89*	*92*	*34.5*	*83*	*48*	*108*	*67*	*191*	*133*	-			*2.9*
5 x 1¼	5.563 x 1.660	2	2⅛	500	3 11/16	1⅞	4⅜	3¼	9⅛	3¾	⅝ x 3¼	100	130	5.4
125 x 32	*141.3 x 42.4*	*51*	*54*	*34.5*	*94*	*48*	*111*	*83*	*232*	*95*	-			*2.4*
5 x 1½	5.563 x 1.900	2	2⅛	500	3 11/16	1⅞	4⅜	3¼	9⅛	3¾	⅝ x 3¼	100	130	5.5
125 x 40	*141.3 x 48.3*	*51*	*54*	*34.5*	*94*	*48*	*111*	*83*	*232*	*95*	-			*2.5*
5 x 2	5.563 x 2.375	2½	2⅝	500	3 13/16	1⅞	4½	3¼	9⅛	4⅛	⅝ x 3¼	100	130	5.7
125 x 50	*141.3 x 60.3*	*64*	*67*	*34.5*	*97*	*48*	*114*	*83*	*232*	*105*	-			*2.6*
5 x 2½	5.563 x 2.875	2¾	2⅞	500	3 13/16	1⅞	4¾	3¼	9⅛	4⅜	⅝ x 3¼	100	130	7.0
125 x 65	*141.3 x 73.0*	*70*	*73*	*34.5*	*97*	*48*	*121*	*83*	*232*	*111*	-			*3.2*
5 x 3 O.D.	*5.563 x 2.996*	*2¾*	*2⅞*	*500*	*3¾*	*1⅞*	*4¾*	*3¼*	*9⅛*	*4⅜*	*⅝ x 3¼*	*130*	*180*	*7.0*
125 x 80	141.3 x 76.1	70	73	34.5	95	48	121	83	232	111	-			3.2
5 x 3	5.563 x 3.500	3½	3⅝	500	4	1⅞	5	3¼	9⅛	5¼	⅝ x 3¼	100	130	8.7
125 x 80	*141.3 x 88.9*	*89*	*92*	*34.5*	*102*	*48*	*127*	*83*	*232*	*133*	-			*3.9*
6 x 1¼	6.625 x 1.660	2	2⅛	500	4 3/16	2	4⅞	3⅜	10⅛	3¾	⅝ x 4¼	100	130	7.8
150 x 32	*168.3 x 42.4*	*51*	*54*	*34.5*	*106*	*51*	*124*	*98*	*257*	*95*	-			*3.5*
6 x 1½	6.625 x 1.900	2	2⅛	500	4 3/16	2	4⅞	3⅜	10⅛	3¾	⅝ x 4¼	100	130	7.8
150 x 40	*168.3 x 48.3*	*51*	*54*	*34.5*	*106*	*51*	*124*	*98*	*257*	*95*	-			*3.5*
6 x 2	6.625 x 2.375	2½	2⅝	500	4 3/16	2	4⅞	3⅜	10⅛	4⅛	⅝ x 4¼	100	130	7.8
150 x 50	*168.3 x 60.3*	*64*	*67*	*34.5*	*106*	*51*	*124*	*98*	*257*	*105*	-			*3.5*
6 x 2½	6.625 x 2.875	2¾	2⅞	500	4 3/16	2	5⅛	3⅜	10⅛	4⅜	⅝ x 4¼	100	130	8.4
150 x 65	*168.3 x 73.0*	*70*	*73*	*34.5*	*106*	*51*	*130*	*98*	*257*	*111*	-			*3.8*
6 x 3 O.D.	*6.625 x 2.996*	*2¾*	*2⅞*	*500*	*4⅛*	*2*	*5⅛*	*3⅜*	*10⅛*	*4⅜*	*⅝ x 4¼*	*100*	*130*	*8.4*
150 x 80	168.3 x 76.1	70	73	34.5	105	51	130	98	257	111	-			3.8
6 x 3	6.625 x 3.500	3½	3⅝	500	4⅜	2	5⅜	3⅜	10⅛	5¼	⅝ x 4¼	100	130	9.6
150 x 80	*168.3 x 88.9*	*89*	*92*	*34.5*	*111*	*51*	*137*	*98*	*257*	*133*	-			*4.4*
6 x 4	6.625 x 4.500	4½	4⅝	500	4⅜	2	5½	3⅜	10⅛	6½	⅝ x 4¼	100	130	10.5
150 x 100	*168.3 x 114.3*	*114*	*117*	*34.5*	*111*	*51*	*140*	*98*	*257*	*165*	-			*4.8*
8 x 2	8.625 x 2.750	2½	2⅝	500	5 5/16	2¼	5⅞	5	12¾	4⅛	¾ x 4¼	130	180	11.3
200 x 50	*219.1 x 70.0*	*64*	*67*	*34.5*	*132*	*57*	*149*	*127*	*324*	*105*	-			*5.1*
8 x 2½	8.625 x 2.875	2¾	2⅞	500	5 5/16	2¼	6¼	5	12¾	4⅜	¾ x 4½	130	180	11.1
200 x 65	*219.1 x 73.0*	*70*	*73*	*34.5*	*134*	*57*	*159*	*127*	*324*	*111*	-			*5.0*
8 x 3 O.D.	*8.625 x 2.996*	*2¾*	*2⅞*	*500*	*5¼*	*2¼*	*6¼*	*5*	*12¾*	*4⅜*	*¾ x 4½*	*130*	*180*	*11.1*
200 x 80	219.1 x 76.1	70	73	34.5	133	57	159	127	324	111	-			5.0
8 x 3	8.625 x 3.500	3½	3⅝	500	5⅜	2¼	6⅜	5	12¾	5¼	¾ x 4½	130	180	13.0
200 x 80	*219.1 x 88.9*	*89*	*92*	*34.5*	*137*	*57*	*162*	*127*	*324*	*133*	-			*5.9*
8 x 4	8.625 x 4.500	4½	4⅝	500	5⅜	2¼	6½	5	12¾	6½	¾ x 4½	130	180	16.2
200 x 100	*219.1 x 114.3*	*114*	*117*	*34.5*	*137*	*57*	*165*	*127*	*324*	*165*	-			*7.3*

NOTE: 2½", 5" and 6" Nominal size run pipe may be used on 3" O.D., 5½" O.D. and 6½" O.D. pipe.

§ – For additional Bolt Torque information, see Technical Data Section.

▲ – Working Pressure Ratings are for reference only and based on Sch. 40 pipe. For the latest UL/ULC, FM, VdS and LPCB pressure ratings versus pipe schedule, please visit anvilintl.com or contact your local Anvil Representative.

Not for use in copper systems.

FIG. 7046 Clamp-T®, Grooved Branch

GRUVLOK®

The Gruvlok® Clamp-T provides a quick and easy outlet at any location along the pipe. A hole drilled or cut in the pipe to receive the locating collar of the Clamp-T is all that is required. The full, smooth outlet area provides for optimum flow characteristics.

The Clamp-T housing is specially engineered to conform to the pipe O.D. and the Clamp-T gasket providing a leak tight reliable seal in both positive pressure and vacuum conditions. The maximum working pressure for all sizes is 500 PSI (34.5 bar) when assembled on standard wall steel pipe. For the latest UL/ULC listed, LPCB, VdS and FM Approved pressure ratings versus pipe schedule, see www.anvilintl.com or contact your local Anvil Representative.

The Gruvlok Clamp-T provides for a branch or cross connection in light wall or standard wall steel pipe.

Clamp-T cross connections are available in most sizes allowing greater versatility in piping design.

CLAMP-T FLOW DATA (FRICTIONAL RESISTANCE)

Branch Size	Fig. 7046 Grooved Branch	
	C.V. Value	Equiv. Pipe Length
In./DN(mm)		*Ft./m*
1 1/4 *32*	5.4 -	5.0 *1.5*
1 1/2 *40*	95 -	3.5 *1.1*
2 *50*	148 -	4.5 *1.4*
2 1/2 *65*	205 -	7.0 *2.1*
3 *80*	294 -	9.5 *2.9*
4 *100*	571 -	7.0 *2.1*

c UL us LISTED FM APPROVED LPCB VdS

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

– Available galvanized.

MATERIAL SPECIFICATIONS

HOUSING:
Ductile Iron conforming to ASTM A-536, Grade 65-45-12

ANSI BOLTS & HEAVY HEX NUTS:
Heat treated, oval neck track head bolts conforming to ASTM A-183 Grade 2 with a minimum tensile strength of 110,000 psi and heavy hex nuts of carbon steel conforming to ASTM A-563 Grade A or Grade B, or J995 Grade 2. Bolts and nuts are provided zinc electroplated as standard.

METRIC BOLTS & HEAVY HEX NUTS:
Heat treated, zinc electroplated oval-neck track head bolts made of carbon steel with mechanical properties per ISO 898-1 Class 8.8. Hex nuts and bolts are zinc electroplated followed by a yellow chromate dip.

U-BOLT:
Cold drawn steel and zinc plated.

COATINGS:
☐ Rust inhibiting paint Color: ORANGE (standard)
☐ Hot Dipped Zinc Galvanized (optional)
☐ Other available options: Example: RAL3000 or RAL9000 Series
For other coating requirements contact an Anvil Representative.

LUBRICATION:
☐ Standard Gruvlok
☐ Gruvlok Xtreme™ required for dry pipe systems and freezer applications.

GASKETS: Materials
Properties as designated in accordance with ASTM D-2000.

☐ **Grade "E" EPDM** (Green color code)
-40°F to 230°F (Service Temperature Range)(-40°C to 110°C)
Recommended for water service, diluted acids, alkalies solutions, oil-free air and many chemical services.
NOT FOR USE IN PETROLEUM APPLICATIONS.

☐ **Grade "EP" EPDM** (Green and Red color code)
-40°F to 250°F (Service Temperature Range)(-40°C to 121°C)
Recommended for water service, diluted acids, alkalies solutions, oil-free air and many other chemical services.
NOT FOR USE IN PETROLEUM APPLICATIONS.

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

FIG. 7046 Clamp-T®, Grooved Branch

GRUVLOK®

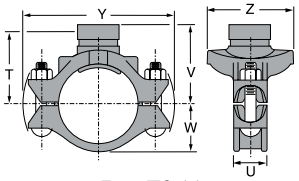


Fig. 7046

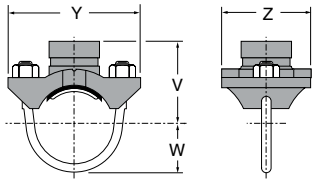


Fig. 7046 (U-Bolt)

⚠ WARNING

For dry pipe systems and freezer applications lubrication of the gasket is required, Gruvlok® Xtreme™ Lubricant is required.

FIGURE 7046-GR BRANCH

Nominal Size	O.D.	Hole Dimensions		Max. Working Pressure▲	Clamp-T Dimensions					Bolt* Size	Specified Torque §		Approx. Wt. Ea.
		Min. Diameter	Max. Diameter		U	V Grooved	W	Y	Z		Min.	Max.	
In./DN(mm)	*In./mm*	*In./mm*	*In./mm*	*PSI/bar*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*Ft.-Lbs./N-m*		*Lbs./Kg*
2½ x 1¼•	2.875 x 1.660	2	2⅛	500	9/16	3⅛	1¾	6⅛	3½	½ U-Bolt	30	40	3.4
65 x 32	*73.0 x 42.4*	*51*	*54*	*34.5*	*14*	*79*	*44*	*156*	*89*	-			*1.5*
2½ x 1½	2.875 x 1.900	2	2⅛	500	9/16	3⅛	1¾	6⅛	3½	½ U-Bolt	30	40	3.4
65 x 40	*73.0 x 48.3*	*51*	*54*	*34.5*	*14*	*79*	*44*	*156*	*89*	-			*1.5*
3 x 1¼	3.500 x 1.660	2	2⅛	500	1½	3½	2⅛	6⅞	3¾	½ x 2¾	80	100	3.4
80 x 32	*88.9 x 42.4*	*51*	*54*	*34.5*	*38*	*89*	*54*	*175*	*95*	-			*1.5*
3 x 1½	3.500 x 1.900	2	2⅛	500	1½	3½	2⅛	6⅞	3¾	½ x 2¾	80	100	4.4
80 x 40	*88.9 x 48.3*	*51*	*54*	*34.5*	*38*	*89*	*54*	*175*	*95*	-			*2.0*
3 x 2	3.500 x 2.375	2½	2⅝	500	1½	3½	2⅛	6⅞	4⅛	½ x 2¾	80	100	4.6
80 x 50	*88.9 x 60.3*	*64*	*67*	*34.5*	*38*	*89*	*54*	*175*	*105*	-			*2.1*
4 x 1¼	4.500 x 1.660	2	2⅛	500	1⅞	4	2⅝	7½	3¾	½ x 2¾	80	100	4.2
100 x 32	*114.3 x 42.4*	*51*	*54*	*34.5*	*48*	*102*	*67*	*191*	*95*	-			*1.9*
4 x 1½	4.500 x 1.900	2	2⅛	500	1⅞	4	2⅝	7½	3¾	½ x 2¾	80	100	4.3
100 x 40	*114.3 x 48.3*	*51*	*54*	*34.5*	*48*	*102*	*67*	*191*	*95*	-			*2.0*
4 x 2	4.500 x 2.375	2½	2⅝	500	1⅞	4	2⅝	7½	4⅛	½ x 2¾	80	100	4.6
100 x 50	*114.3 x 60.3*	*64*	*67*	*34.5*	*48*	*102*	*67*	*191*	*105*	-			*2.1*
4 x 2½	4.500 x 2.875	2¾	2⅞	500	1⅞	4	2⅝	7½	4⅜	½ x 2¾	80	100	5.0
100 x 65	*114.3 x 73.0*	*70*	*73*	*34.5*	*48*	*102*	*67*	*191*	*111*	-			*2.3*
4 x 3 O.D.	*4.500 x 2.996*	*2¾*	*2⅞*	*500*	*1⅞*	*4*	*2⅝*	*7½*	*4⅜*	*½ x 2¾*	*80*	*100*	*5.0*
100 x 80	114.3 x 76.1	70	73	34.5	48	102	67	191	111	-			2.3
4 x 3	4.500 x 3.500	3½	3⅝	500	1⅞	4	2⅝	7½	5¼	½ x 3½	80	100	5.6
100 x 80	*114.3 x 88.9*	*89*	*92*	*34.5*	*48*	*102*	*67*	*191*	*133*	-			*2.5*
5 x 1¼	5.563 x 1.660	2	2⅛	500	1⅞	4¼	3¼	9⅛	3¾	½ x 2¾	80	100	5.6
125 x 32	*141.3 x 42.4*	*51*	*54*	*34.5*	*48*	*108*	*83*	*232*	*95*	-			*2.5*
5 x 1½	5.563 x 1.900	2	2⅛	500	1⅞	4¼	3¼	9⅛	3¾	⅝ x 3¼	100	130	5.6
125 x 40	*141.3 x 48.3*	*51*	*54*	*34.5*	*48*	*108*	*83*	*232*	*95*	-			*2.5*
5 x 2	5.563 x 2.375	2½	2⅝	500	1⅞	4¼	3¼	9⅛	4⅛	⅝ x 3¼	100	130	5.5
125 x 50	*141.3 x 60.3*	*64*	*67*	*34.5*	*48*	*108*	*83*	*232*	*105*	-			*2.5*
5 x 2½	5.563 x 2.875	2¾	2⅞	500	1⅞	4¼	3¼	9⅛	4⅜	⅝ x 3¼	100	130	5.8
125 x 65	*141.3 x 73.0*	*70*	*73*	*34.5*	*48*	*108*	*83*	*232*	*111*	-			*2.6*
5 x 3	5.563 x 3.500	3½	3⅝	500	1⅞	4⅝	3¼	9⅛	5¼	⅝ x 3¼	100	130	7.1
125 x 80	*141.3 x 88.9*	*89*	*92*	*34.5*	*48*	*117*	*83*	*232*	*133*	-			*3.2*
6 x 1½	6.625 x 1.900	2	2⅛	500	2	5	3⅜	10⅛	3¾	⅝ x 4¼	100	130	7.2
150 x 40	*168.3 x 48.3*	*51*	*54*	*34.5*	*51*	*127*	*98*	*257*	*95*	*			*3.3*
6 x 2	6.625 x 2.375	2½	2⅝	500	2	5	3⅜	10⅛	4⅛	⅝ x 4¼	100	130	7.8
150 x 50	*168.3 x 60.3*	*64*	*67*	*34.5*	*51*	*127*	*98*	*257*	*105*	*			*3.5*
6 x 2½	6.625 x 2.875	2¾	2⅞	500	2	5⅛	3⅜	10⅛	4⅜	⅝ x 4¼	100	130	7.6
150 x 65	*168.3 x 73.0*	*70*	*73*	*34.5*	*51*	*130*	*98*	*257*	*111*	*			*3.4*
6 x 3 O.D.	*6.625 x 2.996*	*2¾*	*2⅞*	*500*	*2*	*5⅛*	*3⅜*	*10⅛*	*4⅜*	*⅝ x 4¼*	*100*	*130*	*7.6*
150 x 80	168.3 x 76.1	70	73	34.5	51	130	98	257	111	*			3.4
6 x 3	6.625 x 3.500	3½	3⅝	500	2	5⅛	3⅜	10⅛	5¼	⅝ x 4¼	100	130	8.0
150 x 80	*168.3 x 88.9*	*89*	*92*	*34.5*	*51*	*130*	*98*	*257*	*133*	*			*3.6*
6 x 4	6.625 x 4.500	4½	4⅝	500	2	5¼	3⅜	10⅛	6½	⅝ x 4¼	100	130	10.4
150 x 100	*168.3 x 114.3*	*114*	*117*	*34.5*	*51*	*133*	*98*	*257*	*165*	*			*4.7*
8 x 2	8.625 x 2.375	2½	2⅝	500	2¼	6⅛	5	12¾	4¼	¾ x 4½	130	180	10.4
200 x 50	*219.1 x 60.3*	*64*	*67*	*34.5*	*57*	*156*	*127*	*324*	*108*	-			*4.7*
8 x 2½	8.625 x 2.875	2¾	2⅞	500	2¼	6⅛	5	12¾	4⅜	¾ x 4½	130	180	10.6
200 x 65	*219.1 x 73.0*	*70*	*73*	*34.5*	*57*	*156*	*127*	*324*	*111*	*M20 x 110*	*175*	*245*	*4.8*
8 x 3	8.625 x 3.500	3½	3⅝	500	2¼	6⅛	5	12¾	5¼	¾ x 4½	130	180	11.5
200 x 80	*219.1 x 88.9*	*89*	*92*	*34.5*	*57*	*156*	*127*	*324*	*133*	*M20 x 110*	*175*	*245*	*5.2*
8 x 4	8.625 x 4.500	4½	4⅝	500	2¼	6¼	5	12¾	6½	¾ x 4½	130	180	16.2
200 x 100	*219.1 x 114.3*	*114*	*117*	*34.5*	*57*	*159*	*127*	*324*	*165*	*M20 x 110*	*175*	*245*	*7.3*

NOTE: 2½", 5" and 6" Nominal size run pipe may be used on 3" O.D., 5½" O.D. and 6½" O.D. pipe.

* All bolts and nuts are of track head design and are zinc plated conforming to ASTM B-633.

▲ – Working Pressure Ratings are for reference only and based on Sch. 40 pipe. For the latest UL/ULC, FM, VdS and LPCB pressure ratings versus pipe schedule, please visit anvilintl.com or contact your local Anvil Representative.

Not for use in copper systems.

§ – For additional Bolt Torque information, see Technical Data Section.

• Can not be used in cross configuration.

FIG. 7012* Gruvlok Flange

GRUVLOK®

The Gruvlok® Fig. 7012 Flange allows direct connection of Class 125 or Class 150 flanged components to a grooved piping system. The two interlocking halves of the 2" thru 12" sizes of the Gruvlok Flange are hinged for ease of handling, and are drawn together by a latch bolt which eases assembly on the pipe. Precision machined bolt holes, key and mating surfaces assure concentricity and flatness to provide exact fit-up with flanged, lug, and wafer styles of pipe system equipment. A specially designed gasket provides a leak-tight seal on both the pipe and the mating flange face.

Working pressure ratings shown are for reference only and are based on Schedule 40 pipe. For the latest UL/ULC listed, LPCB, VdS and FM Approved pressure ratings versus pipe schedule, see www.anvilintl.com or contact your local Anvil Representative.

The Gruvlok Fig. 7012 Flange requires the use of a steel adapter insert when used against rubber faced surfaces, wafer/lug design valves and serrated or irregular sealing surfaces. In copper systems a phenolic adapter insert is required, in place of the steel adapter insert. (See Installation and Assembly Instructions Section or contact your Anvil Rep. for details.)

c UL us LISTED · FM APPROVED · LPCB · VdS

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

– Available galvanized.

* When ordering, refer to product as FP7012.

MATERIAL SPECIFICATIONS

HOUSING:
Ductile Iron conforming to ASTM A-536, Grade 65-45-12

LATCH BOLT/NUT (2"-12"):
Heat treated, zinc electroplated, carbon steel oval neck track bolts conforming to ASTM A-183 and zinc electroplated heavy hex nuts of carbon steel conforming to ASTM A-563 Grade A or Grade B, or J995 Grade 2.

METRIC BOLTS & HEAVY HEX NUTS:
Heat treated, zinc electroplated oval-neck track head bolts made of carbon steel with mechanical properties per ISO 898-1 Class 8.8. Hex nuts and bolts are zinc electroplated followed by a yellow chromate dip.

COATINGS:
☐ Rust inhibiting paint Color: ORANGE (standard)
☐ Hot Dipped Zinc Galvanized (optional)
☐ Other available options: Example: RAL3000 or RAL9000 Series
For other coating requirements contact an Anvil Representative.

LUBRICATION:
☐ Standard Gruvlok
☐ Gruvlok Xtreme™ required for dry pipe systems and freezer applications.

GASKETS: Materials
Properties as designated in accordance with ASTM D-2000.

☐ **Grade "E" EPDM** (Green color code)
-40°F to 230°F (Service Temperature Range)(-40°C to 110°C)
Recommended for water service, diluted acids, alkalies solutions, oil-free air and many chemical services.
NOT FOR USE IN PETROLEUM APPLICATIONS.

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

FIG. 7012* Gruvlok Flange

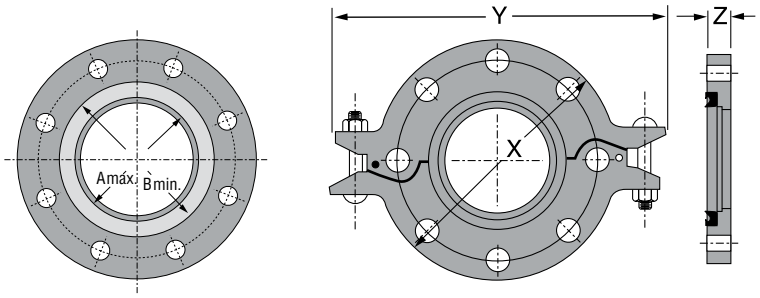


FIGURE 7012 FLANGE: ANSI CLASS 125 & 150

Nominal Size	Pipe O.D.	Max. Working Pressure ▲	Max. End Load ▲	Latch Bolt			Dimensions			Sealing Surface		Mating Flange Bolts				Approx. Wt. Ea.
				Latch Bolt Size*	Specified Torque §		X	Y	Z	A Max.	B Min.	Mating Flange Bolts		Specified Torque §		
					Min.	Max.						Qty.	Size (ANSI)	Min.	Max.	
In./DN(mm)	*In./mm*	*PSI/bar*	*Lbs./kN*	*In./mm*	*Ft.-Lbs/N-m*		*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*		*in. (ISO) mm*	*Ft.-Lbs/N-m*		*Lbs./Kg*
2	2.375	300	1,329	⅜ x 2¾	30	45	6¼	8⅜	¾	2⅜	3⁷⁄₁₆	4	⅝ x 2¾	110	140	4.2
50	*60.3*	*20.7*	*5.91*	*M10 x 70*	*40*	*60*	*159*	*213*	*19*	*60*	*87*	*4*	*M16 x 70*	*149*	*190*	*1.9*
2½	2.875	300	1,948	⅜ x 2¾	30	45	7	9½	¾	2⅞	4	4	⅝ x 2¾	110	140	4.6
65	*73.0*	*20.7*	*8.66*	*M10 x 70*	*40*	*60*	*178*	*241*	*19*	*73*	*102*	-	*M16 x 70*	*149*	*190*	*2.1*
3 O.D.	*2.996*	*300*	*2,115*	-	*30*	*45*	*7¼*	*9¾*	*¾*	*3*	*4⅛*	-	-	*110*	*140*	*4.8*
76.1	76.1	20.7	9.41	M10 x 70	40	60	184	248	19	76	105	4	M16 x 70	149	190	2.2
3	3.500	300	2,886	⅜ x 2¾	30	45	7⅞	10½	¾	3½	4⁹⁄₁₆	4	⅝ x 2¾	110	140	6.0
88.9	*88.9*	*20.7*	*12.84*	*M10 x 70*	*40*	*60*	*200*	*267*	*19*	*89*	*116*	*8*	*M16 x 70*	*149*	*190*	*2.7*
4	4.500	300	4,771	⅜ x 2¾	30	45	9	11½	¾	4½	5⁹⁄₁₆	8	⅝ x 2¾	110	140	6.3
100	*114.3*	*20.7*	*21.22*	*M10 x 70*	*40*	*60*	*229*	*292*	*19*	*114*	*141*	*8*	*M16 x 70*	*149*	*190*	*2.9*
5½ O.D.	*5.500*	*300*	*7,127*	-	*30*	*45*	*9⅞*	*12⅞*	*⅞*	*5⁹⁄₁₆*	*6¾*	-	-	*220*	*250*	*15.6*
139.7	139.7	20.7	31.70	M10 x 70	40	60	251	327	22	141	171	8	M16 x 75	298	339	7.1
5	5.563	300	7,292	⅜ x 2¾	30	45	10	12½	⅞	5⁹⁄₁₆	6¾	8	¾ x 2⅞	220	250	8.8
125	*141.3*	*20.7*	*32.44*	*M10 x 70*	*40*	*60*	*254*	*318*	*22*	*141*	*171*	-	-	*298*	*339*	*4.0*
6½ O.D.	*6.500*	*300*	*9,955*	-	*30*	*45*	*11¼*	*14*	*⅞*	*6⅝*	*7¹³⁄₁₆*	-	-	*220*	*250*	*9.7*
165.1	165.1	20.7	44.28	M10 x 70	40	60	286	356	22	168	198	8	M20 x 80	298	339	4.4
6	6.625	300	10,341	⅜ x 2¾	30	45	11	14	⅞	6⅝	7¹³⁄₁₆	8	¾ x 3⅛	220	250	9.6
150	*168.3*	*20.7*	*46.00*	*M10 x 70*	*40*	*60*	*279*	*356*	*22*	*168*	*198*	*8*	*M20 x 80*	*298*	*339*	*4.4*
8	8.625	300	17,528	⅜ x 2¾	30	45	13½	16½	1	8⅝	10	8	¾ x 3¼	220	250	15.6
200	*219.1*	*20.7*	*77.97*	*M10 x 70*	*40*	*60*	*343*	*419*	*25*	*219*	*254*	*8 (12)*	*M20 x 80*	*298*	*339*	*7.1*
10	10.750	300	27,229	⅜ x 2¾	30	45	16	19	1	10¾	12⅛	12	⅞ x 3½	320	400	18.2
250	*273.1*	*20.7*	*121.12*	*M10 x 70*	*40*	*60*	*406*	*483*	*25*	*273*	*308*	*12*	*M20 x 90*	*439*	*542*	*8.3*
12	12.750	300	38,303	⅜ x 2¾	30	45	19	21¾	1¼	12¾	14⅛	12	⅞ x 3¾	320	400	29.9
300	*323.9*	*20.7*	*170.38*	*M10 x 70*	*40*	*60*	*483*	*552*	*32*	*324*	*359*	*12*	-	*439*	*542*	*13.6*

+ PN 16 uses M24 x 90 (PN) Dimensions for bolt circle PN 10 & 16 Flange.

* Available in ANSI or metric bolt sizes only as indicated.

▲ – Working Pressure Ratings are for reference only and based on Sch. 40 pipe.For the latest UL/ULC, FM, VdS and LPCB pressure ratings versus pipe schedule, please visit anvilintl.com or contact your local Anvil Representative.

§ – For additional Bolt Torque information, see Technical Data Section.

The Gruvlok Flange bolt hole pattern conforms to ANSI Class 150 and Class 125 flanges.

To avoid interference issues, flanges cannot be assembled directly to Series 7700 butterfly valve. Flange can be assembled to one side of series 7500 and 7600 valve only.

Mating flange bolts must be at least Intermediate Strength Bolting per ASME B16.5. Bolts with material properties equal or greater than SAE J429 Grade 5 are acceptable.

Refer to the Gruvlok Product Catalog or Anvil's web site for more information on installing this flange.

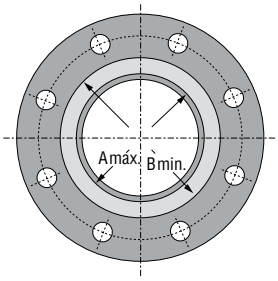
300 Lb Flange is available, Fig. 7013, see Gruvlok Catalog or contact your Anvil Rep. for more information.

Other sizes available, contact an Anvil Representative.

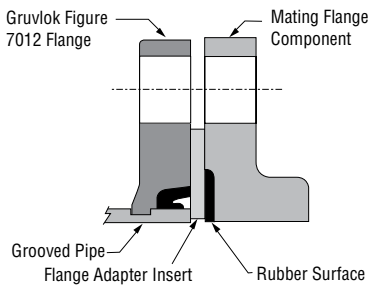
⚠ WARNING

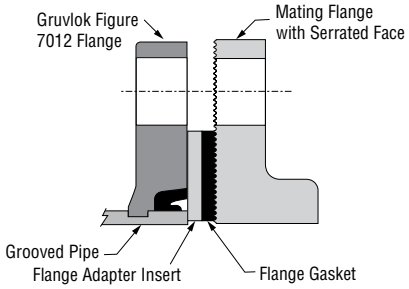
For dry pipe systems and freezer applications lubrication of the gasket is required, Gruvlok® Xtreme™ Lubricant is required.

FIG. 7012* Gruvlok Flange



Mating Flange





A. The sealing surfaces A Max. to B Min. of the mating flange must be free from gouges, undulations and deformities of any type to ensure proper sealing of the gasket.

B. Gruvlok Flanges are to be assembled on butterfly valves so as not to interfere with actuator or handle operation.

C. Do not use Gruvlok Flanges within 90 degrees of one another on standard fittings because the outside dimensions may cause interference.

D. Gruvlok Flanges should not be used as anchor points for tie-rods across non-restrained joints.

E. Fig. 7012 Gruvlok Flange sealing gaskets require a hard flat surface for adequate sealing. The use of a Gruvlok Flange Adapter Insert is required for applications against rubber faced valves or other equipment. The Gruvlok Flange Adapter Insert is installed between the Gruvlok Flange sealing gasket and the mating flange or surface to provide a good sealing surface area.

F. Gruvlok Flanges are not recommended for use against formed rubber flanges.

G. An additional bolt is recommended for the hinge side of the 2″ - 12″ Figure 7012 when connecting to lug valves.

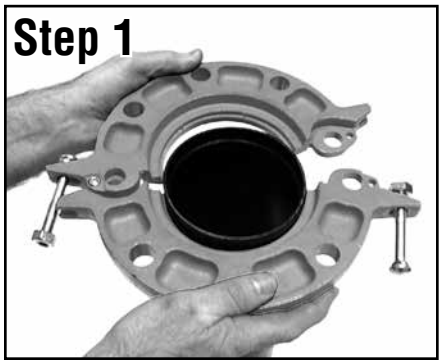
H. Contact an Anvil Representative for Di-Electric Flange connections.

Applications which require a Gruvlok Flange Adapter Insert:

1. When mating to a wafer valve (lug valve), if the valve is rubber faced in the area designated by the sealing surface dimensions (A Max. to B Min.), place the Gruvlok Flange Adapter Insert between the valve and the Gruvlok flange.
2. When mating to a rubber-faced metal flange, the Gruvlok Flange Adapter Insert is placed between the Gruvlok Flange and the rubber-faced flange.
3. When mating to a serrated flange surface, a standard full-faced flange gasket is installed against the serrated flange face and the Gruvlok Flange Adapter Insert is placed between the Gruvlok Flange and the standard Flange gasket.
4. When mating to valves or other component equipment where the flange face has an insert, use procedure described in note 3.

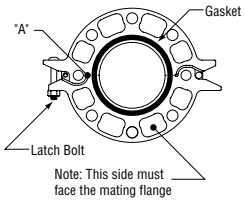
FIG. 7012 Gruvlok Flange

ALWAYS USE A GRUVLOK® SPF/ANVIL™ LUBRICANT FOR PROPER COUPLING ASSEMBLY. Thorough lubrication of the external surface of the gasket is essential to prevent pinching and possible damage to the gasket. For temperatures above 150°F (65˚C) and below 32°F (0˚C) use Gruvlok® SPF/Anvil™ Xtreme Lubricant™ and lubricate all gasket surfaces, internal and external. See Gruvlok SPF/Anvil Lubricants in the Technical Data section of the Anvil SPF catalog for additional important information. **Check pipe end for proper grooved dimensions and to assure that the pipe end is free of indentations and projections that would prevent proper sealing of the Gruvlok flange gasket.**



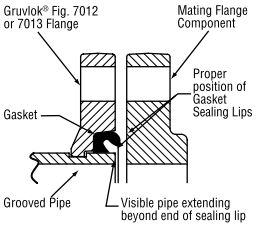
1 On the side without the hinge pin, loosen the latch bolt nut to the end of the bolt thread. (It is not necessary to remove the nut from the latch bolt.) Swing the latch bolt out of the slot. Open the Gruvlok Flange and place around the grooved pipe end with the key section fitting into the groove. The flange gasket cavity must face the pipe end.

2 Place the latch bolt back into the slotted hole. Tighten the nut until there is a 1/16" gap between the flange halves at location "A". (See Figure below)



3 Check the gasket to assure that it is properly suited for the intended service. Lubricate the entire exterior surface of the gasket, including the sealing lips, using the proper Gruvlok lubricant.

4 Stretch the Gruvlok gasket around the pipe end and then press the gasket into the cavity between the pipe O.D. and the flange. The gasket must be properly positioned as shown in the figure below.



5 With the gasket in place apply lubricant to the exposed gasket tip, which will seal on the mating flange. **Tighten the nuts on the latch bolts alternately to the specified latch bolt torque. The flange housings must be in firm metal-to-metal contact.**

⚠ WARNING

The Gruvlok Flange gasket must be inserted so that the sealing lips face toward the pipe end and the mating flange. The lip of the gasket, sealing on the pipe, should not extend beyond the pipe end. The pipe should extend out beyond the end of the sealing lip by approximately 1/8" on the 2"-6" sizes and 3/16" on the 8"-12" sizes.

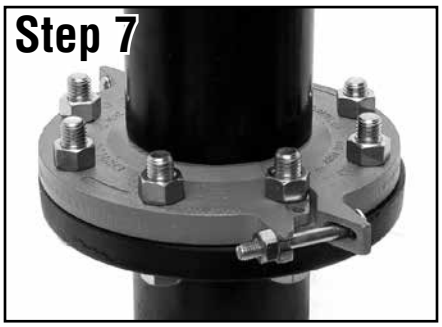
Step 6

6 Verify that the mating flange face is hard, flat and smooth, free of indentations, which would prevent proper sealing of the Gruvlok Flange gasket. Assure the gasket is still in the proper position and align Gruvlok Flange bolt holes with the mating flange, pump, tank, etc., bolt holes.

⚠ WARNING

It is important to line up the bolt holes before bringing the two flanges together. Sliding the flanges into place will dislodge the gasket and cause leakage to occur. When using a flange insert, it is important that the insert is properly aligned with the gasket prior to tightening the bolts.

Step 7



7 Insert a flange bolt or stud with material properties of SAE J429 Grade 5 or higher through the bolt holes and thread a nut on hand tight. Continue this procedure until all bolt holes have been fitted. Tighten the nuts alternately and evenly so the flange faces remain parallel. All the bolts or studs must be torqued to the mating flange bolts specified torque. The flange faces should have metal-to-metal contact.

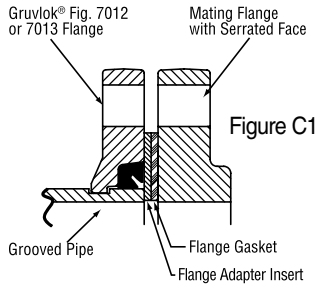


Figure C1

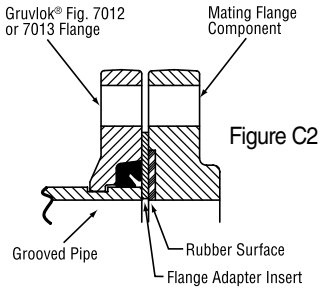


Figure C2

Note: The Gruvlok Fig. 7012 Flange requires the use of a Flange Adapter Insert when used against rubber surfaces (Figure C1), serrated flange surfaces or mating flanges with inserts (Figure C2). The Flange Adapter Insert will be exposed to the fluids in the system. Ensure that the Insert is compatible with the fluids in the systems and with adjacent piping components.

⚠ WARNING

Do not use a steel Flange Adapter Insert in copper systems or in systems where galvanic corrosion is possible.

Specified Bolt Torque for Latch and Mating Flange Bolts

Specified bolt torque is for the latch and mating flange bolts used on Gruvlok® flanges. The nuts must be tightened alternately and evenly until fully tightened. **Caution:** Use of an impact wrench is not recommended because the torque output can vary significantly due to many variables including air pressure supply, battery strength and operational variations.

Caution: Proper torquing of latch and mating flange bolts is required to obtain specified performance. **Over torquing the bolts may result in damage to the bolt and/or casting which could result in pipe joint separation.** Under torquing the bolts may result in lower pressure retention capabilities, lower bend load capabilities, joint leakage and pipe joint separation. Pipe joint separation may result in significant property damage and serious injury.

Note: For VDS approved applications, please refer to data sheet VDSGruv: "VDS – Roll Grooving Approval Specifications" in the Technical Data/Installation Instruction Section at www.anvilintl.com.

ANSI/METRIC SPECIFIED LATCH BOLT TORQUE

Bolt Size	Wrench Size	Specified Bolt Torque *
In./mm	*In./mm*	*Ft.-Lbs/N-M*
3/8 *M10*	1 1/16 *16*	30-45 *40-60*
1/2 –	7/8 –	80-100 –
5/8 –	1 1/16 –	100-130 –
3/4 –	1 1/4 –	130-180 –
7/8 –	1 7/16 –	180-220 –

* Non-lubricated bolt torques.

ANSI/METRIC SPECIFIED MATING FLANGE BOLT TORQUE

Bolt Size	Wrench Size	Specified Bolt Torque *
In./mm	*In./mm*	*Ft.-Lbs/N-M*
5/8 *M16*	1 1/16 *24*	110-140 *149-190*
3/4 *M20*	1 1/4 *30*	220-250 *298-339*
7/8 *M24*	1 7/16 *36*	320-400 *434-542*
1 –	1 5/8 –	360-520 –
1 1/8 –	1 13/16 –	450-725 –
1 1/4 –	2 –	620-1000 –

* Non-lubricated bolt torques.

