Fire Protection Submittal Review

Project:	NW Harnett Elementary	**Reviewed by:**	ESD
Date:	April 11, 2022	**Optima #:**	20-0224
Item Reviewed:	NWHES_211300-1.0_Auto Sprinkler Systems and Pumps_Product Information		

Stamp:

OPTIMA ENGINEERING, P.A.
SHOP DRAWING REVIEW
REVIEW IS FOR GENERAL COMPLIANCE WITH THE INTENT OF THE CONTRACT DOCUMENTS. FIRE PROTECTION CONTRACTOR SHALL ASSUME RESPONSIBILITY FOR CORRECTNESS, DIMENSIONS, DETAILS, QUANTITIES AND ALL COST ASSOCIATED WITH SUBSTITUTED EQUIPMENT, INCLUDING ELECTRICAL CHANGES, MAINTENANCE ACCESS, CLEARANCES, BUILDING ALTERATIONS, PIPING, REPLACEMENT OF OTHER SYSTEM COMPONENTS, ETC.

NO EXCEPTION TAKEN	
APPROVED AS NOTED	X
REVISE AND RESUBMIT	
REJECTED	

Comments:

1) At the time of this review, no shop drawings have been provided. Please coordinate all sprinkler escutcheon colors with the architectural drawings to match ceiling color.
2) Sprinkler heads are approved. Exact temperature ratings and locations will be confirmed during shop drawing review.

1927 S. Tryon Street, Suite 300
Charlotte, NC 28203
(704) 338-1292

150 Fayetteville Street, Suite 520
Raleigh, NC 27601
(919) 926-2200

Corporate
763 Comtech Drive
Pembroke, North Carolina 28372
P: (910) 521-8013
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Project: 2021024 Northwest Harnett ES
736 Rollins Road
Fuquay Varina, North Carolina 27526

Submittal #21 13 00-1.0 - 211300 - Automatic Sprinkler Systems
21 13 00 - Automatic Sprinkler Systems

Revision	0	**Submittal Manager**	Melanie Ziemniak (Metcon, Inc.)
Status	Open	**Date Created**	Jul 28, 2021
Issue Date		**Spec Section**	21 13 00 - Automatic Sprinkler Systems
Responsible Contractor	ABL Fire Protection	**Received From**	
Received Date		**Submit By**	Sep 30, 2021
Final Due Date	Nov 13, 2021	**Lead Time**	
		Cost Code	
Location		**Type**	Product Data
Owner Review			

Approvers Marquis Mason (Metcon, Inc.), Melanie Ziemniak (Metcon, Inc.), Scott Drew (Optima Engineering, PA), Drew Landen (Optima Engineering, PA), Tom Hughes (SfL+a Architects), Mahan Kick (SfL+a Architects), Jaclin Wawak (SfL+a Architects), Marquis Mason (Metcon, Inc.), Melanie Ziemniak (Metcon, Inc.)

Ball in Court Marquis Mason (Metcon, Inc.), Melanie Ziemniak (Metcon, Inc.)

Distribution Denis Escobar (Metcon, Inc.)

Description B. Submit manufacturer’s data for the following: 1. Aboveground pipe and tube. 2. Pipe fittings. 3. Valves. 4. Sprinklers. 5. System attachments. 6. Hangers and supports. 7. System signage.

GENERAL CONTRACTORS APPROVAL

___APPROVED ___NOT APPROVED

X APPROVED AS NOTED ___REVISE AND RESUBMIT

___NO EXCEPTIONS TAKEN

APPROVAL BY GENERAL CONTRACTOR DOES NOT RELIEVE SUPPLIER OR SUB-CONTRACTOR OF HIS RESPONSIBILITY TO CONFORM TO CONTRACT PLANS, SPECIFICATIONS, AND ADDENDA GENERAL CONTRACTOR WILL NOT ASSUME ANY OF SUPPLIER'S OR SUB-CONTRACTOR'S RESPONSIBILITY FOR ERROR OR CHANGES TO DIMENSIONS, MATERIALS, TECHNIQUES, ETC., CALLED TO GENERAL CONTRACTORS ATTENTION IN WRITING PRIOR TO APPROVAL.

DATE 03/17/22 METCON, INC.

BY Marquis Mason

Corporate Office: 300 Hoke Street, Raleigh, NC 27601-2637 . (919) 835-2225 . Fax (919) 835-2210

FIRE PROTECTION
~~NCCU School of Business~~
Fuquay Varina , North Carolina

Northwest Harnett Elementary School

Product Data
Division 21

1

Sprinkler Pipe

All pipe shall be marked along its length by the manufacturer in such a way as to properly identify the type of pipe, every 2 feet.

Schedule 10 and Schedule 40

FM Approved and UL Listed Sprinkler Pipe

Bull Moose Tube Company is a recognized producer of quality pipe products. Our Schedule 10 and Schedule 40 are FM Approved and UL Listed (for U.S. and Canada), even though these products do not require separate approvals and listings. Bull Moose Tube made the decision to have them approved and listed for your peace of mind. Our Sch. 10 and Sch. 40 have been through the same rigorous testing as our other fine pipe products.

Bull Moose Tube's Sch. 10 and Sch. 40 pipes are made to ASTM A135 and ASTM A795. These products are typically supplied with our protective coating but can be supplied without the coating so they can be hot-dip galvanized to meet FM requirements for use in dry systems in accordance with the zinc coating specifications of ASTM A795 or ASTM A53. All Schedule 10 and Schedule 40 pipe has a pressure rating of 300 PSI.

Schedule 10 Pipe → When joined by welding or roll-grooved piping and fittings

Nominal Pipe Size (in)	Nominal O.D. (in)	Nominal I.D. (in)	Weight/Ft	Bundle Size
~~1~~	1.315	1.097	1.41 lbs/ft	91
~~1 1/4~~	1.660	1.442	1.81 lbs/ft	61
~~1 1/2~~	1.900	1.682	2.09 lbs/ft	61
2	2.375	2.157	2.64 lbs/ft	37
2 1/2	2.875	2.635	3.53 lbs/ft	30
3	3.500	3.260	4.34 lbs/ft	19
4	4.500	4.260	5.62 lbs/ft	19

Schedule 40 Pipe → When jointed by threaded or cut-grooved piping and fittings

Nominal Pipe Size (in)	Nominal O.D. (in)	Nominal I.D. (in)	Weight/Ft	Bundle Size
1	1.315	1.049	1.68 lbs/ft	70
1 1/4	1.660	1.380	2.27 lbs/ft	51
1 1/2	1.900	1.610	2.72 lbs/ft	44
~~2~~	2.375	2.067	3.66 lbs/ft	30
~~2 1/2~~	2.875	2.468	5.80 lbs/ft	30
~~3~~	3.500	3.068	7.58 lbs/ft	19
~~4~~	4.500	4.026	10.80 lbs/ft	19

PIPE PREPARATION

For proper operation, all pipe surfaces should be cleaned prior to installation. In order to provide a leak-tight seat for the gasket, pipe surfaces should be free from indentations and projections from the end of the pipe to the groove. All loose paint, scale, dirt, chips, grease, and rust must be removed prior to installation. Failure to take these important steps may result in improper coupling assembly, causing leakage. Also, check the manufacturer's instructions for the specific fitting used.

BULL MOOSE TUBE COMPANY
A CAPARO company

1819 Clarkson Road
Chesterfield, MO 63017
(800) 325-4467
FAX: (636) 537-2645
www.bullmoosetube.com
e-mail: sales@bullmoosetube.com

For additional information, contact your salesperson today at (800) 325-4467 or (636) 537-2600 in the USA, or from Canada call (800) 882-4666

Wheatland's

Schedule 40

Sprinkler Pipe

When jointed by threaded or cut-grooved piping and fittings

Wheatland's Schedule 40 Sprinkler Pipe is a high quality sprinkler pipe offering you the full range of assurances you require. Schedule 40 Sprinkler Pipe has passed some of the toughest lab tests ever created for sprinkler pipe.

Made in the U.S.A. by Wheatland Tube Company means made to the highest standards for consistant quality.

Wheatland's schedule 40 Sprinkler Pipe is made from the highest quality steel in one of the nation's most modern and most complete pipe manufacturing plants. Our proprietary mill coating offers you a clean, corrosion and heat resistant surface that outlasts and outperforms standard lacquer coatings. Plus, this coating can be quickly and easily painted without special preparation. Or it may be hot-dipped galvanized to meet FM requirements for dry systems in accordance with the zinc coating specification of ASTM A795. Schedule 40 is also available as ASTM A 53 Type F, Grade A in NPS 1 - 6 and is UL Listed and FM Approved.

Specifications and Approvals

Wheatland's Schedule 40 Standard Wall Sprinkler Pipe meets or exceeds the following:

- UL Listed
- FM Approved
- ASTM A795, Type E, Grade A

Please refer to appropriate documentation for up-to-date listing and approval information. Specifications and descriptions are accurate as known at time of publication and are subject to change without notice.

Specifications

NPS	Nominal O.D		Nominal I.D		Nominal Wall		Nominal Weight		UL CRR*	Pieces Lift
	in.	mm	in.	mm	in.	mm	lbs./ft.	kg/m		
1"	1.315	33.4	1.049	26.6	.133	3.38	1.68	2.50	1.00	70
1 1/4"	1.660	42.2	1.380	35.1	.140	3.56	2.27	3.39	1.00	51
1 1/2"	1.900	48.3	1.610	40.9	.145	3.68	2.72	4.05	1.00	44
2"	2.375	60.3	2.067	52.5	.154	3.91	3.66	5.45	1.00	30

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

* The CRR is a ratio value used to measure the ability of a pipe to withstand corrosion. Schedule 40 steel pipe is used as the benchmark (value of 1.0).

Wheatland Tube Company
1 Council Avenue, P.O. Box 608 Wheatland, PA 16161-0608
Ph 800.257.8182 Fax 724.346.7260
www.wheatland.com

Wheatland's

Schedule 10

When joined by welding or roll-grooved piping and fittings

Sprinkler Pipe

Wheatland's Schedule 10 Sprinkler Pipe is a high quality sprinkler pipe offering you the full range of assurances you require. Schedule 10 Sprinkler Pipe has passed some of the toughest lab tests ever created for sprinkler pipe.

Made in the U.S.A. by Wheatland Tube Company means made to the highest standards for consistant quality.

Wheatland's schedule 10 Sprinkler Pipe is made from the highest quality steel in one of the nation's most modern and most complete pipe manufacturing plants. Our proprietary mill coating offers you a clean, corrosion and heat resistant surface that outlasts and outperforms standard lacquer coatings. Plus, this coating can be quickly and easily painted without special preparation. Or it may be hot-dipped galvanized to meet FM requirements for dry systems in accordance with the zinc coating specification of ASTM A795 or A53.

Specifications and Approvals

Wheatland's Schedule 10 Lightwall Sprinkler Pipe meets or exceeds the following:

- UL Listed
- FM Approved
- ASTM A135, Grade A

Please refer to appropriate documentation for up-to-date listing and approval information. Specifications and descriptions are accurate as known at time of publication and are subject to change without notice.

Specifications

NPS	Nominal O.D		Nominal I.D		Nominal Wall		Nominal Weight		UL CRR*	Pieces Lift
	in.	mm	in.	mm	in.	mm	lbs./ft.	kg/m		
~~1 1/4~~	1.660	42.2	1.442	36.6	.109	2.77	1.81	2.69	7.3	61
~~1 1/2~~	1.900	48.3	1.682	42.7	.109	2.77	2.09	3.11	5.8	61
2	2.375	60.3	2.157	54.8	.109	2.77	2.64	3.93	4.7	37
2 1/2	2.875	73.0	2.635	66.9	.120	3.05	3.53	5.26	3.5	30
3	3.500	88.9	3.260	82.8	.120	3.05	4.34	6.46	2.6	19
4	4.500	114.3	4.260	108.2	.120	3.05	5.62	8.37	1.6	19
5	5.563	141.3	5.295	134.5	.134	3.40	7.78	11.58	1.5	13
6	6.625	168.3	6.357	161.5	.134	3.40	9.30	13.85	1.0	10

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

* The CRR is a ratio value used to measure the ability of a pipe to withstand corrosion. Schedule 40 steel pipe is used as the benchmark (value of 1.0).

Wheatland Tube Company
1 Council Avenue, P.O. Box 608 Wheatland, PA 16161-0608
Ph 800.257.8182 Fax 724.346.7260
www.wheatland.com

Schedule 10 Sprinkler Pipe

Youngstown Tube manufactures Schedule 10 pipe in sizes 1 ¼" thru 6" using only high quality **domestic** steel. This ensures a uniform superior product for roll grooving, welding or plain end uses. Youngstown Tube's schedule 10 pipe is produced under ASTM A795 Type E, Grade A, NH standards. Every piece is Eddy-Current tested and conforms to internal SPC testing and recording.

Youngstown Tube Schedule 10 steel sprinkler pipe is coated with a black enamel coating, continuous color coded ***white*** stencil, and **stored indoors** ready for immediate shipment.

Approvals

- **UL Listed**
- **CUL Listed**
- **FM Approved**

Youngstown Tube schedule 10 pipe meets the rigorous testing and certification processes of Underwriters Laboratory and Factory Mutual for steel sprinkler pipe with working pressures of 300 psi or less. It also meets the requirements of NFPA 13 and can be used in wet, dry, deluge and preaction systems.

Schedule 10 *

Pipe Size	Pipe OD	Nominal Wall	Weight per Foot	Standard Length	Pieces per Bundle	Feet per Bundle	Weight per Bundle	UL Threaded CRR
~~1 ¼~~	~~1.660~~	~~.109~~	~~1.81~~	~~21~~	~~61~~	~~1,281~~	~~2,319~~	~~8.5~~
~~1 ½~~	~~1.900~~	~~.109~~	~~2.08~~	~~21~~	~~44~~	~~924~~	~~1,921~~	~~6.8~~
2	2.375	.109	2.64	21	37	777	2,051	5.5
2 ½	2.875	.120	3.53	21	37	777	2,742	4.1
3	3.500	.120	4.33	21	24	504	2,182	3.0
4	4.500	.120	5.61	21	19	399	2,238	1.8
6	6.625	.134	9.29	21	10	210	1,951	1.16
8**	8.625	.188	18.49	21	7	147	2,424	1.81

* Schedule 10 pipe can not be threaded or cut-grooved.
** 8" schedule 10 is manufactured from a different domestic supplier.

Youngstown Tube Company
401 Andrews Avenue
Youngstown, Ohio 44505
1-866-The-Tube
www.youngstowntube.com

Schedule 40 Sprinkler Pipe

Youngstown Tube manufactures Schedule 40 pipe in sizes 1" thru 2" using only high quality **domestic** steel. This ensures a uniform superior product for threading, roll grooving, welding or plain end uses. Youngstown Tube's schedule 40 pipe is produced under ASTM A135/A795 Type E, Grade A, NH standards. Every piece is Eddy-Current tested and conforms to internal SPC testing and recording.

Youngstown Tube Schedule 40 steel sprinkler pipe is coated with a black enamel coating, continuous color coded ***red*** stencil, and **stored indoors** ready for immediate shipment.

Approvals

- **UL Listed**
- **CUL Listed**
- **FM Approved**

Youngstown Tube schedule 40 pipe meets the rigorous testing and certification processes of Underwriters Laboratory and Factory Mutual for steel sprinkler pipe with working pressures of 300 psi or less. It also meets the requirements of NFPA 13 and can be used in wet, dry, deluge and preaction systems.

Schedule 40

Pipe Size	Pipe OD	Nominal Wall	Weight per Foot	Standard Length	Pieces per Bundle	Feet per Bundle	Weight per Bundle	UL Threaded CRR
1	1.315	.133	1.68	21	61	1,281	2,152	1.00
1 ¼	1.660	.140	2.27	21	61	1,281	2,907	1.00
1 ½	1.900	.145	2.72	21	44	924	2,511	1.00
2	2.375	.154	3.65	21	37	777	2,836	1.00

Youngstown Tube Company
401 Andrews Avenue
Youngstown, Ohio 44505
1-866-The-Tube
www.youngstowntube.com

2

Fittings

- Grooved Fittings
- Threaded Fittings

Grooved Fittings

c UL us LISTED FM APPROVED

For Fire Protection pressure rating, listing, and approval information, visit Shurjoint website, www.shurjoint.com for details or contact your SHURJOINT Representative.

MODEL 7041-A FLANGE ADAPTER - ANSI 125/150

The Model 7041-A Flange Adapter allows for a direct connection with ANSI class 125/150 flanges. The specially designed gasket enables the transition from a grooved system to a flanged system or component with this single flange adapter. The two-segment design provides an easy and fast installation. 2" through 12" flange adapters are supplied hinged as a single assembly, while 14" -24" (Model 7041N) are supplied with two separate segments and a draw kit. All include an EPDM rubber gasket and plated track bolts and nuts. Housing segments are supplied with our standard painted finishes, i.e. orange or RAL3000 red. Optional finishes such as hot dipped zinc galvanized and custom epoxy coatings are available.

CAUTION

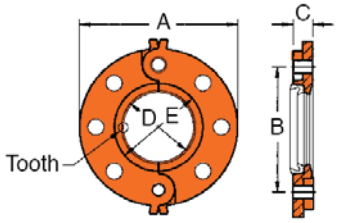
Always use factory-supplied bolts and nuts to assemble flange segments. The use of other bolts may cause of joint failure.

Pressure-Temperature Rating

Nom. Rating	Working Pressure (STD, Roll-grooved)	Max. Service Temperature
Class 150	300 psi @100°F *20 Bar @38°C*	EPDM: 230°F / 110°C Nitrile: 180°F / 82°C

*Working pressure is based on roll- or cut-grooved standard wall carbon steel pipe.
* Hydrostatic Shell Test: 450 psi (30 bar) per ANSI B16.5.

MODEL 7041-A FLANGE ADAPTER - ANSI CLASS 125/150



2" - 12" (hinged)

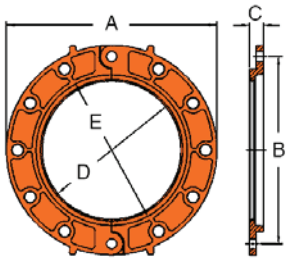
10 YEAR LIMITED WARRANTY

Full warranty terms can be found on www.shurjoint.com

Model 7041-A Flange Adapter - ANSI Class 125/150

Nominal Size	Pipe OD	Max. Working Pressure	Max. End Load	Dimensions A	B	C	Sealing Surface D	E	Bolts Size	No.	Weight
mm *in*	mm *in*	Bar *PSI*	kN *Lbs*	mm *in*	mm *in*	mm *in*	mm *in*	mm *in*	in		Kgs *Lbs*
50 *2*	60.3 *2.375*	20 *300*	5.71 *1330*	152 *6.00*	121 *4.75*	19 *0.75*	60 *2.36*	87 *3.42*	⅝	4	1.8 *4.0*
65 *2½*	73.0 *2.875*	20 *300*	8.37 *1950*	178 *7.00*	140 *5.50*	22 *0.87*	73 *2.87*	102 *4.00*	⅝	4	2.3 *5.1*
80 *3*	88.9 *3.500*	20 *300*	12.41 *2880*	190 *7.50*	152 *6.00*	24 *0.94*	89 *3.50*	116 *4.56*	⅝	4	2.8 *6.2*
100 *4*	114.3 *4.500*	20 *300*	20.51 *4770*	229 *9.00*	191 *7.50*	24 *0.94*	114 *4.50*	141 *5.56*	⅝	8	3.8 *8.3*
125 *5*	141.3 *5.563*	20 *300*	31.35 *7290*	254 *10.00*	216 *8.50*	24 *0.94*	141 *5.56*	171 *6.73*	¾	8	4.7 *10.3*
150 *6*	168.3 *6.625*	20 *300*	44.47 *10340*	279 *11.00*	241 *9.50*	25 *1.00*	168 *6.62*	198 *7.79*	¾	8	5.0 *11.1*
200 *8*	219.1 *8.625*	20 *300*	75.37 *17520*	343 *13.50*	298 *11.75*	28 *1.12*	219 *8.62*	254 *10.00*	¾	8	7.8 *17.2*
250 *10*	273.0 *10.750*	20 *300*	117.01 *27210*	406 *16.00*	362 *14.25*	30 *1.18*	273 *10.75*	308 *12.12*	⅞	12	11.7 *25.7*
300 *12*	323.9 *12.750*	20 *300*	164.71 *38280*	482 *19.00*	432 *17.00*	32 *1.25*	324 *12.75*	359 *14.13*	⅞	12	17.1 *37.6*

MODEL 7041N-A FLANGE ADAPTER - ANSI CLASS 125/150



7041N 14" - 24"

14" ~ 24": Supplied with a draw kit.

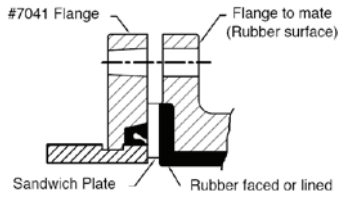
Model 7041N-A Flange Adapter - ANSI Class 125/150

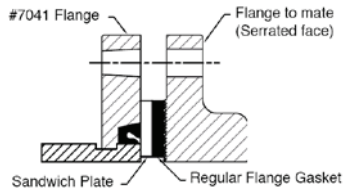
Nominal Size	Pipe OD	Max. Working Pressure	Max. End Load	Dimensions			Sealing Surface		Bolts		Weight
				A	B	C	D	E	Size	No.	
mm in	mm in	Bar PSI	KN Lbs	mm in	mm in	mm in	mm in	mm in	in		Kgs Lbs
350 14	355.6 14.000	20 300	198.53 461.60	533 21.00	476 18.75	36 1.42	382 15.04	351 13.82	1	12	28.0 61.7
400 16	406.4 16.000	20 300	259.3 60290	597 23.50	540 21.25	38 1.50	430 16.93	402 15.83	1	16	35.0 77.1
450 18	457.2 18.000	20 300	328.18 76300	635 25.00	578 22.75	40 1.56	486 19.14	452 17.80	1⅛	16	39.0 86.0
500 20	508.0 20.000	20 300	405.18 94200	699 27.50	635 25.00	43 1.60	537 21.15	504 19.83	1⅛	20	49.5 109.1
550 22	559.0 22.000	20 300	490.24 113980	749 29.50	692 27.25	48 1.90	551 21.70	588 23.15	1¼	20	60.4 133.1
600 24	609.6 24.000	20 300	583.43 135650	813 32.00	749 29.50	48 1.89	602 23.70	635 25.00	1¼	20	71.5 157.6

CAUTION

Important Notes:

1. The Model 7041 flange adapter requires a hard flat face for effective sealing. When the mating surface is not adequate as with the serrated faces of some valves or the rubber-faced wafer valves, a sandwich plate (Model #49, see cut sheet #V-03) must be used..

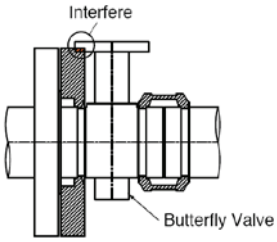




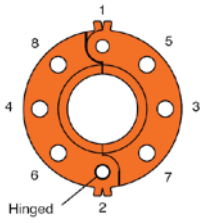
2. The Model 7041 flange adapter has small triangular teeth inside the key shoulder to prevent the pipe from rotating. The teeth should be ground off when mating to a rubber-lined flange, plastic pipe and or light wall pipe.

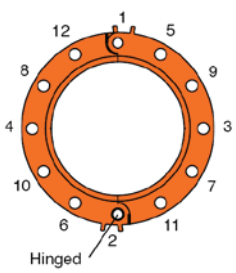
3. The Models 7041 flange adapter shall not be used as anchor points for tie-rods across non-restrained joints.

4. When assembling a Model 7041 flange adapter against a butterfly valve or ball valve, make sure that the outside diameter of the flange adapters do not interfere with the valve actuator or the mounting pad of the actuator.



5. Bolt tightening sequence: Like a regular flange joint, it is important to make flange faces contact parallel. Tighten nuts alternately in the sequence of diagonally opposite pairs as shown below until the flange faces meet and make a metal-to-metal contact.





MATERIAL SPECIFICATIONS

• Housing:

Ductile Iron to ASTM A536, Gr. 65-45-12 and or ASTM A395 Gr.65-45-15, min. tensile strength 448MPa (65,000 psi).

• Surface Finish:

Standard painted finishes in orange or RAL3000 red.

- ☐ Hot dip zinc galvanized (Option).
- ☐ Epoxy coatings in RAL3000 red or other colors (Option)

• Rubber Gasket:

Grade "E" EPDM (Color code: Green stripe) Good for cold & hot water up to +230°F (+110°C). Also good for services for water with acid, water with chlorine, deionized water, seawater and waste water, dilute acids, oil-free air and many chemicals. Not recommended for petroleum oils, minerals oils, solvents and aromatic hydrocarbons.
Maximum Temperature Range: -30°F (-34°C) to +230°F (+110°C).

- ☐ (Option) **Grade "T" Nitrile** (Color code: Orange stripe) Recommended for petroleum products, air with oil vapors, vegetable and mineral oils within the specified temperature range. Also good for water services under +66 °C (+150 °F). Temperature range: -29 °C to +82 °C (-20 °F to +180 °F). **Do not use for HOT WATER above +66°C (+150°F) or HOT DRY AIR above +60°C (+140°F)**

- ☐ Other options: Grade "O" Fluoroelastomer.
  Grade "L" Silicone.
  For additional details contact ***Shurjoint***.

• Standard Hex Bolts & Nuts:

Plated hex bolts conforming to ASTM A307 with hex nuts. (2 nuts and bolts are supplied). Bolts and nuts for the flange connection to be supplied by installer.

• Draw Kit:

Screw Rod: Carbon Steel.
Assembly holders: Ductile Iron.
Bolts & Nuts: Commercial.

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***.
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606 (latest version) specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1½ times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

__Shurjoint__ product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact __Shurjoint__ Technical Service. __Shurjoint__ reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligations to make such changes and modifications on __Shurjoint__ products previously subsequently sold.

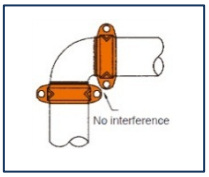
MODEL K-9 RIGID COUPLING

- T&G Design -

The ***Shurjoint*** Model K-9 is a T&G (tongue & groove) design coupling for moderate pressure applications where rigidity is required including valve connections, mechanical rooms, fire mains and long straight runs. The built-in teeth and T&G mechanism firmly grasp the pipe ends to eliminate undesired flex. Support and hanging requirements correspond to ANSI B31.1, B31.9 and NFPA 13.

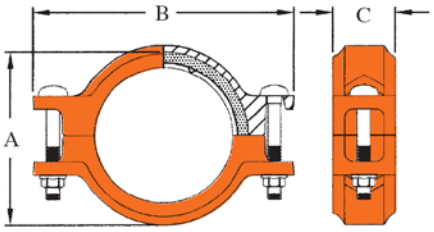
The Model K-9 couplings are comprised of two identical housing segments, EPDM rubber gasket and plated track bolts and nuts. Housing segments are supplied with our standard painted finishes, i.e. orange or RAL3000 red. Optional finishes such as hot dipped zinc galvanized and custom epoxy coatings are available.

K-9 couplings should always be installed so that the coupling bolt pads make metal to metal contact.



No need to worry about bold pad interference as the Model K-9 works well with both regular and short radius elbows and tees.

For Fire Protection pressure rating, listing, and approval information, refer to Data Sheet B-42 or visit ***SHURJOINT*** website, www.shurjoint.com for details or contact your ***SHURJOINT*** Representative.



10 YEAR LIMITED WARRANTY

Full warranty terms can be found on www.shurjoint.com

Model K-9 Rigid Coupling

Nominal Size	Pipe OD	Max. Working Pressure (CWP)*	ASME/ANSI Pressure Class Rating^ @100ºF/@38ºC	Max End Load (CWP)	Axial Displacement	Dimension			Bolt Size	Weight
						A	B	C		
in *mm*	in *mm*	PSI *Bar*	PSI *Nom. class*	Lbs *kN*	in *mm*	in *mm*	in *mm*	in *mm*	in *mm*	Lbs *Kgs*
1¼ *32*	1.660 *42.2*	500 *34.5*	300 *150*	1080 *4.82*	0~0.06 *0~1.6*	2.56 *65*	4.33 *110*	1.77 *45*	⅜ x 1¾ *M10 x 45*	1.3 *0.6*
1½ *40*	1.900 *48.3*	500 *34.5*	300 *150*	1410 *6.32*	0~0.06 *0~1.6*	2.80 *71*	4.45 *113*	1.77 *45*	⅜ x 2⅛ *M10 x 55*	1.3 *0.6*
2 *50*	2.375 *60.3*	500 *34.5*	300 *150*	2210 *9.85*	0~0.06 *0~1.6*	3.27 *83*	4.88 *124*	1.77 *45*	⅜ x 2⅛ *M10 x 55*	1.5 *0.7*
2½ *65*	2.875 *73.0*	500 *34.5*	300 *150*	3240 *14.43*	0~0.06 *0~1.6*	3.86 *98*	5.39 *137*	1.77 *45*	⅜ x 2⅛ *M10 x 55*	1.8 *0.8*
76.1 mm	3.000 *76.1*	500 *34.5*	300 *150*	3530 *15.68*	0~0.06 *0~1.6*	4.00 *102*	5.51 *140*	1.77 *45*	⅜ x 2⅛ *M10 x 55*	1.8 *0.8*
3 *80*	3.500 *88.9*	500 *34.5*	300 *150*	4800 *21.40*	0~0.06 *0~1.6*	4.50 *114*	5.94 *151*	1.77 *45*	⅜ x 2¾ *M10 x 70*	2.6 *1.2*
108.0 mm	4.250 *108.0*	500 *34.5*	300 *150*	7080 *31.59*	0~0.13 *0~3.2*	5.38 *137*	7.00 *219*	2.00 *51*	⅜ x 2¾ *M10 x 70*	3.6 *1.7*
4 *100*	4.500 *114.3*	350 *24.1*	300 *150*	5560 *24.72*	0~0.13 *0~3.2*	5.63 *143*	7.48 *190*	2.00 *51*	⅜ x 2¾ *M10 x 70*	3.6 *1.7*
133.0 mm	5.250 *133.0*	350 *24.1*	300 *150*	7570 *33.46*	0~0.13 *0~3.2*	6.52 *166*	8.61 *219*	2.00 *51*	½ x 3 *M12 x 75*	4.6 *2.1*
139.7 mm	5.500 *139.7*	350 *24.1*	300 *150*	8310 *36.92*	0~0.13 *0~3.2*	6.77 *172*	9.21 *234*	2.00 *51*	½ x 3 *M12 x 75*	4.6 *2.1*
5 *125*	5.563 *141.3*	350 *24.1*	300 *150*	8500 *37.77*	0~0.13 *0~3.2*	6.89 *175*	8.98 *228*	2.00 *51*	½ x 3 *M12 x 75*	4.6 *2.1*
159.0 mm	6.250 *159.0*	350 *24.1*	300 *150*	10730 *47.83*	0~0.13 *0~3.2*	7.50 *191*	9.67 *246*	2.00 *51*	½ x 3 *M12 x 75*	4.4 *2.0*
165.1 mm	6.500 *165.1*	350 *24.1*	300 *150*	11600 *51.57*	0~0.13 *0~3.2*	7.75 *197*	9.92 *252*	2.00 *51*	½ x 3 *M12 x 75*	5.3 *2.4*

Model K-9 Rigid Coupling

Nominal Size	Pipe OD	Max. Working Pressure (CWP)*	ASME/ANSI Pressure Class Rating^ @100ºF/@38ºC	Max End Load (CWP)	Axial Displacement	Dimension			Bolt Size	Weight
						A	B	C		
in *mm*	in *mm*	PSI *Bar*	PSI *Nom. class*	Lbs *kN*	in *mm*	in *mm*	in *mm*	in *mm*	in *mm*	Lbs *Kgs*
6 *150*	6.625 *168.3*	350 *24.1*	300 *150*	12050 *53.59*	0~0.13 *0~3.2*	7.87 *200*	10.04 *255*	2.09 *53*	½ x 3 *M12 x 75*	5.9 *2.7*
8 *200*	8.625 *219.1*	350 *24.1*	300 *150*	20430 *90.82*	0~0.13 *0~3.2*	10.16 *258*	13.98 *355*	2.40 *61*	⅝ x 3½ *M16 x 90*	9.7 *4.4*

* Working Pressure is based on roll grooved standard wall carbon steel pipe.
^ The ASME/ANSI pressure class rating is not the design or maximum pressure rating, rather is provided for those that are accustomed to specifying or using ASME/ANSI pressure class rated components such as flange, valves, etc.

MODEL K-9H RIGID COUPLING

Model K-9H Rigid Coupling

Nominal Size	Pipe OD	Max. Working Pressure (CWP)*	ANSI Pressure Class Rating^ @100ºF/@38ºC	Max End Load (CWP)	Axial Displacement	Dimension			Bolt Size	Weight
						A	B	C		
in *mm*	in *mm*	PSI *Bar*	PSI *Nom. class*	Lbs *kN*	in *mm*	in *mm*	in *mm*	in *mm*	in *mm*	Lbs *Kgs*
8 *200*	8.625 *219.1*	350 *24.1*	300 *150*	20430 *90.82*	0~0.13 *0~3.2*	10.29 *261*	13.08 *332*	2.48 *63*	¾ x 4¾ *M20 x 120*	9.7 *4.4*

* Working Pressure is based on roll grooved standard wall carbon steel pipe.
^ The ASME/ANSI pressure class rating is not the design or maximum pressure rating, rather is provided for those that are accustomed to specifying or using ASME/ANSI pressure class rated components such as flange, valves, etc.

Performance Data

The following tables show the maximum working pressures (CWP) of ***Shurjoint*** Model K-9/K-9H Rigid Coupling used on both carbon steel and stainless steel pipes. ***Shurjoint*** ductile iron couplings can be used in conjunction with stainless steel pipe in non-corrosive environment as the flow media does not come in direct contact with the coupling housings but rather only the gasket.

Model K-9 on Carbon Steel Pipe

Nom. Size	Cut-Grooved		Roll-Grooved		
in / *mm*	XS PSI / *Bar*	STD PSI / *Bar*	STD PSI / *Bar*	Sch. 10 PSI / *Bar*	Sch. 7 PSI / *Bar*
1¼ *32*	600 *41.4*	600 *41.4*	500 *34.50*	400 *27.6*	300 *20.7*
1½ *40*	600 *41.4*	600 *41.4*	500 *34.50*	400 *27.6*	300 *20.7*
2 *50*	600 *41.4*	600 *41.4*	500 *34.50*	400 *27.6*	300 *20.7*
2½ *65*	600 *41.4*	600 *41.4*	500 *34.50*	400 *27.6*	300 *20.7*
2½ *65*	600 *41.4*	600 *41.4*	500 *34.50*	400 *27.6*	300 *20.7*
3 *80*	600 *41.4*	600 *41.4*	500 *34.50*	400 *27.6*	300 *20.7*
4 *100*	600 *41.4*	600 *41.4*	500 *34.50*	400 *27.6*	300 *20.7*
5 *125*	450 *31.0*	450 *31.0*	450 *31.0*	350 *24.1*	250 *17.2*
5 *125*	450 *31.0*	450 *31.0*	450 *31.0*	350 *24.1*	250 *17.2*
6 *150*	450 *31.0*	450 *31.0*	450 *31.0*	350 *24.1*	250 *17.2*
6 *150*	450 *31.0*	450 *31.0*	450 *31.0*	350 *24.1*	250 *17.2*
8 *200*	450 *31.0*	450 *31.0*	300 *20.7*	250 *17.2*	200 *13.8*
8 (K-9H) *200*	450 *31.0*	450 *31.0*	300 *20.7*	250 *17.2*	200 *13.8*

Model K-9 on Stainless Steel Pipe

Nom. Size	Cut-Grooved		Roll-Grooved		
in / *mm*	Sch. 80S PSI / *Bar*	Sch. 40S PSI / *Bar*	Sch. 40S PSI / *Bar*	Sch. 10S PSI / *Bar*	Sch. 5S PSI / *Bar*
1¼ *32*	600 *41.4*	600 *41.4*	450 *31.0*	300 *20.7*	250 *17.2*
1½ *40*	600 *41.4*	600 *41.4*	450 *31.0*	300 *20.7*	250 *17.2*
2 *50*	600 *41.4*	600 *41.4*	450 *31.0*	300 *20.7*	250 *17.2*
2½ *65*	600 *41.4*	600 *41.4*	450 *31.0*	300 *20.7*	250 *17.2*
2½ *65*	600 *41.4*	600 *41.4*	450 *31.0*	300 *20.7*	250 *17.2*
3 *80*	600 *41.4*	600 *41.4*	450 *31.0*	300 *20.7*	250 *17.2*
4 *100*	600 *41.4*	600 *41.4*	450 *31.0*	300 *20.7*	*200* *13.8*
5 *125*	450 *31.0*	450 *31.0*	300 *20.7*	200 *13.8*	NR
5 *125*	450 *31.0*	450 *31.0*	300 *20.7*	200 *13.8*	NR
6 *150*	450 *31.0*	450 *31.0*	300 *20.7*	125 *8.6*	NR
6 *150*	450 *31.0*	450 *31.0*	300 *20.7*	125 *8.6*	NR
8 *200*	450 *31.0*	450 *31.0*	300 *20.7*	100 *6.9*	NR
8 (K-9H) *200*	450 *31.0*	450 *31.0*	300 *20.7*	100 *6.9*	NR

MATERIAL SPECIFICATIONS

• Housing:

Ductile Iron to ASTM A536, Gr. 65-45-12 and or ASTM A395, Gr. 65-45-15, min. tensile strength 65,000 psi (448 MPa).

• Surface Finish:

Standard painted finishes in orange or RAL3000 red.

- ☐ Hot dip zinc galvanized (Option).
- ☐ Epoxy Coatings in RAL3000 red or other colors (Option)

• Rubber Gasket:

Grade "E" EPDM (Color code: Green stripe) Good for cold & hot water up to +230ºF (+110ºC). Also good for services for water with acid, water with chlorine, deionized water, seawater and waste water, dilute acids, oil-free air and many chemicals.
Not recommended for petroleum oils, minerals oils, solvents and aromatic hydrocarbons.
Maximum Temperature Range: -30ºF (-34ºC) to +230ºF (+110ºC)*.
*EPDM gaskets for water services are not recommended for steam services unless couplings or components are accessible for frequent gasket replacement.

- ☐ (Option) Grade "T" Nitrile (Color code: Orange stripe) Recommended for petroleum products, air with oil vapors, vegetable and mineral oils within the specified temperature range. Also good for water services under +150ºF (+66ºC).
  Temperature range: -20 ºF to +180 ºF (-29 ºC to +82 ºC).
  Do not use for HOT WATER above +150 ºF (+66 ºC) or HOT DRY AIR above +140 ºF (+60 ºC)

- ☐ Other options: Grade "O" Fluoroelastomer.
  Grade "L" Silicone.

For additional details contact *Shurjoint.*

• Bolts & Nuts:

Heat treated carbon manganese steel track bolts to ASTM A449-83a (or A183 Gr. 2), minimum tensile strength 110,000 psi (758 MPa), Zinc electroplated, with heavy-duty hexagonal nuts to ASTM A563.

General Notes:

- *ASME/ANSI Pressure-Temperature Rating* is provided as an aid in selecting a proper coupling to incorporate with other piping components (valves, flanges, and etc.) that are used in the same system and carry the ASME/ANSI rating. Select a Class 150 coupling to incorporate with Class 150 valves and flanges.
- *Maximum Working Pressure (CWP)* listed is the maximum cold water pressure for general piping services tested to ASTM F1476 and or AWWA C606 methods. Figures listed are based on roll- or cut-grooved standard wall carbon steel pipe. For other pipe schedules or pipe materials, contact *Shurjoint* for additional information.
- *Max. End Load* is calculated based on the maximum working pressure (CWP).
- *Listed and or Approved Pressures* are pressure ratings for fire protection systems, tested and approved by various approval bodies. Please always refer to the latest approval data posted on the *Shurjoint* website.
- *Field Joint Test:* For one time only the system may be tested hydrostatically at 1½ times the maximum working pressure listed (AWWA C606 5.2.3).
- *Warning:* Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- *The 10 Year Limited Warranty* applies to manufacturing defects only and does not cover severe service/temperature applications or wear parts.
- *Shurjoint* reserves the right to change specifications, designs and or standard without notice and without incurring any obligations.

Job Name:	System No.	Location:
Contractor:	Approved:	Date:
Engineer:	Approved:	Date:

Shurjoint *product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact* ***Shurjoint*** *Technical Service.* ***Shurjoint*** *reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligations to make such changes and modifications on* ***Shurjoint*** *products previously subsequently sold.*

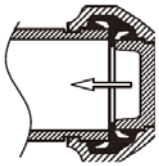
MODEL 7706 REDUCING COUPLING

The Model 7706 Reducing Coupling allows direct reduction on a piping run and eliminates the need for a concentric reducer and couplings. The specially designed rubber gasket prevents the smaller pipe from telescoping into the larger pipe during vertical installation. All 7706 couplings are comprised of two identical housing segments, EPDM rubber gasket and plated track bolts and nuts. Housing segments are supplied with our standard painted finishes, i.e. orange or RAL3000 red. Optional finishes such as hot dipped zinc galvanized and custom epoxy coatings are available.

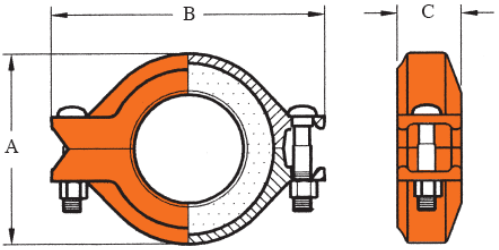
7706 couplings should always be installed so that the coupling bolt pads make metal to metal contact.

CAUTION

The Model 7706 couplings must not be used with an end cap, as the end cap could be sucked into the pipe by the vacuum created when a system is being drained.



For Fire Protection pressure rating, listing, and approval information, refer to Data Sheet B-42 or visit ***SHURJOINT*** website, www.shurjoint.com for details or contact your ***SHURJOINT*** Representative.



10 YEAR LIMITED WARRANTY

Full warranty terms can be found on www.shurjoint.com

Model 7706 Reducing Coupling

Nominal Size	Pipe O.D.	Max. Working Pressure (CWP)*	ASME/ANSI Pressure Class Rating^ @100ºF/@38ºC	Max. End Load (CWP)	Axial Displace-ment †	Angular Movement **† Deg. Per Coupling	Angular Movement **† Per Pipe	Pipe A	Pipe B	Pipe C	Bolt Size	Weight
in *mm*	in *mm*	PSI *Bar*	PSI *Nom. Class*	Lbs *kN*	in *mm*	(º) 	in/ft *mm/m*	in *mm*	in *mm*	in *mm*	in *mm*	Lbs *Kgs*
1½ x 1¼ *40 x 32*	1.900 x 1.660 *48.3 x 42.2*	500 *35*	300 *150*	1410 *6.23*	0 ~ 0.065 *0 ~ 1.6*	1º - 54'	0.20 *17*	2.83 *72*	4.25 *108*	1.81 *46*	⅜ x 2⅛ *M10 x 55*	1.8 *0.8*
2 x 1½ *50 x 40*	2.375 x 1.900 *60.3 x 48.3*	500 *35*	300 *150*	2210 *9.70*	0 ~ 0.065 *0 ~ 1.6*	1º - 31'	0.16 *13*	3.35 *85*	4.80 *122*	1.89 *48*	⅜ x 2⅛ *M10 x 55*	2.0 *0.9*
2½ x 2 *65 x 50*	2.875 x 2.375 *73.0 x 60.3*	500 *35*	300 *150*	3240 *14.22*	0 ~ 0.065 *0 ~ 1.6*	1º - 15'	0.13 *11*	3.78 *96*	5.67 *144*	1.89 *48*	⅜ x 2⅛ *M10 x 55*	2.6 *1.2*
76.1 mm x 50	3.000 x 2.375 *76.1 x 60.3*	500 *35*	300 *150*	3530 *15.46*	0 ~ 0.065 *0 ~ 1.6*	1º - 12'	0.13 *11*	4.02 *102*	5.43 *138*	1.89 *48*	⅜ x 2⅛ *M10 x 55*	2.6 *1.2*
3 x 2 *80 x 50*	3.500 x 2.375 *88.9 x 60.3*	500 *35*	300 *150*	4800 *21.09*	0 ~ 0.065 *0 ~ 1.6*	1º - 02'	0.11 *9*	4.57 *116*	6.61 *168*	1.89 *48*	½ x 3 *M12 x 75*	3.3 *1.5*
3 x 2½ *80 x 65*	3.500 x 2.875 *88.9 x 73.0*	500 *35*	300 *150*	4800 *21.09*	0 ~ 0.065 *0 ~ 1.6*	1º - 02'	0.11 *9*	4.57 *116*	6.61 *168*	1.89 *48*	½ x 3 *M12 x 75*	3.7 *1.7*
80 x 76.1 mm	3.500 x 3.000 *88.9 x 76.1*	500 *35*	300 *150*	4800 *21.09*	0 ~ 0.065 *0 ~ 1.6*	1º - 02'	0.11 *9*	4.57 *116*	6.61 *168*	1.89 *48*	½ x 3 *M12 x 75*	3.7 *1.7*
4 x 2 *100 x 50*	4.500 x 2.375 *114.3 x 60.3*	500 *35*	300 *150*	7940 *34.87*	0 ~ 0.095 *0 ~ 2.4*	1º - 12'	0.13 *11*	5.75 *146*	7.80 *198*	2.05 *52*	½ x 3 *M12 x 75*	5.3 *2.4*
4 x 2½ *100 x 65*	4.500 x 2.875 *114.3 x 73.0*	500 *35*	300 *150*	7940 *34.87*	0 ~ 0.095 *0 ~ 2.4*	1º - 12'	0.13 *11*	5.75 *146*	7.80 *198*	2.05 *52*	½ x 3 *M12 x 75*	5.7 *2.6*
100 x 76.1 mm	4.500 x 3.000 *114.3 x 76.1*	500 *35*	300 *150*	7940 *34.87*	0 ~ 0.095 *0 ~ 2.4*	1º - 12'	0.13 *11*	5.75 *146*	7.80 *198*	2.05 *52*	½ x 3 *M12 x 75*	5.7 *2.6*
4 x 3 *100 x 80*	4.500 x 3.500 *114.3 x 88.9*	500 *35*	300 *150*	7940 *34.87*	0 ~ 0.095 *0 ~ 2.4*	1º - 12'	0.13 *11*	5.75 *146*	7.80 *198*	2.05 *52*	½ x 3 *M12 x 75*	5.3 *2.4*
139.7 mm x 100	5.500 x 4.500 *139.7 x 114.3*	400 *28*	300 *150*	9490 *42.90*	0 ~ 0.125 *0 ~ 3.2*	1º - 18'	0.14 *12*	6.30 *160*	9.84 *242*	2.05 *52*	⅝ x 3½ *M16 x 90*	8.4 *3.8*
5 x 4 *125 x 100*	5.563 x 4.500 *141.3 x 114.3*	400 *28*	300 *150*	9710 *43.88*	0 ~ 0.125 *0 ~ 3.2*	1º - 18'	0.14 *12*	6.30 *160*	9.84 *242*	2.05 *52*	⅝ x 3½ *M16 x 90*	7.9 *3.6*

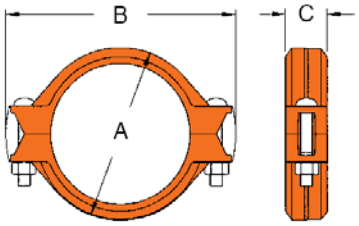
Model 7706 Reducing Coupling

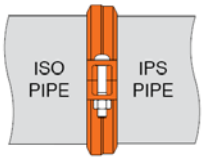
Nominal Size	Pipe O.D.	Max. Working Pressure (CWP)*	ASME/ANSI Pressure Class Rating^ @100ºF/@38ºC	Max. End Load (CWP)	Axial Displace-ment †	Angular Movement **† Deg. Per Coupling	Angular Movement **† Per Pipe	Pipe A	Pipe B	Pipe C	Bolt Size	Weight
in *mm*	in *mm*	PSI *Bar*	PSI *Nom. Class*	Lbs *kN*	in *mm*	(º)	in/ft *mm/m*	in *mm*	in *mm*	in *mm*	in *mm*	Lbs *Kgs*
165.1 mm x 80	6.500 x 3.500 *165.1 x 88.9*	400 *28*	300 *150*	13260 *59.91*	0 ~ 0.125 *0 ~ 3.2*	1º - 07'	0.12 *10*	7.95 *202*	10.59 *269*	2.05 *52*	⅝ x 3½ *M16 x 90*	10.1 *4.6*
6 x 3 *150 x 80*	6.625 x 3.500 *168.3 x 88.9*	400 *28*	300 *150*	13780 *62.26*	0 ~ 0.125 *0 ~ 3.2*	1º - 06'	0.12 *10*	8.19 *208*	10.83 *275*	2.05 *52*	⅝ x 3½ *M16 x 90*	10.1 *4.6*
165.1 mm x 100	6.500 x 4.500 *165.1 x 114.3*	400 *28*	300 *150*	13260 *59.91*	0 ~ 0.125 *0 ~ 3.2*	1º - 07'	0.12 *10*	7.95 *202*	10.59 *269*	2.05 *52*	⅝ x 3½ *M16 x 90*	9.9 *4.5*
6 x 4 *150 x 100*	6.625 x 4.500 *168.3 x114.3*	400 *28*	300 *150*	13780 *62.26*	0 ~ 0.125 *0 ~ 3.2*	1º - 06'	0.12 *10*	8.19 *208*	10.83 *275*	2.05 *52*	⅝ x 3½ *M16 x 90*	9.9 *4.5*
8 x 6 *200 x 150*	8.625 x 6.625 *219.1 x 168.3*	400 *28*	300 *150*	23350 *105.51*	0 ~ 0.125 *0 ~ 3.2*	0º - 50'	0.09 *8*	10.24 *260*	13.15 *334*	2.24 *57*	¾ x 4¾ *M20 x 120*	14.3 *6.5*
200 x 165.1 mm	8.625 x 6.500 *219.1 x 165.1*	400 *28*	300 *150*	23350 *105.51*	0 ~ 0.125 *0 ~ 3.2*	0º - 50'	0.09 *8*	10.24 *260*	13.15 *334*	2.24 *57*	¾ x 4¾ *M20 x 120*	14.3 *6.5*

* Working Pressure is based on roll- or cut-grooved standard wall carbon steel pipe.
^ The ASME/ANSI pressure class rating is not the design or maximum pressure rating, rather is provided for those that are accustomed to specifying or using ASME/ANSI pressure class rated components such as flange, valves, etc.
† Allowable Axial Displacement and Angular Movement (deflection) figures are for roll grooved standard steel pipe. Values for cut grooved pipe will be double that of roll grooved. These values are maximums; for design and installation purposes these figures should be reduced by: 50% for ¾" – 3½"; 25% for 4" and larger to compensate for jobsite conditions.
** Deflection or angular movement is the maximum value that a coupling allows under no internal pressure.

MODEL 7706-T TRANSITION COUPLING

The Model 7706-T Transition Coupling allows for a direction transition from IPS pipe sizes to ISO pipe sizes.





Model 7706-T Transition Coupling

Nominal Size	Pipe O.D.	Max. Working Pressure (CWP)*	ASME/ANSI Pressure Class Rating^ @100ºF/@38ºC	Max. End Load	Axial Displace-ment †	Angular Movement**† Deg. Per Coupling	Angular Movement**† Per Pipe	Pipe A	Pipe B	Pipe C	Bolt Size	Weight
in *mm*	in *mm*	PSI *Bar*	PSI *Nom. Class*	Lbs *kN*	in *mm*	(º)	in/ft *mm/m*	*mm*	*mm*	*mm*	in *mm*	Lbs *Kgs*
2½ x 76.1mm	2.875 x 3.000 *73.0 x 76.1*	500 *35*	300 *150*	2110 *9.09*	0 ~ 0.065 *0 ~ 1.6*	1º - 12'	0.13 *11*	4.02 *102*	5.43 *138*	1.89 *48*	⅜ x 2⅛ *M10 x 55*	2.6 *1.2*
6 x 165.1mm	6.625 x 6.500 *168.3 x 165.1*	400 *28*	300 *150*	9940 *42.80*	0 ~ 0.125 *0 ~ 3.2*	0º - 33'	0.12 *10*	7.87 *200*	10.63 *270*	2.09 *53*	⅝ x 3½ *M16 x 90*	7.7 *3.5*

*Working Pressure is based on roll grooved standard wall carbon steel pipe.
^The ASME/ANSI pressure class rating is not the design or maximum pressure rating, rather is provided for those that are accustomed to specifying or using ASME/ANSI pressure class rated components such as flange, valves, etc.
† Allowable Axial Displacement and Angular Movement (deflection) figures are for roll grooved standard steel pipe. Values for cut grooved pipe will be double that of roll grooved. These values are maximums; for design and installation purposes these figures should be reduced by: 50% for ¾" – 3½"; 25% for 4" and larger to compensate for jobsite conditions.
**Deflection or angular movement is the maximum value that a coupling allows under no internal pressure.

Performance Data

The following tables show the maximum working pressures (CWP) of ***Shurjoint*** Model 7706 Reducing Coupling used on both carbon steel and stainless steel pipes. ***Shurjoint*** ductile iron couplings can be used in conjunction with stainless steel pipe in non-corrosive environment as the flow media does not come in direct contact with the coupling housings but rather only the gasket.

Unit: psi / Bar

Model 7706 on Carbon Steel Pipe					
Nom. Size	**Cut-Grooved**		**Roll-Grooved**		
in / mm	XS	STD	STD	Sch. 10	Sch. 7
1½ x 1¼	500	500	500	350	300
40 x 32	*35*	*35*	*35*	*24*	*20*
2 x 1½	500	500	500	350	300
50 x 40	*35*	*35*	*35*	*24*	*20*
2½ x 2	500	500	500	350	300
65 x 50	*35*	*35*	*35*	*24*	*20*
2½ x 2	500	500	500	350	300
65 x 50	*35*	*35*	*35*	*24*	*20*
3 x 2	500	500	500	350	300
80 x 50	*35*	*35*	*35*	*24*	*20*
3 x 2½	500	500	500	350	300
80 x 65	*35*	*35*	*35*	*24*	*20*
4 x 2	500	500	500	350	300
100 x 50	*35*	*35*	*35*	*24*	*20*
4 x 2 ½	500	500	500	350	300
100 x 65	*35*	*35*	*35*	*24*	*20*
4 x 2 ½	500	500	500	350	300
100 x 65	*35*	*35*	*35*	*24*	*20*
4 x 3	500	500	500	300	250
100 x 80	*35*	*35*	*35*	*20*	*17*
5 x 4	400	400	400	300	250
125 x 100	*28*	*28*	*28*	*20*	*17*
5 x 4	400	400	400	300	250
125 x 100	*28*	*28*	*28*	*20*	*17*
6 x 3	400	400	400	300	200
150 x 80	*28*	*28*	*28*	*20*	*14*
6 x 3	400	400	400	300	200
150 x 80	*28*	*28*	*28*	*20*	*14*
6 x 4	400	400	400	300	175
150 x 100	*28*	*28*	*28*	*20*	*12*
6 x 4	400	400	400	300	175
150 x 100	*28*	*28*	*28*	*20*	*12*
8 x 6	400	400	400	300	175
200 x 150	*28*	*28*	*28*	*20*	*12*
8 x 6	400	400	400	300	175
200 x 150	*28*	*28*	*28*	*20*	*12*

Unit: psi / Bar

Model 7706 on Stainless Steel Pipe					
Nom. Size	**Cut-Grooved**		**Roll-Grooved**		
in / mm	Sch. 80S	Sch. 40S	Sch. 40S	Sch. 10S	Sch. 5S
1½ x 1¼	500	500	350	300	250
40 x 32	*35*	*35*	*24*	*20*	*17*
2 x 1½	500	500	350	300	250
50 x 40	*35*	*35*	*24*	*20*	*17*
2½ x 2	500	500	350	300	250
65 x 50	*35*	*35*	*24*	*20*	*17*
2½ x 2	500	500	350	300	250
65 x 50	*35*	*35*	*24*	*20*	*17*
3 x 2	500	500	350	300	250
80 x 50	*35*	*35*	*24*	*20*	*17*
3 x 2½	500	500	350	300	250
80 x 65	*35*	*35*	*24*	*20*	*17*
4 x 2	500	500	350	300	250
100 x 50	*35*	*35*	*24*	*20*	*17*
4 x 2 ½	500	500	350	300	200
100 x 65	*35*	*35*	*24*	*20*	*14*
4 x 2 ½	500	500	350	300	200
100 x 65	*35*	*35*	*24*	*20*	*14*
4 x 3	500	500	300	250	200
100 x 80	*35*	*35*	*20*	*17*	*14*
5 x 4	400	400	300	250	NR
125 x 100	*28*	*28*	*20*	*17*	
5 x 4	400	400	300	250	NR
125 x 100	*28*	*28*	*20*	*17*	
6 x 3	400	400	300	200	NR
150 x 80	*28*	*28*	*20*	*14*	
6 x 3	400	400	300	200	NR
150 x 80	*28*	*28*	*20*	*14*	
6 x 4	400	400	300	175	NR
150 x 100	*28*	*28*	*20*	*12*	
6 x 4	400	400	300	175	NR
150 x 100	*28*	*28*	*20*	*12*	
8 x 6	400	400	300	175	NR
200 x 150	*28*	*28*	*20*	*12*	
8 x 6	400	400	300	175	NR
200 x 150	*28*	*28*	*20*	*12*	

Flow Data

The pressure drop or head loss across Model 7706 Reducing Coupling is small and less than that of the same size of concentric reducer. Equivalent lengths of sch. 40 steel pipe (new pipe) for water 60°F (16°C) are shown in the table.