90° ELBOW

- Approved By UL, ULC and FM at 300 psi
- Cast Iron ASTM A 126 Class B.
- NPT Thread per ANSI/ASME B1.20.1.
- Dimension per ASME B16.4
- Marked with SPD
- For current listing/approval details contact a Titus representative

Nominal Size	Pressure	Dimension		Unit WT
in/mm	PSI/MPa	A	B	LB/KGS
1	300	1.50	1.50	0.90
25	2065	38.1	38.1	0.41
1-1/4	300	1.75	1.75	1.39
32	2065	44.45	44.45	0.63
1-1/2	300	1.94	1.94	1.83
40	2065	49.27	49.27	0.83
2	300	2.25	2.25	3.10
50	2065	57.15	57.15	1.41
2-1/2	300	2.70	2.70	4.80
65	2065	68.58	68.58	2.18

90° REDUCED ELBOW

- Approved By UL, ULC and FM at 300 psi
- Cast Iron ASTM A 126 Class B.
- NPT Thread per ANSI/ASME B1.20.1.
- Dimension per ASME B16.4
- Marked with SPD
- For current listing/approval details contact a Titus representative

Nominal Size in/mm	Pressure PSI/MPa	Dimension		Unit WT LB/KGS
		A	B	
1×1/2	300	1.26	1.36	0.68
25×15	2065	32.0	34.5	0.31
1×3/4	300	1.37	1.45	0.77
25×20	2065	34.80	36.83	0.35
1-1/4×1/2	300	1.34	1.53	0.97
32×15	2065	34.04	38.86	0.44
1-1/4×3/4	300	1.45	1.62	1.08
32×20	2065	36.83	41.15	0.49
1-1/4×1	300	1.58	1.67	1.19
32×25	2065	40.13	42.42	0.54
1-1/2×1/2	300	1.41	1.66	1.17
40×15	2065	35.8	42.2	0.53
1-1/2×3/4	300	1.52	1.75	1.30
40×20	2065	38.61	44.45	0.59
1-1/2×1	300	1.65	1.80	1.43
40×25	2065	41.91	45.72	0.65
1-1/2×1/-1/4	300	1.82	1.88	1.65
40×32	2065	46.23	47.75	0.75
2×1/2	300	1.49	1.88	1.72
50×15	2065	37.85	47.75	0.78
2×3/4	300	1.60	1.97	1.85
50×20	2065	40.6	50.0	0.84
2×1	300	1.73	2.02	2.00
50×25	2065	43.94	51.31	0.91
2×1-1/4	300	1.90	2.10	2.31
50×32	2065	48.26	53.34	1.05
2×1-1/2	300	2.02	2.16	2.53
50×40	2065	51.31	54.86	1.15

45° ELBOW

- Approved By UL, ULC and FM at 300 psi
- Cast Iron ASTM A 126 Class B.
- NPT Thread per ANSI/ASME B1.20.1.
- Dimension per ASME B16.4
- Marked with SPD
- For current listing/approval details contact a Titus representative

Nominal Size in/mm	Pressure PSI/MPa	Dimension		Unit WT LB/KGS
		A	B	
1	300	1.120	1.120	0.81
25	2065	28.448	28.448	0.37
1-1/4	300	1.290	1.290	1.23
32	2065	32.766	32.766	0.56
1-1/2	300	1.430	1.430	1.65
40	2065	36.322	36.322	0.75
2	300	1.680	1.680	2.68
50	2065	42.672	42.672	1.22

REDUCED COUPLING

- Approved By UL, ULC and FM at 300 psi
- Cast Iron ASTM A 126 Class B.
- NPT Thread per ANSI/ASME B1.20.1.
- Dimension per ASME B16.4
- Marked with SPD
- For current listing/approval details contact a Titus representative

Nominal Size in/mm	Pressure PSI/MPa	Dimension A	Unit WT LB/KGS
1×1/2	300	1.70	0.616
25×15	2065	43.18	0.28
1×3/4	300	1.70	0.684
25×20	2065	43.18	0.311

CROSS

- Approved By UL, ULC and FM at 300 psi
- Cast Iron ASTM A 126 Class B.
- NPT Thread per ANSI/ASME B1.20.1.
- Dimension per ASME B16.4
- Marked with SPD
- For current listing/approval details contact a Titus representative

Nominal Size in/mm	Pressure PSI/MPa	Dimension		Unit WT LB/KGS
		A	B	
1	300	1.50	1.50	1.60
25	2065	38.1	38.1	0.73
1-1/4	300	1.75	1.75	2.64
32	2065	44.45	44.45	1.20
1-1/2	300	1.94	1.94	2.99
40	2065	49.27	49.27	1.36
2	300	2.25	2.25	4.80
50	2065	57.15	57.15	2.18

REDUCED CROSS

- Approved By UL, ULC and FM at 300 psi
- Cast Iron ASTM A 126 Class B.
- NPT Thread per ANSI/ASME B1.20.1.
- Dimension per ASME B16.4
- Marked with SPD
- For current listing/approval details contact a Titus representative

Nominal Size in/mm	Pressure PSI/MPa	Dimension		Unit WT LB/KGS
		A	B	
1-1/4×1	300	1.58	1.67	1.89
32×25	2065	40.13	42.42	0.86
1-1/2×1	300	1.65	1.80	2.27
40×25	2065	41.91	45.72	1.03
2×1	300	1.73	2.02	2.99
50×25	2065	43.94	51.31	1.36

TEE

- Approved By UL, ULC and FM at 300 psi
- Cast Iron ASTM A 126 Class B.
- NPT Thread per ANSI/ASME B1.20.1.
- Dimension per ASME B16.4
- Marked with SPD
- For current listing/approval details contact a Titus representative

Nominal Size in/mm	Pressure PSI/MPa	Dimension		Unit WT LB/KGS
		A	B	
1	300	1.50	1.50	1.25
25	2065	38.10	38.10	0.57
1-1/4	300	1.75	1.75	1.91
32	2065	44.45	44.45	0.87
1-1/2	300	1.94	1.94	2.55
40	2065	49.27	49.27	1.16
2	300	2.25	2.25	3.96
50	2065	57.15	57.15	1.80
2-1/2	300	2.70	2.70	6.38
65	2065	68.58	68.58	2.90

REDUCED TEE

- Approved By UL, ULC and FM at 300 psi
- Cast Iron ASTM A 126 Class B.
- NPT Thread per ANSI/ASME B1.20.1.
- Dimension per ASME B16.4
- Marked with SPD
- For current listing/approval details contact a Titus representative

c UL us FM APPROVED

Nominal Size in/mm	Pressure PSI/MPa	Dimension			Unit WT LB/KGS
		A	B	C	
1×1/2×1	300	1.50	1.36	1.50	1.06
25×15×25	2065	38.10	34.54	38.10	0.48
1×3/4×1	300	1.50	1.45	1.50	1.10
25×20×25	2065	38.10	36.83	38.10	0.50
1×1×1/2	300	1.26	1.26	1.36	0.97
25×25×15	2065	32.00	32.00	34.54	0.44
1×1×3/4	300	1.37	1.37	1.45	1.08
25×25×20	2065	34.80	34.80	36.83	0.49
1×1×1-1/4	300	1.67	1.67	1.58	1.45
25×25×32	2065	42.42	42.42	40.13	0.66
1×1×1-1/2	300	1.80	1.80	1.65	1.72
25×25×40	2065	45.72	45.72	41.91	0.78
1-1/4×1×1/2	300	1.34	1.26	1.53	1.19
32×25×15	2065	34.04	32.00	38.86	0.54
1-1/4×1×3/4	300	1.45	1.37	1.62	1.34
32×25×20	2065	36.83	34.80	41.15	0.61
1-1/4×1×1	300	1.58	1.50	1.67	1.45
32×25×25	2065	40.13	38.10	42.42	0.66
1-1/4×1×1-1/4	300	1.75	1.67	1.75	1.78
32×25×32	2065	44.45	42.42	44.45	0.81
1-1/4×1×1-1/2	300	1.88	1.80	1.82	1.94
32×25×40	2065	47.75	45.72	46.23	0.88
1-1/4×1-1/4×1/2	300	1.34	1.34	1.53	1.36
32×32×15	2065	34.04	34.04	38.86	0.62
1-1/4×1-1/4×3/4	300	1.45	1.45	1.62	1.41
32×32×20	2065	36.83	36.83	41.15	0.64
1-1/4×1-1/4×1	300	1.58	1.58	1.67	1.63
32×32×25	2065	40.13	40.13	42.42	0.74
1-1/4×1-1/4×1-1/2	300	1.88	1.88	1.82	1.91
32×32×40	2065	47.75	47.75	46.23	0.87
1-1/4×1-1/4×2	300	2.10	2.10	1.90	2.64
32×32×50	2065	53.34	53.34	48.26	1.20
1-1/2×1×1/2	300	1.41	1.34	1.66	1.43
40×25×15	2065	35.81	34.04	42.16	0.65
1-1/2×1×3/4	300	1.52	1.37	1.75	1.52
40×25×20	2065	38.61	34.80	44.45	0.69
1-1/2×1×1	300	1.65	1.50	1.80	1.78
40×25×25	2065	41.91	38.10	45.72	0.81
1-1/2×1×1-1/4	300	1.82	1.67	1.88	1.98
40×25×32	2065	46.23	42.42	47.75	0.90
1-1/2×1×1-1/2	300	1.94	1.80	1.94	2.20
40×25×40	2065	49.28	45.72	49.28	1.00
1-1/2×1-1/4×1/2	300	1.41	1.34	1.66	1.58
40×32×15	2065	35.81	34.04	42.16	0.72
1-1/2×1-1/4×3/4	300	1.52	1.45	1.75	1.72
40×32×20	2065	38.61	36.83	44.45	0.78
1-1/2×1-1/4×1	300	1.65	1.58	1.80	1.91
40×32×25	2065	41.91	40.13	45.72	0.87
1-1/2×1-1/4×1-1/4	300	1.82	1.75	1.88	2.27
40×32×32	2065	46.23	44.45	47.75	1.03

Nominal Size in/mm	Pressure PSI/MPa	Dimension			Unit WT LB/KGS
		A	B	C	
1-1/2×1-1/4×1-1/2	300	1.94	1.88	1.94	2.42
40×32×40	2065	49.28	47.75	49.28	1.10
1-1/2×1-1/4×2	300	2.16	2.10	2.02	2.95
40×32×50	2065	54.86	53.34	51.31	1.34
1-1/2×1-1/2×1/2	300	1.41	1.41	1.66	1.80
40×40×15	2065	35.81	35.81	42.16	0.82
1-1/2×1-1/2×3/4	300	1.52	1.52	1.75	1.91
40×40×20	2065	38.61	38.61	44.45	0.87
1-1/2×1-1/2×1	300	1.65	1.65	1.80	2.09
40×40×25	2065	41.91	41.91	45.72	0.95
1-1/2×1-1/2×1-1/4	300	1.82	1.82	1.88	2.42
40×40×32	2065	46.23	46.23	47.75	1.10
1-1/2×1-1/2×2	300	2.16	2.16	2.02	2.99
40×40×50	2065	54.86	54.86	51.31	1.36
2×1×2	300	2.25	2.02	2.25	3.21
50×25×50	2065	57.15	51.31	57.15	1.46
2×1-1/4×2	300	2.25	2.10	2.25	3.50
50×32×50	2065	57.15	53.34	57.15	1.59
2×1-1/2×1/2	300	1.49	1.41	1.88	2.27
50×40×15	2065	37.85	35.81	47.75	1.03
2×1-1/2×3/4	300	1.60	1.52	1.97	2.38
50×40×20	2065	40.64	38.61	50.04	1.08
2×1-1/2×1	300	1.73	1.65	2.02	2.53
50×40×25	2065	43.94	41.91	51.31	1.15
2×1-1/2×1-1/4	300	1.90	1.82	2.10	2.86
50×40×32	2065	48.26	46.23	53.34	1.30
2×1-1/2×1-1/2	300	2.02	1.94	2.16	3.08
50×40×40	2065	51.31	49.28	54.86	1.40
2×1-1/2×2	300	2.25	2.16	2.25	3.59
50×40×50	2065	57.15	54.86	57.15	1.63
2×2×1/2	300	1.49	1.49	1.88	2.57
50×50×15	2065	37.85	37.85	47.75	1.17
2×2×3/4	300	1.60	1.60	1.97	2.77
50×50×20	2065	40.64	40.64	50.04	1.26
2×2×1	300	1.73	1.73	2.02	2.93
50×50×25	2065	43.94	43.94	51.31	1.33
2×2×1-1/4	300	1.90	1.90	2.10	3.21
50×50×32	2065	48.26	48.26	53.34	1.46
2×2×1-1/2	300	2.02	2.02	2.16	3.52
50×50×40	2065	51.31	51.31	54.86	1.60
2×2×2-1/2	300	2.60	2.60	2.39	5.06
50×50×65	2065	66.04	66.04	60.71	2.30

PLUG

- Approved By UL, ULC and FM at 300 psi
- Cast Iron ASTM A 126 Class B.
- NPT Thread per ANSI/ASME B1.20.1.
- Dimension per ASME B16.4
- Marked with SPD
- For current listing/approval details contact a Titus representative

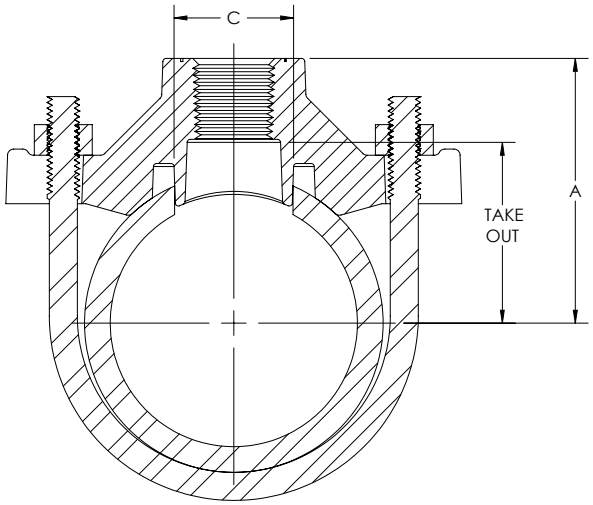
Nominal Size in/mm	Pressure PSI/MPa	Dimension A	Unit WT LB/KGS
1/2	300	0.94	0.10
15	2065	23.88	0.05
3/4	300	1.07	0.18
20	2065	27.18	0.08
1	300	1.25	0.29
25	2065	31.75	0.13
1-1/4	300	1.36	0.46
32	2065	34.54	0.21
1-1/2	300	1.45	0.64
40	2065	36.83	0.29
2	300	1.56	1.08
50	2065	39.62	0.49

SECTION 10 TEELOX™ MECHANICAL BRANCH CONNECTOR

Designed for fast installation of bolted branch outlets, Teelox™ mechanical branch connectors are practical alternatives to existing branch connect systems. Made from high quality cast iron, Teelox™ are known for long-lasting, maintenance-free performance.
Key Features:

- A high grade EPDM rubber gasket surrounds the locating collar for accurate, permanent installation and the best seal in the industry.
- The locating collar is an integral part of the casting.
- A zinc-plated high-tensile steel U-bolt ensures rust-free attachment.
- Teelox™ is approved for conventional and arm-over installations.

NPS	Pipe Center to Outlet A	Hole Dia. B	Take Out
1 1/4 x 1/2	1.98	1.19	1.19
1 1/4 x 3/4	2.05	1.19	1.19
1 1/4 x 1	2.13	1.19	1.19
1 1/2 x 1/2	1.98	1.19	1.19
1 1/2 x 3/4	2.05	1.19	1.19
1 1/2 x 1	2.13	1.19	1.19
2 x 1/2	2.26	1.19	1.47
2 x 3/4	2.33	1.19	1.47
2 x 1	2.41	1.19	1.47
2 1/2 x 1/2	2.57	1.19	1.78
2 1/2 x 3/4	2.64	1.19	1.78
2 1/2 x 1	2.72	1.19	1.78



Material:	**Cast Iron ASTM A126 Class A Minimum**
Gasket:	**E.P.D.M. Rubber ASTM D-2000**
U Bolt:	**Zinc Plated High-Tensile Steel**
Dimensions:	**ANSI/ASME B1.20.1**
Pressure Ratings:	**175 psi**
Coatings:	**ASTM B633, ASTM A153**
Additional Specifications:	**UL, ULC and FM where applicable**
Torque Requirement:	**20 ft.-lbs. max.**

Section 3 – Valves

Victaulic® Series UMC (Universal Manifold Check) Assembly

30.72

1.0 PRODUCT DESCRIPTION

Available Sizes

- 1 ¼ – 8"/DN32 – DN200

Maximum Working Pressure

- Up to 300 psi/2068 kPa/20.6 bar

Application

- Floor control assemblies may be utilized to meet the zone separation requirements of multistory applications exceeding two stories in height or whenever separate control or zoning is specified.
- Shotgun riser assemblies may be utilized in vertical orientations on individual system risers.

Configurations

- Optional control valve: Series 705 Butterfly Valve or Series 728 Ball Valve
- Factory assembled right-handed/left-handed (field changeable if necessary)

Included Components

- Integrated Check Valve
- Series UTD (Universal Test Drain) with integrated Series ARV (Adjustable Relief Valve)
- Quick Drain Hose
- Vane Type Flow Switch
- 1 ¼ – 2"/DN32 – DN50 UMC use saddle type 2" VSR flow switch
- 2 ½ – 3"/73mm – DN80 and 8"/DN200 UMC use saddle type VSR flow switch for corresponding valve size
- 4 – 6"/DN100-DN150 UMC use VSR-M flow switch with flange adapter
- 1 ¼ – 8"/DN32 – DN200 System-side pressure gauge 400 psi/2750 kPa/27.5 bar
- 1 ¼ – 3"/DN32-DN80 supply side ½" plugged port located on control valve (if using as a system riser, pressure gauge ordered separately)
- 4 – 8"/DN100 – DN200 Supply-side pressure gauge 400 psi/2750 kPa/27.5 bar

Available End Connections

- Victaulic Original Groove System (OGS) standard groove

2.0 CERTIFICATION/LISTINGS

c UL us LISTED FM

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

3.0 SPECIFICATIONS – MATERIAL

Body: Ductile iron conforming to ASTM A536, grade 65-45-12

Clapper: Stainless Steel

Clapper Seal: EPDM

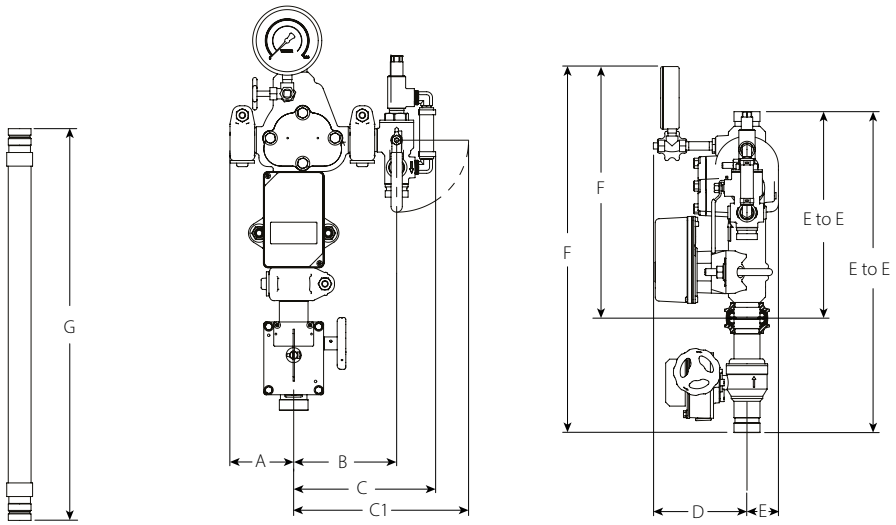
Shafts: Stainless Steel

Seat: Brass

Spring: Stainless Steel

Hose: Stainless Steel

4.0 DIMENSIONS

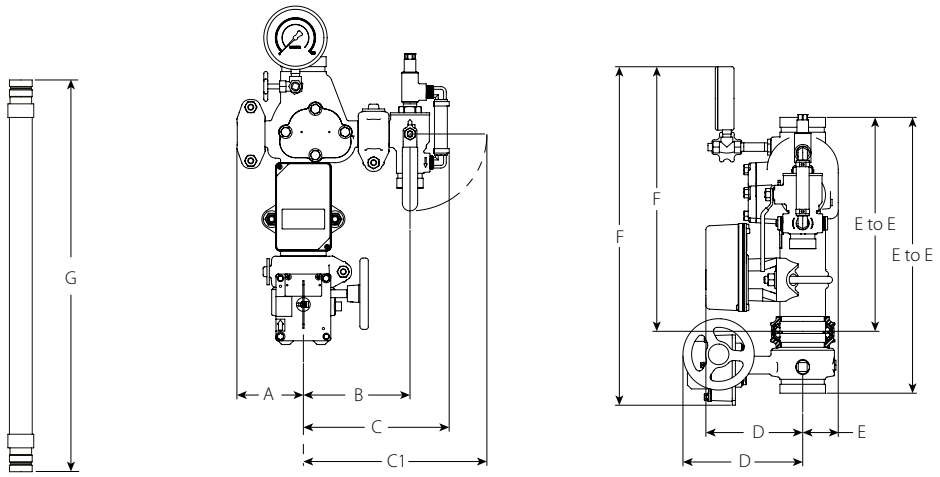


Size		Dimensions											Series UTD Valve Size (Nominal)	Series UTD Test Orifice	G Quick Drain Hose Length	Weight	
Nominal	Actual Outside Dia.	E to E with control valve	E to E without control valve	A	B	C	C-1	D with control valve	D without control valve	E	F with control valve	F without control valve				Approx. (Each) with control valve	Approx. (Each) without control valve
inches DN	inches mm	inches mm											inches DN	K-Factor S.I.	inches mm	lb kg	lb kg
1 ¼ DN32	1.660 42.4	20.50 521	13.13 333	3.63 92	5.88 149	8.25 210	10.00 254	6.00 152	6.00 152	2.00 51	23.38 594	16.00 406	1.00 25	2.8 4.0	24.00 610	32.0 14.5	24.0 10.9
1 ½ DN40	1.900 48.3	20.50 521	13.13 333	3.63 92	5.88 149	8.25 210	10.00 254	6.00 152	6.00 152	2.00 51	23.50 597	16.13 410	1.00 25	2.8 4.0	24.00 610	34.0 15.4	25.0 11.3

NOTES

- When Series UTD Valve Size (Nominal) is 1"/25 mm, flexible drain hose connection utilizes FireLock IGS™ groove profile
- ½" system supply pressure gauge port located on the control valve for sizes 1 ¼ – 1 ½"/DN32 – DN40

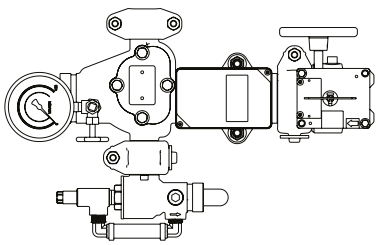
4.0 DIMENSIONS (CONTINUED)



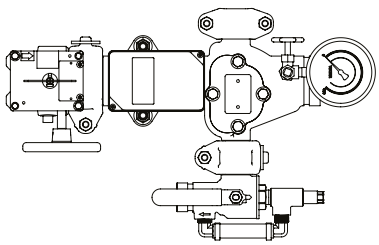
Size		Dimensions											Series UTD Valve Size (Nominal)	Series UTD Test Orifice	G Quick Drain Hose Length	Weight	
Nominal	Actual Outside Dia.	E to E with control valve	E to E without control valve	A	B	C	C-1	D with control valve	D without control valve	E	F with control valve	F without control valve				Approx. (Each) with control valve	Approx. (Each) without control valve
inches DN	inches mm	inches mm											inches DN	K-Factor S.I.	inches mm	lb kg	lb kg
2	2.375	17.50	13.13	3.63	5.88	8.25	10.00	6.38	6.00	2.00	21.13	16.38	1.00	2.8	24.00	36.0	25.0
DN50	60.3	445	333	92	149	210	254	162	152	51	537	416	25	4.0	610	16.3	11.3
2½	2.875	17.38	13.50	4.25	6.75	9.25	11.50	7.50	6.13	2.25	21.25	16.63	1.25	4.2	24.00	39.0	28.0
	73.0	441	343	108	171	235	292	191	156	57	540	422	32	6.1	610	17.7	12.7
	3.000	17.38	13.50	4.25	6.75	9.25	11.50	7.50	6.13	2.25	21.25	16.63	1.25	4.2	24.00	39.0	28.0
DN65	76.1	441	343	108	171	235	292	191	156	57	540	422	32	6.1	610	17.7	12.7
3	3.500	17.63	13.75	4.38	7.13	9.63	11.88	7.75	6.38	2.38	21.13	16.50	1.25	4.2	24.00	44.0	31.0
DN80	88.9	448	349	111	181	244	302	197	162	60	537	419	32	6.1	610	20.0	14.1
4	4.500	19.50	14.63	5.75	8.75	11.63	14.88	8.75	7.00	3.00	22.75	17.63	2.00	5.6	36.00	65.0	52.0
DN100	114.3	495	371	146	222	295	378	222	178	76	578	448	51	8.1	914	29.5	23.6
	6.500	23.50	17.38	6.88	10.00	12.88	16.13	11.38	8.00	3.88	25.88	19.75	2.00	5.6	36.00	100.0	73.0
	165.1	597	441	175	254	327	410	289	203	98	657	502	51	8.1	914	45.4	33.1
6	6.625	23.50	17.38	6.88	10.00	12.88	16.13	11.38	8.00	3.88	25.88	19.75	2.00	5.6	36.00	100.0	73.0
DN150	168.3	597	441	175	254	327	410	289	203	98	657	502	51	8.1	914	45.4	33.1

NOTES

- ½" system supply pressure gauge port located on the control valve for sizes 2 – 3"/DN50 – DN80 (gauge sold separately)
- Included System supply pressure gauge located on the control valve for sizes 4 – 6"/DN100 – DN150
- When Series UTD Valve Size (Nominal) is 1"/25 mm, flexible drain hose connection utilizes FireLock IGS™ groove profile

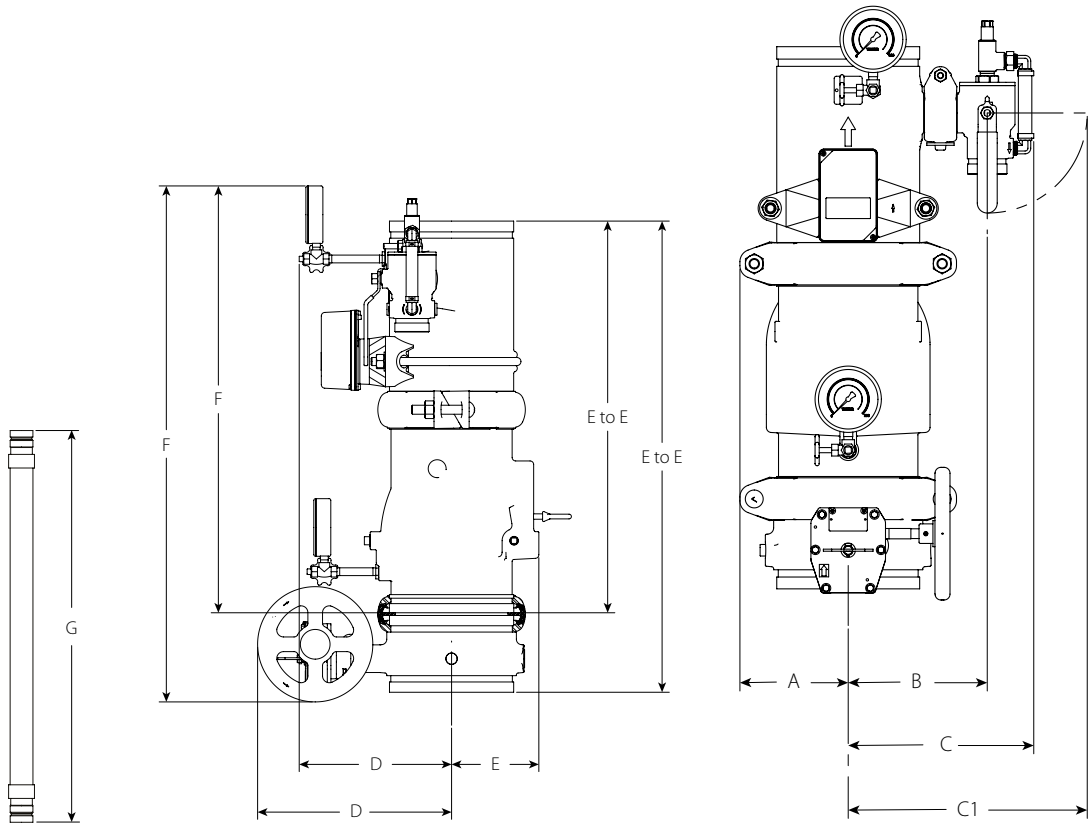


Horizontal Install Left Hand with Control Valve



Horizontal Install Right Hand with Control Valve

4.0 DIMENSIONS (CONTINUED)



Size		Dimensions											Series UTD Valve Size (Nominal)	Series UTD Test Orifice	G Quick Drain Hose Length	Weight	
Nominal	Actual Outside Dia.	E to E with control valve	E to E without control valve	A	B	C	C-1	D with control valve	D without control valve	E	F with control valve	F without control valve				Approx. (Each) with control valve	Approx. (Each) without control valve
inches DN	inches mm	inches mm											inches DN	K-Factor S.I.	inches mm	lb kg	lb kg
8 DN200	8.625 219.1	32.75 832	27.25 692	6.50 165	8.38 213	11.25 286	14.38 365	13.50 343	10.63 270	6.00 152	35.13 892	29.63 752	2.00 51	5.6 8.1	36.00 914	178.0 80.7	136.0 61.7

NOTE

- System supply pressure gauge port is on the supply side of check valve

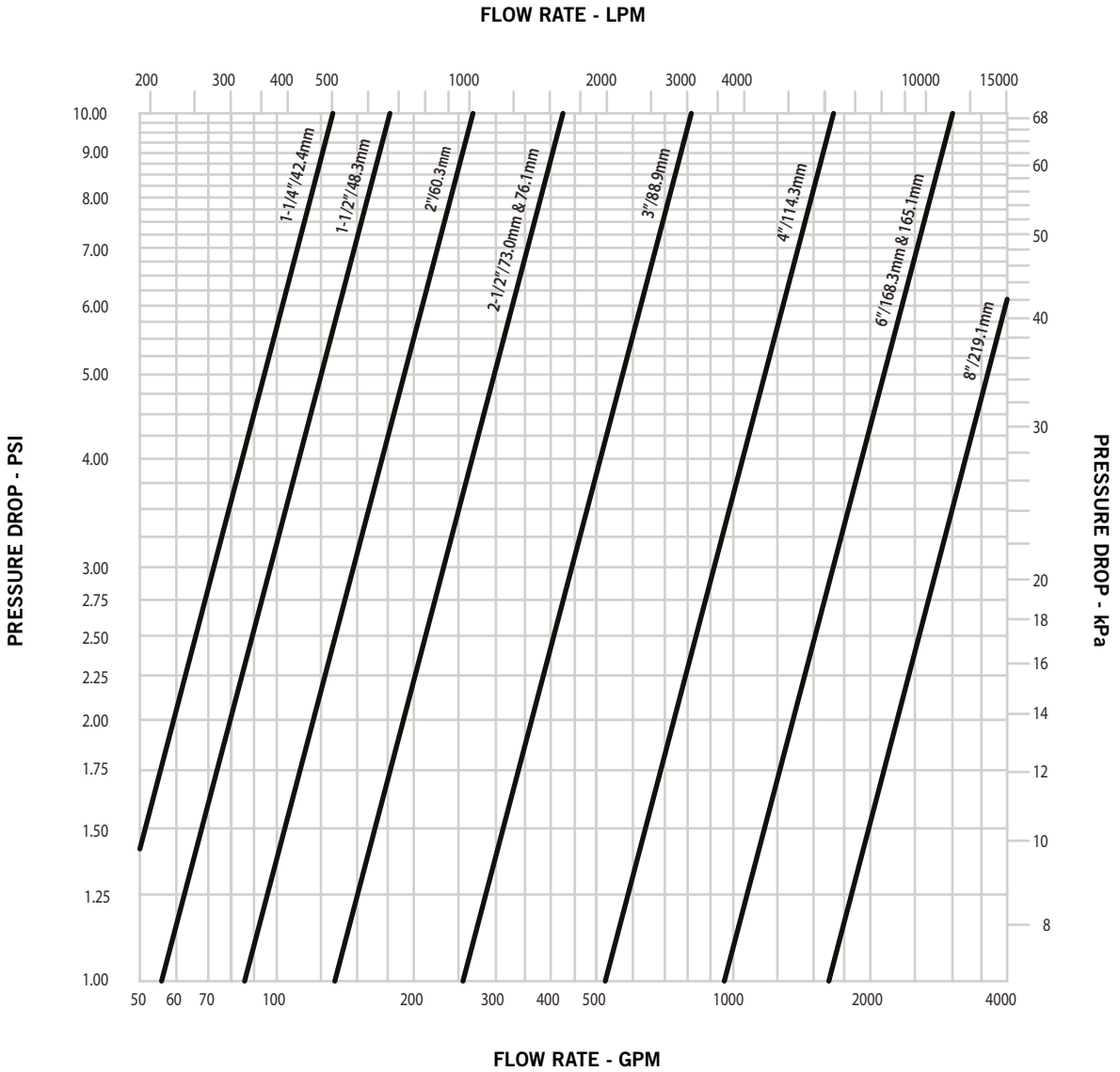
5.0 PERFORMANCE

Size		Equivalent Length of Sch. 40 Pipe[1]		Flow Characteristics		
Nominal inches DN	**Actual Outside Diameter** inches mm	**with control valve** feet meters	**without control valve** feet meters	**Cv/Kv Values with control valve** Full Open	**Cv/Kv Values without control valve** Full Open	**Maximum Working Pressure** psi kPa
1 ¼ DN32	1.660 42.4	8.3 2.5	8.0 2.4	38.52 33	35.59 31	300 2068
1 ½ DN40	1.900 48.3	10.1 3.1	10.0 3.0	56.75 49	57.43 50	300 2068
2 DN50	2.375 60.3	21.1 6.4	15.8 4.8	71.43 62	83.14 72	300 2068
2 ½	2.875 73.0	19.6 6.0	15.8 4.8	112.43 97	125.84 109	300 2068
 DN65	3.000 76.1	19.6 6.0	15.8 4.8	112.43 97	125.84 109	300 2068
3 DN80	3.500 88.9	20.0 6.1	13.3 4.0	199.32 172	241.43 209	300 2068
4 DN100	4.500 114.3	17.6 5.4	12.9 3.9	425.88 368	499.23 432	300 2068
	6.500 165.1	40.6 12.4	32.0 9.8	834.97 722	932.83 807	300 2068
6 DN150	6.625 168.3	40.6 12.4	32.0 9.8	834.97 722	932.83 807	300 2068
8 DN200	8.625 219.1	60.8 18.5	45.8 13.9	1376.8 1191	1556.57 1346	300 2068

[1] Equivalent length of Sch 40 pipe calculated using the Hazen-Williams formula with a roughness coefficient of C=120

5.0 PERFORMANCE (CONTINUED)

Series UMC without Control Valve

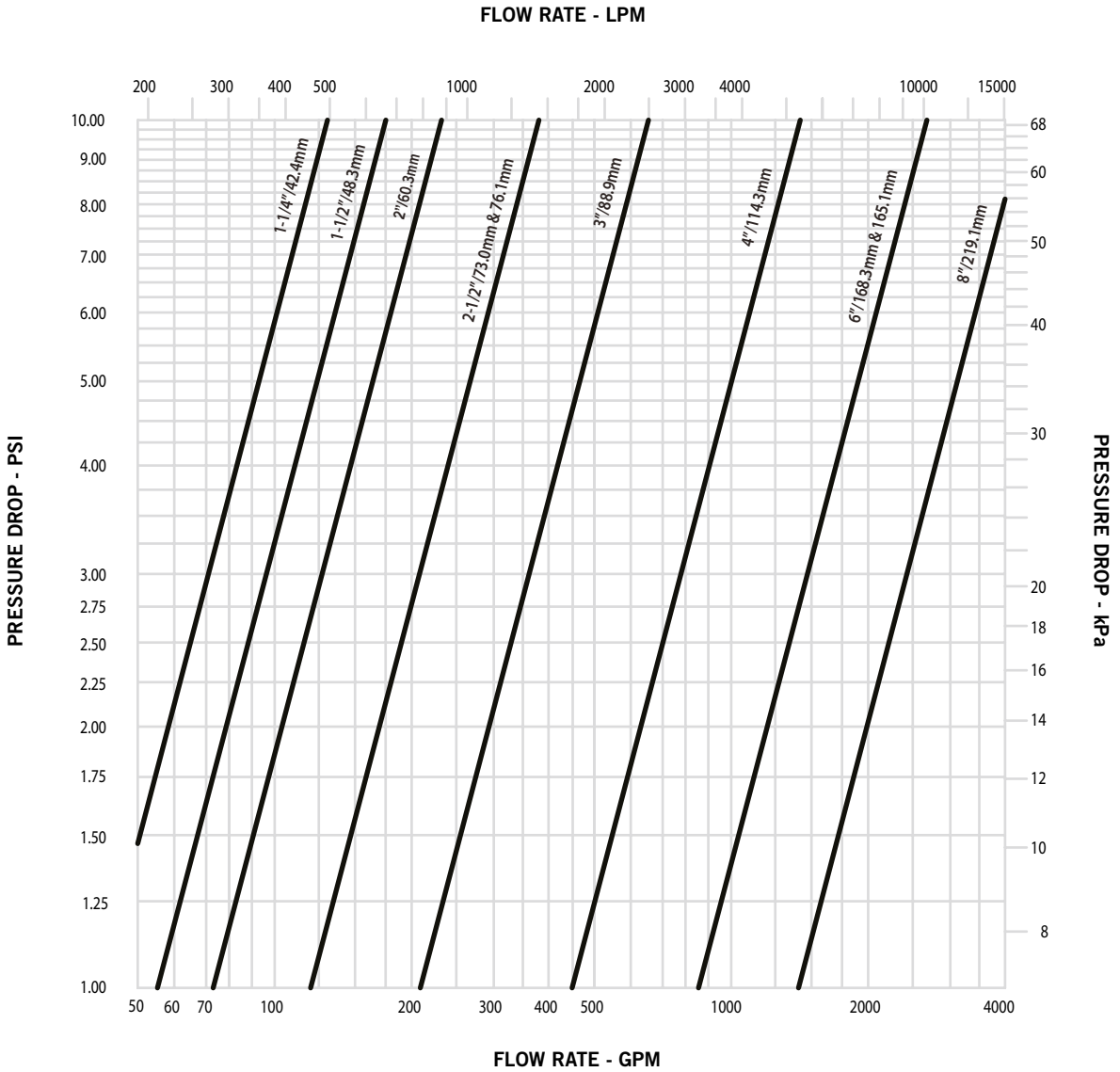


NOTE

- Includes friction loss across flow switch

5.0 PERFORMANCE (CONTINUED)

Series UMC with Control Valve



NOTE

- Includes friction loss across flow switch

6.0 NOTIFICATIONS

⚠ WARNING

- **Read and understand all instructions before attempting to install, remove, adjust, or maintain any Victaulic piping products.**
- **Depressurize and drain the piping system before attempting to install, remove, adjust, or maintain any Victaulic piping products.**
- **Wear safety glasses, hardhat, and foot protection.**

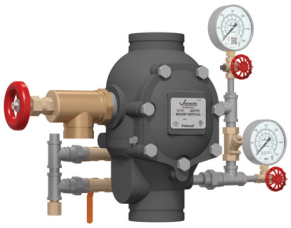
Failure to follow these instructions could result in death or serious personal injury and property damage.

7.0 REFERENCE MATERIALS

10.17: FireLock® Ball Valve
10.54: Victaulic FireLock™ Innovative Groove System I IGS™
10.64: Victaulic® FireLock™ Installation-Ready™ Rigid Couplings
10.81: FireLock® Butterfly Valve
30.71: Series UM Universal Manifold Assembly
30.73: Victaulic® Series UTD Universal Test and Drain
30.74: Victaulic® Series ARV Adjustable Relief Valve
I-100: Field Installation Handbook
I-UMC: Series UMC Universal Manifold Check Assembly

FireLock™ Alarm Check Valve
Series 751

30.01



Series 751

Series 751 European Trim

1.0 PRODUCT DESCRIPTION

Available Sizes

- 1 ½ – 8"/40 – 200 mm

Pressure Class

- 1 ½ – 6"/40 – 152.4 mm 300 psi/2068 kPa/20 Bar
- 8"/200 mm 232 psi/1600 kPa/16 bar. See section 5.0

Valve Configurations

- Bare
- Pre-trimmed
- Vic-Quick Riser: Pre-trimmed and includes:
  - Shut Off Valve (1 ½"/40 mm: Series 728 Ball Valve, 2" – 8"/50 – 200 mm: Series 705 *FireLock* Butterfly Valve)
  - Drain Connection kit
- Fire-Pac Series 745 (refer to Victaulic publication 30.23)

Pipe Preparation

- Victaulic Original Groove System

Application/Media

- For use on fire protection systems only.

2.0 CERTIFICATION/LISTINGS

104e/01 2831

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

3.0 SPECIFICATIONS – MATERIAL

Bill of Materials: Standard Trim, cULus, FM, CCC version

Body: Ductile iron, ASTM A-536 Grade 65-45-12

Clapper: Aluminum bronze UNS-C95500

Shaft: Stainless steel 17-4PH

Clapper Seal: EPDM

Seat O-Rings: Nitrile

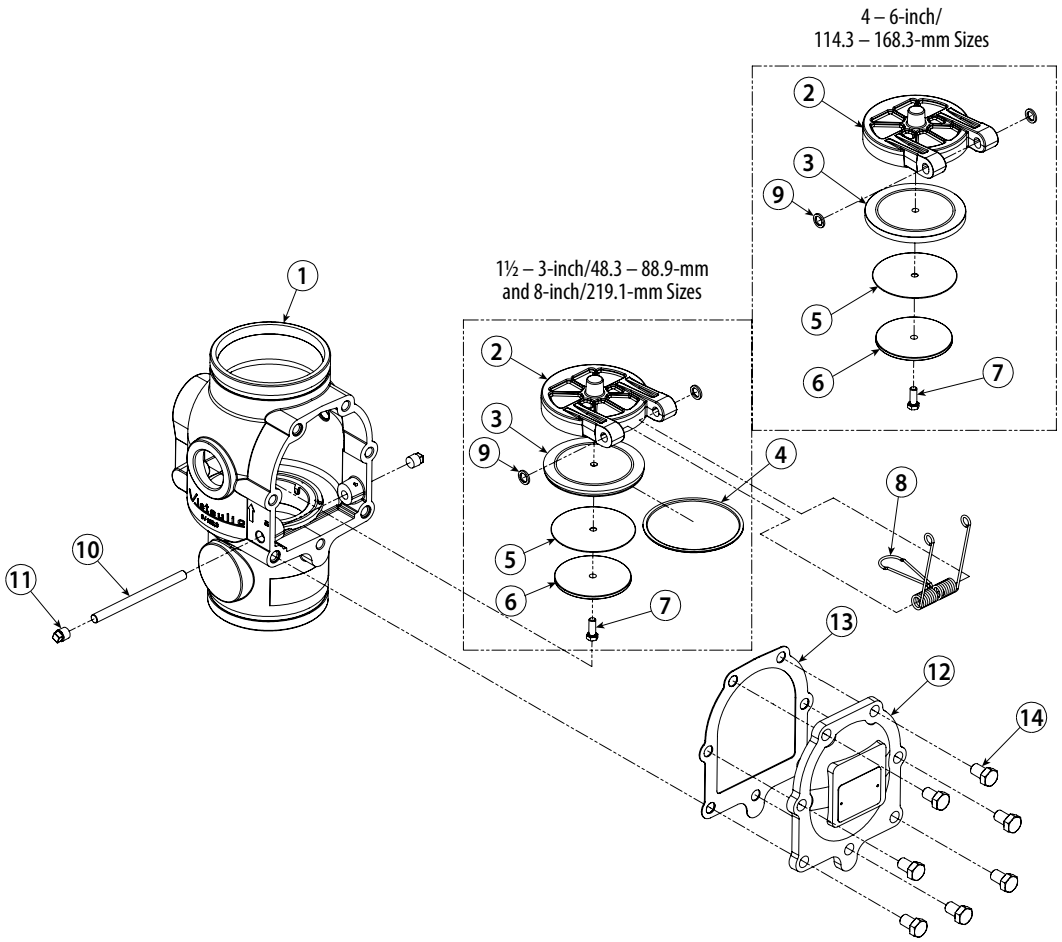
Clapper Spring: Stainless steel (302 Series)

Washers: PTFE

Cover Plate Bolts: Carbon steel, zinc plated

Cover Plate Gasket: Nitrile

Seal Plate: Aluminum Bronze (UNS-C95400)

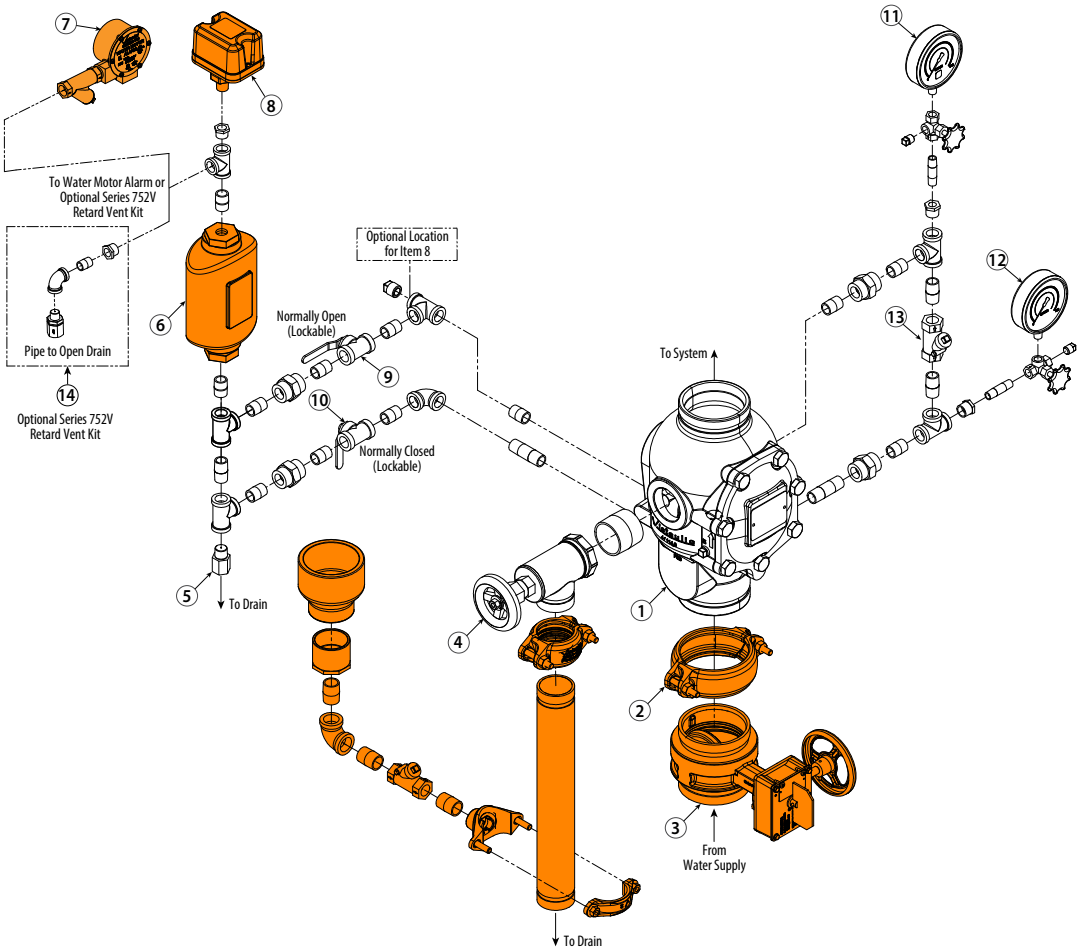


Item	Description	Item	Description
1	Valve Body	8	Clapper Spring
2	Clapper	9	Washer
3	Clapper Seal	10	Shaft
4	Seal Ring	11	Clapper Shaft Retaining Plug
5	Seal Washer	12	Cover Plate
6	Seal Plate	13	Cover Plate Gasket
7	Screw, Self Sealing	14	Cover Plate Bolts

3.1 SPECIFICATIONS – MATERIAL

Standard Trim: cULus, FM, CCC version

Series 751 *FireLock* Alarm Check Valve



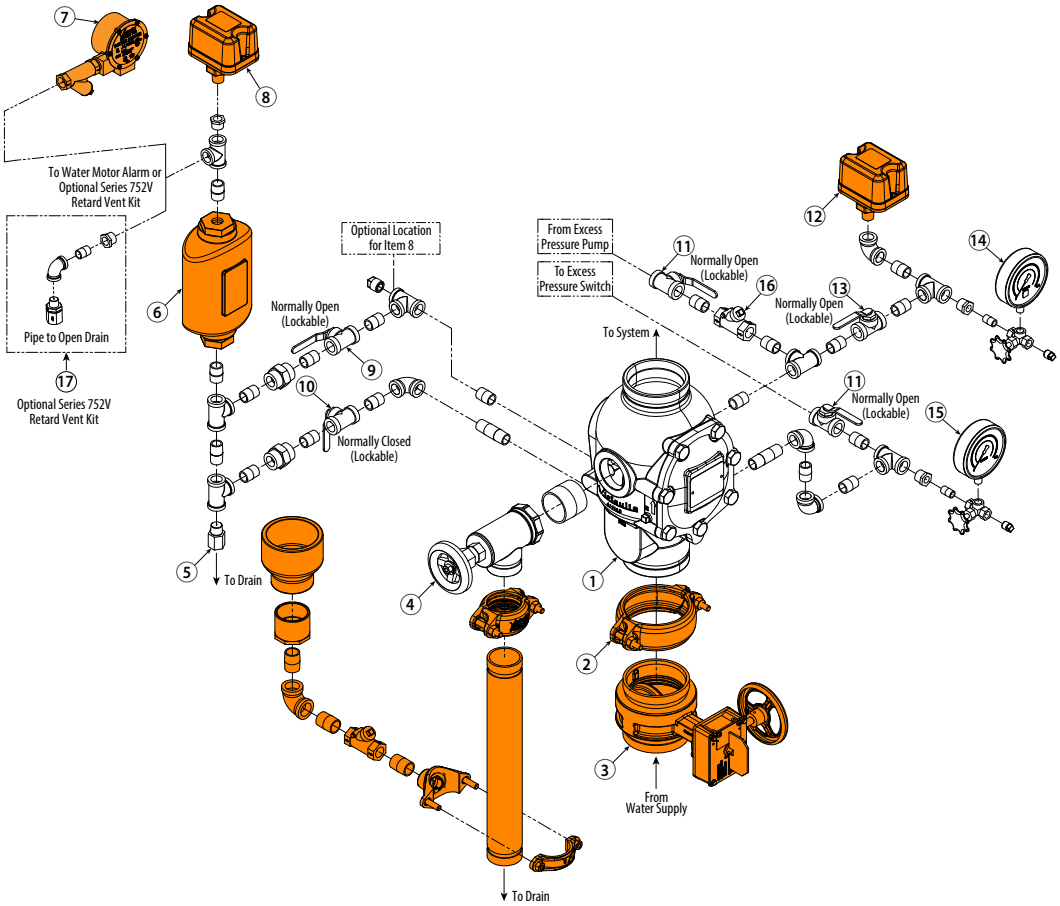
Item	Description	Item	Description
1	Series 751 *FireLock* Alarm Check Valve	8	Alarm Pressure Switch (Optional/Sold Separately)
2	*FireLock* Rigid Coupling (Optional/Sold Separately)	9	Alarm Line Ball Valve (Normally Open)
3	Water Supply Main Control Valve (Optional/Sold Separately)	10	Alarm Test Line Ball Valve (Normally Closed)
4	System Main Drain Valve	11	System Pressure Gauge/Gauge Valve Assembly (0-300 psi/0-2068 kPa)
5	Alarm Line Drain Restrictor (1⁄16-inch)	12	Water Supply Pressure Gauge/Gauge Valve Assembly (0-300 psi/0-2068 kPa)
6	Series 752 Retard Chamber Assembly (Optional/Sold Separately)	13	Swing Check Valve
7	Series 760 Water Motor Alarm Assembly (Optional/Sold Separately)	14	Series 752V Retard Vent Kit[1] (Optional/Sold Separately)

[1] The Series 752V Retard Vent Kit is required any time an air break is needed above the Series 752 VdS Retarding Chamber Assembly. In addition, the Series 752V Retard Vent Kit is required if multiple valves are tied into one water motor alarm and a check valve isolates each line.