Equivalent Length of Sch. 40 steel pipe for water 60°F (16°C)

Model 7706 Reducing Coupling			
Size	Equivalent Length	Size	Equivalent Length
in	feet	in	feet
mm	*m*	*mm*	*m*
1½ x 1¼	1.6	4 x 2½	4.9
40 x 32	*0.5*	*100 x 65*	*1.5*
2 x 1	3.9	4 x 3	3.6
50 x 25	*1.2*	*100 x 80*	*1.1*
2 x 1½	2.0	5 x 4	3.0
50 x 40	*0.6*	*125 x 100*	*0.9*
2½ x 2	2.0	6 x 3	7.9
65 x 50	*0.6*	*150 x 80*	*2.4*
3 x 2	3.9	6 x 4	5.9
80 x 50	*1.2*	*150 x100*	*1.8*
3 x 2½	2.3	6 x 5	4.5
80 x 65	*0.7*	*150 x 125*	*1.37*
4 x 2	6.2	8 x 6	7.2
100 x 50	*1.9*	*200 x 150*	*2.2*

MATERIAL SPECIFICATIONS

• Housing:

Ductile Iron to ASTM A536, Gr. 65-45-12 and or ASTM A395, Gr. 65-45-15, min. tensile strength 65,000 psi (448 MPa).

• Surface Finish:

Standard painted finishes in orange or RAL3000 red.

☐ Hot dip zinc galvanized (Option)

☐ Epoxy Coatings in RAL3000 red or other colors (Option)

• Rubber Gasket:

Grade "E" EPDM (Color code: Green stripe) Good for cold & hot water up to +230ºF (+110ºC). Also good for services for water with acid, water with chlorine, deionized water, seawater and waste water, dilute acids, oil-free air and many chemicals.
Not recommended for petroleum oils, minerals oils, solvents and aromatic hydrocarbons.
Maximum Temperature Range: -30ºF (-34ºC) to +230ºF (+110ºC)*.
*EPDM gaskets for water services are not recommended for steam services unless couplings or components are accessible for frequent gasket replacement.

☐ (Option) Grade "T" Nitrile (Color code: Orange stripe) Recommended for petroleum products, air with oil vapors, vegetable and mineral oils within the specified temperature range. Also good for water services under +150ºF (+66ºC).
Temperature range: -20 ºF to +180 ºF (-29 ºC to +82 ºC).
Do not use for HOT WATER above +150 ºF (+66 ºC) or HOT DRY AIR above +140 ºF (+60 ºC)

☐ Other options: Grade "O" - Fluoroelastomer.
Grade "L" - Silicone.
For additional details contact *Shurjoint*.

• Bolts & Nuts:

Heat treated carbon manganese steel track bolts to ASTM A449-83a (or A183 Gr. 2), minimum tensile strength 110,000 psi (758 MPa), Zinc electroplated, with heavy-duty hexagonal nuts to ASTM A563.

LISTINGS/APPROVALS

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

Standard Pipe **Specialty Pipe**

Nom. Size	cULus / FM		VdS	LPCB	cULus	FM
in *mm*	Sch. 10 *PSI/Bar*	Sch. 40 *PSI/Bar*	 *Bar*	 *PSI/Bar*	BS1387(M) *PSI/Bar*	 *PSI/Bar*
2×1½ *50 x 40*	300 *20*	300 *20*	16	300 *20*	N/A	300 *20*
2½×2 *65 x 50*	300 *20*	300 *20*	N/A	N/A	N/A	300 *20*
76.1 mm×2 *65 x 50*	300 *20*	300 *20*	16	300 *20*	300 *20*	300 *20*
76.1 mm×3 *65 x 80*	N/A	N/A	N/A	N/A	300 *20*	N/A
3×2 *80 x 50*	300 *20*	300 *20*	16	300 *20*	300 *20*	300 *20*
3×2½ *80 x 65*	300 *20*	300 *20*	N/A	N/A	300 *20*	300 *20*
3×76.1 mm *80 x 65*	N/A	300 *20*	16	300 *20*	N/A	300 *20*
4×2 *100 x 50*	300 *20*	300 *20*	16	300 *20*	N/A	300 *20*
4×2½ *100 x 65*	300 *20*	300 *20*	N/A	N/A	300 *20*	300 *20*
4x76.1 mm *100 x 65*	300 *20*	300 *20*	16	300 *20*	N/A	300 *20*
4x3 *100 x 80*	300 *20*	300 *20*	16	300 *20*	300 *20*	300 *20*
5×4 *125 x 100*	N/A	300 *20*	N/A	N/A	N/A	300 *20*
139.7 mm×4 *125 x 100*	N/A	300 *20*	N/A	N/A	N/A	300 *20*
165.1 mm×3 *150 x 80*	N/A	300 *20*	N/A	N/A	N/A	300 *20*
6x3 *150 x 80*	300 *20*	300 *20*	N/A	N/A	N/A	300 *20*
165.1 mm×4 *150 x 100*	300 *20*	300 *20*	N/A	300 *20*	300 *20*	300 *20*
6x4 *150 x 100*	300 *20*	300 *20*	N/A	N/A	N/A	300 *20*
8×165.1 mm *200 x 150*	N/A	300 *20*	N/A	300 *20*	N/A	300 *20*
8x6 *200 x 150*	300 *20*	300 *20*	N/A	N/A	N/A	300 *20*

General Notes:

- *ASME/ANSI Pressure-Temperature Rating* is provided as an aid in selecting a proper coupling to incorporate with other piping components (valves, flanges, and etc.) that are used in the same system and carry the ASME/ANSI rating. Select a Class 150 coupling to incorporate with Class 150 valves and flanges.
- *Maximum Working Pressure (CWP)* listed is the maximum cold water pressure for general piping services tested to ASTM F1476 and or AWWA C606 methods. Figures listed are based on roll- or cut-grooved standard wall carbon steel pipe. For other pipe schedules or pipe materials, contact *Shurjoint* for additional information.
- *Max. End Load* is calculated based on the maximum working pressure (CWP).
- *Listed and or Approved Pressures* are pressure ratings for fire protection systems, tested and approved by various approval bodies. Please always refer to the latest approval data posted on the *Shurjoint* website.
- *Field Joint Test:* For one time only the system may be tested hydrostatically at 1½ times the maximum working pressure listed (AWWA C606 5.2.3).
- *Warning:* Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- *The 10 Year Limited Warranty* applies to manufacturing defects only and does not cover severe service/temperature applications or wear parts.
- *Shurjoint* reserves the right to change specifications, designs and or standard without notice and without incurring any obligations.

Job Name:	System No.	Location:
Contractor:	Approved:	Date:
Engineer:	Approved:	Date:

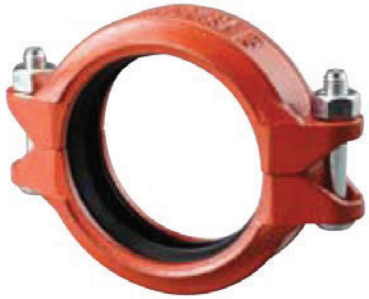
MODEL 7705 STANDARD FLEXIBLE COUPLING

The Model 7705 Standard Flexible Coupling is a standard flexible coupling for use in a variety of general piping applications of moderate pressure services. The model 7705 couplings features flexibility that can deal with misalignment, distortion, thermal stress, vibration and noise and also resist seismic tremors. With the use of Model 7705 couplings you can even design a curved layout. See Typical Applications – Flexible Couplings on ***Shurjoint*** cut sheet #B-19.

All Model 7705 couplings are comprised of two identical ductile iron housings segments, EPDM rubber gasket and plated track bolts & nuts. Housings segments are supplied with our standard painted finishes, i.e. orange or RAL3000 red. Optional finishes such as hot dipped zinc galvanized and custom epoxy coatings are available.

7705 couplings should always be installed so that the coupling bolt pads make metal to metal contact.

For Fire Protection pressure rating, listing, and approval information, refer to page 3 or visit Shurjoint website, www.shurjoint.com for details or contact your SHURJOINT Representative.

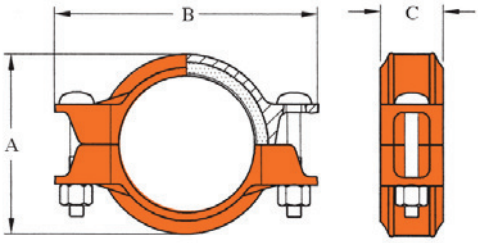


Pressure-Temperature Rating

Nom. Rating	Working Pressure	Max. Service Temperature
Class 150	300 psi @100°F *20 Bar @38°C*	EPDM: 230°F / 110°C Nitrile: 180°F / 82°C

*Working pressure is based on roll- or cut-grooved standard wall carbon steel pipe.
*Proof test pressure: 1.5 times the working pressure, non-shock cold water.
*Burst pressure is engineered minimum 3 times the working pressure

MODEL 7705 STANDARD FLEXIBLE COUPLING



10 YEAR LIMITED WARRANTY

Full warranty terms can be found on www.shurjoint.com

Model 7705 Standard Flexible Coupling

Nom. Size	Pipe O.D.	Max. Working Pressure	Max. End Load	Axial Displace-ment	Angular Movement		Dimensions			Bolt Size	Weight
					Deg. Per Coupling	Per Pipe	A	B	C		
mm *in*	mm *in*	Bar *PSI*	kN *Lbs*	mm *in*	(°)	mm/m *in/ft*	mm *in*	mm *in*	mm *in*	mm *in*	Kgs *Lbs*
25 *1*	33.7 *1.315*	20 *300*	1.75 *410*	1.6 *0.0625*	5° - 30'	96 *1.16*	57 *2.24*	100 *3.94*	46 *1.81*	M10 x 45 *⅜ x 1¾*	0.6 *1.3*
32 *1¼*	42.4 *1.660*	20 *300*	2.80 *650*	1.6 *0.0625*	4° - 20'	76 *0.91*	66 *2.60*	103 *4.06*	46 *1.81*	M10 x 55 *⅜ x 2⅛*	0.7 *1.5*
40 *1½*	48.3 *1.900*	20 *300*	3.66 *850*	1.6 *0.0625*	3° - 48'	66 *0.80*	72 *2.83*	108 *4.25*	46 *1.81*	M10 x 55 *⅜ x 2⅛*	0.7 *1.6*
50 *2*	60.3 *2.375*	20 *300*	5.71 *1330*	1.6 *0.0625*	3° - 01'	53 *0.63*	84 *3.31*	129 *5.08*	48 *1.89*	M10 x 55 *⅜ x 2⅛*	0.8 *1.8*
65 *2½*	73.0 *2.875*	20 *300*	8.37 *1950*	1.6 *0.0625*	2° - 30'	44 *0.52*	99 *3.90*	142 *5.59*	48 *1.89*	M10 x 55 *⅜ x 2⅛*	0.9 *2.0*
76.1mm	76.1 *3.000*	20 *300*	9.09 *2120*	1.6 *0.0625*	2° - 24'	42 *0.50*	102 *4.02*	147 *5.79*	48 *1.89*	M10 x 55 *⅜ x 2⅛*	1.0 *2.1*
80 *3*	88.9 *3.500*	20 *300*	12.41 *2880*	1.6 *0.0625*	2° - 04'	36 *0.43*	116 *4.57*	169 *6.65*	48 *1.89*	M12 x 75 *½ x 3*	1.3 *2.8*
101.6 mm	101.6 *4.000*	20 *300*	16.21 *3770*	1.6 *0.0625*	1° - 48'	31 *0.38*	129 *5.07*	200 *7.90*	52 *2.05*	M12 x 75 *½ x 3*	1.6 *3.6*

Model 7705 Standard Flexible Coupling

Nom. Size	Pipe O.D.	Max. Working Pressure	Max. End Load	Axial Displace-ment	Angular Movement		Dimensions			Bolt Size	Weight
					Deg. Per Coupling	Per Pipe	A	B	C		
mm in	mm in	Bar PSI	kN Lbs	mm in	(°)	mm/m in/ft	mm in	mm in	mm in	mm in	Kgs Lbs
108.0 mm	108.0 4.250	20 300	18.31 4250	3.2 0.125	3° - 24'	59 0.71	138 5.43	192 7.56	52 2.05	M12 x 75 ½ x 3	1.9 4.1
100 4	114.3 4.500	20 300	20.51 4770	3.2 0.125	3° - 12'	55 0.67	145 5.71	197 7.76	52 2.05	M12 x 75 ½ x 3	1.9 4.1
133.0 mm	133.0 5.250	20 300	27.77 6460	3.2 0.125	2° - 46'	48 0.58	165 6.50	231 9.09	52 2.05	M16 x 90 5/8 x 3-1/2	2.3 5.1
139.7 mm	139.7 5.500	20 300	30.64 7120	3.2 0.125	2° - 37'	46 0.55	170 6.69	233 9.17	52 2.05	M16 x 90 ⅝ x 3½	2.6 5.7
125 5	141.3 5.563	20 300	31.35 7290	3.2 0.125	2° - 36'	45 0.54	172 6.77	234 9.21	52 2.05	M16 x 90 ⅝ x 3½	2.7 5.9
159.0 mm	159.0 6.250	20 300	39.69 9200	3.2 0.125	2° - 18'	40 0.48	190 7.48	253 9.96	54 2.13	M16 x 90 ⅝ x 3½	2.7 5.9
165.1 mm	165.1 6.500	20 300	42.80 9950	3.2 0.125	2° - 14'	39 0.47	196 7.72	261 10.28	54 2.13	M16 x 90 ⅝ x 3½	3.1 6.8
150 6	168.3 6.625	20 300	44.47 10340	3.2 0.125	2° - 10'	38 0.45	200 7.87	268 10.55	62 2.44	M16 x 90 ⅝ x 3½	3.2 7.0
200 8	219.1 8.625	20 300	75.37 17520	3.2 0.125	1° - 40'	28 0.35	260 10.24	350 13.78	64 2.52	M16 x 90 ⅝ x 3½	5.8 12.8
200 (7705H) 8	219.1 8.625	20 300	75.37 17520	3.2 0.125	1° - 40'	29 0.35	266 10.47	343 13.50	63 2.48	M20 x 120 ¾ x 4¾	7.1 15.7
250 10	273.0 10.750	20 300	117.01 27210	3.2 0.125	1° - 20'	23 0.28	343 13.50	425 16.73	64 2.52	M20 x 120 ¾ x 4¾	8.2 18.0
300 12	323.9 12.750	20 300	164.71 38280	3.2 0.125	1° - 08'	20 0.24	390 15.35	467 18.39	64 2.52	--- ⅛ x 6½	10.8 23.8
200 JIS	216.3 8.516	20 300	73.45 17080	3.2 0.125	1° - 42'	30 0.36	254 10.00	348 13.70	62 2.44	M20 x 120 ¾ x 4¾	5.8 12.8
250 JIS	267.4 10.528	20 300	112.26 26100	3.2 0.125	1° - 22'	24 0.29	337 13.27	420 16.54	64 2.52	M20 x 120 ¾ x 4¾	8.0 17.6
300 JIS	318.5 12.539	20 300	159.26 37030	3.2 0.125	1° - 10'	20 0.25	389 15.31	478 18.81	64 2.52	--- ⅛ x 6½	10.3 22.6

*Deflection or angular movement is the ma16ximum value that a coupling allows under no internal pressure.
All DIN size 7705 couplings up to DN150 size and the DN200 7705H coupling are VdS approved in addition to cULus and FM approvals.

MATERIAL SPECIFICATIONS

• Housing:

Ductile Iron to ASTM A536, Gr. 65-45-12 and or ASTM A395 Gr.65-45-15, min. tensile strength 448MPa (65,000 psi).

• Surface Finish:

Standard painted finishes in orange or RAL3000 red.

- ☐ Hot dip zinc galvanized (Option).
- ☐ Epoxy Coatings in RAL3000 red or other colors (Option)

• Rubber Gasket:

To assure maximum life for the service intended, proper gasket selection and specification in ordering is essential. Failure to select the proper gasket compound may result in personal injury, property damage, joint leakage or joint failure.

Grade "E" EPDM(Color code: Green stripe) Good for cold & hot water up to +230°F (+110°C). Also good for services for water with acid, water with chlorine, deionized water, seawater and waste water, dilute acids, oil-free air and many chemicals. Not recommended for petroleum oils, minerals oils, solvents and aromatic hydrocarbons.

Maximum Temperature Range: -30°F (-34°C) to +230°F (+110°C)

- ☐ (Option) **Grade "T" Nitrile** (Color code: Orange stripe) Recommended for petroleum products, air with oil vapors, vegetable and mineral oils within the specified temperature range. Also good for water services under +66°C (+150°F).
  Temperature range: -29 °C to +82 °C (-20 °F to +180 °F).
  Do not use for HOT WATER above +66°C (+150°F) or HOT DRY AIR above +60°C (+140°F)

- ☐ Other options: Grade "O" - Fluoroelastomer.
  Grade "L" - Silicone.
  For additional details contact ***Shurjoint***

• Bolts & Nuts:

Heat treated carbon manganese steel track bolts to ASTM A449-83a (or A183 Gr. 2), minimum tensile strength 758 MPa (110,000 psi), Zinc electroplated, with heavy-duty hexagonal nuts to ASTM A563.

LISTINGS/APPROVALS

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

Standard Pipe

Nom. Size	cULus Sch. 5	cULus/FM Sch. 10/40	VdS	LPCB	Nom. Size	cULus/FM Sch. 10/40	VdS	LPCB	Nom. Size	VdS
mm / in	Bar /psi	Bar / psi	bar	Bar /psi	mm / in	Bar / psi	bar	Bar /psi	mm / in	bar
25 *1"*		20 *300*	16	-	125 *5½"OD*	20 *300*	16	20 *300*	108.0mm	16
32 *1¼"*	12 *175*	20 *300*	16	-	125 *5"*	20 *300*	-	-	133.0mm	16
40 *1½"*	12 *175*	20 *300*	16	-	150 *6½"OD*	20 *300*	-	20 *300*	159.0mm	16
50 *2"*	12 *175*	20 *300*	16	20 *300*	150 *6"*	20 *300*	16	-		
65 2½"	12 *175*	20 *300*	-	-	200 *8"*	20 *300*	-	20 *300*		
65 *3"OD*	12 *175*	20 *300*	16	20 *300*	250 *10"*	12 *175*	-	-		
80 *3"*	12 *175*	20 *300*	16	20 *300*	300 *12"*	12 *175*	-	-		
100 *4"*	-	20 *300*	16	20 *300*	(7705H) 200 (8")	31 *450*	16	-		

Specialty Pipe

Pipe	Size	Pressure Rating		Pipe	Size	Pressure Rating	Pipe	Size	Pressure Rating
Sch.	in	cULus psi	FM psi	Sch.	in	cULus psi	Sch.	in	FM psi
BS1387(M)	1¼"~6"	*300*	*300*	XL	1¼"~4"	*300*	Fire-Thread	1" ~ 2"	*300*
DF/SF*	1"~4"	*300*	*300*	FLF	1¼"~4"	*175*	FF	1¼" ~ 1½"	*300*
DF*	1¼"~4"	*300*	*300*	Sch.30	12"	*175*	WST	1" ~ 2"	*175*
EF	1½"~4"	*175*	*300*	Sch. 10	10"	*175*	Ultra Eddy	1" ~ 2"	*175*
EF*	1¼"~3"	*175*	*175*	FLT	1"~1½"	*300*	TL	1" ~ 2"	*300*
EL	1¼"~2"	*300*	*300*	SPS	1¼"~3"	*175*	WST	1" ~ 2"	*300*
XL-II	1"~4"	*300*	*300*	BLT	1" ~ 2"	*300*	Su40/SuXL*	1" ~ 3"	*300*

DF/SF: 1" cULus listing is not applicable.
EF: 4" cULus listing is not applicable
EL: 1" cULus listing is not applicable.

XL-II: 1" cULus listing & 4" FM approval are not applicable
Su40/SuXL 2-1/2" FM approval is not applicable

5 refers to Listed Schedule 5 steel pipe. 30 refers to Schedule 30 steel pipe.
BS1387(M) refers to British Standard Medium steel pipe.
DF refers to Listed DYNA-FLOW steel pipe manufactured by Allied Tube & Conduit Corp.
SF refers to Listed Super-Flo steel pipe manufactured by Allied Tube & Conduit Corp.
EF refers to Listed EDDY FLOW steel pipe manufactured by Bull Moose Tube Co.
EL refers to Listed EDDYLITE steel pipe manufactured by Bull Moose Tube Co.
XL, XL-II refers to Listed XL, XL-II steel pipe manufactured by Allied Tube & Conduit Corp.
FLF refers to Listed Fire-Line Flow steel pipe manufactured by Western International Forest Products Inc.
SPS refers to Listed SPS Flow steel pipe manufactured by Yieh Phui Enterprise Co Ltd
BLT refers to Listed BLT steel pipe manufactured by Allied Tube & Conduit Corp
FF refers to Listed Fire-Flo steel pipe manufactured by Youngstown Tube Co
Ultra Eddy steel pipe manufactured by Bull Moose Tube Co.
TL steel pipe manufactured by Central
WST refers to Listed WST steel pipe manufactured by Wheatland Tube Co
Su40, SuXL refers to Listed Super XL, Super 40 steel pipe manufactured by Allied Tube & Conduit Corp.

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606 (latest version) specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1½ times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

Shurjoint *product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact* ***Shurjoint*** *Technical Service.* ***Shurjoint*** *reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligations to make such changes and modifications on* ***Shurjoint*** *products previously subsequently sold.*

MODELS 7110 90° ELBOW, REGULAR RADIUS
7111 45° ELBOW, REGULAR RADIUS
7112 22½° ELBOW
7113 11¼° ELBOW

Shurjoint grooved-end elbows are made of ductile iron per ASTM A536 Gr. 65-45-12 and or ASTM A395 Gr. 65-45-15. C-E dimensions are manufacturer's standard.

For sizes larger than 14" (350 mm) are fabricated from standard weight (0.375" or 9.5 mm) carbon steel pipe to ASTM A234 GR. WPB or segmentally welded with carbon steel of the same or equivalent grade. C-E dimensions conform to ANSI B16.9.

Shurjoint standard fitting pressure ratings conform to the ratings of Model 7707 couplings.

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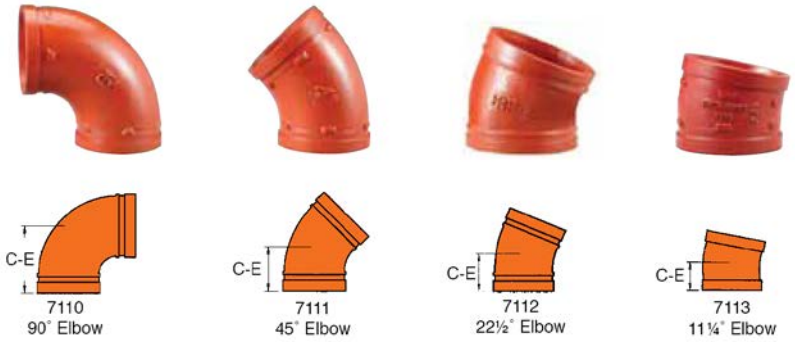
For Fire Protection pressure rating, listing, and approval information, refer to Data Sheet B-42 or visit ***SHURJOINT*** website, www.shurjoint.com for details or contact your ***SHURJOINT*** Representative.



10 YEAR LIMITED WARRANTY

Full warranty terms can be found on www.shurjoint.com

Models 7110 / 7111 / 7112 / 7113 Elbows

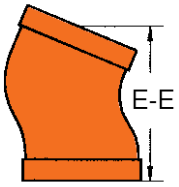
Nominal Pipe Size	Pipe O.D.	#7110 90° Elbows C-E	#7110 90° Elbows Weight	#7111 45° Elbows C-E	#7111 45° Elbows Weight	7112 22½° Elbows C-E	7112 22½° Elbows Weight	#7113 11¼° Elbows C-E	#7113 11¼° Elbows Weight
in *mm*	in *mm*	in *mm*	Lbs *Kgs*	in *mm*	Lbs *Kgs*	in *mm*	Lbs *Kgs*	in *mm*	Lbs *Kgs*
1 *25*	1.315 *33.4*	2.25 *57*	0.7 *0.3*	1.75 *45*	0.5 *0.2*	--- *---*	--- *---*	1.38 *35*	0.4 *0.2*
1¼ *32*	1.660 *42.2*	2.75 *70*	1.1 *0.5*	1.75 *45*	0.7 *0.3*	1.75 *45*	0.7 *0.3*	1.38 *35*	0.7 *0.3*
1½ *40*	1.900 *48.3*	2.75 *70*	1.3 *0.6*	1.75 *45*	0.9 *0.4*	1.75 *45*	1.1 *0.5*	1.38 *35*	0.7 *0.3*
2 *50*	2.375 *60.3*	3.25 *83*	2.0 *0.9*	2.00 *51*	1.5 *0.7*	1.88 *48*	1.6 *0.7*	1.38 *35*	1.0 *0.4*
2½ *65*	2.875 *73.0*	3.75 *95*	2.6 *1.2*	2.25 *57*	2.1 *0.9*	2.01 *51*	2.6 *1.2*	1.50 *38*	1.6 *0.7*
76.1 mm	3.000 *76.1*	3.75 *95*	3.1 *1.4*	2.25 *57*	2.1 *0.9*	2.01 *51*	2.5 *1.1*	1.50 *38*	1.7 *0.8*
3 *80*	3.500 *88.9*	4.25 *108*	4.3 *2.0*	2.50 *64*	2.9 *1.3*	2.25 *57*	3.1 *1.4*	1.50 *38*	1.8 *0.8*
101.6 mm	4.000 *101.6*	4.50 *114*	5.5 *2.5*	--- *---*	--- *---*	--- *---*	--- *---*	--- *---*	--- *---*
108.0 mm	4.250 *108.0*	5.00 *127*	5.5 *2.5*	3.00 *76*	4.4 *2.0*	--- *---*	--- *---*	--- *---*	--- *---*
4 *100*	4.500 *114.3*	5.00 *127*	6.9 *3.1*	3.00 *76*	4.4 *2.0*	2.88 *73*	4.4 *2.0*	1.75 *45*	2.2 *1.0*
133.0 mm	5.250 *133.0*	5.50 *140*	9.0 *4.1*	3.25 *83*	5.9 *2.7*	--- *---*	--- *---*	--- *---*	--- *---*
139.7 mm	5.500 *139.7*	5.50 *140*	9.5 *4.3*	3.25 *83*	6.4 *2.9*	2.88 *73*	6.5 *2.9*	2.00 *51*	4.5 *2.0*
5 *125*	5.563 *141.3*	5.50 *140*	11.0 *5.0*	3.25 *83*	6.6 *3.0*	2.88 *73*	6.8 *3.1*	2.00 *51*	4.5 *2.1*
159.0 mm	6.250 *159.0*	6.50 *165*	13.2 *6.0*	3.50 *89*	8.4 *3.8*	--- *---*	--- *---*	--- *---*	--- *---*

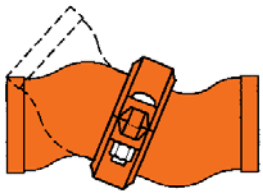
Models 7110 / 7111 / 7112 / 7113 Elbows

Nominal Pipe Size	Pipe O.D.	#7110 90° Elbows C-E	#7110 90° Elbows Weight	#7111 45° Elbows C-E	#7111 45° Elbows Weight	7112 22½° Elbows C-E	7112 22½° Elbows Weight	#7113 11¼° Elbows C-E	#7113 11¼° Elbows Weight
in *mm*	in *mm*	in *mm*	Lbs *Kgs*	in *mm*	Lbs *Kgs*	in *mm*	Lbs *Kgs*	in *mm*	Lbs *Kgs*
165.1 mm	6.500 *165.1*	6.50 *165*	12.5 *5.7*	3.50 *89*	8.9 *4.0*	3.12 *79*	10.7 *4.9*	2.00 *51*	5.5 *2.5*
6 *150*	6.625 *168.3*	6.50 *165*	12.8 *5.8*	3.50 *89*	8.9 *4.0*	3.12 *79*	9.3 *4.2*	2.00 *51*	5.5 *2.5*
8 *200*	8.625 *219.1*	7.75 *197*	28.7 *13.0*	4.25 *108*	19.0 *8.6*	3.88 *98*	17.8 *8.1*	2.00 *51*	10.1 *4.6*
10 *250*	10.750 *273.0*	9.00 *229*	53.1 *24.1*	4.75 *121*	34.2 *15.5*	4.38 *111*	39.0 *17.7*	2.13 *54*	22.1 *10.0*
12 *300*	12.750 *323.9*	10.00 *254*	81.0 *36.7*	5.25 *133*	49.5 *22.5*	4.88 *124*	43.0 *19.5*	2.25 *57*	27.3 *12.4*
200 JIS	8.516 *216.3*	7.75 *197*	27.2 *12.4*	4.25 *108*	18.5 *8.4*	3.88 *98*	13.9 *6.3*	2.00 *51*	9.3 *4.2*
250 JIS	10.528 *267.4*	9.00 *229*	52.8 *24.0*	4.75 *121*	34.2 *15.5*	4.38 *111*	22.5 *10.2*	2.13 *54*	22.1 *10.0*
300 JIS	12.539 *318.5*	10.00 *254*	77.0 *35.0*	5.25 *133*	49.5 *22.5*	4.88 *124*	33.7 *15.3*	2.25 *57*	27.3 *12.4*
14 *350*	14.000 *355.6*	11.00 *280*	77.5 *35.2*	6.00 *152*	48.4 *22.0*	--- ---	--- ---	--- ---	--- ---
16 *400*	16.000 *406.4*	12.00 *305*	94.6 *43.0*	7.25 *184*	96.8 *44.0*	--- ---	--- ---	--- ---	--- ---
18 *450*	18.000 *457.2*	15.50 *394*	184.0 *83.5*	8.00 *203*	102.5 *46.6*	--- ---	--- ---	--- ---	--- ---
20 *500*	20.000 *508.0*	17.25 *438*	261.2 *118.5*	9.00 *229*	120.2 *54.5*	--- ---	--- ---	--- ---	--- ---
24 *600*	24.000 *609.6*	20.00 *508*	407.9 *185.0*	11.00 *280*	184.1 *83.5*	--- ---	--- ---	--- ---	--- ---

MODEL 7112G 22½° ELBOW, Goose Neck Design

Two model 7112G elbows in combination with a coupling will serve as a universal joint and is ideal for instances where a pipe line is in need of a slight adjustment during make-up.





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For Fire Protection pressure rating, listing, and approval information, refer to Data Sheet B-42 or visit Shurjoint website, www.shurjoint.com for details or contact your ***SHURJOINT*** Representative.

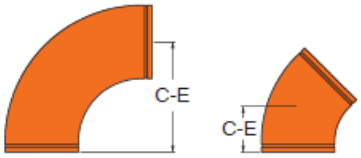
Model 7112G 22½° Elbow, Goose Neck Design

Nominal Pipe Size	Pipe O.D.	7112 22½° Elbows E-E	7112 22½° Elbows Weight
in *mm*	in *mm*	in *mm*	Lbs *Kgs*
1½ *40*	1.900 *48.3*	3.75 *95 G*	1.3 *0.6*
2 *50*	2.375 *60.3*	3.75 *95 G*	1.3 *0.8*
2½ *65*	2.875 *73.0*	4.00 *102 G*	2.2 *1.0*
76.1 mm	3.000 *76.1*	4.00 *102 G*	2.2 *1.0*
3 *80*	3.500 *88.9*	4.50 *114 G*	3.1 *1.4*
4 *100*	4.500 *114.3*	5.00 *127 G*	4.4 *2.0*
139.7 mm	5.500 *139.7*	5.00 *127 G*	6.5 *2.9*
5 *125*	5.563 *141.3*	5.00 *127 G*	6.8 *3.0*
165.1 mm	6.500 *165.1*	6.25 *159 G*	11.0 *5.0*
6 *150*	6.625 *168.3*	6.25 *159 G*	11.0 *5.0*
8 *200*	8.625 *219.1*	7.75 *197 G*	22.0 *10.0*
200 JIS	8.516 *216.3*	7.75 *197 G*	19.2 *8.8*

WROUGHT STEEL GROOVED END FITTINGS

MODELS W110LR 90° ELBOW, LONG RADIUS
W111LR 45° ELBOW, LONG RADIUS

Material: ASTM A234 Gr. WPB, Standard weight (0.375" or 9.5mm), or carbon steel of the same or equivalent grade.
C-E dimensions: conform to ANSI B16.9.



W110LR W111LR

Models W110LR / W111LR Wrought Steel Elbows

Nominal Pipe Size	Pipe O.D.	W110LR 90° L/R Elbows C-E	W110LR 90° L/R Elbows Weight	W111LR 45° Elbows C-E	W111LR 45° Elbows Weight	Nominal Pipe Size	Pipe O.D.	W110LR 90° L/R Elbows C-E	W110LR 90° L/R Elbows Weight	W111LR 45° Elbows C-E	W111LR 45° Elbows Weight
in *mm*	in *mm*	in *mm*	Lbs *Kgs*	in *mm*	Lbs *Kgs*	in *mm*	in *mm*	in *mm*	Lbs *Kgs*	in *mm*	Lbs *Kgs*
14 *350*	14.000 *355.6*	21.00 *533.4*	149.4 *67.9*	8.75 *222.3*	74.8 *34.0*	28 *700*	28.000 *711.0*	42.00 *1066.8*	120.1 *264.7*	17.25 *438.2*	59.9 *132.1*
16 *400*	16.000 *406.4*	24.00 *609.6*	195.8 *89.0*	10.00 *254.0*	98.1 *44.6*	30 *750*	30.000 *762.0*	45.00 *1143.0*	137.7 *303.6*	18.50 *469.9*	68.8 *151.6*
18 *450*	18.000 *457.2*	27.00 *685.8*	248.6 *113.0*	11.25 *285.5*	124.3 *56.5*	32 *800*	32.000 *812.8*	48.00 *1219.2*	156.5 *345.1*	19.75 *501.7*	78.2 *172.4*
20 *500*	20.000 *508.0*	30.00 *762.0*	308.0 *140.0*	12.50 *317.5*	154.0 *70.0*	34 *850*	34.000 *863.6*	51.00 *1295.4*	176.6 *389.3*	21.00 *533.4*	88.2 *194.6*
22 *550*	22.000 *558.8*	33.00 *838.2*	371.8 *169.0*	13.50 *342.9*	187.0 *85.0*	36 *900*	36.000 *914.4*	54.00 *1371.6*	197.8 *436.1*	22.25 *565.2*	98.9 *218.1*
24 *600*	24.000 *609.6*	36.00 *914.4*	444.4 *202.0*	15.00 *381.0*	222.2 *101.0*	40 *1000*	40.000 *1016.0*	60.00 *1524.0*	244.2 *538.4*	24.88 *632.0*	122.7 *270.6*
26 *650*	26.000 *660.4*	39.00 *990.6*	103.6 *228.5*	16.00 *406.4*	51.7 *114.0*	42 *1050*	42.000 *1066.8*	63.00 *1600.2*	269.1 *593.2*	26.00 *660.4*	134.6 *296.7*

MATERIAL SPECIFICATIONS

• Fitting body:

Ductile Iron castings to ASTM A536, Gr. 65-45-12 and or to ASTM A395, Gr. 65-45-15, min. tensile strength 65,000 psi (448 MPa).

Wrought fittings to ASTM A234 Gr. WPB, standard weight (0.375" or 9.5mm), or segmentally welded carbon steel of the same or equivalent grade.

• Surface Finish:

Orange color painted or red RAL3000 color painted.

- ☐ Hot dip galvanized (Option).
- ☐ Epoxy coated in red RAL3000 or other colors (Option)

General Notes:

- *Pressure Ratings* for fittings conform to the working pressure of the coupling used to join the system.
- *Listed and or Approved Pressures* are pressure ratings for fire protection systems, tested and approved by various approval bodies. Please always refer to the latest approval data posted on the *Shurjoint* website.
- *Field Joint Test:* For one time only the system may be tested hydrostatically at 1½ times the maximum working pressure listed (AWWA C606 5.2.3).
- *Warning:* Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- *The 10 Year Limited Warranty* applies to manufacturing defects only and does not cover severe service/temperature applications or wear parts.
- *Shurjoint* reserves the right to change specifications, designs and or standard without notice and without incurring any obligations.

Job Name:	System No.	Location:
Contractor:	Approved:	Date:
Engineer:	Approved:	Date:

Shurjoint *product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact* ***Shurjoint*** *Technical Service.* ***Shurjoint*** *reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligations to make such changes and modifications on* ***Shurjoint*** *products previously subsequently sold.*

MODEL 901 SHORT RADIUS 90° ELBOW
903 SHORT RADIUS TEE

Shurjoint short radius fittings, while primarily designed for fire protection applications, can also be used for general service requirements. The Model K-9 and Z05 rigid couplings can be used with short radius fittings without the worry of bolt pad interference.

Shurjoint grooved-end fittings are made of ductile iron per ASTM A536 Gr. 65-45-12 and or ASTM A395 Gr. 65-45-15. C-E dimensions are manufacturer's standard.

Pressure-Temperature Rating

Size	Nom. Rating	Working Pressure (STD, Roll-grooved)	Max. Service Temperature
1" – 6" 25 - 150	Class 300	750 psi @100°F 52 Bar @38°C	EPDM: 230°F / 110°C Nitrile: 180°F / 82°C
8" 200	Class 250	400 psi @100°F 28 Bar @38°C	

*Working pressure is based on connection with roll- or cut-grooved standard wall carbon steel pipe.
*Proof test pressure: 1.5 times the working pressure, non-shock cold water.
*Burst pressure is engineered minimum 3 times the working pressure.

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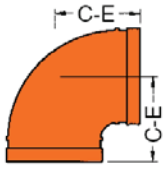
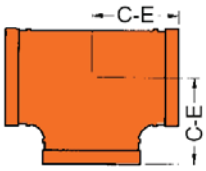
For Fire Protection pressure rating, listing, and approval information, visit Shurjoint website, www.shurjoint.com for details or contact your SHURJOINT Representative.

10 YEAR LIMITED WARRANTY

Full warranty terms can be found on www.shurjoint.com

MODEL 901 SHORT RADIUS 90° ELBOW
903 SHORT RADIUS TEE





Models 901 / 903					
Nominal Pipe Size	Pipe OD	901 SR 90° Elbow		903 SR Straight Tee	
mm *in*	mm *in*	C-E mm/*in*	Kgs *Lbs*	C-E mm/*in*	Kgs *Lbs*
50 *2*	60.3 *2.375*	70 *2.75*	0.7 *1.5*	70 *2.75*	1.0 *2.2*
65 *2½*	73.0 *2.875*	76 *3.00*	0.9 *2.0*	76 *3.00*	1.3 *2.9*
65 *2½*	76.1 *3.000*	76 *3.00*	1.1 *2.5*	76 *3.00*	1.3 *2.9*
80 *3*	88.9 *3.500*	86 *3.38*	1.4 *3.1*	86 *3.38*	2.0 *4.4*
100 *4*	114.3 *4.500*	102 *4.00*	2.2 *4.9*	102 *4.00*	3.6 *7.9*
125 *5*	139.7 *5.500*	124 *4.88*	3.6 *7.9*	124 *4.88*	5.1 *11.1*
125 *5*	141.3 *5.563*	124 *4.88*	3.6 *7.9*	124 *4.88*	4.6 *10.1*
150 *6*	165.1 *6.500*	140 *5.50*	5.9 *12.9*	140 *5.50*	7.5 *16.5*
150 *6*	168.3 *6.625*	140 *5.50*	5.9 *12.9*	140 *5.50*	7.8 *17.2*
200 *8*	219.1 *8.625*	176 *6.94*	10.6 *23.4*	176 *6.94*	16.5 *36.3*

MATERIAL SPECIFICATIONS

• Fitting body:

Ductile Iron to ASTM A536, Gr. 65-45-12 or ASTM A395 Gr. 65-45-15, Min. tensile strength 448MPa (65,000 psi).

• Surface Finish:

Orange color painted or red RAL3000 color painted.

- ☐ (Option) Hot dip galvanized.
- ☐ (Option) Epoxy coated in red RAL3000 or other colors.

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***.
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606 (latest version) specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1-1/2 times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

__Shurjoint__ product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact __Shurjoint__ Technical Service. __Shurjoint__ reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligations to make such changes and modifications on __Shurjoint__ products previously subsequently sold.

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For Fire Protection pressure rating, listing, and approval information, refer to page 4 or visit Shurjoint website, www.shurjoint.com for details or contact your SHURJOINT Representative.

MODEL M22 MECHANICAL TEE, GROOVED-END OUTLET

The ***Shurjoint*** Model M22 features an advanced design and when mounted on hole cut pipe Model M22 pro vides a fast and easy mid-pipe grooved branch outlet. By utilizing the Model M22 you can eliminate the need for welding or the use of multiple fittings. The M22 Mechanical Tee is comprised of upper and lower ductile iron housing segments, a grade "E" EPDM rubber gasket (Model M22 & M21 gaskets are interchangeable) and plated track bolts and nuts. The groove dimensions conform to AWWA C606.

The M22 Mechanical T Mechanical tees are supplied with our standard painted finishes, i.e. orange or RAL3000 red. Optional finishes such as hot dipped *zinc* galvanized and custom epoxy coatings are also available.

Shurjoint mechanical tees: Model M22, M21, 7721 & 7722 can also be used on applicable IPS size HDP pipe. When used in conjunction with HDP pipe the pressure rating would be the lower of the fitting or pipe rating. Please note ***Shurjoint*** mechanical tees are not recommended for use on PVC plastic pipe.

Important Note: Model M22 housing segments are not compatible and should not be used with other ***Shurjoint*** mechanical tee housing segments such as Model 7721 & 7722 mechanical tees.

10 YEAR LIMITED WARRANTY

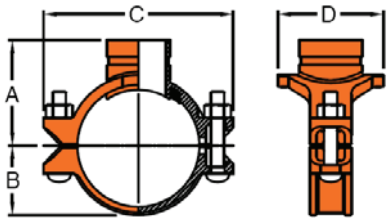
Full warranty terms can be found on www.shurjoint.com

Pressure-Temperature Rating*

Nom. Rating	Working Pressure (STD, Roll-grooved)	Max. Service Temperature
Class 150	300 psi @100°F 20 Bar @38°C	EPDM: 230°F / 110°C Nitrile: 180°F / 82°C

*Working pressure is based on standard wall carbon steel pipe.
*Proof test pressure: 1.5 times the working pressure, non-shock cold water.
*Burst pressure is engineered minimum 3 times the working pressure

MODEL M22 MECHANICAL TEE, GROOVED-END OUTLET



Model M22 Mechanical Tee, Grooved-End Outlet

Nominal Size Run x Branch	Pipe O.D.	Hole Dia. +3.2, -0 / +0.13, -0	Dimensions A	B	C	D	Bolt Size	Weight
mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	Kgs Lbs
50 x 25 2x 1	60.3 x 33.4 2.375x 1.315	38 1.50	73.0 2.87	38.1 1.50	115.9 4.57	81.0 3.19	M10 x 55 3/8x 2-1/8	1.03 2.27
50 x 32 2x 1¼	60.3 x 42.2 2.375x 1.660	[45] [1.75]	76.2 3.00	38.1 1.50	115.9 4.57	84.0 3.31	M10 x 55 3/8x 2-1/8	1.11 2.44
50 x 40 2x 1½	60.3 x 48.3 2.375x 1.900	[45] [1.75]	76.2 3.00	38.1 1.50	115.9 4.57	84.0 3.31	M10 x 55 3/8x 2-1/8	1.18 2.60
65 x 25 2½ x 1	73.0 x 33.4 2.875x 1.315	38 1.50	79.4 3.13	44.5 1.75	141.3 5.56	81.0 3.19	M12 x 60 1/2x 2-3/8	1.23 2.71
65 x 32 2½ x 1¼	73.0 x 42.2 2.875x 1.660	51 2.00	82.6 3.25	44.5 1.75	141.3 5.56	94.0 3.70	M12 x 60 1/2x 2-3/8	1.39 3.06
65 x 40 2.5x 1½	73.0 x 48.3 2.875x 1.900	51 2.00	82.6 3.25	44.5 1.75	141.3 5.56	94.0 3.70	M12 x 60 1/2x 2-3/8	1.42 3.12
76.1mm x 25	76.1 x 33.4 3.000x 1.315	38 1.50	79.4 3.13	46.1 1.81	144.5 5.69	81.0 3.19	M12 x 60 1/2x 2-3/8	1.23 2.71

Model M22 Mechanical Tee, Grooved-End Outlet

Nominal Size Run x Branch	Pipe O.D.	Hole Dia. +3.2, -0 / +0.13, -0	Dimensions A	B	C	D	Bolt Size	Weight
mm *in*	mm *in*	mm *in*	mm *in*	mm *in*	mm *in*	mm *in*	mm *in*	Kgs *Lbs*
76.1mm x 32	76.1 x 42.2 *3.000x 1.660*	51 *2.00*	82.6 *3.25*	46.1 *1.81*	144.5 *5.69*	94.0 *3.70*	M12 x 60 *1/2x 2-3/8*	1.39 *3.06*
76.1mm x 40	76.1 x 48.3 *3.000x 1.900*	51 *2.00*	82.6 *3.25*	46.1 *1.81*	144.5 *5.69*	94.0 *3.70*	M12 x 60 *1/2x 2-3/8*	1.42 *3.12*
80 x 25 *3x 1*	88.9 x 33.4 *3.500x 1.315*	38 *1.50*	85.7 *3.37*	53.2 *2.09*	157.2 *6.19*	81.0 *3.19*	M12 x 75 *1/2x 3*	1.45 *3.19*
80 x 32 *3x 1¼*	88.9 x 42.2 *3.500x 1.660*	51 *2.00*	90.5 *3.56*	53.2 *2.09*	157.2 *6.19*	94.0 *3.70*	M12 x 75 *1/2x 3*	1.68 *3.70*
80 x 40 *3x 1½*	88.9 x 48.3 *3.500x 1.900*	51 *2.00*	90.5 *3.56*	53.2 *2.09*	157.2 *6.19*	94.0 *3.70*	M12 x 75 *1/2x 3*	1.70 *3.74*
80 x 50 *3x 2*	88.9 x 60.3 *3.500x 2.375*	64 *2.50*	90.5 *3.56*	53.2 *2.09*	157.2 *6.19*	108.0 *4.25*	M12 x 75 *1/2x 3*	1.83 *4.03*
100 x 25 *4x 1*	114.3 x 33.4 *4.500x 1.315*	38 *1.50*	93.7 *3.69*	66.7 *2.63*	182.6 *7.19*	79.4 *3.13*	M12 x 75 *1/2x 3*	1.65 *3.63*
100 x 32 *4x 1¼*	114.3 x 42.2 *4.500x 1.660*	51 *2.00*	92.1 *3.63*	66.7 *2.63*	182.6 *7.19*	101.6 *4.00*	M12 x 75 *1/2x 3*	1.80 *3.96*
100 x 40 *4x 1½*	114.3 x 48.3 *4.500x 1.900*	51 *2.00*	92.1 *3.63*	66.7 *2.63*	182.6 *7.19*	101.6 *4.00*	M12 x 75 *1/2x 3*	1.81 *3.98*
100 x 50 *4x 2*	114.3 x 60.3 *4.500x 2.375*	64 *2.50*	101.6 *4.00*	66.7 *2.63*	182.6 *7.19*	101.6 *4.00*	M12 x 75 *1/2x 3*	1.93 *4.25*
100 x 65 *4x 2½*	114.3 x 73.0 *4.500x 2.875*	70 *2.75*	101.6 *4.00*	66.7 *2.63*	182.6 *7.19*	112.7 *4.44*	M12 x 75 *1/2x 3*	2.66 *5.85*
100 x 76.1mm	114.3 x 76.1 *4.500x 3.000*	70 *2.75*	101.6 *4.00*	66.7 *2.63*	182.6 *7.19*	112.7 *4.44*	M12 x 75 *1/2x 3*	2.17 *4.78*
100 x 80 *4x 3*	114.3 x 88.9 *4.500x 3.500*	89 *3.50*	104.8 *4.13*	66.7 *2.63*	182.6 *7.19*	128.6 *5.06*	M12 x 75 *1/2x 3*	2.41 *5.30*
139.7mm x 50	139.7 x 60.3 *5.500x 2.375*	64 *2.50*	120.7 *4.75*	81.0 *3.19*	223.8 *8.81*	106.4 *4.19*	M16 x 90 *5/8x 3-1/2*	2.63 *5.79*
139.7mm x 76.1mm.	139.7 x 76.1 *5.500x 3.000*	70 *2.75*	120.7 *4.75*	81.0 *3.19*	223.8 *8.81*	112.7 *4.44*	M16 x 90 *5/8x 3-1/2*	2.95- *6.50*
139.7mm x 80	139.7 x 88.9 *5.500x 3.500*	70 *2.75*	117.5 *4.63*	81.0 *3.19*	223.8 *8.81*	131.8 *5.19*	M16 x 90 *5/8x 3-1/2*	3.08 *6.78*
125 x 50	141.3 x 60.3 *5.563x2.375*	64 *2.50*	120.7 *4.75*	81.0 *3.19*	223.8 *8.81*	106.4 *4.19*	M16 x 90 *5/8x 3-1/2*	2.63 *5.79*
125 x 65 *5x 2½*	141.3 x 73.0 *5.563x 2.875*	70 *2.75*	120.7 *4.75*	81.0 *3.19*	223.8 *8.81*	112.7 *4.44*	M16 x 90 *5/8x 3-1/2*	2.88 *6.34*
125 x 76.1mm	141.3 x 76.1 *5.563x 3.000*	70 *2.75*	120.7 *4.75*	81.0 *3.19*	223.8 *8.81*	112.7 *4.44*	M16 x 90 *5/8x 3-1/2*	2.95 6.49
125 x 80 *5x 3*	141.3 x 88.9 *5.563x 3.500*	70 *2.75*	117.5 *4.63*	81.0 *3.19*	223.8 *8.81*	131.8 *5.19*	M16 x 90 *5/8x 3-1/2*	3.08 *6.78*
165.1mm x 32	165.1 x 42.2 *6.500x 1.660*	51 *2.00*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	92.1 *3.63*	M16 x 90 *5/8x 3-1/2*	2.74 *6.03*
165.1mm x 40	165.1 x 48.3 *6.500x 1.900*	51 *2.00*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	92.1 *3.63*	M16 x 90 *5/8x 3-1/2*	2.78 *6.12*
165.1mm x 50	165.1 x 60.3 *6.500x 2.375*	64 *2.50*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	106.4 *4.19*	M16 x 90 *5/8x 3-1/2*	2.91 *6.40*
150 x 65 *6x 2½*	168.3 x 73.0 *6.625x 2.875*	70 *2.75*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	112.7 *4.44*	M16 x 90 *5/8x 3-1/2*	3.22 *7.08*
165.1mm x 76.1mm	165.1 x 76.1 *6.500x 3.000*	70 *2.75*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	115.9 *4.56*	M16 x 90 *5/8x 3-1/2*	3.38 *7.44*
165.1mm x 80	165.1 x 88.9 *6.500x 3.500*	89 *3.50*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	131.8 *5.19*	M16 x 90 *5/8x 3-1/2*	3.64 *8.01*
165.1mm x 100	165.1 x 114.3 *6.500x 4.500*	114 *4.50*	137.1 *5.40*	94.5 *3.72*	250.8 *9.87*	158.8 *6.25*	M16 x 90 *5/8x 3-1/2*	4.05 *8.91*
150 x 32 *6 x 1¼*	168.3 x 42.2 *6.625x 1.660*	51 *2.00*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	92.1 *3.63*	M16 x 90 *5/8x 3-1/2*	2.75 *6.05*
150 x 40 *6x 1½*	168.3 x 48.3 *6.625x 1.900*	51 *2.00*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	92.1 *3.63*	M16 x 90 *5/8x 3-1/2*	2.78 *6.12*
150 x 50 *6x 2*	168.3 x 60.3 *6.625x 2.375*	64 *2.50*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	106.4 *4.19*	M16 x 90 *5/8x 3-1/2*	2.92 *6.42*
150 x 65 *6x 2½*	168.3 x 73.0 *6.625x 2.875*	70 *2.75*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	112.7 *4.44*	M16 x 90 *5/8x 3-1/2*	3.22 *7.08*
150 x 80 *6x 3*	168.3 x 88.9 *6.625x 3.500*	89 *3.50*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	131.8 *5.19*	M16 x 90 *5/8x 3-1/2*	3.68 *8.10*
150 x 100 *6x 4*	168.3 x 114.3 *6.625x 4.500*	114 *4.50*	137.1 *5.40*	94.5 *3.72*	250.8 *9.87*	158.8 *6.25*	M16 x 90 *5/8x 3-1/2*	4.05 *8.91*

[ ] Important: Make special note of the hole saw size and maximum diameter allowed on these sizes, deviation could lead to joint failure.

MATERIAL SPECIFICATIONS

• Housing:

Ductile Iron to ASTM A536, Gr. 65-45-12 or to ASTM A395 Gr. 65-45-15, Min. tensile strength 448 MPa (65,000 psi).

• Surface Finish:

Orange color painted or red RAL3000 color painted.

- ☐ Hot dip galvanized (Option).
- ☐ Epoxy coated in red RAL3000 or other colors (Option)

• Rubber Gasket:

Grade "E" EPDM (Color code: Green stripe) Good for cold & hot water up to +230°F (+110°C). Also good for services for water with acid, water with chlorine, deionized water, seawater and waste water, dilute acids, oil-free air and many chemicals. Not recommended for petroleum oils, minerals oils, solvents and aromatic hydrocarbons.
Maximum Temperature Range: -30°F (-34°C) to +230°F (+110°C).