3.2 SPECIFICATIONS – MATERIAL

Standard Trim: cULus, FM, CCC version

Series 751 *FireLock* Alarm Check Valve Trim for Use with Excess Pressure Pump



Item	Description	Item	Description
1	Series 751 *FireLock* Alarm Check Valve	10	Alarm Test Line Ball Valve (Normally Closed)
2	*FireLock* Rigid Coupling (Optional/Sold Separately – Comes Standard when VQR Assembly is Ordered)	11	Excess Pressure Pump Isolation Ball Valve (Normally Open)
3	Water Supply Main Control Valve (Optional/Sold Separately – Comes Standard when VQR Assembly is Ordered)	12	Excess Pressure Pump Pressure Switch (Sold Separately/Not Provided by Victaulic)
4	System Main Drain Valve	13	Excess Pressure Pump Pressure Switch Isolation Ball Valve (Normally Open)
5	Alarm Line Drain Restrictor (1/16-inch)	14	System Pressure Gauge (0-300 psi/0-2068 kPa)
6	Series 752 Retard Chamber Assembly (Optional/Sold Separately)	15	Water Supply Pressure Gauge (0-300 psi/0-2068 kPa)
7	Series 760 Water Motor Alarm Assembly (Optional/Sold Separately)	16	Swing Check Valve
8	Alarm Pressure Switch (Optional/Sold Separately)	17	Series 752V Retard Vent Kit[1] (Optional/Sold Separately)
9	Alarm Line Ball Valve (Normally Open)		

[1] The Series 752V Retard Vent Kit is required any time an air break is needed above the Series 752 VdS Retarding Chamber Assembly. In addition, the Series 752V Retard Vent Kit is required if multiple valves are tied into one water motor alarm and a check valve isolates each line.

3.2 SPECIFICATIONS – MATERIAL (CONTINUED)

☐ Standard Trim Package

Optional Accessories (specify choice):

☐ Series 752 Retard Chamber – Required when the Series 751 FireLock Alarm Check Valve is installed in a variable pressure installation in order to reduce the possibility of false alarms. (Refer to 30.01).

☐ Series 752V Retard Vent Kit – Required when an electric pressure switch is installed on the retard chamber without a water motor alarm.

☐ Series 760 Water Motor Alarm – The Series 751 FireLock Alarm Check Valve is designed to activate a mechanical alarm when a sustained flow of water (such as an open sprinkler) causes the alarm check's clapper to lift from its seat. (Refer to 30.32).

☐ Alarm pressure switch – The Series 751 FireLock Alarm Check Valve is designed to allow the installation of pressure switches to activate electric alarms and control panels when a sustained flow of water (such as an open sprinkler) causes the alarm check's clapper to lift from its seat.

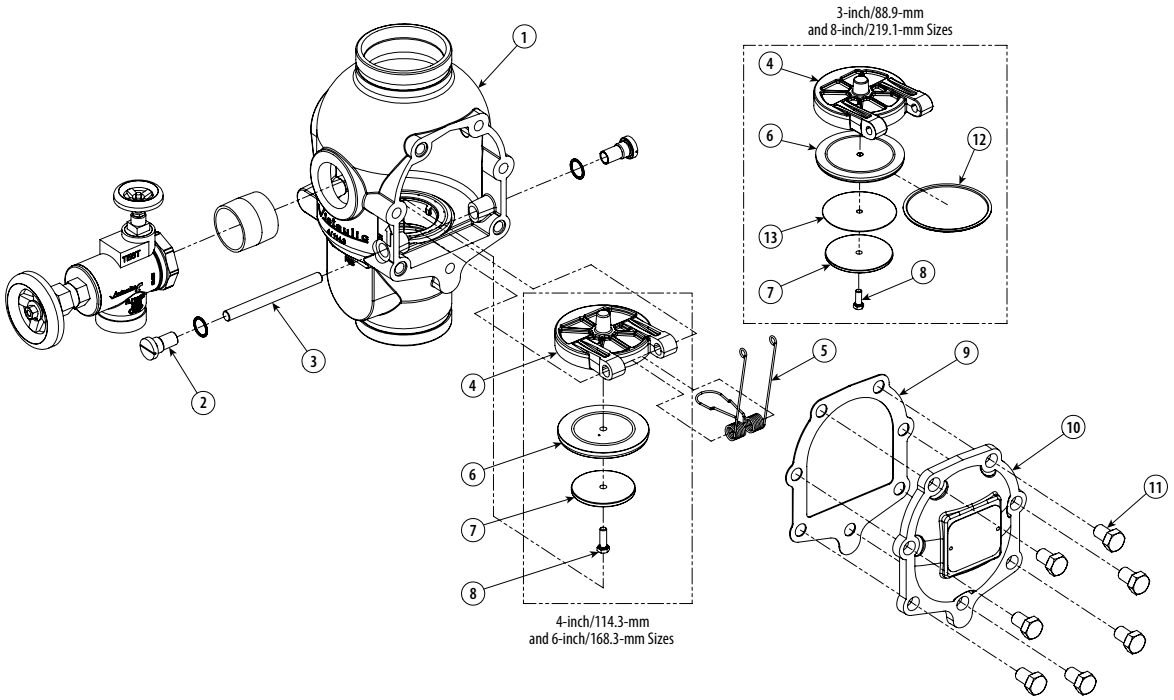
☐ Waterflow Detectors – Waterflow detectors are available for installation on the riser.

☐ Trim kit available for configuration with excess pressure pump.

3.3 SPECIFICATIONS – MATERIAL

Bill of Materials: European Trim, VdS, CE, LPCB, CNBOP, FM, EAC version

Series 751 *FireLock* Alarm Check Valve

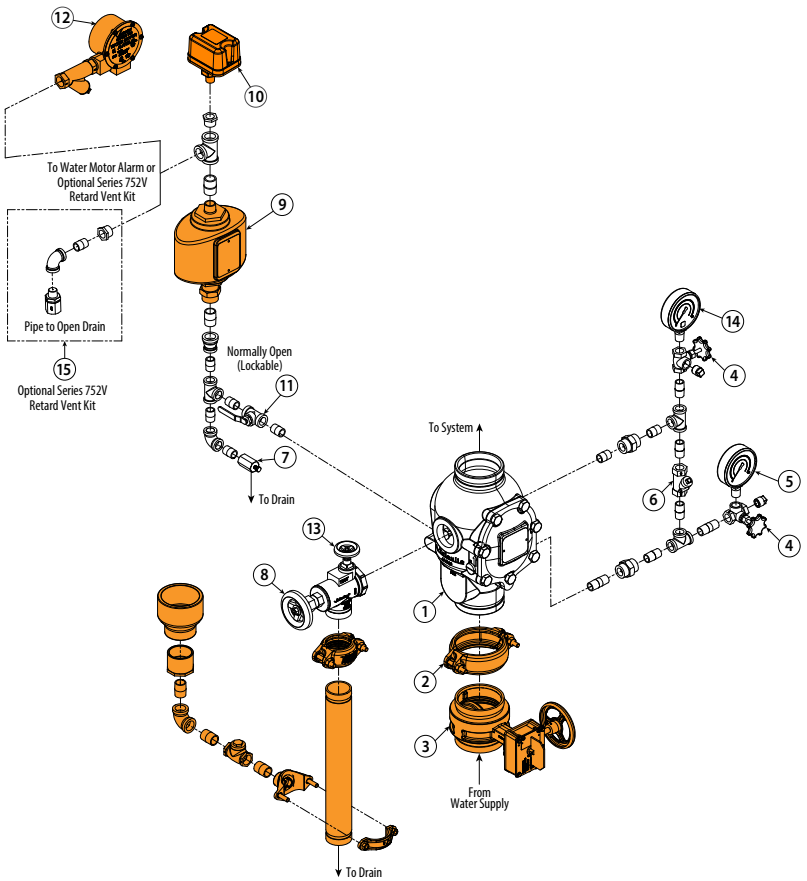


Item	Description	Item	Description
1	Valve Body	8	Screw, Self Sealing
2	Clapper Shaft Retaining Bushing	9	Cover Plate Gasket
3	Shaft	10	Cover Plate
4	Clapper	11	Cover Plate Bolt
5	Clapper Spring	12	Seal Ring
6	Clapper Seal	13	Seal Washer
7	Seal Plate		

3.4 SPECIFICATIONS – MATERIAL

European Trim: VdS, CE, LPCB, FM, EAC version

Series 751 *FireLock* Alarm Check Valve with Vertical Trim



Item	Description	Item	Description
1	Series 751 *FireLock* European Alarm Check Valve	9	Series 752 VdS Retarding Chamber Assembly (Optional/Sold Separately) Alarm Pressure Switch
2	*FireLock* Rigid Coupling	10	Alarm pressure switch (Optional/Sold Separately)
3	Water Supply Main Control Valve	11	Alarm Line Ball Valve (Lockable – Normally Open) Series 760 European Water Motor Alarm Assembly (Optional/Sold Separately)
4	Gauge Valve	12	Series 760 Water Motor Alarm (Optional/Sold Separately)
5	Water Supply Pressure Gauge (0-25 Bar)	13	System Test Valve
6	Swing Check Valve	14	System Pressure Gauge (0-25 Bar)
7	Restricted Orifice/Alarm Line Drain	15	Series 752V Retard Vent Kit[1] (Optional/Sold Separately)
8	System Main Drain Valve		

[1] The Series 752V Retard Vent Kit is required any time an air break is needed above the Series 752 VdS Retarding Chamber Assembly. In addition, the Series 752V Retard Vent Kit is required if multiple valves are tied into one water motor alarm and a check valve isolates each line.

3.4 SPECIFICATIONS – MATERIAL (CONTINUED)

☐ Standard Trim Package

Optional Accessories (specify choice):

☐ Series 752 Retard Chamber – Required when the Series 751 FireLock Alarm Check Valve is installed in a variable pressure installation in order to reduce the possibility of false alarms. (Refer to 30.01).

☐ Series 752V Retard Vent Kit – Required when an electric pressure switch is installed on the retard chamber without a water motor alarm.

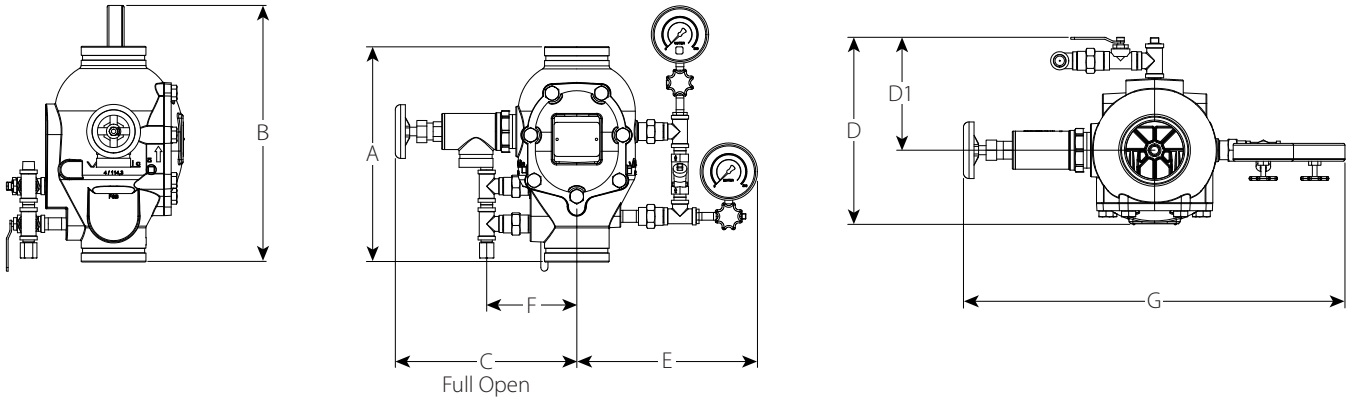
☐ Series 760 Water Motor Alarm – The Series 751 FireLock Alarm Check Valve is designed to activate a mechanical alarm when a sustained flow of water (such as an open sprinkler) causes the alarm check's clapper to lift from its seat. (Refer to 30.32).

☐ Waterflow Detectors – Waterflow detectors are available for installation on the riser.

4.0 DIMENSIONS

Standard Trim Dimensions: cULus, FM, CCC Version

Standard trim and trim for use with excess pressure pump (without drain connection kit and water supply main control valve options).



NOTES

- The "A" dimension is the actual takeout dimension of the valve body.
- For systems with the optional Series 752 Retard Chamber Assembly, add 12 inches/305 mm to the "B" dimension to account for the additional height.

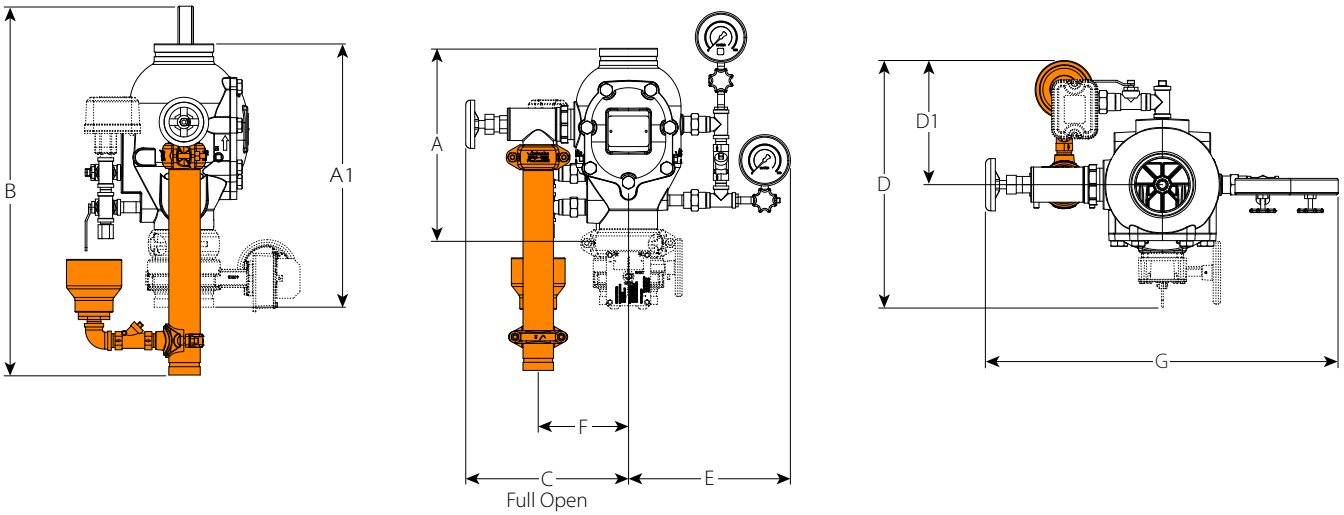
Size		Dimensions								Approx Weight Each	
Nominal inches mm	**Actual Outside Diameter** inches mm	**A** inches mm	**B** inches mm	**C** inches mm	**D** inches mm	**D1** inches mm	**E** inches mm	**F** inches mm	**G** inches mm	**Without Trim** lbs. kg	**With Trim** lbs. kg
1 ½ DN40	1.900 48.3	9.00 229	11.75 298	10.00 254	11.25 286	7.00 178	11.00 279	5.00 127	21.00 533	14.2 6.4	31.0 14.0
2 DN50	2.875 60.3	9.00 229	11.75 298	10.00 254	11.25 286	7.00 178	11.00 279	5.00 127	21.00 533	14.6 6.6	31.0 14.1
2 ½	2.875 73.0	12.50 318	15.00 381	11.25 286	11.75 298	7.50 191	11.75 298	7.50 191	23.00 548	34.4 15.6	52.0 23.6
DN65	3.000 76.1	12.50 318	15.00 381	11.25 286	11.75 298	7.50 191	11.75 298	7.50 191	23.00 584	34.4 15.6	52.0 23.6
3 DN80	3.500 88.9	12.50 318	15.00 381	11.25 286	11.75 298	7.50 191	11.75 298	7.50 191	23.00 584	35.3 16.0	52.0 23.6
4 DN100	4.500 114.3	15.00 381	18.25 464	13.00 330	12.75 324	7.75 197	13.00 330	6.75 171	26.00 660	49.0 22.2	80.0 36.3
165.1mm	6.625 168.3	16.00 406	19.00 483	13.50 343	14.75 375	9.00 229	13.75 349	6.75 171	27.25 692	69.0 31.3	91.0 41.3
6 DN150	6.500 165.1	16.00 406	19.00 483	13.50 343	14.75 375	9.00 229	13.75 349	6.75 171	27.25 692	69.0 31.3	95.0 43.1
8 DN200	8.625 219.1	17.50 445	18.75 476	14.75 375	17.25 438	10.00 254	14.75 375	6.75 171	29.50 749	142.0 64.4	182.0 82.6

4.0 DIMENSIONS

Standard Trim Dimensions: cULus, FM, CCC Version

Standard trim and trim for use with excess pressure pump (with drain connection kit and water supply main control valve options).

A 4-inch/114.3 mm Series 751 *FireLock* Alarm Check Valve with optional drain connection kit and water supply main control valve is shown below.



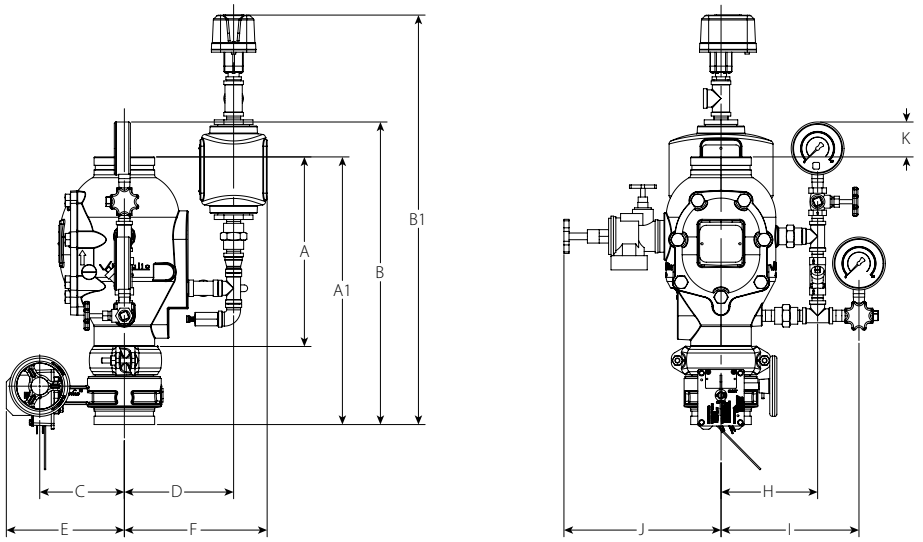
NOTES

- The "A" dimension is the actual takeout dimension of the valve body.
- The "A1" dimension is the actual takeout dimension of the valve body with optional water supply main control valve.
- For systems with the optional Series 752 Retard Chamber Assembly, add 12 inches/305 mm to the ·"B" dimension to account for the additional height. The "D" and ·"D1" dimensions are not fixed measurements. The drip cup of the drain connection kit option can be rotated to provide more clearance at the back of the trim.
- Components shown as dotted lines denote optional equipment.
- The recommended drain connection kit option (shaded in orange) is shown for reference and takeout dimensions.

Size		Dimensions									Approx Weight Each	
Nominal inches mm	Actual Outside Diameter inches mm	A inches mm	A1 inches mm	B inches mm	C inches mm	D inches mm	D1 inches mm	E inches mm	F inches mm	G inches mm	Without Trim lbs. kg	With Trim lbs. kg
1 ½ DN40	1.900 48.3	9.00 229	16.25 413	24.50 622	9.25 235	14.00 356	7.50 191	11.25 286	5.75 146	20.50 521	16.7 7.6	43.0 19.5
2 DN50	2.875 60.3	9.00 229	13.75 349	24.50 622	9.25 235	14.00 356	7.50 191	11.25 286	5.75 146	20.50 521	17.0 7.7	43.0 19.5
2 ½	2.875 73.0	12.50 318	16.50 419	26.25 667	11.25 286	16.50 419	9.00 229	11.75 298	6.50 165	23.00 584	41.0 18.7	65.0 29.5
DN65	3.000 76.1	12.50 318	16.50 419	26.25 667	11.25 286	16.50 419	9.00 229	11.75 298	6.50 165	23.00 584	41.0 18.7	65.0 29.5
3 DN80	3.500 88.9	12.50 318	16.50 419	26.25 667	11.25 286	16.50 419	9.00 229	11.75 298	6.50 165	23.00 584	41.0 18.7	65.0 29.5
4 DN100	4.500 114.3	15.00 381	19.75 502	25.50 648	13.00 330	18.00 457	9.25 235	13.00 330	7.50 191	26.00 660	59.0 26.7	95.0 43.0
165.1mm	6.625 168.3	16.00 406	22.13 562	25.25 641	13.50 343	20.75 527	9.25 235	13.75 349	7.75 197	27.25 692	80.0 36.2	116.0 52.6
6 DN150	6.500 165.1	16.00 406	22.13 562	25.25 641	13.50 343	20.75 527	9.25 235	13.75 349	7.75 197	27.25 692	80.0 36.2	116.0 52.6
8 DN200	8.625 219.1	17.50 445	23.00 584	26.75 679	14.75 375	24.00 610	10.50 267	14.50 368	9.25 235	29.25 743	122.0 55.3	158.0 71.6

4.0 DIMENSIONS (CONTINUED)

European Trim Dimensions: VdS, CE, LPCB, FM, EAC version



Size		Dimensions												Weight
Nominal inches mm	Actual Outside Diameter inches mm	A[2] inches mm	A1 inches mm	B inches mm	B1 inches mm	C inches mm	D inches mm	E inches mm	F inches mm	H inches mm	I inches mm	J inches mm	K inches mm	Approx. Each lbs. kg
3 DN80	3.500 88.9	12.50 318	16.50 419	17.13 435	28.75 730	5.50 140	7.63 194	7.50 191	10.13 257	6.63 168	9.75 248	10.88 276	0.63 16	75.8 34.4
4 DN100	4.500 114.3	15.00 381	19.88 505	22.50 572	30.50 775	6.25 159	8.13 206	8.75 222	10.63 270	7.13 181	10.25 260	11.63 295	2.50 64	100.4 45.5
6 DN150	6.625 168.3	16.00 406	22.13 562	24.63 625	32.13 816	8.13 206	9.38 238	10.75 273	11.88 302	7.50 191	10.63 270	12.00 305	2.50 64	132.5 60.1
8 DN200	8.625 219.1	17.50 445	23.00 584	23.25 591	30.13 765	9.38 238	8.50 216	12.00 305	11.00 279	9.25 235	12.13 308	13.38 340	0.25 6	199.7 90.6

[2] The “A” dimension is the measurement from the top of the valve body to the bottom of the valve body (takeout dimension).

NOTE

- Overall height “B” is greatest height if optional retard chamber is not installed.

5.0 PERFORMANCE

Standard Trim: cULus, FM, CCC Version

Frictional Resistance

The chart below expresses the frictional resistance of Series 751 *FireLock* Alarm Check Valve in equivalent feet of straight pipe.

Nominal Size inches mm	**Actual Outside Diameter** inches mm	**Equivalent Length of Pipe** feet meters
1 ½ DN40	1.900 48.3	3.00 0.910
2 DN50	2.875 60.3	9.00 2.740
2 ½	2.875 73.0	8.00 2.438
 DN65	3.000 76.1	8.00 2.438
3 DN80	3.500 88.9	17.00 5.182
4 DN100	4.500 114.3	21.00 6.401
6 DN150	6.625 168.3	22.00 6.706
	6.500 165.1	22.00 6.706
8 DN200	8.625 219.1	50.00 15.240

European Trim: VdS, CE, LPCB, FM, EAC version

Frictional Resistance

The chart below expresses the frictional resistance of Series 751 *FireLock* Alarm Check Valve in equivalent meters of straight pipe.

Nominal Size DN inches	**Actual Outside Diameter** mm inches	**Equivalent Length of Pipe** meters feet
DN80 3	88.9 3.500	5.182 17.00
DN100 4	114.3 4.500	6.401 21.00
DN150 6	168.3 6.625	6.706 22.00
DN200 8	219.1 8.625	15.240 50.00

5.0 PERFORMANCE (CONTINUED)

Maximum Working Pressure

Standard Trim:

Size		cULus	FM	CCC
Nominal inches DN	**Actual Outside Diameter** inches DN	psi kPa bar	psi kPa bar	psi kPa bar
1 ½ DN40	1.900 48.3	300 2068 21	300 2068 21	-
2 DN50	2.375 60.3	300 2068 21	300 2068 21	-
2 ½	2.875 73.0	300 2068 21	300 2068 21	-
DN65	3.000 76.1	300 2068 21	300 2068 21	-
3 DN80	3.500 88.9	300 2068 21	300 2068 21	232 1600 16
4 DN100	4.500 114.3	300 2068 21	300 2068 21	232 1600 16
6 DN150	6.625 168.3	300 2068 21	300 2068 21	232 1600 16
	6.500 165.1	300 2068 21	300 2068 21	232 1600 16
8 DN200	8.625 219.1	232 1600 16	232 1600 16	232 1600 16

European Trim:

Size		FM	EAC	VdS	LPCB	CE
Nominal inches DN	**Actual Outside Diameter** inches DN	psi kPa bar	psi kPa bar	psi kPa bar	psi kPa bar	psi kPa bar
3 DN80	3.500 88.9	232 1600 16	232 1600 16	232 1600 16	232 1600 16	232 1600 16
4 DN100	4.500 114.3	232 1600 16	232 1600 16	232 1600 16	232 1600 16	232 1600 16
6 DN150	6.625 168.3	232 1600 16	232 1600 16	232 1600 16	232 1600 16	232 1600 16
	6.500 165.1	232 1600 16	232 1600 16	232 1600 16	232 1600 16	232 1600 16
8 DN200	8.625 219.1	232 1600 16	232 1600 16	232 1600 16	232 1600 16	232 1600 16

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 REFERENCES

10.64: Style 009N Firelock EZ™ Rigid Coupling

10.81: Firelock™ Butterfly Valve with Weatherproof Actuator Series 705 Submittal

I-751: Firelock™ Alarm Check Valve Series 751 Installation, Maintenance, and Testing Manual

I-751-NXT.KIT: Firelock™ European Fire Protection Valves Series 751,764,768 and 769 Alarm Kit Trim Instructions (Europe Only)

I-751.PST: Firelock™ Alarm Check Valve Series 751 Installation Poster

I-751.VDS: Firelock™ European Alarm Check Valve Stations Series 751 Installation, Maintenance, and Testing Manual

I-751-VDS-ADD: Firelock™ European Alarm Check Valve Station (VDS) Series 751 Wall Chart for Placing the System in Service

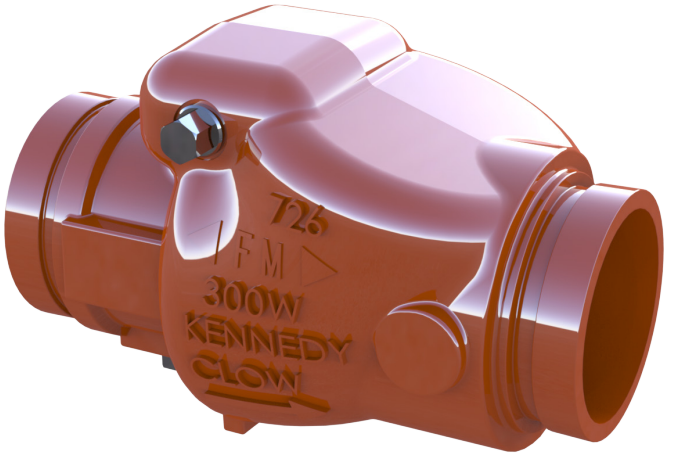
I-751.VDS-KIT: Firelock™ European Alarm Check Valve Stations Series 751 Kit Installation Instructions

I-760: Firelock™ Water Motor Alarm Series 760 Installation Manual

GROOVED END CHECK VALVE - FIG. 726

The Kennedy Valve Figure 726 Grooved End Check Valve is a lightweight unit that is intended to be easily installed with approved IPS grooved couplings. They may be installed either with the flow in a vertical position (flow up) or horizontally Upon request valves can have a 1/2" NPT connection on the inlet side for installation of a 1/2" ball drip.

- UL/FM Listed

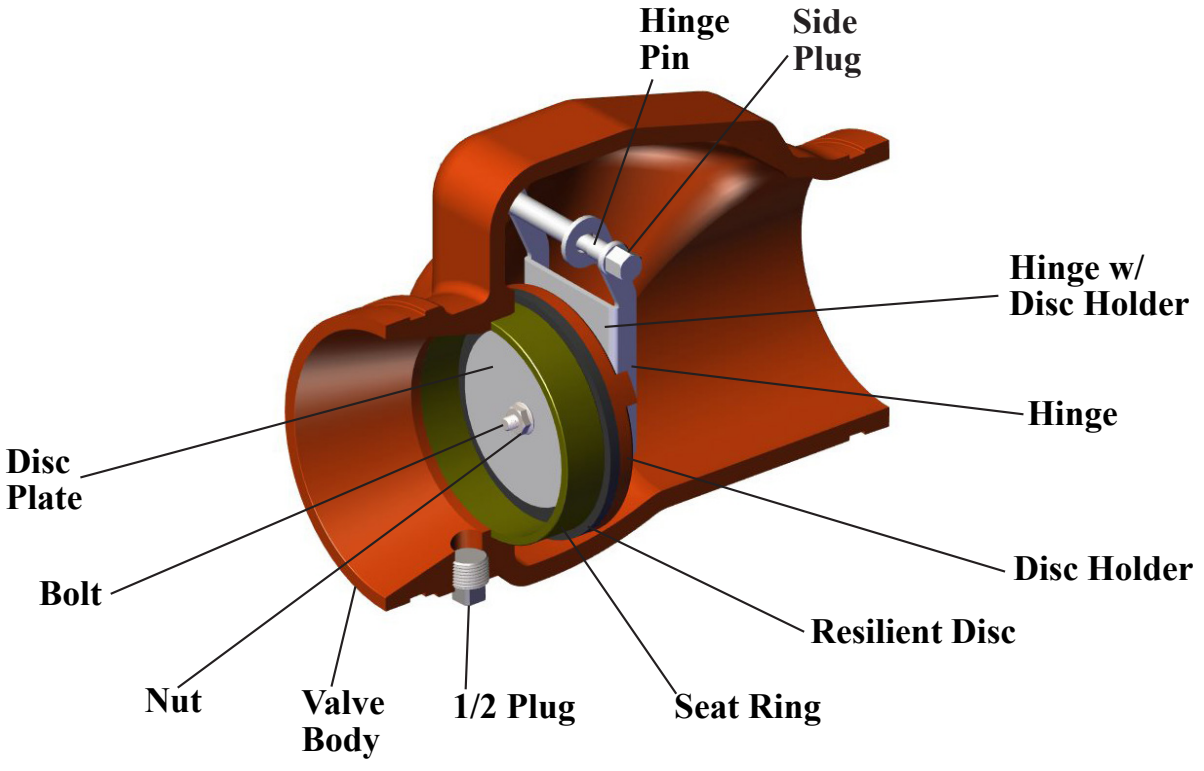


SIZES & WEIGHT

- 2-1/2" - 15 lbs.
- 3" - 20 lbs.
- 4" - 25 lbs.
- 6" - 50 lbs.
- 8" - 68 lbs. (requires lifting lug)

WORKING PRESSURE

Working Pressure - 300 PSI



BUTTERFLY VALVES 2-1/2"-8"

Designed for years of trouble free reliability, Kennedy UL-FM butterfly valves are constructed of durable ductile iron for a lightweight superior product. We utilize stainless steel upper and lower shafts as well as EPDM encapsulated discs. Our fusion bonded coated bodies offer a superior long-lasting coating. The valves are slow operating with low torque leading to excellent high cycle life. Our butterfly valves are always rated to 300psi and all are fully hydrostatically tested before they leave Elmira, NY.

GROOVED BUTTERFLY VALVES

- G300 - 2-1/2" - 6"
- 01G - 8"

Long Body BFV

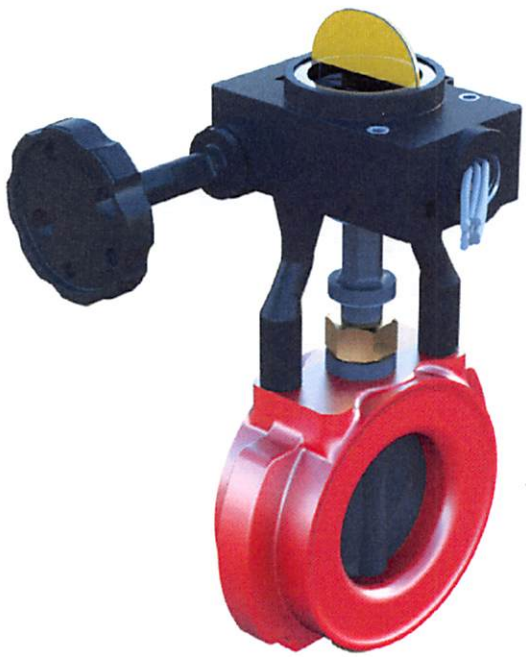
- G300E - 2-1/2" - 6"
- 02G - 8"
- Long Body BFV are USC Approved with EPDM Disc

Working Pressure

- UL/FM 300 PSI

Features

- Outdoor Rated
- NSF Certified (Long Body Only)
- Lightweight
- Standard Grooves



WAFER BUTTERFLY VALVES

- W300 - 2-1/2" - 6"
- 01W - 8"

Working Pressure

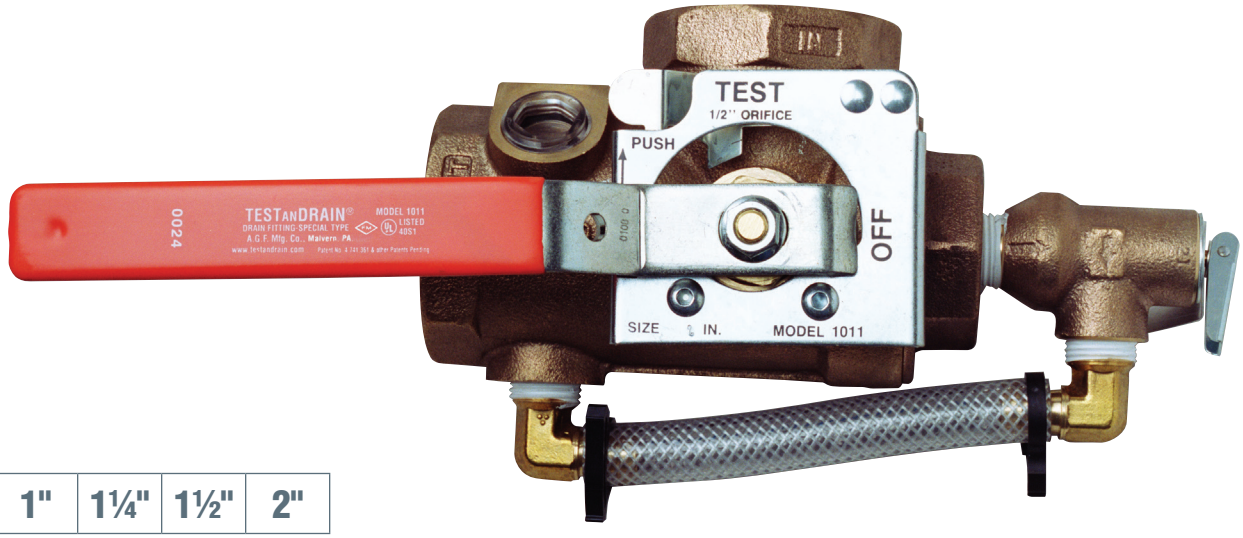
- UL/FM 300 PSI

Features

- Outdoor Rated
- Integral Gearbox (2-1/2" - 6")
- Lightweight
- Short Lay Length
- Does NOT require washer for installation with grooved flange adapter.

Model 1011A
TESTANDRAIN®

Sectional Floor Control Test and Drain Valve for Systems Requiring Pressure Relief Valve



Sizes:

¾"	1"	1¼"	1½"	2"

The AGF **Model 1011A TESTANDRAIN®** provides the test and express drain functions for wet fire sprinkler systems on multi-story installations requiring pressure relief (NFPA 13 and NFPA 13R). The **Model 1011A** features a **Model 7000 Pressure Relief Valve** with drain pipe.

The **Model 1011A** is available in a full range of sizes (¾" to 2") with NPT connections (BSPT available). The **Model 7000 Pressure Relief Valve** (UL/FM) features a flushing handle and a 175 PSI factory rating (other pressure ratings available).

- Complies with NFPA 13 and NFPA 13R Requirements
- Compact, Single-Handle Ball Valve
- Tamper-Resistant Test Orifice and Sight Glasses
- 300 PSI rated.
- Specifiable orifice sizes: ⅜" (2.8K), 7⁄16" (4.2K), ½" (5.6K), 17⁄32" (8.0K), ⅝" (11.2K, ELO), ¾" (14.0K, ESFR), and K25
- Relieves Excess System Pressure caused by Surges or Temperature Changes
- Shipped with Relief Valve and Bypass Drain Ports Plugged to Expedite Pressure Testing
- Locking Kit Available

Repair kits are available for all **TESTANDRAIN®** valves. Kit includes: Adapter Gasket (1), Ball (1), Valve Seats (2), Stem Packing (1), and Stem Washer (1). ***Valve and orifice size must be specified when ordering.***

NOTE: It is important to note that the pressure rating of the relief valve indicates an operating range of pressure for both opening and closing of the valve. Standard relief valves are required to OPEN in a range of pressure between 90% and 105% of their rating. The valves are required to CLOSE at a pressure above 80% of that rating. The relief valve should be installed where it is easily accessible for maintenance. Care should be taken that the relief valve CANNOT be isolated from the system when the system is operational. A relief valve should NEVER have a shutoff valve or a plug downstream of its outlet.

Reliability, Versatility, Code Compatibility

Model 1011A
TEST AN DRAIN®

Model 1011A 300 PSI Bronze Ball Valve, Model 7000 Pressure Relief Valve
Factory Rated at 175 PSI with other setting available

Dimensions

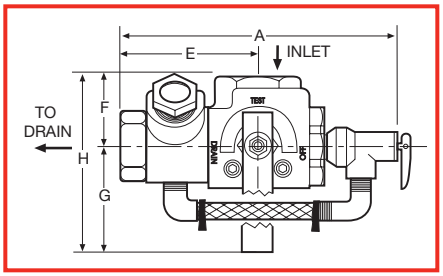
SIZE	A	B	C	D	E	F	G	H
¾"	7 9/16" (191 mm)	1 1/2" (37.5 mm)	2 3/16" (57 mm)	3 5/8" (93 mm)	3 3/8" (86 mm)	1 13/16" (46 mm)	4 9/16" (117 mm)	6 3/8" (162.5 mm)
1"	7 9/16" (191 mm)	1 1/2" (37.5 mm)	2 3/16" (57 mm)	3 5/8" (93 mm)	3 3/8" (86 mm)	1 13/16" (46 mm)	4 9/16" (117 mm)	6 3/8" (162.5 mm)
1¼"	7 15/16" (201 mm)	1 11/16" (43 mm)	2 9/16" (65 mm)	4 1/4" (108 mm)	3 5/8" (91 mm)	1 15/16" (51 mm)	5 9/16" (141 mm)	7 1/2" (192 mm)
1½"	8 15/16" (227 mm)	1 13/16" (45 mm)	3 1/4" (81.5 mm)	5 1/16" (127 mm)	3 7/8" (99 mm)	2 5/8" (67 mm)	8 1/4" (207 mm)	10 7/8" (274 mm)
2"	8 15/16" (227 mm)	1 13/16" (45 mm)	3 1/4" (81.5 mm)	5 1/16" (127 mm)	3 7/8" (99 mm)	2 5/8" (67 mm)	8 1/4" (207 mm)	10 7/8" (274 mm)

The Model 1011A provides the following…

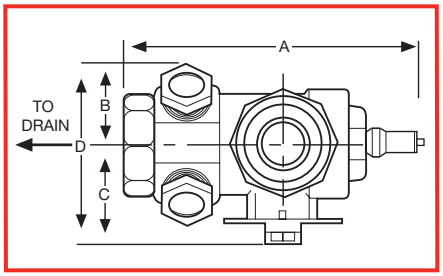
From the 2013 Edition of NFPA 13

Chapter 8.16.2.4.1*	Provisions shall be made to properly drain all parts of the system.
Chapter 8.16.2.4.2 & 8.16.2.4.3	Drain connections, interior sectional or floor control valve(s) – shall be provided with a drain connection having a minimum size as shown in Table 8.16.2.4.2.
Chapter 8.16.2.4.4	Drains shall discharge outside or to a drain capable of handling the flow of the drain.
Chapter A.8.17.4.2	(Wet Pipe System) test connection is permitted to terminate into a drain capable of accepting full flow… using an approved sight test connection containing a smooth bore corrosion-resistant orifice giving a flow equivalent to one sprinkler…
Chapter 8.17.4.2.2	The test connection valve shall be accessible.
Chapter 8.17.4.2.4	shall be permitted to be installed in any location… downstream of the waterflow alarm.
Chapter 8.17.4.3.1	(Dry Pipe System) a trip test connection not less than 1" in diameter, terminating in a smooth bore corrosion-resistant orifice, to provide a flow equivalent to one sprinkler…
Chapter 8.17.4.3.2	The trip test connection… with a shutoff valve and plug not less than 1", at least one of which shall be brass.
Chapter 7.1.2	- a wet pipe system shall be provided with a listed relief valve set to operate at 175 PSI or 10 PSI in excess of the maximum system pressure, whichever is greater.
Chapter 8.16.1.2.3*	A listed relief valve of not less than ½" in size shall be provided on the discharge side of the pressure-reducing valve set to operate at a pressure not exceeding rated pressure of the system.
Chapter A.8.16.1.2.3	- consideration should be given to piping the discharge from the (pressure relief) valve

Model 1011A - Front View



Model 1011A - Plan View



Orifice Sizes

3/8", 7/16", 1/2", 17/32", 5/8" ELO*,
¾" ESFR*, and K25**

Materials

Handle ..... Steel
Stem ..... Rod Brass
Ball..... C.P. Brass
Body ..... Bronze
Valve Seat..... Impregnated Teflon®
Indicator Plate .... Steel
Relief Valve ..... Bronze
Bypass Fittings... Brass
Bypass Tubing.... Nylobraid

Approvals

UL and ULC Listed:
(EX4019 & EX4533)
FM Approved
NYC-BSA No. 720-87-SM

MADE IN U.S.A.

USA Patent # 4741361 and Other Patents Pending

AGF Manufacturing Inc.
100 Quaker Lane, Malvern, PA 19355
Phone: 610-240-4900
Fax: 610-240-4906
www.testandrain.com

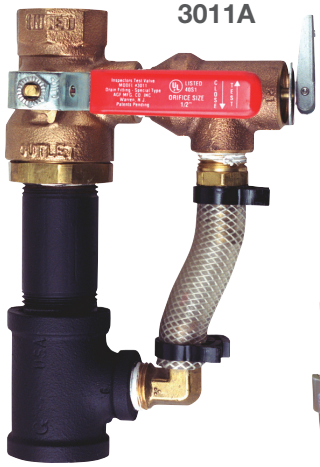
Job Name:_____
Architect:_____
Engineer:_____
Contractor:_____

*Available on 1¼" to 2" size units only • **Available on 1½" and 2" size units only

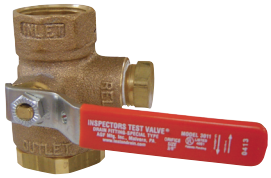
Model 3011
INSPECTOR'sTEST®

Remote Inspector's Test

For Single Story and Other Applications Including Systems Requiring Pressure Relief Valve



3011A



3011BV

3011SG

3011ASG

Size:

1"

The AGF **Model 3011 INSPECTOR'sTEST®** family of valves are designed to perform the remote inspector's test function on single story systems and other applications with the benefit of locating the orifice indoors. The Inspector'sTEST is available in four different models (M3011BV, M3011SG, M3011A, and M3011ASG) with optional orifice sizes (3/8" 2.8K, 7/16" 4.2K, 1/2" 5.6K, 17/32" 8.0K, and 5/8" 11.2K ELO).

The **Model 3011A** and **3011ASG** feature a **Model 7000 Pressure Relief Valve** rated at 175 PSI with drainage piping designed to relieve excess system pressure caused by surges or temperature changes. Both models solve the difficult problem of providing the relief valve with a drainage piping outlet while complying with NFPA 13 requiring installation of a pressure relief valve on all grided systems and downstream of all pressure reducing valves.

To expedite system testing every Inspector'sTEST model is shipped semi-assembled with relief valve and bypass drain ports plugged.

- Complies with NFPA 13
- Compact, Single-Handle Ball Valve
- Tamper-Resistant Test Orifice
- Tamper-Resistant Sight Glass
- 300 PSI rated ball valve.
- 175 PSI rated pressure relief valve
- Specifiable orifice sizes

NOTE: It is important to note that the pressure rating of the relief valve indicates an operating range of pressure for both opening and closing of the valve. Standard relief valves are required to OPEN in a range of pressure between 90% and 105% of their rating. The valves are required to CLOSE at a pressure above 80% of that rating. The relief valve should be installed where it is easily accessible for maintenance. Care should be taken that the relief valve CANNOT be isolated from the system when the system is operational. A relief valve should NEVER have a shutoff valve or a plug downstream of its outlet.

Reliability, Versatility, Code Compatibility

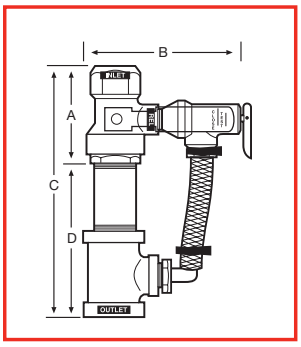
Model 3011
INSPECTOR'S TEST®

300 PSI Bronze Ball Valve

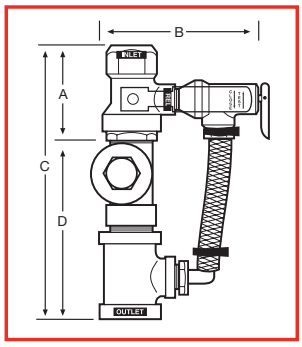
c UL LISTED

FM APPROVED

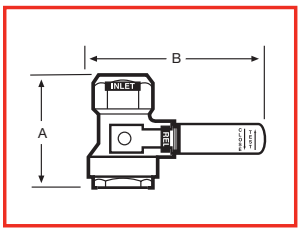
Model 3011A



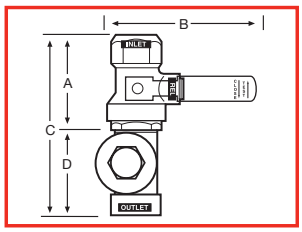
Model 3011ASG



Model 3011BV



Model 3011SG



Orifice Sizes

3/8", 7/16", 1/2", 17/32", and 5/8" ELO

Approvals

UL and ULC Listed:
[EX4019(N) & EX4533(N)]
FM Approved
NYC-BSA No. 720-87-SM

Materials

Handle	Steel
Stem	Rod Brass
Ball	C.P. Brass
Body	Bronze
Valve Seat	Virgin Teflon®
Relief Valve	Bronze
Bypass Fittings	Brass
Bypass Tubing	Nylobraid
Sight Glass	Bronze & Glass

Dimensions

SIZE	A	B	C	D
3011A	3 1/16" (75 mm)	4 11/16" (118 mm)	7 7/8" (200 mm)	4 7/8" (124 mm)
3011BV	3 1/16" (75 mm)	4 11/16" (118 mm)	—	—
3011ASG	3 1/16" (75 mm)	4 11/16" (118 mm)	9 5/16" (237 mm)	6 1/4" (159 mm)
3011SG	3 1/16" (75 mm)	4 11/16" (118 mm)	6 3/16" (157 mm)	3 1/8" (79 mm)

From the 2013 Edition of NFPA 13

Models 3011A, 3011BV, 3011ASG, and 3011SG, depending on the variant chosen, provide some or all requirements listed below:

Chapter 8.16.2.4.1*	Provisions shall be made to properly drain all parts of the system.
Chapter 8.16.2.4.2 & 8.16.2.4.3	Drain connections, interior sectional or floor control valve(s) – shall be provided with a drain connection having a minimum size as shown in Table 8.16.2.4.2.
Chapter 8.16.2.4.4	Drains shall discharge outside or to a drain capable of handling the flow of the drain.
Chapter 8.16.2.4.6	The test connection shall be permitted to be used as main drain connection.
Chapter A.8.17.4.2	(Wet Pipe System) test connection is permitted to terminate into a drain capable of accepting full flow… using an approved sight test connection containing a smooth bore corrosion-resistant orifice giving a flow equivalent to one sprinkler…
Chapter 8.17.4.2.2	The test connection valve shall be accessible.
Chapter 8.17.4.2.4	shall be permitted to be installed in any location… downstream of the waterflow alarm.
Chapter 7.1.2	- a gridded wet pipe system shall be provided with a relief valve set to operate at 175 PSI or 10 PSI in excess of the maximum system pressure, whichever is greater.
Chapter 8.16.1.2.3*	A relief valve of not less that ½" in size shall be provided on the discharge side of the pressure-reducing valve set to operate at a pressure not exceeding 175 psi.
Chapter A8.16.1.2.3	- consideration should be given to piping the discharge from the (pressure relief) valve
Chapter 8.17.4.3.1	(Dry Pipe System) a trip test connection not less than 1" in diameter, terminating in a smooth bore corrosion-resistant orifice, to provide a flow equivalent to one sprinkler…
Chapter 8.17.4.3.2	The trip test connection… with a shutoff valve and plug not less than 1", at least one of which shall be brass.

MADE IN U.S.A.

USA Patent # 4971109 and Other Patents Pending

AGF Manufacturing Inc.
100 Quaker Lane, Malvern, PA 19355
Phone: 610-240-4900
Fax: 610-240-4906
www.testandrain.com

Job Name:_____

Architect:_____

Engineer:_____

Contractor:_____

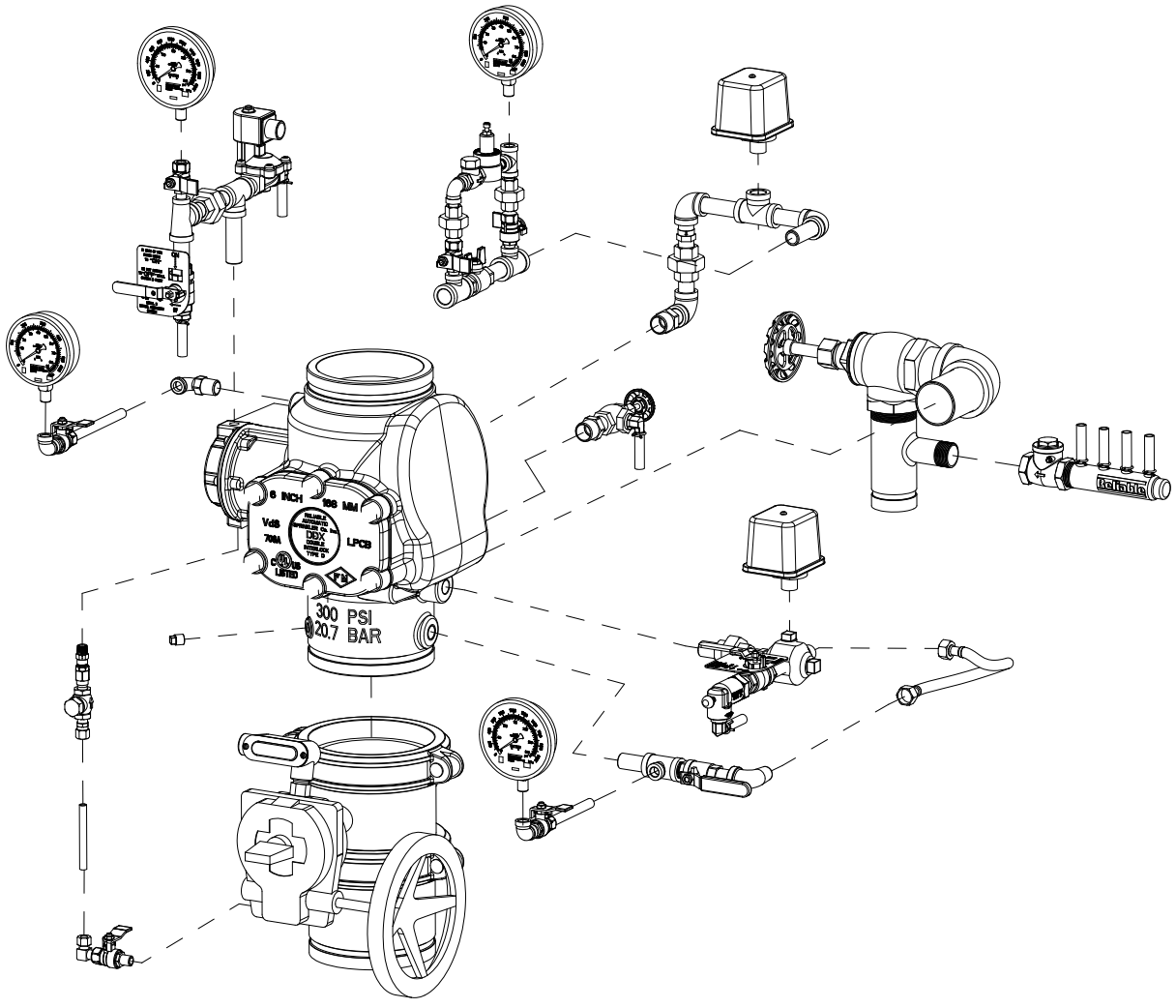
Bulletin 750 October 2018

Model DDX Double Interlock Preaction System – Type D
2” (50 mm), 2½” (65 mm), 3” (80 mm), 76 mm, 4” (100 mm), 6” (150 mm), 165 mm & 8” (200 mm)

Instructions for Installation, Operation, Care, and Maintenance

7 to 10 psi (0.5 to 0.7 bar) Pneumatic Supervising Pressure with Electric/Electric Actuation Controlled by a Cross-Zoned Releasing Control Panel

- Available with 175 psi (12.1 bar) or 300 psi (20.7 bar) Rated Solenoid Valve
- Externally Resettable Clapper
- One Main Drain



750CVRB

Model DDX Type D Double Interlock Preaction

General

The Reliable Model DDX Type D Double Interlock Preaction system is designed for water sensitive areas that require protection from inadvertent water flow into the sprinkler system piping, but where a mechanical backup for the electric release is not required. Typical applications for this type of system are libraries and computer server rooms.

To release the valve and flow water into a Type D Double Interlock Preaction System, two events must take place: a fire detection device must operate, and the low pressure switch must be operated by the loss of system air or nitrogen pressure due to sprinkler operation (see note 1 below). These two signals must coexist at the releasing control panel, which only then will energize the normally closed solenoid valve (175 psi (12.1 bar) or 300 psi (20.7 bar) rated), causing the water flow into the system.

These systems utilize fire detection devices and system air pressure as separate zones (inputs) to a cross-zoned releasing control panel. The solenoid releasing valve remains closed until energized by the releasing control panel. This will occur only when both a fire detection device is operated and the low air pressure switch has detected sufficient loss of system air pressure generally resulting from the operation of a fire sprinkler.

In the event that the system piping is ruptured, or a sprinkler is accidentally opened, the low air pressure switch will operate and an alarm will sound. The Model DDX Deluge Valve, however, will not release water since the solenoid valve remains closed due since the detection system has not activated.

Conversely, in the event of a false alarm from the detection system, the Model DDX Deluge Valve will not release water provided air pressure in the system is maintained and the low pressue switch is not activated. The requirement for both detector operation and loss of system pressure before the Model DDX Type D Double Interlock Preaction system releases water assures maximum protection against inadvertent water flow.

At the heart of the Reliable Type D Double Interlock Preaction System is the Model DDX Deluge Valve. This deluge valve is a hydraulically operated, straight-through-design, differential latching clapper-type (see Fig. 1). System maintenance is simplified since the deluge valve can be reset extermally without removing the cover plate. This feature provides a significant system-restoration time advantage. The Model DDX Deluge Valve has an intermediate chamber and thereby does not require an in-line air check valve. Subsequently, the deluge valve only requires a single drain connection.

The Reliable Model DDX Type D Double Interlock Preaction System trim set provides all of the necessary equipment for connections to the Model DDX Deluge Valve pushrod chamber inlet and outlet ports, a 1¼" (30 mm) main drain on 2" (50 mm), 2½" (65 mm), 76 mm and 3" (80 mm) valve sizes or a 2" (50 mm) main drain on 4" (100 mm), 165 mm, 6" (150 mm) and 8" (200 mm) valve sizes, alarm devices, air supply, and required pressure gauges. This trim set is available in individual (loose) parts, in time-saving, segmented assembled kit forms or fully assembled to the Model DDX Deluge Valve (with or without a control valve).

Listings & Approvals:

(Only when used with Reliable Trim Sets.)

1. Reliable's Type D Double Interlock Preaction Systems 2" (50 mm), 2½" (65 mm), 76 mm and 3" (80 mm), 4" (100 mm), 165 mm, 6" (150 mm) and 8" (200 mm) are Factory Mutual Approved Refrigerated Area Sprinkler Systems for use in refrigerated rooms or buildings. Refrigerated area sprinkler systems are FM Approved as complete systems. Systems are FM Approved for use with thermal detectors and Class A detector wiring only.
2. Reliable's Type D Double Interlock Preaction Systems 2" (50 mm), 2½" (65 mm), 76 mm, 3" (80 mm), 4" (100 mm), 165 mm, 6" (150 mm) and 8" (200 mm) are Underwriters Laboratories, Inc. Listed and UL certified for Canada (cULus) in the Special System Water Control Valve-Double Interlock Type (VLJH) category.

Note: Wherever the word "air" is used in this bulletin as a reference to the pneumatic pressure source it shall also mean "air or nitrogen."

System Operation

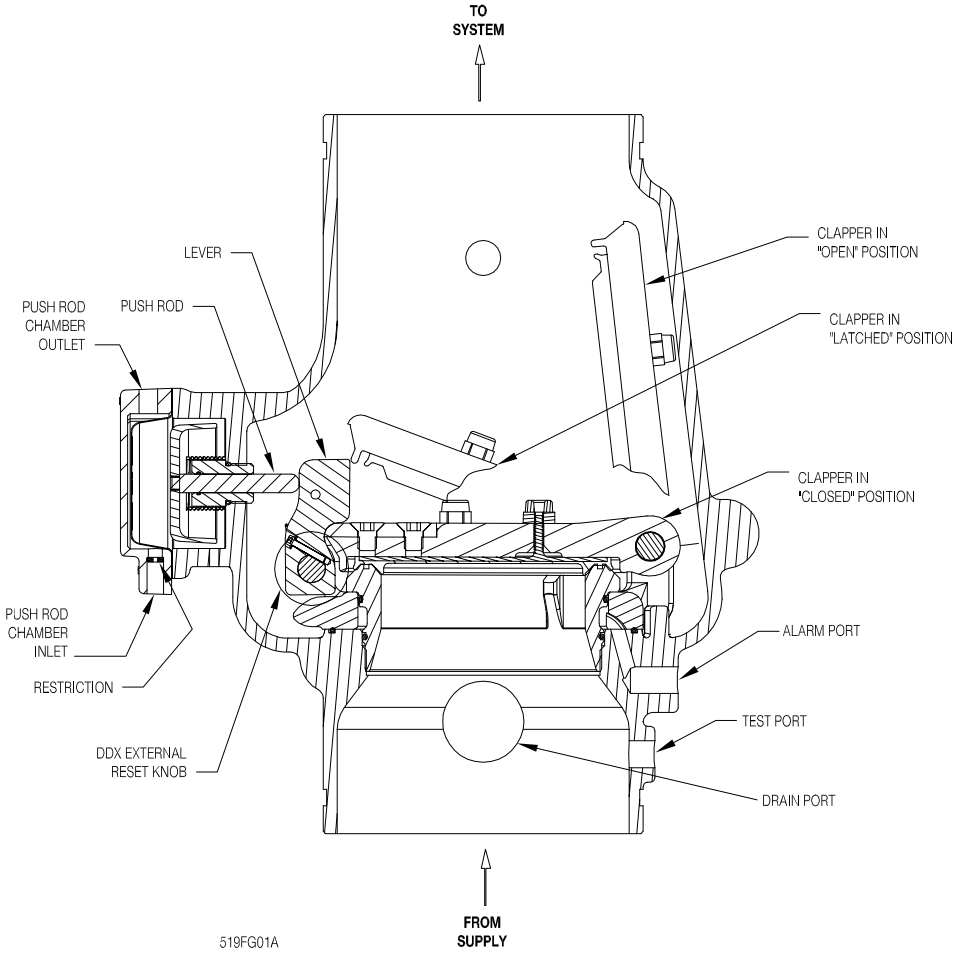
When set correctly for service, the Model DDX Deluge Valve is hydraulically established to separate the supply water from the sprinkler system piping. The Reliable Model DDX Deluge Valve is shown in both closed and open positions in Fig. 1. In the closed position, the supply pressure acts on the underside of the clapper and also on the pushrod through the pushrod chamber inlet restriction. The resultant force due to the supply pressure acting on the pushrod is multiplied by the mechanical advantage of the lever and is more than sufficient to hold the clapper closed against normal supply pressure surges.

Whenever the detection system is activated and a low system air pressure condition coexist, the solenoid valve is energized open which vents the pushrod chamber to atmosphere through the chamber outlet. Since the pressure can not be replenished through the inlet restriction as rapidly as it is vented, the pushrod chamber pressure falls instantaneously. When the pushrod chamber pressure approaches approximately on-third of the supply pressure, the upward force of the supply pressure acting beneath the clapper overcomes the lever applied force thereby opening the clapper.

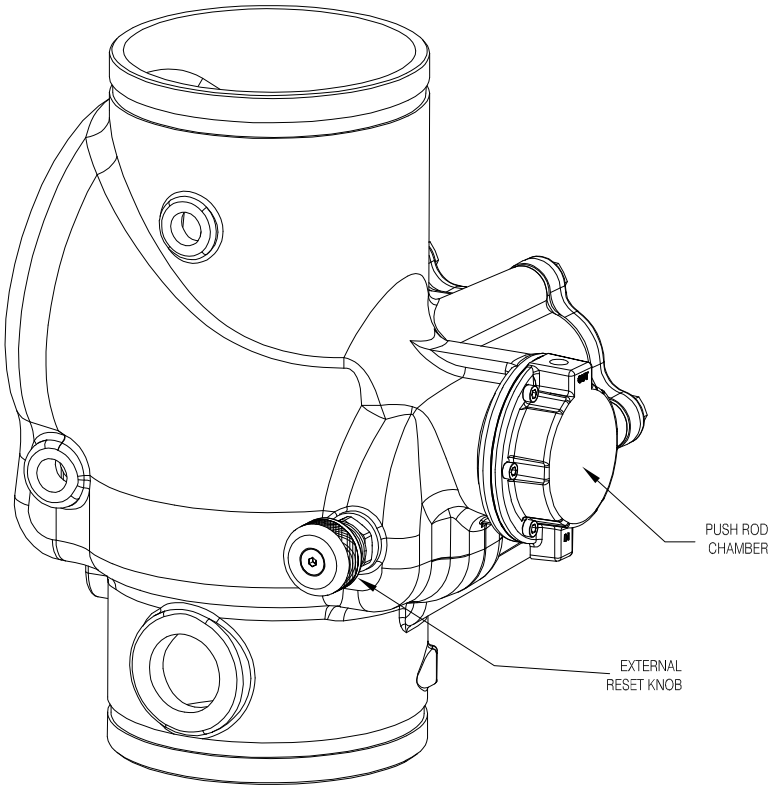
Once the clapper has opened, the lever acts as a latch, preventing the clapper from returning to the closed position. Water from the supply flows through the Deluge Valve into the sprinkler system piping. Water also flows through the alarm outlet to the alarm devices.

Resetting the clapper of the Model DDX Deluge Valve is accomplished using the convenient external reset knob on the rear of the valve. The external reset feature of the Model DDX Deluge Valve provides a means for simple, economical system testing, which is one essential facet of a good maintenance program. The external reset feature does not, however, eliminate another important facet of good maintenance, namely, periodic cleaning and inspection of the internal valve parts.

DDX VALVE CLAPPER IN "OPEN", "CLOSED" AND "LATCHED" POSITIONS



REAR VIEW OF MODEL DDX VALVE



PUSH INWARD AND ROTATE KNOB CLOCKWISE TO RESET CLAPPER.
DO SO ONLY WHEN PUSH ROD CHAMBER IS VENTED.

Fig. 1

A valve body drain is provided in the event that water builds up due to condensate from the air supply system or water left inside form system testing. After closing the main supply valve, the condensate drain can be opened slightly until the water inside the vale body and main pipe column has drained. See the section titled “Draining Excess/Condensate Water from the System” in this bulletin for the detailed procedure.

The Model B Manual Emergency Station is included in the Reliable Type D Double Interlock Preaction System trim sets. It consists of an aluminum nameplate mechanically attached to a ball valve. The valve handle in its OFF position is guarded against accidental turning to the ON position (and system discharge) by a nylon cable tie provided with each trim kit. The cable tie is inserted after the system has been restored for operation. The nylon cable tie is designed to allow, in case of an emergency, forceful turning of the valve handle to the ON position. As an alternative to the Model B Hydraulic Manual Emergency Station, the Model A Hydraulic Manual Emergency Pull Box (see Reliable Bulletin 506) is also available and can be provided as an option.

Whenever ambient temperature conditions are high, the water temperature in the Model DDX Deluge Valve pushrod chamber could possibly increase, thereby increasing the pressure in the chamber to values exceeding the rated pressure of the system. In an indoor installation where standard room temperatures are exceeded, a pressure relief kit may be needed. Pressure relief kit, P/N 6503050001, can be installed into the pushrod chamber’s releasing line to limit the pressure to 250 psi (17.2 bar).

Reliable Model DDX Deluge Valve with associated Type D Double Interlock Preaction Trims sizes 2” (50 mm), 2½” (65 mm), 76 mm, 3” (80 mm), 4” (100 mm), 165 mm, 6” (150 mm) and 8” (200 mm) are rated for use at a minimum water supply pressure of 20 psi (1.4 bar) and a maximum water supply pressure of 250 psi (17.2 bar) for 2” (50mm), 2½” (65mm), 3” (80mm), 76mm and 8” (200mm) valve sizes and 300 psi (20.7 bar) for 4” (100mm), 6” (150mm) and 165mm valve sizes. Water supplied to the inlet of the valve and to the pushrod chamber must be maintained between 40˚F (4˚C) and 140˚F(60˚C).

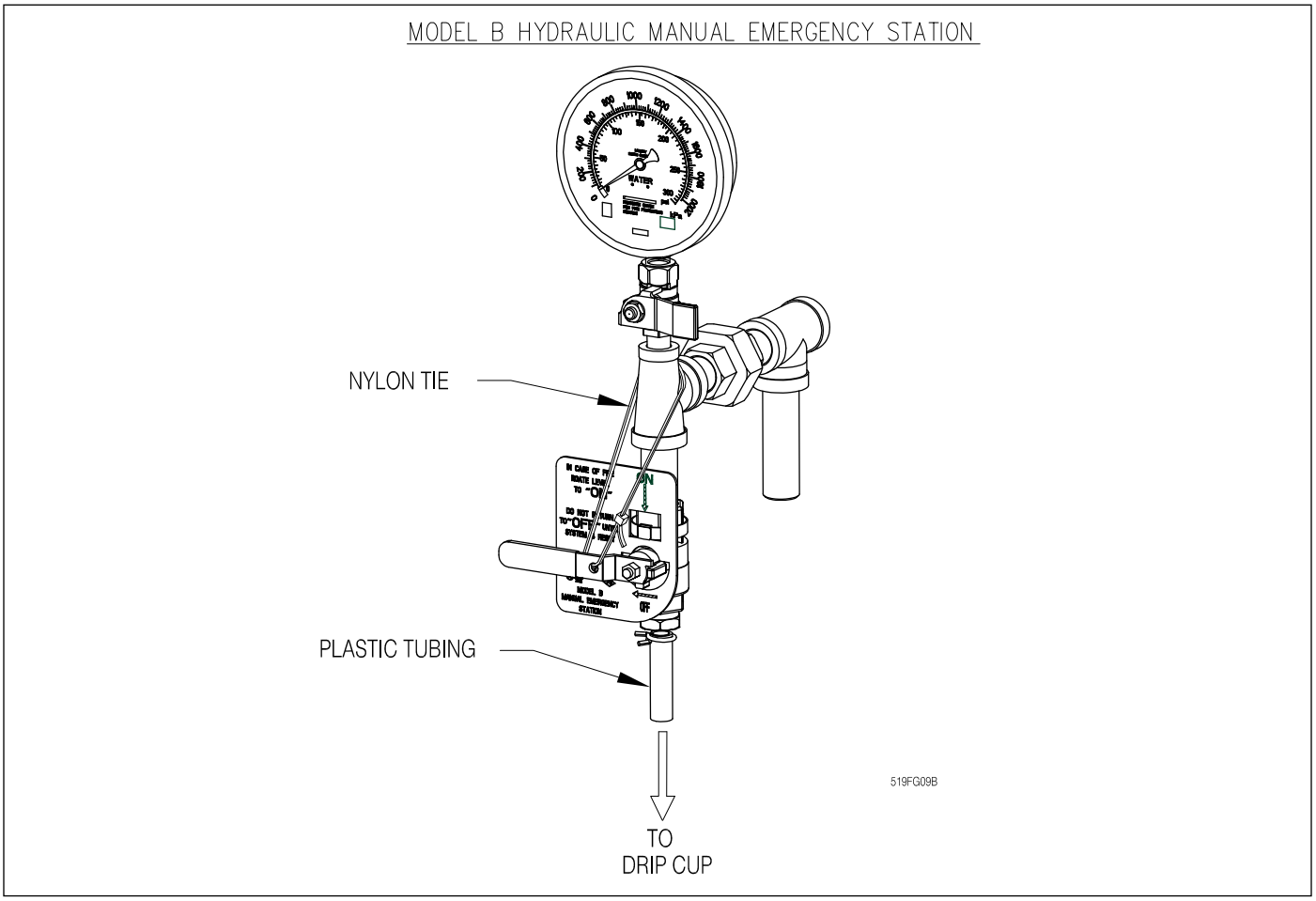


Fig. 2

Pressurizing Line Connection

The water supply for the pushrod chamber must be provided a dedicated connection to the water supply piping. Pressurizing lines for multiple Model DDX Deluge Valve pushrod chambers must never be manifolded together. Each Model DDX Deluge Valve must have its own pushrod chamber pressurizing line connection.

This connection must be made on the supply side of the water supply control valve. This can be accomplished by:

- Using a tapped connection directly below or next to the main water supply control valve using a welded outlet or the appropriate mechanical fittings. A grooved-end outlet coupling is one way to achieve this; or
- Using a water supply control valve that has an available threaded (NPT) supply-side tap design to allow for a direct water supply connection to the Model DDX Deluge Valve's pushrod chamber.

Caution: Reliable's DDX valve is designed with an inlet restriction built into the pushrod chamber. It is important not to introduce additional restrictions into the direct water supply connection or the discharge from the pushrod chamber by installing additional valves or improperly installing the copper lines used in the trim of the valve.

Hydrostatic Testing of DDX Valves and DDX Systems

As required by NFPA 13, fire sprinkler systems with working pressures up to and including 150 psi are to be hydrostatically tested at a water pressure of 200 psi. Fire sprinkler systems with working pressures above 150 psi are required to be hydrostatically tested at 50 psi above the system working pressure. In addition to the hydrostatic tests described above, dry pipe and double interlock preaction systems require an additional low pressure air test.

In some cases, hydrostatic testing (in accordance with the NFPA 13 requirements noted above) will result in pressures that exceed the working pressure of the valve and trim kit for the two-hour test period. **The valve and applicable trim kit have been tested, approved and listed under these conditions and as such, hydrostatic testing in accordance with NFPA 13 is acceptable. In addition, the clapper can remain in the closed position and the trim kit need not be isolated, as each has been designed to withstand hydrostatic testing as required by NFPA 13.**

Hydrostatically testing the valve and trim to pressures higher than their rating is limited to the hydrostatic test as referenced by NFPA 13. It does not address the occurrence(s) of a "water hammer" effect, which can indeed damage the valve. A "water hammer" in the water supply piping of the valve can create pressures in excess of the rated pressure and should be avoided by all necessary means. This condition may be created from improper fire pump settings, underground construction work, or an improper venting of trapped air in the water supply piping.

System Design Considerations

The automatic sprinklers, releasing devices, electric releasing control equipment, fire detection devices, manual pull stations, and signaling devices which are utilized with the Type D Double Interlock Preaction System must be UL or ULC Listed or FM Approved, as applicable.

Factory Mutual requires that detection devices in refrigerated areas be of the fixed temperature type. In addition, they must have a temperature rating lower than that of the sprinklers and preferably as low as possible for the given ambient conditions.

The Deluge Valve, and all interconnecting piping must be located in a readily visible and accessible location and in an area that can be maintained above 40ºF (4ºC). **Note:** Heat Tracing is not permitted.

Pendent sprinklers, other than dry pendents, used on preaction systems shall be installed on return bends per NFPA 13.

The solenoid valve must be operated and the system supervised by a listed releasing control panel.

System Air Pressure Requirements

In accordance with NFPA 13, Double Interlock Preaction Systems require a minimum of 7 psi (0.5 bar) pneumatic pressure to supervise the sprinkler system. The Reliable Model A Pressure Maintenance Device is used to maintain the system pneumatic pressure between 7 and 10 psi (0.5 and 0.7 bar) where a dry nitrogen gas supply or a clean, dependable and continuous (24 hours a day, 7 days a week) compressed air source is available.

To adjust the system pneumatic pressure between 7 and 10 psi (0.5 and 0.7 bar) refer to Reliable Bulletin 251. The low air pressure alarm switch is factory set to operate between 5 and 6 psi (0.3 and 0.4 bar) on decreasing pressure. If necessary, adjustments can be made by following the manufacturer's adjustment procedure as described in the installation and maintenance instructions.

Note: The dew point of the air supply must be maintained below the lowest ambient temperature to which the double interlock preaction system piping will be exposed. Introduction of moisture into the system piping that is exposed to freezing temperatures can create ice blockage, which could prevent proper operation of the sprinkler system. As a minimum, the air supply of air should be taken from the refrigerated area at the lowest temperature. The air supply system must be carefully designed to prevent plugging by frost deposits. Special requirements such as those in FME&R Installation Guidelines for Refrigerated Storage may need to be incorporated.

Each Type D Double Interlock Preaction system is provided with a Reliable Model A Pressure Maintenance Device for individual monitoring of pneumatic pressure and proper operation of the system. The Reliable Model A Pressure Maintenance Device requires a tank mounted air compressor.

System Electrical Requirements

All releasing and detection devices in Reliable's Model DDX Type D Double Interlock Preaction System may be operated and supervised by the PFC-4410-RC Releasing Control Panel. An emergency manual pull station should be provided near the sprinkler riser to facilitate setup of the system.

The power supply, the standby emergency power supply, battery charger, and the rectifier circuitry are all contained within the Potter PFC-4410-RC Releasing Control Panel. Batteries that provide ninety hours of standby power are required for Factory Mutual Approved systems.

The Potter PFC-4410-RC Releasing Control Panel can utilize either 120VAC or 220VAC.

Note:

In order for the solenoid valve to maintain a warranty it must remain sealed as it came from the factory. If there are concerns about the valve's internal components, immediate replacement is recommended.

Standard Solenoid Valve Specifications:

Skinner Model 73218BN4UNLVN0C111C2
Rated working pressure: 175 psi (12.1 bar)
Voltage: 24 VDC
Power: 10 Watts
Current: 0.41 Amps Holding
Enclosure Coil: NEMA 4X
Pipe Size: ½" NPT Female
Cv Factor: 4.0

Alternate Solenoid Valve Specifications:

Skinner Model 73212BN4TNLVN0C322C2
Rated working pressure: 300 psi (20.7 bar)
Voltage: 24 VDC
Power: 22 Watts
Current: 0.83 Amps Holding
Enclosure Coil: NEMA 4X
Pipe Size: ½" NPT Female
Cv Factor: 2.8

Type D Double Interlock Preaction Systems Engineering Specification

2" (50 mm), 2½" (65 mm), 76 mm, 3" (80 mm), 4" (100 mm), 165 mm, 6" (150 mm) and 8" (200 mm)
Model DDX Deluge Valve

Preaction System shall be a Double Interlock Preaction System utilizing a [2" (50 mm)][2½" (65 mm)][76 mm] [3" (80 mm)] [4" (100 mm)][165 mm][6" (150 mm][8" (200 mm)] [cULus Listed] [Factory Mutual Approved] Reliable Model DDX Deluge Valve. Deluge valve shall be a [2" (50 mm)][2½" (65 mm)][76 mm] [3" (80 mm)][4" (100 mm)][165 mm][6" (150 mm][8" (200 mm)] [cULus Listed] [Factory Mutual Approved] hydraulically operated, differential latching-clapper type valve. Deluge Valve construction shall be of lightweight, ductile iron construction with either a "screw in" stainless steel seat and clapper assembly or drop in bronze seat and clapper assembly. Stainless steel or Bronze seat shall have O-ring seals to resist leakage and corrosion. Clapper facing shall be pressure actuated, providing a limited compression seat for the sealing force between the clapper rubber facing and the valve seat. Deluge valve shall have an external reset knob for resetting the clapper without requiring the removal of the valve face plate. Pushrod chamber design shall consist of a stainless steel piston/ pushrod and spring assembly with diaphragm seal secured to the casting through a pushrod guide constructed of a synthetic engineering plastic to resist corrosion. Casting shall have a bleeder hole located on the pushrod chamber for air/water leakage indication. Trip ratio shall be approximately a 3:1 force differential. Deluge valve shall be of the straight through design to minimize friction loss. Inlet restriction orifice shall be factory installed into the inlet port of the deluge valve pushrod cover plate and not be a separate part of the deluge valve trim. End connection style to be [2" (50 mm)] [2½" (65 mm)][76 mm] [3" (80 mm)][4" (100 mm)][165 mm] [6" (150 mm)][8" (200mm)] grooved, per ANSI/AWWA C606 or flanged per ASME B16.5 or ISO 7005. Deluge valve shall have a rated working pressure of 250 psi (17.2 bar) for 2" (50mm), 2½" (65mm), 3" (80mm), 76mm and 8" (200mm) valve sizes and 300 psi (20.7 bar) for 4" (100mm), 6" (150mm) and 165mm valve sizes and shall be factory hydrostatic tested at 500 psi (34.5 bar) for 2" (50mm), 2½" (65mm), 3" (80mm), 76mm and 8" (200mm) valve sizes and 600 psi (41.4 bar) for 4" (100mm), 6" (150mm) and 165mm valve sizes.

Deluge valve to be [2" (50 mm)][2½" (65 mm)][76 mm] [3" (80 mm)][4" (100 mm)][165 mm][6" (150 mm)][8" (200 mm)] Reliable Model DDX Deluge Valve (Bulletin 519).

Valve trim shall be Type D electric/electric release trim consisting of the following components:

- Hydraulic trim to be galvanized and brass components. All trims and components to be listed/Approved with the Deluge Valve, including associated pressure gauges, 1¼" or 2" drain connection, alarm devices, alarm test and pushrod chamber connections.
- Electrical two-way, normally closed, pilot operated solenoid valve [cULus] [FM Approved] for its intended use. The solenoid valve shall be constructed of a brass body with stainless steel sleeve tube, springs, stop and plunger, and with ½" female NPT end connections. Solenoid valve shall have a maximum working pressure of [175 psi (12.1 bar)] [300 psi (20.7 bar)] and a maximum ambient temperature rating of 150ºF (66ºC). Power consumption of the integrated coil shall be limited to [10 watts for the 175 psi (12.1 bar) rated] [22 watts for the 300 psi (20.7 bar) rated] and require 24 VDC from a releasing Control Panel listed for such service. Solenoid shall be a Skinner ½" normally closed solenoid valve [73218BN4UNLVNOC111C2 (175 psi (12.1 bar) rated)] [73212BN4TNLVNOC322C2 (300 psi (20.7 bar) rated)].
- Low air pressure switch to indicate loss of air pressure in system piping. Pressure switch shall be [cULus Listed] [FM Approved] and of the bellows activated type enclosed in a weatherproof NEMA 4/4X rated enclosure incorporating tamper proof screws. There shall be two sets of SPDT (form C) contacts rated 10.0 A @ 125/250 VAC and 2.5 A @ 6/12/24 VDC. The pressure switch shall have a maximum service pressure rating of 250 psi (17.2 bar) and shall be factory adjusted to operate at a pressure of 4 to 8 psi (0.27 to 0.55 bar) with adjustment up to 15 psi (1.03 bar). Switch shall be provided with a ½" NPT male pressure connection. Low air supervisory switch shall be Potter PS10-2.

- Pressure alarm switch to indicate water flow in system. Pressure switch shall be [cULus Listed] [FM Approved] and of the bellows activated type enclosed in a weather proof NEMA 4/4X rated enclosure incorporating tamper proof screws. There shall be two sets of SPDT (form C) contacts rated 10.0 A @ 125/250 VAC and 2.5 A @ 6/13/24 VDC. The pressure switch shall have a maximum service pressure rating of 250 psi (17,2 bar) and shall be factory adjusted to operate at a pressure of 4 to 8 psi (0,27 to 0,55 bar) with adjustment up to the 15 psi (1,03 bar). Switch shall be provided with a 1/2" NPT male pressure connection. Pressure alarm switch shall be Potter PS10-2.
- Pressure maintenance device for maintaining a constant pneumatic system pressure regardless of pressure fluctuations in the compressed air (or nitrogen) source. The pressure maintenance device shall consist of galvanized trim and brass parts, including a strainer, a field adjustable air pressure regulator and associated pressure gauge. The pressure regulator shall have an adjustable outlet pressure range of 5 to 100 psi (0.34 to 6.8 bar). The pressure maintenance device shall have a working pressure of 175 psi (12.1 bar). Recommended supervisory pressure shall be 7 to 10 psi (0.5 to 0.7 bar). Pressure maintenance device shall be Reliable Model A.

Double Interlock Preaction System shall be Reliable Double Interlock Type D Preaction System, Bulletin 750.

Pneumatic Supervisory Pressure Supply Options

Note: See Reliable Bulletins 254 and 251 for complete information on air and nitrogen regulating equipment.

Owner's Air supply

Supervisory air supply shall be provided by an owner supplied air system in conjunction with a listed automatic pressure maintenance device, capable of maintaining a constant system pressure regardless of pressure fluctuations in the compressed air source.

Compressed Air Supply

Supervisory air supply shall be provided by an automatic tank-mounted air compressor sized for the capacity of the double interlock preaction system piping, and be capable of restoring normal air pressure in the system within the time limits specified by NFPA 13. Unit shall include a motor mounted, oil-less, piston compressor, pressure gauge, pressure switch, check valve, drain valve and safety relief valve. Single-phase motor shall have internal thermal protection.

Nitrogen

Nitrogen cylinders provided by an approved source shall provide the nitrogen supply. The nitrogen cylinder pressure shall be regulated and supervised through the use of nitrogen regulating device and low-pressure trim kit. This device shall consist of a brass, single stage pressure regulator, equipped with high pressure inlet and low pressure outlet gauges, and ¼" copper connection tubing with galvanized ¾" x ¼" reducer bushing. This kit shall include a low-pressure switch with associated galvanized connection trim. Assembly shall be a Reliable Nitrogen Regulating Device. This device is to be used in conjunction with the Reliable Model A Pressure Maintenance Device.

Optional System Accessories

System Control Valve

Preaction system control valve shall be a slow close, [cULus Listed] indicating butterfly type valve with a pre-wired supervisory tamper switch assembly. The valve shall be rated for a working pressure of [300 psi (20.7 bar)]. System control valve shall be for a [2" (50 mm)] Gruvlok AN7722-3A Butterfly Valve or [2½" (65 mm)][3" (80 mm)][4" (100 mm)][6" (150 mm][8" (200 mm] - Reliable BFG-300 Butterfly Valve.

Detection System

To initiate actuation of the preaction system's deluge valve, a supplemental electric detection system shall be provided [Insert applicable product specification].

Releasing/Control Panel

A releasing/control panel shall be used to operate the preaction system. The releasing/control panel shall be a conventional, microprocessor-controlled panel containing two initiating device circuits, and waterflow and supervisory inputs. Output circuits shall include alarm, waterflow, supervisory, and releasing circuits. Mode of operation shall be set for cross zoned operation, requiring both a detection device input and a low air pressure switch input (sprinkler operation) to energize the solenoid valve, causing the deluge valve to operate. Releasing/control panel shall be equipped with a local tone alarm to annunciate loss of AC power, system trouble, circuit trouble, and low auxiliary DC power supply. Panel shall be [cULus Listed] [FM Approved] and be capable of providing power for compatible detectors and auxiliary devices used. Audible alarms shall be able to be silenced at releasing panel. Auxiliary DC power supply shall consist of (2) 12-volt lead acid batteries of the same ampere-hour rating, providing [60 hours – cULus Listed] [90 hours – FM Approved]. Dry contacts shall be provided for remote annunciation of alarm, trouble, and supervisory panel signals. Main power supply to be a dedicated a 120 VAC / 60 Hz circuit.

Technical Data

Reliable Double Interlock Type D Preaction Systems, with associated trim, size 2" (50 mm), 2½" (65 mm), 76 mm, 3" (80 mm), 4" (100 mm), 165 mm, 6" (150 mm), 8" (200 mm) are rated for use at minimum water supply pressure of 20 psi (1.4 bar) and maximum supply pressure of 250 psi (17.2 bar) for 2" (50mm), 21/2" (65mm), 3" (80mm), 76mm and 8" (200mm) valve sizes and 300 psi (20.7 bar) for 4" (100mm), 6" (150mm) and 165mm valve sizes. Water supplied to the inlet of the valve and to the pushrod chamber must be maintained between 40°F (4°C) and 140°F (60°C).