- ☐ **Grade "T" Nitrile** (Color code: Orange stripe) (Option) Recommended for petroleum products, vegetable oils, mineral oils and air with oil vapors. Temperature range: -29 °C to +82 °C (-20 °F to +180 °F). Also good for water services under +66 °C (+150 °F).
  Do not use for HOT WATER above +66°C (+150°F) or HOT DRY AIR above +60°C (+140°F)
- ☐ Other options: Grade "O" Fluoro-Elastomer, Grade "L" Silicone, etc. are also available upon request.

• Bolts & Nuts:

Heat treated carbon manganese steel track bolts to ASTM A449-83a (or A183 Gr. 2), minimum tensile strength 758 MPa (110,000psi), Zinc electroplated, with heavy-duty hexagonal nuts to ASTM A563.

Outlet Flow Data – C_v Values

Values for flow of water at +60°F (+16°C).

$$Cv = \frac{Q}{\sqrt{\Delta P}}$$

Where: C_v = Flow coefficient
Q = Flow (GPM)
ΔP = Pressure drop (psi)

Model #M22 Mechanical Tee, Grooved-end Outlet Cv Values

Nominal Size mm / in	Cv Values	Nominal Size mm / in	Cv Values
15 *1/2*	17	50 *2*	100
20 *3/4*	21	65 *2-1/2*	135
25 *1*	25	80 *3*	200
32 *1-1/4*	45	100 *4*	400
40 *1-1/2*	60		

Outlet Flow Characteristics

Model #M22 Mechanical Tee, Grooved-end Outlet Flow Characteristics

Nominal Size mm / in	Equivalent Length* meter/feet of pipe	Nominal Size mm / in	Equivalent Length* meter/feet of pipe
15 *1/2*	--	50 *2*	1.8 6.0
20 *3/4*	--	65 *2-1/2*	2.4 8.0
25 *1*	0.9 3.0	80 *3*	3.1 10.0*
32 *1-1/4*	1.2 4.0	100 *4*	4.3 14.0
40 *1-1/2*	1.2 4.0*		

Expressed in equivalent of schedule 40 pipe based on Hazen & Williams formula: C=120
*Note equivalent for 2" x 1-1/2" and 6" x 3" are 2.74 meters (9 feet) and 4.3 meters (14 feet) respectively.

Approved Pressure Ratings & Applicable Pipes

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

Size Range Inch	Pipe Schedules	Rated Working Pressure Psi (Bar)	
		cULus	FM
2" x 1" ~ 6" x 2-1/2"	Sch. 40, Sch. 10	300 (20)	300 (20)
1-1/4" ~ 4"	SF, DF, EF		
1" ~ 2"	MT, EZ		
1-1/2" ~ 4"	FF		
3" ~ 6"	EZF		
1" ~ 6"	BS1387 (M)		
4" x 3" 6" x 3", 6" x 4" 6-1/2" OD x 3", 6-1/2" OD x 4	Sch. 40, Sch. 10 SF, DF, MF, MT, EZT, FF, EF, EZF, BS 1387M	175 (12)	175 (12)

Notes:
Sch. 40 refers to Listed/Approved Schedule 40 steel sprinkler pipe.
Sch. 10 refers to Listed/Approved Schedule 10 steel sprinkler pipe.
SF refers to Listed/Approved Super-Flo steel sprinkler pipe manufactured by Allied Tube and Conduit Corporation, sizes 1-1/4" – 4"
DF efers to Listed/Approved Dyno-Flo steel sprinkler pipe manufactured by Allied Tube and Conduit Corporation. sizes 1-1/4" – 4"
MF refers to Listed Mega-Flow steel pipe manufactured by Wheatland Tube Co, sizes: 1" -4"
MT refers to Listed Mega-Thread steel pipe manufactured by Wheatland Tube Co, sizes: 1" – 2"
EZT refers to Listed EZ-Thread steel pipe manufactured by Youngstown Tube Co, size: 1" – 2"
FF refers to Listed Fire-Flo steel pipe manufactured by Youngstown Tube Co, sizes: 1-1/2"- 4"
EF refers to Listed Eddy Flow steel pipe manufactured by Bull Moose Tube Co, sizes: 1-1/4" – 4"
EZF refers to Listed EZ-Flow steel pipe manufactured by Northwest Pipe Co, sizes: 3" – 6"
BS1387 (M) (for BS EZ 10255) refer to steel pipe manufactured in accordance with European standard BS EN 10255, sizes: 1" – 6"

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***.
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606 (latest version) specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1½ times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

Shurjoint *product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact* ***Shurjoint*** *Technical Service.* ***Shurjoint*** *reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligations to make such changes and modifications on* ***Shurjoint*** *products previously subsequently sold.*

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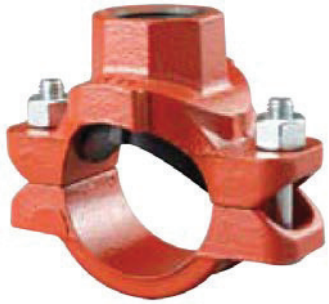
MODEL M21 MECHANICAL TEE, FEMALE THREADED OUTLET

For Fire Protection pressure rating, listing, and approval information, visit Shurjoint website, www.shurjoint.com for details or contact your SHURJOINT Representative.



The ***Shurjoint*** Model M21 features an advanced design and when mounted on hole cut pipe the Model M21 provides a fast and easy mid-pipe threaded branch outlet. Threads are NPT per ANSI B1.20 or BSPT per ISO 7. By utilizing the Model M21 you can eliminate the need for welding or the use of multiple fittings. The M21 Mechanical Tee is comprised of upper and lower ductile iron housing segments, a grade "E" EPDM rubber gasket (Model M21 & M22 gaskets are interchangeable) and plated track bolts and nuts.

Mechanical tees are supplied with our standard painted finishes, i.e. orange or RAL3000 red. Optional finishes such as hot dipped zinc galvanized and custom epoxy coatings are also available.

Shurjoint mechanical tees: Model M21, M22, 7721 & 7722 can also be used on applicable IPS size HDP pipe. When used in conjunction with HDP pipe the pressure rating would be the lower of the fitting or pipe rating. Please note Shurjoint mechanical tees are not recommended for use on PVC plastic pipe.

Important Note: Model M21 housing segments are not compatible and should not be used with other ***Shurjoint*** mechanical tee housing segments such as Model 7721 & 7722 mechanical tees.

10 YEAR LIMITED WARRANTY

Full warranty terms can be found on www.shurjoint.com

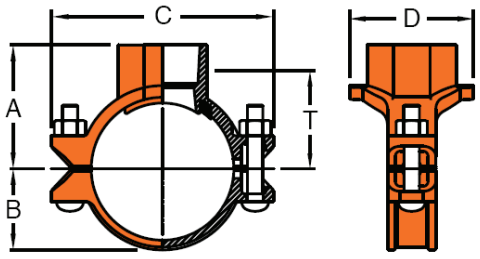
Pressure-Temperature Rating*

Nom. Rating	Working Pressure (STD, Roll-grooved)	Max. Service Temperature
Class 150	300 psi @100°F 20 Bar @38°C	EPDM: 230°F / 110°C Nitrile: 180°F / 82°C

*Working pressure is based on standard wall carbon steel pipe.
*Proof test pressure: 1.5 times the working pressure, non-shock cold water.
*Burst pressure is engineered minimum 3 times the working pressure

* Please refer to page 4 for additional working pressure information.

MODEL M21 MECHANICAL TEE, FEMALE THREADED OUTLET



Model M21 Mechanical Tee, Female Threaded Outlet

Nominal Size Run x Branch	Pipe O.D.	Hole Dia. +3.2, -0 / +0.13, -0	Dimensions T*	A	B	C	D	Bolt Size	Weight
mm *in*	mm *in*	mm *in*	mm *in*	mm *in*	mm *in*	mm *in*	mm *in*	mm *in*	Kgs *Lbs*
50 x 15 *2 x ½*	60.3 x 21.3 *2.375 x 0.840*	38 *1.50*	50 *1.97*	63.5 *2.50*	38.1 *1.50*	115.9 *4.56*	81 *3.19*	M10 x 55 *⅜ x 2⅛*	0.99 *2.18*
50 x 20 *2 x ¾*	60.3 x 26.7 *2.375 x 1.050*	38 *1.50*	50 *1.97*	63.5 *2.50*	38.1 *1.50*	115.9 *4.56*	81 *3.19*	M10 x 55 *⅜ x 2⅛*	1.01 *2.22*
50 x 25 *2 x 1*	60.3 x 33.4 *2.375 x 1.315*	38 *1.50*	47 *1.85*	63.5 *2.50*	38.1 *1.50*	115.9 *4.56*	81 *3.19*	M10 x 55 *⅜ x 2⅛*	1.09 *2.40*
50 x 32 *2 x 1¼*	60.3 x 42.2 *2.375 x 1.660*	[45] *[1.75]*	52 *2.05*	73.0 *2.87*	38.1 *1.50*	115.9 *4.56*	84 *3.31*	M10 x 55 *⅜ x 2⅛*	1.26 *2.77*

Model M21 Mechanical Tee, Female Threaded Outlet

Nominal Size Run x Branch	Pipe O.D.	Hole Dia. +3.2, -0 / +0.13, -0	Dimensions T*	A	B	C	D	Bolt Size	Weight
mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	mm in	Kgs Lbs
50 x 40 2 x 1½	60.3 x 48.3 2.375 x 1.900	[45] [1.75]	52 2.08	76.2 3.00	38.1 1.50	115.9 4.56	84 3.31	M10 x 55 ⅜ x 2⅛	1.37 3.01
65 x 15 2½ x ½	73.0 x 21.3 2.875 x 0.840	38 1.50	56 2.20	69.9 2.75	44.5 1.75	141.3 5.56	81 3.19	M12 x 60 ½ x 2⅜	1.20 2.60
65 x 20 2½ x ¾	73.0 x 26.7 2.875 x 1.050	38 1.50	56 2.20	69.9 2.75	44.5 1.75	141.3 5.56	81 3.19	M12 x 60 ½ x 2⅜	1.20 2.70
65 x 25 2½ x 1	73.0 x 33.4 2.875 x 1.315	38 1.50	53 2.09	69.9 2.75	44.5 1.75	141.3 5.56	81 3.19	M12 x 60 ½ x 2⅜	1.30 2.86
65 x 32 2½ x 1¼	73.0 x 42.2 2.875 x 1.660	51 2.00	58 2.28	76.2 3.00	44.5 1.75	141.3 5.56	94 3.70	M12 x 60 ½ x 2⅜	1.46 3.21
65 x 40 2½ x 1½	73.0 x 48.3 2.875 x 1.900	51 2.00	58 2.28	76.2 3.00	44.5 1.75	141.3 5.56	94 3.70	M12 x 60 ½ x 2⅜	1.56 3.43
76.1mm x 15	76.1 x 21.3 3.000 x 0.840	38 1.50	56 2.20	69.9 2.75	46.1 1.81	144.5 5.69	81 3.19	M12 x 60 ½ x 2⅜	1.20 2.64
76.1mm x 20	76.1 x 26.7 3.000 x 1.050	38 1.50	56 2.20	69.9 2.75	46.1 1.81	144.5 5.69	81 3.19	M12 x 60 ½ x 2⅜	1.20 2.64
76.1mm x 25	76.1 x 33.4 3.000 x 1.315	38 1.50	53 2.09	69.9 2.75	46.1 1.81	144.5 5.69	81 3.19	M12 x 60 ½ x 2⅜	1.30 2.86
76.1mm x 32	76.1 x 42.2 3.000 x 1.660	51 2.00	58 2.28	76.2 3.00	46.1 1.81	144.5 5.69	94 3.70	M12 x 60 ½ x 2⅜	1.46 3.21
76.1mm x 40	76.1 x 48.3 3.000 x 1.900	51 2.00	58 2.28	76.2 3.00	46.1 1.81	144.5 5.69	94 3.70	M12 x 60 ½ x 2⅜	1.56 3.43
80 x 15 3 x ½	88.9 x 21.3 3.500 x 0.840	38 1.50	60 2.36	77.8 3.06	53.2 2.09	157.2 6.19	81 3.19	M12 x 75 ½ x 3	1.44 3.17
80 x 20 3 x ¾	88.9 x 26.7 3.500 x 1.050	38 1.50	59 2.32	77.8 3.06	53.2 2.09	157.2 6.19	81 3.19	M12 x 75 ½ x 3	1.46 3.21
80 x 25 3 x 1	88.9 x 33.4 3.500 x 1.315	38 1.50	61 2.40	77.8 3.06	53.2 2.09	157.2 6.19	81 3.19	M12 x 75 ½ x 3	1.53 3.37
80 x 32 3 x 1¼	88.9 x 42.2 3.500 x 1.660	51 2.00	65 2.56	82.6 3.25	53.2 2.09	157.2 6.19	94 3.70	M12 x 75 ½ x 3	1.81 3.98
80 x 40 3 x 1½	88.9 x 48.3 3.500 x 1.900	51 2.00	71 2.80	88.9 3.50	53.2 2.09	157.2 6.19	94 3.70	M12 x 75 ½ x 3	1.88 4.14
80 x 50 3 x 2	88.9 x 60.3 3.500 x 2.375	64 2.50	70 2.76	88.9 3.50	53.2 2.09	157.2 6.19	108 4.25	M12 x 75 ½ x 3	2.07 4.55
100 x 15 4 x ½	114.3 x 21.3 3.500 x 0.840	38 1.50	72 2.83	93.7 3.69	66.7 2.63	182.6 7.19	79.4 3.13	M12 x 75 ½ x 3	1.63 3.59
100 x 20 4 x ¾	114.3 x 26.7 4.500 x 1.050	38 1.50	71 2.79	93.7 3.69	66.7 2.63	182.6 7.19	79.4 3.13	M12 x 75 ½ x 3	1.64 3.61
100 x 25 4 x 1	114.3 x 33.4 4.500 x 1.315	38 1.50	73 2.87	93.7 3.69	66.7 2.63	182.6 7.19	79.4 3.13	M12 x 75 ½ x 3	1.70 3.74
100 x 32 4 x 1¼	114.3 x 42.2 4.500 x 1.660	51 2.00	78 3.07	92.1 3.63	66.7 2.63	182.6 7.19	101.6 4.00	M12 x 75 ½ x 3	1.90 4.18
100 x 40 4 x 1½	114.3 x 48.3 4.500 x 1.900	51 2.00	84 3.31	92.1 3.63	66.7 2.63	182.6 7.19	101.6 4.00	M12 x 75 ½ x 3	2.04 4.49
100 x 50 4 x 2	114.3 x 60.3 4.500 x 2.375	64 2.50	83 3.27	101.6 4.00	66.7 2.63	182.6 7.19	101.6 4.00	M12 x 75 ½ x 3	2.27 5.00
100 x 65 4 x 2½	114.3 x 73.0 4.500 x 2.875	70 2.75	73 2.87	101.6 4.00	66.7 2.63	182.6 7.19	112.7 4.44	M12 x 75 ½ x 3	2.47 5.43
100 x 76.1mm	114.3 x 76.1 4.500 x 3.000	70 2.75	73 2.87	101.6 4.00	66.7 2.63	182.6 7.19	112.7 4.44	M12 x 75 ½ x 3	2.57 5.65
100 x 80 4 x 3	114.3 x 88.9 4.500 x 3.500	89 3.50	84 3.31	104.8 4.13	66.7 2.63	182.6 7.19	128.6 5.06	M12 x 75 ½ x 3	2.91 6.41
139.7mm x 50	139.7 x 60.3 5.500 x 2.375	64 2.50	83 3.27	120.7 4.75	81.0 3.19	223.8 8.81	106.4 4.19	M16 x 90 ⅝ x 3½	2.90 6.38
139.7mm x 76.1mm	139.7 x 76.1 5.500 x 3.000	70 2.75	93 3.67	120.7 4.75	81.0 3.19	223.8 8.81	115.9 4.57	M16 x 90 ⅝ x 3½	3.40 7.40
139.7mm x 80	139.7 x 88.9 5.500 x 3.500	89 3.50	97 3.82	127.0 4.75	81.0 3.19	223.8 8.81	131.8 5.19	M16 x 90 ⅝ x 3½	3.82 8.41
125 x 50 5 x 2	141.3 x 60.3 5.563 x 2.375	64 2.50	83 3.27	120.7 4.75	81.0 3.19	223.8 8.81	106.4 4.19	M16 x 90 ⅝ x 3½	2.90 6.38

Model M21 Mechanical Tee, Female Threaded Outlet

Nominal Size Run x Branch	Pipe O.D.	Hole Dia. +3.2, -0 / +0.13, -0	Dimensions T*	A	B	C	D	Bolt Size	Weight
mm *in*	mm *in*	mm *in*	mm *in*	mm *in*	mm *in*	mm *in*	mm *in*	mm *in*	Kgs *Lbs*
125 x 65 *5 x 2½*	141.3 x 73.0 *5.563 x 2.875*	70 *2.75*	93 *3.67*	120.7 *4.75*	81.0 *3.19*	223.8 *8.81*	112.7 *4.44*	M16 x 90 *⅝ x 3½*	3.39 *7.46*
125 x 80 *5 x 3*	141.3 x 88.9 *5.563 x 3.500*	89 *3.50*	97 *3.82*	127.0 *4.75*	81.0 *3.19*	223.8 *8.81*	131.8 *5.19*	M16 x 90 *⅝ x 3½*	3.82 *8.40*
165.1mm x 32	165.1 x 42.2 *6.500 x 1.660*	51 *2.00*	112 *4.41*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	92.1 *3.63*	M16 x 90 *⅝ x 3½*	2.53 *5.57*
165.1mm x 40	165.1 x 48.3 *6.500 x 1.900*	51 *2.00*	112 *4.41*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	92.1 *3.63*	M16 x 90 *⅝ x 3½*	3.00 *6.60*
165.1mm x 50	165.1 x 60.3 *6.500 x 2.375*	64 *2.50*	111 *4.37*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	106.4 *4.19*	M16 x 90 *⅝ x 3½*	3.17 *6.97*
165.1mm x 65	165.1 x 73.0 *6.500 x 2.875*	70 *2.75*	101 *3.98*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	112.7 *4.44*	M16 x 90 *⅝ x 3½*	3.58 *7.88*
165.1mm x 76.1mm	165.1 x 76.1 *6.500 x 2.875*	70 *2.75*	101 *3.98*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	115.9 *4.56*	M16 x 90 *⅝ x 3½*	3.75 8.25
165.1mm x 80	165.1 x 88.9 *6.500 x 3.500*	89 *3.50*	110 *4.33*	139.7 *5.50*	94.5 *3.72*	250.8 *9.87*	131.8 *5.19*	M16 x 90 *⅝ x 3½*	4.13 *9.09*
165.1mm x 100	165.1 x 114.3 *6.500 x 4.500*	114 *4.50*	113 *4.45*	146.1 *5.75*	94.5 *3.72*	250.8 *9.87*	158.8 *6.25*	M16 x 90 *⅝ x 3½*	4.77 *10.50*
150 x 32 *6 x 1¼*	168.3 x 42.2 *6.625 x 1.660*	51 *2.00*	112 *4.41*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	92.1 *3.63*	M16 x 90 *⅝ x 3½*	2.91 *6.41*
150 x 40 *6 x 1½*	168.3 x 48.3 *6.625 x 1.900*	51 *2.00*	112 *4.41*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	92.1 *3.63*	M16 x 90 *⅝ x 3½*	2.99 *6.58*
150 x 50 *6 x 2*	168.3 x 60.3 *6.625 x 2.375*	64 *2.50*	111 *4.37*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	106.4 *4.19*	M16 x 90 *⅝ x 3½*	3.18 *7.00*
150 x 65 *6 x 2½*	168.3 x 73.0 *6.625 x 2.875*	70 *2.75*	101 *3.98*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	112.7 *4.44*	M16 x 90 *⅝ x 3½*	3.58 *7.88*
150 x 76.1mm	168.3 x 76.1 *6.625 x 2.875*	70 *2.75*	101 *3.98*	130.2 *5.13*	94.5 *3.72*	250.8 *9.87*	115.9 *4.56*	M16 x 90 *⅝ x 3½*	3.58 7.88
150 x 80 *6 x 3*	168.3 x 88.9 *6.625 x 3.500*	89 *3.50*	110 *4.33*	139.7 *5.50*	94.5 *3.72*	250.8 *9.87*	131.8 *5.19*	M16 x 90 *⅝ x 3½*	4.10 *9.02*
150 x 100 *6 x 4*	168.3 x 114.3 *6.625 x 4.500*	114 *4.50*	113 *4.45*	146.1 *5.75*	94.5 *3.72*	250.8 *9.87*	158.8 *6.25*	M16 x 90 *⅝ x 3½*	4.76 *10.47*

Hole diameters listed are suggested hole diameters. T*: Take-Out (Center of run to end of pipe to be engaged.)
[ ] Important: Make special note of the hole saw size and maximum diameter allowed on these sizes, deviation could lead to joint failure.

Flow Data – C_v Values

Values for flow of water at +60°F (+16°C).

$$Cv = \frac{Q}{\sqrt{\Delta P}}$$

Where: C_v = Flow coefficient
Q = Flow (GPM)
ΔP = Pressure drop (psi)

Model #M21 Mechanical Tee, Female Threaded Outlet Cv Values			
Nominal Size mm / in	Cv Values	Nominal Size mm / in	Cv Values
15 1/2	17	50 2	100
20 3/4	21	65 2-1/2	135
25 1	25	80 3	200
32 1-1/4	45	100 4	400
40 1-1/2	60		

Outlet Flow Characteristics

Model #M21 Mechanical Tee, Female Threaded Outlet Flow Characteristics			
Nominal Size mm / in	Equivalent Length* meter/feet of pipe	Nominal Size mm / in	Equivalent Length* meter/feet of pipe
15 1/2	0.6 2.0	50 2	1.8 6.0
20 3/4	0.9 3.0	65 2-1/2	2.4 8.0
25 1	0.9 3.0	80 3	3.1 10.0
32 1-1/4	1.2 4.0*	100 4	4.3 14.0
40 1-1/2	1.2 4.0*		

*Expressed in equivalent of schedule 40 pipe based on Hazen & Williams formula: C=120
Equivalent length of 2" x 1-1/4" and 2" x 1-1/2" are 1.83 meters (6 feet) and 3.36 meters (11 feet) respectively.

MODEL M21 – MATERIAL SPECIFICATIONS

• Housing:

Ductile Iron to ASTM A536, Gr. 65-45-12 or to ASTM A395 Gr. 65-45-15. Min. tensile strength 448 MPa (65,000 psi).

• Surface Finish:

Orange color painted or red RAL3000 color painted.

- ☐ Hot dip galvanized (Option).
- ☐ Epoxy coated in red RAL3000 or other colors (Option)

• Rubber Gasket:

Grade "E" EPDM (Color code: Green stripe) Good for cold & hot water up to +230°F (+110°C). Also good for services for water with acid, water with chlorine, deionized water, seawater and waste water, dilute acids, oil-free air and many chemicals. Not recommended for petroleum oils, minerals oils, solvents and aromatic hydrocarbons.
Maximum Temperature Range: -30°F (-34°C) to +230°F (+110°C).

- ☐ **Grade "T" Nitrile** (Color code: Orange stripe) (Option) Recommended for petroleum products, vegetable oils, mineral oils and air with oil vapors. Temperature range: -29 °C to +82 °C (-20 °F to +180 °F). Also good for water services under +66 °C (+150 °F).
  Do not use for HOT WATER above +66°C (+150°F) or HOT DRY AIR above +60°C (+140°F)
- ☐ Other options: Grade "O" Fluoro-Elastomer, Grade "L" Silicone.

• Bolts & Nuts:

Heat treated carbon manganese steel track bolts to ASTM A449-83a (or A183 Gr. 2), minimum tensile strength 758 MPa (110,000psi), Zinc electroplated, with heavy-duty hexagonal nuts to ASTM A563.

Applicable Pipe Type/Pressure Ratings

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

Size Range, Inch	Pipe Schedule	Rated Working Pressure Psi (Bar)	
		cULus	FM
2" x 1/2" ~ 6" x 2-1/2"	Sch. 40, Sch. 10	300 (20)	300 (20)
1-1/4" ~ 4"	SF, DF, EF		
1" ~ 4"	MF		
1" ~ 2"	MT, EZ		
1-1/2" ~ 4"	FF		
3" ~ 6"	EZF		
1" ~ 6"	BS1387 (M)		
4" x 2"	DF	200 (14)	
4" x 3" 6" x 3", 6" x 4" 6-1/2" OD x 3", 6-1/2" OD x 4	Sch. 40, Sch. 10 SF, DF, MF, MT, EZT, FF, EF, EZF, BS 1387M	175 (12)	175 (12)

Notes:
Sch. 40 refers to Listed/Approved Schedule 40 steel sprinkler pipe.
Sch. 10 refers to Listed/Approved Schedule 10 steel sprinkler pipe.
SF refers to Listed/Approved Super-Flo steel sprinkler pipe manufactured by Allied Tube and Conduit Corporation, sizes 1-1/4" – 4"
DF efers to Listed/Approved Dyno-Flo steel sprinkler pipe manufactured by Allied Tube and Conduit Corporation. sizes 1-1/4" – 4"
MF refers to Listed Mega-Flow steel pipe manufactured by Wheatland Tube Co, sizes: 1" -4"
MT refers to Listed Mega-Thread steel pipe manufactured by Wheatland Tube Co, sizes: 1" – 2"
EZT refers to Listed EZ-Thread steel pipe manufactured by Youngstown Tube Co, size: 1" – 2"
FF refers to Listed Fire-Flo steel pipe manufactured by Youngstown Tube Co, sizes: 1-1/2"- 4"
EF refers to Listed Eddy Flow steel pipe manufactured by Bull Moose Tube Co, sizes: 1-1/4" – 4"
EZF refers to Listed EZ-Flow steel pipe manufactured by Northwest Pipe Co, sizes: 3" – 6"
BS 1387M (or EZ 10255(refer to steel pipe manufactured in accordance with European standard BS EN 10255, sizes: 1" – 6"

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by cULus and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***.
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 40 steel pipe with roll grooves to ANSI/AWWA C606 (latest version) specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1½ times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

Shurjoint *product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact* ***Shurjoint*** *Technical Service.* ***Shurjoint*** *reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligations to make such changes and modifications on* ***Shurjoint*** *products previously subsequently sold.*

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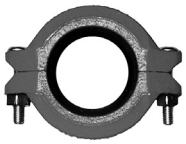
Technical Services: Tel: (800) 381-9312 / Fax: (800) 791-5500

Grinnell Grooved Fire Protection Products

Fire Protection Submittal Sheet

Listing and Approval Information

Figure	Nominal Size Inches	Nominal Size mm	Pipe Schedule	Rated Pressure (psi-UL,ULC,FM; Bar LPCB and VdS)				
				UL	ULC	FM	VdS	LPCB
 Figure 705	1¼, 1½, 2	42.4, 48.3, 60.3	Sch 5, ID, WST	175	175	175	-	-
	1¼, 1½, 2, 2½	42.4, 48.3, 60.3, 73.0	Sch 10, Sch 40	300	300	300	-	-
	3, 4, 5, 6, 8	88.9, 114.3, 141.3, 168.3, 219.1	Sch 10, Sch 40	300	300	300	-	-
	10, 12	273.0, 323.9	Sch 10, Sch 40	250	250	250	-	-
	1¼, 1½, 2, 2½, 3	42.4, 48.3, 60.3, 73.0, 88.9	MF	300	300	300	-	-
	4	114.3	MF	-	-	300	-	-
	1¼, 1½, 2, 2½, 3, 4	42.4, 48.3, 60.3, 73.0, 88.9, 114.3	DF	300	300	300	-	-
	1¼, 1½, 2, 2½, 3, 4	42.4, 48.3, 60.3, 73.0, 88.9, 114.3	FLF	300	300	-	-	-
	1½, 2, 2½, 3, 4	48.3, 60.3, 73.0, 88.9, 114.3	FF	300	300	300	-	-
	1, 1¼, 1½, 2	33.7, 42.4, 48.3, 60.3	MLT, EZT	300	300	300	-	-
	3	88.9	EZ	300	300	300	-	-
	4	114.3	EZ	250	250	300	-	-
	6	168.3	EZ	250	250	175	-	-
	1¼, 1½, 2	42.4, 48.3, 60.3	BLT, DT, TL, Gal 7, Gal Flo	300	300	300	-	-
	1¼, 1½, 2	42.4, 48.3, 60.3	GL, MLT, MT, SL, WLS	300	300	-	-	-
	1¼, 1½, 2	42.4, 48.3, 60.3	UE	-	-	175	-	-
		76.1, 165.1	BS1387	300	300	300	-	-
		42.4, 48.3, 60.3, 76.1, 88.9, 114.3	BS1387, ISO 4200	-	-	-	16	20
		139.7	BS1387, ISO 4200	-	-	-	16	-
		165.1	BS1387, ISO 4200	-	-	-	-	20
		168.3, 219.1	ISO 4200	-	-	-	16	20
		108.0, 133.0, 159.0	ISO 4200	300	-	300	-	-
		216.3	JIS G3452	300	-	300	-	-
 Figure 707	1½, 2, 2½	48.3, 60.3, 73.0	Sch 5, UE, WST	175	175	175	-	-
	1½, 2, 2½, 3, 4, 5	48.3, 60.3, 73.0, 88.9, 114.3, 141.3	Sch 10	450	450	450	-	-
	6, 8, 10, 12	168.3, 219.1, 273.0, 323.9	Sch 10	450	450	450	-	-
	1½, 2, 2½, 3, 4, 5	48.3, 60.3, 73.0, 88.9, 114.3, 141.3	Sch 40	500	500	500	-	-
	6, 8, 10, 12	168.3, 219.1, 273.0, 323.9	Sch 40	500	500	500	-	-
	1½, 2, 2½, 3, 4	48.3, 60.3, 73.0, 88.9, 114.3	MF, DF, FF, SF, STF	300	300	300	-	-
	2	60.3	EZT	300	-	-	-	-
	3	88.9	EZ	300	300	300	-	-
	4	114.3	EZ	250	250	300	-	-
	6	168.3	EZ	250	250	175	-	-
	1½, 2, 2½, 3	48.3, 60.3, 73.0, 88.9	XL	300	300	300	-	-
	1½, 2	48.3, 60.3	GL, MT, MLT, TL	300	300	300	-	-
	1½, 2	48.3, 60.3	Gal 7, Gal Flo	300	300	300	-	-
	1½, 2	48.3, 60.3	BLT, DT	-	-	300	-	-
	14, 16	355.6, 406.4	Sch 30	300	-	-	-	-
	18, 20	457.2, 508.0	Sch 30	200	-	-	-	-
	24	610.0	Sch 20	250	-	-	-	-
		76.1, 165.1	BS1387, ISO 4200	300	-	300	-	20
		48.3, 60.3, 88.9, 114.3, 168.3	BS1387, ISO 4200	-	-	-	-	20
		219.1, 273.0, 323.9	ISO 4200	-	-	-	16	20
 Figure 71	2	60.3	Sch 5, ID, UE, WST	175	175	175	-	-
	2, 2½, 3, 4, 5	60.3, 73.0, 88.9, 114.3, 141.3	Sch 10, Sch 40	250	250	250	-	-
	6, 8	168.3, 219.1	Sch 10, Sch 40	250	250	250	-	-
	10, 12	273.0, 323.9	Sch 40	250	250	250	-	-
	2	60.3	BLT, DT, EZT, FF, GL, LS	250	250	250	-	-
	2	60.3	MT, MLT, TL, WLS, XL	250	250	250	-	-
	2	60.3	Gal 7, Gal Flo	250	250	250	-	-
	2	60.3	MF, FF	-	-	250	-	-
	2, 2½, 3, 4	60.3, 73.0, 88.9, 114.3	DF, FF, MF, SF	250	250	250	-	-
	3, 4	88.9, 114.3	EZ	250	250	250	-	-
	6	168.3	EZ	250	250	175	-	-
	2, 3, 4	60.3, 88.9, 114.3	STF	250	250	250	-	-
	2½, 3	73.0, 88.9	XL	250	250	250	-	-
Figure 71 PN16		60.3, 76.1, 88.9, 114.3, 168.3	BS1387, ISO 4200	250	-	250	16	20
		139.7	BS1387, ISO 4200	250	-	250	16	-
		165.1	BS1387, ISO 4200	250	-	250	-	20
		219.1, 273.0	ISO 4200	250	-	250	-	20
		323.9	ISO 4200	250	-	250	-	16

Figure	Nominal Size Inches	Nominal Size mm	Pipe Schedule	Rated Pressure (psi-UL,ULC,FM; Bar LPCB and VdS)				
				UL	ULC	FM	VdS	LPCB
 Figure 772 Patented	1¼, 1½, 2	42.4, 48.3, 60.3	Sch 5, ID, UE, WST	175	175	175	-	-
	1¼	42.4	Sch 10, Sch 40	300	300	300	-	-
	1½, 2, 2½, 3, 4	48.3, 60.3, 73.0, 88.9, 114.3	Sch 10, Sch 40	500	500	500	-	-
	5, 6	141.3, 168.3	Sch 10	300	300	300	-	-
	8	219.1	Sch 10	400	400	400	-	-
	5	141.3	Sch 40	300	300	300	-	-
	6	168.3	Sch 40	400	400	400	-	-
	8	219.1	Sch 40	450	450	450	-	-
	10, 12	273.0, 323.9	Sch 10, Sch 40	250	250	250	-	-
	1¼, 1½, 2, 2½, 3	42.4, 48.3, 60.3, 73.0, 88.9	MF	300	300	300	-	-
	4	114.3	EZ, MF	250	250	300	-	-
	3	88.9	EZ	300	300	300	-	-
	6	168.3	EZ	250	250	300	-	-
	1½, 2, 2½, 3, 4	48.3, 60.3, 73.0, 88.9, 114.3	DF, STF	300	300	300	-	-
	1¼, 1½, 2, 2½, 3	42.4, 48.3, 60.3, 73.0, 88.9	FLF	300	300	-	-	-
	4	114.3	FLF	250	250	-	-	-
	1½, 2, 2½, 3	48.3, 60.3, 73.0, 88.9,	FF	300	300	300	-	-
	4	114.3	FF	250	250	300	-	-
	1¼, 1½, 2	42.4, 48.3, 60.3	EZT, MT, MLT, WLS	300	300	300	-	-
	1¼, 1½, 2	42.4, 48.3, 60.3	GL, Gal 7, Gal Flo	300	300	300	-	-
	1½, 2	48.3, 60.3	BLT, DT	300	300	300	-	-
	1½, 2	48.3, 60.3	TL, XL	300	300	-	-	-
		76.1, 165.1	BS1387	300	300	300	-	-
		42.4, 48.3, 60.3, 76.1, 88.9, 114.3	BS1387, ISO 4200	-	-	-	16	20
		139.7	BS1387, ISO 4200	-	-	-	16	-
		165.1	BS1387, ISO 4200	-	-	-	-	20
		168.3, 219.1, 273.0, 323.9	ISO 4200	-	-	-	16	20
 Figure 716	2 x 1½, 2½ x 2, 3 x 2	60.3 x 48.3, 73.0 x 60.3, 88.9 x 60.3	Sch 5	175	175	175	-	-
	3 x 2½, 4 x 2, 4 x 2½	88.9 x 73.0, 114.3 x 60.3, 114.3 x 73.0	Sch 5	175	175	175	-	-
	2 x 1½, 2½ x 2, 3 x 2	60.3 x 48.3, 73.0 x 60.3, 88.9 x 60.3	Sch 10, Sch 40	350	350	350	-	-
	3 x 2½, 4 x 2, 4 x 2½	88.9 x 73.0, 114.3 x 60.3, 114.3 x 73.0	Sch 10, Sch 40	350	350	350	-	-
	4 x 3, 5 x 4	114.3 x 88.9, 141.3, 114.3	Sch 10, Sch 40	350	350	300	-	-
	6 x 4, 6 x 5	168.3 x 114.3 x 1638.3 x 141.3	Sch 10, Sch 40	350	350	300	-	-
	8 x 6	219.1 x 168.3	Sch 40	350	350	300	-	-
	2 x 1½, 2½ x 2, 3 x 2	60.3 x 48.3, 73.0 x 60.3, 88.9 x 60.3	DF, EZT, FF, GL, MF	300	300	300	-	-
	2 x 1½, 2½ x 2, 3 x 2	60.3 x 48.3, 73.0 x 60.3, 88.9 x 60.3	MT, MLT, SF, STF, TL	300	300	300	-	-
	4 x 2	114.3 x 60.3	DF, EZT, FF, GL, MF	300	300	300	-	-
	4 x 2	114.3 x 60.3	MT, MLT, SF, STF, TL	300	300	300	-	-
	3 x 2½, 4 x 2½, 4 x 3	88.9 x 73.0, 114.3 x 73.0, 114.3 x 88.9	DF, MF, SF	300	300	300	-	-
	4 x 2½, 4 x 3	114.3 x 73.0, 114.3 x 88.9	FF, STF	300	300	300	-	-
	5 x 4, 6 x 4	141.3 x 114.3, 168.3 x 114.3	DF, FF, SF, STF	300	300	300	-	-
	3 x 2, 3 x 2½	88.9 x 60.3, 88.9 x 73.0	EZ	300	300	300	-	-
	2 x 1½	60.3 x 48.3	Gal 7, Gal Flo	300	300	300	-	-
		60.3 x 48.3, 73.0 x 60.3, 88.9 x 60.3	BS1387, ISO 4200	300	-	300	16	20
		88.9 x 76.1, 114.3 x 60.3, 114.3 x 76.1	BS1387, ISO 4200	300	-	300	16	20
		114.3 x 88.9	BS1387, ISO 4200	300	-	300	16	20
		168.3 x 114.3, 219.1 x 168.3	ISO 4200	300	-	300	16	20
		139.7 x 114.3	BS1387, ISO 4200	300	-	300	16	-
		165.1 x 114.3	BS1387, ISO 4200	300	-	300	-	20
 Figure 40-5•	1¼, 1½, 2 x ½, ¾, 1	42.4, 48.3, 60.3 x 21.3, 26.7, 33.7	Sch 5, Sch 10, Sch 40	175	175	175	-	-
	1¼, 1½, 2 x ½, ¾, 1	42.4, 48.3, 60.3 x 21.3, 26.7, 33.7	BLT, DF, DT, GL, LS, MF	175	175	175	-	-
	1¼, 1½, 2 x ½, ¾, 1	42.4, 48.3, 60.3 x 21.3, 26.7, 33.7	MT, MLT, TL, WLS, XL	175	175	175	-	-
	1¼, 1½, 2 x ½, ¾, 1	42.4, 48.3, 60.3 x 21.3, 26.7, 33.7	Gal 7, Gal Flo	175	175	175	-	-
	1¼, 1½ x ½, ¾, 1	42.4, 48.3 x 21.3, 26.7, 33.7	EZT	175	175	175	-	-
	1½ x ½, ¾, 1	48.3 x 21.3, 26.7, 33.7	FF	175	175	175	-	-
	2½ x ½, ¾, 1	73.0 x 21.3, 26.7, 33.7	Sch 10, Sch 40	175	175	175	-	-
	2½ x ½, ¾, 1	73.0 x 21.3, 26.7, 33.7	DF, MF, STF, XL	175	175	175	-	-
	1½, 2 x ½, ¾, 1	48.3, 60.3 x 21.3, 26.7, 33.7	STF	175	175	175	-	-

- Figure 40-5 Straps are UL and ULC Listed and FM Approved with NPT and ISO threaded outlets as specified in the chart.

Figure	Nominal Size Inches	Nominal Size mm	Pipe Schedule	Rated Pressure (psi-UL, ULC and FM; bar LPCB and VdS)				
				UL	ULC	FM	VdS	LPCB
 Figure 730 Threaded*‡	2 x 1/2, 3/4, 1, 1 1/4, 1 1/2	60.3 x 21.3, 26.7, 33.7, 42.4, 48.3	Sch 5	175	175	175	-	-
	2 x 1/2, 3/4, 1, 1 1/4, 1 1/2	60.3 x 21.3, 26.7, 33.7, 42.4, 48.3	Sch 10, Sch 40	300	300	300	-	-
	2 1/2 x 1/2, 3/4, 1, 1 1/4, 1 1/2, 2	73.0 x 21.3, 26.7, 33.7, 42.4, 48.3, 60.3	Sch 10, Sch 40	300	300	300	-	-
	3, 4 x 1/2, 3/4, 1	88.9, 114.3 x 21.3, 26.7, 33.7	Sch 10, Sch 40	300	300	300	-	-
	4 x 2 1/2, 4 x 3	114.3 x 73.0, 4 x 88.9	Sch 10, Sch 40	300	300	300	-	-
	5 x 2, 5 x 2 1/2	141.3 x 60.3, 141.3 x 73.0	Sch 10, Sch 40	300	300	300	-	-
	6 x 1 1/2, 2, 2 1/2, 3, 4	168.3 x 48.3, 60.3, 73.0, 88.9, 114.3	Sch 10, Sch 40	300	300	300	-	-
	2 x 1/2, 3/4, 1, 1 1/4, 1 1/2	60.3 x 21.3, 26.7, 33.7, 42.4, 48.3	BLT, DT, EZT, FF, GL, MF	300	300	300	-	-
	2 x 1/2, 3/4, 1, 1 1/4, 1 1/2	60.3 x 21.3, 26.7, 33.7, 42.4, 48.3	MT, MLT, STF, TL, WLS	300	300	300	-	-
	2 x 1/2, 3/4, 1, 1 1/4, 1 1/2	60.3 x 21.3, 26.7, 33.7, 42.4, 48.3	Gal 7, Gal Flo	300	300	300	-	-
	2 x 1/2, 3/4, 1	60.3 x 21.3, 26.7, 33.7	DF	300	300	300	-	-
	2 1/2, 3, 4 x 1/2, 3/4, 1	73.0, 88.9, 114.3 x 21.3, 26.7, 33.7	DF, FF, MF, STF	300	300	300	-	-
	2 x 1 1/4, 1 1/2	60.3 x 42.4, 48.3	DF	300	300	300	-	-
	3, 4 x 2	88.9, 114.3 x 60.3	DF, FF, MF, STF	300	300	300	-	-
	4 x 2 1/2	114.3 x 73.0	DF, FF, MF, STF	300	300	300	-	-
	4 x 3	114.3 x 88.9	FF, MF, STF	300	300	300	-	-
		76.1 x 21.3, 26.7, 33.7	BS1387, ISO 4200	300	-	300	16	20
		139.7 x 48.3, 88.9	BS1387, ISO 4200	300	-	300	16	20
		165.1 x 42.4	BS1387, ISO 4200	300	-	300	16	20
		60.3 x 21.3, 26.7, 33.7, 42.4, 48.3	BS1387, ISO 4200	-	-	-	16	20
		76.1 x 42.4, 48.3, 60.3	BS1387, ISO 4200	-	-	-	16	20
		88.9 x 21.3, 26.7, 33.7, 42.4, 48.3, 60.3	BS1387, ISO 4200	-	-	-	16	20
		114.3 x 21.3, 26.7, 33.7, 42.4	BS1387, ISO 4200	-	-	-	16	20
		114.3 x 48.3, 76.1, 88.9	BS1387, ISO 4200	-	-	-	16	20
		165.1 x 48.3, 60.3, 76.1, 88.9, 114.3	BS1387, ISO 4200	-	-	-	-	20
		139.7 x 60.3, 76.1	BS1387, ISO 4200	-	-	-	16	-
		168.3 x 48.3, 60.3, 73.0	ISO 4200	-	-	-	16	20
		168.3, 219.1 x 76.1, 88.9, 114.3	ISO 4200	-	-	-	16	20
 Figure 730 Grooved**‡	2 x 1 1/2	60.3 x 48.3	Sch 5	175	175	175	-	-
	2, 2 1/2, 3, 4, 5, 6 x 1 1/2	60.3, 73.0, 88.9, 114.3, 141.3, 168.3 x 48.3	Sch 10, Sch 40	300	300	300	-	-
	3, 4, 5 x 2, 2 1/2	88.9, 114.3, 141.3 x 60.3, 73.0	Sch 10, Sch 40	300	300	300	-	-
	4 x 3, 5 x 3	114.3 x 88.9, 141.3 x 88.9	Sch 10, Sch 40	300	300	300	-	-
	6 x 2 1/2, 3, 4	168.3 x 48.3, 73.0, 88.9, 114.3	Sch 10, Sch 40	250	250	250	-	-
	8 x 2 1/2, 3, 4	219.1 x 73.0, 88.9, 114.3	Sch 10, Sch 40	300	300	300	-	-
	2, 2 1/2, 3, 4 x 1 1/2	60.3, 73.0, 88.9, 114.3 x 48.3	DF	300	300	300	-	-
	3, 4 x 2	88.9, 114.3 x 60.3	DF	300	300	300	-	-
	2 x 1 1/2	60.3 x 48.3	BLT, TL	300	300	300	-	-
	3 x 1 1/2	88.9 x 48.3	EZ	300	300	300	-	-
		139.7 x 48.3, 88.9	BS1387, ISO 4200	300	-	300	16	20
		165.1 x 42.4, 48.3, 60.3, 76.1	BS1387, ISO 4200	300	-	300	16	20
		60.3 x 42.4, 48.3	BS1387, ISO 4200	-	-	-	16	20
		76.1 x 42.4, 48.3, 60.3	BS1387, ISO 4200	-	-	-	16	20
		88.9 x 42.4, 48.3, 60.3	BS1387, ISO 4200	-	-	-	16	20
		114.3 x 42.4, 48.3, 60.3, 76.1, 88.9	BS1387, ISO 4200	-	-	-	16	20
		165.1 x 48.3, 60.3, 76.1, 88.9, 114.3	BS1387, ISO 4200	-	-	-	-	20
		139.7 x 60.3, 76.1	BS1387, ISO 4200	-	-	-	16	-
		168.3 x 48.3, 60.3, 73.0	ISO 4200	-	-	-	16	20
		168.3, 219.1 x 76.1, 88.9, 114.3	ISO 4200		-	-	-	16

* Figure 730 Threaded Mechanical Outlets are UL and ULC Listed and FM Approved in both the Tee and Cross configuration with NPT and ISO threaded outlets as specified in the chart.

** Figure 730 Grooved Mechanical Outlets are UL and ULC Listed and FM Approved in both the Tee and Cross configuration.

‡ Figure 730 Threaded and Grooved Mechanical Outlets are VdS Approved in the Tee configuration only.

Grinnell® products are UL and ULC Listed and FM, LPCB and VdS Approved, as specified in the charts, for the pressure ratings shown for use in Fire Protection Systems (automatic sprinkler, open sprinkler and standpipe) and connections to such systems. The charts were developed from the latest Listings and Approval data available at the time of publication. Listings are subject to changes and additions by the approval bodies. For Dry Pipe systems or Freezer Systems, use Tri-Seal Gaskets and petroleum free silicone lubricant. Follow installation instructions provided in the Installation Handbook IH-1000.

Figure	Nominal Size Inches	Nominal Size mm	Pipe Schedule	Rated Pressure (psi-UL,ULC,FM; Bar LPCB and VdS)				
				UL	ULC	FM	VdS	LPCB
 Figure 577	1-1/4, 1-1/2, 2	42.4, 48.3, 60.3	FLF, MF, XL, GL, 10, 40, CT, DF, TL, WLS, MT, MLT	300	300	300		
	2-1/2, 3, 4	73.0, 88.9, 114.3	FLF, MF, DF	300	300	300		
	2-1/2, 3	73.0, 88.9	FF, XL	300	300	300		
	1-1/4, 1-1/2, 2, 2-1/2, 3, 4, 6, 8	42.4, 48.3, 60.3, 73.0, 88.9, 114.3, 168.3, 219.1	10	300	300	300		
	1-1/4, 1-1/2, 2, 2-1/2, 3, 4, 6	42.4, 48.3, 60.3, 73.0, 88.9, 114.3, 168.3	40	300	300	300		
	1, 1-1/4, 1-1/2, 2	33.7, 42.4, 48.3, 60.3	5	175	175	175		
	3, 4, 6	88.9, 114.3, 168.3	EZF	300	300	300		
	1 1/4	42.4	EZT	300	300	300		
	1-1/2, 2	48.3, 60.3	EZT, FF	300	300	300		
	1-1/2, 2, 2-1/2, 3, 4	48.3, 60.3, 73.0, 88.9, 114.3	STF	300	300	300		
	4	114.3	STF	250	250	250		
	8	219.1	0.188 in. wall	300	300	300		
	1	33.7	10, 40, XL, TL, DF, BLT, DL, DT, MT, WLS, WST, GL, MLT, EZT, ET, EL, 5, BS1387M, ISO 4200	300	300	300		
	5	141.3	10	300	300	300		
	5	141.3	40	300	300	300		
		76.1mm, 165mm	BS1387M, ISO 4200	300		300		
		139.7mm	ISO 4200	300		300		
	1, 1-1/4, 1-1/2, 2, 3, 4	33.7, 42.4, 48.3, 60.3, 88.9, 114.3	BS1387M, ISO 4200					20 bar
		76.1, 165.1	BS1387M, ISO 4200					20 bar
	6, 8	168.3, 219.1	ISO 4200					20 bar
	1, 1-1/4, 1-1/2, 2, 3, 4, 6, 8	33.7, 42.4, 48.3, 60.3, 88.9, 114.3, 168.3, 219.1	ISO 4200				16 bar	
		76.1, 139.7	ISO 4200				16 bar	

Pipe Schedule Key

STF - Steady Flow Listed/Approved steel sprinkler pipe manufactured by AMS Tube Corp.

BLT - Black Light Wall Threadable Listed/Approved steel sprinkler pipe manufactured by Allied Tube and Conduit.

DF - Dyna-Flow Listed/Approved steel sprinkler pipe manufactured by Allied Tube and Conduit.

DT - Dyna-Thread Listed/Approved steel sprinkler pipe manufactured by Allied Tube and Conduit.

SF - Super-Flow Listed/Approved steel sprinkler pipe manufactured by Allied Tube and Conduit.

XL - Extra Light Weight Listed/Approved steel sprinkler pipe manufactured by Allied Tube and Conduit.

UE - Ultra-Eddy Listed/Approved steel sprinkler pipe manufactured by Bull Moose Tube Company.

TL - TL Listed/Approved steel sprinkler pipe manufactured by Central Grooved Piping Products.

LS - Listed/Approved steel sprinkler pipe manufactured by Century Tube Corporation.

ID - IDOD Listed/Approved steel sprinkler pipe manufactured by IDOD Systems.

GAL-FLO - Listed/Approved steel sprinkler pipe manufactured by IDOD Systems.

GAL-7 - Listed/Approved steel sprinkler pipe manufactured by IDOD Systems.

EZ - EZ-Flow Listed/Approved steel sprinkler pipe manufactured by Northwest Pipe and Casting Company.

FLF - Fire Line Flow Listed/Approved steel sprinkler pipe manufactured by Western International Forest Products.

MF - Mega Flow Listed/Approved steel sprinkler pipe manufactured by Wheatland Tube Company.

MLT - Mega Light Listed/Approved steel sprinkler pipe manufactured by Wheatland Tube Company.

MT - Mega Thread Listed/Approved steel sprinkler pipe manufactured by Wheatland Tube Company.

SL - Listed/Approved steel sprinkler pipe manufactured by Wheatland Tube Company.

WLS - WLS Listed/Approved steel sprinkler pipe manufactured by Wheatland Tube Company.

WST - WST Listed/Approved steel sprinkler pipe manufactured by Wheatland Tube Company.

GL - GL Listed/Approved steel sprinkler pipe manufactured by Wheatland Tube Company.

EZT - EZ Thread Listed/Approved steel sprinkler pipe manufactured by Youngstown Tube Company.

FF - Fire-Flo Listed/Approved steel sprinkler pipe manufactured by Youngstown Tube Company.

5 - Schedule 5 steel sprinkler pipe

10 - Schedule 10 steel sprinkler pipe

20 - Schedule 20 steel sprinkler pipe

30 - Schedule 30 steel sprinkler pipe

40 - Schedule 40 steel sprinkler pipe

BS1387m - British Standard Medium Listed/Approved steel sprinkler tube.

ISO4200 - ISO Standard Listed/Approved steel sprinkler tube.

JIS G3452 - Japanese International Standard

Note: Cut and roll grooved references are for pipe runs and also grooved outlets.

Figure ADACAP®

Figure 201
45° Elbow

Figure 210
90° Elbow

Figure 219
Tee

Figure 260
End Cap

Figure 250
Concentric
Reducer

Figure	Nominal Size Inches	Nominal Size mm	Rated Pressure (psi-UL,ULC,FM; Bar LPCB and VdS)				
			UL	ULC	FM	VdS	LPCB
ADACAP®*	1 1/2 x 1/2, 3/4, 1	42.4 x 21.3, 26.7, 33.7	300	300	300	-	-
	2 x 1/2, 3/4, 1	48.3 x 21.3, 26.7, 33.7	300	300	300	-	-
	2 1/2 x 1/2, 3/4, 1	60.3 x 21.3, 26.7, 33.7	300	300	300	-	-
Figure 201	1	33.7	500	500	500	-	-
	1 1/4, 1 1/2, 2, 3, 4	42.4, 48.3, 60.3, 88.9, 114.3	500	500	500	16	20
	6, 8	168.3, 219.1	500	500	500	16	20
	10	273.0	450	450	450	16	20
	12	323.9	450	450	400	16	20
	2 1/2, 5	73.0, 141.3	500	500	500	-	-
		76.1	500	-	500	16	20
		165.1	500	-	500	-	20
		139.7	500	-	500	16	-
		108.0, 133.0, 159.0, 216.3	300	-	300	-	-
Figure 210	1	33.7	500	500	500	-	-
	1 1/4, 1 1/2, 2, 3, 4	42.4, 48.3, 60.3, 88.9, 114.3	500	500	500	16	20
	6, 8	168.3, 219.1	500	500	500	16	20
	10	273.0	450	450	450	16	20
	12	323.9	450	450	400	16	20
	2 1/2, 5	73.0, 141.3	500	500	500	-	-
		76.1	500	-	500	16	20
		165.1	500	-	500	-	20
		139.7	500	-	500	16	-
		108.0, 133.0, 159.0, 216.3	300	-	300	-	-
Figure 219	1	33.7	500	500	500	-	-
	1 1/4, 1 1/2, 2, 3, 4	42.4, 48.3, 60.3, 88.9, 114.3	500	500	500	16	20
	6, 8	168.3, 219.1	500	500	500	16	20
	10	273.0	450	450	450	16	20
	12	323.9	450	450	400	16	20
	2 1/2, 5	73.0, 141.3	500	500	500	-	-
		76.1	500	-	500	16	20
		165.1	500	-	500	-	20
		139.7	500	-	500	16	-
		108.0, 133.0, 159.0, 216.3	300	-	300	-	-
Figure 260	1 1/4, 1 1/2, 2, 3, 4	42.4, 48.3, 60.3, 88.9, 114.3	500	500	500	16	20
	6, 8	168.3, 219.1	500	500	500	16	20
	10	273.0	450	450	450	16	20
	12	323.9	450	450	400	16	20
	2 1/2, 5	73.0, 141.3	500	500	500	-	-
		76.1	500	-	500	16	20
		165.1	500	-	500	-	20
		139.7	500	-	500	16	-
Figure 250	1 1/2, x 1, 2 x 1	48.3 x 33.7, 60.3 x 33.7	500	500	500	16	-
	2 x 1 1/4, 2 x 1 1/2	60.3 x 42.4, 60.3 x 48.3	500	500	500	16	20
	2 1/2 x 2, 3 x 2 1/2, 4 x 2 1/2	73.0 x 60.3, 88.9 x 73.0, 114.3 x 73.0	500	500	500	16	20
	4 x 2, 6 x 2	114.3 x 60.3, 168.3 x 60.3	500	500	500	16	-
	3 x 2, 4 x 3, 6 x 4	88.9 x 60.3, 114.3 x 88.9, 168.3 x 114.3	500	500	500	16	20
	5 x 4, 6 x 5	141.3 x 114.3, 168.3 x 141.3	500	500	500	-	-
		76.1 x 48.3, 76.1 x 60.3	500	500	500	16	20
		88.9 x 76.1, 114.3 x 76.1	500	500	500	16	20
		139.7 x 88.9, 139.7 x 114.3	500	500	500	16	-
		165.1 x 114.3	500	500	500	-	20
		168.3 x 76.1, 168.3 x 139.7	500	500	500	16	-
		165.1 x 88.9, 165.1 x 139.7	500	-	500	-	-

* ADACAPs are UL and ULC Listed and FM Approved with NPT and ISO threaded outlets.