The following list of technical bulletins pertains to valves and devices that may be used in this preaction system:

Deluge Valve	Reliable 519
Hydraulic Emergency Station (Model A)	Reliable 506
Mechanical Sprinkler Alarm	Reliable 612/613
Pressure Maintenance Device	Reliable 251
Nitrogen Regulating Device	Reliable 254
Releasing/Control Panel	Potter #5403550
Low Air Pressure Supervisory Switch	Potter 5400928
Waterflow Pressure Alarm Switch	Potter 5400928

Model DDX Deluge Valve Description

1. Rated working pressure:
   Valve & System - 250 psi (17.2 bar) for 2" (50mm), 2½" (65mm), 3" (80mm), 76mm and 8" (200mm) valve sizes and 300 psi (20.7 bar) for 4" (100mm), 6" (150mm) and 165mm valve sizes.
2. Factory tested to a hydrostatic pressure of 500 psi (34.5 bar) for 2" (50mm), 2½" (65mm), 3" (80mm), 76mm and 8" (200mm) valve sizes and 600 psi (41.7 bar) for 4" (100mm), 6" (150mm) and 165mm valve sizes. (Valve only)
3. End and trim connections:
   - ANSI/AWWA C606 grooved inlet and outlet

Nominal Pipe Size	Outlet Diameter	Groove Diameter	Groove Width	Outlet Face to Groove
2" (50 mm)	2.375" (60 mm)	2.250" (57 mm)	11/32" (9.0 mm)	5/8" (16 mm)
2½" (65 mm)	2.875" (73 mm)	2.720" (69 mm)	11/32" (9.0 mm)	5/8" (16 mm)
76 mm	3.000" (76 mm)	2.845" (72 mm)	11/32" (9.0 mm)	5/8" (16 mm)
3" (80 mm)	3.500" (89 mm)	3.344" (85 mm)	11/32" (9.0 mm)	5/8" (16 mm)
4" (100 mm)	4.500" (114 mm)	4.334" (110 mm)	3/8" (9.5 mm)	5/8" (16 mm)
165 mm	6.500" (165 mm)	6.330" (161 mm)	3/8" (9.5 mm)	5/8" (16 mm)
6" (150 mm)	6.625" (168 mm)	6.455" (164 mm)	3/8" (9.5 mm)	5/8" (16 mm)
8" (200 mm)	8.625" (219 mm)	8.441" (214 mm)	7/16" (11 mm)	3/4" (19 mm)

   - Threaded openings Per ANSI B 2.1
   - Flange Dimensions

Flange Type:	Nominal Pipe Size	Bolt Circle Diameter	Bolt Hole Diameter	Flange Outside Diameter	Flange Thickness	Number of Bolts
ASME B16.5 Class 150	4" (100mm)	7½" (191mm)	¾" (19mm)	9" (229mm)	15/16" (24mm)	8
ISO 7005-2 PN16	4" (100mm)	7 3/32" (180mm)	¾" (19mm)	9" (229mm)	15/16" (24mm)	8
ASME B16.5 Class 150	6" (150mm)	9½" (241mm)	7/8" (22mm)	11" (279mm)	15/16" (24mm)	8
ISO 7005-2 PN16	6" (150mm)	9 7/16" (240mm)	29/32" (23mm)	11" (279mm)	15/16" (24mm)	8
ASME B16.5 Class 150	8" (200mm)	11¾" (298mm)	7/8" (22mm)	13½" (343mm)	1" (25.4mm)	8
ISO 7005-2 PN16	8" (200mm)	11 5/8" (295mm)	29/32" (23mm)	13½" (343mm)	1" (25.4mm)	12

4. Valve Color:

Valve Size	Color
2" (50 mm)	Black or Red
2½" (65 mm)	Black or Red
76 mm	Red
3" (80 mm)	Black or Red
4" (100 mm)	Black or Red
165 mm	Red
6" (150 mm)	Black or Red
8" (200 mm)	Black or Red

5. Face to face dimensions:

Valve Size:	End Connection:	End to End:
2" (50mm), 2½" (65mm), 76mm & 3" (80mm)	Groove/ Groove	12½" (318mm)
4" (100mm)	Groove/ Groove	14" (356mm)
	Flange/ Groove	16" (406mm)
	Flange/ Flange	16" (406mm)
6" (150mm) & 165mm	Groove/ Groove	16" (406mm)
	Flange/ Groove	19" (483mm)
	Flange/ Flange	19" (483mm)
8" (200mm)	Groove/ Groove	19 3/8" (492mm)
	Flange/ Flange	21¼" (540mm)

6. Valve shipping weight:

Valve Size:	End Connection:	Weight:
2" (50mm), 2½" (65mm), 76mm & 3" (80mm)	Groove/ Groove	34 lbs (15 kg)
4" (100mm)	Groove/ Groove	64 lbs (29 kg
	Flange/ Groove	79 lbs (36 kg)
	Flange/ Flange	92 lbs (42 kg)
6" (150mm) & 165mm	Groove/ Groove	95 lbs (43 kg)
	Flange/ Groove	122 lbs (56 kg)
	Flange/ Flange	138 lbs (69 kg)
8" (200mm)	Groove/ Groove	148 lbs (67 kg)
	Flange/ Flange	197 lbs (90 kg)

7. Trim shipping weight:

Trim Configuration	2" (50 mm), 2½" (65 mm), 3" (80 mm) & 76 mm	4" (100 mm), 6" (150 mm), 8" (200 mm) & 165 mm
Type D Double Interlock	47 lbs (21 kg)	52 lbs (24 kg)

8. Friction loss (Expressed in equivalent length of Schedule 40 pipe, based on Hazen & Williams formula:

Valve Size:	Equivalent Length:		Cv
	C = 120	C = 100	
2" (50mm)	4.4 ft (1.3 m)	3.1 ft (1.0 m)	101
2½" (65mm)	6.0 ft (1.8 m)	4.3 ft (1.3 m)	236
76mm	7.7 ft (2.3 m)	5.5 ft (1.7 m)	241
3" (80mm)	12.6 ft (3.8 m)	9.0 ft (2.7 m)	254
4" (100mm)	14 ft (4.3 m)	10 ft (3.0 m)	469
165mm	29.4 ft (9.0 m)	20.9 ft (6.4 m)	886
6" (150mm)	29.4 ft (9.0 m)	20.9 ft (6.4 m)	886
8" (200mm)	53.5 ft (16.3 m)	38.1 ft (11.6 m)	1516

9. Installation position: Vertical

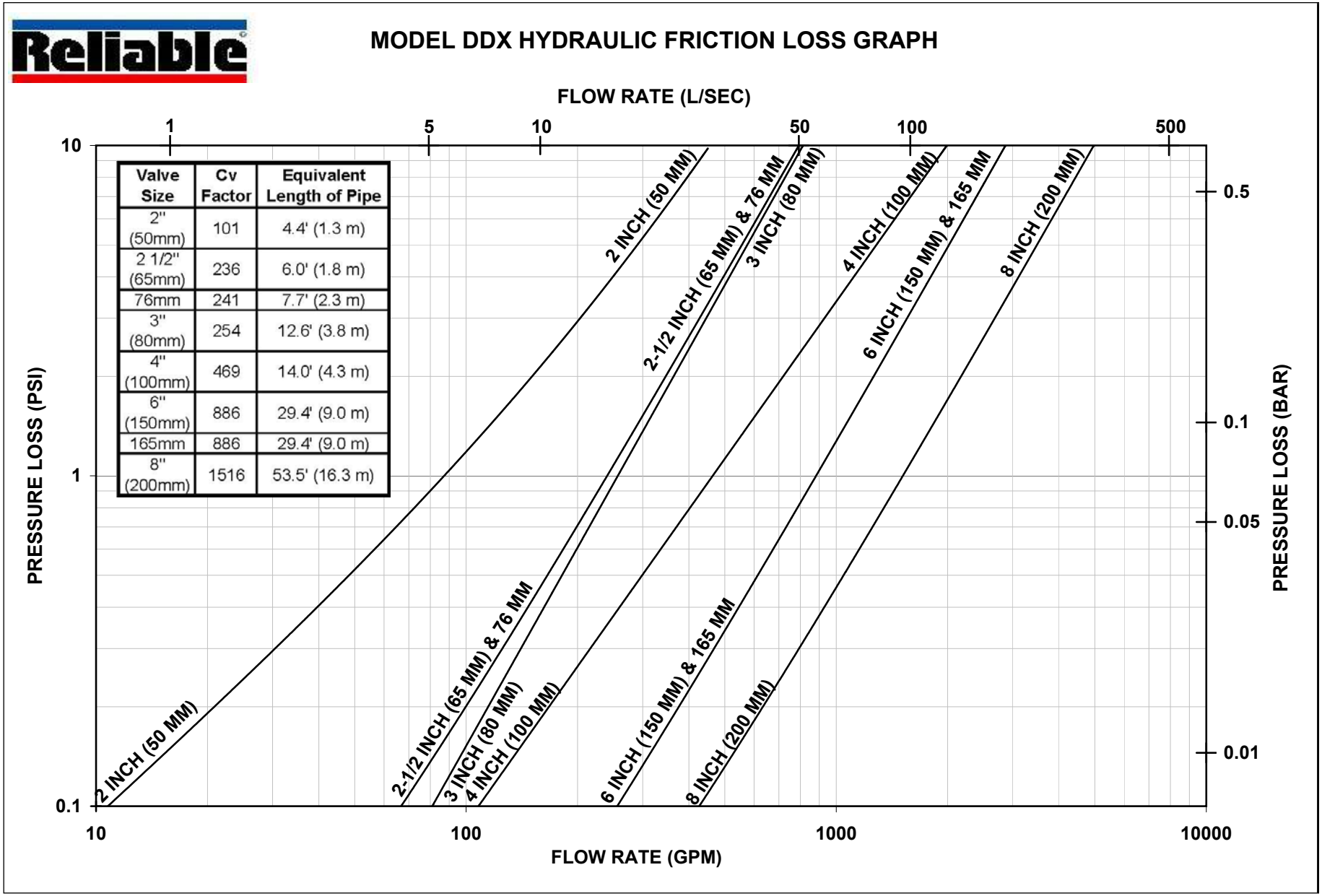

Reliable
MODEL DDX HYDRAULIC FRICTION LOSS GRAPH
FLOW RATE (L/SEC)
1
5
10
50
100
500
10
1
0.1
PRESSURE LOSS (PSI)
0.5
0.1
0.05
0.01
PRESSURE LOSS (BAR)
10
100
1000
10000
FLOW RATE (GPM)
2 INCH (50 MM)
2-1/2 INCH (65 MM) & 76 MM
3 INCH (80 MM)
4 INCH (100 MM)
6 INCH (150 MM) & 165 MM
8 INCH (200 MM)
Valve Size | Cv Factor | Equivalent Length of Pipe
2" (50mm) | 101 | 4.4' (1.3 m)
2 1/2" (65mm) | 236 | 6.0' (1.8 m)
76mm | 241 | 7.7' (2.3 m)
3" (80mm) | 254 | 12.6' (3.8 m)
4" (100mm) | 469 | 14.0' (4.3 m)
6" (150mm) | 886 | 29.4' (9.0 m)
165mm | 886 | 29.4' (9.0 m)
8" (200mm) | 1516 | 53.5' (16.3 m)

Fig. 3

Trim Descriptions

The Type D Double Interlock Preaction Trims for the Reliable Model DDX Deluge Valve are arranged for rapid, easy, and compact attachment, and serve as connection points to Reliable Model C Mechanical Alarms and other devices.

The Double Interlock Type D Preaction System trim configurations can be ordered as individual parts, in time-saving segmentally assembled kit forms, or fully assembled to the Model DDX Deluge Valve (with or without a control valve).

The Model B Hydraulic Manual Emergency Station is a standard item of all Deluge Valve trim sets. It consists of an aluminum nameplate mechanically attached to a ball valve. The valve handle in its OFF position is guarded against accidental turning to the ON position (and system discharge) by a nylon cable tie provided with each trim kit. The cable tie is inserted, after the system has been restored for operation. The nylon cable tie is designed to allow, in case of an emergency, forceful turning of the valve handle to the ON position. As an alternative to the Model B Hydraulic Manual Emergency Station, the Model A Hydraulic Manual Emergency Pull Box (see Bulletin 506) is also available and can be provided as an option.

Resetting Model DDX Type D Double Interlock Preaction System

1. Close the valve controlling water supply to the Deluge Valve and close the air or nitrogen supply to the sprinkler system.
2. Close the pushrod chamber supply valve.
3. Open main drain valve and drain system.
4. Open all drain valves and vents at low points throughout the system, closing them when flow of water has stopped. Open the Model B Manual Emergency Station to relieve pressure in the pushrod chamber of the Deluge Valve.
5. With the alarm line valve open, push in the plunger of ball drip valve, forcing the ball from its seat, and drain the alarm line.
6. With the Model B Manual Emergency Station open, push in and rotate the Deluge Valve's external reset knob counterclockwise (when facing the valve), until you hear a distinct noise indicating that the clapper has reset. **Note:** The reset knob can be rotated only while pressure in the pushrod chamber is vented to atmospheric conditions (0 psig).
7. Inspect and replace any portion of the detection system and/or sprinkler system subjected to fire conditions.
8. Open the pushrod chamber supply valve and allow water to fill the pushrod chamber. Close the Model B Manual Emergency Station.
9. Bleed all air from the actuation piping: Open the solenoid valve by operating a detector or an electric manual emergency station. While water is flowing through the solenoid valve, cause it to close using the release control panel reset.
10. Close the alarm line valve. Open the air or nitrogen supply quick fill valve to restore 10 psi (0.7 bar) supervisory pressure in the sprinkler system, then set the pneumatic supply to automatic operation. Note: To build supervisory air pressure in the sprinkler system, it may be necessary to temporarily close the main drain valve until air pressure has built up to the recommended level.
11. Open the alarm line valve. Verify the main drain valve is open. Open slightly the main valve controlling water supply to the Model DDX Deluge Valve, closing the main drain valve when water flows. Observe if water leaks through the ball drip valve into the drip cup. If no leak occurs, the Deluge Valve clapper is sealed. Open slowly and verify the main valve controlling water supply is fully opened and properly monitored.
12. Verify that the pushrod chamber supply valve and alarm line valve are open. The pushrod chamber supply valve must remain open when the Deluge Valve has been reset, to maintain water pressure in the pushrod chamber.
13. Verify that the Model B Manual Emergency Station is secured in the OFF position with the appropriate nylon tie.

Inspection and Testing

1. Water supply — Confirm that valves controlling water supply to the Deluge Valve are opened fully and properly monitored.
2. Alarm line — Confirm that the alarm line valve is open and remains in this position.
3. Other trim valves — Confirm that the pushrod chamber supply valve is open, as well as all pressure gauge valves. The main drain valve, condensate drain valve, and alarm test valve should be closed.
4. Ball drip valve — Push in on the plunger to be sure ball check is off its seat. If no water appears, the Deluge Valve water seat is tight. Inspect the bleed hole on the underside of the pushrod chamber for leakage.
5. Dry pilot trim — Inspect air pressure for conformance to Table A.
6. Releasing device — Check outlet of the releasing device (i.e., solenoid valve and hydraulic manual emergency station) for leakage. Also verify that tubing drain lines from releasing devices are not pinched or crushed which could prevent proper releasing of the Deluge Valve.
7. Testing alarms — Open the alarm test valve permitting water from the supply to flow to the electric sprinkler alarm switch and to the mechanical sprinkler alarm (water motor). After testing, close this valve securely. Push in on the plunger of ball drip valve until all water has drained from the alarm line.
8. Operational test — Open the Model B Manual Emergency Station. Alternatively, operate the electrical detection system and deplete pneumatic pressure from the sprinkler system.

Note: AN OPERATIONAL TEST WILL CAUSE THE DELUGE VALVE TO OPEN AND FLOW WATER INTO THE SPRINKLER SYSTEM.

9. Secure the Model B Manual Emergency Station in the OFF position with nylon tie after Deluge Valve is reset.

Testing Detection System Without Operating Deluge Valve

1. Close the valve controlling water supply to the deluge valve and open the main drain valve.
2. Verify that valve supplying hydraulic pressure to the piston/pushrod chamber is open, allowing water to enter the pushrod chamber.
3. Operate the electrical detection system and deplete pneumatic pressure from the sprinkler system.
4. Operation of the detection combined with loss of pneumatic pressure must result in a sudden drop of water pressure in the pushrod chamber, as indicated by the pressure gauge on the hydraulic release trim.
5. Reset the valve per the reset instructions.

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.

The Reliable Model DDX valve 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. System components shall be tested, operated, cleaned, and inspected at least annually, and parts replaced as required. Replace any components found to be corroded, damaged, worn, or non-operable. Increase the frequency of inspections when the valve is exposed to corrosive conditions or chemicals that could impact materials or operation of the assembly.

If face plate is removed during maintenance, torque face plate bolts to the following values during re-installation:

- 35 ft-lbs. (47 N-m) for 2" through 4" valves
- 70 ft-lbs. (95 N-m) for 6"-8" valves

Troubleshooting

1. Mechanical sprinkler alarm not operating: This is most likely caused by a clogged screen in the strainer of the water motor. Proceed as follows: Remove plug from the strainer. Remove and clean the screen. Replace the screen and the plug, and then tighten securely (Ref. Bulletin 613).
2. Water leaking from Ball Drip. This can be caused by either a water column on top of the clapper or a supply water leakage.
   a. Leakage due to water column. This condition is caused by leakage past the clapper seal assembly. Be sure the clapper seal and seat are free of any type of de-bris or damage. If necessary, follow steps below to replace the seal assembly and/or seat.
   b. Supply water leakage. This condition is caused by leakage past the lower seat O-ring. Follow steps below for inspection and/or replacement of lower seat O-ring.

Repair Procedures - Model DDX Deluge Valve

The following section provides instructions to correct both conditions:

1. Disable detection system.
2. Shut down the valve controlling the water supply to the Deluge Valve and open the main drain valve. Open the condensate drain valve. Close the pushrod chamber supply valve and open the Model B Manual Emergency Station.
3. Remove the Deluge Valve front (handhold) cover and inspect the seat, clapper, and seal assembly for damage. If inspection indicates damage to the seal assembly, replace as follows:
4. Remove the bumpstop nuts and remove the seal assembly. Install a new seal assembly and thread the bumpstop nuts onto the threaded studs of the seal assembly. Tighten finger tight plus ¼ to ½ turn.
5. If inspection indicates damage to the clapper, proceed to step 6.
6. At the rear of the valve, disconnect the condensate drain trim section starting with the elbow connector. Then remove the ¼" globe valve, followed by the ¾"x¼" reducing bushing. Remove the retaining rings from the clapper hinge pin, push the hinge through the condensate drain opening and remove the clapper subassembly. Install a new clapper subassembly in the reverse order making sure the clapper spacers are in their proper position.
7. If the seat is damaged, or it is suspected that the leakage is through the seat O-rings, proceed to step 8.
8. Using Reliable P/N 6881603000 Seat Wrench for 2" (50mm), 2½" (65mm), 76mm and 3" (80mm) valve sizes, Reliable P/N 6881604000 for 4" (100mm) valve size, Reliable P/N 6881606000 for the 6" (150mm) and 165mm valve sizes or Reliable P/N 6881608000 Seat Wrench for 8" (200mm) valve size, remove the seat by unscrewing. This will loosen the seat-clapper-mounting ring subassembly. Reach into the valve and grasp the seat and remove it from the valve. Then remove the clapper-mounting ring subassembly from the valve. Visually examine all components of the seat-clapper-mounting ring subassembly and replace any component that appears damaged. New O-rings should always be used for reassembly.
9. Reassembly: clean the bore of the valve body. Lubricate the bore with O-ring grease. Lubricate and install the O-rings onto the seat. Lubricate and install the mounting ring O-ring into the body (8" (200mm) valve size only). Insert the clapper-mounting-ring subassembly into the handhold opening of the Deluge Valve using caution to not damage or dislodge the mounting ring O-ring (8" (200mm) valve size only). Align the mounting ring so that the Lever is near the pushrod and the mounting ring "ears" are between the tabs of the valve body. Insert the seat into the valve body and through the clapper-mounting ring subassembly. Start to tread the seat into the body by hand, then tighten the seat with the seat wrench until it bottoms out on the mounting ring. Verify that the seat-clapper-mounting ring subassembly is in the fully down position between the tabs of the body, and check to see that the lever lines up with the pushrod. Reassemble the handhold cover and set up the Model DDX Deluge Valve as per the section "Resetting Model DDX Type D Double Interlock Preaction System."

Pushrod Chamber Maintenance - Model DDX Deluge Valve

A small bleed hole is located on the underside of the pushrod chamber. Water leakage from the bleed hole can be caused by a ruptured pushrod diaphragm:

a) Disable detection system.

b) Shut down the valve controlling water supply to the Deluge Valve. Relieve the inlet pressure by opening the main drain valve. Close the pushrod chamber supply valve and open the Model B Manual Emergency Station.

c) Remove the trim at the unions nearest to the pushrod chamber cover.

d) Take the pushrod chamber cover off by removing the six retaining screws.

e) Visually inspect the pushrod chamber cover and piston to determine what could have damaged the diaphragm and then correct. Install a new diaphragm.

Note: The diaphragm has two different surfaces; it is not bi-directional and will fail if installed backwards. Roll the diaphragm so that the smooth surface (the pressure side) conforms to the inside of the pushrod chamber cover and the fabric side engages the pushrod.

f) Reassemble the six retaining screws with an installation torque of 15 foot-pounds in a star pattern.

g) Set up the Model DDX Deluge Valve as per the section "Resetting Model DDX Type D Double Interlock Preaction System."

Draining Excess/Condensate Water from the System

1. Notify the owner and monitoring company that maintenance is being performed on the system.
2. Close the main water control valve.
3. Open the Main Drain Valve.
4. Open the Condensate Drain Valve until all water has drained.
5. Close Condensate Drain Valve.
6. Partially open the Main Water Control Valve.
7. Slowly close the Main Drain Valve.
8. Fully open the Main Water Control Valve.
9. Notify the owner and monitoring company that the system has been returned to service.

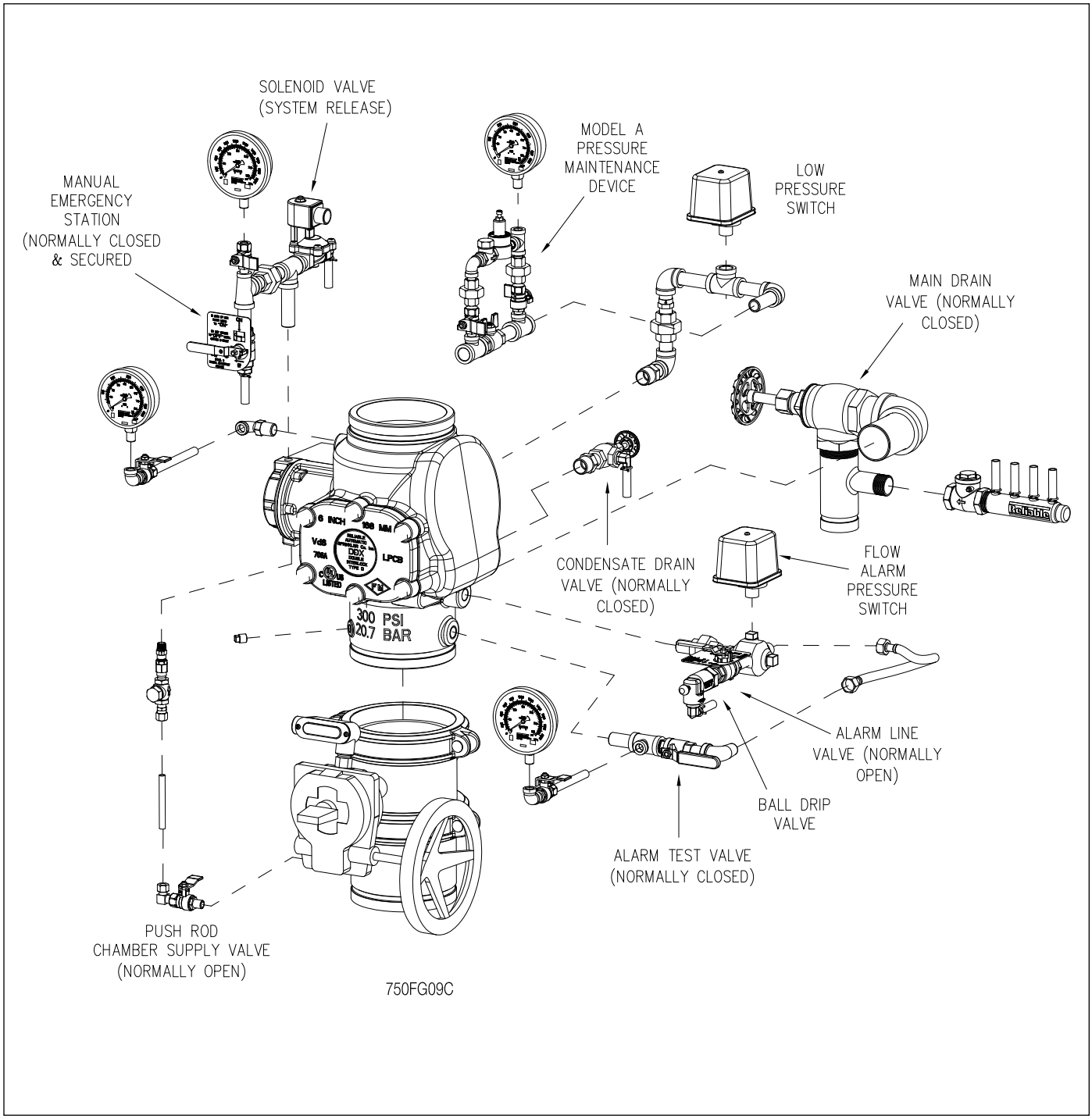
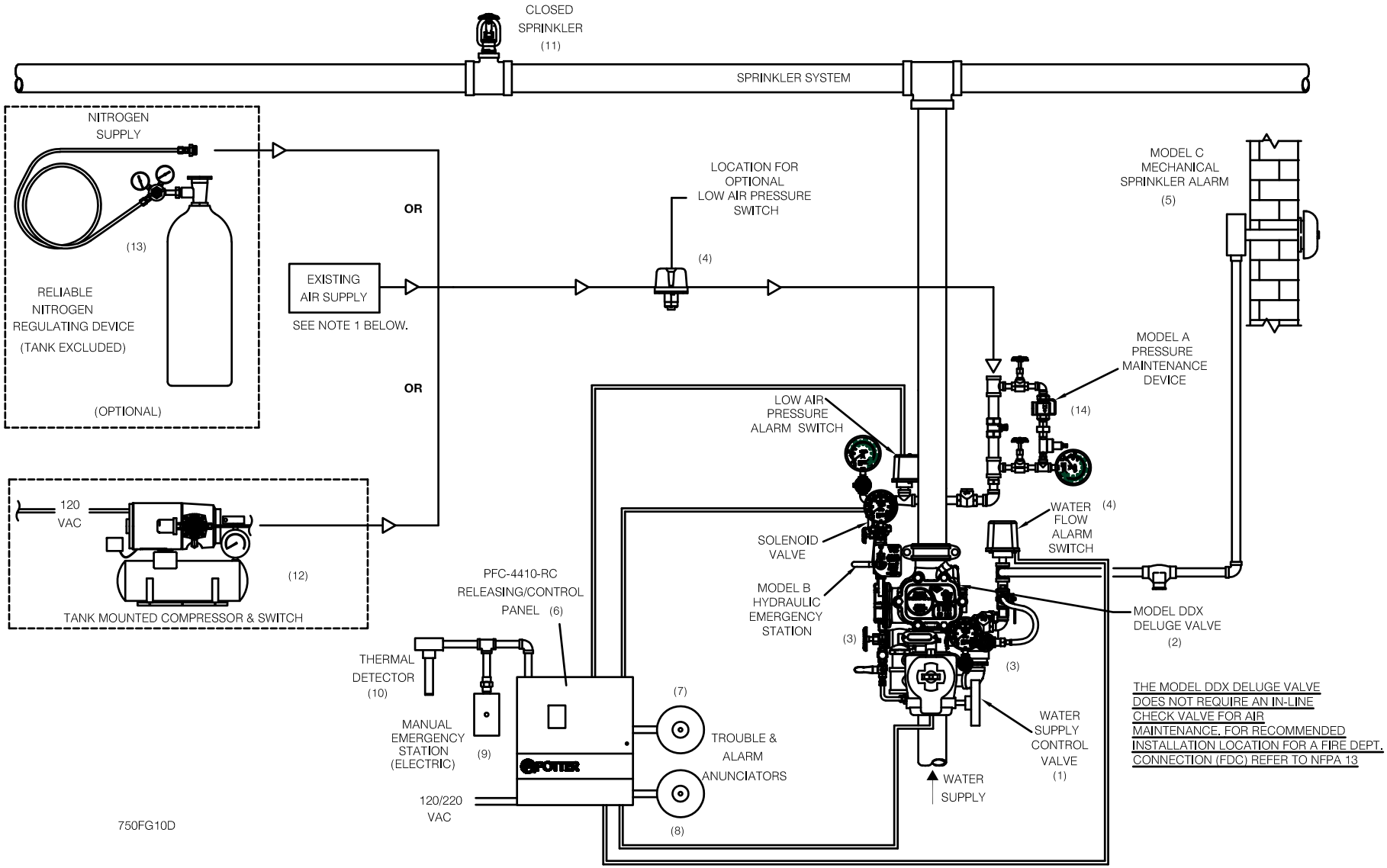

SOLENOID VALVE
(SYSTEM RELEASE)
MODEL A
PRESSURE
MAINTENANCE
DEVICE
LOW
PRESSURE
SWITCH
MANUAL
EMERGENCY
STATION
(NORMALLY CLOSED
& SECURED
MAIN DRAIN
VALVE (NORMALLY
CLOSED)
6 INCH
300 PSI
@20.7 BAR
CONDENSATE DRAIN
VALVE (NORMALLY
CLOSED)
FLOW
ALARM
PRESSURE
SWITCH
ALARM LINE
VALVE (NORMALLY
OPEN)
BALL DRIP
VALVE
ALARM TEST VALVE
(NORMALLY CLOSED)
PUSH ROD
CHAMBER SUPPLY VALVE
(NORMALLY OPEN)
750FG09C

Fig. 4

TYPE D DOUBLE INTERLOCK PREACTION SYSTEM COMPONENTS



NOTE 1: THE EXISTING AIR SUPPLY MUST INCORPORATE A TANK. DO NOT USE TANK-LESS OR RISER-MOUNT AIR COMPRESSORS WITH THE TYPE D DOUBLE INTERLOCK PREACTION SYSTEM AS THESE ARE NOT COMPATIBLE WITH THE MODEL A PRESSURE MAINTENANCE DEVICE.

Fig. 6

Section 4 – Electrical Components

VSR

VANE TYPE WATERFLOW ALARM SWITCH WITH RETARD

UL, CUL and CSFM Listed, FM Approved, LPCB Approved, For CE Marked (EN12259-5) / VdS Approved model use VSR-EU

Service Pressure: 450 PSI (31 BAR) - UL

Flow Sensitivity Range for Signal:
4-10 GPM (15-38 LPM) - UL

Maximum Surge: 18 FPS (5.5 m/s)

Contact Ratings: Two sets of SPDT (Form C)
10.0 Amps at 125/250VAC
2.0 Amps at 30VDC Resistive
10 mAmps min. at 24VDC

Conduit Entrances: Two knockouts provided for 1/2" conduit. Individual switch compartments suitable for dissimilar voltages.

Environmental Specifications:

- NEMA 4/IP54 Rated Enclosure suitable for indoor or outdoor use with factory installed gasket and die-cast housing when used with appropriate conduit fitting.
- Temperature Range: 40°F - 120°F, (4.5°C - 49°C) - UL
- Non-corrosive sleeve factory installed in saddle.

Service Use:

Automatic Sprinkler	NFPA-13
One or two family dwelling	NFPA-13D
Residential occupancy up to four stories	NFPA-13R
National Fire Alarm Code	NFPA-72

Specifications subject to change without notice.

Ordering Information			
Nominal Pipe Size		Model	Part Number
2"	DN50	VSR-2	1144402
2 1/2"	DN65	VSR-2 1/2	1144425
3"	DN80	VSR-3	1144403
3 1/2"	-	VSR-3 1/2	1144435
4"	DN100	VSR-4	1144404
5"	-	VSR-5	1144405
6"	DN150	VSR-6	1144406
8"	DN200	VSR-8	1144408

Optional: Cover Tamper Switch Kit, stock no. 0090148
Replaceable Components: Retard/Switch Assembly, stock no. 1029030

⚠ 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.

CAUTION

Waterflow switches that are monitoring wet pipe sprinkler systems shall not be used as the sole initiating device to discharge AFFF, deluge, or chemical suppression systems. Waterflow switches used for this application may result in unintended discharges caused by surges, trapped air, or short retard times.

Important: This document contains important information on the installation and operation of the VSR waterflow switches. Please read all instructions carefully before beginning installation. A copy of this document is required by NFPA 72 to be maintained on site.

General Information

The Model VSR is a vane type waterflow switch for use on wet sprinkler systems. It is UL Listed for use on a steel pipe; schedules 5 through 40, sizes 2" - 6" and is UL Listed and FM Approved for use on steel pipe; schedules 10 through 40, sizes 2" thru 8" (50 mm thru 200 mm). LPC approved sizes are 2" thru 8" (50 mm thru 200 mm). See Ordering Information chart.

The VSR may also be used as a sectional waterflow detector on large systems. The VSR contains two single pole, double throw, snap action switches and an adjustable, instantly recycling pneumatic retard. The switches are actuated when a flow of 10 GPM (38 LPM) or more occurs downstream of the device. The flow condition must exist for a period of time necessary to overcome the selected retard period.

Enclosure

The VSR switches and retard device are enclosed in a general purpose, die-cast housing. The cover is held in place with two tamper resistant screws which require a special key for removal. A field installable cover tamper switch is available as an option which may be used to indicate unauthorized removal of the cover. See bulletin number 5401103 for installation instructions of this switch.

VSR
VANE TYPE WATERFLOW ALARM SWITCH WITH RETARD

Installation (see Fig. 1)

These devices may be mounted on horizontal or vertical pipe. On horizontal pipe they shall be installed on the top side of the pipe where they will be accessible. The device should not be installed within 6" (15 cm) of a fitting which changes the direction of the waterflow or within 24" (60 cm) of a valve or drain.

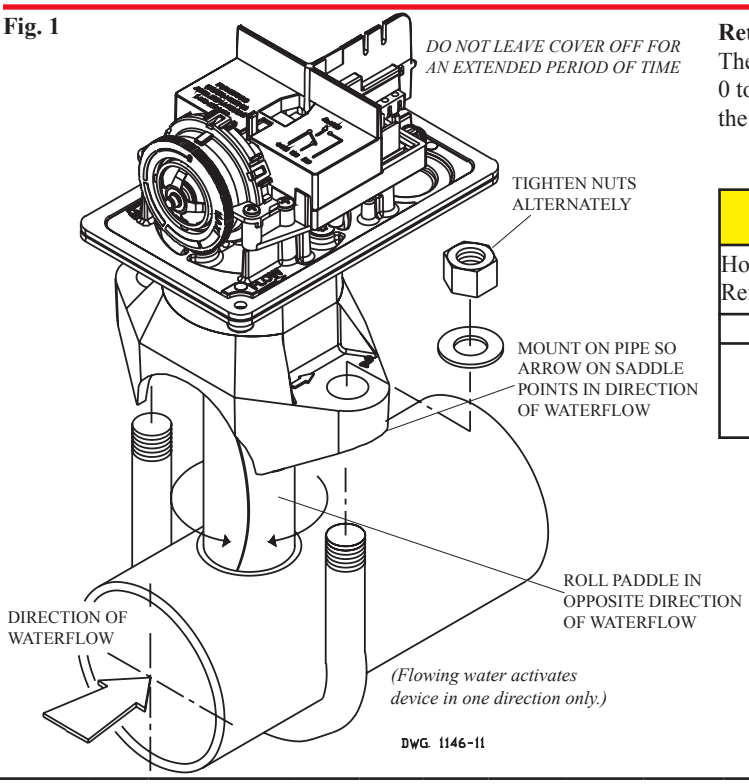
NOTE: Do not leave cover off for an extended period of time.

Drain the system and drill a hole in the pipe using a hole saw in a slow speed drill (see Fig. 1). Clean the inside pipe of all growth or other material for a distance equal to the pipe diameter on either side of the hole. Roll the vane so that it may be inserted into the hole; do not bend or crease it. Insert the vane so that the arrow on the saddle points in the direction of the waterflow. Take care not to damage the non-corrosive bushing in the saddle. The bushing should fit inside the hole in the pipe. Install the saddle strap and tighten nuts alternately to required torque (see the chart in Fig. 1). The vane must not rub the inside of the pipe or bind in any way.

⚠ CAUTION

Do not trim the paddle. Failure to follow these instructions may prevent the device from operating and will void the warranty. Do not obstruct or otherwise prevent the trip stem of the flow switch from moving when water flows as this could damage the flow switch and prevent an alarm. If an alarm is not desired, a qualified technician should disable the alarm system.

Fig. 1

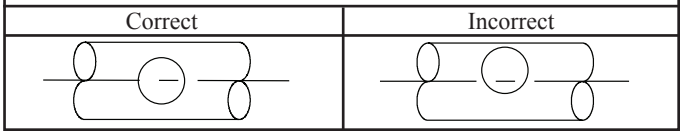


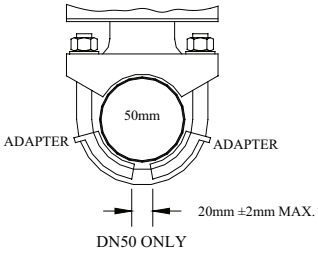
Retard Adjustment

The delay can be adjusted by rotating the retard adjustment knob from 0 to the max setting (60-90 seconds). The time delay should be set at the minimum required to prevent false alarms

CAUTION

Hole must be drilled perpendicular to the pipe and vertically centered. Refer to the Compatible Pipe/Installation Requirements chart for size.





USE (2) 5180162 ADAPTERS AS SHOWN ABOVE

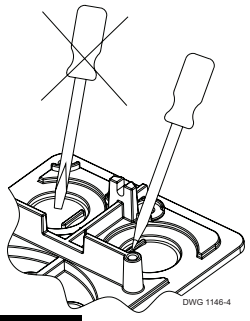
DWG# 1146-1F

Compatible Pipe/ Installation Requirements

Model	Nominal Pipe Size		Nominal Pipe O.D.		Pipe Wall Thickness										Hole Size		U-Bolt Nuts Torque	
					Lightwall		Schedule 10 (UL)		Schedule 40 (UL)		BS-1387 (LPC)		DN (VDS)					
	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	ft-lb	n-m
VSR-2	2	DN50	2.375	60.3	.065	1.651	0.109	2.77	0.154	3.91	0.142	3.6	0.091	2.3	1.25 + .125/- .062	33.0 ± 2.0	20	27
VSR-2 1/2	2.5	-	2.875	73.0	.084	2.134	0.120	3.05	0.203	5.16	-	-	-	-				
VSR-2 1/2	-	DN65	3.000	76.1	-	-	-	-	-	-	0.142	3.6	0.102	2.6				
VSR-3	3	DN80	3.500	88.9	.083	2.108	0.120	3.05	0.216	5.49	0.157	4.0	0.114	2.9	2.00 ± .125	50.8 ± 2.0		
VSR-3 1/2	3.5	-	4.000	101.6	-	-	0.120	3.05	0.226	5.74	-	-	-	-				
VSR-4	4	DN100	4.500	114.3	.084	2.134	0.120	3.05	0.237	6.02	0.177	4.5	0.126	3.2				
VSR-5	5	-	5.563	141.3	-	-	0.134	3.40	0.258	6.55	-	-	-	-				
VSR-6	6	DN150	6.625	168.3	.115	2.921	0.134	3.40	0.280	7.11	0.197	5.0	0.157	4.0				
VSR-8	8	DN200	8.625	219.1	-	-	0.148	3.76	0.322	8.18	0.248	6.3	0.177	4.5				

NOTE: For copper or plastic pipe use Model VSR-CF.

Fig. 2
To remove knockouts: Place screwdriver at inside edge of knockouts, not in the center.



NOTICE
Do not drill into the base as this creates metal shavings which can create electrical hazards and damage the device. Drilling voids the warranty.

Fig. 3
Break out thin section of cover when wiring both switches from one conduit entrance.

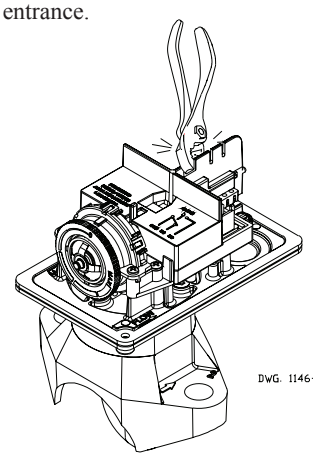
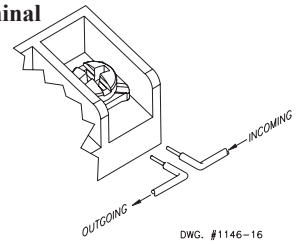


Fig. 4 Switch Terminal Connections Clamping Plate Terminal

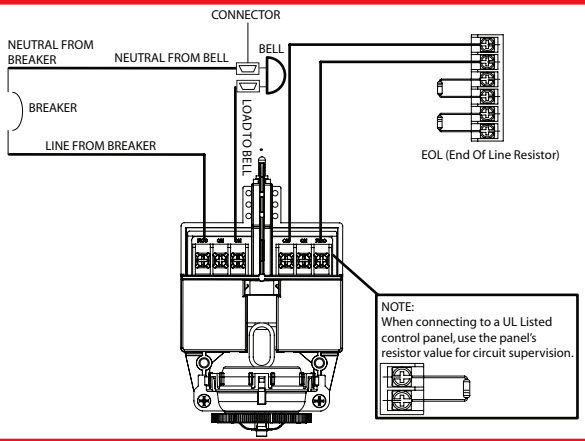


⚠ WARNING

An uninsulated section of a single conductor should not be looped around the terminal and serve as two separate connections. The wire must be severed, thereby providing supervision of the connection in the event that the wire become dislodged from under the terminal. Failure to sever the wire may render the device inoperable risking severe property damage and loss of life.

Do not strip wire beyond 3/8" of length or expose an uninsulated conductor beyond the edge of the terminal block. When using stranded wire, capture all strands under the clamping plate.

Fig. 5 Typical Electrical Connections



Notes:

1. The Model VSR has two switches, one can be used to operate a central station, proprietary or remote signaling unit, while the other contact is used to operate a local audible or visual annunciator.
2. For supervised circuits, see "Switch Terminal Connections" drawing and warning note (Fig. 4).

Testing

The frequency of inspection and testing for the Model VSR and its associated protective monitoring system shall be in accordance with applicable NFPA Codes and Standards and/or the authority having jurisdiction (manufacturer recommends quarterly or more frequently).

If provided, the inspector's test valve shall always be used for test purposes. If there are no provisions for testing the operation of the flow detection device on the system, application of the VSR is not recommended or advisable.
A minimum flow of 10 GPM (38 LPM) is required to activate this device.

NOTICE Advise the person responsible for testing of the fire protection system that this system must be tested in accordance with the testing instructions.

Fig. 6 Mounting Dimensions

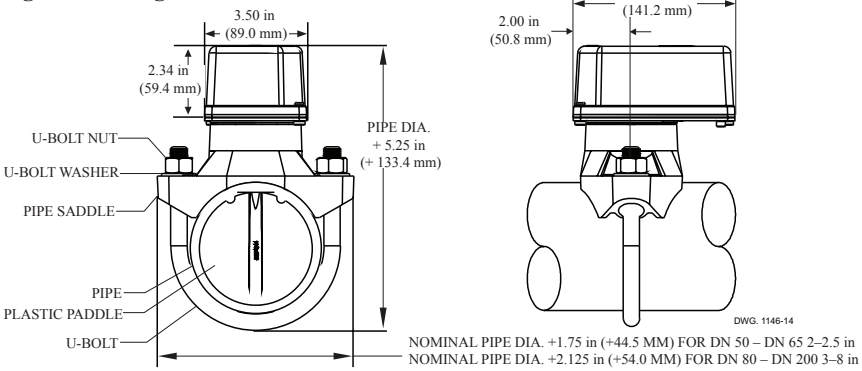
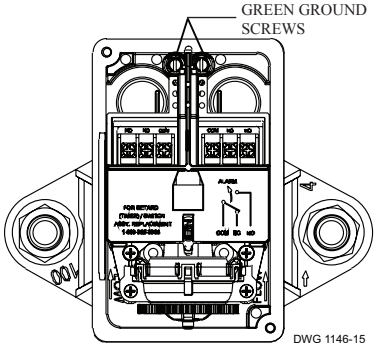


Fig. 7



Maintenance

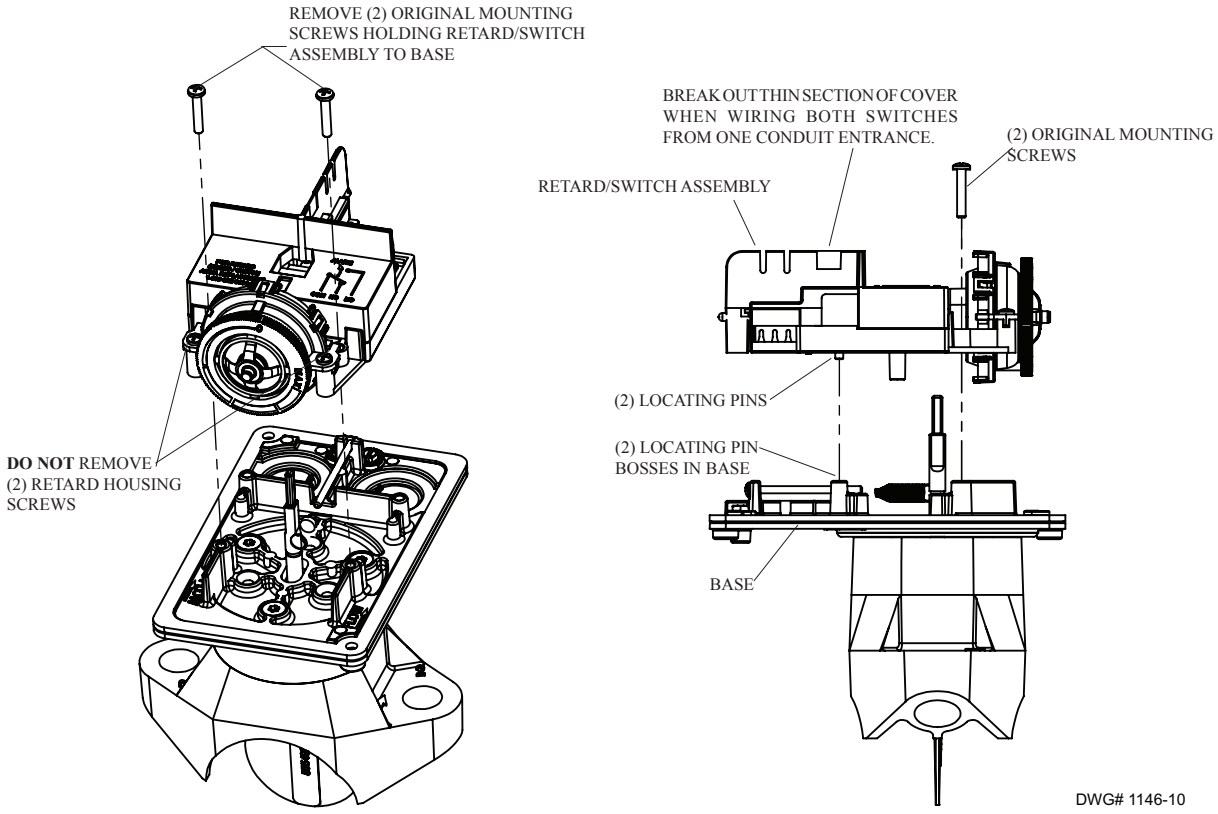
Inspect detectors monthly. If leaks are found, replace the detector. The VSR waterflow switch should provide years of trouble-free service. The retard and switch assembly are easily field replaceable. In the unlikely event that either component does not perform properly, please order replacement retard switch assembly stock #1029030 (see Fig. 8). There is no maintenance required, only periodic testing and inspection.

Retard/Switch Assembly Replacement (See Fig. 8)

NOTICE The Retard/Switch Assembly is field-replaceable without draining the system or removing the waterflow switch from the pipe

1. Make sure the fire alarm zone or circuit connected to the waterflow switch is bypassed or otherwise taken out of service.
2. Disconnect the power source for local bell (if applicable).
3. Identify and remove all wires from the waterflow switch.
4. Remove the (2) mounting screws holding retard/switch assembly to the base. **Do not** remove the (2) retard housing screws.
5. Remove the retard assembly by lifting it straight up over the tripstem.
6. Install the new retard assembly. Make sure the locating pins on the retard/switch assembly fit into the locating pin bosses on the base.
7. Re-install the (2) original mounting screws.
8. Reconnect all wires. Perform a flow test and place the system back in service.

Fig. 8



Removal of Waterflow Switch

- To prevent accidental water damage, all control valves should be shut tight and the system completely drained before waterflow detectors are removed or replaced.
- Turn off electrical power to the detector, then disconnect wiring.
- Loosen nuts and remove U-bolts.
- Gently lift the saddle far enough to get your fingers under it. With your fingers, roll the vane so it will fit through the hole while continuing to lift the waterflow detector saddle.
- Lift detector clear of pipe.

Section 5 – Hanger & Seismic Materials

HDI, HDI-L, HDI+ and HDI-L+ Drop-in Anchor 3.3.11

3.3.11.1 Product description

HDI+, HDI-L+ and HDI drop-in anchors are internally threaded, flush mounted expansion anchors for use in concrete.