Figure 501
45° Elbow

Figure 510
90° Elbow

Figure 519
Tee

Figure 501S
45° Elbow

Figure 510S
90° Elbow

Figure 519S
Tee

Figure 510DE
Drain Elbow

Figure	Nominal Size Inches	Nominal Size mm	Rated Pressure (psi-UL,ULC,FM; Bar LPCB and VdS)				
			UL	ULC	FM	VdS	LPCB
Figure 501	1¼, 1½, 2, 3, 4	42.4, 48.3, 60.3, 88.9, 114.3	300	300	300	16	20
	6, 8	168.3, 219.1	300	300	300	16	20
	2½, 5	73.0, 141.3	300	300	300	-	-
		76.1	300	300	300	16	20
		139.7	300	300	300	16	-
		165.1	300	300	300	-	20
Figure 510	1¼,1½, 2, 3, 4	42.4, 48.3, 60.3, 88.9, 114.3	300	300	300	16	20
	6, 8	168.3, 219.1	300	300	300	16	20
	2½, 5	73.0, 141.3	300	300	300	-	-
		76.1	300	300	300	16	20
		139.7	300	300	300	16	-
		165.1	300	300	300	-	20
Figure 519	1¼, 1½, 2, 3, 4	42.4, 48.3, 60.3, 88.9, 114.3	300	300	300	16	20
	6, 8	168.3, 219.1	300	300	300	16	20
	2½, 5	73.0, 141.3	300	300	300	-	-
		76.1	300	300	300	16	20
		139.7	300	300	300	16	-
		165.1	300	300	300	-	20
Figure 501S	2, 3, 4, 6, 8	60.3, 88.9, 114.3, 168.3, 219.1	300	300	300	16	20
	2½, 5	73.0, 141.3	300	300	300	-	-
		76.1	300	300	300	16	20
		139.7	300	300	300	16	-
		165.1	300	300	300	-	20
Figure 510S	2, 3, 4, 6, 8	60.3, 88.9, 114.3, 168.3, 219.1	300	300	300	16	20
	2½, 5	73.0, 141.3	300	300	300	-	-
		76.1	300	300	300	16	20
		139.7	300	300	300	16	-
		165.1	300	300	300	-	20
Figure 519S	2, 3, 4, 6, 8	60.3, 88.9, 114.3, 168.3, 219.1	300	300	300	16	20
	2½, 5	73.0, 141.3	300	300	300	-	-
		76.1	300	300	300	16	20
		139.7	300	300	300	16	-
		165.1	300	300	300	-	20
Figure 510DE	2½, 3, 4, 5	73.0, 88.9, 114.3, 141.3	300	300	300	-	-
	6, 8	168.3, 219.1	300	300	300	-	-

Fabricated Fittings

Figure	Nominal Size Inches	Rated Pressure (psi)	
		UL	FM
Figure 391 Groove x Male Threaded Adapter Nipples	1,1¼,1½	300	300
	2,2½	300	300
	3,4,5	300	300
	6,8	300	300
	10,12	300	300
Figure 392 Groove x Groove Adapter Nipples	1,1¼,1½	300	300
	2,2½	300	300
	3,4,5	300	300
	6,8	300	300
	10,12	300	300
Figure 393 Groove x Bevel Adapter Nipples	1,1¼,1½	300	300
	2,2½	300	300
	3,4,5	300	300
	6,8	300	300
	10,12	300	300
Figure 312 22½° Elbow	1¼,1½	300	300
	2,2½	300	300
	3,4,5	300	300
	6,8	300	300
	10,12	300	300
Figure 313 11¼° Elbow	1¼,1½	300	300
	2,2½	300	300
	3,4,5	300	300
	6,8	300	300
	10,12	300	300

Figure	Nominal Size Inches	Rated Pressure (psi)	
		UL	FM
Figure 321 Reducing Tee	1¼, 1½	300	300
	2, 2½	300	300
	3, 4, 5	300	300
	6, 8	300	300
	10, 12	300	300
Figure 327 Cross	1, 1¼,1½	300	300
	2, 2½	300	300
	3, 4, 5	300	300
	6, 8	300	300
	10, 12	300	300
Figure 341 Groove Flange Adapter 150 lbs.	1,1¼, 1½	300	300
	2, 2½	300	300
	3, 4, 5	300	300
	6, 8	300	300
	10, 12	300	300
Figure 350 Concentric Groove x Groove Reducer	1¼, 1½	300	300
	2, 2½	300	300
	3, 4, 5	300	300
	6, 8	300	300
	10, 12	300	300

General Notes: It is the Designer's responsibility to select products suitable for the intended service and to ensure that pressure ratings and performance data is not exceeded. Always read and understand the installation instructions (IH-1000). Never remove any piping component or correct or modify any piping deficiencies without first depressurizing and draining the system. Material and gasket selection should be verified to be compatible for the specific application.

ISO 9001 Certified Company

G-FIRE Grooved Fittings, Ductile Iron

General Description

GRINNELL G-FIRE Grooved Fittings provide an economical and efficient method of changing direction, adding an outlet, reducing, or capping piping systems. The G-FIRE grooved fittings are available in ductile iron or fabricated steel as indicated.

Note: *Figure 510S and 519S fittings are special short radius fittings with smaller center to end dimensions than standard grooved fittings. Depending on the size and coupling used, there may be interferences at the bolt pads that require repositioning of the coupling orientation. The use of flange adapters is not recommended with Figures 510S and 519S fittings. Contact Johnson Controls for details.*

NOTICE

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

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

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

IMPORTANT

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

The owner is responsible for maintaining their system and devices in proper operating condition. Contact the installing contractor or product manufacturer with any questions

Technical Data

Approvals
UL and ULC Listed
FM Approved
VdS Approved
LPCB Certified

Note: *LPCB Certification applies to Figures 211, 212, 221, 250, 260, 501, 510, 511, 512, 519, 550, 510S, and 519S.*

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

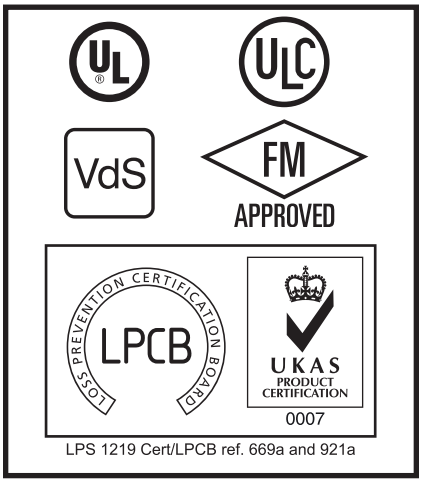
Protective Coatings
- Non-lead orange paint (USA)
- RAL red or non-lead paint (EMEA and APAC)
- Hot dipped galvanized conforming to ASTM A153

Care and Maintenance

The following inspection procedure must be performed as indicated, in addition to any specific requirements of the NFPA. Any impairments must be immediately corrected.

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

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



LPS 1219 Cert/LPCB ref. 669a and 921a

of the NATIONAL FIRE PROTECTION ASSOCIATION (e.g., NFPA 25), in addition to the standards of any authority having jurisdiction. Contact the installing contractor or product manufacturer with any questions.

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

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

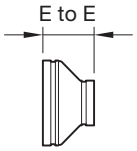


FIGURE 250
CAST CONCENTRIC REDUCER

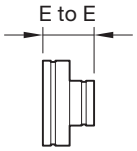


FIGURE 350
FABRICATED CONCENTRIC REDUCER

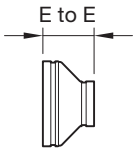


FIGURE 550(1)
CAST CONCENTRIC REDUCER

Nominal Pipe Size		Figure 250 Cast		Figure 350 Fabricated		Figure 550[a] Cast	
ANSI Inches (DN)	O.D. Inches (mm)	Nominal E to E Inches (mm)	Approx. Weight Lbs. (kg)	Nominal E to E Inches (mm)	Approx. Weight Lbs. (kg)	Nominal E to E Inches (mm)	Approx. Weight Lbs. (kg)
1-1/4 x 1 (32 x 25)	1.66 x 1.31 (42,4 x 33,4)	2.50 (63,5)	0.7 (0,3)	—	—	2.50 (63,5)	0.7 (0,3)
1-1/2 x 1 (40 x 25)	1.90 x 1.31 (48,3 x 33,4)	—	—	2.50 (63,5)	0.7 (0,3)	—	—
1-1/2 x 1-1/4 (40 x 32)	1.90 x 1.66 (48,3 x 42,4)	2.50 (63,5)	0.8 (0,3)	—	—	2.50 (63,5)	0.8 (0,3)
2 x 1 (50 x 25)	2.37 x 1.31 (60,3 x 33,4)	—	—	2.50 (63,5)	0.9 (0,4)	—	—
2 x 1-1/4 (50 x 32)	2.37 x 1.66 (60,3 x 42,4)	—	—	2.50 (63,5)	0.9 (0,4)	—	—
2 x 1-1/2 (50 x 40)	2.37 x 1.90 (60,3 x 48,3)	—	—	2.50 (63,5)	1.0 (0,5)	—	—
2-1/2 x 1 (65 x 25)	2.87 x 1.31 (73,0 x 33,4)	—	—	2.50 (63,5)	1.2 (0,5)	—	—
2-1/2 x 1-1/4 (65 x 32)	2.87 x 1.66 (73,0 x 42,4)	2.50 (63,5)	1.4 (0,6)	—	—	2.50 (63,5)	1.4 (0,6)
2-1/2 x 1-1/2 (65 x 40)	2.87 x 1.90 (73,0 x 48,3)	2.50 (63,5)	1.4 (0,6)	—	—	2.50 (63,5)	1.4 (0,6)
2-1/2 x 2 (65 x 50)	2.87 x 2.37 (73,0 x 60,3)	2.50 (63,5)	1.3 (0,6)	—	—	2.50 (63,5)	1.3 (0,6)
76mm x 1-1/4 (65 x 32)	3.00 x 1.66 (76,1 x 42,4)	2.50 (63,5)	1.4 (0,6)	—	—	2.50 (63,5)	1.4 (0,6)
76mm x 1-1/2 (65 x 40)	3.00 x 1.90 (76,1 x 48,3)	2.50 (63,5)	1.4 (0,6)	—	—	2.50 (63,5)	1.4 (0,6)
76mm x 2 (65 x 50)	3.00 x 2.37 (76,1 x 60,3)	2.50 (63,5)	1.5 (0,7)	—	—	2.50 (63,5)	1.5 (0,7)
3 x 1 (80 x 25)	3.50 x 1.31 (88,9 x 33,4)	—	—	2.50 (63,5)	1.3 (0,6)	—	—
3 x 1-1/4 (80 x 32)	3.50 x 1.66 (88,9 x 42,4)	—	—	2.50 (63,5)	1.3 (0,6)	—	—
3 x 1-1/2 (80 x 40)	3.50 x 1.90 (88,9 x 48,3)	2.50 (63,5)	1.8 (0,8)	—	—	2.50 (63,5)	1.8 (0,8)
3 x 2 (80 x 50)	3.50 x 2.37 (88,9 x 60,3)	2.50 (63,5)	1.7 (0,8)	—	—	2.50 (63,5)	1.7 (0,8)
3 x 2-1/2 (80 x 65)	3.50 x 2.87 (88,9 x 70,3)	2.50 (63,5)	1.7 (0,8)	—	—	2.50 (63,5)	1.7 (0,8)
3 x 76mm (80 x 65)	3.50 x 3.00 (88,9 x 76,1)	2.50 (63,5)	2.0 (0,9)	—	—	2.50 (63,5)	2.0 (0,9)
4 x 1 (100 x 25)	4.50 x 1.31 (114,3 x 33,4)	—	—	3.00 (76,2)	2.9 (1,1)	—	—
4 x 1-1/4 (100 x 32)	4.50 x 1.66 (114,3 x 42,4)	—	—	3.00 (76,2)	2.2 (1,0)	—	—
4 x 1-1/2 (100 x 40)	4.50 x 1.90 (114,3 x 48,3)	—	—	3.00 (76,2)	2.3 (1,0)	—	—
4 x 2 (100 x 50)	4.50 x 2.37 (114,3 x 60,3)	3.00 (76,2)	2.4 (1,1)	—	—	3.00 (76,2)	2.4 (1,1)
4 x 2-1/2 (100 x 65)	4.50 x 2.87 (114,3 x 73,0)	3.00 (76,2)	2.7 (1,2)	—	—	3.00 (76,2)	2.7 (1,2)

a. Figure 550 is available for the America market only.

FIGURE 1 (1 OF 3)
FIGURES 250, 350, AND 550 CONCENTRIC REDUCERS
NOMINAL DIMENSIONS

Nominal Pipe Size		Figure 250 Cast		Figure 350 Fabricated		Figure 550[a] Cast	
ANSI Inches (DN)	O.D. Inches (mm)	Nominal E to E Inches (mm)	Approx. Weight Lbs. (kg)	Nominal E to E Inches (mm)	Approx. Weight Lbs. (kg)	Nominal E to E Inches (mm)	Approx. Weight Lbs. (kg)
4 x 76mm (100 x 65)	4.50 x 3.00 (114,3 x 76,1)	3.00 (76,2)	3.2 (1,5)	—	—	3.00 (76,2)	3.2 (1,5)
4 x 3 (100 x 80)	4.50 x 3.50 (114,3 x 88,9)	3.00 (76,2)	2.8 (1,3)	—	—	3.00 (76,2)	2.8 (1,3)
139mm x 3 (125 x 80)	5.50 x 3.50 (139,7 x 88,9)	3.50 (88,9)	4.2 (1,9)	—	—	3.50 (88,9)	4.2 (1,9)
139mm x 4 (125 x 100)	5.50 x 4.50 (139,7 x 114,3)	3.50 (88,9)	4.4 (2,0)	—	—	3.50 (88,9)	4.4 (2,0)
5 x 2 (125 x 50)	5.56 x 2.37 (141,3 x 60,3)	—	—	3.50 (88,9)	4.6 (2,1)	—	—
5 x 2-1/2 (125 x 65)	5.56 x 2.87 (141,3 x 73,0)	—	—	3.50 (88,9)	4.5 (2,0)	—	—
5 x 3 (125 x 80)	5.56 x 3.50 (141,3 x 88,9)	3.50 (88,9)	4.2 1,9)	—	—	3.50 (88,9)	4.2 1,9)
5 x 4 (125 x 100)	5.56 x 4.50 (141,3 x 114,3)	3.50 (88,9)	4.4 (2,0)	—	—	3.50 (88,9)	4.4 (2,0)
165mm x 3 (150 x 80)	6.50 x 3.50 (165,1 x 88,9)	4.00 (101,6)	5.5 (2,5)	—	—	4.00 (101,6)	5.5 (2,5)
165mm x 4 (150 x 100)	6.50 x 4.50 (165,1 x 114,3)	4.00 (101,6)	6.0. (2,7)	—	—	4.00 (101,6)	6.0. (2,7)
165mm x 139mm (150 x 125)	6.50 x 5.50 (165,1 x 139,7)	4.00 (101,6)	5.6 (2,5)	—	—	4.00 (101,6)	5.6 (2,5)
6 x 1 (150 x 25)	6.63 x 1.31 (168.3 x 33.7)	4.00 (101,6)	4.7 (2,1)	—	—	4.00 (101,6)	4.7 (2,1)
6 x 1-1/2 (150 x 40)	6.63 x 1.90 (168.3 x 48.3)	4.00 (101,6)	5.0 (2,3)	—	—	4.00 (101,6)	5.0 (2,3)
6 x 2 (150 x 50)	6.63 x 2.37 (168,3 x 60,3)	4.00 (101,6)	5.3 (2,4)	—	—	4.00 (101,6)	5.3 (2,4)
6 x 2-1/2 (150 x 65)	6.63 x 2.87 (168,3 x 73,0)	4.00 (101,6)	5.7 (2,6)	—	—	4.00 (101,6)	5.7 (2,6)
6 x 76mm (150 x 65)	6.63 x 3.00 (168,3 x 76,1)	4.00 (101,6)	6.1 (2,7)	—	—	4.00 (101,6)	6.1 (2,7)
6 x 3 (150 x 80)	6.63 x 3.50 (168,3 x 88,9)	4.00 (101,6)	5.8 (2,6)	—	—	4.00 (101,6)	5.8 (2,6)
6 x 108mm (150 x 100)	6.63 x 4.25 (168,3 x 108,0)	—	—	4.00 (101,6)	6.0 (2,7)	—	—
6 x 4 (150 x 100)	6.63 x 4.50 (168,3 x 114,3)	4.00 (101,6)	6.0 (2,7)	—	—	4.00 (101,6)	6.0 (2,7)
6 x 139mm (150 x 100)	6.63 x 5.50 (168,3 x 139,7)	4.00 (101,6)	6.3 (2,3)	—	—	4.00 (101,6)	6.3 (2,3)
6 x 5 (150 x 125)	6.63 x 5.56 (168,3 x 141,3)	4.00 (101,6)	6.2 (2,8)	—	—	4.00 (101,6)	6.2 (2,8)
216mm x 2-1/2 (200 x 65)	8.52 x 2.87 (216,3 x 73,0)	—	—	5.00 (127,0)	12.1 (5,5)	—	—
8 x 3 (200 x 80)	8.63 x 3.50 (219,1 x 88,9)	5.00 (127,0)	11.5 (5,2)	—	—	5.00 (127,0)	11.5 (5,2)
8 x 4 (200 x 100)	8.63 x 4.50 (219,1 x 114,3)	5.00 (127,0)	10.7 (4,9)	—	—	5.00 (127,0)	10.7 (4,9)

a. Figure 550 is available for the America market only.

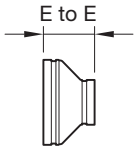


FIGURE 250
CAST CONCENTRIC REDUCER

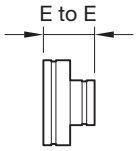


FIGURE 350
FABRICATED CONCENTRIC REDUCER

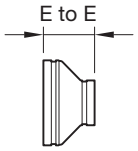


FIGURE 550 (1)
CAST CONCENTRIC REDUCER

FIGURE 1 (2 OF 3)
FIGURES 250, 350, AND 550 CONCENTRIC REDUCERS
NOMINAL DIMENSIONS

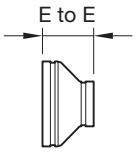


FIGURE 250
CAST CONCENTRIC
REDUCER

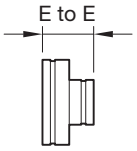


FIGURE 350
FABRICATED CONCENTRIC
REDUCER

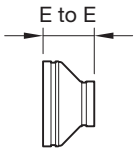


FIGURE 550 (1)
CAST CONCENTRIC
REDUCER

Nominal Pipe Size		Figure 250 Cast		Figure 350 Fabricated		Figure 550[a] Cast	
ANSI Inches (DN)	O.D. Inches (mm)	Nominal E to E Inches (mm)	Approx. Weight Lbs. (kg)	Nominal E to E Inches (mm)	Approx. Weight Lbs. (kg)	Nominal E to E Inches (mm)	Approx. Weight Lbs. (kg)
8 x 139mm (200 x 125)	8.63 x 5.50 (219,1 x 139.7)	5.00 (127,0)	10.0 (4,5)	—	—	5.00 (127,0)	10.0 (4,5)
8 x 5 (200 x 125)	8.63 x 5.56 (219,1 x 141,3)	5.00 (127,0)	10.8 (4,9)	—	—	5.00 (127,0)	10.8 (4,9)
8 x 165mm (200 x 150)	8.63 x 6.50 (219,1 x 165.1)	5.00 (127,0)	11.0 (5,0)	—	—	5.00 (127,0)	11.0 (5,0)
8 x 6 (200 x 150)	8.63 x 6.63 (219,1 x 168,3)	5.00 (127,0)	11.3 (5,1)	—	—	5.00 (127,0)	11.3 (5,1)
10 x 4 (250 x 100)	10.75 x 4.50 (273,0 x 114,3)	—	—	6.00 (152,4)	20.5 (9,3)	—	—
10 x 5 (250 x 125)	10.75 x 5.56 (273,0 x 141,3)	—	—	6.00 (152,4)	20.1 (9,1)	—	—
10 x 165mm (250 x 150)	10.75 x 6.50 (273,0 x 165,1)	6.00 (152,4)	17.8 (8,0)	—	—	6.00 (152,4)	17.8 (8,0)
10 x 6 (250 x 150)	10.75 x 6.63 (273,0 x 168,3)	6.00 (152,4)	16.3 (7,4)	—	—	6.00 (152,4)	16.3 (7,4)
10 x 8 (250 x 200)	10.75 x 8.63 (273,0 x 219,1)	6.00 (152,4)	18.3 (8,3)	—	—	6.00 (152,4)	18.3 (8,3)
12 x 4 (300 x 100)	12.75 x 4.50 (323,9 x 114,3)	7.00 (177,8)	22.7 (10,3)	—	—	7.00 (177,8)	22.7 (10,3)
12 x 6 (300 x 150)	12.75 x 6.63 (323,9 x 168,3)	7.00 (177,8)	23.6 (10,7)	—	—	7.00 (177,8)	24.2 (11,0)
12 x 8 (300 x 200)	12.75 x 8.63 (323,9 x 219,1)	7.00 (177,8)	25.2 (11,4)	—	—	7.00 (177,8)	25.8 (11,7)
12 x 10 (300 x 250)	12.75 x 10.75 (323,9 x 273,0)	7.00 (177,8)	28.2 (12,8)	7.00 (177,8)	28.2 (12,8)	7.00 (177,8)	28.2 (12,8)

a. Figure 550 is available for the America market only.

FIGURE 1 (3 OF 3)
FIGURES 250, 350, AND 550 CONCENTRIC REDUCERS
NOMINAL DIMENSIONS

Nominal Pipe Size		Figure 501 Cast 45° Elbow		Figure 510 Cast 90° Elbow	
ANSI Inches (DN)	O.D. Inches (mm)	Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)	Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)
1 (25)	1.0 (33,7)	1.7 (43,2)	0.6 (0,3)	2.25 (57,2)	0.8 (0,4)
1-1/4 (32)	1.7 (42,4)	1.8 (44,5)	0.8 (0,4)	2.8 (69,9)	1.1 (0,5)
1-1/2 (40)	1.9 (48,3)	1.8 (44,5)	1.0 (0,5)	2.8 (69,9)	1.4 (0,6)
2 (50)	2.4 (60,3)	2.0 (50,8)	1.3 (0,6)	3.3 (82,6)	2.0 (0,9)
2-1/2 (65)	2.9 (73,0)	2.3 (57,2)	2.1 (1,0)	3.8 (95,3)	2.8 (1,3)
76,1mm (65)	3.0 (76,1)	2.3 (57,2)	2.2 (1,0)	3.8 (95,3)	3.0 (1,3)
3 (80)	3.5 (88,9)	2.5 (63,5)	3.4 (1,5)	4.3 (108,0)	4.1 (1,9)
4 (100)	4.5 (114,3)	3.0 (76,2)	5.5 (2,5)	5.0 (127,0)	7.0 (3,2)
139,1mm (125)	5.5 (139,7)	3.3 (82,6)	7.2 (3,3)	5.5 (139,7)	10.3 (4,7)
165,1mm (150)	6.5 (165,1)	3.5 (88,9)	9.2 (4,2)	6.5 (165,1)	13.9 (6,3)
6 (150)	6.6 (168,3)	3.5 (88,9)	11.2 (5,1)	6.5 (165,1)	15.2 (6,9)
8 (200)	8.6 (219,1)	4.25 (108,0)	20.6 (9,3)	7.8 (196,9)	29.6 (13,4)
10 (250)	10.750 (273,0)	4.75 (120,7)	30.1 (13,7)	9.00 (228,6)	52.0 (23,6)
12 (300)	12.750 (323,9)	5.25 (133,4)	48.0 (22,0)	10.00 (254,0)	66.4 (30,1)

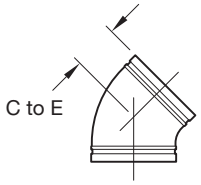


FIGURE 501
CAST 45° ELBOW

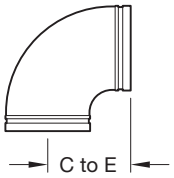


FIGURE 510
CAST 90° ELBOW

FIGURE 2
FIGURES 501 AND 510 ELBOWS
NOMINAL DIMENSIONS

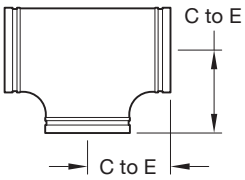


FIGURE 519
CAST TEE

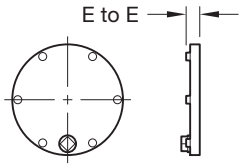


FIGURE 260(1)
CAST END CAP

Nominal Pipe Size		Figure 519 Cast Tee		Figure 260(a) Cast End Cap	
ANSI Inches (DN)	O.D. Inches (mm)	Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)	Nominal E to E Inches (mm)	Approx. Weight Lbs. (kg)
1 (25)	1.3 (33,4)	2.25 (57,2)	1.1 (0,5)	0.8 (21,1)	0.2 (0,1)
1-1/4 (32)	1.7 (42,4)	2.8 (69,9)	1.7 (0,8)	0.8 (21,1)	0.3 (0,1)
1-1/2 (40)	1.9 (48,3)	2.8 (69,9)	2.1 (1,00)	0.8 (21,1)	0.4 (0,2)
2 (50)	2.4 (60,3)	3.3 (82,6)	2.8 (1,3)	0.9 (23,4)	0.7 (0,3)
2-1/2 (65)	2.9 (73,0)	3.8 (95,3)	4.4 (2,0)	0.9 (23,4)	1.0 (0,5)
76,1mm (65)	3.0 (76,1)	3.8 (95,3)	4.5 (2,0)	0.9 (21,8)	1.3 (0,6)
3 (80)	3.5 (88,9)	4.3 (108,0)	6.5 (3,0)	0.9 (23,4)	1.4 (0,6)
4 (100)	4.5 (114,3)	5.0 (127,0)	9.5 (4,3)	1.0 (25,4)	2.6 (1,2)
139,1mm (125)	5.5 (139,7)	5.5 (139,7)	13.9 (6,3)	0.9 (23,4)	4.7 (2,1)
5 (125)	5.6 (141,3)	5.0 (127,0)	14.2 (6,4)	1.0 (25,4)	5.0 (2,3)
165,1mm (150)	6.5 (165,1)	6.5 (165,1)	19.7 (8,9)	0.9 (23,4)	6.4 (2,9)
6 (150)	6.6 (168,3)	6.5 (165,1)	22.4 (10,2)	1.0 (25,4)	6.2 (2,8)
8 (200)	8.6 (219,1)	7.8 (196,9)	39.8 (18,1)	1.1 (27,0)	7.1 (3,2)
10 (250)	10.8 (273,0)	9.00 (228,6)	64.2 (29,1)	1.0 (25,8)	24.5 (11,1)
12 (300)	12.8 (323,9)	10.00 (254,0)	110.0 (49,9)	1.0 (25,8)	31.0 (14,1)

a. Available with tapped plugs. Contact Johnson Controls.

FIGURE 3
FIGURES 519 TEE AND FIGURE 260 END CAP
NOMINAL DIMENSIONS

Nominal Pipe Size		Figure 510S 90° Elbow		Figure 519S Tee	
ANSI Inches (DN)	O.D. Inches (mm)	Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)	Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)
2 (50)	2.4 (60,3)	2.8 (69,9)	1.5 (0,7)	2.8 (69,9)	2.6 (1,2)
2-1/2 (65)	2.9 (73,0)	3.0 (76,2)	2.1 (1,0)	3.0 (76,2)	4.4 (2,0)
76,1mm (65)	3.0 (76,1)	3.0 (76,2)	2.3 (1,0)	3.0 (76,2)	3.1 (1,4)
3 (80)	3.5 (88,9)	3.4 (85,9)	3.0 (1,4)	3.8 (85,9)	6.5 (3,0)
4 (100)	4.5 (114,3)	4.0 (101,6)	5.0 (2,3)	4.0 (101,6)	10.7 (4,9)
139mm (125)	5.5 (139,7)	4.9 (124,0)	8.7 (3,9)	4.9 (124,0)	10.9 (5,0)
5 (125)	5.6 (141,3)	4.8 (123,0)	9.4 (4,3)	4.8 (123,0)	11.6 (5,3)
165,1mm (150)	6.5 (165,1)	5.5 (139,7)	11.4 (5,2)	5.5 (139,7)	14.8 (6,7)
6 (150)	6.6 (168,3)	5.5 (139,7)	12.1 (5,5)	5.5 (139,7)	15.0 (6,8)
8 (200)	8.6 (219,1)	6.9 (174,8)	22.2 (10,1)	6.9 (174,8)	39.8 (18,1)

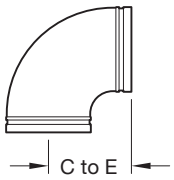


FIGURE 510S
90° ELBOW
SHORT PATTERN

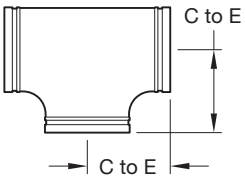
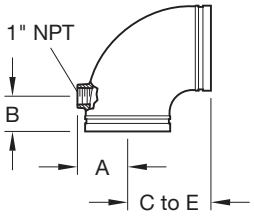


FIGURE 519S
TEE
SHORT PATTERN

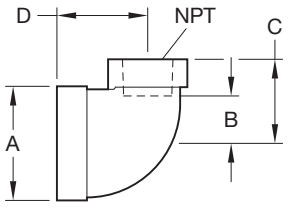
FIGURE 4
FIGURES 510S ELBOW AND FIGURE 519S TEE
NOMINAL DIMENSIONS



Nominal Pipe Size		Figure 510DE[a] 90° Drain Elbow			
ANSI Inches (DN)	O.D. Inches (mm)	Nominal C to E Inches (mm)	Nominal A Inches (mm)	Nominal B Inches (mm)	Approx. Weight Lbs. (kg)
2 (50)	2.4 (60,3)	3.8 (95,3)	2.0 (50,8)	2.8 (69,9)	3.1 (1,4)
2-1/2 (65)	2.9 (73,0)	3.8 (95,3)	2.0 (50,8)	2.8 (69,9)	2.2 (1,0)
3 (80)	3.5 (88,9)	4.3 (108,0)	2.3 (59,4)	2.8 (69,9)	6.0 (2,7)
4 (100)	4.5 (114,3)	5.0 (127,0)	2.9 (72,4)	2.8 (69,9)	8.6 (3,9)
6 (150)	6.6 (168,3)	6.5 (165,1)	3.9 (99,6)	2.8 (69,9)	18.0 (8,2)
8 (200)	8.6 (219,1)	7.8 (196,9)	5.00 (125,7)	2.8 (69,9)	31.0 (14,1)

a. Figure 510DE not available for the EMEA market.

FIGURE 5
FIGURE 510DE 90° DRAIN ELBOW
NOMINAL DIMENSIONS



Nominal Pipe Size		Dimensions- Inches (mm)				Approx. Weight Lbs. (kg)
ANSI Inches (DN)	Outlet NPT[1]	A O.D.	B Takeout	C	D	
1-1/2 (40)	1/2	1.9 (48,3)	1.3 (31,8)	1.8 (44,5)	1.9 (48,0)	0.8 (0,4)
	3/4		1.3 (31,8)	1.8 (44,5)	1.9 (48,0)	0.8 (0,4)
	1		1.4 (34,8)	2.0 (50,8)	2.0 (51,3)	0.9 (0,4)
2 (50)	1/2	2.4 (60,3)	1.3 (31,8)	1.8 (44,5)	1.9 (48,0)	0.9 (0,4)
	3/4		1.3 (31,8)	1.8 (44,5)	1.9 (48,0)	0.8 (0,4)
	1		1.4 (34,8)	2.0 (50,8)	2.0 (51,3)	1.1 (0,5)
2-1/2 (65)	1/2	2.9 (73,0)	1.5 (37,3)	2.0 (50,0)	1.9 (48,0)	1.8 (0,8)
	3/4		1.5 (37,3)	2.0 (50,0)	1.9 (48,0)	1.1 (0,5)
	1		1.4 (34,8)	2.0 (50,8)	2.0 (51,3)	1.1 (0,5)

NOTES
a. ISO threaded outlets are available upon request.
b. ADACAP not available for the EMEA market.
c. Rated pressure 300 psi (20,7 bar)

FIGURE 6
ADACAP
NOMINAL DIMENSIONS

Nominal Pipe Size		Figure 320 Fabricated Thread Tee		
ANSI Inches (DN)	**O.D. Inches (mm)**	**Nominal C to GE Inches (mm)**	**Nominal C to TE Inches (mm)**	**Approx. Weight Lbs. (kg)**
1 (25)	1.31 (33,4)	2.25 (57,2)	2.25 (57,2)	1.3 (0,6)
1-1/4 (32)	1.66 (42,4)	2.75 (69,9)	2.75 (69,9)	1.5 (0,7)
1-1/2 (40)	1.90 (48,3)	2.75 (69,9)	2.75 (69,9)	1.9 (0,9)
2 (50)	2.37 (60,3)	3.25 (82,6)	4.25 (108,0)	3.2 (1,5)
2-1/2 (65)	2.87 (73,0)	3.75 (95,3)	3.75 (95,3)	4.0 (1,8)
76mm (65)	3.00 (76,1)	3.75 (95,3)	3.75 (95,3)	4.5 (2,0)
3 (80)	3.50 (88,9)	4.25 (108,0)	6.00 (152,4)	6.0 (2,7)
4 (100)	4.50 (114,3)	5.00 (127,0)	7.25 (184,2)	11.0 (5,0)
139mm (125)	5.50 (139,7)	5.50 (139,7)	5.50 (139,7)	21.0 (9,5)
5 (125)	5.56 (141,3)	5.50 (139,7)	5.50 (139,7)	23.0 (10,5)
165mm (150)	6.50 (165,1)	6.50 (165,1)	6.50 (165,1)	25 (11,3)
6 (150)	6.63 (168,3)	6.50 (165,1)	6.50 (165,1)	28.0 (12,7)
8 (200)	8.63 (219,1)	7.75 (196,9)	7.75 (196,9)	38.7 (17,6)
10 (250)	10.75 (273,0)	9.00 (228,6)	9.00 (228,6)	72.1 (32,8)
12 (300)	12.75 (323,9)	10.00 (254,0)	10.00 (254,0)	92.5 (42,0)

a. Figure 320 not available for the EMEA market.

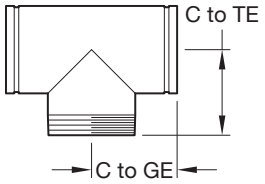


FIGURE 7
FIGURE 320 FABRICATED GROOVE X GROOVE X MALE THREAD TEES (SEGMENT WELDED) NOMINAL DIMENSIONS

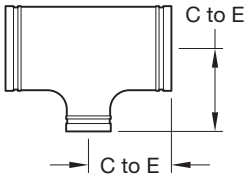


FIGURE 221
CAST TEE REDUCING
GROOVED
(SEGMENT WELDED)

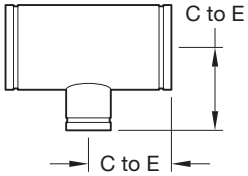


FIGURE 321
FABRICATED TEE REDUCING
GROOVED
(SEGMENT WELDED)

Nominal Pipe Size		Figure 221 Cast Reducing Tee		Figure 321 Fabricated Reducing Tee	
ANSI Inches (DN)	O.D. Inches (mm)	Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)	Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)
1-1/4 x 1-1/4 x 1 (32 x 32 x 25)	1.66 x 1.66 x 1.31 (42,4 x 42,4 x 33,4)	—	—	2.75 (69,9)	1.3 (0,6)
1-1/2 x 1-1/2 x 1 (40 x 40 x 25)	1.90 x 1.90 x 1.31 (48,3 x 48,3 x 33,4)	—	—	2.75 (69,9)	1.4 (0,6)
1-1/2 x 1-1/2 x 1-1/4 (40 x 40 x 32)	1.90 x 1.90 x 1.66 (48,3 x 48,3 x 42,4)	—	—	2.75 (69,9)	1.5 (0,7)
2 x 2 x 1 (50 x 50 x 25)	2.37 x 2.37 x 1.32 (60,3 x 60,3 x 33,4)	—	—	3.25 (82,6)	1.6 (0,7)
2 x 2 x 1-1/2 (50 x 50 x 40)	2.37 x 2.37 x 1.90 (60,3 x 60,3 x 48,3)	3.25 (82,6)	2.7 (1,2)	3.25 (82,6)	2.0 (0,9)
2-1/2 x 2-1/2 x 1 (65 x 65 x 25)	2.87 x 2.87 x 1.32 (73,0 x 73,0 x 33,4)	—	—	3.75 (95,3)	2.3 (1,1)
2-1/2 x 2-1/2 x 1-1/4 (65 x 65 x 32)	2.87 x 2.87 x 1.66 (73,0 x 73,0 x 42,4)	—	—	3.75 (95,3)	4.2 (1,9)
2-1/2 x 2-1/2 x 1-1/2 (65 x 65 x 40)	2.87 x 2.87 x 1.90 (73,0 x 73,0 x 48,3)	—	—	3.75 (95,3)	4.2 (1,9)
2-1/2 x 2-1/2 x 2 (65 x 65 x 50)	2.87 x 2.87 x 2.37 (73,0 x 73,0 x 60,3)	3.75 (95,3)	4.2 (1,9)	3.75 (95,3)	4.5 (2,0)
76mm x 76mm x 1 (65 x 65 x 25)	3.00 x 3.00 x 1.32 (76,1 x 76,1 x 33,4)	—	—	3.75 (95,3)	2.4 (1,1)
76mm x 76mm x 1-1/4 (65 x 65 x 32)	3.00 x 3.00 x 1.66 (76,1 x 76,1 x 42,4)	—	—	3.75 (95,3)	4.3 (2,0)
76mm x 76mm x 1-1/2 (65 x 65 x 40)	3.00 x 3.00 x 1.90 (76,1 x 76,1 x 48,3)	3.75 (95,3)	4.5 (2,0)	3.75 (95,3)	4.2 (1,9)
76mm x 76mm x 2 (65 x 65 x 50)	3.00 x 3.00 x 2.37 (76,1 x 76,1 x 60,3)	3.75 (95,3)	4.3 (2,0)	3.75 (95,3)	4.6 (2,1)
3 x 3 x 1 (80 x 80 x 25	3.50 x 3.50 x 1.32 (88,9 x 88,9 x 33,4)	4.25 (108,0)	5.6 (2,5)	4.25 (108,0)	6.0 (2,7)
3 x 3 x 1-1/4 (80 x 80 x 32)	3.50 x 3.50 x 1.66 (88,9 x 88,9 x 42,4)	—	—	4.25 (108,0)	6.1 (2,8)
3 x 3 x 1-1/2 (80 x 80 x 40)	3.50 x 3.50 x 1.90 (88,9 x 88,9 x 48,3)	4.25 (108,0)	5.9 (2,7)	4.25 (108,0)	6.2 (2,8)
3 x 3 x 2 (80 x 80 x 50)	3.50 x 3.50 x 2.37 (88,9 x 88,9 x 60,3)	4.25 (108,0)	6.0 (2,7)	4.25 (108,0)	6.4 (2,9)
3 x 3 x 2-1/2 (80 x 80 x 65)	3.50 x 3.50 x 2.87 (88,9 x 88,9 x 73,0)	4.25 (108,0)	6.2 (2,8)	4.25 (108,0)	6.5 (2,9)
3 x 3 x 76mm (80 x 80 x 65)	3.50 x 3.50 x 3.00 (88,9 x 88,9 x 76,1)	4.25 (108,0)	6.0 (2,7)	4.25 (108,0)	6.7 (3,0)
4 x 4 x 1 (100 x 100 x 25)	4.50 x 4.50 x 1.32 (114,3 x 114,3 x 33,4)	—	—	5.00 (127,0)	8.0 (3,7)
4 x 4 x 1-1/4 (100 x 100 x 32)	4.50 x 4.50 x 1.66 (114,3 x 114,3 x 42,4)	—	—	5.00 (127,0)	9.8 (4,4)
4 x 4 x 1-1/2 (100 x 100 x 40)	4.50 x 4.50 x 1.90 (114,3 x 114,3 x 48,3)	—	—	5.00 (127,0)	9.9 (4,5)
4 x 4 x 2 (100 x 100 x 50)	4.50 x 4.50 x 2.37 (114,3 x 114,3 x 60,3)	5.00 (127,0)	9.1 (4,1)	5.00 (127,0)	11.0 (5,0)
4 x 4 x 2-1/2 (100 x 100 x 65)	4.50 x 4.50 x 2.88 (114,3 x 114,3 x 73,0)	5.00 (127,0)	9.5 (4,3)	5.00 (127,0)	11.2 (5,1)
4 x 4 x 76mm (125 x 125 x 65)	4.50 x 4.50 x 3.00 (114,3 x 114,3 x 76,1)	5.00 (127,0)	9.5 (4,3)	5.00 (127,0	11.4 (5,2)

FIGURE 8 (1 OF 3)
FIGURES 221 AND 321 REDUCING TEES
NOMINAL DIMENSIONS

Nominal Pipe Size		Figure 221 Cast Reducing Tee		Figure 321 Fabricated Reducing Tee	
ANSI Inches (DN)	O.D. Inches (mm)	Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)	Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)
4 x 4 x 3 (100 x 100 x 80)	4.50 x 4.50 x 3.50 (114,3 x 114,3 x 88,9)	5.00 (127,0)	9.7 (4,4)	5.00 (127,0	11.6 (5,3)
139,7mm x 139,7mm x 3 (125 x 125 x 80)	5.50 x 5.50 x 3.50 (139,7 x 139,7 x 88,9)	5.50 (139,7)	12.7 (5,8)	5.50 (139,7)	12.2 (5,5)
139,7mm x 139,7mm x 4 (125 x 125 x 100)	5.50 x 5.50 x 4.50 (139,7 x 139,7 x 114,3)	5.50 (139,7)	13.4 (6,1)	5.50 (139,7)	12.5 (5,7)
5 x 5 x 1 (125 x 125 x 25)	5.56 x 5.56 x 1.31 (141,3 x 141,3 x 33,4)	—	—	5.50 (139,7)	13.0 (5,9)
5 x 5 x 1-1/2 (125 x 125 x 40)	5.56 x 5.56 x 1.90 (141,3 x 141,3 x 48,3)	—	—	5.50 (139,7)	13.4 (6,1)
5 x 5 x 2 (125 x 125 x 50)	5.56 x 5.56 x 2.37 (141,3 x 141,3 x 60,3)	—	—	5.50 (139,7)	14.1 (6,4)
5 x 5 x 2-1/2 (125 x 125 x 65)	5.56 x 5.56 x 2.87 (141,3 x 141,3 x 73,0)	5.50 (139,7)	18.0 (8,2)	5.50 (139,7)	14.8 (6,7)
5 x 5 x 76mm (125 x 125 x 65)	5.56 x 5.56 x 3.00 (141,3 x 141,3 x 76,1)	—	—	5.50 (139,7)	15.3 (6,9)
5 x 5 x 3 (125 x 125 x 80)	5.56 x 5.56 x 3.50 (141,3 x 141,3 x 88,9)	5.50 (139,7)	14.0 (6,4)	5.50 (139,7)	16.0 (7,3)
5 x 5 x 4 (125 x 125 x 100)	5.56 x 5.56 x 4.50 (141,3 x 141,3 x 114,3)	5.50 (139,7)	13.9 (6,3)	5.50 (139,7)	16.4 (7,4)
165mm x 165mm x 3 (150 x 150 x 80)	6.50 x 6.50 x 3.50 (165,1 x 165,1 x 88,9)	6.50 (165,1)	18.0 8,2	6.50 (165,1)	22.0 (10,0)
165mm x 165mm x 4 (150 x 150 x 100)	6.50 x 6.50 x 4.50 (165,1 x 165,1 x 114,3)	6.50 (165,1)	19.5 8,9	6.50 (165,1)	22.6 (10,3)
165mm x 165mm x 5 (150 x 150 x 125)	6.50 x 6.50 x 5.50 (165,1 x 165,1 x 139,7)	—	—	6.50 (165,1)	23.2 (10,5)
165mm x 165mm x 139mm (150 x 150 x 125)	6.50 x 6.50 x 5.50 (165,1 x 165,1 x 141,3)	—	—	6.50 (165,1)	22.9 (10,4)
6 x 6 x 1 (150 x 150 x 25)	6.63 x 6.63 x 1.31 (168,3 x 168,3 x 33,4)	—	—	6.50 (165,1)	22.8 (10,3)
6 x 6 x 1-1/2 (150 x 150 x 40)	6.63 x 6.63 x 1.90 (168,3 x 168,3 x 48,3)	—	—	6.50 (165,1)	22.9 (10,4)
6 x 6 x 2 (150 x 150 x 50)	6.63 x 6.63 x 2.37 (168,3 x 168,3 x 60,3)	6.50 (165,1)	19.4 (8,8)	6.50 (165,1)	23.0 (10,4)
6 x 6 x 2-1/2 (150 x 150 x 65)	6.63 x 6.63 x 2.87 (168,3 x 168,3 x 73,0)	6.50 (165,1)	21.2 (9,8)	6.50 (165,1)	23.4 (10,6)
6 x 6 x 76mm (150 x 150 x 65)	6.63 x 6.63 x 3.00 (168,3 x 168,3 x 76,1)	6.50 (165,1)	21.2 9,8	6.50 (165,1)	23.5 (10,7)
6 x 6 x 3 (150 x 150 x 80)	6.63 x 6.63 x 3.50 (168,3 x 168,3 x 88,9)	6.50 (165,1)	21.0 (9,5)	6.50 (165,1)	23.7 (10,7)
6 x 6 x 4 (150 x 150 x 100)	6.63 x 6.63 x 4.50 (168,3 x 168,3 x 114,3)	6.50 (165,1)	21.8 (9,9)	6.50 (165,1)	23.9 (10,8)
6 x 6 x 139mm (150 x 150 x 125)	6.63 x 6.63 x 5.50 (168,3 x 168,3 x 139,7)	6.50 (165,1)	23.0 10,4	6.50 (165,1)	24.0 (10,9)
6 x 6 x 5 (150 x 150 x 125)	6.63 x 6.63 x 5.56 (168,3 x 168,3 x 141,3)	—	—	6.50 (165,1)	27.0 12,2
8 x 8 x 1-1/2 (200 x 200 x 40)	8.63 x 8.63 x 1.90 (219,1 x 219,1 x 48,3)	—	—	7.75 (196,9	36.0 (16,3)
8 x 8 x 2 (200 x 200 x 50)	8.63 x 8.63 x 2.375 (219,1 x 219,1 x 60,3)	—	—	7.75 (196,9)	36.2 (16,4)

FIGURE 8 (2 OF 3)
FIGURES 221 AND 321 REDUCING TEES
NOMINAL DIMENSIONS

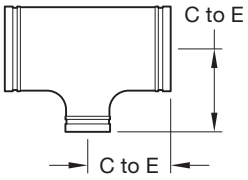


FIGURE 221
CAST TEE REDUCING
GROOVED
(SEGMENT WELDED)

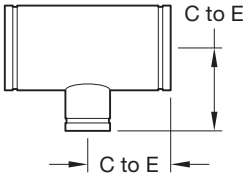


FIGURE 321
FABRICATED TEE REDUCING
GROOVED
(SEGMENT WELDED)

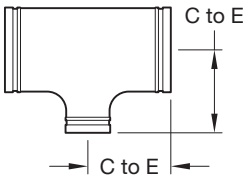


FIGURE 221
CAST TEE REDUCING
GROOVED
(SEGMENT WELDED)

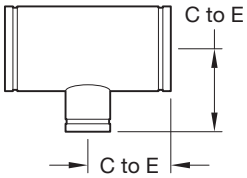


FIGURE 321
FABRICATED TEE REDUCING
GROOVED
(SEGMENT WELDED)

Nominal Pipe Size		Figure 221 Cast Reducing Tee		Figure 321 Fabricated Reducing Tee	
ANSI Inches (DN)	O.D. Inches (mm)	Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)	Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)
8 x 8 x 2-1/2 (200 x 200 x 65)	8.63 x 8.63 x 2.88 (219,1 x 219,1 x 73,0)	—	—	7.75 (196,9)	36.4 (16,5)
216mm x 216mm x 165mm (200 x 200 x 150)	8.52 x 8.52 x 6.50 (216,3 x 216,3 x 165,1)	—	—	7.75 (196,9)	37.9 (17,2)
8 x 8 x 76mm (200 x 200 x 65)	8.63 x 8.63 x 3.00 (216,1 x 219,1 x 76.1)	—	—	7.75 (196,9)	36.4 (16,5)
8 x 8 x 3 (200 x 200 x 80)	8.63 x 8.63 x 3.50 (219,1 x 219,1 x 88,9)	—	—	7.75 (196,9)	36.5 (16,6)
8 x 8 x 4 (200 x 200 x 100)	8.63 x 8.63 x 4.50 (219,1 x 219,1 x 114,1)	7.75 (196,9)	37.2 (16,9)	7.75 (196,9)	36.4 (16,5)
8 x 8 x 139mm (200 x 200 x 125)	8.63 x 8.63 x 5.56 (219,1 x 219,1 x 139,7)	7.75 (196,9)	37.7 (17,1)	7.75 (196,9)	36.7 (16,6)
8 x 8 x 5 (200 x 200 x 125)	8.63 x 8.63 x 5.50 (219,1 x 219,1 x 141,3)	—	—	7.75 (196,9)	36.8 (16,7)
8 x 8 x 165mm (200 x 200 x 150)	8.63 x 8.63 x 6.50 (219,1 x 219,1 x 165,1)	7.75 (196,9)	37.7 (17,1)	7.75 (196,9)	39.0 (17,7)
10 x 10 x 1-1/2 (250 x 250 x 40)	10.75 x 10.75 x 1.90 (273,0 x 273,0 x 48,3)	—	—	9.00 (228,6)	57.0 (25,8)
10 x 10 x 2 (250 x 250 x 50)	10.75 x 10.75 x 2.37 (273,0 x 273,0 x 60,3)	—	—	9.00 (228,6)	57.1 (25,9)
10 x 10 x 2-1/2 (250 x 250 x 65)	10.75 x 10.75 x 2.87 (273,0 x 273,0 x 73,0)	—	—	9.00 (228,6)	57.3 (26,0)
10 x 10 x 3 (250 x 250 x 80)	10.75 x 10.75 x 3.50 (273,0 x 273,0 x 88,9)	—	—	9.00 (228,6)	57.4 (26,0)
10 x 10 x 4 (250 x 250 x 100)	10.75 x 10.75 x 4.50 (273,0 x 273,0 x 114,3)	—	—	9.00 (228,6)	57.8 (26,2)
10 x 10 x 5 (250 x 250 x 125)	10.75 x 10.75 x 5.56 (273,0 x 273,0 x 141,3)	—	—	9.00 (228,6)	58.0 (26,3)
10 x 10 x 6 (250 x 250 x 150)	10.75 x 10.75 x 6.63 (273,0 x 273,0 x 168,3)	—	—	9.00 (228,6)	62.0 (28,1)
10 x 10 x 8 (250 x 250 x 200)	10.75 x 10.75 x 8.63 (273,0 x 273,0 x 219,1)	—	—	9.00 (228,6)	63.0 (28,6)
12 x 12 x 1 (300 x 300 x 25)	12.75 x 12.75 x 1.31 (323,9 x 323,9 x 33,4)	—	—	10.00 (254,0)	64.0 (29,0)
12 x 12 x 2 (300 x 300 x 50)	12.75 x 12.75 x 2.37 (323,9 x 323,9 x 60,3)	—	—	10.00 (254,0)	69.5 (31,5)
12 x 12 x 2-1/2 (300 x 300 x 65)	12.75 x 12.75 x 2.87 (323,9 x 323,9 x 73,0)	—	—	10.00 (254,0)	75.6 (34,3)
12 x 12 x 3 (300 x 300 x 80)	12.75 x 12.75 x 3.50 (323,9 x 323,9 x 88,9)	—	—	10.00 (254,0)	80.2 (36,4)
12 x 12 x 4 (300 x 300 x 100)	12.75 x 12.75 x 4.50 (323,9 x 323,9 x 114,3)	—	—	10.00 (254,0)	80.5 (36,5)
12 x 12 x 5 (300 x 300 x 125)	12.75 x 12.75 x 5.56 (323,9 x 323,9 x 141,3)	—	—	10.00 (254,0)	80.7 (36,6)
12 x 12 x 6 (300 x 300 x 150)	12.75 x 12.75 x 6.63 (323,9 x 323,9 x 168,3)	—	—	10.00 (254,0)	80.9 (36,7)
12 x 12 x 165mm (300 x 300 x 150)	12.75 x 12.75 x 6.50 (323,9 x 323,9 x 165,1)	—	—	10.00 (254,0)	79.9 (36,2)
12 x 12 x 8 (300 x 300 x 200)	12.75 x 12.75 x 8.63 (323,9 x 323,9 x 219,1)	—	—	10.00 (254,0)	76.3 (34,6)
12 x 12 x 10 (300 x 300 x 250)	12.75 x 12.75 x 10.75 (323,9 x 323,9 x 273,0)	—	—	10.00 (254,0)	77.6 (35,2)

FIGURE 8 (3 OF 3)
FIGURES 221 AND 321 REDUCING TEES
NOMINAL DIMENSIONS

Nominal Pipe Size		Figure 327[a]		Figure 341[a]			Figure 342[a]		
ANSI Inches (DN)	O.D. Inches (mm)	Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)	Nominal E to E Inches (mm)	Mating Flange Bolt Qty.	Approx. Weight Lbs. (kg)	Nominal E to E Inches (mm)	Mating Flange Bolt Qty.	Approx. Weight Lbs. (kg)
1 (25)	1.31 (33,4)	2.25 (57,2)	2.2 (1,0)	3.00 (76,2)	4	2.3 (1,0)	3.00 (76,2)	4	4.0 (1,8)
1-1/4 (32)	1.66 (42,4)	2.75 (69,9)	2.2 (1,0)	4.00 (101,6)	4	2.8 (1,3)	4.00 (101,6)	4	4.6 (2,1)
1-1/2 (40)	1.90 (48,3)	2.75 (69,9)	2.5 (1,1)	4.00 (101,6)	4	3.2 (1,5)	4.00 (101,6)	4	7.1 (3,2)
2 (50)	2.37 (60,3)	3.25 (82,6)	3.7 (1,7)	4.00 (101,6)	4	5.2 (2,4)	4.00 (101,6)	8	8.2 (3,7)
2-1/2 (65)	2.87 (73,0)	3.75 (95,3)	5.8 (2,6)	4.00 (101,6)	4	8.0 (3,6)	4.00 (101,6)	8	11.9 (5,4)
76mm (65)	3.00 (76,1)	3.75 (95,3)	6.0 (2,7)	4.00 (101,6)	4	8.8 (4,0)	4.00 (101,6)	8	12.5 (5,7)
3 (80)	3.50 (88,9)	4.25 (108,0)	8.6 (3,9)	4.00 (101,6)	4	10.2 (4,6)	4.00 (101,6)	8	15.5 (7,0)
4 (100)	4.50 (114,3)	5.00 (127,0)	20.7 (9,4)	6.00 (152,4)	8	17.2 (7,8)	6.00 (152,4)	8	28.0 (12,7)
139mm (125)	5.50 (139,7)	5.50 (139,7)	18.3 (8,3)	6.00 (152,4)	8	18.5 (8,4)	6.00 (152,4)	8	32.5 (14,7)
5 (125)	5.56 (141,3)	5.50 (139,7)	18.5 (8,4)	6.00 (152,4)	8	21.4 (9,7)	6.00 (152,4)	8	37.0 (16,8)
165mm (150)	6.50 (165,1)	6.50 (165,1)	26.2 (11,9)	6.00 (152,4)	8	22.0 (10,0)	6.00 (152,4)	12	42.5 (19,3)
6 (150)	6.63 (168,3)	6.50 (165,1)	27.3 (12,4)	6.00 (152,4)	8	26.0 (11,8)	6.00 (152,4)	12	48.0 (21,8)
216mm (200)	8.52 (216,3)	7.75 (196,9)	44.0 (20,0)	6.00 (152,4)	8	34.5 (15,6)	6.00 (152,4)	12	72.5 (32,9)
8 (200)	8.63 (219,1)	7.75 (196,9)	48.0 (21,7)	6.00 (152,4)	8	38.4 (17,4)	6.00 (152,4)	12	79.0 (35,8)
10 (250)	10.75 (273,0)	9.00 (228,6)	75.0 (34,0)	8.00 (203,2)	12	65.0 (29,5)	8.00 (203,2)	16	122.0 (55,3)
12 (300)	12.75 (323,9)	10.00 (254,0)	95.8 (43,4)	8.00 (203,2)	12	91.0 (41,3)	8.00 (203,2)	16	183.0 (83,0)

a. Figure 327, Figure 341, and Figure 342 are not available for the EMEA market.

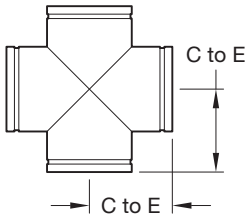


FIGURE 327[1] FABRICATED CROSS GROOVED (SEGMENT WELDED)

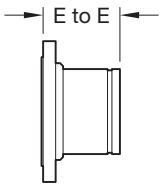
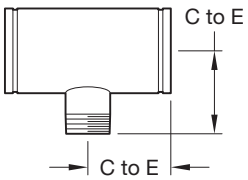


FIGURE 341[1] FABRICATED FLANGE ADAPTER ANSI CLASS 150 LBS. GROOVED

FIGURE 342[1] FABRICATED FLANGE ADAPTER ANSI CLASS 300 LBS. GROOVED

FIGURE 9
FIGURE 327 CROSS AND FIGURE 341 AND FIGURE 342 FLANGE ADAPTERS NOMINAL DIMENSIONS

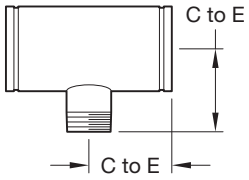


Nominal Pipe Size		Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)
ANSI Inches (DN)	O.D. Inches (mm)		
2 x 2 x 3/4 (50 x 50 x 20)	2.37 x 2.37 x 1.05 (60,3 x 60,3 x 26,7)	3.25 (82,6)	2.0 (0,9)
2 x 2 x 1 (50 x 50 x 25)	2.37 x 2.37 x 1.31 (60,3 x 60,3 x 33,4)	3.25 (82,6)	2.2 (1,0)
2 x 2 x 1-1/4 (50 x 50 x 32)	2.37 x 2.37 x 1.66 (60,3 x 60,3 x 42,4)	3.25 (82,6)	2.3 (1,0)
2 x 2 x 1-1/2 (50 x 50 x 40)	2.37 x 2.37 x 1.90 (60,3 x 60,3 x 48,3)	3.25 (82,6)	1.4 (1,1)
2-1/2 x 2-1/2 x 1 (65 x 65 x 25)	2.875 x 2.875 x 1.315 (73,0 x 73,0 x 33,4)	3.75 (95,3)	3.6 (1,6)
2-1/2 x 2-1/2 x 1-1/4 (65 x 65 x 32)	2.875 x 2.875 x 1.660 (73,0 x 73,0 x 42,4)	3.75 (95,3)	3.8 (1,7)
2-1/2 x 2-1/2 x 1-1/2 (65 x 65 x 40)	2.875 x 2.875 x 1.900 (73,0 x 73,0 x 48,3)	3.75 (95,3)	4.0 (1,8)
2-1/2 x 2-1/2 x 2 (65 x 65 x 50)	2.875 x 2.875 x 2.375 (73,0 x 73,0 x 60,3)	3.75 (95,3)	4.2 (1,9)
76mm x 76mm x 1 (65 x 65 x 25)	3.00 x 3.00 x 1.31 (76,1 x 76,1 x 33,4)	3.75 (95,3)	3.8 (1,7)
76mm x 76mm x 1-1/4 (65 x 65 x 32)	3.00 x 3.00 x 1.66 (76,1 x 76,1 x 42,4)	3.75 (95,3)	4.0 (1,8)
76mm x 76mm x 1-1/2 (65 x 65 x 40)	3.00 x 3.00 x 1.90 (76,1 x 76,1 x 48,3)	3.75 (95,3)	4.2 (1,9)
3 x 3 x 3/4 (80 x 80 x 20)	3.50 x 3.50 x 1.05 (88,9 x 88,9 x 26,7)	4.25 (108,0)	5.2 (2,4)
3 x 3 x 1 (80 x 80 x 25)	3.50 x 3.50 x 1.31 (88,9 x 88,9 x 33,4)	4.25 (108,0)	5.7 (2,6)
3 x 3 x 1-1/2 (80 x 80 x 40)	3.50 x 3.50 x 1.90 (88,9 x 88,9 x 48,3)	4.25 (108,0)	5.8 (2,6)
3 x 3 x 2 (80 x 80 x 50)	3.50 x 3.50 x 2.37 (88,9 x 88,9 x 60,3)	4.25 (108,0)	5.9 (2,7)
3 x 3 x 2-1/2 (80 x 80 x 65)	3.50 x 3.50 x 2.87 (88,9 x 88,9 x 73,0)	4.25 (108,0)	6.3 (2,9)
3 x 3 x 76mm (80 x 80 x 65)	3.50 x 3.50 x 3.00 (88,9 x 88,9 x 76,1)	4.25 (108,0)	6.5 (2,9)
4 x 4 x 3/4 (100 x 100 x 20)	4.50 x 4.50 x 1.05 (114,3 x 114,3 x 26,7)	3.75 (95,3)	6.4 (2,9)
4 x 4 x 1 (100 x 100 x 25)	4.50 x 4.50 x 1.31 (114,3 x 114,3 x 33,4)	5.00 (127,0)	6.9 (3,1)
4 x 4 x 1-1/4 (100 x 100 x 32)	4.50 x 4.50 x 1.66 (114,3 x 114,3 x 42,4)	5.00 (127,0)	7.6 (3,4)
4 x 4 x 1-1/2 (100 x 100 x 40)	4.50 x 4.50 x 1.90 (114,3 x 114,3 x 48,3)	5.00 (127,0)	8.3 (3,8)
4 x 4 x 2 (100 x 100 x 50)	4.50 x 4.50 x 2.37 (114,3 x 114,3 x 60,3)	5.00 (127,0)	9.6 (4,4)
4 x 4 x 2-1/2 (100 x 100 x 65)	4.500 x 4.500 x 2.875 (114,3 x 114,3 x 73,0)	5.00 (127,0)	10.0 (4,5)
4 x 4 x 76mm (100 x 100 x 65)	4.500 x 4.500 x 3.00 (114,3 x 114,3 x 76,1)	5.00 (127,0)	10.5 (4,8)

a. Figure 323 not available for the EMEA market.

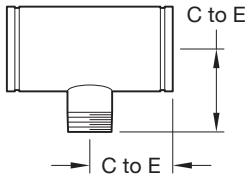
FIGURE 10 (1 OF 3)
FIGURE 323 FABRICATED GROOVE X GROOVE X MALE THREAD REDUCING TEES (SEGMENT WELDED) NOMINAL DIMENSIONS

Nominal Pipe Size		Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)
ANSI Inches (DN)	O.D. Inches (mm)		
4 x 4 x 3 (100 x 100 x 80)	4.50 x 4.50 x 3.50 (114,3 x 114,3 x 88,9)	5.00 (127,0)	10.3 (4,7)
5 x 5 x 2 (125 x 125 x 50)	5.56 x 5.56 x 2.37 (141,3 x 141,3 x 60,3)	5.50 (139,7)	14.0 (6,4)
5 x 5 x 2-1/2 (125 x 125 x 65)	5.56 x 5.56 x 2.87 (141,3 x 141,3 x 73,0)	5.50 (139,7)	14.3 (6,5)
5 x 5 x 76mm (125 x 125 x 65)	5.56 x 5.56 x 3.00 (141,3 x 141,3 x 76,1)	5.50 (139,7)	14.5 (6,6)
5 x 5 x 3 (125 x 125 x 80)	5.56 x 5.56 x 3.50 (141,3 x 141,3 x 88,9)	5.50 (139,7)	14.6 (6,6)
5 x 5 x 4 (125 x 125 x 100)	5.56 x 5.56 x 4.50 (141,3 x 141,3 x 114,3)	5.50 (139,7)	15.1 (6,8)
165mm x 165mm x 2 (150 x 150 x 50)	6.50 x 6.50 x 2.37 (165,1 x 165,1 x 60,3)	6.50 (165,1)	9.5 (4,3)
165mm x 165mm x 2-1/2 (150 x 150 x 65)	6.50 x 6.50 x 2.875 (165,1 x 165,1 x 73,0)	6.50 (165,1)	9.7 (4,4)
165mm x 165mm x 76mm (150 x 150 x 65)	6.50 x 6.50 x 3.00 (165,1 x 165,1 x 76,1)	6.50 (165,1)	9.7 (4,4)
165mm x 165mm x 3 (150 x 150 x 80)	6.50 x 6.50 x 3.50 (165,1 x 165,1 x 88,9)	6.50 (165,1)	9.8 (4,4)
165mm x 165mm x 4 (150 x 150 x 100)	6.50 x 6.50 x 4.50 (165,1 x 165,1 x 114,3)	6.50 (165,1)	10.0 (4,5)
165mm x 165mm x 5 (150 x 150 x 125)	6.50 x 6.50 x 5.563 (165,1 x 165,1 x 141,3)	6.50 (165,1)	10.2 (4,6)
6 x 6 x 1-1/2 (150 x 150 x 40)	6.625 x 6.625 x 1.90 (168,3 x 168,3 x 48,3)	6.50 (165,1)	19.0 (8,6)
6 x 6 x 2 (150 x 150 x 50)	6.625 x 6.625 x 2.375 (168,3 x 168,3 x 60,3)	6.50 (165,1)	21.3 (9,7)
6 x 6 x 2-1/2 (150 x 150 x 65)	6.625 x 6.625 x 2.875 (168,3 x 168,3 x 73,0)	6.50 (165,1)	21.7 (9,8)
6 x 6 x 76mm (150 x 150 x 65)	6.625 x 6.625 x 3.00 (168,3 x 168,3 x 76,1)	6.50 (165,1)	14.5 (6,6)
6 x 6 x 3 (150 x 150 x 80)	6.625 x 6.625 x 3.500 (168,3 x 168,3 x 88,9)	6.50 (165,1)	22.0 (10,0)
6 x 6 x 4 (150 x 150 x 100)	6.625 x 6.625 x 4.500 (168,3 x 168,3 x 114,3)	6.50 (165,1)	22.5 (10.2)
6 x 6 x 5 (150 x 150 x 125)	6.625 x 6.625 x 5.563 (168,3 x 168,3 x 141,3)	6.50 (165,1)	23.1 10,5
8 x 8 x 2 (200 x 200 x 50)	8.63 x 8.63 x 2.37 (219,1 x 219,1 x 60,3)	7.75 (196,9)	32.7 (14,8)
8 x 8 x 3 (200 x 200 x 80)	8.63 x 8.63 x 3.50 (219,1 x 219,1 x 88,9)	7.75 (196,9)	33.5 (15,2)
8 x 8 x 4 (200 x 200 x 100)	8.63 x 8.63 x 4.50 (219,1 x 219,1 x 114,1)	7.75 (196,9)	34.5 (15,6)
8 x 8 x 5 (200 x 200 x 125)	8.63 x 8.63 x 5.56 (219,1 x 219,1 x 141,3)	7.75 (196,9)	34.7 (15,7)
8 x 8 x 165mm (200 x 200 x 150)	8.63 x 8.63 x 6.50 (219,1 x 219,1 x 165,1)	7.75 (196,9)	35.0 (15,9)



a. Figure 323 not available for the EMEA market.

FIGURE 10 (2 OF 3)
FIGURE 323 FABRICATED GROOVE X GROOVE X MALE THREAD REDUCING TEES (SEGMENT WELDED) NOMINAL DIMENSIONS



Nominal Pipe Size		Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)
ANSI Inches (DN)	O.D. Inches (mm)		
8 x 8 x 6 (200 x 200 x 150)	8.63 x 8.63 x 6.63 (219,1 x 219,1 x 168,3)	7.75 (196,9)	35.6 (16,1)
10 x 10 x 2 (250 x 250 x 50)	10.75 x 10.75 x 2.37 (273,0 x 273,0 x 60,3)	9.00 (228,6)	52.2 (23,7)
10 x 10 x 3 (250 x 250 x 80)	10.75 x 10.75 x 3.50 (273,0 x 273,0 x 88,9)	9.00 (228,6)	53.0 (24,0)
10 x 10 x 4 (250 x 250 x 100)	10.75 x 10.75 x 4.50 (273,0 x 273,0 x 114,3)	9.00 (228,6)	53.6 (24,3)
10 x 10 x 5 (250 x 250 x 125)	10.75 x 10.75 x 5.56 (273,0 x 273,0 x 141,3)	9.00 (228,6)	54.2 (24,6)
10 x 10 x 165mm (250 x 250 x 150)	10.75 x 10.75 x 6.50 (273,0 x 273,0 x 165,1)	9.00 (228,6)	55.5 (25,2)
10 x 10 x 6 (250 x 250 x 150)	10.75 x 10.75 x 6.63 (273,0 x 273,0 x 168,3)	9.00 (228,6)	54.9 (24,9)
10 x 10 x 8 (250 x 250 x 200)	10.75 x 10.75 x 8.63 (273,0 x 273,0 x 219,1)	9.00 (228,6)	55.3 (25,1)
12 x 12 x 3 (300 x 300 x 80)	12.75 x 12.75 x 3.50 (323,9 x 323,9 x 88,9)	10.00 (254,0)	74.6 (33,8)
12 x 12 x 4 (300 x 300 x 100)	12.75 x 12.75 x 4.50 (323,9 x 323,9 x 141,3)	10.00 (254,0)	75.1 (34,1)
12 x 12 x 5 (300 x 300 x 125)	12.75 x 12.75 x 5.563 (323,9 x 323,9 x 114,3)	10.00 (254,0)	75.6 (34,3)
12 x 12 x 165mm (300 x 300 x 150)	12.75 x 12.75 x 6.50 (323,9 x 323,9 x 165,1)	10.00 (254,0)	76.2 (34,6)
12 x 12 x 6 (300 x 300 x 150)	12.75 x 12.75 x 6.625 (323,9 x 323,9 x 168,3)	10.00 (254,0)	76.2 (34,6)
12 x 12 x 8 (300 x 300 x 200)	12.750 x 12.750 x 8.625 (323,9 x 323,9 x 219,1)	10.00 (254,0)	76.3 (34,6)
12 x 12 x 10 (300 x 300 x 250)	12.750 x 12.750 x 10.750 (323,9 x 323,9 x 273,0)	10.00 (254,0)	77.6 (35,2)

a. Figure 323 not available for the EMEA market.

FIGURE 10 (3 OF 3)
FIGURE 323 FABRICATED GROOVE X GROOVE X MALE THREAD REDUCING TEES (SEGMENT WELDED) NOMINAL DIMENSIONS

Nominal Pipe Size		E to E Inches (mm)	Approx. Weight Lbs. (kg)
ANSI Inches (DN)	Pipe O.D. Inches (mm)		
1-1/2 x 1 (40 x 25)	1.90 x 1.31 (48,3 x 33,7)	2.50 (63,5)	0.6 (0,3)
2 x 3/4 (50 x 20)	2.37 x 1.05 (60,3 x 26,7)	2.50 (63,5)	1.0 (0,5)
2 x 1 (50 x 25)	2.37 x 1.31 (60,3 x 33,4)	2.50 (63,5)	0.8 (0,4)
2 x 1-1/4 (50 x 32)	2.37 x 1.66 (60,3 x 42,4)	2.50 (63,5)	0.8 (0,4)
2 x 1-1/2 (50 x 40)	2.37 x 1.90 (60,3 x 48,3)	2.50 (63,5)	0.8 (0,4)
2-1/2 x 1 (65 x 25)	2.87 x 1.31 (73,0 x 33,4)	2.50 (63,5)	0.9 (0,4)
2-1/2 x 1-1/4 (65 x 32)	2.87 x 1.66 (73,0 x 42,4)	2.50 (63,5)	1.0 (0,5)
2-1/2 x 1-1/2 (65 x 40)	2.87 x 1.90 (73,0 x 48,3)	2.50 (63,5)	1.3 (0,6)
2-1/2 x 2 (65 x 50)	2.87 x 2.37 (73,0 x 60,3)	2.50 (63,5)	1.2 (0,5)
76mm x 1-1/4 (65 x 32)	3.00 x 1.66 (76,1 x 42,4)	2.50 (63,5)	1.0 (0,5)
76mm x 1-1/2 (65 x 40)	3.00 x 1.90 (76,1 x 48,3)	2.50 (63,5)	1.1 (0,5)
76mm x 2 (65 x 50)	3.00 x 2.37 (76,1 x 60,3)	2.50 (63,5)	1.2 (0,5)
3 x 3/4 (80 x 20)	3.50 x 1.05 (88,9 x 26,7)	2.50 (63,5)	1.1 (0,5)
3 x 1 (80 x 25)	3.50 x 1.31 (88,9 x 33,4)	2.50 (63,5)	1.3 (0,6)
3 x 1-1/4 (80 x 32)	3.50 x 1.66 (88,9 x 42,4)	2.5 (63,5)	1.3 (0,6)
3 x 1-1/2 (80 x 40)	3.50 x 1.90 (88,9 x 48,3)	2.50 (63.5)	1.3 (0,6)
3 x 2 (80 x 50)	3.50 x 2.37 (88,9 x 60,3)	2.50 (63.5)	1.3 (0,6)
3 x 2-1/2 (80 x 65)	3.50 x 2.87 (88,9 x 73,0)	2.50 (63.5)	1.5 (0,7)
3 x 76mm (80 x 65)	3.50 x 3.00 (88,9 x 76,1)	2.50 (63.5)	1.5 (0,7)
4 x 1 (100 x 25)	4.50 x 1.31 (114,3 x 33,4)	3.00 (76,2)	1.8 (0,8)
4 x 1-1/4 (100 x 32)	4.50 x 1.66 (114,3 x 42,4)	3.00 (76,2)	2.0 (0,9)
4 x 1-1/2 (100 x 40)	4.50 x 1.90 (114,3 x 48,3)	3.00 (76,2)	2.3 (1,0)
4 x 2 (100 x 50)	4.50 x 2.37 (114,3 x 60,3)	3.00 (76,2)	2.3 (1,0)
4 x 2-1/2 (100 x 65)	4.50 x 2.87 (114,3 x 73,0)	3.00 (76,2)	2.3 (1,0)

a. Figure 372 not available for the EMEA market.

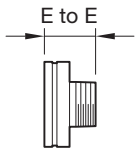
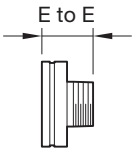


FIGURE 11 (1 OF 2)
FIGURE 372 FABRICATED CONCENTRIC REDUCER GROOVE X MALE THREAD (MPT)
NOMINAL DIMENSIONS

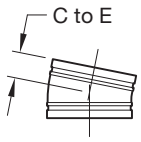


Nominal Pipe Size		E to E Inches (mm)	Approx. Weight Lbs. (kg)
ANSI Inches (DN)	Pipe O.D. Inches (mm)		
4 x 3 (100 x 80)	4.50 x 3.50 (114,3 x 88,9)	3.00 (76,2)	2.6 (1,2)
5 x 4 (125 x 100)	5.56 x 4.50 (141,3 x 114,3)	3.50 (88,9)	4.5 (2,0)
165mm x 1 (150 x 25)	6.50 x 1.31 (165,1 x 33,4)	4.00 (101,6)	1.2 (0,5)
165mm x 2 (150 x 50)	6.50 x 2.37 (165,1 x 60,3)	4.00 (101,6)	5.5 (2,5)
165mm x 76mm (150 x 65)	6.50 x 3.00 (165,1 x 76,1)	4.00 (101,6)	5.7 (2,6)
165mm x 3 (150 x 50)	6.50 x 3.50 (165,1 x 88,9)	4.00 (101,6)	5.8 (2,6)
165mm x 4 (150 x 50)	6.50 x 4.50 (165,1 x 114,3)	4.00 (101,6)	5.8 (2,6)
165mm x 5 (150 x 50)	6.50 x 5.563 (165,1 x 141,3)	4.00 (101,6)	5.8 (2,6)
6 x 1 (150 x 25)	6.63 x 1.31 (168,3 x 33,4)	4.00 (101,6)	5.2 (2,4)
6 x 2 (150 x 50)	6.63 x 2.37 (168,3 x 60,3)	4.00 (101,6)	5.4 (2,4)
6 x 2-1/2 (150 x 65)	6.63 x 2.87 (168,3 x 73,0)	4.00 (101,6)	5.6 (2,5)
6 x 76mm (150 x 65)	6.63 x 3.00 (168,3 x 76,1)	4.00 (101,6)	5.8 (2,6)
6 x 3 (150 x 80)	6.63 x 3.50 (168,3 x 88,9)	4.00 (101,6)	6.0 (2,7)
6 x 4 (150 x 100)	6.63 x 4.50 (168,3 x 114,3)	4.00 (101,6)	6.2 (2,8)
6 x 5 (150 x 125)	6.63 x 5.56 (168,3 x 141,3)	4.00 (101,6)	6.7 (3,0)

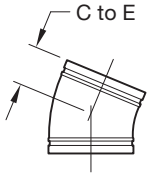
a. Figure 372 not available for the EMEA market.

FIGURE 11 (2 OF 2)
FIGURE 372 FABRICATED CONCENTRIC REDUCER GROOVE X MALE THREAD (MPT)
NOMINAL DIMENSIONS

Nominal Pipe Size		Figures 211, 311, & 511		Figures 212, 312, & 512	
ANSI Inches (DN)	O.D. Inches (mm)	Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)	Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)
1-1/4 (32)	1.660 (42,4)	1.38 (35,1)	0.4 (0,2)	1.75 (44,5)	0.4 (0,2)
1-1/2 (40)	1.900 (48,3)	1.38 (35,1)	0.5 (0,2)	1.75 (44,5)	0.5 (0,2)
2 (50)	2.375 (60,3)	1.38 (35,1)	0.6 (0,3)	1.88 (47,8)	0.6 (0,3)
2-1/2 (65)	2.875 (73,0)	1.50 (38,1)	1.1 (0,5)	2.00 (50,8)	0.7 (0.3)
76,1mm (65)	3.000 (76,1)	1.50 (38,1)	1.1 (0,5)	2.00 (50,8)	1.2 (0,5)
3 (80)	3.500 (88,9)	1.50 (38,1)	1.2 (0,5)	2.25 (57,2)	1.4 (0,6)
4 (100)	4.500 (114,3)	1.75 (44,5)	2.2 (1,0)	2.63 (66,8)	2.4 (1,1)
139,7mm (125)	5.500 (139,7)	2.00 (50,8)	2.3 (1,0)	2.88 (73,2)	2.5 (1,1)
5 (125)	5.563 (141,3)	2.00 (50,8)	3.3 (1,5)	2.88 (73,2)	4.1 (1,9)
165,1mm (150)	6.500 (165,1)	2.00 (50.8)	3.5 (1,6)	3.13 (79,5)	4.3 (2,0)
6 (150)	6.625 (168,3)	2.00 (50.8)	4.6 (2,1)	3.13 (79,5)	5.6 (2,5)
8 (200)	8.625 (219,1)	2.00 (50,8)	8.7 (3,9)	3.88 (98,6)	11.1 (5,0)
10 (250)	10.750 (273,0)	2.13 (54,1)	9.1 (4,1)	4.38 (111,3)	14.0 (6,4)
12 (300)	12.750 (323,9)	2.25 (57,2)	16.7 (7,6)	4.88 (124,0)	22.0 (10,0)



FIGURES 211, 311, & 511 FABRICATED 11¼° ELBOW (SEGMENT WELDED)



FIGURES 212, 312, & 512 FABRICATED 22½° ELBOW (SEGMENT WELDED)

FIGURE 12
FIGURES 211, 311, AND 511 FABRICATED ELBOWS AND FIGURES 212, 312, AND 512 FABRICATED ELBOWS NOMINAL DIMENSIONS

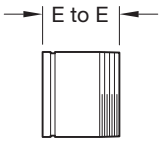


FIGURE 391(1)
FABRICATED
ADAPTER NIPPLE
GROOVE X MALE THREAD
(MA)

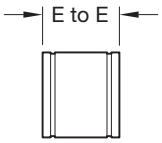


FIGURE 392(1)
FABRICATED
ADAPTER NIPPLE
GROOVE X GROOVE

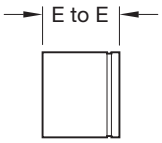


FIGURE 393(1)
FABRICATED
ADAPTER NIPPLE
GROOVE X PLAIN

Nominal Pipe Size		Figures 391, 392 & 393[a]	
ANSI Inches (DN)	**O.D. Inches (mm)**	**Nominal E to E Inches (mm)**	**Approx. Weight Lbs. (kg)**
1-1/4 (32)	1.660 (42,4)	4.00 (101,6)	0.8 (0,4)
1-1/2 (40)	1.900 (48,3)	4.00 (101,6)	0.9 (0,4)
2 (50)	2.375 (60,3)	4.00 (101,6)	1.2 (0,5)
2-1/2 (65)	2.875 (73,0)	4.00 (101,6)	1.9 (0,9)
76,1mm (65)	3.000 (76,1)	4.00 (101,6)	1.9 (0,9)
3 (80)	3.500 (88,9)	4.00 (101,6)	2.5 (1,1)
4 (100)	4.500 (114,3)	6.00 (154,4)	5.5 (2,5)
139,7mm (125)	5.500 (139,7)	6.00 (154,4)	5.6 (2,5)
5 (125)	5.563 (141,3)	6.00 (154,4)	7.4 (3,4)
165,1mm (150)	6.500 (165,1)	6.00 (154,4)	7.6 (3,4)
6 (150)	6.625 (168,3)	6.00 (154,4)	9.5 (4,3)
8 (200)	8.625 (219,1)	6.00 (154,4)	14.2 (6,4)
10 (250)	10.750 (273,0)	8.00 (203,2)	27.0 (12,2)
12 (300)	12.750 (323,9)	8.00 (203,2)	33.0 (15,0)

a. Figure 391, Figure 392, and Figure 393 are not available for the EMEA market.

FIGURE 13
FIGURES 391, 392, AND 393 FABRICATED ADAPTER NIPPLES
NOMINAL DIMENSIONS

ANSI Inches (DN)	O.D. Inches (mm)	Nominal C to GE Inches (mm)	Nominal C to TE Inches (mm)	Approx. Weight Lbs. (kg
5 x 5 x 8 (125 X 125 X 200)	5.563 x 5.563 x 8.625 (141,3 x 141,3 x 219,1)	13.313 (388,14)	9.313 (236,55)	27.8 (12,6)
6 x 6 x 8 (150 X 150 X 200)	6.625 x 6.625 x 8.625 (168,3 x 168,3 x 219,1)	13.313 (388,14)	8.750 (222,25)	36.7 (16,4)

a. Figure 507/50L not available for the EMEA market.

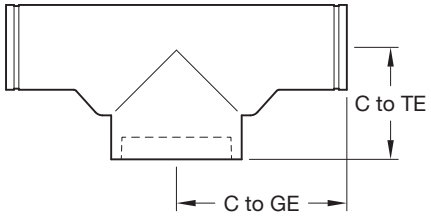


FIGURE 14
FIGURE 507/50L FABRICATED BULLHEAD TEE
NOMINAL DIMENSIONS

ANSI Inches (DN)	O.D. Inches (mm)	Nominal C to GE Inches (mm)	Nominal C to TE Inches (mm)	Approx. Weight Lbs. (kg)
4 x 4 x 2-1/2 (100 X 100 X 65)	5.563 x 5.563 x 8.625 (141,3 x 141,3 x 219,1)	13.313 (388,14)	9.313 (236,55)	8.7 (3,9)
6 x 6 x 2-1/2 (150 X 50 X 65)	6.625 x 6.625 x 8.625 (168,3 x 168,3 x 219,1)	13.313 (388,14)	8.750 (222,25)	13.7 (6,2)

a. Figure 328 not available for the EMEA and APAC market.

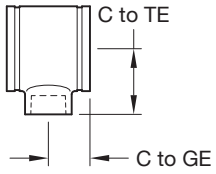


FIGURE 15
FIGURE 328 FABRICATED STANDPIPE TEE
NOMINAL DIMENSIONS

Friction Resistance					
Nominal Pipe Size		Elbows 90° Feet (m)	Elbows 45° Feet (m)	Tee[1] Branch Feet (m)	Tee Run Feet (m)
ANSI Inches (DN)	O.D. Inches (mm)				
1 (25)	1.31 (33,4)	1.3 (0,4)	0.8 (0.3)	3.7 (1,1)	1.3 (0.6)
1-1/4 (32)	1.7 (42,4)	1.9 (0,6)	1.0 (0,3)	4.8 (1,5)	1.9 (0,6)
1-1/2 (40)	1.9 (48,3)	2.3 (0,7)	1.2 (0,4)	5.8 (1,8)	2.3 (0,7)
2 (50)	2.4 (60,3)	3.2 (1,0)	1.6 (0,5)	8.0 (2,5)	3.2 (1,0)
2-1/2 (65)	2.9 (73,0)	3.9 (1,2)	2.0 (0,6)	9.8 (3,0)	3.9 (1,2)
– (65)	3.0 (76,1)	4.1 (1,2)	2.1 (0,6)	10.3 (3,1)	4.1 (1,2)
3 (80)	3.5 (88,9)	4.9 (1,5)	2.4 (0,7)	12.2 (3,7)	4.9 (1,5)
4 (100)	4.5 (114,3)	6.5 (2,0)	3.3 (1,0)	16.3 (5,0)	6.5 (2,0)
– (125)	5.5 (139,7)	8.0 (2,4)	4.1 (1,3)	20.0 (6,1)	8.0 (2,4)
5 (125)	5.6 (141,3)	8.2 (2,5)	4.1 (1,3)	20.5 (6,3)	8.2 (2,5)
– (150)	6.5 (165,1)	9.5 (2,9)	4.8 (1,4)	23.8 (7,2)	9.5 (2,9)
6 (150)	6.6 (168,3)	9.9 (3,0)	5.0 (1,5)	24.8 (7,6)	9.9 (3,0)
8 (200)	8.6 (219,1)	13.1 (4,0)	6.6 (2,0)	32.8 (10,0)	13.1 (4,0)
10 (250)	10.8 (273,0)	16.5 (5,0)	8.3 (2,5)	41.3 (12,6)	16.5 (5,0)
12 (300)	12.8 (323,9)	19.9 (6,1)	9.9 (3,0)	49.7 (15,1)	19.9 (6,1)

a. For the reducing tee branches, use the value that is corresponding to the branch size.
Example:
For 8 in. x 8 in. x 2 in. tee, the branch value of 2 in. is 8.0 feet.
For sizes not listed interpolate from the values shown.

TABLE A
FRICTION RESISTANCE FOR
FIGURES 501, 510, 510DE AND 519
(EXPRESSED AS EQUIVALENT STRAIGHT PIPE)

Friction Resistance					
Nominal Pipe Size		Elbows 90° Feet (m)	Elbows 45° Feet (m)	Tee* Branch Feet (m)	Tee Run Feet (m)
ANSI Inches (DN)	O.D. Inches (mm)				
2 (50)	2.4 (60,3)	3.5 (1,1)	1.6 (0,5)	8.0 (2,4)	3.2 (1,0)
2-1/2 (65)	2.9 (73,0)	4.3 (1,3)	2.0 (0,6)	9.8 (3,0)	3.9 (1,2)
– (65)	3.0 (76,1)	4.3 (1,3)	2.1 (0,6)	10.3 (3,1)	4.1 (1,2)
3 (80)	3.5 (88,9)	5.0 (1,5)	2.4 (0,7)	12.2 (3,7)	4.9 (1,5)
4 (100)	4.5 (114,3)	6.7 (2,0)	3.3 (1,0)	16.3 (5,0)	6.5 (2,0)
– (125)	5.5 (139,7)	8.3 (2,5)	4.1 (1,2)	20.0 (6,1)	8.0 (2,4)
5 (125)	5.6 (141,3)	8.5 (2,5)	4.3 (1,3)	21.5 (6,5)	8.6 (2,6)
– (150)	6.5 (165,1)	9.6 (2,9)	4.8 (1,5)	23.8 (7,3)	9.5 (2,9)
6 (150)	6.6 (168,3)	10.0 (3,0)	5.0 (1,5)	24.8 (7,6)	9.9 (3,0)
8 (200)	8.6 (219,1)	13.1 (4,0)	6.6 (2,0)	32.8 (10,0)	13.0 (4,0)

TABLE B
FRICTION RESISTANCE FOR FIGURES 510S AND 519S
(EXPRESSED AS EQUIVALENT LENGTH OF STRAIGHT SCHEDULE 40 STEEL PIPE)

Nominal Pipe Size		Figure 501 Cast 45° Elbow psi bar				Figure 510 Cast 90° Elbow psi bar				Figure 519 Cast Tee psi bar			
Ansi Inches (DN)	O.D. Inches mm	UL	FM	VdS	LPCB	UL	FM	VdS	LPCB	UL	FM	VdS	LPCB
1 (25)	1.31 (33,4)	—	—	—	—	—	—	—	—	—	—	—	—
1-1/4 (32)	1.66 (42,4)	—	—	—	—	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	—	365 (25,2)	232 (16,0)	290 (20,0)
1-1/2 (40)	1.90 (48,3)	—	—	—	—	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	—	365 (25,2)	232 (16,0)	290 (20,0)
2 (50)	2.37 (60,3)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)
2-1/2 (65)	2.87 (73,0)	365 (25,2)	365 (25,2)	—	—	365 (25,2)	365 (25,2)	—	—	365 (25,2)	365 (25,2)	—	—
76,1mm (65)	3.00 (76,1)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)
3 (80)	3.50 (88,9)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)
4 (100)	4.50 (114,3)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)
139,1mm (125)	5.50 (139,7)	365 (25,2)	365 (25,2)	232 (16,0)	—	365 (25,2)	365 (25,2)	232 (16,0)	—	365 (25,2)	365 (25,2)	232 (16,0)	—
5 (125)	5.56 (141,3)	—	365 (25,2)	—	—	—	365 (25,2)	—	—	—	365 (25,2)	—	—
165,1mm (150)	6.50 (165,1)	365 (25,2)	365 (25,2)	—	290 (20,0)	365 (25,2)	365 (25,2)	—	290 (20,0)	365 (25,2)	365 (25,2)	—	290 (20,0)
6 (150)	6.63 (168,3)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)
8 (200)	8.63 (219,1)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)
10 (250)	10.75 (273,0)	—	—	—	—	—	—	—	—	—	—	—	—
12 (300)	12.75 (323,9)	—	—	—	—	—	—	—	—	—	—	—	—

TABLE C
FIGURE 501 AND FIGURE 510 CAST ELBOWS, AND 519 CAST TEE
LISTED/APPROVED PRESSURE RATING

Nominal Pipe Size		Figure 260 Cast End Cap psi bar				Figure 510S Cast 90° Elbow psi bar				Figure 519S Cast Tee psi bar			
Ansi Inches (DN)	O.D. Inches (mm)	UL	FM	VdS	LPCB	UL	FM	VdS	LPCB	UL	FM	VdS	LPCB
1 (25)	1.31 (33,4)	500 (34,5)	—	—	—	—	—	—	—	—	—	—	—
1-1/4 (32)	1.66 (42,4)	500 (34,5)	500 (34,5)	—	—	—	—	—	—	—	—	—	—
1-1/2 (40)	1.90 (48,3)	500 (34,5)	500 (34,5)	—	—	—	—	—	—	—	—	—	—
2 (50)	2.37 (60,3)	500 (34,5)	500 (34,5)	—	—	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)
2-1/2 (65)	2.87 (73,0)	500 (34,5)	500 (34,5)	—	—	365 (25,2)	365 (25,2)	—	—	365 (25,2)	365 (25,2)	—	—
76,1mm (65)	3.00 (76,1)	500 (34,5)	500 (34,5)	—	—	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	—	290 (20,0)
3 (80)	3.50 (88,9)	500 (34,5)	500 (34,5)	—	—	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)
4 (100)	4.50 (114,3)	500 (34,5)	500 (34,5)	—	—	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)
139,1mm (125)	5.50 (139,7)	500 (34,5)	500 (34,5)	—	—	365 (25,2)	365 (25,2)	232 (16,0)	—	365 (25,2)	365 (25,2)	232 (16,0)	—
5 (125)	5.56 (141,3)	500 (34,5)	500 (34,5)	—	—	—	365 (25,2)	—	—	—	365 (25,2)	—	—
165,1mm (150)	6.50 (165,1)	500 (34,5)	500 (34,5)	—	—	365 (25,2)	365 (25,2)	—	—	365 (25,2)	365 (25,2)	—	—
6 (150)	6.63 (168,3)	500 (34,5)	500 (34,5)	—	—	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)
8 (200)	8.63 (219,1)	500 (34,5)	500 (34,5)	—	—	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)	365 (25,2)	365 (25,2)	232 (16,0)	290 (20,0)
10 (250)	10.75 (273,0)	500 (34,5)	500 (34,5)	—	—	—	—	—	—	—	—	—	—
12 (300)	12.75 (323,9)	500 (34,5)	500 (34,5)	—	—	—	—	—	—	—	—	—	—

TABLE D
FIGURE 260 CAST END CAP, FIGURE 510S CAST ELBOW, AND FIGURE 519S CAST TEE LISTED/APPROVED PRESSURE RATING

Nominal Pipe Size	ADACAP psi bar			
Inches x NPT (DN)	UL	FM	VdS	LPCB
1-1/2 x 1/2 (40)	300 (20,7)	300 (20,7)	—	—
1-1/2 x 3/4 (40)	300 (20,7)	300 (20,7)	—	—
1-1/2 x 1 (40)	300 (20,7)	300 (20,7)	—	—
2 x 1/2 (50)	300 (20,7)	300 (20,7)	—	—
2 x 3/4 (50)	300 (20,7)	300 (20,7)	—	—
2 x 1 (50)	300 (20,7)	300 (20,7)	—	—
2-1/2 x 1/2 (65)	300 (20,7)	300 (20,7)	—	—
2-1/2 x 3/4 (65)	300 (20,7)	300 (20,7)	—	—
2-1/2 x 1 (65)	300 (20,7)	300 (20,7)	—	—

TABLE E
ADACAP
LISTED/APPROVED PRESSURE RATING

Limited Warranty

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

Ordering Procedure

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

Please specify the quantity, figure number, wall thickness, and size.

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

Threaded Fittings

For Fire Protection pressure rating, listing, and approval information, visit Shurjoint website, www.shurjoint.com for details or contact your SHURJOINT Representative.

THREADED FITTINGS

Shurjoint *offers a complete range of ductile iron Class 300 threaded fittings in sizes from ½" to 2½". **Shurjoint** ductile iron threaded fittings are 100% air tested underwater to ensure leak-free performance. The **Shurjoint** ductile iron fitting series is UL listed and FM approved, making them the right choice for fire protection and other general application services.*

Ductile Iron Class 300 threaded fittings are designed to the same dimensions as that of Class 150 malleable iron fittings. Though due to the superior strength characteristics, ductile Iron fittings carry a much higher pressure rating. Laboratory tests confirm ***Shurjoint*** ductile iron fittings have passed hydrostatic test pressures exceeding 6,000 psi / 414 Bar, which is equal to four times the 1,500 psi /103 Bar as specified by ANSI B16.3 for 1½" – 2" sizes.

Burst pressure testing of DI threaded fittings (2")

Material: Ductile iron ASTM A536 Gr. 65-45-12 and or ASTM A395 Gr. 65-45-15.

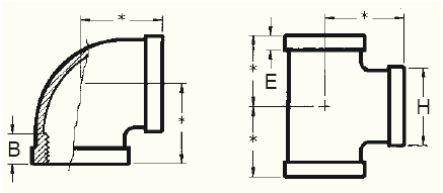
Dimensions: ANSI B16.3 Class 150 except bushings and plugs (B16.14), unions (B16.39) and companion flanges (B16.42). Please note wall thickness dimensions are subordinate to ***Shurjoint*** UL and FM pressure rating listings and approvals

Threads: ANSI B1.20.1 NPT or ISO-7 (BSPT)

Finish: Black or electro-zinc plated

General Dimensions

These dimensions apply to all standard fittings, both straight and reducing. For center-to-face dimensions(*), see fitting tables.



Pipe Size	H Band O.D.	E Band Width	B Thread Length (min)
in	in	in	in
½	1.02	0.25	0.43
¾	1.46	0.27	0.50
1	1.77	0.30	0.58
1¼	2.15	0.34	0.67
1½	2.43	0.37	0.70
2	2.96	0.42	0.75
2½	3.59	0.48	0.92

Installers who have not used DI threaded fittings before should be instructed that the fittings are stronger than the pipe in most cases. In general DI threaded fittings require about a one-half turn less than cast iron fittings. Refer to the installation instructions for further detail.

Pressure-Temperature Rating (ANSI B16.3 & B16.14)

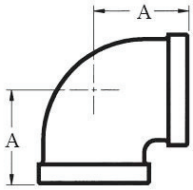
Nom. Rating	Working Pressure (W.O.G.) @150˚F / @65˚C	Working Pressure Saturated Steam
Class 300	½" – 1" : 2000 psi / 140 Bar 1¼" – 2" : 1500 psi / 105 Bar 2½": 1000 psi / 70 Bar	300 psi (20 Bar)

*Proof test pressure: 1.5 times the working pressure, non-shock cold water.

10 YEAR LIMITED WARRANTY

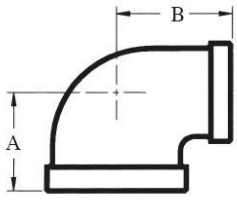
Full warranty terms can be found on www.shurjoint.com

MODEL 811 ELBOW 90°



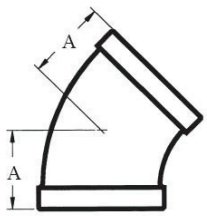
Model 811 Elbow 90°			
Size	A	Wt.	Box Q'ty
in	in	Lbs	Pcs
½	1.12	0.25	240
¾	1.31	0.35	120
1	1.50	0.57	70
1¼	1.75	0.97	40
1½	1.94	1.17	30
2	2.25	1.83	20
2½	2.70	3.34	10

MODEL 812 REDUCING ELBOW 90°



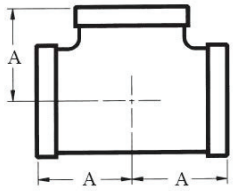
Model 812 Reducing Elbow 90°				
Size	A	B	Wt.	Box Q'ty
in	in	in	Lbs	Pcs
¾ x ½	1.20	1.22	0.35	160
1 x ½	1.26	1.36	0.46	110
1 x ¾	1.18	1.45	0.57	90
1¼ x ½	1.34	1.53	0.64	75
1¼ x ¾	1.45	1.62	0.68	60
1¼ x 1	1.58	1.67	0.81	55
1½ x ½	1.41	1.66	0.84	45
1½ x ¾	1.52	1.75	0.90	45
1½ x 1	1.65	1.80	0.95	40
1½ x 1¼	1.82	1.88	1.10	35
2 x ¾	1.60	1.97	1.19	30
2 x 1	1.73	2.02	1.47	25
2 x 1½	2.02	2.16	1.61	20
2½ x 2	2.39	2.60	2.93	15

MODEL 813 ELBOW 45°



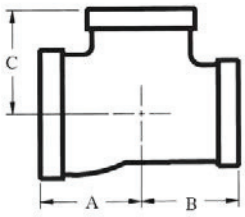
Model 813 Elbow 45°			
Size	A	Wt.	Box Q'ty
in	in	Lbs	Pcs
½	0.88	0.22	250
¾	0.98	0.33	150
1	1.12	0.55	90
1¼	1.29	0.84	50
1½	1.43	0.92	35
2	1.68	1.63	18
2½	1.95	2.42	12

MODEL 814 TEE



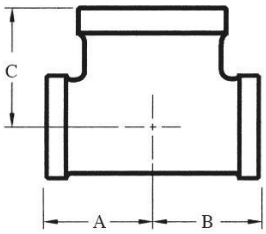
Model 814 Tee			
Size	A	Wt.	Box Q'ty
in	in	Lbs	Pcs
½	1.12	0.31	150
¾	1.31	0.48	90
1	1.50	0.81	60
1¼	1.75	1.28	35
1½	1.94	1.72	24
2	2.25	2.57	12
2½	2.70	4.44	8

MODEL 815 REDUCING TEE



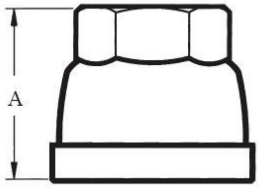
Model 815 Reducing Tee							
Size			A	B	C	Wt.	Box
in			in	in	in	Lbs	Pcs
¾	¾	½	1.20	1.20	1.22	0.46	95
1	½	1	1.50	1.36	1.50	0.71	55
	¾	½	1.26	1.20	1.36	0.59	80
		¾	1.37	1.31	1.45	0.66	65
		1	1.50	1.45	1.50	0.77	55
	1	½	1.26	1.26	1.36	0.64	65
		¾	1.37	1.37	1.45	0.75	60
1¼	1	½	1.34	1.26	1.53	0.79	50
		¾	1.45	1.37	1.62	0.88	50
		1	1.58	1.50	1.67	1.01	45
		1¼	1.75	1.67	1.75	1.25	40
	1¼	½	1.34	1.34	1.53	0.84	45
		¾	1.45	1.45	1.62	0.99	45
		1	1.58	1.58	1.67	1.12	40
1½	1	½	1.44	1.31	1.69	0.92	40
		¾	1.50	1.37	1.75	1.01	40
		1	1.65	1.50	1.80	1.19	30
		1¼	1.82	1.67	1.88	1.54	30
		1½	1.94	1.80	1.94	1.54	30
	1¼	½	1.41	1.34	1.66	1.08	40
		¾	1.52	1.45	1.75	1.14	40
		1	1.65	1.58	1.80	1.39	30
	1½	½	1.41	1.41	1.66	1.10	35
		¾	1.52	1.52	1.75	1.17	35
		1	1.65	1.65	1.80	1.36	30
		1¼	1.82	1.82	1.88	1.56	30
2	1	2	2.25	2.02	2.25	2.13	15
	1¼	2	2.25	2.10	2.25	2.22	15
	1½	½	1.49	1.41	1.88	1.52	30
		¾	1.60	1.52	1.97	1.47	25
		1	1.73	1.65	2.02	1.63	20
		1½	2.02	1.94	2.16	2.09	20
		2	2.25	2.16	2.25	2.33	15
	2	½	1.49	1.49	1.88	1.56	20
		¾	1.60	1.60	1.97	1.61	20
		1	1.73	1.73	2.02	1.80	20
		1¼	1.90	1.90	2.10	2.09	20
		1½	2.02	2.02	2.16	2.24	15
2½	2	¾	1.74	1.60	2.32	2.35	15

MODEL 815 BULLHEAD TEE



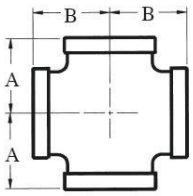
Model 815 Bullhead Tee							
Size			A	B	C	Wt.	Box
in			in	in	in	Lbs	Pcs
¾	¾	1	1.45	1.45	1.37	0.66	65
1	1	1¼	1.67	1.67	1.58	0.97	45
		1½	1.80	1.80	1.65	1.15	35
1¼	1	1½	1.88	1.80	1.82	1.43	30
	1¼	1½	1.88	1.88	1.82	1.52	30
		2	2.10	2.10	1.90	1.80	24
1½	1¼	2	2.16	2.10	2.02	1.94	20
	1½	2	2.16	2.16	2.02	2.00	20
2	2	2½	2.60	2.60	2.39	3.61	10

MODEL 816 REDUCING COUPLING

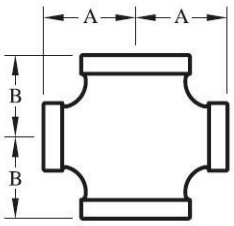


Model 816 Reducing Coupling				
Size	A	Wrench Size	Wt.	Box
in	in	in	Lbs	Pcs
¾ x ½	1.63	1-¼	0.37	150
1 x ½	1.69	1-¼	0.37	140
1 x ¾	1.37	1-½	0.48	120
1¼ x ¾	2.06	1-½	0.59	80
1¼ x 1	2.06	-	0.66	60
1½ x 1	2.31	-	0.84	50
1½ x 1¼	2.31	-	0.92	45
2 x 1	2.81	-	1.23	35
2 x 1¼	2.81	-	1.28	30
2 x 1½	2.81	-	1.66	30
2½ x 2	3.25	-	2.24	18

MODEL 817 CROSS

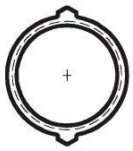


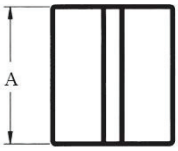
Model 817 Cross				
Size	A	B	Wt.	Box Q'ty
in	in	in	Lbs	Pcs
1/2	1.12	1.12	0.48	90
3/4	1.31	1.31	0.77	60
1	1.50	1.50	0.95	45
1¼	1.75	1.75	1.43	25
1½	1.94	1.94	1.87	20
2	2.25	2.25	2.86	10



Model 817 Reducing Cross				
Size	A	B	Wt.	Box Q'ty
in	in	in	Lbs	Pcs
1¼x1¼x1x1	1.67	1.58	1.25	30
1½x1½x1x1	1.80	1.65	1.47	24
2 x 2 x 1 x 1	2.02	1.73	1.94	16

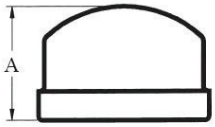
MODEL 818 STRAIGHT COUPLING





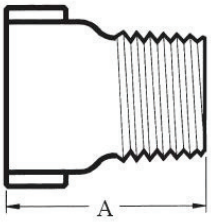
Model 818 Straight Coupling				
Size	A	Wrench Size	Wt.	Box Q'ty
in	in	in	Lbs	Pcs
½	1.38	1⅛"	0.18	360
¾	1.61	1⅜"	0.26	200
1	1.77	1 11/16"	0.42	110
1¼	2.00	2"	0.57	75
1½	2.20	2¼"	0.77	60
2	2.60	2¾"	1.17	30
2½	3.00	3⅜"	2.11	18

MODEL 820 CAP



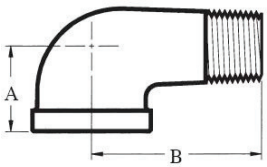
Model 820 Cap			
Size	A	Wt.	Box Q'ty
in	in	in	Lbs
½	0.89	0.14	500
¾	1.00	0.20	300
1	1.18	0.33	180
1¼	1.32	0.46	110
1½	1.38	0.57	80
2	1.48	0.88	45
2½	1.77	1.54	25

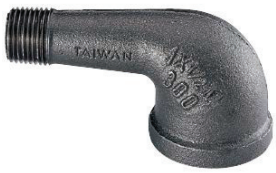
MODEL 825 EXTENSION PIECE



Model 825 Extension Piece			
Size	A	Wt.	Box Q'ty
in	in	Lbs	Pcs
½ x 1½L	1.50	0.18	300
½ x 2L	2.00	0.22	250
¾ x 1½L	1.50	0.22	250
¾ x 2L	2.00	0.26	200

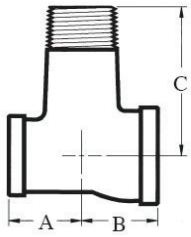
MODEL 831 LONG STREET ELBOW 90°





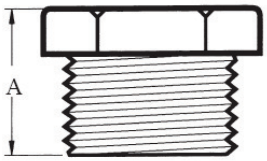
Model 831 Long Street Elbow 90°				
Size	A	B	Wt.	Box Q'ty
in	in	in	Lbs	Pcs
1 x ½M	1.50	3.00	0.66	80
1 x 1M	1.50	3.00	0.81	60

MODEL 832 LONG STREET TEE



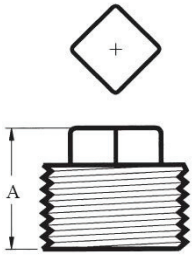
Model 832 Long Street Tee					
Size	A	B	C	Wt	Box Q'ty
in	in	in	in	Lbs	Pcs
1 x ½x1M	1.50	1.40	3.00	0.91	50
1 x 1 x 1M	1.50	1.50	3.00	1.03	45

MODEL 827 HEX BUSHING



Model 827 Hex Bushing			
Size	A	Wt.	Box Q'ty
in	in	Lbs	Pcs
1 x ½	1.06	0.20	280
1 x ¾	1.06	0.18	280
1¼ x 1	1.18	0.29	150
1½ x 1	1.26	0.53	100
1½ x 1¼	1.26	0.37	100
2 x 1	1.34	0.75	80
2 x 1¼	1.34	0.75	80
2 x 1½	1.34	0.64	80

MODEL 819 PLUG



Model 819 Plug			
Size	A	Wt.	Box Q'ty
in	in	Lbs	Pcs
½	0.93	0.09	500
¾	1.13	0.18	300
1	1.25	0.25	200
1¼	1.36	0.42	110
1½	1.45	0.59	80
2	1.50	0.95	45

General Notes:

- Pressure ratings listed are CWP (cold water pressure) or maximum working pressure within the service temperature range of the gasket used in the coupling. This rating may occasionally differ from maximum working pressures listed and/or approved by UL, ULC, and/or FM as testing conditions and test pipes differ. For additional information contact ***Shurjoint***.
- Maximum working pressures and end loads listed are total of internal and external pressures and loads based on Sch. 10 steel pipe with roll grooves to ANSI/AWWA C606 (latest version) specifications. For information on other pipe schedules contact ***Shurjoint***.
- **For one time field test only** the maximum joint working pressure may be increased 1½ times the figures shown.
- **Warning:** Piping systems must always be depressurized and drained before attempting disassembly and or removal of any components.
- ***Shurjoint*** reserves the right to change specifications, designs and or standard equipment without notice and without incurring any obligations.

Job Name:	**System No.**	**Location:**
Contractor:	**Approved:**	**Date:**
Engineer:	**Approved:**	**Date:**

Shurjoint *product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact* ***Shurjoint*** *Technical Service.* ***Shurjoint*** *reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligations to make such changes and modifications on* ***Shurjoint*** *products previously subsequently sold.*

Pipe Fittings NPT Threaded, Ductile Iron

General Description

The TYCO Series 800 Threaded Pipe Fittings and California Tees & Elbows are manufactured from ductile iron. They are stronger and more corrosion resistant than cast iron fittings. The additional strength is provided by the ductile properties and by adding magnesium while the iron is being poured into the final cast shape. Although lighter than standard cast iron, the fittings have an added advantage of being less susceptible to cracking due to their added strength.