Product features

HDI+, HDI-L+ and HDI

- Anchor, setting tool and Hilti drill bit form a matched tolerance system to provide reliable fastenings
- Allows shallow embedment without sacrificing performance
- Lip allows accurate flush surface setting, independent of hole depth for the HDI-L+
- Ideal for repetitive fastenings with threaded rods of equal length
- HDI+ and HDI-L+ have an innovative stepped plug that reduces number of hammer blows by up to 50%
- HDI+ and HDI-L+ can be installed with the new HDI+ Setting Tool system (stop drill bit and machine setting tool) for improved productivity

Guide specifications

Expansion anchor shall be drop-in, shell or flush type. Carbon steel anchors are zinc plated in accordance with ASTM B633, SC 1, Type III. Stainless steel anchors are manufactured from AISI Type 303 stainless steel. Anchors shall be Hilti HDI+ (HDI-L+) (HDI) anchors as supplied by Hilti.

Listings/Approvals

FM (Factory Mutual)
Pipe Hanger Components for Automatic Sprinkler Systems HDI+ 3/8, HDI-L+ 3/8, HDI+1/2, HDI-L+ 1/2, HDI 5/8 and HDI 3/4

UL LLC
UL 203 Pipe Hanger Equipment for Fire Protection Services HDI+ 3/8, HDI-L+ 3/8, HDI+1/2, HDI-L+ 1/2, HDI 5/8 and HDI 3/4

FM APPROVED

c UL us LISTED

3.3.11.2 Material specifications

HDI+, HDI-L+ and HDI anchors are manufactured from mild carbon steel. Anchor bodies are zinc plated in accordance with ASTM B633, SC 1, Type III.

HDI stainless steel anchors are manufactured from AISI Type 303 stainless steel.

3.3.11.3 Technical data

Table 1 - Hilti HDI+, HDI-L+ and HDI specifications[1]

Setting Information	Symbol	Units	HDI+ and HDI-L+			HDI	
			1/4	3/8	1/2	5/8	3/4
Insert thread	d	UNC	1/4-20	3/8-16	1/2-13	5/8-11	3/4-10
Nominal bit diameter	d_{bit}	in.	3/8	1/2	5/8	27/32	1
Nominal embedment Anchor length Hole depth	h_{nom} ℓ h_o	in. (mm)	1 (25)	1-9/16 (40)	2 (51)	2-9/16 (65)	3-3/16 (81)
Useable thread length	ℓ_{th}	in. (mm)	7/16 (11)	5/8 (15)	11/16 (17)	7/8 (22)	1-3/8 (34)
Installation torque	T_{inst}	ft-lb (Nm)	4 (5)	11 (15)	22 (30)	37 (50)	80 (109)
Minimum slab thickness	h	in. (mm)	3 (76)	3-1/8 (79)	4 (102)	5-1/8 (130)	6-3/8 (162)

1 HDI+ and HDI-L+ are available in 1/4-, 3/8- and 1/2-in. The HDI is available in 5/8- and 3/4-in.

Combined shear and tension loading

$$\left(\frac{N_d}{N_{rec}}\right)^{5/3} + \left(\frac{V_d}{V_{rec}}\right)^{5/3} \leq 1.0$$

3.3.11 HDI, HDI-L, HDI+ and HDI-L+ Drop-in Anchor

Table 2 - Hilti HDI+, HDI-L+ and HDI carbon steel allowable loads in concrete (lb)[1,2]

Anchor type	Nominal anchor diameter in.	f'_c = 2,000		f'_c = 4,000		f'_c = 6,000	
		Tension	Shear	Tension	Shear	Tension	Shear
HDI+	1/4	500	450	570	625	790	700
	3/8	635	965	920	1,250	1,260	1,500
	1/2	945	1,500	1,605	1,940	1,950	2,500
HDI	5/8	1,875	2,500	2,920	3,250	3,715	3,750
	3/4	2,500	3,875	4,065	5,000	5,565	5,500

Table 3 - Hilti HDI+, HDI-L+ and HDI carbon steel ultimate loads in concrete (lb)[1]

Anchor type	Nominal anchor diameter in.	f'_c = 2,000		f'_c = 4,000		f'_c = 6,000	
		Tension	Shear	Tension	Shear	Tension	Shear
HDI+	1/4	1,995	1,800	2,270	2,500	3,150	2,800
	3/8	2,540	3,850	3,685	5,000	5,035	6,000
	1/2	3,780	6,000	6,425	8,500	7,810	10,000
HDI	5/8	7,500	10,000	11,685	13,000	14,865	15,000
	3/4	10,000	15,500	16,260	20,000	22,250	22,000

1 The shear tests were conducted with SAE Grade 5 bolts with minimum yield strength of 85 ksi and minimum tension strength of 120 ksi. Shear testing for the 1/4-in. models were conducted with SAE Grade 8 bolts with minimum yield strength of 120 ksi and minimum tension strength of 150 ksi in 6,000 psi concrete. High-strength bolts were used to force concrete failure modes. When using steel bolts with a lower tensile strength, steel failure must be considered.

2 Allowable loads calculated with a factor of safety of 4.

Table 4 - Hilti HDI+, HDI-L+ and HDI carbon steel allowable loads in lightweight concrete and lightweight concrete poured over metal deck (lb)[1,2,3,4]

Anchor type	Nominal anchor diameter in.	Lightweight concrete		Lightweight concrete poured over metal deck			
				Upper flute		Lower flute	
		Tension	Shear	Tension	Shear	Tension	Shear
HDI+	1/4	465	340	530	335	375	250
	3/8	720	940	810	1,010	500	500
	1/2	1,035	1,700	1,035	1,755	625	750
HDI	5/8	1,465	2,835			875	875
	3/4	2,075	3,680			1,250	1,000

1 The shear tests were conducted with SAE Grade 5 bolts with minimum yield strength of 85 ksi and minimum tension strength of 120 ksi. Shear testing for the 1/4-in. models were conducted with SAE Grade 8 bolts with minimum yield strength of 120 ksi and minimum tension strength of 150 ksi in 6,000 psi concrete. High-strength bolts were used to force concrete failure modes. When using steel bolts with a lower tensile strength, steel failure must be considered.

2 Minimum compressive strength of structural lightweight concrete is 3,000 psi.

3 See figure 1 for typical details.

4 Allowable loads calculated with a factor of safety of 4.

Table 5 - Hilti HDI stainless steel allowable loads in concrete (lb)[1,2,3]

Nominal anchor diameter in.	f'_c = 4,000		f'_c = 6,000	
	Tension	Shear	Tension	Shear
1/4	480	600	740	600
3/8	1,040	1,230	1,460	1,230
1/2	1,840	2,760	2,410	2,760
5/8	2,630	4,510	3,770	4,510
3/4	3,830	5,580	5,030	5,580

Table 6 - Hilti HDI stainless steel ultimate loads in concrete (lb)[1,2]

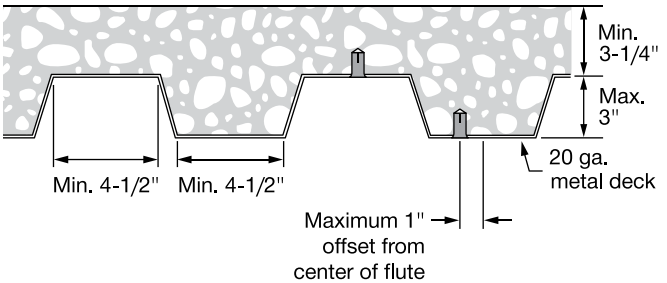
Nominal anchor diameter in.	f'_c = 4,000		f'_c = 6,000	
	Tension	Shear	Tension	Shear
1/4	1,930	2,400	2,950	2,400
3/8	4,170	4,920	5,850	4,920
1/2	7,350	11,040	9,630	11,040
5/8	10,540	18,040	15,100	18,040
3/4	15,340	22,320	20,130	22,320

1 Stainless steel models available in HDI version only.

2 Shear testing conducted with 18-8 stainless steel bolts.

3 Allowable loads calculated with a factor of safety of 4.

Figure 1 - Installation of Hilti HDI drop-in anchor in the soffit of concrete over metal deck floor and roof assemblies W – deck



HDI, HDI-L, HDI+ and HDI-L+ Drop-in Anchor 3.3.11

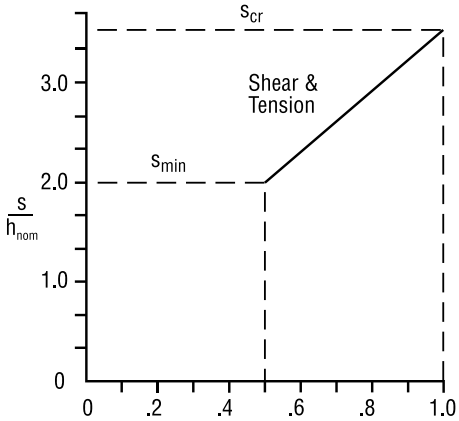
Anchor spacing and edge distance guidelines

Anchor spacing adjustment factors

s = Actual Spacing

s_{min} = 2.0 h_{nom}

s_{cr} = 3.5 h_{nom}



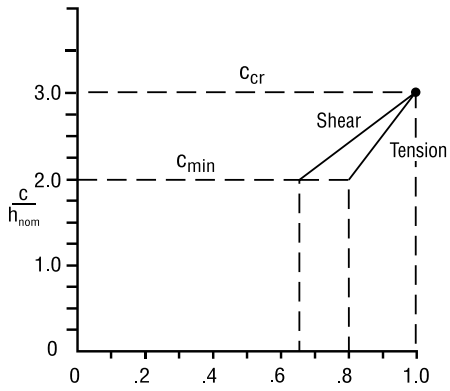
Anchor spacing adjustment Factor

Edge distance adjustment factors

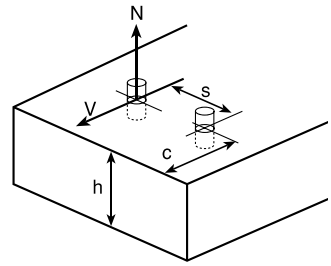
c = Actual edge distance

c_{min} = 2.0 h_{nom}

c_{cr} = 3.0 h_{nom}



Edge distance adjustment factor



Influence of anchor spacing and edge distance f_A and f_R

Anchor Size		h_{nom}	
in.	(mm)	in.	(mm)
1/4	(6.4)	1	(25)
3/8	(9.5)	1-9/16	(40)
1/2	(12.7)	2	(51)
5/8	(15.8)	2-9/16	(65)
3/4	(19.1)	3-3/16	(81)

h_{nom} = nominal embedment depth

Table 7 - Load adjustment factors for Hilti HDI drop-in anchors in concrete

Load adjustment factors for anchor spacing f_A							Load adjustment factors for edge distance f_R											
Tension/shear loads							Tension f_{RN}							Shear f_{RV}				
Spacing s		Anchor diameter					Edge distance c		Anchor diameter					Anchor diameter				
in.	(mm)	1/4	3/8	1/2	5/8	3/4	in.	(mm)	1/4	3/8	1/2	5/8	3/4	1/4	3/8	1/2	5/8	3/4
2	(51)	.50					2	(51)	.80					.65				
2-1/2	(64)	.67					2-1/2	(64)	.90					.83				
3	(76)	.83	.50				3	(76)	1.0	.80				1.0	.65			
3-1/2	(89)	1.0	.58				3-1/2	(89)		.85					.73			
4	(102)		.69	.50			4	(102)		.91	.80				.85	.65		
4-1/2	(114)		.79	.58			4-1/2	(114)		.98	.85				.96	.74		
5	(127)		.90	.67	.50		5	(127)		1.0	.90	.80			1.0	.83	.65	
5-1/2	(140)		1.0	.75	.55		5-1/2	(140)			.95	.83				.91	.70	
6	(152)			.83	.61	.50	6	(152)			1.0	.87				1.0	.77	
7	(178)			1.0	.74	.57	6-1/2	(165)				.91	.80				.84	.65
8	(203)				.87	.67	7	(178)				.95	.84				.91	.72
9	(229)				1.0	.77	8	(203)				1.0	.90				1.0	.83
10	(254)					.88	9	(229)					.96					.94
11	(279)					.98	10	(254)					1.0					1.0
12	(305)					1.0												
s_{min} = 2.0 h_{nom} s_{cr} = 3.5 h_{nom} $f_A = 0.33 \frac{s}{h_{nom}} - 0.17$ for $s_{cr} > s > s_{min}$							c_{min} =2.0 h_{nom} c_{cr} = 3.0 h_{nom} $f_{RN} = 0.2 \frac{c}{h_{nom}} + 0.4$ for $c_{cr} > c > c_{min}$							c_{min} = 2.0 h_{nom} c_{cr} = 3.0 h_{nom} $f_{RV} = 0.35 \frac{c}{h_{nom}} - 0.05$ for $c_{cr} > c > c_{min}$				

3.3.11

3.3.11 HDI, HDI-L, HDI+ and HDI-L+ Drop-in Anchor

3.3.11.4 Installation instructions

Manufacturer's Printed Installation Instructions (MPII) are included with each product package. They can also be viewed or downloaded at www.hilti.com. Because of the possibility of changes, always verify that downloaded MPII are current when used. Proper installation is critical to achieve full performance. Training is available on request. Contact Hilti Technical Services for applications and conditions not addressed in the MPII.

3.3.11.5 Ordering information[1]

HDI+, HDI-L+ and HDI

Carbon steel

Description	Description	Anchor thread size	Qty / box
HDI+ 1/4	**HDI-L+ 1/4**	1/4	100
HDI+ 3/8	**HDI-L+ 3/8**	3/8	50
HDI+ 1/2	**HDI-L+ 1/2**	1/2	50
HDI 5/8	**–**	5/8	25
HDI 3/4	**–**	3/4	25

HDI-SS anchors

Stainless steel

Description	Anchor thread size	Qty / box
HDI 1/4 SS303	1/4	100
HDI 3/8 SS303	3/8	50
HDI 1/2 SS303	1/2	50
HDI 5/8 SS303	5/8	25
HDI 3/4 SS303	3/4	25

Setting tools for HDI and HDI-SS anchors

Description	Anchor thread size
HST 5/8 Setting Tool	5/8
HST 3/4 Setting Tool	3/4

Setting Tools for HDI+ and HDI-L+

Anchor thread size	Description
	HST 1/4 Setting tool
1/4	HSD-MM 1/4 (TE-C-24D6 1/4 Setting tool)
	HDI+ Setting Tool includes a TE-CX 3/8x1 carbide bit
	HST 3/8 Setting tool
3/8	HSD-MM 3/8 (TE-C-24SD10 3/8 Setting tool)
	HDI+ Setting Tool includes a TE-CX 1/2x1-9/16 carbide bit
	HST 1/2 Setting tool
1/2	HSD-MM 1/2 (TE-C-24SD12 1/2 Setting tool)
	HDI+ Setting Tool includes a TE-CX 5/8x2 carbide bit

1 All dimensions in inches

The following excerpt are pages from the North American Product Technical Guide, Volume 2: Anchor Fastening, Edition 19.

Please refer to the publication in its entirety for complete details on this product including data development, product specifications, general suitability, installation, corrosion and spacing and edge distance guidelines.
US&CA: https://submittals.us.hilti.com/PTGVol2/

To consult directly with a team member regarding our anchor fastening products, contact Hilti's team of technical support specialists between the hours of 7:00am – 6:00pm CST.
US: 877-749-6337 or HNATechnicalServices@hilti.com
CA: 1-800-363-4458, ext. 6 or CATechnicalServices@hilti.com

Hilti, Inc.
7250 Dallas Parkway, Suite 1000
Plano, TX 75024

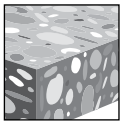
1-800-879-8000
www.hilti.com

3.3.14 HDI-P DROP-IN ANCHORS

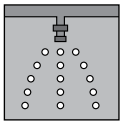
PRODUCT DESCRIPTION

HDI-P Drop-in Anchors

Anchor System	Features and Benefits
HDI-P Drop-in Anchor 	• Optimized anchor length to allow reliable fastenings in hollow core panels, precast plank and post tensioned slabs • Shallow drilling enables fast installation • Lip provides flush installation, consistent anchor depth and easy rod alignment • HSD-G 3/8 setting tool with hand guard leaves mark on flange when anchor is set properly to enable inspection and verification of proper expansion



Uncracked concrete



Fire sprinkler listings

MATERIAL SPECIFICATIONS

The HDI-P is manufactured from mild carbon steel, which is zinc plated for corrosion protection in accordance with ASTM B633, SC 1, Type III.

Approvals/Listings	
FM (Factory Mutual)	Pipe hanger components for automatic sprinkler systems for ¾=8-in. model

DESIGN DATA IN CONCRETE USING ALLOWABLE STRESS DESIGN

Technical data

Table 1 - Hilti HDI-P loads in normal-weight concrete and hollow core concrete panels

Nominal anchor diameter	Length in. (mm)	Nom. bit dia. in.	Ultimate loads, lb (kN)								Allowable loads, lb (kN)[3]							
			f'_c = 4,000 psi concrete				Hollow core[1,2]				f'_c = 4,000 psi concrete				Hollow core[1,2]			
			Tension		Shear		Tension		Shear		Tension		Shear		Tension		Shear	
1/4	5/8	(15.9)	3/8	1,430	(6.4)	1,870	(8.3)	1,550	(6.9)	2,275	(10.1)	285	(1.3)	375	(1.7)	310	(1.4)	455	(2.0)
3/8	3/4	(19.1)	1/2	1,900	(8.5)	3,000	(13.3)	2,100	(9.3)	4,000	(17.8)	380	(1.7)	600	(2.7)	420	(1.9)	800	(3.6)
1/2	1	(25.4)	5/8	3,000	(13.3)	6,075	(27.0)	3,110	(13.8)	5,495	(24.5)	600	(2.7)	1215	(5.4)	620	(2.8)	1,100	(4.9)

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.

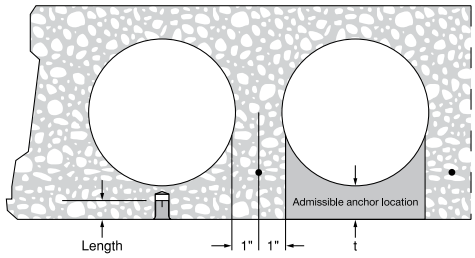
2 Minimum compressive strength of hollow core panels is 7,000 psi at the time of installation. The minimum thickness “t” is 1-3/8 inches.

3 Allowable loads calculated with a 5:1 factor-of-safety.

INSTALLATION INSTRUCTIONS

Installation Instructions For Use (IFU) are included with each product package. They can also be viewed or downloaded online at www.hilti.com (Canada). Because of the possibility of changes, always verify that downloaded IFU are current when used. Proper installation is critical to achieve full performance. Training is available on request. Contact Hilti Technical Services for applications and conditions not addressed in the IFU.

Figure 1 - Installation of Hilti HDI-P in hollow core concrete



ORDERING INFORMATION

HDI-P anchor

Description	Bit diameter	Qty / box
HDI-P 1/4	3/8	100
HDI-P 3/8	1/2	100
HDI-P 1/2	5/8	50

Setting tools for HDI-P anchors

Description
HST-P 1/4 Hand Setting Tool
HST-P 3/8 Hand Setting Tool
HSD-G 3/8 Hand Setting Tool with hand guard
HST-P 1/2 Hand Setting Tool

INSTALLATION INSTRUCTIONS

Manufacturer's Printed Installation Instructions (MPII) are included with each product package. They can also be viewed or downloaded at www.hilti.com. Because of the possibility of changes, always verify that downloaded MPII are current when used. Proper installation is critical to achieve full performance. Training is available on request. Contact Hilti Technical Services for applications and conditions not addressed in the MPII.

ORDERING INFORMATION[1]

HDI+, HDI-L+ and HDI

Carbon steel

Description	Description	Anchor thread size	Qty / box
HDI+ 1/4	**HDI-L+ 1/4**	1/4	100
HDI+ 3/8	**HDI-L+ 3/8**	3/8	50
HDI+ 1/2	**HDI-L+ 1/2**	1/2	50
HDI 5/8	**–**	5/8	25
HDI 3/4	**–**	3/4	25

HDI-SS anchors

Stainless steel

Description	Anchor thread size	Qty / box
HDI 1/4 SS303	1/4	100
HDI 3/8 SS303	3/8	50
HDI 1/2 SS303	1/2	50
HDI 5/8 SS303	5/8	25
HDI 3/4 SS303	3/4	25

Setting tools for HDI and HDI-SS anchors

Description	Anchor thread size
HST 5/8 Setting Tool	5/8
HST 3/4 Setting Tool	3/4

Setting Tools for HDI+ and HDI-L+

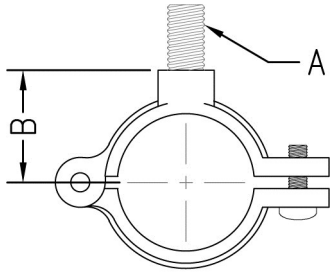
Anchor thread size	Description
1/4	HST 1/4 Setting tool
	HSD-MM 1/4 (TE-C-24D6 1/4 Setting tool)
	HDI+ Setting Tool includes a TE-CX 3/8x1 carbide bit
3/8	HST 3/8 Setting tool
	HSD-MM 3/8 (TE-C-24SD10 3/8 Setting tool)
	HDI+ Setting Tool includes a TE-CX 1/2x1-9/16 carbide bit
1/2	HST 1/2 Setting tool
	HSD-MM 1/2 (TE-C-24SD12 1/2 Setting tool)
	HDI+ Setting Tool includes a TE-CX 5/8x2 carbide bit

1 All dimensions in inches

HINGED EXTENSION SPLIT CLAMP

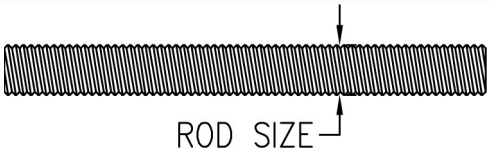
FIG. 508R

Function: Designed for non-insulated stationary pipe lines in either a horizontal or vertical position. The hinged design allows for a quick installation.
Material: Malleable iron
Finish: Plain or electro-galvanized
Approvals: Complies with Federal Specification A-A-1192A (Type 12) and Manufacturers' Standardization Society ANSI/MSS SP-58 (Type 12) which supersedes ANSI/MSS SP-69.
Ordering: Specify figure number, pipe size, and finish.



Pipe Size		Bolt Thread A	B		Max. Rec. Load		Wt. Each	
					lbs.	kN	lbs.	kg
3/8	(10)	3/8	13/16	(20.64)	180	(0.80)	.13	(.06)
1/2	(15)	3/8	7/8	(22.23)	180	(0.80)	.14	(.06)
3/4	(20)	3/8	1	(25.40)	180	(0.80)	.16	(.07)
1	(25)	3/8	1 1/8	(28.58)	180	(0.80)	.18	(.08)
1 1/4	(32)	3/8	1 5/16	(33.34)	180	(0.80)	.22	(.10)
1 1/2	(40)	3/8	1 7/16	(36.51)	180	(0.80)	.38	(.17)
2	(50)	3/8	1 11/16	(42.86)	180	(0.80)	.44	(.20)
2 1/2	(65)	1/2	2 1/8	(53.98)	300	(1.33)	.45	(.20)
3	(80)	1/2	2 7/16	(61.91)	300	(1.33)	.55	(.25)
4	(100)	1/2	3	(76.20)	300	(1.33)	.95	(.43)

FIG. 20 & 21 CONTINUOUS THREADED ROD



Function: Useful in applications where stud lengths cannot be predetermined.
Material: Carbon steel (Type 304 or 316 Stainless Steel upon request)
Finish: Plain **(Fig. 20)** or electro-galvanized Finish **(Fig. 21)** (Hot dipped galvanized upon request)
Ordering: Specify figure number, rod size, length, material, and finish.

Rod Size	Packaging Feet Per Bundle						Max. Rec. Load				Wt. Per Foot	
							650°F (343°C)		750°F (399°C)			
	6ft.	(1.83)	10ft.	(3.05)	12ft.	(3.66)	lbs.	kN	lbs.	kN	lbs.	kg
1/4-20	300	(91.44)	500	(152.4)	600	(182.88)	240	(1.07)	188	(0.84)	.12	(.05)
3/8-16	150	(45.72)	250	(76.2)	240	(73.15)	730	(3.25)	572	(2.54)	.29	(.13)
1/2-13	72	(21.95)	120	(36.58)	144	(43.90)	1350	(6.01)	1057	(4.70)	.54	(.25)
5/8-11	48	(14.63)	80	(24.38)	96	(29.26)	2160	(9.61)	1692	(7.52)	.83	(.38)
3/4-10	30	(9.14)	50	(15.24)	60	(18.29)	3230	(14.37)	2530	(11.25)	1.25	(.57)
7/8-9	24	(7.32)	40	(12.19)	48	(14.63)	4480	(19.93)	3508	(15.61)	1.65	(.75)
1-8	12	(3.66)	20	(6.10)	24	(7.32)	5900	(26.24)	4620	(20.55)	2.25	(1.02)

BEAM CLAMPS

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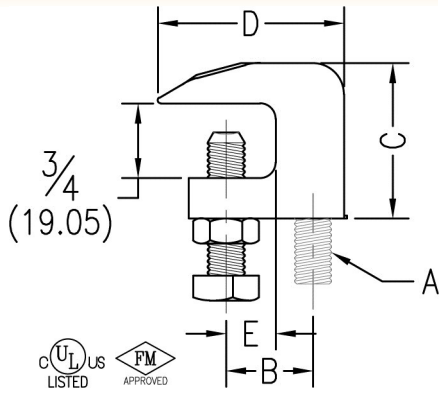
DOMESTIC BEAM CLAMP FIG. 350, 353, 354, 355, 356, & 357



Function: Designed for attaching hanger rod to the top flange of a beam or bar joist, where the flange thickness does not exceed $^{3}/_{4}$" (19.05mm). The open U design permits rod adjustment. The universal design of the $^{3}/_{8}$" Fig. 353 allows it to be used in an inverted position on the bottom flange of a beam as well.

Material: Malleable iron with hardened steel cup point set screw and locknut

Finish: Plain or electro-galvanized (Hot dipped galvanized with electro-galvanized hardware upon request)

Approvals: Underwriters' Laboratories Listed in the U.S. (UL), Canada (CUL), for sizes $^{3}/_{8}$" to $^{7}/_{8}$" only. Factory Mutual Approved for rod sizes $^{3}/_{8}$" and $^{1}/_{2}$" only. Complies with Federal Specifications A-A-1192A (Type 19) and Manufacturers' Standardization Society ANSI/MSS SPSP-58 (Type 19) which supersedes ANSI/MSS SP-69. Fig. 353 sized for $^{3}/_{8}$" rod can be used in an inverted position (bottom of beam) and follows the same U.S. (UL), Canada (CUL), and Factory Mutual Approvals. Used in this manner the $^{3}/_{8}$" Fig. 353 also complies with Federal Specifications A-A-1192A (Type 23) and Manufacturers' Standardization Society ANSI/MSS SPSP-58 (Type 23) which supersedes ANSI/MSS SP-69. (Approvals are only valid for beam clamps with locknut).
Buy American Act compliant.

Ordering: Specify figure number, rod size, material, and finish.

NOTE: When a torque wrench is unavailable, the setscrew should be tightened so it contacts the I-beam and then an additional $^{1}/_{4}$ to $^{1}/_{2}$ turn.

Set Screw Torque				
Nominal Thread Size		$^{3}/_{8}$	$^{1}/_{2}$	Caution should be taken not to over tighten the set screw
Rec. Torque	in-lbs.	60	125	
	N-m	(6.8)	(14.1)	

Figure Numbers	Rod Size A	B		C		D		E		Max. Pipe Size		Max. Rec. Load		Wt. Each	
												lbs.	kN	lbs.	kg
* 350	$^{1}/_{4}$	$^{7}/_{8}$	(22.23)	$1^{1}/_{2}$	(38.10)	$1^{5}/_{8}$	(41.28)	$^{1}/_{2}$	(12.70)	N/A	N/A	250	(1.11)	.34	(.15)
Δ 353	$^{3}/_{8}$	$^{7}/_{8}$	(22.23)	$1^{1}/_{2}$	(38.10)	$1^{5}/_{8}$	(41.28)	$^{1}/_{2}$	(12.70)	4	(100)	400	(1.78)	.33	(.15)
354	$^{1}/_{2}$	1	(25.40)	$1^{1}/_{2}$	(38.10)	$1^{11}/_{16}$	(42.86)	$^{1}/_{2}$	(12.70)	8	(200)	500	(2.22)	.34	(.15)
355	$^{5}/_{8}$	$1^{1}/_{16}$	(26.99)	$1^{1}/_{2}$	(38.10)	$1^{7}/_{8}$	(47.63)	$^{5}/_{8}$	(15.88)	8	(200)	600	(2.67)	.39	(.18)
356	$^{3}/_{4}$	$1^{5}/_{16}$	(33.34)	$1^{3}/_{4}$	(44.45)	$2^{3}/_{8}$	(60.33)	$^{5}/_{8}$	(15.88)	8	(200)	800	(3.56)	.63	(.29)
357	$^{7}/_{8}$	$1^{5}/_{16}$	(33.34)	$1^{3}/_{4}$	(44.45)	$2^{3}/_{8}$	(60.33)	$^{5}/_{8}$	(15.88)	8	(200)	1200	(5.34)	.60	(.27)

* $^{1}/_{4}$" Fig. 350 Not UL or FM approved.

Δ $^{3}/_{8}$" Fig. 353 Reversible design approved for bottom beam use.

Unless otherwise specified, all dimensions on drawings and in charts are in inches and dimensions shown in parentheses are in millimeters.

BAND HANGERS

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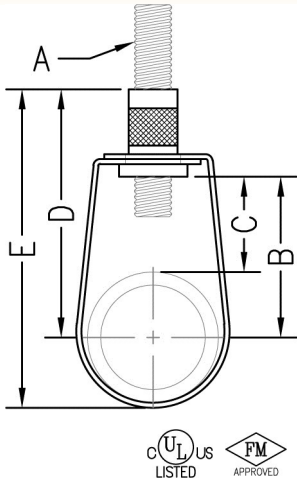
NFPA SWIVEL RING HANGER — FIG. 141 & 141F



Function: Designed for the suspension of non-insulated stationary pipe lines. The knurled insert nut that allows a vertical adjustment after installation, is tapped to NFPA reduced rod size standards. Captured knurled insert nut present on pipe sizes ½" (15mm) to 2" (50mm). The capture is permanent in the bottom portion of the band, allowing the hanger to be opened during installation if desired, but preventing the knurled insert nut from falling completely out. Fig. 141F has a layer of felt which separates the pipe from the hanger to reduce vibration and sound.

Material: Carbon steel

Finish: Pre-galvanized **(Fig. 141)** or pre-galvanized with felt lining **(Fig. 141F)**

Approvals: Underwriters' Laboratories Listed in the U.S. (UL), Canada (CUL), for use with standard steel pipe sizes ¾" (20mm) to 8" (200mm) and CPVC pipe size ¾" (20mm) to 4" (100mm). Factory Mutual Approved for steel pipe sizes ¾" (20mm) to 8" (200mm). Complies with Federal Specifications A-A-1192A (Type 10), and Manufacturers' Standardization Society ANSI/MSS SP-58 (Type 10) which supersedes ANSI/MSS SP-69.

Ordering: Specify figure number and pipe size.

NOTE: If ordering Fig. 141F felt lined hangers for pipe sizes of 3½"(90mm) or under, order the next largest size to allow for the thickness of the felt lining. Metric knurl insert nuts available upon request.

Pipe Size		Rod Size	B		Adj. C		D		E		Max. Rec. Load		Wt. Each	
											lbs.	kN	lbs.	kg
½	(15)	3/8	1 7/8	(47.63)	1 7/16	(36.51)	2 3/4	(69.85)	3 1/16	(77.79)	300	(1.33)	.10	(.05)
¾	(20)	3/8	1 11/16	(42.86)	1 1/8	(28.58)	2 1/2	(63.50)	3 1/16	(77.79)	300	(1.33)	.10	(.05)
1	(25)	3/8	1 5/8	(41.28)	1	(25.40)	2 1/2	(63.50)	3 3/16	(80.96)	300	(1.33)	.10	(.05)
1¼	(32)	3/8	1 15/16	(49.21)	1 1/16	(26.99)	2 13/16	(71.44)	3 9/16	(90.49)	300	(1.33)	.11	(.05)
1½	(40)	3/8	2 1/8	(53.98)	1 1/16	(26.99)	3 1/8	(79.38)	3 7/8	(98.43)	300	(1.33)	.11	(.05)
2	(50)	3/8	2 7/16	(61.91)	1 1/8	(28.58)	3 5/16	(84.14)	4 3/8	(111.13)	300	(1.33)	.14	(.06)
2½	(65)	3/8	3 1/16	(77.79)	1 5/8	(41.28)	3 15/16	(100.01)	5 3/8	(136.53)	525	(2.34)	.19	(.09)
3	(80)	3/8	3 11/16	(93.66)	1 7/8	(47.63)	4 9/16	(115.89)	6 5/16	(160.34)	525	(2.34)	.23	(.10)
3½	(90)	3/8	3 3/4	(95.25)	1 7/8	(47.63)	4 5/8	(117.48)	6 5/8	(168.28)	525	(2.34)	.25	(.11)
4	(100)	3/8	4 3/16	(106.36)	1 7/8	(47.63)	5 1/16	(128.59)	7 5/16	(185.74)	650	(2.89)	.30	(.14)
5	(125)	1/2	4 5/8	(117.48)	1 5/8	(41.28)	5 5/8	(142.88)	8 3/8	(212.73)	1000	(4.45)	.50	(.23)
6	(150)	1/2	5 5/8	(142.88)	2 1/4	(57.15)	6 1/2	(165.10)	9 13/16	(249.24)	1000	(4.45)	.58	(.26)
8	(200)	1/2	6 13/16	(173.04)	2 7/16	(61.91)	7 15/16	(201.61)	12 1/4	(311.15)	1000	(4.45)	.90	(.41)

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RISER CLAMP

FIG. 550, 551, & 553

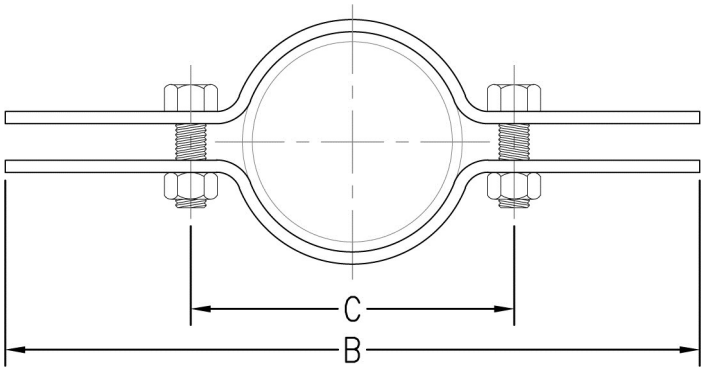
Function: Designed for supporting and stabilizing vertical pipe runs. The PVC coating on Fig. 553 protects the pipe from the metal surface of the clamp. This product is not intended for use with hanger rods. Clamp is designed for standard iron pipe O.D. and must be considered when sizing other types of piping.

Material: Carbon steel (Type 304 or 316 Stainless Steel upon request)

Finish: Plain **(Fig. 550)**, electro-galvanized **(Fig. 551)**, or plain with PVC coating **(Fig. 553)**,or (Hot dipped galvanized with electro-galvanized hardware upon request)

Approvals: Underwriters' Laboratories Listed in the U.S. (UL) and Factory Mutual Approved for sizes $^{3}/_{4}$" (20mm) to 8" (200mm) only. Complies with Federal Specification A-A-1192A (Type 8) and Manufacturers' Standardization Society ANSI/ MSS SP-58 (Type 8) which supersedes ANSI/ MSS SP-69.

Ordering: Specify figure number, pipe size, material, and finish.



FM APPROVED UL LISTED

Installation practice for Model 550 Riser Clamps: When possible the clamp should be placed under a coupling, hub, or welded lugs on steel pipe. Bolt torques should be per industry standards.

Pipe Size		B		C		Bolt Size	Max. Rec. Load		Wt. Each	
							lbs.	kN	lbs.	kg
1/2	(15)	9	(228.60)	2 1/2	(63.50)	3/8 x 1 1/4	220	(0.98)	1.05	(.48)
3/4	(20)	8 7/8	(225.43)	2 3/8	(60.33)	3/8 x 1 1/4	220	(0.98)	1.05	(.48)
1	(25)	8 3/4	(222.25)	2 1/4	(57.15)	3/8 x 1 1/4	220	(0.98)	1.05	(.48)
1 1/4	(32)	9 1/4	(234.95)	2 3/4	(69.85)	3/8 x 1 1/4	250	(1.11)	1.10	(.50)
1 1/2	(40)	10	(254.00)	3 1/2	(88.90)	3/8 x 1 1/4	250	(1.11)	1.17	(.53)
2	(50)	10 1/4	(260.35)	3 3/4	(95.25)	3/8 x 1 1/4	300	(1.33)	1.20	(.54)
2 1/2	(65)	11 1/8	(282.58)	4 5/8	(117.48)	3/8 x 1 1/2	400	(1.78)	1.89	(.86)
3	(80)	11 3/4	(298.45)	5 1/4	(133.35)	3/8 x 1 1/2	500	(2.22)	1.99	(.90)
3 1/2	(90)	12 1/2	(317.50)	6	(152.40)	3/8 x 1 1/2	600	(2.67)	2.17	(.98)
4	(100)	13	(330.20)	6 1/2	(165.10)	1/2 x 1 3/4	750	(3.34)	2.21	(1.00)
5	(125)	14 1/4	(361.95)	7 3/4	(196.85)	1/2 x 1 3/4	1500	(6.67)	3.24	(1.47)
6	(150)	15 3/8	(390.53)	8 7/8	(225.43)	1/2 x 1 3/4	1600	(7.12)	3.89	(1.76)
8	(200)	18 1/2	(469.90)	12	(304.80)	5/8 x 2	2500	(11.12)	7.60	(3.45)
10	(250)	20 1/2	(520.70)	14	(355.60)	5/8 x 2	2500	(11.12)	11.10	(5.03)
12	(300)	22 1/2	(571.50)	16	(406.40)	5/8 x 2 1/2	2700	(12.01)	16.50	(7.48)
14	(350)	25 1/8	(638.18)	18 5/8	(473.08)	5/8 x 3	2700	(12.01)	17.70	(8.03)
16	(400)	26 1/4	(666.75)	20 3/4	(527.05)	3/4 x 3 1/2	2900	(12.90)	30.40	(13.79)
18	(450)	27 7/8	(708.03)	22 3/8	(568.33)	3/4 x 3 1/2	2900	(12.90)	33.30	(15.10)
20	(500)	30	(762.00)	24 1/2	(622.30)	3/4 x 3 1/2	2900	(12.90)	36.30	(16.47)
24	(600)	35	(889.00)	29 1/2	(749.30)	7/8 x 3 1/2	2900	(12.90)	48.68	(22.08)
30	(750)	42 3/8	(1076.33)	35 3/8	(898.52)	7/8 x 3 1/2	2900	(12.90)	60.16	(27.29)

Recommended Torque For Pipe Clamp Hardware						
Bolt Size	1/4"-20	5/16"-18	3/8"-16	1/2"-13	5/8"-11	3/4"-10 & Larger
ft-lbs.	6	11	19	50	65	75
N-m	(8)	(15)	(26)	(68)	(88)	(102)

Unless otherwise specified, all dimensions on drawings and in charts are in inches and dimensions shown in parentheses are in millimeters.

Section 6 – Specialties

TECHNICAL DATA

WATER MOTOR ALARMS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com.

1. DESCRIPTION

The Viking water motor alarm is a mechanical device actuated by a flow of water. It is designed to sound a continuous alarm while a sprinkler system operates. An alarm is a required component of every sprinkler system having more than 20 sprinklers.

WARNING: Cancer and Reproductive Harm- www.P65Warnings.ca.gov

A. Features

1. The water motor alarm is tapped 3/4” NPT on the inlet and 1” NPT on the drain outlet.
2. The water motor alarm package includes a drive shaft 16-3/4” (425 mm) long for walls 14” (356 mm) thick or less. A special extension shaft is available for walls up to 30-1/4” (768 mm) thick.
3. The package also includes the required 3/4” (20 mm) NPT strainer for installation on the alarm line.
4. Rated water working pressures: 300 PSI (20.7 bar)

B. Accessories: (order separately)

1. Extension Mounting Cup: Viking Part Number 05957B, Material: 14-Gauge Cold Rolled Steel, UNS-G10080, coated with black E-coat. The extension mounting cup is required when the wall thickness is less than 3” (76.2 mm). Refer to “INSTALLATION” instructions. See Figure 1.
2. Closure Plate: Viking Part Number 05820B, Material: 16-Gauge Galvanized Steel, UNS-G10080. The closure plate is required when the Water Motor Alarm gong is mounted on an irregularly surfaced wall. It serves to prevent birds from entering the inside of the gong. The closure plate also serves as a mounting plate for sheet metal walls. Refer to “INSTALLATION” instructions. See Figure 1.
3. Special Extension Shaft: Viking Part Number 03312B, Material: Stainless Steel, UNS-S30400. The extension shaft is required when the Water Motor Alarm is installed on walls from 14” (356 mm) to 30-1/4” (768 mm) thick.

2. LISTINGS AND APPROVALS

cULus Listed - VPLX

FM Approved - Water Motor Gongs

LPCB Approved

CE - Standard EN 12259-4, EC-certificate of conformity 1725-CPD-H0001

New York City Board of Standards and Appeals - Calendar No. 219-76-SA

3. TECHNICAL DATA

Specifications

Available since 1991
Shipping Weight: Model F-2: 11 lbs. (5.0 kg)
Water working pressure: Rated to 300 psi (20.7 bar)

Material Standards (See Figure 3)

Viking E-coat Spec: SPF02 W01

Ordering Information

Viking Part No. 07862

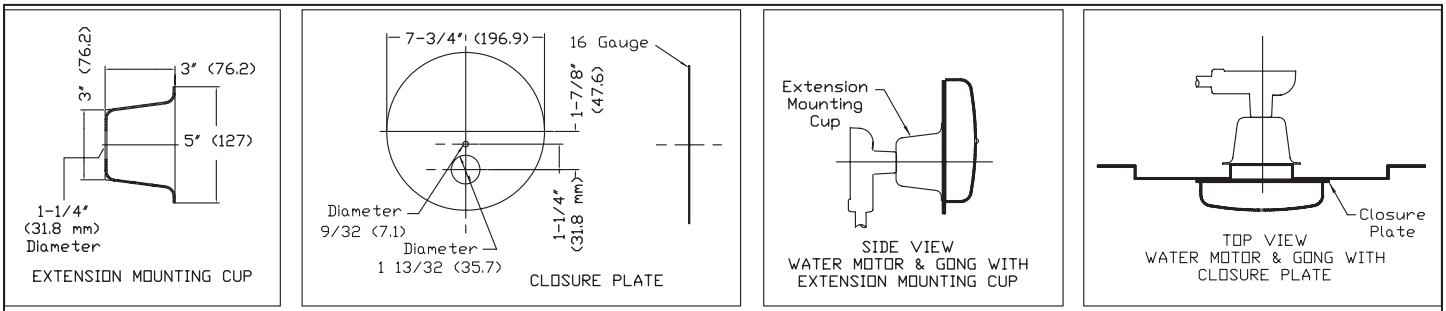


Figure 1: Accessories

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com.

4. INSTALLATION

Locate the water motor on an exterior wall as close as practical to the valve being monitored for water flow. A 3/4" (20 mm) strainer (included) is required on the alarm line as close as possible to the alarm outlet of the valve being monitored for water flow (or outlet of the retard chamber, if used). The location must be easily accessible for cleaning.

1. Cut a 1-7/16" (36.5 mm) minimum to 1-5/8" (41.3 mm) maximum diameter hole in the building wall to accommodate the 3/4" (20 mm) galvanized spacer pipe. (Note: Spacer pipe is NOT included in Water Motor Alarm Package). The hole through the wall must be level or pitched slightly downward toward the water motor.
2. Measure the wall thickness.
3. Cut and thread the spacer pipe to a length equal to: The wall thickness minus 1" (25.4 mm). If the extension mounting cup is used, add an additional 3" (76 mm) to the spacer pipe.
4. Cut the drive shaft (10) to a length equal to: The total wall thickness plus 2-3/4" (70 mm). If extension mounting cup is used, add an additional 3" (76 mm).
5. File the drive shaft to provide a 3/32" (2.4 mm) x 450 chamfer on both corners of both ends. File off all burrs and insert the drive shaft into the hole of the striker arm shaft.
6. Slide the spacer pipe over the shaft and thread the end of the spacer pipe into the gong support assembly coupling (12).
7. Slide the closure plate (if used) over the free end of the spacer pipe, up to the back of the gong. If desired, the closure plate may be fastened to the gong support by using the 9/32" (7.14 mm) diameter hole in the gong support. Use only a flat or round headed fastener that will not interfere with striker arm movement.
8. Position the support assembly on the exterior wall surface by sliding the free threaded end of the spacer pipe into the hole from outside the building.
9. On the inside surface of the wall: Slide the wall plate provided (9), over the free threaded end of the spacer pipe. (If an extension mounting cup is used, place it over the end of the spacer pipe with the flared end toward the wall before sliding the wall plate into position).
10. Remove the plastic thread protectors from the threaded openings in the body of the water motor.
11. Attach the water motor assembly by threading the body (3) onto the free threaded end of the spacer pipe. The chamfered ends of the drive shaft allow it to slide into position as the water motor body is threaded onto the spacer pipe. When the assembly is properly tightened, the water motor should be positioned with the 1" (25 mm) NPT drain outlet facing downward and the 3/4" (20 mm) NPT alarm line inlet horizontal. See Figures 2 and 3.
12. Attach the gong, the flat washer, and the gong label (16, 17, and 18) to the gong support installed on the exterior surface of the wall, with the 5/16-18 x 12" (13 mm) screw (19). Note: The flat washer must be installed between the gong and the gong support (17).
13. With galvanized, brass, or other approved corrosion-resistant piping, not less than 3/4" (20 mm) diameter, connect the water motor inlet to the alarm outlet of the waterflow detecting device. A 3/4" (20 mm) strainer (included) is required on the alarm line as close as possible to the alarm outlet of the waterflow detecting device (or outlet of the retard chamber if used). The location must be easily accessible for cleaning.
14. The drain outlet of the impeller housing must discharge to an open drain. Care shall be taken to keep the drain line clean at all times.
15. A water motor drain line that:
    a. Has too many fittings, and/or
    b. Has a very short length of pipe between the 1" (25 mm) outlet and the first elbow in the water motor drain pipe, and/or
    c. Is very long may result in slow drainage and reduced water motor speed. This condition can be remedied by increasing the drain pipe diameter, increasing the length of pipe to the first elbow, and/or pitching the pipe toward the discharge location.

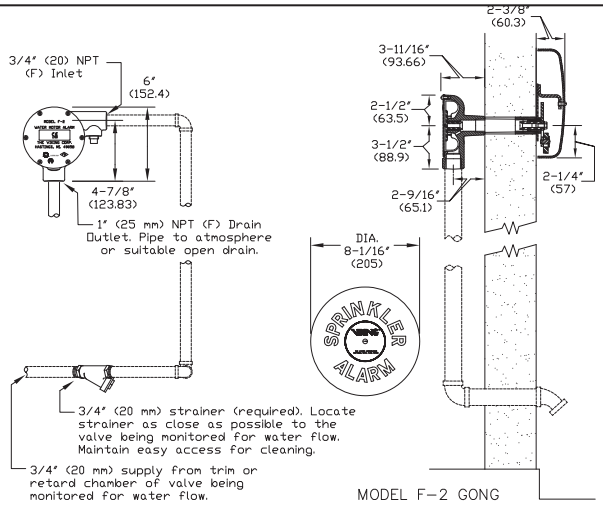


Figure 2

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com.

5. OPERATION (See Figure 3)

When a sprinkler system is activated, water flows from the alarm outlet of the valve, through the 3/4" (20 mm) strainer and alarm line piping, into the inlet of the water motor. From the 1/8" inlet orifice, the water flows through a nozzle (4), which restricts the flow into a pressurized stream directed onto the impeller (7). Force from the water stream turns the impeller and drive shaft (10), causing the striker arm (20) to rotate. The striker (25) impacts against the gong (16), producing a continuous alarm. A minimum of 5 PSI (.34 bar) is required at the nozzle to cause a continuous alarm. When properly installed, the Water Motor Alarm produces the required 90 decibel output. After passing through the water motor, the water is discharged through a 1" (25 mm) drain outlet in the bottom of the impeller housing. The discharged water must be piped through the wall to atmosphere or to a suitable open drain.

6. INSPECTIONS, TESTS AND MAINTENANCE

Weather-resistant materials are used in the construction of the water motor alarm. At regular intervals, examine and test the water motor to ensure that the nozzle and drain line are clean and free of obstruction, and that the alarm functions properly. Also, at regular intervals and before disassembly of the water motor, clean and inspect the alarm line strainer located at the alarm outlet of the water-flow detecting device, or the outlet of the retard chamber, if used. (Note: Some retard chambers may be equipped with a strainer built in). For minimum maintenance and inspection requirements, refer to NFPA 25. In addition, the Authority Having Jurisdiction may have additional maintenance, testing, and inspection requirements that must be followed. Before proceeding with disassembly of the water motor alarm, notify the Authority Having Jurisdiction and occupants of the area covered by the system affected. Take all appropriate precautions. The water motor alarm will be disabled during disassembly.

A. Water Motor Disassembly (See Figure 3)

1. Isolate the water motor alarm by closing the alarm line valve in the trim of the waterflow detecting device. (Refer to appropriate technical data for the system used.)
2. Remove pipe plug (5).
3. Remove all round head machine screws (1) from the water motor cover.
4. Separate the cover (2) and the gasket (6) from the housing (3).
5. Remove the impeller (7).
6. Inspect and, if necessary, carefully clean the nozzle (4) with a wire or pipe cleaner brush.
7. Flush the nozzle way and drain line with water or compressed air.

B. Water Motor Re-Assembly

1. Re-install the pipe plug (5).
2. Re-install the impeller (7).
3. Replace cover gasket (6) and attach cover (2) by using round head machine screws (1).
4. Open the alarm line valve.
5. Test the water motor alarm.
6. When test is complete and water motor alarm operation is satisfactory, place the alarm line valve in the proper "alarm" position. Reset and return the affected systems to service.

7. AVAILABILITY

The Viking Water Motor Alarm is available through a network of domestic and international distributors. See the Viking Corp. Web site for closest distributor or contact The Viking Corporation.

8. GUARANTEES

For details of warranty, refer to Viking's current list price schedule or contact Viking directly.

TECHNICAL DATA

WATER MOTOR ALARMS

The Viking Corporation, 210 N Industrial Park Drive, Hastings MI 49058
Telephone: 269-945-9501 Technical Services: 877-384-5464 Fax: 269-818-1680 Email: techsvcs@vikingcorp.com
Visit the Viking website for the latest edition of this technical data page www.vikinggroupinc.com.

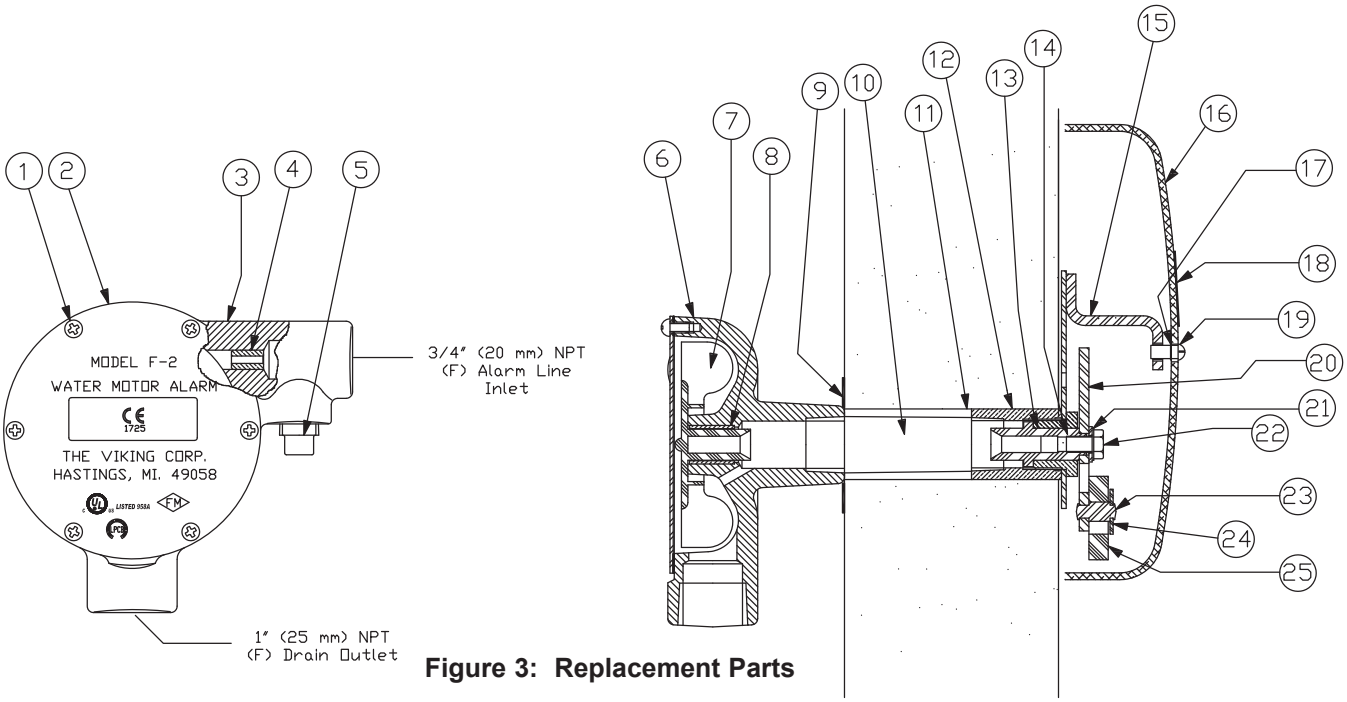


Figure 3: Replacement Parts

ITEM NO.	PART NUMBER	DESCRIPTION	MATERIAL	NO. REQ'D
1	*	Screw, R. H. Self-tap #10-24 x 3/8" lg.	Zinc Plated Steel	6
2	07867	Cover	Steel	1
3	*	Housing	Cast Iron	1
4	*	Nozzle	Brass	1
5	01925S	1/2" Pipe Plug	Cast Iron	1
6	02550B	Cover Gasket	Cellulose/Nitrile/Glass Blend	1
7	02547C	Impeller	Delrin	1
8	*	Bearing	Brass: Sintered Bronze	1
9	05603A	Wall Plate	Galvanized Steel	1
10	05604B	Drive Shaft	Stainless Steel	1
11	--	3/4" Pipe (C.O.J.) not furnished	Galvanized Steel	1
12	*	Coupling	Brass	1
13	02556B	Striker Arm Shaft	Celcon Glass Filled	1
14	*	Bearing	Brass	1
15	*	Gong Support	Stainless Steel	1
16	05821C	Gong	Aluminum	1
17	02766A	Flat Washer, 11/32" ID x 11/16" ID x 1/16"	Stainless Steel	1
18	05768A	Gong Label	Aluminum (F-2)	1
19	--	Screw, B.H. Slotted, 5/16-18 x 1/2" lg.	Stainless Steel	1
20	*	Striker Arm	Stainless Steel	1
21	--	Flat Washer, 11/32" ID x 11/16" OD x 1/16"	Stainless Steel	1
22	--	Screw, H.H. Self-tap 5/16-18 x 1/2" lg.	Zinc Plated Steel	1
23	*	Striker Pin	Stainless Steel	1
24	*	Striker Arm Washer	Stainless Steel	1
25	*	Striker	Canvas Phenolic	1
--Indicates replacement part not available				
*Indicates replacement part only available in a Sub-Assembly listed below				
SUB-ASSEMBLIES				
1-8	07863	Motor Assembly		
20, 23-25	02558B	Striker Arm Assembly		
12-15, 20-25	05606C	Support Assembly		

High-performance intumescent firestop sealant FS-ONE MAX

Applications

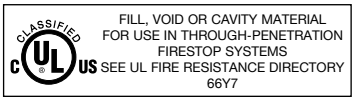
- For effectively sealing most common through penetrations in a variety of base materials
- For use on concrete, masonry and drywall
- Mixed and multiple penetrations
- Metal pipe penetrations: copper, steel and EMT
- Insulated metal pipe penetrations: steel and copper
- Plastic pipe penetrations: closed or vented

Advantages

- US-produced: “Buy American” compliant
- One product for a variety of common through penetrations
- Cost-effective, easy-to-use solution
- Water-based and paintable
- Industry-leading VOC results
- Ethylene glycol-free

Chemical resistant

Mold and mildew resistant



Technical data	
Chemical basis	Water-based acrylic dispersion
Approx. Density	84.3 lb/ft³
Color	Red
Application temperature range	41 - 104 °F
Approx. cure time[1)]	4 mm/3 days
Temperature resistance range	-4 to 212 °F
Mold and mildew performance	Class 0 (ASTM G21-96)
Mold and mildew resistance	Yes
Surface burning characteristics UL 723 (ASTM E84)	Flame spread: 0 Smoke development: 10
Tested in accordance with	UL 1479, ASTM E814, ASTM E84, CAN/ ULC-S115, ASTM G21, ASTM E90
California State fire marshal approval	CSFM Listing 4485-1200:0108 for FS-ONE MAX Intumescent Firestop Sealant
Expansion ratio (unrestricted, up to)	1:5

[1)] at 75°F/24°C, 50% relative humidity

Order Designation	Package Content	Item number
FS-ONE MAX 20oz foil (3 case + disp)	1x Foil pack dispenser manual CS 270-P1, 75x Firestop sealant FS-ONE MAX 20 oz foil	**3530252**
FS-ONE MAX 10oz tube (1 case)	12x Firestop sealant FS-ONE MAX 10 oz cartridge	**3530249**
FS-ONE MAX 5 gallon (18 pails)	18x Firestop sealant FS-ONE MAX 5 gallon pail	**3530263**
FS-ONE MAX 20oz foil (1 case)	25x Firestop sealant FS-ONE MAX 20 oz foil	**3530250**
FS-ONE MAX 20oz foil (3 cases)	75x Firestop sealant FS-ONE MAX 20 oz foil	**3530251**
FS-ONE MAX 20oz Foil-Pallet	600x FSONE-MAX 20 oz foil, 290x Bulk Shipping Condition	**3534713**
FS-ONE MAX 10 oz cartridge		**2101531**
FS-ONE MAX 5 gallon pail		**2101533**

Section 7 – Hydraulic Calculations

Associated Fire Protection
PO Box 28022
Raleigh, NC 27611
919-553-4021

Job Name	:	CAPE FEAR MOB
Drawing	:	FP-4
Location	:	225 BRIGHTWATER DRIVE
Remote Area	:	1
Contract	:	EDW-1588
Data File	:	RA#1 - 3RD FLOOR SHELL.WXF

HYDRAULIC CALCULATIONS
for

JOB NAME CAPE FEAR MOB
Location 225 BRIGHTWATER DRIVE
Drawing # FP-4
Contract # EDW-1588
Date 11.20.23

DESIGN

Remote area # 1
Remote area location 3RD FLOOR SHELL
Occupancy classification LIGHT HAZARD
Density .10 - Gpm/SqFt
Area of application 1513 - SqFt
Coverage/sprinkler 225 MAX - SqFt
Type of sprinkler calculated SSQRU
 # Sprinklers calculated 12
In-rack demand N/A - GPM
Hose streams 100 - GPM
Total water required (including hose streams) 384.02 - GPM @ 100.083 - Psi
Type of system WET
Volume of system (dry or pre-action) N/A - Gal

WATER SUPPLY INFORMATION

Test date 9.6.23
Location BRIGHTWATER DRIVE
Source of info HYDRANT

CONTRACTOR INFO Associated Fire Protection
Address PO Box 28022 / Raleigh, NC 27611
Phone # 919-553-4021
Name of designer WLH
Authority having jurisdiction TOWN OF LILLINGTON
NOTES:

text1(35) - invisible

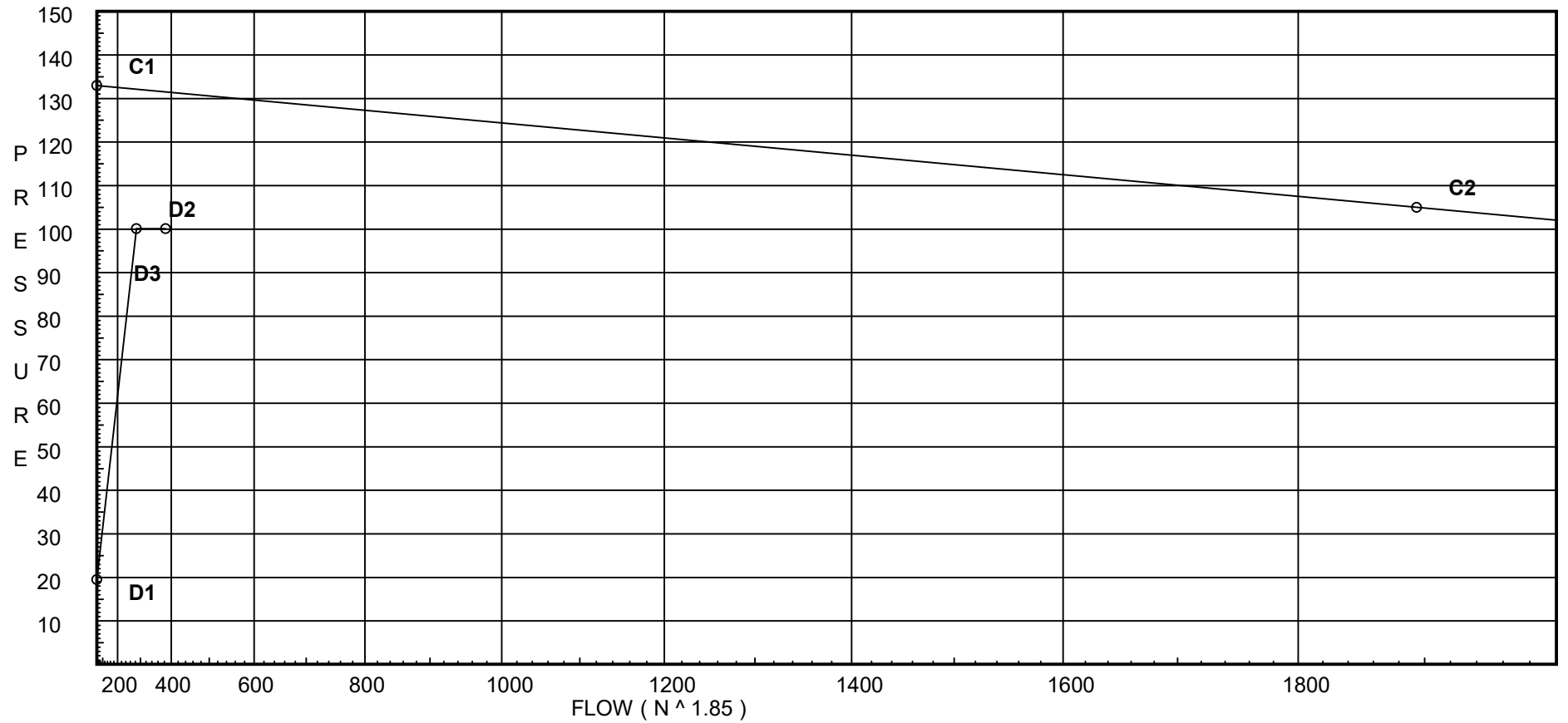
Water Supply Curve

Associated Fire Protection
CAPE FEAR MOB

Date 11.20.23

City Water Supply:
- C1 - Static Pressure : 133
- C2 - Residual Pressure: 105
- C2 - Residual Flow : 1894

Demand:
- D1 - Elevation : 19.490
- D2 - System Flow : 284.02
- D2 - System Pressure : 100.083
- Hose (Demand) : 100
- D3 - System Demand : 384.02
- Safety Margin : 31.455



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Avc	Alarm Vic 751	0	0	0	0	3	9	8	17	0	21	0	22	50	0	0	0	0	0	0	0
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	133.0	105	1894.0	131.538	384.02	100.083

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
H1	45.0	5.6	16.84	22.98	0.1	225
H2	45.0	5.6	16.24	22.57	0.1	225
H3	45.0	5.6	16.14	22.5	0.1	225
H4	45.0	5.6	16.22	22.55	0.1	225
H5	45.0	5.6	16.88	23.01	0.1	225
H6	45.0	5.6	16.92	23.03	0.1	225
H7	45.0	5.6	16.31	22.62	0.1	225
H8	45.0	5.6	16.22	22.55	0.1	225
H9	45.0	5.6	16.3	22.61	0.1	225
H10	45.0	5.6	16.96	23.06	0.1	225
H11	45.0	5.6	25.54	28.3	0.1	225
H12	45.0	5.6	25.44	28.24	0.1	225
M1	44.833		36.64			
1	44.833		17.95			
2	44.833		17.31			
3	44.833		17.21			
4	44.833		17.3			
5	44.833		17.99			
M2	44.833		36.78			
6	44.833		18.03			
7	44.833		17.39			
8	44.833		17.29			
9	44.833		17.38			
10	44.833		18.08			
M3	44.833		37.3			
11	44.833		27.13			
12	44.833		27.03			
M4	44.833		38.23			
M5	44.833		39.46			
M6	44.833		46.04			
M7	44.833		47.07			
F1	44.833		27.76			
F2	44.833		27.89			
F3	44.833		28.38			
F4	44.833		29.01			
F5	44.833		29.44			
F6	44.833		29.68			
S1	44.833		56.36			
S2	12.167		71.38			
TOR	12.167		73.72			
BOR	1.0		83.12			
FLG	1.0		83.17			

NODE ANALYSIS (cont.)

Node Tag	*Elevation*	*Node Type*	*Pressure at Node*	*Discharge at Node*	*Notes*
HOSE	-3.0		85.33	100.0	
UG1	0.0		86.52		
BFP	-3.0		101.18		
TEST	0.0		100.08		

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
H1	45	5.60	22.98	1	T	5.0	1.167	120	16.840	
to							5.000		0.072	
1	44.833		22.98	1.049			6.167	0.1683	1.038	Vel = 8.53
			0.0							
1			22.98						17.950	K Factor = 5.42
H2	45	5.60	22.57	1	T	5.0	1.167	120	16.238	
to							5.000		0.072	
2	44.833		22.57	1.049			6.167	0.1626	1.003	Vel = 8.38
			0.0							
2			22.57						17.313	K Factor = 5.42
H3	45	5.60	22.50	1	T	5.0	1.167	120	16.143	
to							5.000		0.072	
3	44.833		22.5	1.049			6.167	0.1618	0.998	Vel = 8.35
			0.0							
3			22.50						17.213	K Factor = 5.42
H4	45	5.60	22.55	1	T	5.0	1.167	120	16.221	
to							5.000		0.072	
4	44.833		22.55	1.049			6.167	0.1626	1.003	Vel = 8.37
			0.0							
4			22.55						17.296	K Factor = 5.42
H5	45	5.60	23.01	1	T	5.0	1.167	120	16.879	
to							5.000		0.072	
5	44.833		23.01	1.049			6.167	0.1688	1.041	Vel = 8.54
			0.0							
5			23.01						17.992	K Factor = 5.42
H6	45	5.60	23.03	1	T	5.0	1.167	120	16.916	
to							5.000		0.072	
6	44.833		23.03	1.049			6.167	0.1691	1.043	Vel = 8.55
			0.0							
6			23.03						18.031	K Factor = 5.42
H7	45	5.60	22.62	1	T	5.0	1.167	120	16.312	
to							5.000		0.072	
7	44.833		22.62	1.049			6.167	0.1635	1.008	Vel = 8.40
			0.0							
7			22.62						17.392	K Factor = 5.42
H8	45	5.60	22.55	1	T	5.0	1.167	120	16.218	
to							5.000		0.072	
8	44.833		22.55	1.049			6.167	0.1625	1.002	Vel = 8.37
			0.0							
8			22.55						17.292	K Factor = 5.42
H9	45	5.60	22.61	1	T	5.0	1.167	120	16.296	
to							5.000		0.072	
9	44.833		22.61	1.049			6.167	0.1633	1.007	Vel = 8.39
			0.0							
9			22.61						17.375	K Factor = 5.42
H10	45	5.60	23.06	1	T	5.0	1.167	120	16.958	
to							5.000		0.072	
10	44.833		23.06	1.049			6.167	0.1695	1.045	Vel = 8.56

Final Calculations : Hazen-Williams

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
10			0.0 23.06						18.075	K Factor = 5.42
H11 to 11	45 44.833	5.60	28.30 28.3	1 1.049	T	5.0	1.167 5.000 6.167	120 0.2474	25.537 0.072 1.526	Vel = 10.51
11			0.0 28.30						27.135	K Factor = 5.43
H12 to 12	45 44.833	5.60	28.24 28.24	1 1.049	T	5.0	1.167 5.000 6.167	120 0.2465	25.437 0.072 1.520	Vel = 10.48
12			0.0 28.24						27.029	K Factor = 5.43
M1 to 1	44.833 44.833		-57.65 -57.65	1.25 1.442	T	7.432	88.000 7.432 95.432	120 -0.1959	36.643 0.0 -18.693	Vel = 11.33
1 to 2	44.833 44.833		22.98 -34.67	1.25 1.442			8.333 8.333	120 -0.0764	17.950 0.0 -0.637	Vel = 6.81
2 to 3	44.833 44.833		22.57 -12.1	1.25 1.442			9.167 9.167	120 -0.0109	17.313 0.0 -0.100	Vel = 2.38
3 to 4	44.833 44.833		22.50 10.4	1.25 1.442			10.000 10.000	120 0.0083	17.213 0.0 0.083	Vel = 2.04
4 to 5	44.833 44.833		22.55 32.95	1.25 1.442			10.000 10.000	120 0.0696	17.296 0.0 0.696	Vel = 6.47
5 to F1	44.833 44.833		23.01 55.96	1.25 1.442	T	7.432	45.250 7.432 52.682	120 0.1854	17.992 0.0 9.765	Vel = 10.99
F1			0.0 55.96						27.757	K Factor = 10.62
M2 to 6	44.833 44.833		-57.75 -57.75	1.25 1.442	T	7.432	88.000 7.432 95.432	120 -0.1965	36.785 0.0 -18.754	Vel = 11.35
6 to 7	44.833 44.833		23.03 -34.72	1.25 1.442			8.333 8.333	120 -0.0767	18.031 0.0 -0.639	Vel = 6.82
7 to 8	44.833 44.833		22.62 -12.1	1.25 1.442			9.167 9.167	120 -0.0109	17.392 0.0 -0.100	Vel = 2.38
8 to 9	44.833 44.833		22.55 10.45	1.25 1.442			10.000 10.000	120 0.0083	17.292 0.0 0.083	Vel = 2.05
9 to 10	44.833 44.833		22.61 33.06	1.25 1.442			10.000 10.000	120 0.0700	17.375 0.0 0.700	Vel = 6.49

Final Calculations : Hazen-Williams

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
10	44.833		23.06	1.25	T	7.432	45.250	120	18.075	
to							7.432		0.0	
F2	44.833		56.12	1.442			52.682	0.1863	9.817	Vel = 11.02
			0.0							
F2			56.12						27.892	K Factor = 10.63
M3	44.833		-41.47	1.25	T	7.432	88.000	120	37.298	
to							7.432		0.0	
11	44.833		-41.47	1.442			95.432	-0.1065	-10.163	Vel = 8.15
11	44.833		28.30	1.25			8.333	120	27.135	
to									0.0	
12	44.833		-13.17	1.442			8.333	-0.0127	-0.106	Vel = 2.59
12	44.833		28.24	1.25	T	7.432	75.000	120	27.029	
to							7.432		0.0	
F3	44.833		15.07	1.442			82.432	0.0164	1.349	Vel = 2.96
			0.0							
F3			15.07						28.378	K Factor = 2.83
M4	44.833		-23.92	1.25	2T	14.864	195.000	120	38.226	
to					8E	29.728	44.592		0.0	
F4	44.833		-23.92	1.442			239.592	-0.0385	-9.219	Vel = 4.70
			0.0							
F4			-23.92						29.007	K Factor = -4.44
M5	44.833		-28.71	1.25	2T	14.864	170.833	120	39.460	
to							14.864		0.0	
F5	44.833		-28.71	1.442			185.697	-0.0539	-10.015	Vel = 5.64
			0.0							
F5			-28.71						29.445	K Factor = -5.29
M6	44.833		-35.93	1.25	2T	14.864	178.000	120	46.036	
to					2E	7.432	22.296		0.0	
F6	44.833		-35.93	1.442			200.296	-0.0817	-16.356	Vel = 7.06
			0.0							
F6			-35.93						29.680	K Factor = -6.60
M7	44.833		-38.59	1.25	2T	14.864	171.000	120	47.072	
to							14.864		19.417	
F7	0		-38.59	1.442			185.864	-0.0932	-17.323	Vel = 7.58
			0.0							
F7			-38.59						49.166	K Factor = -5.50
M1	44.833		57.65	2.5			13.667	120	36.643	
to									0.0	
M2	44.833		57.65	2.635			13.667	0.0104	0.142	Vel = 3.39
M2	44.833		57.75	2.5			13.667	120	36.785	
to									0.0	
M3	44.833		115.4	2.635			13.667	0.0375	0.513	Vel = 6.79
M3	44.833		41.47	2.5			14.000	120	37.298	
to									0.0	
M4	44.833		156.87	2.635			14.000	0.0663	0.928	Vel = 9.23
M4	44.833		23.92	2.5			14.333	120	38.226	
to									0.0	
M5	44.833		180.79	2.635			14.333	0.0861	1.234	Vel = 10.64

Final Calculations : Hazen-Williams

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
M5	44.833		28.71	2.5	4E	32.948	25.167	120	39.460	
to							32.948		0.0	
M6	44.833		209.5	2.635			58.115	0.1132	6.576	Vel = 12.33
M6	44.833		35.93	2.5			6.833	120	46.036	
to									0.0	
M7	44.833		245.43	2.635			6.833	0.1516	1.036	Vel = 14.44
M7	44.833		38.59	2.5	E	8.237	8.500	120	47.072	
to					T	16.474	38.268		0.0	
S1	44.833		284.02	2.635	Eql	13.557	46.768	0.1987	9.292	Vel = 16.71
			0.0							
S1			284.02						56.364	K Factor = 37.83
F1	44.833		55.96	2.5			13.667	120	27.757	
to									0.0	
F2	44.833		55.96	2.635			13.667	0.0099	0.135	Vel = 3.29
F2	44.833		56.12	2.5			13.667	120	27.892	
to									0.0	
F3	44.833		112.08	2.635			13.667	0.0356	0.486	Vel = 6.59
F3	44.833		15.07	2.5			14.000	120	28.378	
to									0.0	
F4	44.833		127.15	2.635			14.000	0.0449	0.629	Vel = 7.48
F4	44.833		-23.92	2.5			14.333	120	29.007	
to									0.0	
F5	44.833		103.23	2.635			14.333	0.0306	0.438	Vel = 6.07
F5	44.833		-28.71	2.5			14.083	120	29.445	
to									0.0	
F6	44.833		74.52	2.635			14.083	0.0167	0.235	Vel = 4.38
F6	44.833		-35.93	2.5			13.833	120	29.680	
to									19.417	
F7	0		38.59	2.635			13.833	0.0050	0.069	Vel = 2.27
			0.0							
F7			38.59						49.166	K Factor = 5.50
S1	44.833		284.02	4	E	13.167	32.333	120	56.364	
to							13.167		14.148	
S2	12.167		284.02	4.26			45.500	0.0191	0.871	Vel = 6.39
S2	12.167		0.0	4	3E	39.501	82.667	120	71.383	
to							39.501		0.0	
TOR	12.167		284.02	4.26			122.168	0.0191	2.339	Vel = 6.39
			0.0							
TOR			284.02						73.722	K Factor = 33.08
TOR	12.167		284.02	4	T	26.334	11.500	120	73.722	
to					Fsp	0.0	69.785		7.836	* * Fixed Loss = 3
BOR	1		284.02	4.26	Avc	27.651	81.285	0.0192	1.557	Vel = 6.39
					B	15.8				
BOR	1		0.0	6	E	17.603	3.000	120	83.115	
to							17.603		0.0	
FLG	1		284.02	6.357			20.603	0.0027	0.056	Vel = 2.87
FLG	1		0.0	6	E	20.084	94.000	140	83.171	
to					2F	20.084	86.074		1.732	
HOSE	-3		284.02	6.16	S	45.906	180.074	0.0024	0.431	Vel = 3.06

Final Calculations : Hazen-Williams

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
HOSE	-3	H100	100.00	6	2E	40.168	546.000	140	85.334	
to					F	10.042	50.210		-1.299	
UG1	0		384.02	6.16			596.210	0.0042	2.488	Vel = 4.13
UG1	0		0.0	6	4E	80.336	5.000	140	86.523	
to							80.336		14.299	* * Fixed Loss = 13
BFP	-3		384.02	6.16			85.336	0.0042	0.357	Vel = 4.13
BFP	-3		0.0	8	2G	12.652	108.000	140	101.179	
to					2F	28.468	96.474		-1.299	
TEST	0		384.02	8.27	T	55.354	204.474	0.0010	0.203	Vel = 2.29
			0.0							
TEST			384.02						100.083	K Factor = 38.39

Associated Fire Protection
PO Box 28022
Raleigh, NC 27611
919-553-4021

Job Name	:	CAPE FEAR MOB TI - 2ND FLOOR GRID
Drawing	:	FP-3
Location	:	225 BRIGHTWATER DRIVE
Remote Area	:	2
Contract	:	EDW-1588
Data File	:	RA#2 - 2ND FLOOR GRID.WXF

HYDRAULIC CALCULATIONS
for

JOB NAME CAPE FEAR MOB TI - PRE-ACTION
Location 225 BRIGHTWATER DRIVE
Drawing # FP-3
Contract # EDW-1588
Date 23.11.20

DESIGN

Remote area # 2
Remote area location 2ND FLOOR GRID
Occupancy classification LIGHT HAZARD
Density .10 - Gpm/SqFt
Area of application 1048 - SqFt
Coverage/sprinkler 225 MAX - SqFt
Type of sprinkler calculated SSQRRP
 # Sprinklers calculated 13
In-rack demand N/A - GPM
Hose streams 100 - GPM
Total water required (including hose streams) 402.836 - GPM @ 108.278 - Psi
Type of system WET
Volume of system (dry or pre-action) N/A - Gal

WATER SUPPLY INFORMATION

Test date 9.06.23
Location 215 BRIGHTWATER DRIVE
Source of info HYDRANT

CONTRACTOR INFO Associated Fire Protection
Address PO Box 28022 / Raleigh, NC 27611
Phone # 919-553-4021
Name of designer WLH
Authority having jurisdiction HARNETT COUNTY
NOTES:

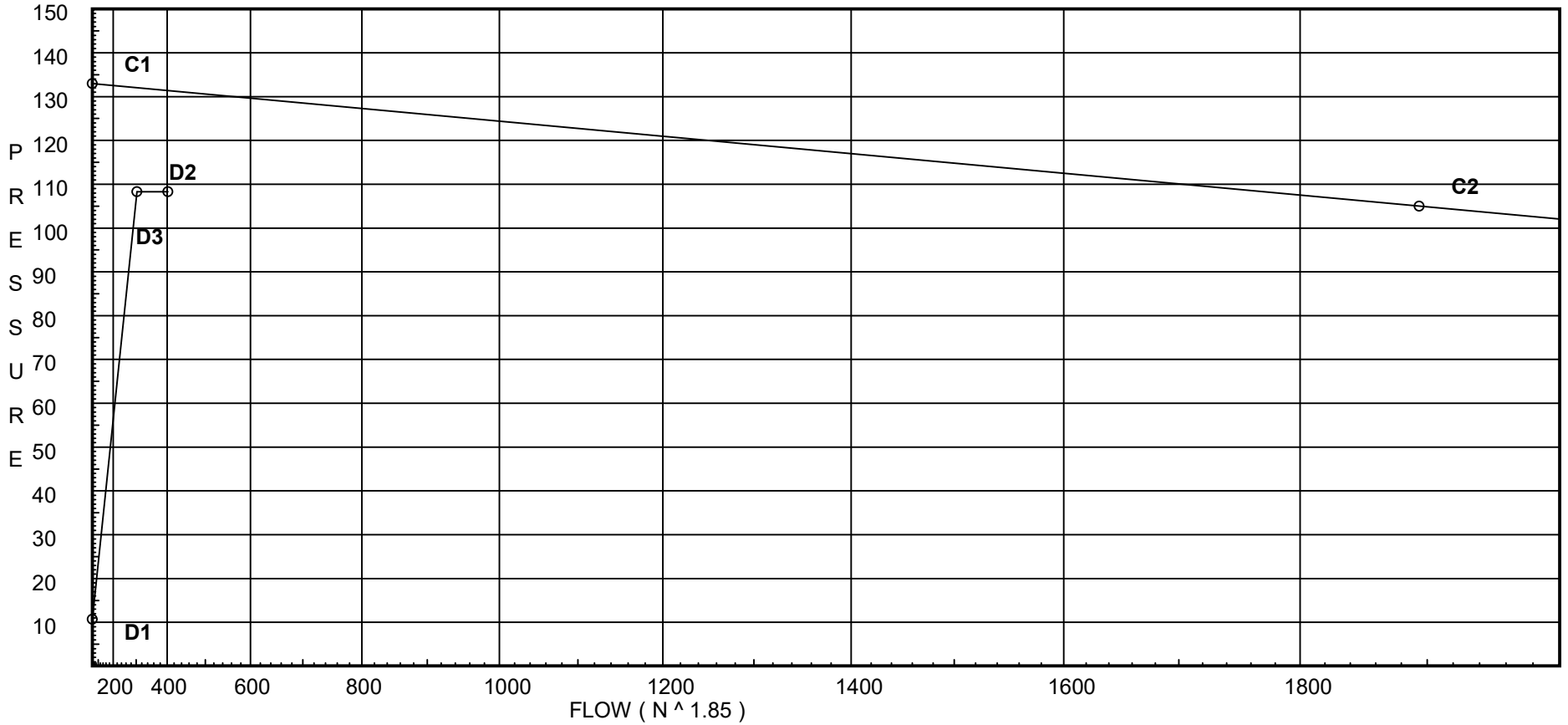
text1(35) - invisible

Water Supply Curve

Associated Fire Protection
CAPE FEAR MOB TI - 2ND FLOOR GRID

City Water Supply:
- C1 - Static Pressure : 133
- C2 - Residual Pressure: 105
- C2 - Residual Flow : 1894

Demand:
- D1 - Elevation : 10.683
- D2 - System Flow : 302.836
- D2 - System Pressure : 108.278
- Hose (Demand) : 100
- D3 - System Demand : 402.836
- Safety Margin : 23.124



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
Avc	Alarm Vic 751	0	0	0	0	3	9	8	17	0	21	0	22	50	0	0	0	0	0	0	0
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	133.0	105	1894.0	131.402	402.84	108.278

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
H21	24.667	5.6	16.35	22.64	0.1	225
H22	24.667	5.6	16.16	22.51	0.1	225
H23	24.667	5.6	16.14	22.5	0.1	225
H24	24.667	5.6	16.24	22.57	0.1	225
H25	24.667	5.6	16.74	22.91	0.1	225
H26	24.667	5.6	20.28	25.22	0.1	225
H27	24.667	5.6	20.22	25.18	0.1	225
H28	24.667	5.6	20.32	25.24	0.1	225
H29	23.667	5.6	16.68	22.87	0.1	225
H30	23.667	5.6	16.42	22.69	0.1	225
H31	23.667	5.6	16.41	22.69	0.15	130
H32	23.667	5.6	16.5	22.75	0.1	225
H33	23.667	5.6	16.96	23.06	0.1	225
M21	25.333		45.59			
21	25.333		29.97			
22	25.333		29.63			
23	25.333		29.61			
24	25.333		29.78			
25	25.333		30.67			
M22	25.333		45.64			
26	25.333		36.98			
27	25.333		36.86			
28	25.333		37.04			
M23	25.333		45.82			
29	25.333		30.14			
30	25.333		29.68			
31	25.333		29.66			
32	25.333		29.82			
33	25.333		30.64			
M24	25.333		46.24			
M25	25.333		46.87			
M25A	25.333		47.4			
B1	25.333		45.33			
B2	25.333		44.64			
M26	25.333		48.4			
M27	25.333		49.12			
M28	25.333		53.12			
M29	25.333		56.81			
M30	25.333		58.19			
F21	25.333		42.3			
F22	25.333		42.38			
F23	25.333		42.63			

NODE ANALYSIS (cont.)