The Series 800, California, and Figure 719 Threaded Pipe Fittings are a redesignation for the Central Series 800, California, and Figure 719 Threaded Pipe Fittings.

NOTICE

The Threaded Pipe Fittings described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction. Failure to do so may impair the performance of these devices.

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

Technical Data

Approvals
UL Listed
FM Approved

Maximum Working Pressure
300 psi (20,7 bar)

Material
Series 800 and California Fittings:
Ductile Iron

Figure 719 Plug:
Cast Iron

Pipe Thread
NPT per ANSI B1.20.1

Installation

Apply TEFLON tape or high quality pipe joint compound on male pipe threads and tighten two to three turns beyond hand tight.

NOTICE

Installers who have not used ductile iron threaded fittings should be instructed that the fittings are stronger than the pipe and overtightening the fitting can create leaks and cause damage to pipe threads. In general, there is about one-half turn difference between cast iron and ductile iron fittings. Apply TEFLON tape or high quality pipe joint compound on the male pipe threads and tighten two to three turns beyond hand tight. If an automatic make-on machine is being used, please exercise caution in setting the machine to the proper parameters prior to tightening fittings onto the male pipe threads.

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).

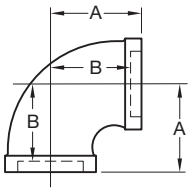


FIGURE 811
90° ELBOW

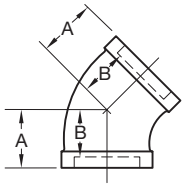


FIGURE 813
45° ELBOW

Nominal Pipe Size	Figure 811				Figure 813			
ANSI Inches DN	A Inches (mm)	B Inches (mm)	Approx. Weight Lbs. (kg)	Part Number	A Inches (mm)	B Inches (mm)	Approx. Weight Lbs. (kg)	Part Number
1/2 15	1.13 (28,7)	0.56 (14,2)	0.24 (0,11)	86206	0.88 (22,4)	0.38 (9,7)	0.22 (0,09)	86780
3/4 20	1.31 (33,3)	0.75 (19,0)	0.40 (0,18)	86205	1.00 (25,4)	0.44 (11,2)	0.33 (0,15)	86781
1 25	1.50 (38,1)	0.81 (20,6)	0.64 (0,29)	86200	1.13 (28,7)	0.81 (20,6)	0.48 (0,21)	86280
1-1/4 32	1.75 (44,5)	1.06 (26,9)	0.95 (0,43)	86201	1.31 (33,3)	0.63 (16,0)	0.73 (0,33)	86281
1-1/2 40	1.94 (49,3)	1.19 (30,2)	1.24 (0,56)	86202	1.44 (36,6)	0.69 (17,5)	0.93 (0,42)	86282
2 50	2.25 (57,1)	1.50 (38,1)	1.74 (0,79)	86203	1.68 (42,7)	0.94 (23,9)	1.55 (0,70)	86283
2-1/2 65	2.69 (68,3)	1.56 (39,6)	3.28 (1,49)	86204	1.94 (49,3)	1.00 (25,4)	2.70 (1,22)	86782

TABLE A
FIGURES 811 & 813
NOMINAL DIMENSIONS

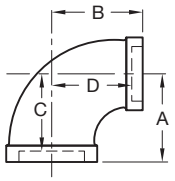


FIGURE 812
90° REDUCING ELBOW

Nominal Pipe Size	Figure 812					
ANSI Inches DN	**A Inches (mm)**	**B Inches (mm)**	**C Inches (mm)**	**D Inches (mm)**	**Approx. Weight Lbs. (kg)**	**Part Number**
3/4 x 1/2 20 x 15	1.19 (30,2)	1.19 (30,2)	0.63 (16,0)	0.63 (16,0)	0.33 (0,15)	86342
1 x 1/2 25 x 15	1.25 (31,8)	1.38 (35,1)	0.56 (14,2)	0.81 (20,6)	0.44 (0,20)	86210
1 x 3/4 25 x 20	1.38 (35,1)	1.44 (36,6)	0.69 (17,5)	0.88 (22,4)	0.53 (0,24)	86211
1-1/4 x 1/2 32 x 15	1.31 (33,3)	1.50 (38,1)	0.63 (16,0)	0.94 (23,9)	0.64 (0,29)	86212
1-1/4 x 3/4 32 x 20	1.44 (36,6)	1.63 (41,4)	0.75 (19,0)	1.06 (26,9)	0.75 (0,34)	86213
1-1/4 x 1 32 x 25	1.56 (39,6)	1.68 (42,7)	0.88 (22,4	1.00 (25,4)	0.77 (0,35)	86214
1-1/2 x 3/4 40 x 20	1.50 (38,1)	1.75 (44,4)	0.75 (19,0)	1.19 (30,2)	0.95 (0,43)	86221
1-1/2 x 1 40 x 25	1.63 (41,4)	1.81 (46,0)	0.88 (22,4)	1.13 (28,7)	0.99 (0,45)	86215
1-1/2 x 1-1/4 40 x 32	1.81 (46,0)	1.88 (47,8)	1.13 (28,7)	1.19 (30,2)	1.14 (0,52)	86216
2 x 3/4 50 x 20	1.63 (41,4)	1.94 (49,3)	0.88 (22,4)	1.38 (35,1)	1.39 (0,63)	86217
2 x 1 50 x 25	1.75 (44,4)	2.06 (52,3)	2.00 (50,8)	1.31 (33,3)	1.58 (0,72)	86218
2 x 1-1/2 50 x 40	2.00 (50,8)	2.19 (55,6)	1.25 (31,8)	1.44 (36,6)	1.67 (0,76)	86220
2-1/2 x 2 65 x 50	2.38 (60,5)	2.63 (66,8)	1.25 (31,8)	1.88 (47,8)	3.01 (1,36)	86762

TABLE B
FIGURE 812
NOMINAL DIMENSIONS

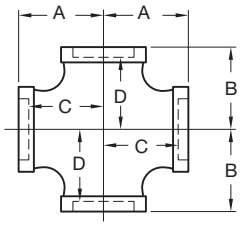


FIGURE 817
CROSS

Nominal Pipe Size	Figure 817					
ANSI Inches DN	**A Inches (mm)**	**B Inches (mm)**	**C Inches (mm)**	**D Inches (mm)**	**Approx. Weight Lbs. (kg)**	**Part Number**
1 25	1.50 (38,1)	1.50 (38,1)	0.81 (20,6)	0.81 (20,6)	0.97 (0,44)	86284
1-1/4 32	1.75 (44,4)	1.75 (44,4)	1.06 (26,9)	1.06 (27,0)	1.59 (0,72)	86285
1-1/2 40	1.94 (49,3)	1.94 (49,3)	1.19 (30,2)	1.19 (30,2)	1.89 (0,86)	86286
2 50	2.25 (57,1)	2.25 (57,1)	1.50 (38,1)	1.50 (38,1)	2.93 (1,33)	86287
1-1/4 x 1-1/4 x 1 x 1 32 x 32 x 25 x 25	1.69 (42,9)	1.56 (39,6)	1.00 (25,4)	0.88 (22,4)	1.25 (0,56)	86289
1-1/2 x 1-1/2 x 1 x 1 40 x 40 x 25 x 25	1.81 (46,0)	1.63 (41,4)	1.06 (26,9)	1.94 (49,3)	1.48 (0,71)	86322
2 x 2 x 1 x 1 50 x 50 x 25 x 25	2.00 (50,8)	1.75 (44,4)	1.25 (31,8)	1.06 (26,9)	2.64 (1,20)	86291

TABLE C
FIGURE 817
NOMINAL DIMENSIONS

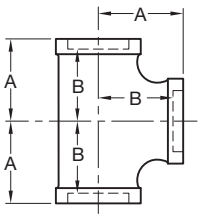


FIGURE 814
IRON TEE

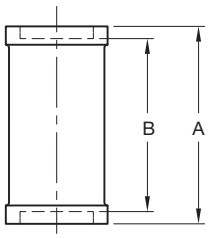


FIGURE 818
STRAIGHT COUPLING

Nominal Pipe Size	Figure 814				Figure 818			
ANSI Inches DN	**A Inches (mm)**	**B Inches (mm)**	**Approx. Weight Lbs. (kg)**	**Part Number**	**A Inches (mm)**	**B Inches (mm)**	**Approx. Weight Lbs. (kg)**	**Part Number**
1/2 15	1.13 (28,7)	0.56 (14,2)	0.33 (0,15)	86340	1.38 (35,1)	0.31 (7,9)	0.18 (0,08)	72779
3/4 20	1.31 (33,3)	0.75 (19,0)	0.50 (0,23)	86341	1.63 (41,4)	0.56 (14,0)	0.26 (0,11)	72778
1 25	1.50 (38,1)	0.81 (20,6)	0.85 (0,38)	86230	1.75 (44,4)	0.38 (9,7)	0.44 (0,20)	72755
1-1/4 32	1.75 (44,4)	1.06 (26,9)	1.30 (0,59)	86231	2.00 (50,8)	0.56 (14,0)	0.54 (0,24)	72754
1-1/2 40	1.94 (49,3)	1.19 (30,2)	1.63 (0,74)	86232	2.19 (55,6)	0.75 (19,0)	0.71 (0,32)	72753
2 50	2.25 (57,1)	1.50 (38,1)	2.63 (1,19)	86233	2.63 (66,8)	1.13 (28,7)	1.15 (0,52)	72752
2-1/2 65	2.69 (68,3)	1.56 (39,6)	4.55 (2,06)	86234	3.00 (76,2)	0.75 (19,0)	2.29 (1,04)	72758

TABLE D
FIGURES 814 & 818
NOMINAL DIMENSIONS

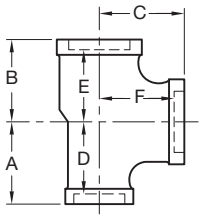


FIGURE 815
REDUCING TEE

Nominal Pipe Size	Figure 815							
ANSI Inches DN	**A Inches (mm)**	**B Inches (mm)**	**C Inches (mm)**	**D Inches (mm)**	**E Inches (mm)**	**F Inches (mm)**	**Approx. Weight Lbs. (kg)**	**Part Number**
3/4 x 3/4 x 1/2 20 x 20 x 15	1.19 (30,2)	1.19 (30,2)	1.25 (31,8)	0.63 (16,0)	0.63 (16,0)	0.69 (17,5)	0.46 (0,21)	86235
3/4 x 3/4 x 1 20 x 20 x 25	1.44 (36,6)	1.44 (36,6)	1.38 (35,1)	0.88 (22,4)	0.88 (22,4)	0.69 (17,5)	0.68 (0,31)	86755
1 x 1/2 x 1 25 x 15 x 25	1.50 (38,1)	1.38 (35,1)	1.50 (38,1)	0.81 (20,6)	0.81 (20,6)	0.81 (20,6)	0.70 (0,32)	86236
1 x 3/4 x 1/2 25 x 20 x 15	1.25 (31,8)	1.19 (30,2)	1.38 (35,1)	0.56 (14,2)	0.63 (16,0)	0.81 (20,6)	0.63 (0,28)	86756
1 x 3/4 x 3/4 25 x 20 x 20	1.38 (35,1)	1.31 (33,3)	1.44 (36,6)	0.69 (17,5)	0.75 (19,0)	0.88 (22,4)	0.68 (0,31)	86757
1 x 3/4 x 1 25 x 20 x 25	1.50 (38,1)	1.44 (36,6)	1.50 (38,1)	0.81 (20,6)	0.88 (22,4)	0.81 (20,6)	0.77 (0,35)	86237
1 x 1 x 1/2 25 x 25 x 15	1.25 (31,8)	1.25 (31,8)	1.38 (35,1)	0.56 (14,3)	0.56 (14,3)	0.81 (20,6)	0.66 (0,30)	86238
1 x 1 x 3/4 25 x 25 x 20	1.38 (35,1)	1.38 (35,1)	1.44 (36,6)	0.69 (17,5)	0.69 (17,5)	0.88 (22,4)	0.73 (0,33)	86239
1 x 1 x 1-1/4 25 x 25 x 32	1.69 (42,9)	1.69 (42,9)	1.56 (39,6)	1.00 (25,4)	1.00 (25,4)	0.88 (22,4)	0.97 (0,44)	86240
1 x 1 x 1-1/2 25 x 25 x 40	1.81 (46,0)	1.81 (46,0)	1.63 (41,4)	1.13 (28,6)	1.13 (28,6)	0.88 (22,4)	1.14 (0,52)	86241
1-1/4 x 1 x 1/2 32 x 25 x 15	1.94 (49,2)	1.25 (31,8)	1.56 (39,6)	0.63 (15,9)	0.56 (14,3)	1.00 (25,4)	0.81 (0,37)	86242
1-1/4 x 1 x 3/4 32 x 25 x 20	1.44 (36,6)	1.38 (35,1)	1.62 (41,2)	0.75 (19,0)	0.69 (17,5)	1.06 (27,0)	0.90 (0,41)	86243
1-1/4 x 1 x 1 32 x 25 x 25	1.56 (39,6)	1.50 (38,1)	1.69 (42,9)	0.88 (22,4)	0.81 (20,6)	1.00 (25,4)	1.03 (0,47)	86244
1-1/4 x 1 x 1-1/4 32 x 25 x 32	1.75 (44,4)	1.69 (42,9)	1.75 (44,4)	1.06 (27,0)	1.00 (25,4)	1.06 (27,0)	1.10 (0,50)	86245
1-1/4 x 1 x 1-1/2 32 x 25 x 40	1.88 (47,6)	1.81 (46,0)	1.81 (46,0)	1.19 (30,1)	1.13 (28,6)	1.06 (27,0)	1.43 (0,65)	86246
1-1/4 x 1-1/4 x 1/2 32 x 32 x 15	1.38 (35,1)	1.38 (35,1)	1.56 (39,6)	0.69 (17,5)	0.69 (17,5)	1.00 (25,4)	0.87 (0,39)	86247
1-1/4 x 1-1/4 x 3/4 32 x 32 x 20	1.44 (36,6)	1.44 (36,6)	1.63 (41,4)	0.75 (19,0)	0.75 (19,0)	1.06 (27,0)	0.96 (0,43)	86248
1-1/4 x 1-1/4 x 1 32 x 32 x 25	1.56 (39,6)	1.56 (39,6)	1.69 (42,9)	0.88 (22,4)	0.88 (22,4)	1.00 (25,4)	1.10 (0,50)	86249
1-1/4 x 1-1/4 x 1-1/2 32 x 32 x 40	1.88 (47,6)	1.88 (47,6)	1.81 (46,0)	1.81 (46,0)	1.81 (46,0)	1.06 (27,0)	1.50 (0,68)	86250
1-1/4 x 1-1/4 x 2 32 x 32 x 50	2.13 (54,1)	2.13 (54,1)	2.00 (50,8)	1.44 (36,6)	1.44 (36,6)	1.13 (28,6)	2.00 (0,91)	86251
1-1/2 x 1 x 1/2 40 x 25 x 15	1.44 (36,6)	1.31 (33,3)	1.69 (42,9)	0.69 (17,5)	0.63 (15,9)	1.13 (28,6)	0.97 (0,44)	86252
1-1/2 x 1 x 3/4 40 x 25 x 20	1.50 (38,1)	1.38 (35,1)	1.75 (44,4)	0.75 (19,0)	0.69 (17,5)	1.19 (30,2)	1.14 (0,52)	86253
1-1/2 x 1 x 1 40 x 25 x 25	1.63 (41,4)	1.50 (38,1)	1.81 (46,0)	0.88 (22,4)	0.81 (20,6)	1.13 (28,7)	1.14 (0,52)	86254
1-1/2 x 1 x 1-1/2 40 x 25 x 40	1.94 (49,3)	1.81 (46,0)	1.94 (49,2)	1.19 (30,2)	1.13 (28,6)	1.19 (30,2)	1.52 (0,69)	86256

TABLE E (1 OF 2)
FIGURE 815
NOMINAL DIMENSIONS

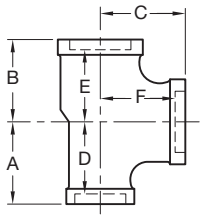


FIGURE 815
REDUCING TEE

Nominal Pipe Size	Figure 815							
ANSI Inches DN	**A Inches (mm)**	**B Inches (mm)**	**C Inches (mm)**	**D Inches (mm)**	**E Inches (mm)**	**F Inches (mm)**	**Approx. Weight Lbs. (kg)**	**Part Number**
1-1/2 x 1-1/4 x 1/2 40 x 32 x 15	1.44 (36,6)	1.31 (33,3)	1.69 (42,9)	0.69 (17,5)	0.63 (16,0)	1.13 (28,7)	1.03 (0,47)	86257
1-1/2 x 1-1/4 x 3/4 40 x 32 x 20	1.50 (38,1)	1.44 (36,6)	1.75 (44,5)	0.75 (19,0)	0.75 (19,0)	1.19 (30,1)	1.10 (0,50)	86258
1-1/2 x 1-1/4 x 1 40 x 32 x 25	1.63 (41,4)	1.56 (39,7)	1.81 (46,0)	0.88 (22,4)	0.88 (22,4)	1.13 (28,7)	1.31 (0,59)	86259
1-1/2 x 1-1/4 x 2 40 x 32 x 50	2.19 (55,6)	2.13 (54,1)	2.00 (50,8)	1.44 (36,6)	1.44 (36,6)	1.25 (57,1)	1.94 (0,88)	86260
1-1/2 x 1-1/2 x 1/2 40 x 40 x 15	1.44 (36,6)	1.44 (36,6)	1.69 (42,9)	0.69 (17,5)	0.69 (17,5)	1.13 (28,7)	1.14 (0,52)	86261
1-1/2 x 1-1/2 x 3/4 40 x 40 x 20	1.50 (38,1)	1.50 (38,1)	1.75 (44,4)	0.75 (19,0)	0.75 (19,0)	1.19 (30,1)	1.23 (0,56)	86262
1-1/2 x 1-1/2 x 1 40 x 40 x 25	1.63 (41,2)	1.63 (41,2)	1.81 (46,0)	0.88 (22,4)	0.88 (22,4)	1.13 (28,7)	1.38 (0,62)	86263
1-1/2 x 1-1/2 x 1-1/4 40 x 40 x 32	1.81 (46,0)	1.81 (46,0)	1.88 (47,6)	1.06 (27,0)	1.06 (27,0)	1.19 (30,1)	1.50 (0,68)	86264
1-1/2 x 1-1/2 x 2 40 x 40 x 50	2.19 (55,5)	2.19 (55,5)	2.00 (50,8)	1.44 (36,6)	1.44 (36,6)	1.25 (31,7)	2.00 (0,91)	86265
2 x 1 x 2 50 x 25 x 50	2.25 (57,2)	2.00 (50,8)	2.25 (57,2)	1.50 (38,1)	1.31 (33,3)	1.50 (38,1)	2.18 (0,99)	86266
2 x 1-1/4 x 2 50 x 32 x 50	2.25 (57,2)	2.13 (54,1)	2.25 (57,2)	1.50 (38,1)	1.44 (36,6)	1.50 (38,1)	2.31 (1,05)	86267
2 x 1-1/2 x 1/2 50 x 40 x 15	1.50 (38,1)	1.44 (36,6)	1.88 (47,8)	0.75 (19,0)	0.69 (17,5)	1.31 (33,3)	1.50 (0,68)	86268
2 x 1-1/2 x 3/4 50 x 40 x 20	1.63 (41,4)	1.50 (38,1)	1.94 (49,3)	0.88 (22,4)	0.75 (19,0)	1.38 (35,0)	1.61 (0,73)	86269
2 x 1-1/2 x 1 50 x 40 x 25	1.75 (44,5)	1.63 (41,4)	2.00 (50,8)	1.00 (25,4)	0.88 (22,4)	1.31 (33,3)	1.65 (0,75)	86270
2 x 1-1/2 x 1-1/2 50 x 40 x 40	2.06 (52,4)	1.94 (49,2)	2.19 (55,5)	1.31 (33,3)	1.19 (30,2)	1.44 (36,6)	2.03 (0,92)	86272
2 x 1-1/2 x 2 50 x 40 x 50	2.25 (57,1)	2.19 (55,5)	2.50 (63,5)	1.50 (38,1)	1.44 (36,6)	1.50 (38,1)	2.37 (1,07)	86273
2 x 2 x 1/2 50 x 50 x 15	1.50 (38,1)	1.50 (38,1)	1.88 (47,8)	0.75 (19,0)	0.75 (19,0)	1.31 (33,3)	1.50 (0,68)	86222
2 x 2 x 3/4 50 x 50 x 20	1.63 (41,4)	1.63 (41,4)	1.94 (49,3)	0.88 (22,4)	0.88 (22,4)	1.38 (35,0)	1.67 (0,76)	86223
2 x 2 x 1 50 x 50 x 25	1.75 (44,5)	1.75 (44,5)	2.00 (50,8)	1.00 (25,4)	1.00 (25,4)	1.31 (33,3)	1.91 (0,86)	86224
2 x 2 x 1-1/4 50 x 50 x 32	1.88 (47,8)	1.88 (47,8)	2.13 (54,1)	1.13 (28,7)	1.13 (28,7)	1.44 (36,6)	2.05 (0,93)	86225
2 x 2 x 1-1/2 50 x 50 x 40	2.00 (50,8)	2.00 (50,8)	2.19 (55,6)	1.25 (31,8)	1.25 (31,8)	1.50 (38,1)	2.11 (0,96)	86226
2 x 2 x 2-1/2 50 x 50 x 65	2.63 (66,8)	2.63 (66,8)	2.38 (60,5)	1.75 (44,5)	1.88 (47,8)	1.44 (36,6)	3.67 (1,66)	86227
2-1/2 x 2 x 3/4 65 x 50 x 20	1.75 (44,5)	1.63 (41,4)	2.31 (58,7)	0.63 (15,9)	0.88 (22,4)	1.75 (44,5)	2.22 (1,01)	86274

TABLE E (2 OF 2)
FIGURE 815
NOMINAL DIMENSIONS

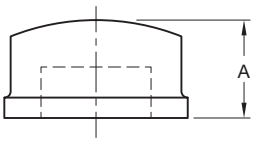


FIGURE 820
CAP

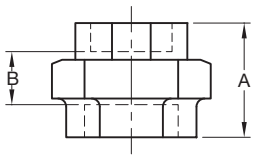


FIGURE 830
BRASS SEAT UNION

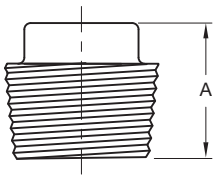


FIGURE 719
PLUG

Nominal Pipe Size	Figure 820			Figure 830				Figure 719		
ANSI Inches DN	A Inches (mm)	Approx. Weight Lbs. (kg)	Part Number	A Inches (mm)	B Inches (mm)	Approx. Weight Lbs. (kg)	Part Number	A Inches (mm)	Approx. Weight Lbs. (kg)	Part Number
1/2 15	0.88 (22,4)	0.15 (0,06)	72776	1.88 (47,8)	0.81 (20,6)	0.47 (0,21)	86207	0.94 (23,9)	0.10 (0,04)	86292
3/4 20	1.00 (25,4)	0.22 (0,10)	72777	2.00 (50,8)	0.94 (23,9)	0.66 (0,30)	86275	1.13 (28,7)	0.18 (0,08)	86293
1 25	1.18 (30,0)	0.33 (0,15)	72824	2.19 (55,6)	0.81 (20,6)	1.08 (0,49)	86276	1.25 (31,7)	0.28 (0,13)	86294
1-1/4 32	1.31 (33,3)	0.54 (0,24)	72756	2.50 (63,5)	1.06 (26,9)	1.54 (0,70)	86277	1.38 (35,1)	0.50 (0,23)	86295
1-1/2 40	1.38 (35,1)	0.68 (0,31)	72822	2.63 (66,8)	1.19 (30,2)	2.03 (0,92)	86278	1.44 (36,6)	0.70 (0,32)	86296
2 50	1.50 (38,1)	0.96 (0,43)	72823	3.13 (79,5)	1.63 (41,4)	3.15 (1,43)	86279	1.50 (38,1)	0.90 (0,41)	86297
2-1/2 65	1.75 (44,5)	1.80 (0,82)	72825	—	—	—	—	—	—	—

TABLE F
FIGURES 820, 830 & 719
NOMINAL DIMENSIONS

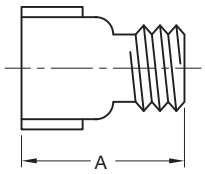


FIGURE 825
EXTENSION PIECE

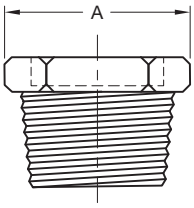


FIGURE 827
HEX BUSHING

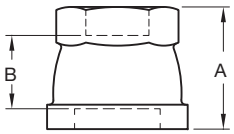


FIGURE 816
REDUCING COUPLING

Nominal Pipe Size	Figure 825 Extension Piece			Figure 827 Hex Bushing			Figure 816 Reducing Coupling			
ANSI Inches DN	**A Inches (mm)**	**Approx. Weight Lbs. (kg)**	**Part Number**	**A Inches (mm)**	**Approx. Weight Lbs. (kg)**	**Part Number**	**A Inches (mm)**	**B Inches (mm)**	**Approx. Weight Lbs. (kg)**	**Part Number**
1/2 x 1/2 15 x 15	1.50 (38,1)	0.20 (0,09)	72751	—	—	—	—	—	—	—
1/2 x 1/2 15 x 15	2.00 (50,8)	0.27 (0,12)	72980	—	—	—	—	—	—	—
3/4 x 3/4 20 x 20	1.50 (38,1)	0.22 (0,10)	72981	—	—	—	—	—	—	—
3/4 x 3/4 20 x 20	2.00 (50,8)	0.31 (0,14)	73982	—	—	—	—	—	—	—
3/4 x 1/2 20 x 15	—	—	—	—	—	—	1.75 (43,2)	0.69 (17,5)	0.38 (0,17)	86772
1 x 1/2 25 x 15	—	—	—	1.06 (26,9)	0.22 (0,10)	72726	1.69 (42,9)	0.50 (12,7)	0.38 (0,17)	86228
1 x 3/4 25 x 20	—	—	—	1.06 (26,9)	0.18 (0,08)	72762	1.75 (43,2)	0.50 (12,7)	0.53 (0,24)	86229
1-1/4 x 1 32 x 25	—	—	—	1.19 (30,2)	0.31 (0,14)	72763	—	—	—	—
1-1/2 x 1 40 x 25	—	—	—	1.25 (31,7)	0.53 (0,24)	72757	—	—	—	—
1-1/2 x 1-1/4 40 x 32	—	—	—	1.25 (31,7)	0.35 (0,10)	72764	—	—	—	—
2 x 1 50 x 25	—	—	—	1.38 (35,1)	0.75 (0,34)	72759	—	—	—	—
2 x 1-1/4 50 x 32	—	—	—	1.38 (35,1)	0.69 (0,31)	72761	—	—	—	—
2 x 1-1/2 50 x 40	—	—	—	1.38 (35,1)	0.62 (0,28)	72775	—	—	—	—

TABLE G
FIGURE 825, 827 & 816
NOMINAL DIMENSIONS

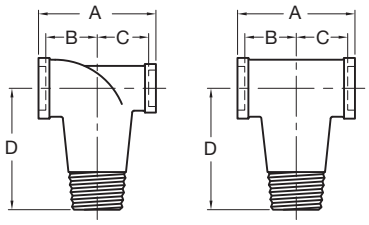


FIGURE 832
CALIFORNIA TEES

Nominal Pipe Size	Figure 832					
ANSI Inches DN	**A Inches (mm)**	**B Inches (mm)**	**C Inches (mm)**	**D Inches (mm)**	**Approx. Weight Lbs. (kg)**	**Part Number**
1 x 1/2 x 1 25 x 15 x 25	1.50 (38,1)	0.88 (22,4)	0.75 (19,1)	3.00 (76,2)	0.95 (0,43)	42000
1 x 1 x 1 25 x 25 x 25	1.50 (38,1)	0.75 (19,1)	0.75 (19,1)	3.00 (76,2)	0.95 (0,43)	42001

TABLE H
FIGURE 832
NOMINAL DIMENSIONS

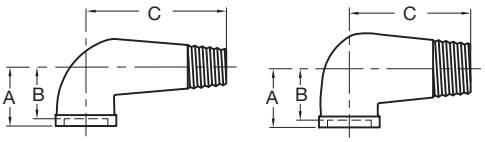


FIGURE 831
STREET ELBOWS

Nominal Pipe Size	Figure 831				
ANSI Inches DN	**A Inches (mm)**	**B Inches (mm)**	**C Inches (mm)**	**Approx. Weight Lbs. (kg)**	**Part Number**
1 x 1/2 25 x 15	1.50 (38,1)	0.75 (19,1)	3.00 (76,2)	0.70 (0,32)	42003
1 x 1 25 x 25	1.50 (38,1)	0.75 (19,1)	3.00 (76,2)	0.90 (0,40)	42002

TABLE J
FIGURE 831
NOMINAL DIMENSIONS

FIG. 3201

90° Elbow

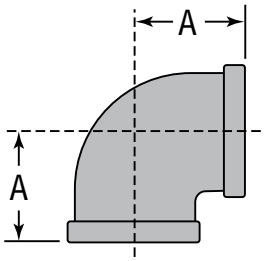


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FIGURE 3201 - 90° ELBOW

Nominal Size	Maximum Working Pressure▲	Dimension A	Approx. Wt. Each
In. (mm)	*PSI (kPa)*	*In. (mm)*	*Lbs. (kg)*
1 *20*	500 *3450*	1.50 *38.10*	0.62 *0.28*
1¼ *32*	500 *3450*	1.75 *44.45*	0.90 *0.41*
1½ *40*	500 *3450*	1.94 *49.276*	1.20 *0.54*
2 *50*	500 *3450*	2.25 *57.15*	1.85 *0.84*

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

MATERIAL SPECIFICATIONS

Dimensions: ASME B16.3

Material: ASTM A536 Grade 65-45-12

Finish: Black

Threads: NPT per ASME B1.20.1

Agency Approvals: All ductile iron threaded fittings are UL/ULC Listed and FM Approved.

NOTICE: Ductile iron fittings have higher tensile strength than that of steel pipe. Therefore, over tightening can cause damage to pipe threads which may cause leakage. Ductile iron fittings should be tightened approximately three turns beyond hand tight, but no more than four turns.

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

FIG. 3201R

Reducing 90° Elbow

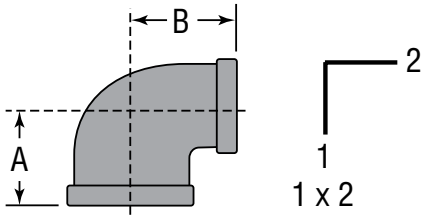

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FIGURE 3201R - REDUCING 90° ELBOW

Nominal Size 1 x 2	Max. Working Pressure▲	Dimensions A	Dimensions B	Approx. Wt. Each
In. (mm)	*PSI (kPa)*	*In. (mm)*	*In. (mm)*	*Lbs. (kg)*
1 x ½ *25 x 15*	500 *3450*	1.26 *32.00*	1.36 *34.54*	0.44 *0.20*
1 x ¾ *25 x 20*	500 *3450*	1.37 *34.79*	1.45 *36.83*	0.52 *0.24*
1¼ x ½ *32 x 15*	500 *34550*	1.34 *34.03*	1.53 *38.86*	0.64 *0.29*
1¼ x ¾ *32 x 20*	500 *3450*	1.45 *36.83*	1.62 *41.14*	0.72 *0.33*
1¼ x 1 *32 x 25*	500 *3450*	1.58 *40.13*	1.67 *42.41*	0.75 *0.34*
1½ x 1 *40 x 25*	500 *3450*	1.65 *41.91*	1.80 *45.72*	0.92 *0.42*
1½ x 1¼ *40 x 32*	500 *3450*	1.82 *46.22*	1.88 *47.75*	1.08 *0.49*
2 x ½ *50 x 15*	500 *3450*	1.49 *37.84*	1.88 *47.75*	1.08 *0.49*
2 x ¾ *50 x 20*	500 *3450*	1.60 *40.64*	1.97 *50.03*	1.24 *0.56*
2 x 1 *50 x 25*	500 *3450*	1.73 *43.94*	2.02 *51.30*	1.40 *0.64*
2 x 1¼ *50 x 32*	500 *3450*	1.90 *48.26*	2.10 *53.34*	1.52 *0.70*
2 x 1½ *50 x 40*	500 *3450*	2.02 *51.30*	2.16 *54.86*	1.65 *0.75*

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

MATERIAL SPECIFICATIONS

Dimensions: ASME B16.3

Material: ASTM A536 Grade 65-45-12

Finish: Black

Threads: NPT per ASME B1.20.1

Agency Approvals: All ductile iron threaded fittings are UL/ULC Listed and FM Approved.

NOTICE: Ductile iron fittings have higher tensile strength than that of steel pipe. Therefore, over tightening can cause damage to pipe threads which may cause leakage. Ductile iron fittings should be tightened approximately three turns beyond hand tight, but no more than four turns.

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

FIG. 3205

Straight Tee

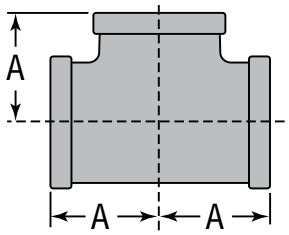

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FIGURE 3205 - STRAIGHT TEE

Nominal Size	Maximum Working Pressure▲	Dimension A	Approx. Wt. Each
In. (mm)	*PSI (kPa)*	*In. (mm)*	*Lbs. (kg)*
1 *25*	500 *3450*	1.50 *38.10*	0.85 *0.39*
1¼ *32*	500 *3450*	1.75 *44.45*	1.22 *0.55*
1½ *40*	500 *3450*	1.94 *49.27*	1.55 *0.70*
2 *50*	500 *3450*	2.25 *57.15*	2.45 *1.11*

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

MATERIAL SPECIFICATIONS

Dimensions: ASME B16.3

Material: ASTM A536 Grade 65-45-12

Finish: Black

Threads: NPT per ASME B1.20.1

Agency Approvals: All ductile iron threaded fittings are UL/ULC Listed and FM Approved.

NOTICE: Ductile iron fittings have higher tensile strength than that of steel pipe. Therefore, over tightening can cause damage to pipe threads which may cause leakage. Ductile iron fittings should be tightened approximately three turns beyond hand tight, but no more than four turns.

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

FIG. 3205R

Reducing Tee

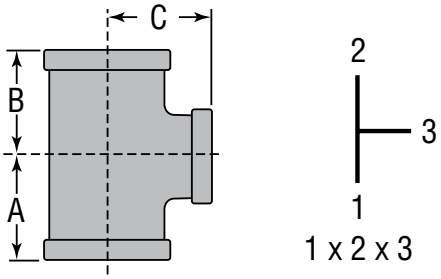

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FIGURE 3205R - REDUCING TEE

Nominal Size 1 x 2 x 3	Max. Working Pressure▲	Dimensions A	B	C	Approx. Wt. Each
In. (mm)	*PSI (kPa)*	*In. (mm)*	*In. (mm)*	*In. (mm)*	*Lbs. (kg)*
1 x ½ x 1 *25 x 15 x 25*	500 *3450*	1.50 *38.10*	1.36 *34.54*	1.50 *38.10*	0.64 *0.29*
1 x ¾ x 1 *25 x 20 x 25*	500 *3450*	1.50 *38.10*	1.45 *36.83*	1.50 *38.10*	0.73 *0.33*
1 x 1 x ½ *25 x 25 x 15*	500 *3450*	1.26 *32.00*	1.26 *32.00*	1.36 *34.54*	0.71 *0.32*
1 x 1 x ¾ *25 x 25 x 20*	500 *3450*	1.37 *34.80*	1.37 *34.80*	1.45 *36.83*	0.76 *0.34*
1 x 1 x 1¼* *25 x 25 x 32*	500 *3450*	1.67 *42.41*	1.67 *42.41*	1.58 *40.13*	0.98 *0.44*
1 x 1 x 1½* *25 x 25 x 40*	500 *3450*	1.80 *45.72*	1.80 *45.72*	1.65 *41.91*	1.16 *0.53*
1¼ x 1 x ½* *32 x 25 x 15*	500 *3450*	1.34 *34.04*	1.26 *32.00*	1.53 *38.86*	0.82 *0.37*
1¼ x 1 x ¾ *32 x 25 x 20*	500 *3450*	1.45 *36.83*	1.37 *34.80*	1.62 *41.15*	0.90 *0.41*
1¼ x 1 x 1 *32 x 25 x 25*	500 *3450*	1.58 *40.13*	1.50 *38.10*	1.67 *42.42*	1.00 *0.45*
1¼ x 1 x 1¼ *32 x 25 x 32*	500 *3450*	1.75 *44.45*	1.67 *42.42*	1.75 *44.45*	1.08 *0.49*
1¼ x 1 x 1½ *32 x 25 x 40*	500 *3450*	1.88 *47.75*	1.80 *45.72*	1.82 *46.22*	1.42 *0.64*
1¼ x 1¼ x ½ *32 x 32 x 15*	500 *3450*	1.34 *34.04*	1.34 *34.04*	1.53 *38.86*	0.86 *0.39*

MATERIAL SPECIFICATIONS

Dimensions: ASME B16.3

Material: ASTM A536 Grade 65-45-12

Finish: Black

Threads: NPT per ASME B1.20.1

Agency Approvals: All ductile iron threaded fittings are UL/ULC Listed and FM Approved.

NOTICE: Ductile iron fittings have higher tensile strength than that of steel pipe. Therefore, over tightening can cause damage to pipe threads which may cause leakage. Ductile iron fittings should be tightened approximately three turns beyond hand tight, but no more than four turns.

FIGURE 3205R - REDUCING TEE

Nominal Size 1 x 2 x 3	Max. Working Pressure▲	Dimensions A	B	C	Approx. Wt. Each
In. (mm)	*PSI (kPa)*	*In. (mm)*	*In. (mm)*	*In. (mm)*	*Lbs. (kg)*
1¼ x 1¼ x ¾ *32 x 32 x 20*	500 *3450*	1.45 *36.83*	1.45 *36.83*	1.62 *41.15*	0.92 *0.42*
1¼ x 1¼ x 1 *32 x 32 x 25*	500 *3450*	1.58 *40.13*	1.58 *40.13*	1.67 *42.42*	0.95 *0.43*
1¼ x 1¼ x 1½* *32 x 32 x 40*	500 *3450*	1.88 *47.75*	1.88 *47.75*	1.82 *46.22*	1.45 *0.66*

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

* Part supplied as "Bull Head Tee".

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

FIG. 3205R

Reducing Tee

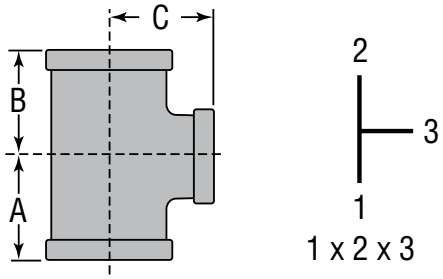

FIGURE 3205R - REDUCING TEE					
Nominal Size	Max. Working Pressure▲	Dimensions			Approx. Wt. Each
1 x 2 x 3		A	B	C	
In. (mm)	*PSI (kPa)*	*In. (mm)*	*In. (mm)*	*In. (mm)*	*Lbs. (kg)*
1¼ x 1¼ x 2* *32 x 32 x 50*	500 *3450*	2.10 *53.34*	2.10 *53.34*	1.90 *48.26*	1.75 *0.79*
1½ x 1 x ½ *40 x 25 x 15*	500 *3450*	1.41 *35.81*	1.34 *34.04*	1.66 *42.16*	0.95 *0.43*
1½ x 1 x ¾ *40 x 25 x 20*	500 *3450*	1.52 *38.61*	1.37 *34.80*	1.75 *44.45*	1.14 *0.52*
1½ x 1 x 1 *40 x 25 x 25*	500 *3450*	1.65 *41.91*	1.50 *38.10*	1.80 *45.72*	1.17 *0.53*
1½ x 1 x 1¼ *40 x 25 x 32*	500 *3450*	1.82 *46.23*	1.67 *42.42*	1.88 *47.75*	1.34 *0.61*
1½ x 1 x 1½ *40 x 25 x 40*	500 *3450*	1.94 *49.28*	1.80 *45.72*	1.94 *49.28*	1.45 *0.66*
1½ x1¼ x ½ *40 x 32 x 15*	500 *3450*	1.41 *35.81*	1.34 *34.04*	1.66 *42.16*	1.05 *0.48*
1½ x1¼ x ¾ *40 x 32 x 20*	500 *3450*	1.52 *38.61*	1.45 *36.83*	1.75 *44.45*	1.15 *0.5*
1½ x 1¼ x 1 *40 x 32 x 25*	500 *3450*	1.65 *41.91*	1.58 *40.13*	1.80 *45.72*	1.25 *0.57*
1½ x 1¼ x 2* *40 x 32 x 50*	500 *3450*	2.16 *54.86*	2.10 *53.34*	2.02 *51.30*	1.90 *0.86*
1½ x 1½ x ½ *40 x 40 x 15*	500 *3450*	1.41 *35.81*	1.41 *35.81*	1.16 *29.46*	1.15 *0.52*
1½ x 1½ x ¾ *40 x 40 x 20*	500 *3450*	1.52 *38.61*	1.52 *38.61*	1.75 *44.45*	1.24 *0.56*
1½ x 1½ x 1 *40 x 40 x 25*	500 *3450*	1.65 *41.91*	1.65 *41.91*	1.80 *45.72*	1.30 *0.59*
1½ x 1½ x 1¼ *40 x 40 x 32*	500 *3450*	1.82 *46.23*	1.82 *46.23*	1.88 *47.75*	1.48 *0.67*

FIGURE 3205R - REDUCING TEE					
Nominal Size	Max. Working Pressure▲	Dimensions			Approx. Wt. Each
1 x 2 x 3		A	B	C	
In. (mm)	*PSI (kPa)*	*In. (mm)*	*In. (mm)*	*In. (mm)*	*Lbs. (kg)*
1½ x 1½ x 2* *40 x 40 x 50*	500 *3450*	2.16 *54.86*	2.16 *54.86*	2.02 *51.30*	1.98 *0.90*
2 x 1 x 2 *50 x 25 x 50*	500 *3450*	2.25 *57.15*	2.02 *51.31*	2.25 *57.15*	2.15 *0.98*
2 x 1¼ x 2 *50 x 32 x 50*	500 *3450*	2.25 *57.15*	2.10 *53.34*	2.25 *57.15*	2.30 *1.04*
2 x 1½ x ½ *50 x 40 x 15*	500 *3450*	1.49 *37.85*	1.41 *35.81*	1.88 *47.75*	1.50 *0.68*
2 x 1½ x ¾ *50 x 40 x 20*	500 *3450*	1.60 *40.64*	1.52 *38.61*	1.97 *50.04*	1.62 *0.73*
2 x 1½ x 1 *50 x 40 x 25*	500 *3450*	1.73 *43.94*	1.65 *41.91*	2.02 *51.31*	1.64 *0.74*
2 x 1½ x 1¼ *50 x 40 x 32*	500 *3450*	1.90 *48.26*	1.82 *46.23*	2.10 *53.34*	1.80 *0.82*
2 x 1½ x 1½ *50 x 40 x 40*	500 *3450*	2.02 *51.31*	1.94 *49.28*	2.16 *54.86*	2.00 *0.91*
2 x 1½ x 2 *50 x 40 x 50*	500 *3450*	2.25 *57.15*	2.16 *54.86*	2.25 *57.15*	2.35 *1.07*
2 x 2 x ½ *50 x 50 x 15*	500 *3450*	1.49 *37.85*	1.49 *37.85*	1.88 *47.75*	1.60 *0.73*
2 x 2 x ¾ *50 x 50 x 20*	500 *3450*	1.60 *40.64*	1.60 *40.64*	1.97 *50.04*	1.68 *0.76*
2 x 2 x 1 *50 x 50 x 25*	500 *3450*	1.73 *43.94*	1.73 *43.94*	2.02 *51.31*	1.85 *0.84*
2 x 2 x 1¼ *50 x 50 x 32*	500 *3450*	1.90 *44.45*	1.90 *42.42*	2.10 *44.45*	2.04 *0.93*
2 x 2 x 1½ *50 x 50 x 40*	500 *3450*	2.02 *44.45*	2.02 *42.42*	2.16 *44.45*	2.18 *0.99*

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

* Part supplied as "Bull Head Tee".

FIG. 3207

Cross

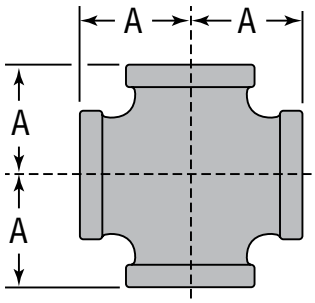

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FIGURE 3207 - CROSS

Nominal Size	Maximum Working Pressure▲	Dimension A	Approx. Wt. Each
In. (mm)	*PSI (kPa)*	*In. (mm)*	*Lbs. (kg)*
1 *25*	500 *3450*	1.50 *38.10*	0.98 *0.44*
1¼ *32*	500 *3450*	1.75 *44.45*	1.50 *0.68*
1½ *40*	500 *3450*	1.94 *49.27*	1.90 *0.86*
2 *50*	500 *3450*	2.25 *57.15*	2.95 *1.34*

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

MATERIAL SPECIFICATIONS

Dimensions: ASME B16.3

Material: ASTM A536 Grade 65-45-12

Finish: Black

Threads: NPT per ASME B1.20.1

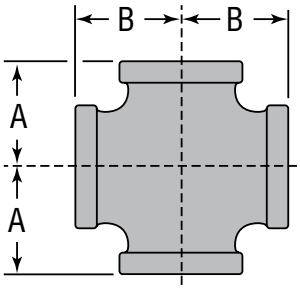
Agency Approvals: All ductile iron threaded fittings are UL/ULC Listed and FM Approved.

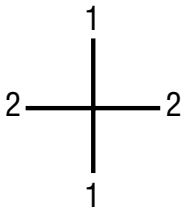
NOTICE: Ductile iron fittings have higher tensile strength than that of steel pipe. Therefore, over tightening can cause damage to pipe threads which may cause leakage. Ductile iron fittings should be tightened approximately three turns beyond hand tight, but no more than four turns.

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

FIG. 3207R

Reducing Cross





1 x 1 x 2 x 2

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FIGURE 3207R - REDUCING CROSS

Nominal Size 1 x 1 x 2 x 2	Max. Working Pressure▲	Dimensions A	Dimensions B	Approx. Wt. Each
In. (mm)	*PSI (kPa)*	*In. (mm)*	*In. (mm)*	*Lbs. (kg)*
1¼ x 1¼ x 1 x 1 *32 x 32 x 25 x 25*	500 *3450*	1.58 *40.13*	1.67 *42.41*	1.27 *0.58*
1½ x 1½ x 1 x 1 *40 x 40 x 25 x 25*	500 *3450*	1.65 *41.91*	1.80 *45.72*	1.48 *0.67*
2 x 2 x 1 x 1 *50 x 50 x 25 x 25*	500 *3450*	1.73 *43.94*	2.02 *51.30*	2.10 *0.95*

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

MATERIAL SPECIFICATIONS

Dimensions: ASME B16.3

Material: ASTM A536 Grade 65-45-12

Finish: Black

Threads: NPT per ASME B1.20.1

Agency Approvals: All ductile iron threaded fittings are UL/ULC Listed and FM Approved.

NOTICE: Ductile iron fittings have higher tensile strength than that of steel pipe. Therefore, over tightening can cause damage to pipe threads which may cause leakage. Ductile iron fittings should be tightened approximately three turns beyond hand tight, but no more than four turns.

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Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

FIG. 3221R
Reducing Coupling

Hexagonal or face bushings shall be permitted in reducing the size of openings of fittings when standard fittings of the required size are not available.

In new installations, it shall be permitted to provide minimum one (1) inch outlets with hexagonal bushings to accommodate sprinklers attached directly to branch line fittings to allow for future system modifications.

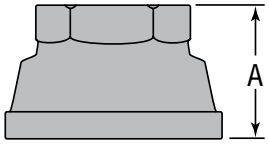

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FIGURE 3221R - REDUCING COUPLING

Nominal Size	Maximum Working Pressure▲	Dimension A	Approx. Wt. Each
In. (mm)	*PSI (kPa)*	*In. (mm)*	*Lbs. (kg)*
1 x ½ *25 x 15*	500 *3450*	1.69 *42.92*	0.39 *0.18*
1 x ¾ *25 x 20*	500 *3450*	1.69 *42.92*	0.53 *0.24*

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

MATERIAL SPECIFICATIONS

Dimensions: ASME B16.3

Material: ASTM A536 Grade 65-45-12

Finish: Black

Threads: NPT per ASME B1.20.1

Agency Approvals: All ductile iron threaded fittings are UL/ULC Listed and FM Approved.

NOTICE: Ductile iron fittings have higher tensile strength than that of steel pipe. Therefore, over tightening can cause damage to pipe threads which may cause leakage. Ductile iron fittings should be tightened approximately three turns beyond hand tight, but no more than four turns.

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

FIG. 3224

Cap

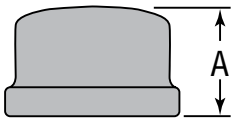

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FIGURE 3224 - CAP

Nominal Size	Maximum Working Pressure▲	Dimension A	Approx. Wt. Each
In. (mm)	*PSI (kPa)*	*In. (mm)*	*Lbs. (kg)*
1 *25*	500 *3450*	1.16 *29.46*	0.32 *0.15*
1¼ *32*	500 *3450*	1.28 *32.51*	0.43 *0.20*
1½ *40*	500 *3450*	1.33 *33.78*	0.60 *0.27*
2 *50*	500 *3450*	1.45 *36.83*	0.91 *0.41*

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

MATERIAL SPECIFICATIONS

Dimensions: ASME B16.3

Material: ASTM A536 Grade 65-45-12

Finish: Black

Threads: NPT per ASME B1.20.1

Agency Approvals: All ductile iron threaded fittings are UL/ULC Listed and FM Approved.

NOTICE: Ductile iron fittings have higher tensile strength than that of steel pipe. Therefore, over tightening can cause damage to pipe threads which may cause leakage. Ductile iron fittings should be tightened approximately three turns beyond hand tight, but no more than four turns.

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

FIG. 3221

Coupling

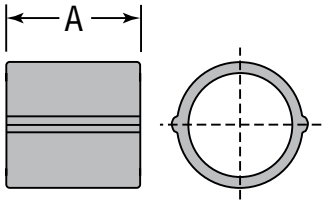

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FIGURE 3221 - COUPLING

Nominal Size	Maximum Working Pressure▲	Dimension A	Approx. Wt. Each
In. (mm)	*PSI (kPa)*	*In. (mm)*	*Lbs. (kg)*
1 *25*	500 *3450*	1.67 *42.42*	0.40 *0.18*
1¼ *32*	500 *3450*	1.93 *49.02*	0.57 *0.26*
1½ *40*	500 *3450*	2.15 *54.61*	0.75 *0.34*
2 *50*	500 *3450*	2.53 *64.26*	1.15 *0.52*

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

MATERIAL SPECIFICATIONS

Dimensions: ASME B16.3

Material: ASTM A536 Grade 65-45-12

Finish: Black

Threads: NPT per ASME B1.20.1

Agency Approvals: All ductile iron threaded fittings are UL/ULC Listed and FM Approved.

NOTICE: Ductile iron fittings have higher tensile strength than that of steel pipe. Therefore, over tightening can cause damage to pipe threads which may cause leakage. Ductile iron fittings should be tightened approximately three turns beyond hand tight, but no more than four turns.

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

3

Sprinkler Head

Concealed Pendent

Extended Coverage Concealed Pendent

Upright

Horizontal Side Wall

Dry Pendent

Flexible Drop

Concealed Pendent Head

Pendent:
1. Type: Concealed pendant type with matching screw on escutcheon plate.
2. Finish: White enamel.
3. Escutcheon plate finish: White enamel.
4. Fusible link: Glass bulb type temperature rated for specific area hazard.

Series RFII — 5.6 K-factor "Royal Flush II" Concealed Pendent Sprinklers Quick & Standard Response, Standard Coverage

General Description

The TYCO Series RFII 5.6 K-factor, "Royal Flush II" Concealed Pendent Sprinklers Quick Response (3-mm bulb) and Standard Response (5-mm bulb), are decorative sprinklers featuring a flat cover plate designed to conceal the sprinkler. These sprinklers are optimal for architecturally sensitive areas such as hotel lobbies, office buildings, churches, and restaurants.

Each sprinkler includes a Cover Plate/Retainer Assembly and a Sprinkler/Support Cup Assembly. The separable, two-piece assembly design provides the following benefits:

- Allows installation of the sprinklers and pressure testing of the fire protection system prior to installation of a suspended ceiling or application of the finish coating to a fixed ceiling.
- Permits the removal of suspended ceiling panels for access to building service equipment without having to first shut down the fire protection system and remove sprinklers.
- Provides for 1/2 in. (12,7 mm) of vertical adjustment to allow a measure of flexibility in determining the length of fixed piping to cut for the sprinkler drops.

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.

The Series RFII Sprinklers are shipped with a Disposable Protective Cap. The Protective Cap is temporarily removed during installation and replaced to help protect the sprinkler during ceiling installation or finish. The tip of the Protective Cap can be used to mark the center of the ceiling hole into plaster board or ceiling tiles by gently pushing the ceiling product against the Protective Cap. When ceiling installation is complete, the Protective Cap is removed and the Cover Plate/Retainer Assembly is installed.

As an option, the Series RFII Standard Response (5-mm bulb) "Royal Flush II" Concealed Pendent Sprinklers can be fitted with a silicone Air and Dust Seal. (Refer to Figure 5.) The Air and Dust Seal is intended for sensitive areas where it is desirable to prevent air and dust from the area above the ceiling to pass through the cover plate.

NOTICE

The Series RFII Concealed 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.

Sprinkler Identification Number (SIN)

TY3531 — 3 mm bulb
TY3551 — 5 mm bulb

Technical Data

Sprinkler Approvals

Approvals apply only to the service conditions indicated in the Design Criteria section.

- TY3531 (3 mm Bulb) is UL Listed, C-UL Listed and NYC Approved (MEA 353-01-E) as Quick Response.
- TY3531 (3 mm Bulb) is VdS Approved (Certificate No. G4090007).
- TY3531 (3 mm Bulb) is FM and LPCB Approved (Ref. No. 094a/10) as Standard Response.

  Note: *FM and LPCB do not approve concealed sprinklers for quick response.*

- TY3551 (5 mm Bulb) is UL Listed, C-UL Listed, FM Approved, LPCB Approved (Ref. No. 094a/9), and NYC Approved (MEA 353-01-E) as Standard Response.

Approvals for Air and Dust Seal

UL and C-UL Listed for use with the RFII Standard Response Concealed Sprinkler (TY3551)

Maximum Working Pressure

Maximum 250 psi (17,3 bar) by UL, C-UL, and NYC

Maximum 175 psi (12,1 bar) by FM, VdS, and LPCB

Temperature Rating

155°F (68°C) Sprinkler with 139°F (59°C) Cover Plate

200°F (93°C) Sprinkler with 165°F (74°C) Cover Plate

Discharge Coefficient
K= 5.6 GPM/psi$^{1/2}$ (80,6 LPM/bar$^{1/2}$)

Adjustment
1/2 inch (12,7 mm)

Finishes
See the Ordering Procedure section.

Physical Characteristics

Frame	Bronze
Support Cup	Plated Steel
Guide Pins	Stainless Steel
Deflector	Bronze
Compression Screw	Brass
Bulb	Glass
Cap	Bronze or Copper
Sealing Assembly	Beryllium Nickel w/TEFLON
Cover Plate	Brass
Retainer	Brass
Ejection Spring	Stainless Steel

Design Criteria

The TYCO Series RFII 5.6 K-factor, "Royal Flush II" Concealed Pendent Sprinklers are intended for fire protection systems designed in accordance with the standard installation rules recognized by the applicable Listing or Approval agency; for example, UL Listing is based on NFPA 13 and VdS Approval is based on the CEA 4001.

For more information on LPCB and VdS Approvals, contact Johnson Controlss at the following office:

Enschede, Netherlands
Telephone: 31-53-428-4444
Fax: 31-53-428-3377

The Series RFII Concealed Pendent Sprinklers are only listed and approved with the Series RFII Concealed Cover Plates having a factory applied finish.

NOTICE

Do not use the Series RFII in applications where the air pressure above the ceiling is greater than that below. Down drafts through the Sprinkler/Support Cup Assembly can delay sprinkler operation in a fire situation.

Operation

When exposed to heat from a fire, the Cover Plate, normally soldered to the Retainer at three points, falls away to expose the Sprinkler/Support Cup Assembly.

The Deflector — supported by the Guide Pins — then drops down to its operational position.

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, activating the sprinkler and allowing water to flow.

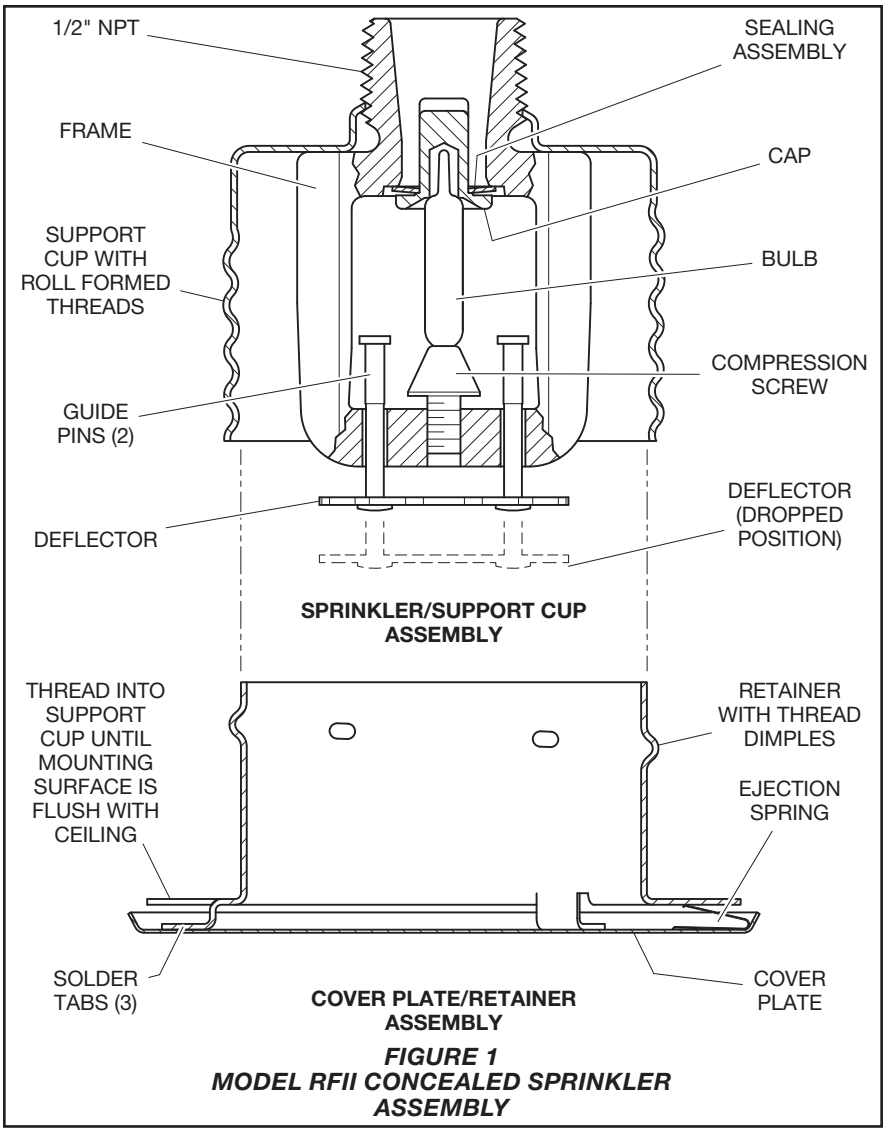


FIGURE 1
MODEL RFII CONCEALED SPRINKLER ASSEMBLY

Installation

The TYCO Series RFII 5.6 K-factor, "Royal Flush II" Concealed 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 inch (1,6 mm) for the 155°F (68°C) and 3/32 inch (2,4 mm) for the 200°F (93°C) temperature ratings.

A leak-tight 1/2 inch NPT sprinkler joint should be obtained by applying a minimum to maximum torque of 7 to 14 ft.-lbs. (9,5 to 19,0 Nm). Higher levels of torque can distort the sprinkler Inlet with consequent leakage or impairment of the sprinkler.

Do not attempt to compensate for insufficient adjustment in the Sprinkler by under- or over-tightening the Sprinkler/Support Cup Assembly. Re-adjust the position of the sprinkler fitting to suit.

Step 1. Install the sprinkler only in the pendent position with the center-line of the sprinkler perpendicular to the mounting surface.

Step 2. Remove the Protective Cap.

Step 3. With pipe thread sealant applied to the pipe threads, hand-tighten the sprinkler into the sprinkler fitting.

Step 4. Wrench-tighten the sprinkler using only the RFII Sprinkler Wrench. (Refer to Figure 3.) Apply the RFII Sprinkler Wrench to the Sprinkler as shown in Figure 3.

Be sure to include in attic stock/spare parts

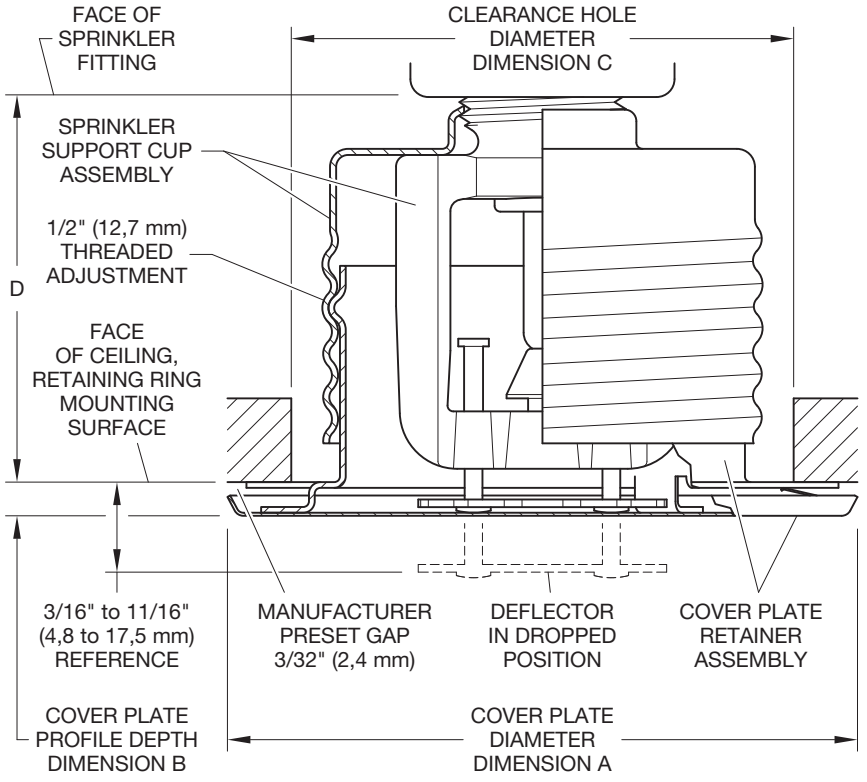


FIGURE 2
SERIES CONCEALED SPRINKLER INSTALLATION DIMENSIONS

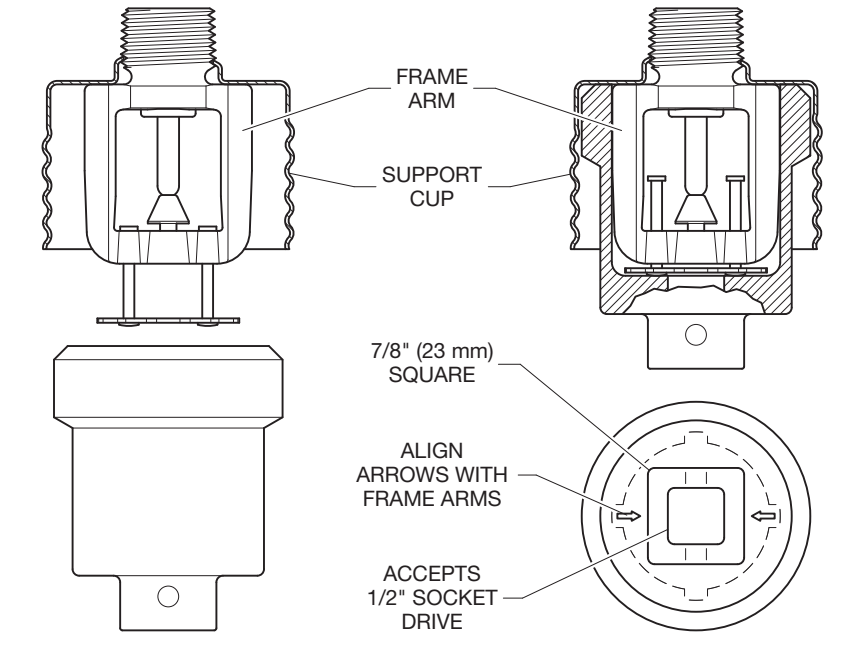


FIGURE 3
RFII SPRINKLER WRENCH

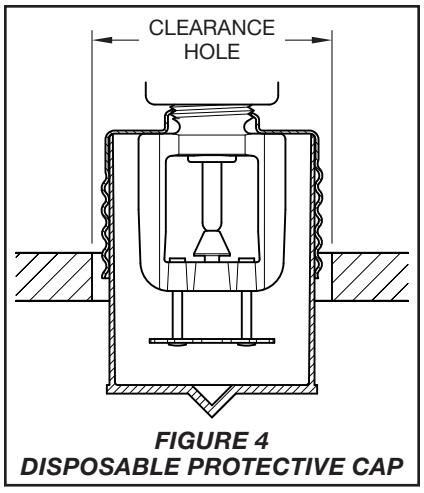


FIGURE 4
DISPOSABLE PROTECTIVE CAP

Step 5. Replace the Protective Cap by pushing it upwards until it bottoms out against the Support Cup. (Refer to Figure 4.) The Protective Cap helps prevent damage to the Deflector and Arms during ceiling installation and/or finish. You can also use the Protective Cap to locate the center of the clearance hole by gently pushing the ceiling material up against the center point of the Protective Cap.

NOTICE

As long as the Protective Cap remains in place, the system is considered "Out of Service".

Step 6. After the ceiling has been completed with the 2-1/2 in. (63,5 mm) diameter clearance hole and in preparation for installing the Cover Plate/Retainer Assembly, remove and discard the Protective Cap. Verify that the Deflector moves up and down freely.

If the Sprinkler is damaged and the Deflector does not move up and down freely, replace the entire Sprinkler. Do not attempt to modify or repair a damaged sprinkler.

Step 7. When installing an Air and Dust Seal, refer to Figure 5; otherwise, proceed to Step 8. To attach the Air and Dust Seal, verify the angle of the outside edge of the seal is oriented according to Figure 5. Start the edge of the Retainer in the grooved slot of the Air and Dust Seal and continue around the retainer until the entire Air and Dust Seal is engaged.

Step 8. Screw on the Cover Plate/Retainer Assembly until the Retainer (shown in Figure 2) or the Air and Dust Seal (shown in Figure 5) contacts the ceiling. Do not continue to screw on the Cover Plate/Retainer Assembly so that it lifts a ceiling panel out of its normal position. If you cannot engage the Cover Plate/Retainer Assembly with the Support Cup or you cannot engage the Cover Plate/Retainer Assembly sufficiently to contact the ceiling, you must reposition the Sprinkler Fitting.

Care and Maintenance

The TYCO Series RFII 5.6 K-factor, "Royal Flush II" Concealed 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 system from the proper authorities and notify all personnel who may be affected by this action.

Absence of the Cover Plate/Retainer Assembly can delay sprinkler operation in a fire situation.

When properly installed, there is a nominal 3/32 in. (2,4 mm) air gap between the lip of the Cover Plate and the ceiling, as shown in Figure 2.

This air gap is necessary for proper operation of the sprinkler. If the ceiling requires repainting after sprinkler installation, ensure that the new paint does not seal off any of the air gap.

Do not pull the Cover Plate relative to the Enclosure. Separation may result.

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.

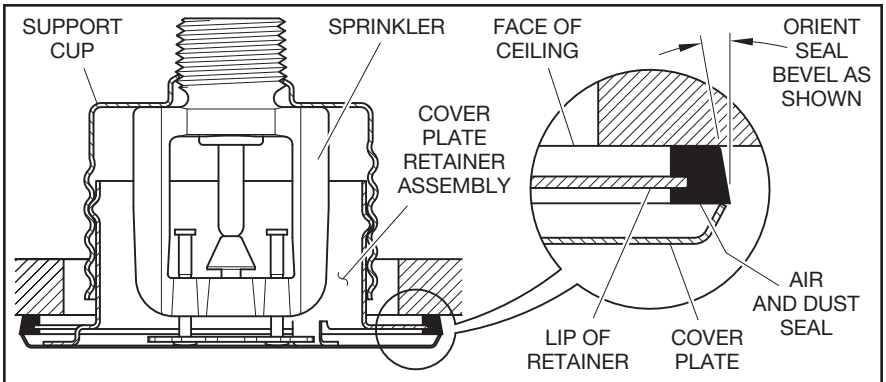


FIGURE 5
OPTIONAL AIR AND DUST SEAL FOR SERIES RFII (TY3551)

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.)

Exercise care to avoid damage to sprinklers before, during, and after installation. Replace sprinklers damaged by dropping, striking, wrench twisting, wrench slipping, or the like. Also, replace any sprinkler that has a cracked bulb or that has lost liquid from its bulb. (Refer to the Installation section.)

If you must remove a sprinkler, do not reinstall it or a replacement without reinstalling the Cover Plate/Retainer Assembly. If a Cover Plate/Retainer Assembly becomes dislodged during service, replace it immediately.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the NATIONAL FIRE PROTECTION ASSOCIATION, for example, 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 should be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national code.

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.

Sprinkler/Support Cup Assembly
Specify: Series RFII (specify SIN), K=5.6, "Royal Flush II" Pendent Sprinklers (specify) temperature rating, P/N* (specify):

	155°F (68°C)	200°F (93°C)
TY3531	51-792-1-155	51-792-1-200
TY3551	51-790-1-155	51-790-1-200

* Use Suffix "I" for ISO 7-1 connection; for example, 51-792-1-155-I

Separately Ordered Cover Plate/ Retainer Assembly:
Specify: (temperature rating from below) Series RFII Concealed Cover Plate with (finish), P/N (specify).

	139°F (59°C)(a)	165°F (74°C)(b)
Grey White (RAL9002)	56-792-0-135	56-792-0-165
Brass	56-792-1-135	56-792-1-165
Pure White (c) (RAL9010)	56-792-3-135	56-792-3-165
Signal White (RAL9003)	56-792-4-135	56-792-4-165
Jet Black (RAL9005)	56-792-6-135	59-792-6-165
Brushed Chrome	56-792-8-135	56-792-8-165
Chrome	56-792-9-135	56-792-9-165
Custom	56-792-X-135	56-792-X-165

(a) For use with 155°F (68°C) sprinklers.
(b) For use with 200°F (93°C) sprinklers.
(c) Eastern Hemisphere sales only.

Sprinkler Wrench
Specify: RFII Sprinkler Wrench, P/N 56-000-1-075

Air and Dust Seal
Specify: Air and Dust Seal, P/N 56-908-1-001

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

Extended Coverage Concealed Pendent Head

Series RFII — 5.6 K-factor Royal Flush II Concealed Pendent Sprinklers Quick Response, Extended Coverage

General Description

The TYCO Series RFII, 5.6 K-factor, Royal Flush Concealed Pendent Sprinklers, (TY3532), Quick Response, Extended Coverage, Light Hazard (ECLH) are decorative, 3 mm bulb-type sprinklers featuring a flat cover plate designed to conceal the sprinkler. These sprinklers are optimal for architecturally sensitive areas such as hotel lobbies, office buildings, churches, and restaurants.

The Series RFII sprinklers are intended for use in automatic sprinkler systems designed in accordance with standard installation rules (e.g., NFPA 13). The fast-response thermal sensitivity rating of the Series RFII (TY3532) provides for a quick response, extended coverage (QREC) rating up to a 20 ft. x 20 ft. coverage area.

Each sprinkler includes a Cover Plate/Retainer Assembly and a Sprinkler/Support Cup Assembly. The separable, two-piece assembly design provides the following benefits:

- Allows installation of the sprinklers and pressure testing of the fire protection system prior to installation of a suspended ceiling or application of the finish coating to a fixed ceiling.
- Permits the removal of suspended ceiling panels for access to building service equipment without having to first shut down the fire protection system and remove sprinklers.

IMPORTANT

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.

- Provides for 1/2 inch (12,7 mm) of vertical adjustment to allow a measure of flexibility in determining the length of fixed piping to cut for the sprinkler drops.

The Series RFII Sprinklers are shipped with a Disposable Protective Cap. The Protective Cap is temporarily removed during installation and replaced to help protect the sprinkler during ceiling installation or finish. The tip of the Protective Cap can be used to mark the center of the ceiling hole into plaster board or ceiling tiles by gently pushing the ceiling product against the Protective Cap. When ceiling installation is complete, the Protective Cap is removed and the Cover Plate/Retainer Assembly is installed.

NOTICE

The Series RFII Concealed 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, 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.

Sprinkler Identification Number (SIN)

TY3532

Technical Data

Approvals
UL and C-UL Listed
NYC Approved under MEA 353-01-E

(The listings apply only to the service conditions indicated in the Design Criteria section.)

Maximum Working Pressure
175 psi (12,1 bar)

Discharge Coefficient
K= 5.6 GPM/psi$^{1/2}$ (80,6 LPM/bar$^{1/2}$)

Temperature Rating
155°F (68°C) Sprinkler with 139°F (59°C) Plate
200°F (93°C) Sprinkler with 165°F (74°C) Plate

Adjustment
1/2 inch (12,7 mm)

Finishes
See the Ordering Procedure section.

Physical Characteristics

Frame	Bronze
Support Cup	Chrome Plated Steel
Guide Pins	Stainless Steel
Deflector	Bronze
Compression Screw	Brass
Blub	Glass
Cap	Bronze or Copper
Sealing Assembly	Beryllium Nickel w/ TEFLON
Cover Plate	Brass
Retainer	Brass
Ejection Spring	Stainless Steel

Design Criteria

The TYCO Series RFII, 5.6 K-factor, Royal Flush Concealed Pendent Sprinklers (TY3532) are UL and C-UL Listed for use in light hazard occupancies, using the design criteria in Table A, in addition to the requirements specified in the current NFPA 13 for extended coverage pendent sprinklers.

The Series RFII Concealed Pendent Sprinklers are only listed and approved with the Series RFII Concealed Cover Plates with a factory-applied finish.

NOTICE

Do not use the Series RFII in applications where the air pressure above the ceiling is greater than that below. Down drafts through the Sprinkler/Support Cup Assembly can delay sprinkler operation in a fire situation.

Operation

When exposed to heat from a fire, the Cover Plate, normally soldered to the Retainer at three points, falls away to expose the Sprinkler/Support Cup Assembly.

The Deflector - supported by the Guide Pins - then drops down to its operational position.

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, activating the sprinkler and allowing water to flow.

Installation

The TYCO Series RFII, 5.6 K-factor, Royal Flush Concealed Pendent Sprinklers, (TY3532) 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 inch (1,6 mm) for the 155°F (68°C) and 3/32 inch (2,4 mm) for the 200°F (93°C) temperature ratings.

Obtain a 1/2 inch NPT sprinkler joint by applying a minimum to maximum torque of 7 to 14 ft.-lbs. (9,5 to 19,0 Nm). Higher levels of torque can distort the sprinkler Inlet with consequent leakage or impairment of the sprinkler.

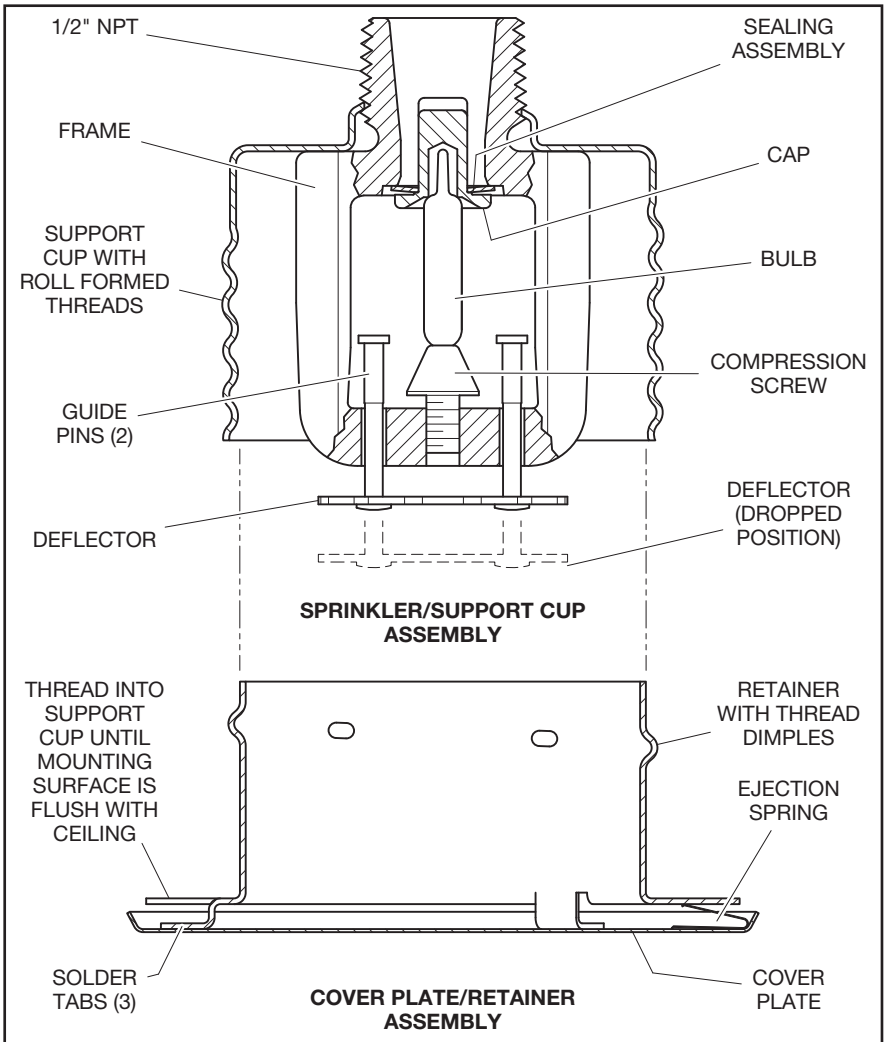


FIGURE 1
SERIES RFII CONCEALED PENDENT SPRINKLER ASSEMBLY (TY3532)

RESPONSE RATING	SPACING	MINIMUM FLOW/PRESSURE
QUICK	16’ x 16’ (4,9 m x 4,9 m)	26.0 GPM / 21.6 PSI (98,4 LPM / 1,49 BAR)
QUICK	18’ x 18’ (5,5 m x 5,5 m)	33.0 GPM / 34.7 PSI (124,9 LPM / 2,39 BAR)
QUICK	20’ x 20’ (6,1 m x 6,1 m)	40.0 GPM / 51 PSI (151,4 LPM / 3,52 BAR)

TABLE A
SERIES RFII (TY3532)
155°F (68°C) AND 200°F (93°C) CONCEALED PENDENT SPRINKLER HYDRAULIC DESIGN CRITERIA

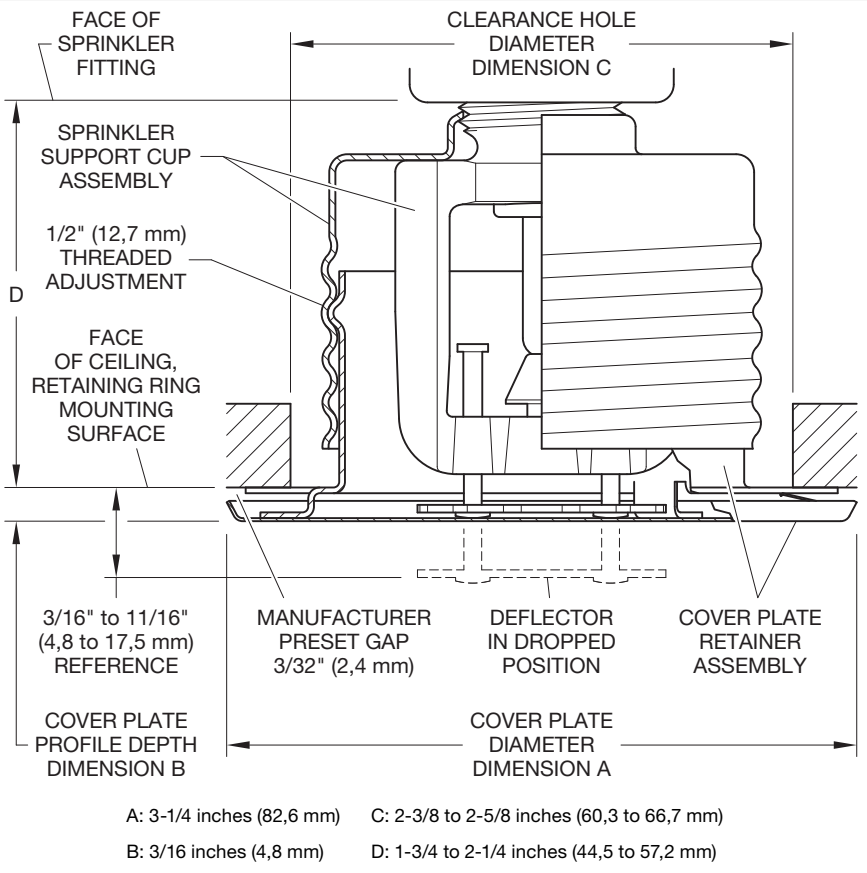


FIGURE 2
SERIES RFII CONCEALED PENDENT SPRINKLER INSTALLATION DIMENSIONS

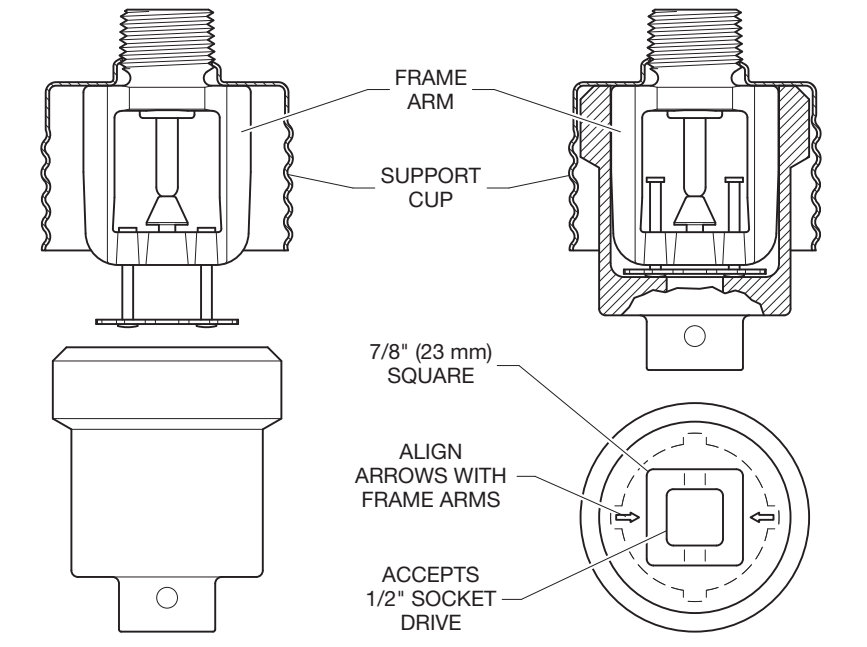


FIGURE 3
SERIES RFII CONCEALED PENDENT SPRINKLER WRENCH

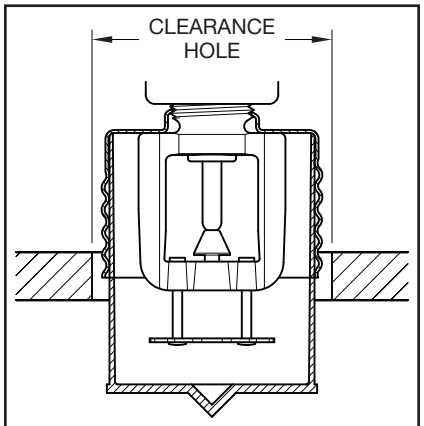


FIGURE 4
DISPOSABLE PROTECTIVE CAP

Do not attempt to compensate for insufficient adjustment in the Sprinkler by under- or over-tightening the Sprinkler/Support Cup Assembly. Re-adjust the position of the sprinkler fitting to suit.

Step 1. Install the sprinkler only in the pendent position with the centerline of the sprinkler perpendicular to the mounting surface.

Step 2. Remove the Protective Cap.

Step 3. With pipe thread sealant applied to the pipe threads, hand-tighten the sprinkler into the sprinkler fitting.

Step 4. Wrench-tighten the sprinkler using only the RFII Sprinkler Wrench shown in Figure 3. Apply the RFII Sprinkler Wrench to the Sprinkler as shown in the figure.

Step 5. Replace the Protective Cap by pushing it upwards until it bottoms out against the Support Cup. (Refer to Figure 4.)

The Protective Cap helps prevent damage to the Deflector and Frame Arms when installing or finishing the ceiling. You can also use it to locate the center of the clearance hole by gently pushing the ceiling material up against the center point of the Protective Cap.

NOTICE

As long as the Protective Cap remains in place, the system is considered "Out of Service".

Step 6. After the ceiling has been completed with the 2-1/2 inch (63,5 mm) diameter clearance hole and in preparation for installing the Cover Plate/Retainer Assembly, remove and discard the Protective Cap.

Verify that the Deflector moves up and down freely. If the Sprinkler is damaged and the Deflector does not move up and down freely, replace the entire Sprinkler. Do not attempt to modify or repair a damaged sprinkler.

Step 7. Screw on the Cover Plate/Retainer Assembly until its flange makes contact with the ceiling. Do not continue to screw on the Cover Plate/Retainer Assembly so that it lifts a ceiling panel out of its normal position. If you cannot engage the Cover Plate/Retainer Assembly with the Support Cup or you cannot engage the Cover Plate/Retainer Assembly sufficiently to contact the ceiling, you must reposition the Sprinkler Fitting.

Care and Maintenance

The TYCO Series RFII, 5.6 K-factor, Royal Flush Concealed Pendent Sprinklers, (TY3532) 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 system from the proper authorities and notify all personnel who may be affected by this action.

Absence of the Cover Plate/Retainer Assembly can delay sprinkler operation in a fire situation.

When properly installed, there is a nominal 3/32 inch (2,4 mm) air gap between the lip of the Cover Plate and the ceiling, as shown in Figure 2. This air gap is necessary for proper operation of the sprinkler. If the ceiling requires repainting after sprinkler installation, ensure that the new paint does not seal off any of the air gap.

Do not pull the Cover Plate relative to the Enclosure. Separation may result.

Replace sprinklers that are leaking or exhibiting visible signs of corrosion.

Never repaint, plate, coat, or otherwise alter automatic sprinklers after they leave the factory. Never repaint factory-painted Cover Plates. If necessary, replace them with factory-painted units. Non-factory applied paint can adversely delay or prevent sprinkler operation in the event of a fire.

Replace modified or over-heated sprinklers.

Exercise care to avoid damage to the sprinklers before, during, and after installation. Replace sprinklers damaged by dropping, striking, wrench twisting, wrench slipping, or the like. Also, replace any sprinkler that has a cracked bulb or that has lost liquid from its bulb. Refer to the Installation Section.

If you must remove a sprinkler, do not reinstall it or a replacement without reinstalling the Cover Plate/Retainer Assembly. If a Cover Plate/Retainer Assembly becomes dislodged during service, replace it immediately.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in compliance with this document, as well as with the applicable standards of the National Fire Protection Association (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 should be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national code.

Ordering Procedure

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

Sprinkler/Support Cup Assembly
Specify: Series RFII Royal Flush Concealed Pendent Sprinkler, TY3532, (specify) temperature rating, (specify) finish, P/N (specify).

	155°F (68°C)	200°F (93°C)
TY3532	51-794-1-155	51-794-1-200

Separately Ordered Cover Plate/ Retainer Assembly
Specify: (temperature rating, listed below) Series RFII Concealed Cover Plate with (finish), P/N (specify).

	139°F(59°C)(a)	165°F(74°C)(b)
Grey White (RAL 9002)	56-792-0-135	56-792-0-165
Brass	56-792-1-135	56-792-1-165
Pure White (c) (RAL 9010)	56-792-3-135	56-792-3-165
Signal White (RAL 9003)	56-792-4-135	56-792-4-165
Jet Black (RAL 9005)	56-792-6-135	56-792-6-165
Chrome	56-792-9-135	56-792-9-165
Custom	56-792-X-135	56-792-X-165

(a) For use with 155°F (68°C) sprinklers.
(b) For use with 200°F (93°C) sprinklers.
(c) Eastern Hemisphere sales only.

Sprinkler Wrench
Specify: RFII Sprinkler Wrench, P/N 56-000-1-075.

Upright Head

Upright:
1. Type: Standard upright type.
2. Finish: Brass.
3. Fusible link: Glass bulb type temperature rated for specific area hazard.

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.

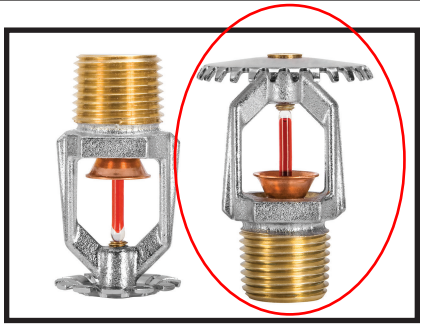
Always refer to Technical Data Sheet TFP700 for the "INSTALLER WARNING" that provides cautions with respect to handling and installation of sprinkler systems and components. Improper handling and installation can permanently damage a sprinkler system or its components and cause the sprinkler to fail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

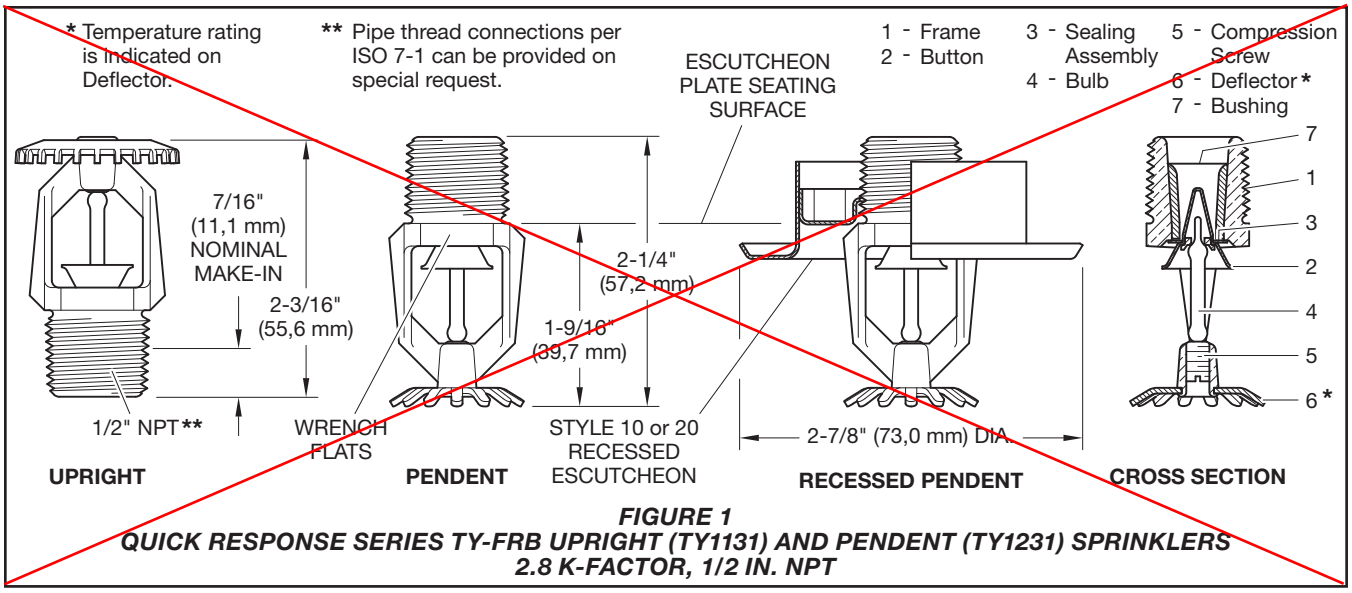


FIGURE 1
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY1131) AND PENDENT (TY1231) SPRINKLERS
2.8 K-FACTOR, 1/2 IN. NPT

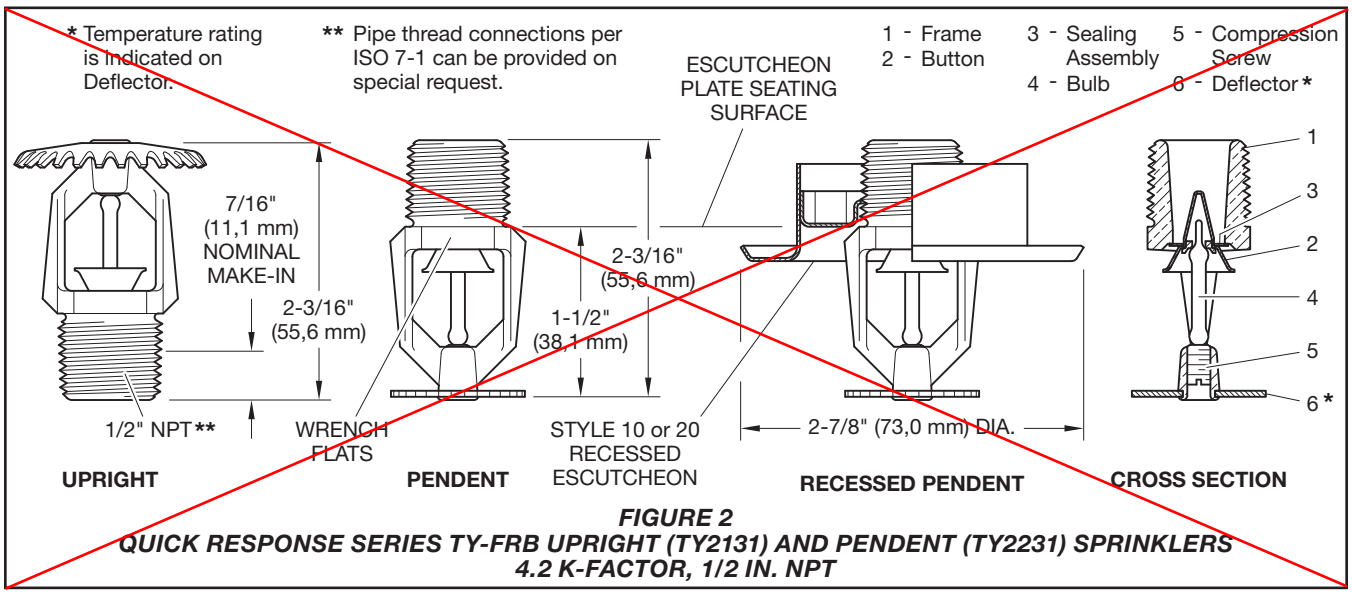


FIGURE 2
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY2131) AND PENDENT (TY2231) SPRINKLERS
4.2 K-FACTOR, 1/2 IN. NPT

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.

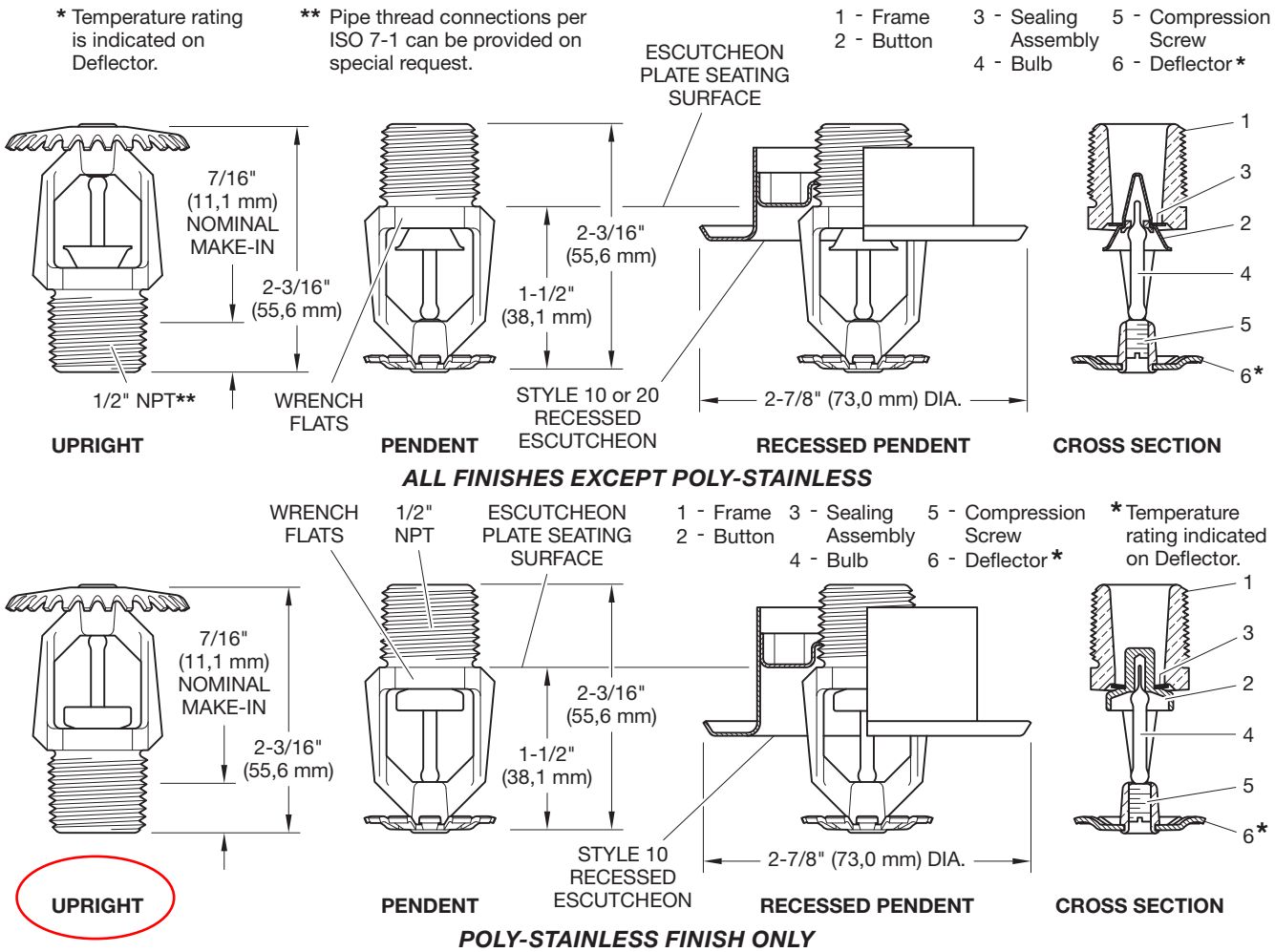


FIGURE 3
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY3131) AND PENDENT (TY3231) SPRINKLERS
5.6 K-FACTOR, 1/2 IN. NPT

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.

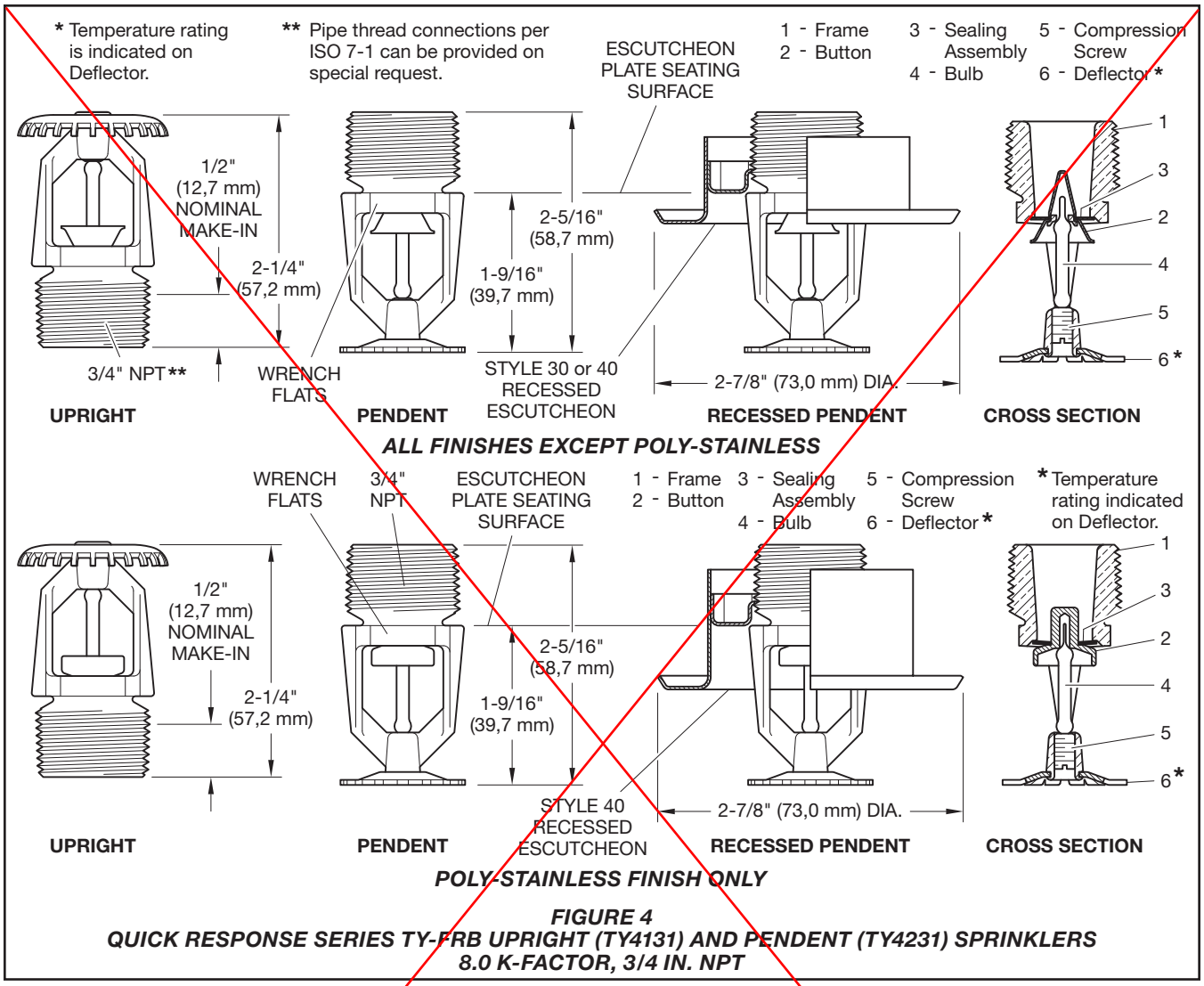


FIGURE 4
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY4131) AND PENDENT (TY4231) SPRINKLERS
8.0 K-FACTOR, 3/4 IN. NPT

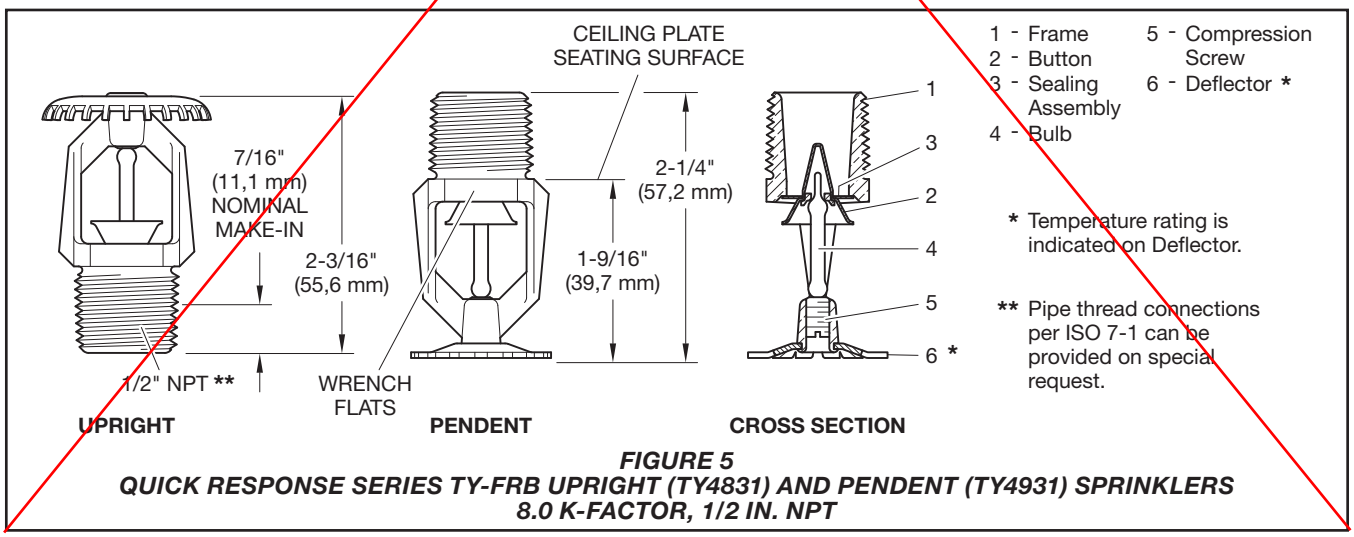


FIGURE 5
QUICK RESPONSE SERIES TY-FRB UPRIGHT (TY4831) AND PENDENT (TY4931) SPRINKLERS
8.0 K-FACTOR, 1/2 IN. NPT

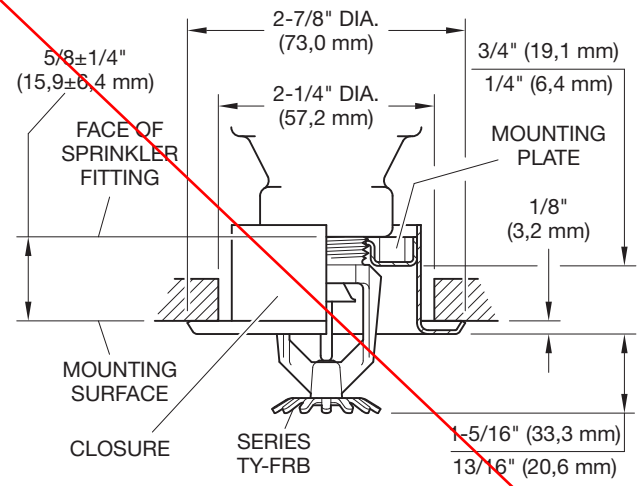


FIGURE 6
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
2.8 K-FACTOR, 1/2 IN. NPT

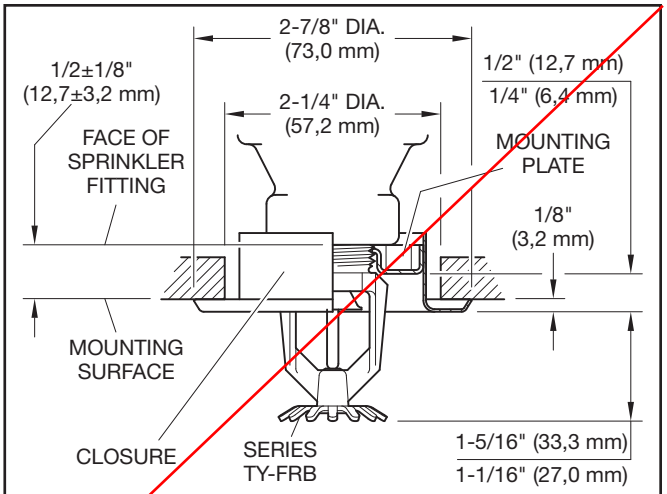


FIGURE 7
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
2.8 K-FACTOR, 1/2 IN. NPT

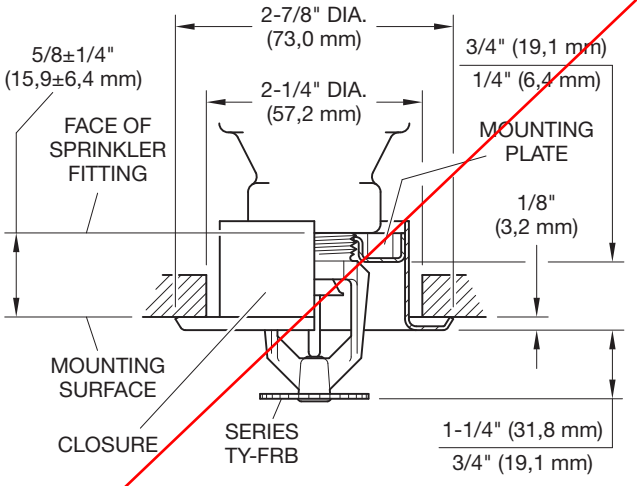


FIGURE 8
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
4.2 K-FACTOR, 1/2 IN. NPT

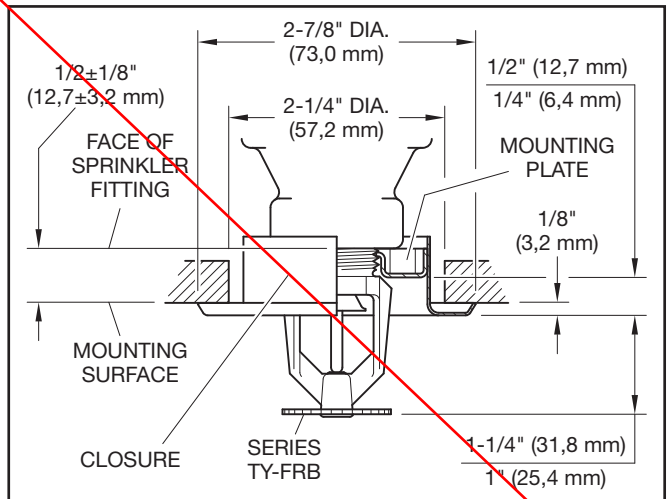


FIGURE 9
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
4.2 K-FACTOR, 1/2 IN. NPT

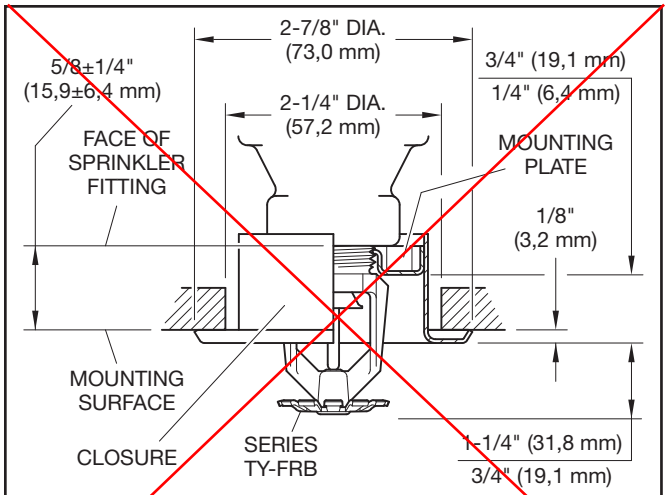


FIGURE 10
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 10 RECESSED ESCUTCHEON
5.6 K-FACTOR, 1/2 IN. NPT

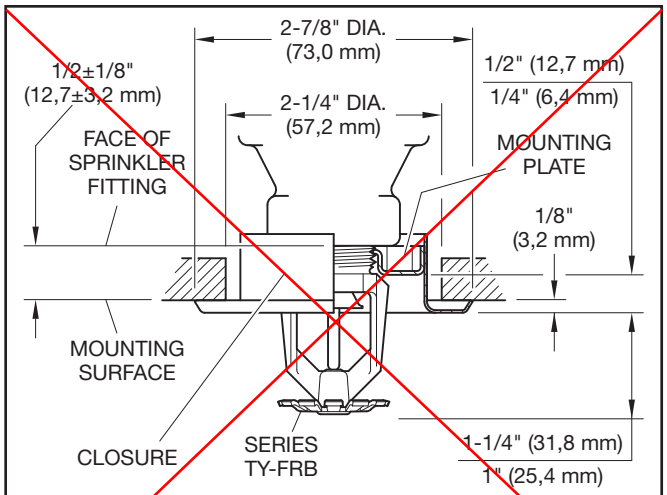


FIGURE 11
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 20 RECESSED ESCUTCHEON
5.6 K-FACTOR, 1/2 IN. NPT

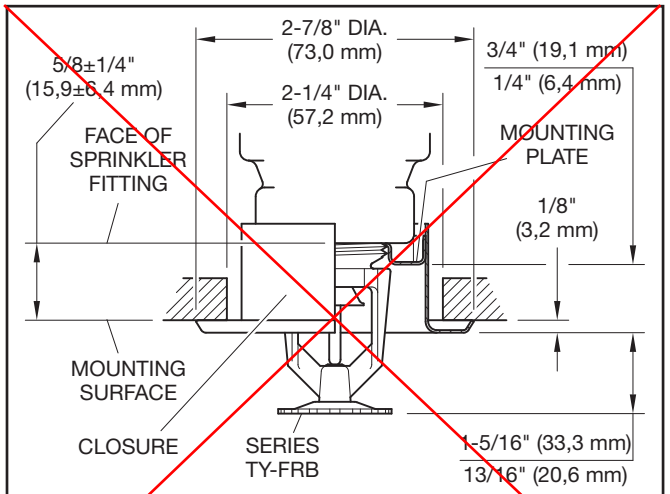


FIGURE 12
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT
STYLE 40 RECESSED ESCUTCHEON
8.0 K-FACTOR, 3/4 IN. NPT

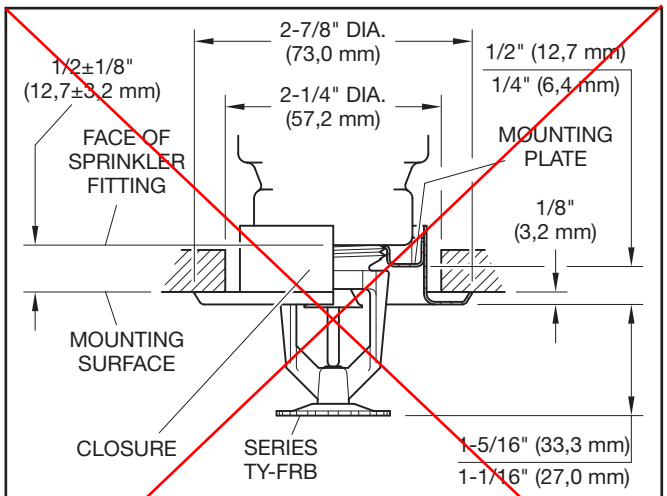


FIGURE 13
SERIES TY-FRB RECESSED PENDENT
WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT
STYLE 30 RECESSED ESCUTCHEON
8.0 K-FACTOR, 3/4 IN. NPT

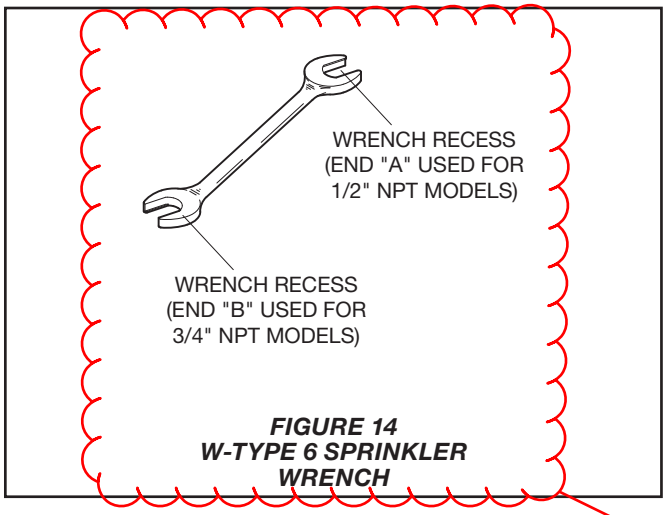


FIGURE 14
W-TYPE 6 SPRINKLER
WRENCH

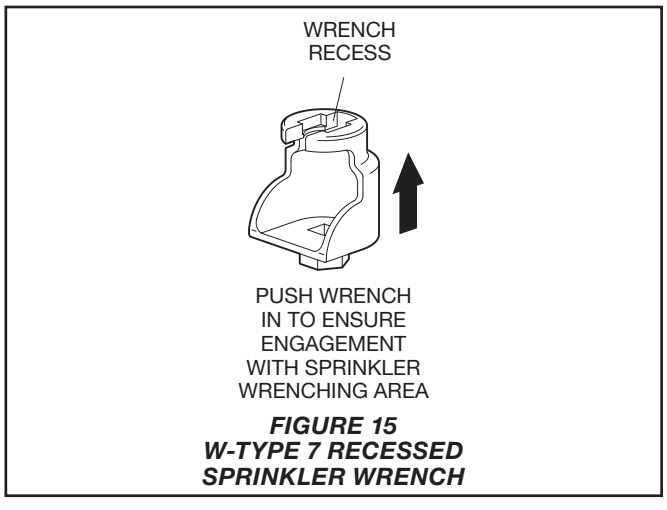


FIGURE 15
W-TYPE 7 RECESSED
SPRINKLER WRENCH

include in attic stock/spare parts

K-Factor	Type	Temperature	Sprinkler Finish[5]			
			Bulb Liquid Color	Natural Brass	Chrome Plated	Polyester
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

Horizontal Side Wall Head

C. Sidewall:
1. Type: Semi-recessed horizontal sidewall type with matching screw on escutcheon plate.
2. Finish: White enamel.
3. Escutcheon plate finish: White enamel.
4. Fusible link: Glass bulb type temperature rated for specific area hazard.