Node Tag	*Elevation*	*Node Type*	*Pressure at Node*	*Discharge at Node*	*Notes*
F24	25.333		43.21		
F25	25.333		43.83		
F25A	25.333		44.13		
F26	25.333		44.68		
F27	25.333		44.92		
F28	25.333		45.25		
F29	25.333		45.33		
ZCA	25.333		72.77		
S2	12.167		78.74		
TOR	12.167		81.38		
BOR	1.0		90.97		
FLG	1.0		91.03		
HOSE	-3.0		93.25	100.0	
UG1	0.0		94.67		
BFP	-3.0		109.36		
TEST	0.0		108.28		

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
H21	24.667	5.60	22.64	1	2E	4.0	76.000	120	16.347	
to					T	5.0	9.000		-0.288	
21	25.333		22.64	1.049			85.000	0.1637	13.913	Vel = 8.40
			0.0							
21			22.64						29.972	K Factor = 4.14
H22	24.667	5.60	22.51	1	2E	4.0	76.000	120	16.157	
to					T	5.0	9.000		-0.288	
22	25.333		22.51	1.049			85.000	0.1619	13.764	Vel = 8.36
			0.0							
22			22.51						29.633	K Factor = 4.14
H23	24.667	5.60	22.50	1	2E	4.0	76.000	120	16.143	
to					T	5.0	9.000		-0.288	
23	25.333		22.5	1.049			85.000	0.1618	13.754	Vel = 8.35
			0.0							
23			22.50						29.609	K Factor = 4.13
H24	24.667	5.60	22.57	1	2E	4.0	76.000	120	16.241	
to					T	5.0	9.000		-0.288	
24	25.333		22.57	1.049			85.000	0.1627	13.831	Vel = 8.38
			0.0							
24			22.57						29.784	K Factor = 4.14
H25	24.667	5.60	22.91	1	2E	4.0	76.000	120	16.738	
to					T	5.0	9.000		-0.288	
25	25.333		22.91	1.049			85.000	0.1673	14.221	Vel = 8.50
			0.0							
25			22.91						30.671	K Factor = 4.14
H26	24.667	5.60	25.22	1	2E	4.0	76.000	120	20.283	
to					T	5.0	9.000		-0.288	
26	25.333		25.22	1.049			85.000	0.1998	16.987	Vel = 9.36
			0.0							
26			25.22						36.982	K Factor = 4.15
H27	24.667	5.60	25.18	1	2E	4.0	76.000	120	20.215	
to					T	5.0	9.000		-0.288	
27	25.333		25.18	1.049			85.000	0.1992	16.935	Vel = 9.35
			0.0							
27			25.18						36.862	K Factor = 4.15
H28	24.667	5.60	25.24	1	2E	4.0	76.000	120	20.316	
to					T	5.0	9.000		-0.288	
28	25.333		25.24	1.049			85.000	0.2002	17.014	Vel = 9.37
			0.0							
28			25.24						37.042	K Factor = 4.15
H29	23.667	5.60	22.87	1	2E	4.0	76.000	120	16.680	
to					T	5.0	9.000		-0.722	
29	25.333		22.87	1.049			85.000	0.1668	14.178	Vel = 8.49
			0.0							
29			22.87						30.136	K Factor = 4.17
H30	23.667	5.60	22.70	1	2E	4.0	76.000	120	16.424	
to					T	5.0	9.000		-0.722	
30	25.333		22.7	1.049			85.000	0.1644	13.976	Vel = 8.43

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
			0.0							
30			22.70						29.678	K Factor = 4.17
H31	23.667	5.60	22.69	1	2E	4.0	76.000	120	16.412	
to					T	5.0	9.000		-0.722	
31	25.333		22.69	1.049			85.000	0.1643	13.966	Vel = 8.42
			0.0							
31			22.69						29.656	K Factor = 4.17
H32	23.667	5.60	22.75	1	2E	4.0	76.000	120	16.502	
to					T	5.0	9.000		-0.722	
32	25.333		22.75	1.049			85.000	0.1652	14.038	Vel = 8.45
			0.0							
32			22.75						29.818	K Factor = 4.17
H33	23.667	5.60	23.06	1	2E	4.0	76.000	120	16.963	
to					T	5.0	9.000		-0.722	
33	25.333		23.06	1.049			85.000	0.1694	14.400	Vel = 8.56
			0.0							
33			23.06						30.641	K Factor = 4.17
M21	25.333		-50.66	1.25	T	7.432	93.833	120	45.587	
to							7.432		0.0	
21	25.333		-50.66	1.442			101.265	-0.1542	-15.615	Vel = 9.95
21	25.333		22.64	1.25			6.583	120	29.972	
to									0.0	
22	25.333		-28.02	1.442			6.583	-0.0515	-0.339	Vel = 5.50
22	25.333		22.51	1.25			9.583	120	29.633	
to									0.0	
23	25.333		-5.51	1.442			9.583	-0.0025	-0.024	Vel = 1.08
23	25.333		22.50	1.25			8.583	120	29.609	
to									0.0	
24	25.333		16.99	1.442			8.583	0.0204	0.175	Vel = 3.34
24	25.333		22.57	1.25			9.083	120	29.784	
to									0.0	
25	25.333		39.56	1.442			9.083	0.0977	0.887	Vel = 7.77
25	25.333		22.91	1.25	T	7.432	43.750	120	30.671	
to							7.432		0.0	
F21	25.333		62.47	1.442			51.182	0.2272	11.631	Vel = 12.27
			0.0							
F21			62.47						42.302	K Factor = 9.60
M22	25.333		-35.84	1.25	T	7.432	99.083	120	45.641	
to							7.432		0.0	
26	25.333		-35.84	1.442			106.515	-0.0813	-8.659	Vel = 7.04
26	25.333		25.22	1.25			14.000	120	36.982	
to									0.0	
27	25.333		-10.62	1.442			14.000	-0.0086	-0.120	Vel = 2.09
27	25.333		25.18	1.25			11.667	120	36.862	
to									0.0	
28	25.333		14.56	1.442			11.667	0.0154	0.180	Vel = 2.86
28	25.333		25.24	1.25	T	7.432	46.667	120	37.042	
to							7.432		0.0	
F22	25.333		39.8	1.442			54.099	0.0987	5.339	Vel = 7.82

Node1 / to / Node2	Elev1 / Elev2	K Fact	Qa / Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt / Pe / Pf	******* Notes ******
			0.0							
F22			39.80						42.381	K Factor = 6.11
M23	25.333		-50.96	1.25	T	7.432	93.167	120	45.821	
to							7.432		0.0	
29	25.333		-50.96	1.442			100.599	-0.1559	-15.685	Vel = 10.01
29	25.333		22.87	1.25			8.833	120	30.136	
to									0.0	
30	25.333		-28.09	1.442			8.833	-0.0519	-0.458	Vel = 5.52
30	25.333		22.69	1.25			9.083	120	29.678	
to									0.0	
31	25.333		-5.4	1.442			9.083	-0.0024	-0.022	Vel = 1.06
31	25.333		22.69	1.25			7.667	120	29.656	
to									0.0	
32	25.333		17.29	1.442			7.667	0.0211	0.162	Vel = 3.40
32	25.333		22.75	1.25			8.250	120	29.818	
to									0.0	
33	25.333		40.04	1.442			8.250	0.0998	0.823	Vel = 7.87
33	25.333		23.06	1.25	T	7.432	44.333	120	30.641	
to							7.432		0.0	
F23	25.333		63.1	1.442			51.765	0.2315	11.985	Vel = 12.40
			0.0							
F23			63.10						42.626	K Factor = 9.66
M24	25.333		-15.00	1.25	2T	14.864	171.500	120	46.236	
to							14.864		0.0	
F24	25.333		-15.0	1.442			186.364	-0.0162	-3.026	Vel = 2.95
			0.0							
F24			-15.00						43.210	K Factor = -2.28
M25	25.333		-12.74	1.25	T	7.432	120.500	120	46.870	
to							7.432		0.0	
B1	25.333		-12.74	1.442			127.932	-0.0120	-1.536	Vel = 2.50
			0.0							
B1			-12.74						45.334	K Factor = -1.89
M25A	25.333		-13.93	1.25	2T	14.864	127.750	120	47.404	
to					E	3.716	18.580		0.0	
B1	25.333		-13.93	1.442			146.330	-0.0141	-2.070	Vel = 2.74
B1	25.333		-12.74	1.25			14.833	120	45.334	
to									0.0	
B2	25.333		-26.67	1.442			14.833	-0.0471	-0.698	Vel = 5.24
B2	25.333		10.52	1.25	T	7.432	36.000	120	44.636	
to							7.432		0.0	
F25	25.333		-16.15	1.442			43.432	-0.0186	-0.808	Vel = 3.17
			0.0							
F25			-16.15						43.828	K Factor = -2.44
B2	25.333		-10.52	1.25	2T	14.864	42.083	120	44.636	
to					E	3.716	18.580		0.0	
F25A	25.333		-10.52	1.442			60.663	-0.0084	-0.510	Vel = 2.07
			0.0							

Final Calculations : Hazen-Williams

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
F25A			-10.52						44.126	K Factor = -1.58
M26	25.333		-16.76	1.25	2T	14.864	171.500	120	48.399	
to							14.864		0.0	
F26	25.333		-16.76	1.442			186.364	-0.0199	-3.714	Vel = 3.29
			0.0							
F26			-16.76						44.685	K Factor = -2.51
M27	25.333		-17.91	1.25	2T	14.864	171.500	120	49.116	
to							14.864		0.0	
F27	25.333		-17.91	1.442			186.364	-0.0225	-4.198	Vel = 3.52
			0.0							
F27			-17.91						44.918	K Factor = -2.67
M28	25.333		-25.41	1.25	2T	14.864	168.000	120	53.117	
to							14.864		0.0	
F28	25.333		-25.41	1.442			182.864	-0.0430	-7.871	Vel = 4.99
			0.0							
F28			-25.41						45.246	K Factor = -3.78
M29	25.333		-30.86	1.25	2T	14.864	171.500	120	56.812	
to							14.864		0.0	
F29	25.333		-30.86	1.442			186.364	-0.0616	-11.486	Vel = 6.06
			0.0							
F29			-30.86						45.326	K Factor = -4.58
M30	25.333		-32.76	1.25	2T	14.864	171.500	120	58.185	
to							14.864		10.972	
F30	0		-32.76	1.442			186.364	-0.0689	-12.832	Vel = 6.44
			0.0							
F30			-32.76						56.325	K Factor = -4.37
M21	25.333		50.66	2.5			6.583	120	45.587	
to									0.0	
M22	25.333		50.66	2.635			6.583	0.0082	0.054	Vel = 2.98
M22	25.333		35.84	2.5			8.167	120	45.641	
to									0.0	
M23	25.333		86.5	2.635			8.167	0.0220	0.180	Vel = 5.09
M23	25.333		50.96	2.5			8.000	120	45.821	
to									0.0	
M24	25.333		137.46	2.635			8.000	0.0519	0.415	Vel = 8.09
M24	25.333		15.00	2.5			10.083	120	46.236	
to									0.0	
M25	25.333		152.46	2.635			10.083	0.0629	0.634	Vel = 8.97
M25	25.333		12.74	2.5			7.333	120	46.870	
to									0.0	
M25A	25.333		165.2	2.635			7.333	0.0728	0.534	Vel = 9.72
M25A	25.333		13.93	2.5			11.750	120	47.404	
to									0.0	
M26	25.333		179.13	2.635			11.750	0.0847	0.995	Vel = 10.54
M26	25.333		16.76	2.5			7.167	120	48.399	
to									0.0	
M27	25.333		195.89	2.635			7.167	0.1000	0.717	Vel = 11.52

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
M27	25.333		17.91	2.5	2E	16.474	17.583	120	49.116	
to							16.474		0.0	
M28	25.333		213.8	2.635			34.057	0.1175	4.001	Vel = 12.58
M28	25.333		25.42	2.5	2E	16.474	9.083	120	53.117	
to							16.474		0.0	
M29	25.333		239.22	2.635			25.557	0.1446	3.695	Vel = 14.07
M29	25.333		30.85	2.5			7.583	120	56.812	
to									0.0	
M30	25.333		270.07	2.635			7.583	0.1811	1.373	Vel = 15.89
M30	25.333		32.77	2.5	2E	16.474	5.333	120	58.185	
to					T	16.474	59.856		0.0	
ZCA	25.333		302.84	2.635	Eql	26.908	65.189	0.2237	14.583	Vel = 17.82
			0.0							
ZCA			302.84						72.768	K Factor = 35.50
F21	25.333		62.47	2.5			6.500	120	42.302	
to									0.0	
F22	25.333		62.47	2.635			6.500	0.0122	0.079	Vel = 3.68
F22	25.333		39.80	2.5			8.167	120	42.381	
to									0.0	
F23	25.333		102.27	2.635			8.167	0.0300	0.245	Vel = 6.02
F23	25.333		63.11	2.5			8.000	120	42.626	
to									0.0	
F24	25.333		165.38	2.635			8.000	0.0730	0.584	Vel = 9.73
F24	25.333		-15.00	2.5			10.083	120	43.210	
to									0.0	
F25	25.333		150.38	2.635			10.083	0.0613	0.618	Vel = 8.85
F25	25.333		-16.16	2.5			6.000	120	43.828	
to									0.0	
F25A	25.333		134.22	2.635			6.000	0.0497	0.298	Vel = 7.90
F25A	25.333		-10.51	2.5			13.083	120	44.126	
to									0.0	
F26	25.333		123.71	2.635			13.083	0.0427	0.559	Vel = 7.28
F26	25.333		-16.77	2.5			7.167	120	44.685	
to									0.0	
F27	25.333		106.94	2.635			7.167	0.0325	0.233	Vel = 6.29
F27	25.333		-17.90	2.5			14.083	120	44.918	
to									0.0	
F28	25.333		89.04	2.635			14.083	0.0233	0.328	Vel = 5.24
F28	25.333		-25.42	2.5			6.417	120	45.246	
to									0.0	
F29	25.333		63.62	2.635			6.417	0.0125	0.080	Vel = 3.74
F29	25.333		-30.86	2.5			7.583	120	45.326	
to									10.972	
F30	0		32.76	2.635			7.583	0.0036	0.027	Vel = 1.93
			0.0							
F30			32.76						56.325	K Factor = 4.37
ZCA	25.333		302.84	4			12.667	120	72.768	
to									5.702	
S2	12.167		302.84	4.26			12.667	0.0216	0.274	Vel = 6.82

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
S2	12.167		0.0	4	3E	39.501	82.667	120	78.744	
to							39.501		0.0	
TOR	12.167		302.84	4.26			122.168	0.0216	2.634	Vel = 6.82
			0.0							
TOR			302.84						81.378	K Factor = 33.57
TOR	12.167		302.84	4	T	26.334	11.500	120	81.378	
to					Fsp	0.0	69.785		7.836	* * Fixed Loss = 3
BOR	1		302.84	4.26	Avc	27.651	81.285	0.0216	1.753	Vel = 6.82
					B	15.8				
BOR	1		0.0	6	E	17.603	3.000	120	90.967	
to							17.603		0.0	
FLG	1		302.84	6.357			20.603	0.0031	0.063	Vel = 3.06
FLG	1		0.0	6	E	20.084	94.000	140	91.030	
to					2F	20.084	86.074		1.732	
HOSE	-3		302.84	6.16	S	45.906	180.074	0.0027	0.485	Vel = 3.26
HOSE	-3	H100	100.00	6	2E	40.168	546.000	140	93.247	
to					F	10.042	50.210		-1.299	
UG1	0		402.84	6.16			596.210	0.0046	2.719	Vel = 4.34
UG1	0		0.0	6	4E	80.336	5.000	140	94.667	
to							80.336		14.299	* * Fixed Loss = 13
BFP	-3		402.84	6.16			85.336	0.0046	0.389	Vel = 4.34
BFP	-3		0.0	8	2G	12.652	108.000	140	109.355	
to					2F	28.468	96.474		-1.299	
TEST	0		402.84	8.27	T	55.354	204.474	0.0011	0.222	Vel = 2.41
			0.0							
TEST			402.84						108.278	K Factor = 38.71

Associated Fire Protection
PO Box 28022
Raleigh, NC 27611
919-553-4021

Job Name	:	CAPE FEAR MOB TI - PRE-ACTION
Drawing	:	FP-2
Location	:	225 BRIGHTWATER DRIVE
Remote Area	:	3
Contract	:	EDW-1588
Data File	:	RA#3 - 1ST FLOOR PRE-ACTION.WXF

HYDRAULIC CALCULATIONS
for

JOB NAME CAPE FEAR MOB TI - PRE-ACTION
Location 225 BRIGHTWATER DRIVE
Drawing # FP-2
Contract # EDW-1588
Date 23.11.20

DESIGN

Remote area # 3
Remote area location LINAC
Occupancy classification LIGHT HAZARD
Density .10 - Gpm/SqFt
Area of application 639 - SqFt
Coverage/sprinkler 225 MAX - SqFt
Type of sprinkler calculated SSQRRP/SSQRCP
 # Sprinklers calculated 8
In-rack demand N/A - GPM
Hose streams 100 - GPM
Total water required (including hose streams) 286.23 - GPM @ 93.3528 - Psi
Type of system PRE-ACTION
Volume of system (dry or pre-action) - Gal

WATER SUPPLY INFORMATION

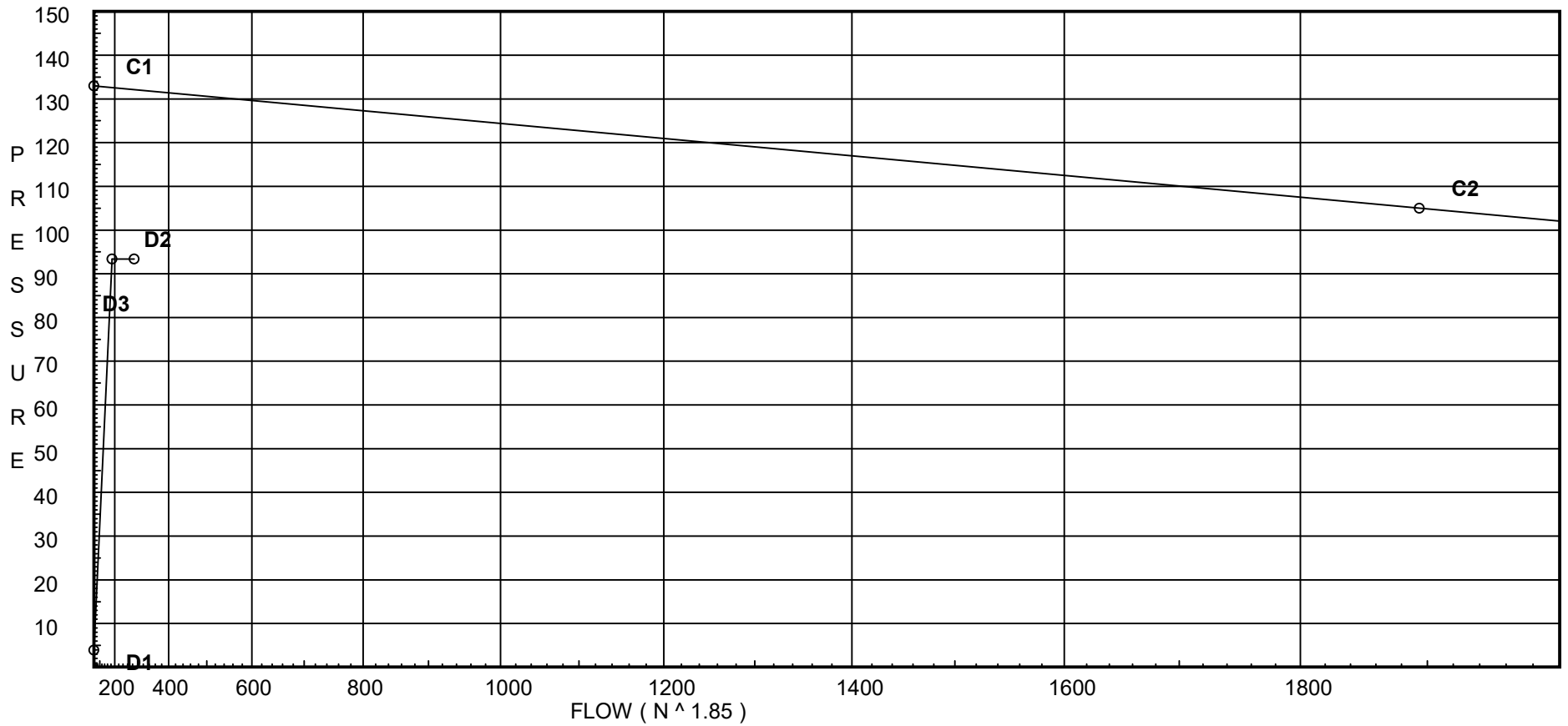
Test date 9.06.23
Location 215 BRIGHTWATER DRIVE
Source of info HYDRANT

CONTRACTOR INFO Associated Fire Protection
Address PO Box 28022 / Raleigh, NC 27611
Phone # 919-553-4021
Name of designer WLH
Authority having jurisdiction HARNETT COUNTY
NOTES:

text1(35) - invisible

City Water Supply:
- C1 - Static Pressure : 133
- C2 - Residual Pressure: 105
- C2 - Residual Flow : 1894

Demand:
- D1 - Elevation : 3.898
- D2 - System Flow : 186.23
- D2 - System Pressure : 93.353
- Hose (Demand) : 100
- D3 - System Demand : 286.23
- Safety Margin : 38.798



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
F	NFPA 13 45' Elbow	1	1	1	1	2	2	3	3	3	4	5	7	9	11	13	17	19	21	24	28
G	NFPA 13 Gate Valve	0	0	0	0	0	1	1	1	1	2	2	3	4	5	6	7	8	10	11	13
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

SUPPLY ANALYSIS

Node at Source	*Static Pressure*	*Residual Pressure*	*Flow*	*Available Pressure*	*Total Demand*	*Required Pressure*
TEST	133.0	105	1894.0	132.151	286.23	93.353

NODE ANALYSIS

Node Tag	*Elevation*	*Node Type*	*Pressure at Node*	*Discharge at Node*	*Notes*	
PH1	8.0	5.6	16.16	22.51	0.1	225
PH2	9.0	5.6	16.14	22.5	0.1	225
PH3	8.0	5.6	17.27	23.27	0.1	225
PH4	9.0	5.6	17.27	23.27	0.1	225
PH5	8.0	5.6	17.27	23.27	0.1	225
PH6	9.0	5.6	17.27	23.28	0.1	225
PH7	8.0	5.6	18.45	24.05	0.1	225
PH8	9.0	5.6	18.48	24.07	0.1	225
1	11.417		17.5			
2	11.417		17.91			
3	11.417		18.79			
4	11.417		19.22			
5	11.417		18.79			
6	11.417		19.23			
7	11.417		20.16			
8	11.417		20.62			
PM1	11.417		20.57			
PM2	11.417		22.05			
TPR	11.417		65.68			
BPR	3.0		77.06			
FLG	1.0		77.95			
HOSE	-3.0		79.88	100.0		
UG1	0.0		80.03			
BFP	-3.0		94.53			
TEST	0.0		93.35			

Final Calculations : Hazen-Williams

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
PH1	8	5.60	22.51	1	2E	2.855	6.000	100	16.163	
to					T	3.568	6.423		-1.480	
1	11.417		22.51	1.049			12.423	0.2270	2.820	Vel = 8.36
			0.0							
1			22.51						17.503	K Factor = 5.38
PH2	9	5.60	22.50	1	2E	2.855	6.000	100	16.143	
to					T	3.568	6.423		-1.047	
2	11.417		22.5	1.049			12.423	0.2268	2.817	Vel = 8.35
			0.0							
2			22.50						17.913	K Factor = 5.32
PH3	8	5.60	23.27	1	2E	2.855	6.000	100	17.268	
to					T	3.568	6.423		-1.480	
3	11.417		23.27	1.049			12.423	0.2413	2.998	Vel = 8.64
			0.0							
3			23.27						18.786	K Factor = 5.37
PH4	9	5.60	23.27	1	2E	2.855	6.000	100	17.270	
to					T	3.568	6.423		-1.047	
4	11.417		23.27	1.049			12.423	0.2413	2.998	Vel = 8.64
			0.0							
4			23.27						19.221	K Factor = 5.31
PH5	8	5.60	23.27	1	2E	2.855	6.000	100	17.273	
to					T	3.568	6.423		-1.480	
5	11.417		23.27	1.049			12.423	0.2413	2.998	Vel = 8.64
			0.0							
5			23.27						18.791	K Factor = 5.37
PH6	9	5.60	23.28	1	2E	2.855	6.000	100	17.275	
to					T	3.568	6.423		-1.047	
6	11.417		23.28	1.049			12.423	0.2414	2.999	Vel = 8.64
			0.0							
6			23.28						19.227	K Factor = 5.31
PH7	8	5.60	24.05	1	2E	2.855	6.000	100	18.450	
to					T	3.568	6.423		-1.480	
7	11.417		24.05	1.049			12.423	0.2565	3.186	Vel = 8.93
			0.0							
7			24.05						20.156	K Factor = 5.36
PH8	9	5.60	24.07	1	2E	2.855	6.000	100	18.475	
to					T	3.568	6.423		-1.047	
8	11.417		24.07	1.049			12.423	0.2569	3.192	Vel = 8.94
			0.0							
8			24.07						20.620	K Factor = 5.30
1	11.417		22.51	1.25			8.500	100	17.503	
to									0.0	
2	11.417		22.51	1.442			8.500	0.0482	0.410	Vel = 4.42
2	11.417		22.50	1.25	T	5.304	10.000	100	17.913	
to							5.304		0.0	
PM1	11.417		45.01	1.442			15.304	0.1736	2.657	Vel = 8.84
			0.0							

Final Calculations : Hazen-Williams

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
PM1			45.01						20.570	K Factor = 9.92
3	11.417		23.27	1.25			8.500	100	18.786	
to									0.0	
4	11.417		23.27	1.442			8.500	0.0512	0.435	Vel = 4.57
4	11.417		23.27	1.25	T	5.304	2.000	100	19.221	
to							5.304		0.0	
PM1	11.417		46.54	1.442			7.304	0.1847	1.349	Vel = 9.14
			0.0							
PM1			46.54						20.570	K Factor = 10.26
5	11.417		23.27	1.25			8.500	100	18.791	
to									0.0	
6	11.417		23.27	1.442			8.500	0.0513	0.436	Vel = 4.57
6	11.417		23.28	1.25	T	5.304	10.000	100	19.227	
to							5.304		0.0	
PM2	11.417		46.55	1.442			15.304	0.1848	2.828	Vel = 9.14
			0.0							
PM2			46.55						22.055	K Factor = 9.91
7	11.417		24.05	1.25			8.500	100	20.156	
to									0.0	
8	11.417		24.05	1.442			8.500	0.0546	0.464	Vel = 4.72
8	11.417		24.07	1.25	T	5.304	2.000	100	20.620	
to							5.304		0.0	
PM2	11.417		48.12	1.442			7.304	0.1965	1.435	Vel = 9.45
			0.0							
PM2			48.12						22.055	K Factor = 10.25
PM1	11.417		91.56	2			16.333	100	20.570	
to									0.0	
PM2	11.417		91.56	2.157			16.333	0.0909	1.485	Vel = 8.04
PM2	11.417		94.67	2	4E	17.567	111.500	100	22.055	
to							17.567		0.0	
TPR	11.417		186.23	2.157			129.067	0.3380	43.621	Vel = 16.35
			0.0							
TPR			186.23						65.676	K Factor = 22.98
TPR	11.417		186.23	2	2B	10.54	8.500	100	65.676	
to					Eql	3.865	14.404		3.645	
BPR	3		186.23	2.157			22.904	0.3380	7.741	Vel = 16.35
BPR	3		0.0	6	E	17.603	2.000	120	77.062	
to							17.603		0.866	
FLG	1		186.23	6.357			19.603	0.0013	0.025	Vel = 1.88
FLG	1		0.0	6	E	20.084	94.000	140	77.953	
to					2F	20.084	86.074		1.732	
HOSE	-3		186.23	6.16	S	45.906	180.074	0.0011	0.197	Vel = 2.00
HOSE	-3	H100	100.00	6	2E	40.168	546.000	140	79.882	
to					F	10.042	50.210		-1.299	
UG1	0		286.23	6.16			596.210	0.0024	1.445	Vel = 3.08
UG1	0		0.0	6	4E	80.336	5.000	140	80.028	
to							80.336		14.299	* * Fixed Loss = 13
BFP	-3		286.23	6.16			85.336	0.0024	0.207	Vel = 3.08

Final Calculations : Hazen-Williams

Node1 / to / Node2	Elev1 / Elev2	K / Fact	Qa / Qt	Nom / Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact / Pf/Ft	Pt / Pe / Pf	*******	Notes	******
BFP	-3		0.0	8	2G	12.652	108.000	140	94.534			
to					2F	28.468	96.474		-1.299			
TEST	0		286.23	8.27	T	55.354	204.474	0.0006	0.118	Vel = 1.71		
			0.0									
TEST			286.23						93.353	K Factor = 29.62		

ASSOCIATED FIRE PROTECTION, INC
Post Office Box 28022 – Raleigh, NC 27611
O: 919-553-4021 | F: 919-553-2169 | www.afp-nc.com

Fire Flow Test Report

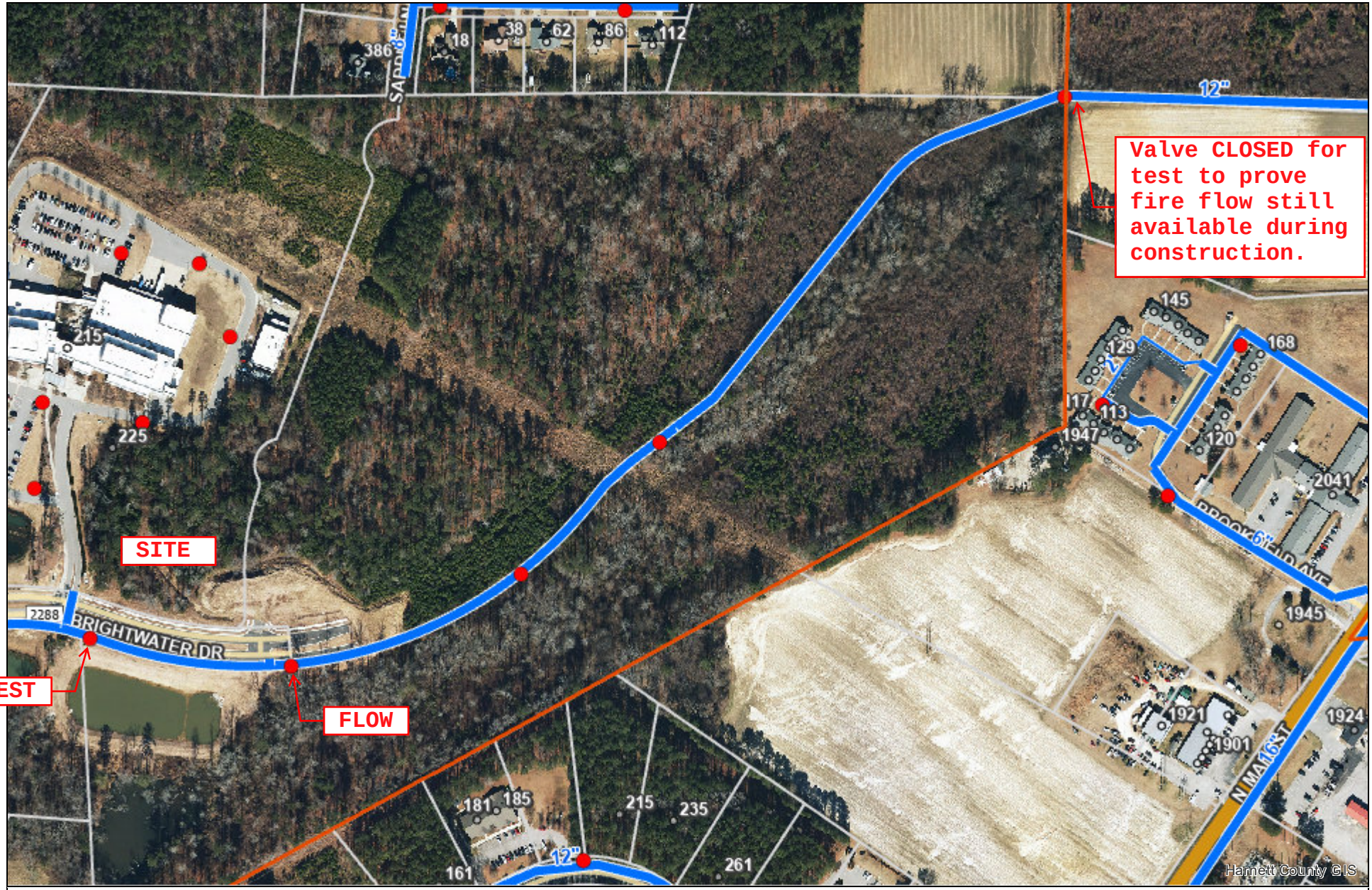
Cape Fear MOB

Test Performed:
September 6, 2023

Test Location:
215 Brightwater Drive
Lillington, NC

Harnett GIS

NOT FOR LEGAL USE .



GIS/E-911 Addressing

September 6, 2023

N W E S

0 165 330 660 Feet

1 inch = 376 feet

FIRE HYDRANT FLOW TEST RESULTS

TEST LOCATION
Address: 215 Brightwater Drive, Lillington (12" Valve CLOSED)
Proposed Tap Location: _____
Requested Flow Location: nearest hydrant to the proposed point of connection

APPLICANT
Name: The Keith Corporation
Address: 4500 Cameron Valley Parkway, Suite 400, Charlotte, NC 28211
Contact Person: Eric Larson Phone: 704.365.6000 Fax: 704.365.0733

TESTING AGENT
Firm Name: Associated Fire Protection, Inc.
Address: PO Box 28022, Raleigh, North Carolina 27611-28022
Phone: (919) 553-4021 Fax: (919) 553-2169

SYSTEM ANALYSIS
Main Size: 12" Elevation of Test Location: 172' +/-
Nearest Elevated Tank: MW BPS 1 Time of Test: 9:15 AM
Tank Elevation: N/A Pressure Zone: N/A

Theoretical Pressure: N/A
Calculated by: Drew King Witnessed by: N/A

RESULTS

Static Pressure: 133 psi 2" Pitotless Nozzle Reading: 18,18 psi
Residual Pressure: 56 psi Volume: 699 + 699 = 1,398 gpm
Disclaimer: These results are an instantaneous snap-shot of the system. It is recommended that the designer allow adequate safety to include low tank level.
Comments: Flowed (2) 2-1/2" Hose Monster(s) with 2" pitotless nozzle(s). (2" Nozzle C = 1.38)

Completed by: Drew King

Date: 9/6/2023

FIRE HYDRANT FLOW TEST RESULTS

TEST LOCATION
Address: 215 Brightwater Drive, Lillington (12" Valve OPEN)
Proposed Tap Location: _____
Requested Flow Location: nearest hydrant to the proposed point of connection

APPLICANT
Name: The Keith Corporation
Address: 4500 Cameron Valley Parkway, Suite 400, Charlotte, NC 28211
Contact Person: Eric Larson Phone: 704.365.6000 Fax: 704.365.0733

TESTING AGENT
Firm Name: Associated Fire Protection, Inc.
Address: PO Box 28022, Raleigh, North Carolina 27611-28022
Phone: (919) 553-4021 Fax: (919) 553-2169

SYSTEM ANALYSIS
Main Size: 12" Elevation of Test Location: 172' +/-
Nearest Elevated Tank: MW BPS 1 Time of Test: 9:20 AM
Tank Elevation: N/A Pressure Zone: N/A

Theoretical Pressure: N/A
Calculated by: Drew King Witnessed by: N/A

RESULTS

Static Pressure: 133 psi 2" Pitotless Nozzle Reading: 33,33 psi
Residual Pressure: 105 psi Volume: 947 + 947 = 1,894 gpm
Disclaimer: These results are an instantaneous snap-shot of the system. It is recommended that the designer allow adequate safety to include low tank level.
Comments: Flowed (2) 2-1/2" Hose Monster(s) with 2" pitotless nozzle(s). (2" Nozzle C = 1.38)

Completed by: Drew King

Date: 9/6/2023

Hydrant Flow Test Report

Test Date 9/6/2023 **Test Time** 9:15 AM

Location

Cape Fear MOB
215 Brightwater Drive
Lillington, NC

Tested by

Associated Fire Protection, Inc.
PO Box 28022
Raleigh, NC 27611-28022
DKing@afp-nc.com
919-906-5236

Notes

12" Valve CLOSED to prove fire flow still available during construction.

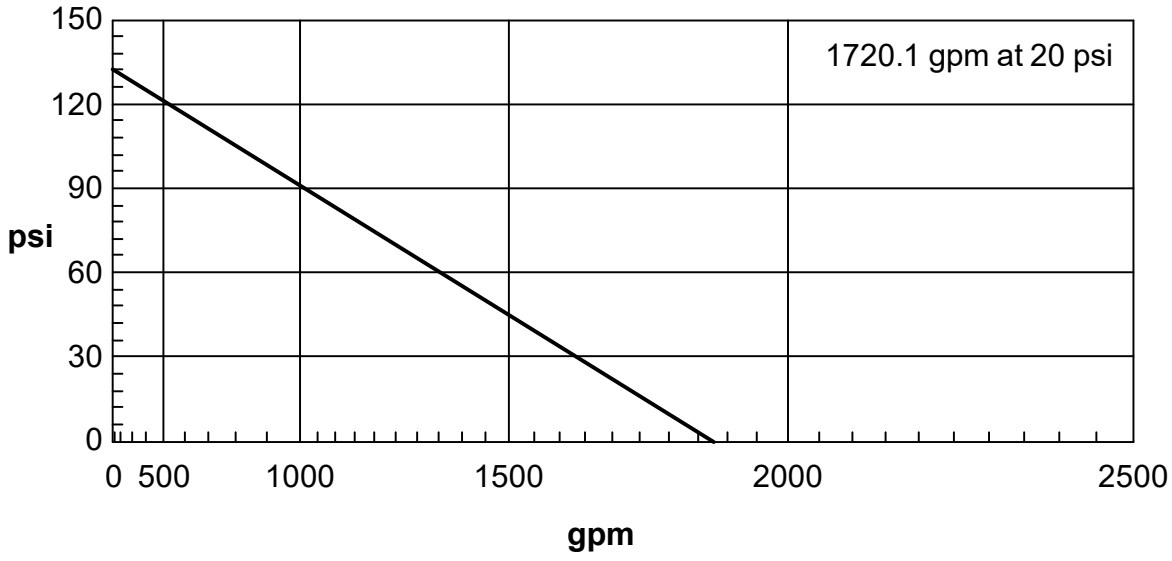
Read Hydrant

133 psi **static pressure**
56 psi **residual pressure**
172 ft **hydrant elevation**

Flow Hydrant(s)

Outlet	Elev	Size	C	Pitot Pressure	Flow
#1	178	2	1.38	18	699 gpm
#2	178	2	1.38	18	699 gpm
				Total	1398 gpm

Flow Graph



Hydrant Flow Test Report

Test Date 9/6/2023 **Test Time** 9:20 AM

Location

Cape Fear MOB
215 Brightwater Drive
Lillington, NC

Tested by

Associated Fire Protection, Inc.
PO Box 28022
Raleigh, NC 27611-28022
DKing@afp-nc.com
919-906-5236

Notes

12" Valve OPEN

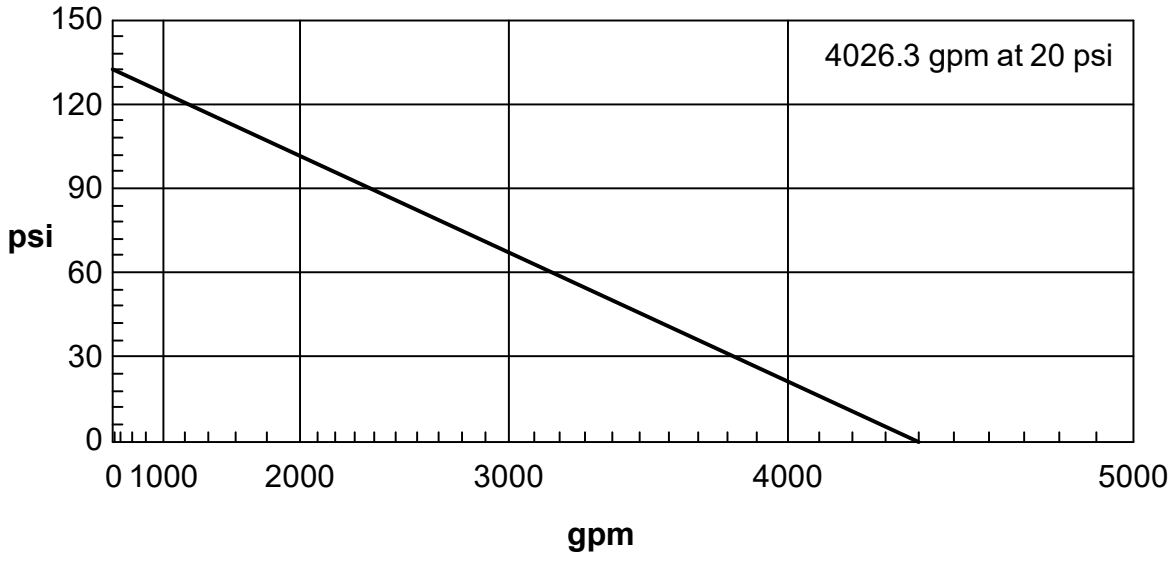
Read Hydrant

133 psi **static pressure**
105 psi **residual pressure**
172 ft **hydrant elevation**

Flow Hydrant(s)

Outlet	Elev	Size	C	Pitot Pressure	Flow
#1	178	2	1.38	33	947 gpm
#2	178	2	1.38	33	947 gpm
				Total	1894 gpm

Flow Graph



2" PITOTLESS NOZZLE™

PN2THD

FLOW CHART

10 - 40 PSI	2 1/2" Hose Monster Model II	Open Atmosphere		41 - 70 PSI	2 1/2" Hose Monster Model II	Open Atmosphere			Key Flow Test Points	2 1/2" Hose Monster Model II	Open Atmosphere	
PSI	GPM	GPM		PSI	GPM	GPM			GPM	PSI	PSI	
10	521	529		41	1055	1071			500	9.5	9.1	
11	547	555		42	1068	1084			562.5	11.7	11.3	
12	571	579		43	1081	1096			750	20.7	20.1	
13	594	603		44	1093	1109			1000	36.8	35.8	
14	617	626		45	1106	1122			1125	46.6	45.3	
15	638	648		46	1118	1134			1500	82.8	80.5	
16	659	669		47	1130	1146						
17	679	689		48	1142	1158						
18	699	709		49	1154	1170						
19	718	729		50	1165	1182						
20	737	748		51	1177	1194						
21	755	766		52	1188	1206						
22	773	784		53	1200	1217						
23	790	802		54	1211	1229						
24	807	819		55	1222	1240						
25	824	836		56	1233	1251						
26	840	853		57	1244	1262						
27	856	869		58	1255	1273						
28	872	885		59	1266	1284						
29	887	900		60	1277	1295						
30	903	916		61	1287	1306						
31	918	931		62	1298	1317						
32	932	946		63	1308	1327						
33	947	960		64	1318	1338						
34	961	975		65	1329	1348						
35	975	989		66	1339	1358						
36	989	1003		67	1349	1369						
37	1002	1017		68	1359	1379						
38	1016	1031		69	1369	1389						
39	1029	1044		70	1379	1399						
40	1042	1057										

The readings on this chart are based on which device the Pitotless Nozzle is connected to.

It is the user's responsibility to verify that the correct chart and column is being used.

- **2 ½" Hose Monster Model II or Flusher with flow splitter (HM2H, HM2HF).** Use this column if the Pitotless Nozzle is connected to the 2 ½" Hose Monster or Flusher. The built-in pitot or flow splitter must be installed for accuracy. If you do not have the built-in pitot or flow splitter, please contact us.
- **Open Atmosphere.** Use this column when the Pitotless Nozzle is connected directly to a test header or hydrant flowing openly to atmosphere.

This chart is FM Approved for flow rate accuracy. Please call us or instruct the Authority Having Jurisdiction to call us if there are any questions. Additional copies of flow charts are available at:
www.hosemonster.com/literature.html

FM APPROVED

The HOSE MONSTER COMPANY
Division of Hydro Flow Products, Inc.

Updated Jun. 2015

MANUFACTURED BY:
Hydro Flow Products, Inc.
888.202.9987 TOLL FREE
847.434.0073 FAX
Service@FlowTest.com EMAIL
www.HoseMonster.com

U. S. Patent # 6,874,375

Calculating Flow-rates

The flow charts we provide with the Pitotless Nozzle™, Hose Monster® and Nozzle Inserts are correct and should be referred to first. Our flow charts are calculated using K-Factors derived from testing performed at FM Approvals. It is common for third-party software to use the pitot formula to compute flow-rate. The 2½" Hose Monster uses a pitot to measure velocity pressure. The Pitotless Nozzle and 4" and 4½" Hose Monsters do not use a pitot, and the pitot formula has to be tricked into calculating correct flow-rates. Entering the coefficients into a program that uses orifice diameter, coefficient and velocity pressure should give relatively accurate flow-rates. Check results against our flow charts.

Here are the equations used for calculating flow-rates and predicting flow-rates. Use the orifice diameter, coefficient or K-factor found on the next page.

K-factor Formula

Computes a flow-rate in GPM given a psi and a K-factor of the flow device.

$$Q = \sqrt{P} \times K$$

Q = flow-rate in GPM, P = velocity pressure in psi, K = K-factor of flow device

Pitot Formula

Computes a flow-rate in GPM given a psi and coefficient of the flow device.

$$Q = 29.84 \times \sqrt{P} \times D^2 \times C$$

Q = flow-rate in GPM, P = velocity pressure in psi, D = orifice diameter in inches
C = coefficient of flow device

Equation for Determining Rated Capacity

Computes the flow-rate available at a specified residual pressure (a.k.a. Rated Capacity).

The example below enables you to find the predicted flow-rate at 20 psi residual pressure.

$$Q_R = Q_F \times (H_R^{0.54} / H_F^{0.54})$$

Q_R = Flow-rate predicted at the desired residual pressure in GPM

Q_F = Total test flow-rate measured during test in GPM
(GPM measured from Hose Monster or Pitotless Nozzle)

H_R = Pressure drop from static pressure to desired residual pressure
(Static – 20 psi [if 20 psi is the desired residual pressure])

H_F = Actual pressure drop measured during the test (Static – Actual Residual)

(Source: NFPA 291, 2010)

Conversion Factors

Here are some conversion factors for switching between US and metric units:

Flow-rate:

US Gallons per Minute x 3.785 = Liters per Minute
Liters per Minute x 0.264 = US Gallons per Minute

US Gallons per Minute x 0.1337 = Cubic Feet per Minute
Cubic Feet per Minute x 7.481 = US Gallons per Minute

Volume:

US Gallons x 3.785 = Liters
Liters x 0.264 = US Gallons

US Gallons x 0.8327 = Imperial Gallons
Imperial Gallons x 1.201 = US Gallons

Cubic Feet x 7.48051945 = US Gallons
US Gallons x 0.1337 = Cubic Feet

Pressure:

psi x 0.0689 = Bars
Bars x 14.5038 = psi

psi x 6894.757 = Pascals
Pascals x 0.000145 = psi

Bars x 100,000 = Pascals
Pascals x 0.00001 = Bars

Weight of Water:

US Gallons of Water x 8.3454 = Pounds
Cubic Feet of Water x 62.42796 = Pounds

Length:

Meters x 3.2808 = Feet
Feet x 0.3048 = Meters

Coefficient and K-Factor Table for Various Flow Devices

last update: 2/14/2012

Pitotless Nozzle™

Device	K-factor	Coefficient	Orifice Diameter	psi Range	Flow Range (GPM)
2" Pitotless Nozzle + Little Hose Monster™	156.0	1.31	2"	10–70	490–1300
2" Pitotless Nozzle + 2½" Hose Monster Steel	164.8	1.38	2"	10–80	520–1380
2" Pitotless Nozzle + Open Atmosphere	167.2	1.40	2"	10–70	530–1400
1¾" Pitotless Nozzle + Little Hose Monster	104.7	1.15	1.75"	10–90	330–1000
1¾" Pitotless Nozzle + 2½" Hose Monster Steel	106.6	1.17	1.75"	10–90	340–1010
1¾" Pitotless Nozzle + Open Atmosphere	109.7	1.20	1.75"	10–90	350–1040
1⅛" Pitotless Nozzle + Little Hose Monster	37.2	0.98	1.125"	5–90	80–350
1⅛" Pitotless Nozzle + 2½" Hose Monster Steel	37.4	0.99	1.125"	5–90	80–350
1⅛" Pitotless Nozzle + Open Atmosphere	37.0	0.98	1.125"	5–90	80–350
1" Pitotless Nozzle + Little Hose Monster	27.2	0.91	1"	3–90	50–260
1" Pitotless Nozzle + 2½" Hose Monster Steel	27.6	0.93	1"	3–90	50–260
1" Pitotless Nozzle + Open Atmosphere	27.7	0.93	1"	3–90	50–260

In-Line Pitotless Nozzle™

Device	K-factor	Coefficient	Orifice Diameter	psi Range	Flow Range (GPM)
2" In-line Pitotless Nozzle	165.3	1.38	2"	10–75	530–1430
1¾" In-line Pitotless Nozzle	109.9	1.20	1.75"	5–80	250–980
1⅛" In-line Pitotless Nozzle	38.4	1.02	1.125"	5–70	90–320

BigBoy Hose Monster™

Device	K-factor	Coefficient	Orifice Diameter	psi Range	Flow Range (GPM)
4 to 10 psi (BigBoy Hose Monster)	382.9	1.38	3.05"	4–10	766–1211
11 to 36 psi (BigBoy Hose Monster)	376.0	1.35	3.05"	11–36	1247–2256
37 to 53 psi (BigBoy Hose Monster)	372.0	1.34	3.05"	37–53	2263–2708

Note: Due to the shape and size of the BigBoy Pitotless Nozzle, the BigBoy Hose Monster uses three different k-factors over its operating range.

2½" Hose Monster®

Device	K-factor	Coefficient	Orifice Diameter	psi Range	Flow Range (GPM)
2½" Hose Monster	168.67	0.906	2.5"	10–75	530–1460
1¾" Nozzle Insert	89.04	0.975	1.75"	10–75	280–770
1⅛" Nozzle Insert	37.36	0.99	1.125"	10–75	120–320

4" and 4½" Hose Monster®

Device	K-factor	Coefficient	Orifice Diameter	psi Range	Flow Range (GPM)
4½" Hose Monster	331.07	0.548	4.5"	10–75	1050–2870
4" Hose Monster	339.65	0.712	4"	10–75	1070–2940

Using Software

Use the table below if you are using software that requires the coefficient input to be less than '1.0'. Notice that the orifice diameter must be changed from its true diameter in order to accommodate the lower coefficient. This is necessary only for the 2" Pitotless Nozzle and the ¾" Pitotless Nozzle.

Device	Coefficient	Orifice Diameter
2" Pitotless Nozzle + Little Hose Monster	0.99	2.30"
2" Pitotless Nozzle + 2½" Hose Monster Steel	0.99	2.36"
2" Pitotless Nozzle + Open Atmosphere	0.99	2.38"
1¾" Pitotless Nozzle + Little Hose Monster	0.99	1.88"
1¾" Pitotless Nozzle + 2½" Hose Monster Steel	0.99	1.90"
1¾" Pitotless Nozzle + Open Atmosphere	0.99	1.93"

Note: If your software uses the Theoretical Discharge Formula, found in NFPA 291, 4.7.3, the coefficient of discharge can be used to produce flow rates that will match our flow charts.

A hand-held pitot directly at a hydrant outlet

Outlet Type	Coefficient
Outlet smooth and rounded	0.9
Outlet square and sharp	0.8
Outlet square and projecting into barrel	0.7
If a stream straightener is used	0.95

Classifying and Marking of Hydrants

Rated Capacity at 20 psi	Class	Marking Color of Hydrant Tops and Nozzles
≥1500 GPM	AA	Light Blue
1000–1499 GPM	A	Green
500–999 GPM	B	Orange
≤499 GPM	C	Red

The above are the NFPA hydrant classifications and color markings for various rated capacities. Source: NFPA 291, 5.1, 2010.

215 Brightwater Drive, Lillington flow test - Wednesday, September 6, 2023