Series TY-FRB — 5.6 K-factor Horizontal and Vertical Sidewall Sprinklers Quick Response, Standard Coverage

General Description

The Series TY-FRB, 5.6 K-factor, Horizontal and Vertical Sidewall Sprinklers described in this data sheet are quick response -standard coverage, decorative 3 mm glass bulb type spray sprinklers designed for use in light and ordinary hazard, commercial occupancies such as banks, hotels, shopping malls, etc. They are designed for installation along a wall or the side of a beam and just beneath a smooth ceiling. Sidewall sprinklers are commonly used instead of pendent or upright sprinklers due to aesthetics or building construction considerations, where piping across the ceiling is not desirable.

The recessed version of the Series TY-FRB Horizontal Sidewall Sprinkler is intended for use in areas with a finished wall. It uses a two-piece Style 10 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 sidewall position, or a two-piece Style 20 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 sidewall position. The adjustment provided by the Recessed Escutcheon reduces the accuracy to which the fixed pipe nipples to the sprinklers must be cut.

Corrosion resistant coatings, where applicable, are utilized to extend the life of copper alloy sprinklers beyond that which would otherwise 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.

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.

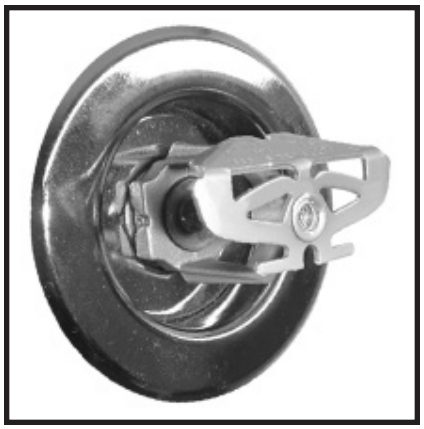
NOTICE

The Series TY-FRB Sprinklers described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction. Failure to do so may impair the performance of these devices.

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

Sprinkler Identification Numbers

TY3331. . . . . Horizontal
TY3431. . . . . Vertical



Technical Data

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

(Refer to Table A for complete approval information including corrosion resistant status.)

Maximum Working Pressure
Refer to Table B

Discharge Coefficient
K=5.6 GPM/psi$^{1/2}$ (80,6 LPM/bar$^{1/2}$)

Temperature Ratings
Refer to Table A

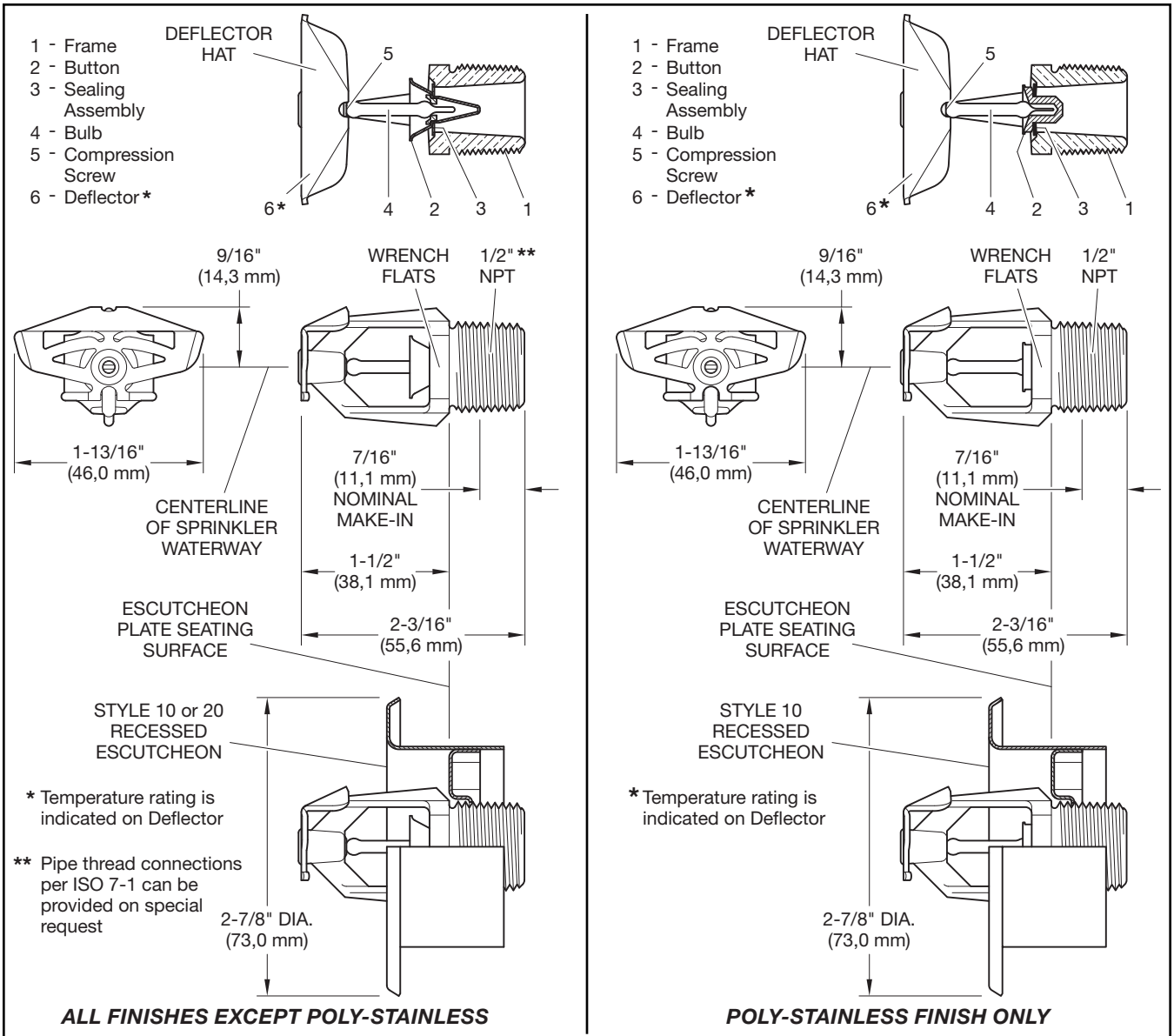


FIGURE 1
5.6 K-FACTOR QUICK RESPONSE
SERIES TY-FRB HORIZONTAL SIDEWALL (TY3331) SPRINKLERS

Finishes
Sprinkler: Refer to Table C

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

Physical Characteristics

Frame	Bronze
Button	Brass/Copper
Sealing Assembly	Beryllium Nickel w/TEFLON
Bulb	Glass
Compression Screw	Bronze
HSW Deflector	Bronze
VSW Deflector	Copper

Poly-Stainless
Physical Characteristics

Frame	Bronze
Button	L316 Stainless Steel*
Bulb	Glass
Compression Screw	L316 Stainless Steel*
HSW 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 which 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 Series TY-FRB, 5.6 K-factor, Horizontal and Vertical Sidewall Sprinklers are intended for fire protection systems designed in accordance with the standard installation rules recognized by the applicable Listing or Approval agency (e.g., UL Listing is based on the requirements of NFPA 13, and FM Approval is based on the requirements of FM's Loss Prevention Data Sheets). Only the Style 10 or 20 Recessed Escutcheon, as applicable, is to be used for recessed horizontal installations.

Installation

The Series TY-FRB, 5.6 K-factor, Horizontal and Vertical Sidewall 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) to 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 with a torque of 7 to 14 lb-ft (9,5 to 19,0 N·m). Higher levels of torque may distort the sprinkler and cause leakage or impairment of the sprinkler.

Do not attempt to make-up for insufficient adjustment in the escutcheon plate by under-or over-tightening the sprinkler. Readjust the position of the sprinkler fitting to suit.

Series TY-FRB Horizontal and Vertical Sidewall Sprinkler Installation
The Series TY-FRB Horizontal and Vertical Sidewall Sprinklers must be installed in accordance with the following instructions.

Step 1. Horizontal sidewall sprinklers are to be installed in the horizontal position with their centerline of waterway perpendicular to the back wall and parallel to the ceiling. The word “TOP” on the Deflector is to face towards the ceiling.

Vertical sidewall sprinklers are to be installed in the pendent or upright position with the arrow on the Deflector pointing away from the wall.

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 5), With reference to Figure 1 or 2, the W-Type 6 Sprinkler Wrench is to be applied to the wrench flats.

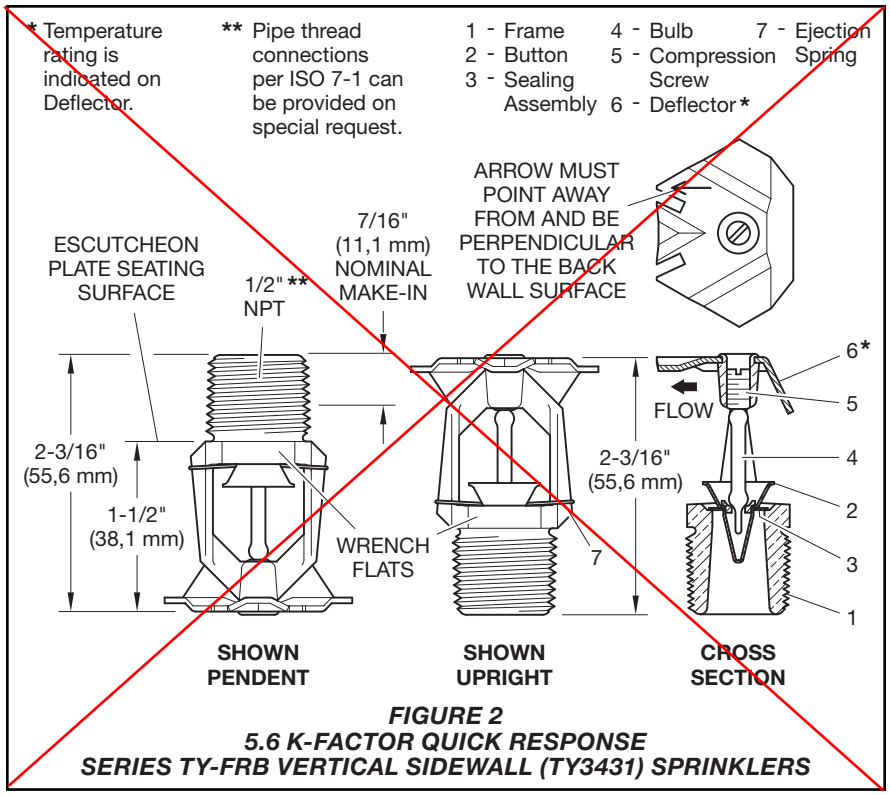


FIGURE 2
5.6 K-FACTOR QUICK RESPONSE
SERIES TY-FRB VERTICAL SIDEWALL (TY3431) SPRINKLERS

Series TY-FRB Recessed Horizontal Sidewall Sprinkler Installation
The Series TY-FRB Recessed Horizontal Sidewall Sprinklers must be installed in accordance with this section.

Step A. Recessed horizontal sidewall sprinklers are to be installed in the horizontal position with their centerline of waterway perpendicular to the back wall and parallel to the ceiling. The word “TOP” on the Deflector is to face towards the ceiling.

Step B. After installing the Style 10 or 20 Mounting Plate over the sprinkler threads, hand tighten the sprinkler into the sprinkler fitting.

Step C. Tighten the sprinkler into the sprinkler fitting using only the W-Type 7 Recessed Sprinkler Wrench (Ref. Figure 6). With reference to Figure 1, the W-Type 7 Recessed Sprinkler Wrench is to be applied to the sprinkler wrench flats.

Step D. After the ceiling has been installed or the finish coat has been applied, slide on the Style 10 or 20 Closure over the Series TY-FRB Sprinkler and push the Closure over the Mounting Plate until its flange comes in contact with the ceiling.

Care and Maintenance

The Series TY-FRB, 5.6 K-factor, Horizontal and Vertical Sidewall 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, permission to shut down the affected fire protection system must be obtained from the proper authorities and all personnel who may be affected by this action must be notified.

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

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

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

Care must be exercised to avoid damage to the sprinklers before, during, and after installation. Spriklers

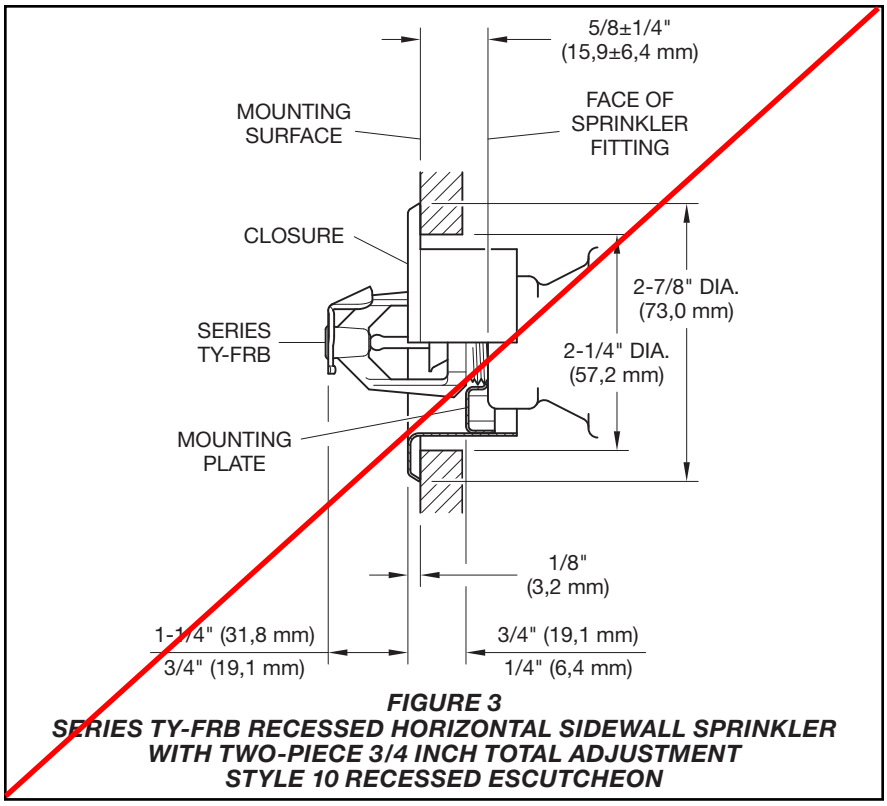


FIGURE 3
SERIES TY-FRB RECESSED HORIZONTAL SIDEWALL SPRINKLER WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT STYLE 10 RECESSED ESCUTCHEON

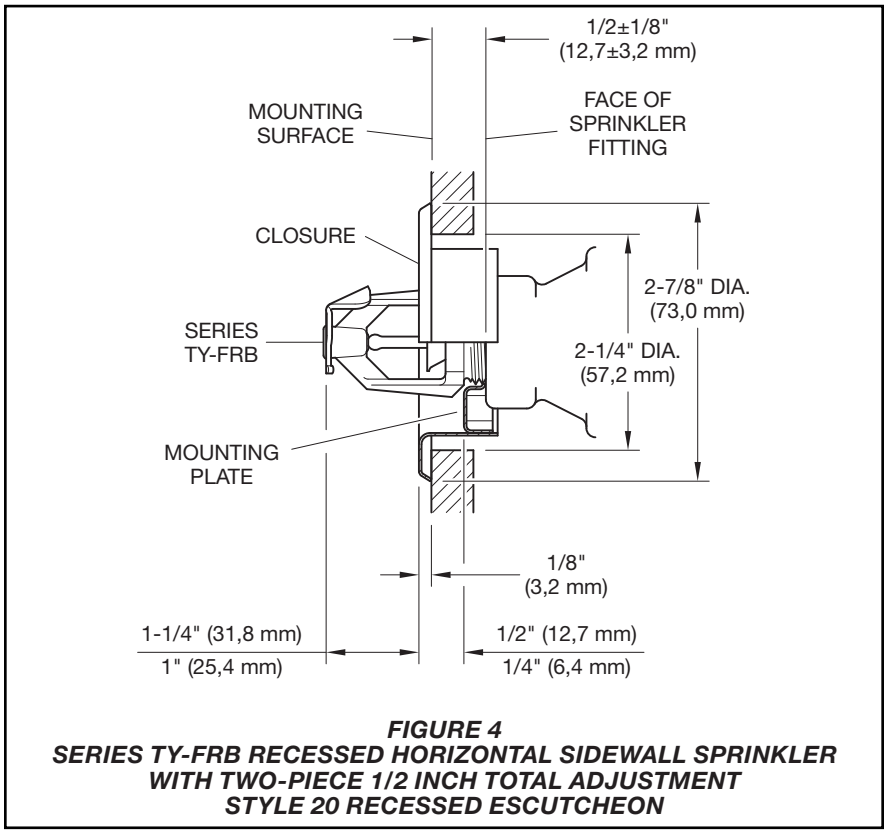


FIGURE 4
SERIES TY-FRB RECESSED HORIZONTAL SIDEWALL SPRINKLER WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT STYLE 20 RECESSED ESCUTCHEON

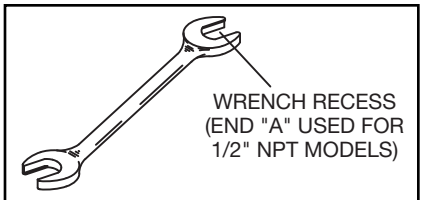


FIGURE 5
W-TYPE 6
SPRINKLER WRENCH

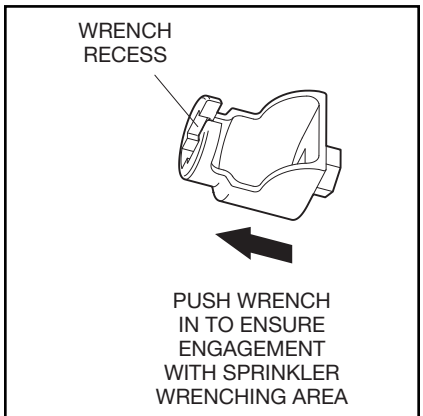


FIGURE 6
W-TYPE 7 RECESSED
SPRINKLER WRENCH

include in attic stock/spare parts

				SPRINKLER FINISH (See Note 11)				
K	**TYPE**	**TEMP.**	**BULB LIQUID**	**NATURAL BRASS**	**CHROME PLATED**	**POLYESTER[c]**	**POLY-STAINLESS[c]**	**LEAD COATED**
5.6 1/2 in. NPT	**HORIZ. SIDEWALL (TY3331)**	135°F (57°C)	Orange	1, 2, 3, 4, 9, 10		1, 2, 3, 9	1, 2	1, 2, 3, 9
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					
	RECESSED HORIZ. SIDEWALL (TY3331)[a] Figure 3	135°F (57°C)	Orange	1, 2, 4, 9, 10		1, 2, 9	1, 2	N/A
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
	RECESSED HORIZ. SIDEWALL (TY3331)[b] Figure 4	135°F (57°C)	Orange	1, 2, 3, 4, 9			N/A	N/A
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
5.6 1/2 in. NPT	**VERTICAL SIDEWALL (TY3431) Installed Pendent or Upright**	135°F (57°C)	Orange	5, 6, 7, 8, 9			N/A	5, 6, 7, 9
		155°F (68°C)	Red					
		175°F (79°C)	Yellow					
		200°F (93°C)	Green					
		286°F (141°C)	Blue					

NOTES:
1. Listed by Underwriters Laboratories, Inc. (UL) as Quick Response Sprinklers for use in Light and Ordinary Hazard Occupancies at a 4 to 12 in. (100 to 300 mm) top of deflector to ceiling distance.
2. Listed by Underwriters Laboratories Inc. for use in Canada (C-UL) as Quick Response Sprinklers for use in Light and Ordinary Hazard Occupancies at a 4 to 12 in. (100 to 300 mm) top of deflector to ceiling distance.
3. Approved by Factory Mutual Research Corporation (FM) as Quick Response Sprinklers for use in Light Hazard Occupancies at a 4 to 12 in. (100 to 300 mm) top of deflector to ceiling distance.
4. Approved by the Loss Prevention Certification Board (LPCB Ref. No. 007a/04) at a 4 to 6 in. (100 to 150 mm) top of deflector to ceiling distance. The LPC does not rate the thermal sensitivity of horizontal sidewall sprinklers.
5. Listed by Underwriters Laboratories, Inc. as Quick Response Sprinklers for use in Light and Ordinary Hazard Occupancies.
6. Listed by Underwriters Laboratories for use in Canada (C-UL) as Quick Response Sprinklers for use in Light and Ordinary Hazard Occupancies.
7. Approved by Factory Mutual Research Corporation (FM) as Quick Response Sprinklers for use in Light Hazard Occupancies.
8. Approved by the Loss Prevention Certification Board (LPCB Ref. No. 094a/06 & 007a/04) as Quick Response Sprinklers.
9. Approved by the City of New York under MEA 354-01-E.
10. Approved by the Loss Prevention Certification Board (LPCB Ref. No. 094a/06) at a 4 to 6 in. (100 to 150 mm) top of deflector to ceiling distance. The LPC does not rate the thermal sensitivity of horizontal sidewall sprinklers.
11. 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 Corrosion Resistant Sprinklers.

a. Installed with Style 10 (1/2 in. NPT) 3/4 in.Total Adjustment Recessed Escutcheon.
b. Installed with Style 20 (1/2 in. NPT) 1/2 in. Total Adjustment Recessed Escutcheon.
c. Frame and deflector only.

TABLE A
LABORATORY LISTINGS AND APPROVALS

damaged by dropping, striking, wrench twist/slippage, or the like, must be replaced. Also, replace any sprikler that has a cracked bulb or that has lost liquid from its bulb. (Ref. Installation Section).

The owner must assure that the sprinklers are not used for hanging any objects and that the sprinklers are only cleaned by means of gently dusting with a feather duster; otherwise, non-operation in the event of a fire or inadvertent operation may result.

Frequent visual inspections are recommended to be initially performed for corrosion resistant coated sprinklers, after the installation has been completed, to verify the integrity of the corrosion resistant coating. Thereafter, annual inspections per NFPA 25 should suffice; however, instead of inspecting from the floor level, a random sampling of close-up visual inspections should be made, so as to better determine the exact sprinkler condition and the long term integrity of the corrosion resistant coating, as it may be affected by the corrosive conditions present.

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 product manufacturer with any questions.

It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

K	TYPE	SPRINKLER FINISH			
		NATURAL BRASS	CHROME PLATED	POLYESTER	LEAD COATED
5.6 1/2 in. NPT	HORIZONTAL SIDEWALL (TY3331)	250 PSI (17,2 BAR) or 175PSI (12,1 BAR) (SEE NOTE 1)			
	RECESSED HORIZ. SIDEWALL (TY3331)				
	~~VERTICAL SIDEWALL (TY3431)~~	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.

TABLE B
MAXIMUM WORKING PRESSURE

P/N 57 – XXX – X – XXX

		SIN
378	HORIZONTAL SIDEWALL	TY3331
375	VERTICAL SIDEWALL	TY3431

	SPRINKLER FINISH
1	NATURAL BRASS
2	POLY-STAINLESS GREY ALUMINUM (RAL9007)[1] POLYESTER
3	PURE WHITE (RAL9010)[2] POLYESTER
4	SIGNAL WHITE (RAL9003) POLYESTER
5	JET BLACK (RAL9005)[3] POLYESTER
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 for TY3331 only.
2. Eastern Hemisphere sales only.
3. Available in 155°F (68°C) or 200°F (93°C temperature rating only.

TABLE C
PART NUMBER SELECTION
SERIES TY-FRB HORIZONTAL AND VERTICAL SIDEWALL SPRINKLERS

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) Horizontal Sidewall or Vertical Sidewall Sprinkler, Standard Response, Standard Coverage, (specify) temperature rating, (specify) finish or coating, P/N (specify from Table C)

Recessed Escutcheon
Specify: Style (10 or 20) 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

Dry Pendent Head

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

General Description

TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage are decorative glass bulb automatic sprinklers designed for commercial use. Dry-type sprinklers are typically used where:

- pendent sprinklers are required on dry pipe systems that are exposed to freezing temperatures (e.g., sprinkler drops from unheated portions of buildings)
- sprinklers and/or a portion of the connecting piping are exposed to freezing temperatures; for example, sprinkler drops from wet systems into freezers, sprinkler sprigs from wet systems into unheated attics, or horizontal piping extensions through a wall to protect an unheated areas such as loading docks, overhangs, and building exteriors
- sprinklers are used on systems that are seasonally drained to avoid freezing (e.g., vacation areas)

NOTICE

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

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

The Series DS-1 Dry-Type Sprinklers must only be installed in fittings that meet the requirements of the Design Criteria section.

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.

Sprinkler Identification Numbers (SINs)

3/4 in. NPT:
TY3935 – Pendent
TY3735 – Horizontal Sidewall

1 in. NPT:
TY3235 – Pendent
TY3135 – Upright
TY3335 – Horizontal Sidewall

Technical Data

Approvals
UL and C-UL Listed
FM Approved
NYC Approved under MEA 352-01-E

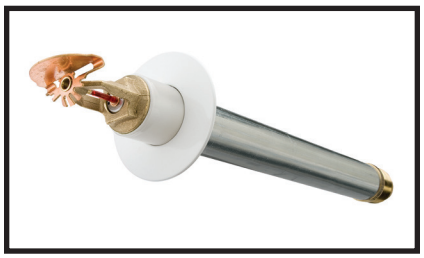
Previous New York City Approval and MEA certification numbers apply to product as shown in this data sheet. In accordance with Section BC 3502 of the Construction Code, current NYC Approvals for use in the City of New York apply to all products that contain UL or FM Approvals and Listings; therefore, not all products currently Approved for use in the City of New York will carry an actual MEA Certification number.
Refer to Tables A and B.

Maximum Working Pressure
175 psi (12,1 bar)

Inlet Thread Connections
3/4 in. NPT

1 in. NPT or ISO 7-R 1

Discharge Coefficient
K=5.6 gpm/psi1/2 (80,6 lpm/bar1/2)



Temperature Ratings
Refer to Tables A and B

Finishes
Sprinkler: Natural Brass, Chrome Plated, or Signal White

Escutcheon: Signal White, Chrome Plated, or Brass Plated

Physical Characteristics

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

* For 3/4 inch NPT only

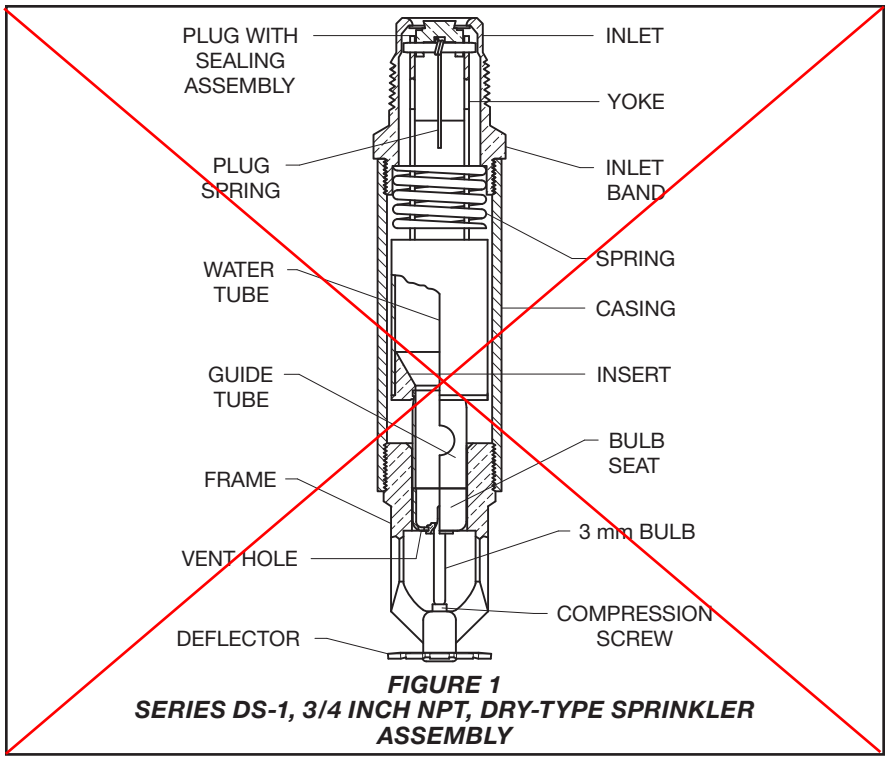


FIGURE 1
SERIES DS-1, 3/4 INCH NPT, DRY-TYPE SPRINKLER ASSEMBLY

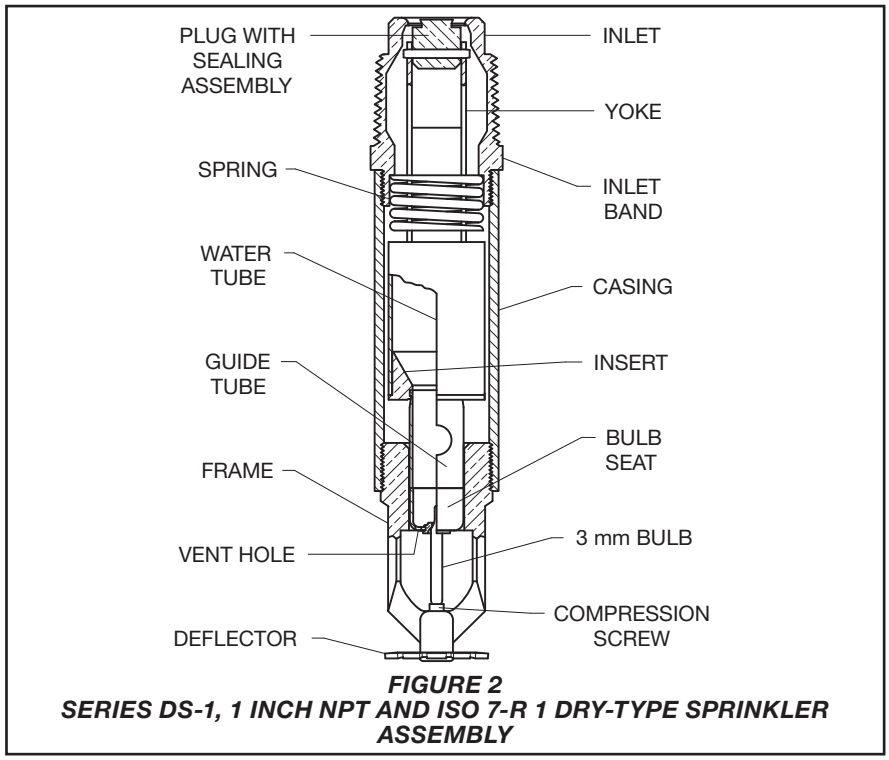


FIGURE 2
SERIES DS-1, 1 INCH NPT AND ISO 7-R 1 DRY-TYPE SPRINKLER ASSEMBLY

Operation

When the TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage are in service, water is prevented from entering the assembly by the Plug with Sealing Assembly in the Inlet of the Sprinkler. See Figures 1 and 2.

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

The compressed Spring is then able to expand and push the Water Tube as well as the Guide Tube outward. This action simultaneously pulls inward on the Yoke, withdrawing the Plug with Sealing Assembly from the Inlet and allowing the sprinkler to activate and flow water.

Design Criteria

The TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage are intended for use in fire sprinkler systems designed in accordance with the standard installation rules recognized by the applicable Listing or Approval agency; for example, UL Listing is based on NFPA 13 requirements.

Sprinkler Fittings
Install the 3/4 or 1 inch NPT Series DS-1 Dry-Type Sprinklers in the 3/4 or 1 inch NPT outlet or run of the following fittings:

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

Do not install the DS-1 Sprinklers into an elbow fittings. The Inlet of the sprinkler can contact the interior of the elbow, potentially damaging the Inlet seal.

The unused outlet of the threaded tee is plugged as shown in Figure 13.

You can also install the Series DS-1 Dry-Type Sprinklers in the 3/4 or 1 inch NPT outlet of a GRINNELL Figure 730 Mechanical Tee. However, the use of the Figure 730 Tee for this arrangement is limited to wet pipe systems.

		3/4 Inch NPT								
		TY3935 Pendent with Recessed Escutcheon (Figure 4)			**TY3935 Pendent** with Standard Escutcheon (Figure 3) with Deep Escutcheon (Figure 5) without Escutcheon (Figure 6)			**TY3735 Horizontal Sidewall** with Top of Deflector-to-Ceiling Distance of 4 to 12 inches (100 to 300 mm) with Standard Escutcheon (Figure 8) with Deep Escutcheon (Figure 9) without Escutcheon (Figure 10)		
Temperature Rating	**Bulb Color Code**	**Finish**								
		Natural Brass	**Chrome Plated**	**White Polyester**	**Natural Brass**	**Chrome Plated**	**White Polyester**	**Natural Brass**	**Chrome Plated**	**White Polyester**
135°F (57°C)	Orange	1, 2			1, 2			1*, 2*		
155°F (68°C)	Red									
175°F (79°C)	Yellow									
200°F (93°C)	Green									
286°F (141°C)	Blue									

Notes:
1. Listed by Underwriters Laboratories, Inc. (maximum order length of 48 inches)
2. Listed by Underwriters Laboratories for use in Canada (maximum order length of 48 inches)
* Light and Ordinary Hazard occupancies only

TABLE A
3/4 INCH NPT SERIES DS-1 QUICK RESPONSE, STANDARD COVERAGE DRY-TYPE SPRINKLERS
LABORATORY LISTINGS AND APPROVALS

		1 Inch NPT (and ISO 7-R 1)								
		TY3235 Pendent with Recessed Escutcheon (Figure 4)			**TY3235 Pendent** with Standard Escutcheon (Figure 3) with Deep Escutcheon (Figure 5) without Escutcheon (Figure 6) TY3135 Upright without Escutcheon[5] (Figure 7)			**TY3335 Horizontal Sidewall** with Top of Deflector-to-Ceiling Distance of 4 to 12 inches (100 to 300 mm) with Standard Escutcheon (Figure 8) with Deep Escutcheon (Figure 9) without Escutcheon (Figure 10)		
Temperature Rating	**Bulb Color Code**	**Finish**								
		Natural Brass	**Chrome Plated**	**White Polyester**	**Natural Brass**	**Chrome Plated**	**White Polyester**	**Natural Brass**	**Chrome Plated**	**White Polyester**
135°F (57°C)	Orange	1, 2, 3, 4		1, 2, 4	1, 2, 3, 4		1, 2, 4	1*, 2*, 3**, 4		1*, 2*, 4
155°F (68°C)	Red									
175°F (79°C)	Yellow									
200°F (93°C)	Green									
286°F (141°C)	Blue	1, 2, 4								

Notes:
1. Listed by Underwriters Laboratories, Inc. (maximum order length of 48 inches)
2. Listed by Underwriters Laboratories for use in Canada (maximum order length of 48 inches)
3. Approved by Factory Mutual Research Corporation (maximum order length of 48 inches)
4. Approved by the City of New York under MEA 352-01-E
5. The Upright Sprinkler without an Escutcheon (TY3135) is available in 1 inch NPT only
* Light and Ordinary Hazard occupancies only
** Light Hazard occupancies only

TABLE B
1 INCH NPT (AND ISO 7-R 1) SERIES DS-1 QUICK RESPONSE, STANDARD COVERAGE DRY-TYPE SPRINKLERS
LABORATORY LISTINGS AND APPROVALS

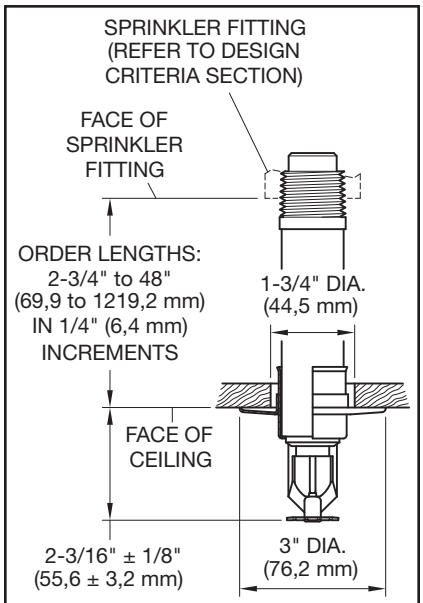


FIGURE 3
PENDENT TY3235 AND TY3935
WITH STANDARD
ESCUTCHEON

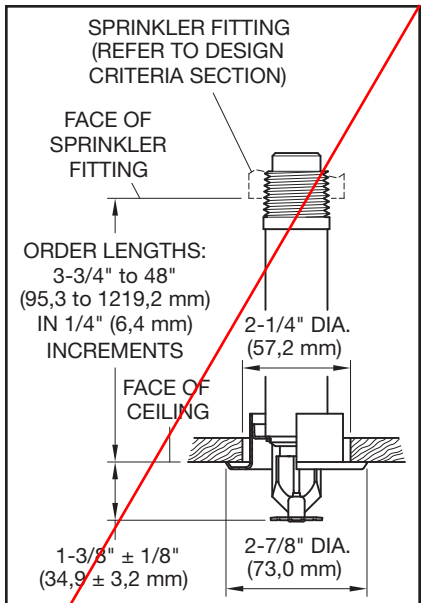


FIGURE 4
PENDENT TY3235 AND TY3935
WITH RECESSED
ESCUTCHEON

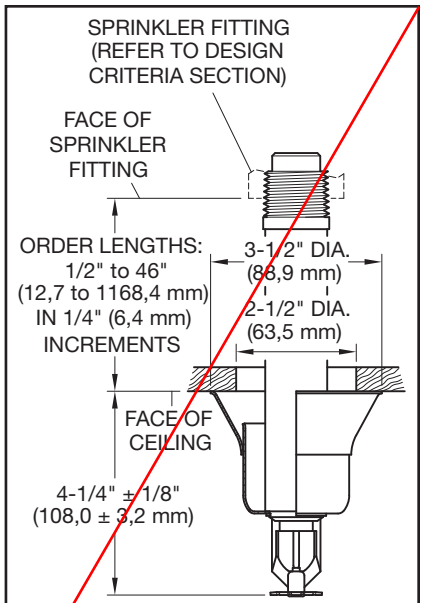


FIGURE 5
PENDENT TY3235 AND TY3935
WITH DEEP
ESCUTCHEON

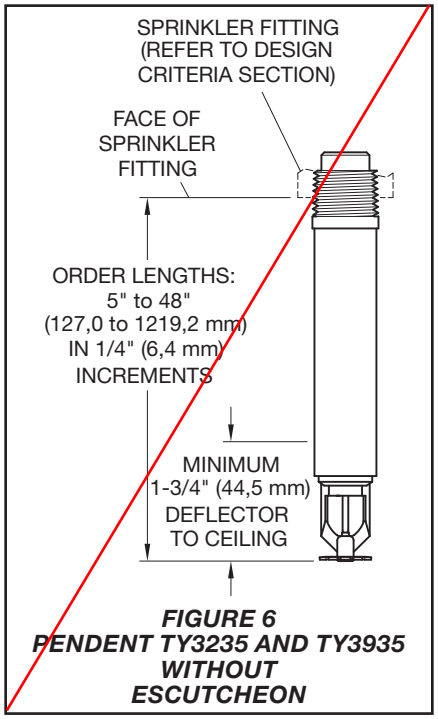


FIGURE 6
PENDENT TY3235 AND TY3935
WITHOUT
ESCUTCHEON

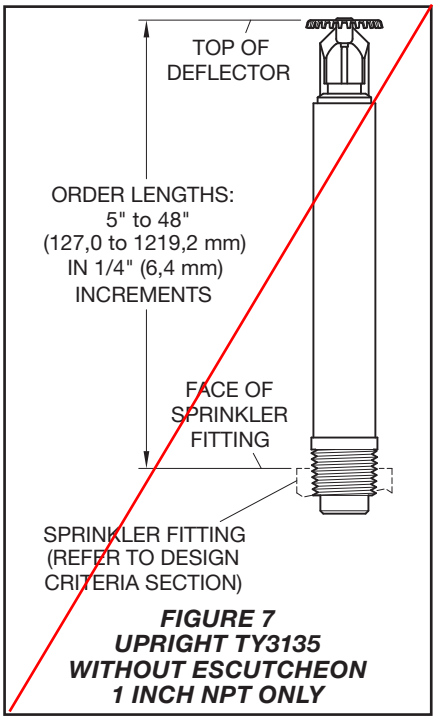


FIGURE 7
UPRIGHT TY3135
WITHOUT ESCUTCHEON
1 INCH NPT ONLY

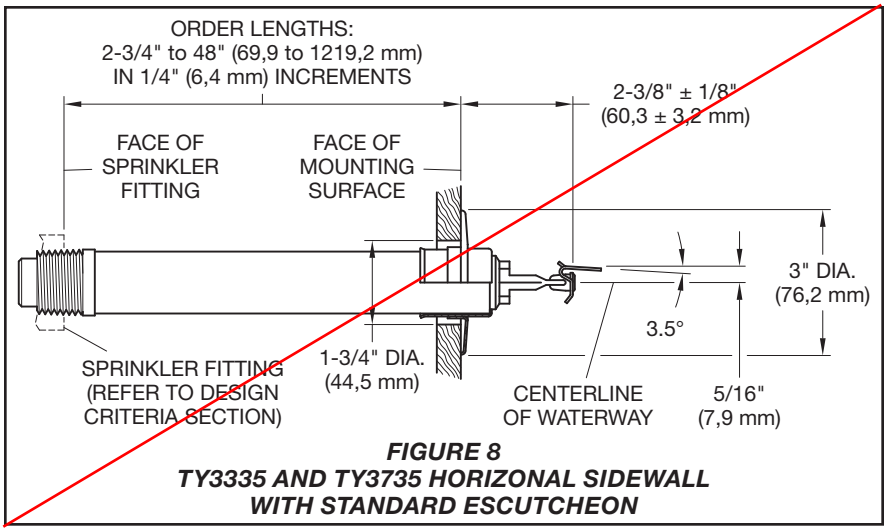


FIGURE 8
TY3335 AND TY3735 HORIZONAL SIDEWALL
WITH STANDARD ESCUTCHEON

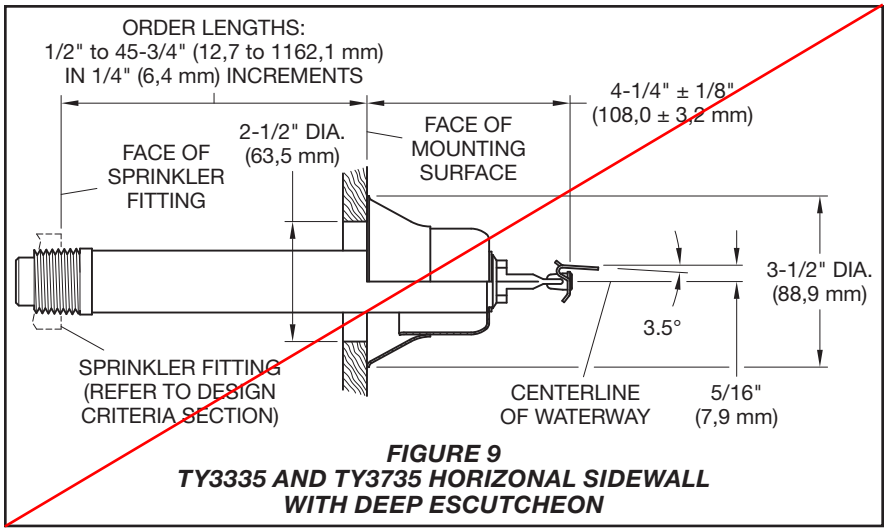


FIGURE 9
TY3335 AND TY3735 HORIZONAL SIDEWALL
WITH DEEP ESCUTCHEON

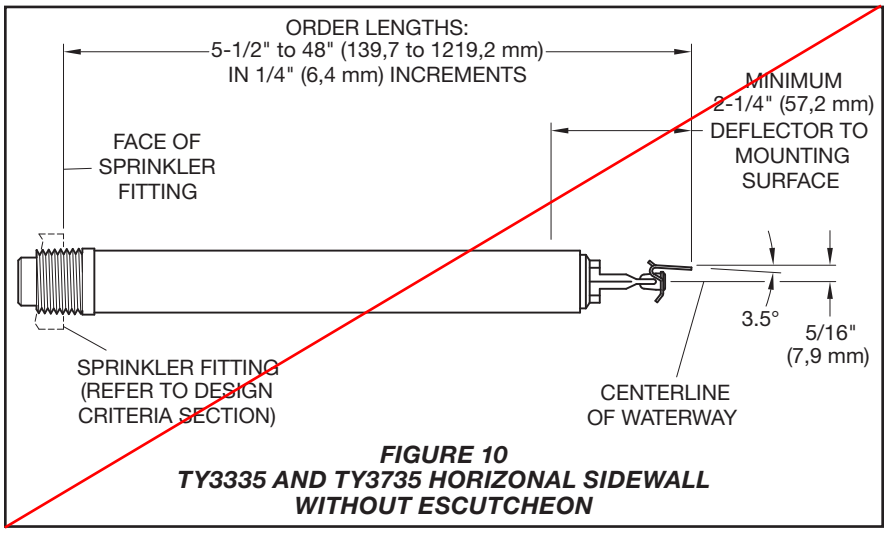


FIGURE 10
TY3335 AND TY3735 HORIZONAL SIDEWALL
WITHOUT ESCUTCHEON

The configuration shown in Figure 12 is only applicable for wet pipe systems where the sprinkler fitting and water-filled pipe above the sprinkler fitting are not subject to freezing and where the length of the Dry-Type Sprinkler has the minimum exposure length depicted in Figure 11. Refer to the Exposure Length section.

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

- 1” x 1” NPT Female Adapter (P/N 80145)
- 1” x 1” x 1” NPT Sprinkler Head Adapter Tee (P/N 80249)

For wet pipe system installations of the the 3/4 inch NPT Series DS-1 Sprinklers connected to CPVC piping, use in the 3/4” x 3/4” NPT Female Adapter (P/N 80142).

For dry pipe system installations, use only the side outlet of maximum 2-1/2-inch reducing tee when locating the Series DS-1 Sprinklers directly below the branch line. Otherwise, use the configuration shown in Figure 13 to assure complete water drainage from above the Series DS-1 Dry-Type Sprinklers and the branch line. Failure to do so may result in pipe freezing and water damage.

NOTICE

Do not install the Series DS-1 Dry-Type Sprinkler into any other type fitting without first consulting the Technical Services Department. Failure to use the appropriate fitting may result in one of the following:

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

Drainage

In accordance with the minimum requirements of the National Fire Protection Association for dry pipe sprinkler systems, branch, cross, and feed-main piping connected to Dry Sprinklers and subject to freezing temperatures must be pitched for proper drainage.

Exposure Length

When using Dry Sprinklers in wet pipe sprinkler systems to protect areas subject to freezing temperatures, use

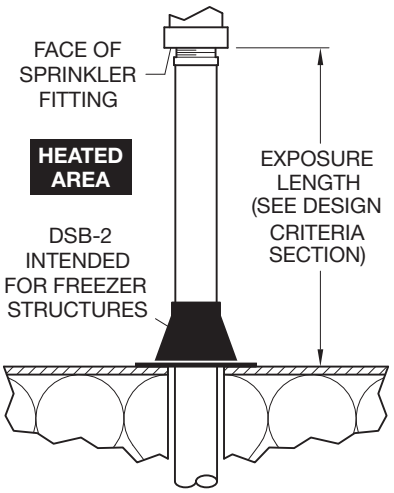


FIGURE 11
EXPOSURE LENGTH

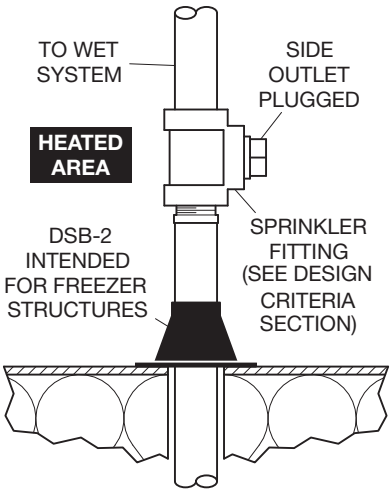


FIGURE 12
SPRINKLER FITTING
HEATED AREA

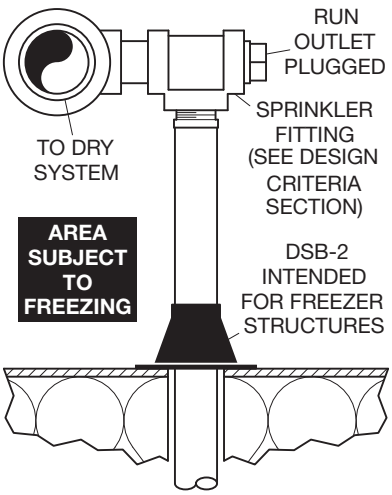


FIGURE 13
SPRINKLER FITTING
UNHEATED AREA

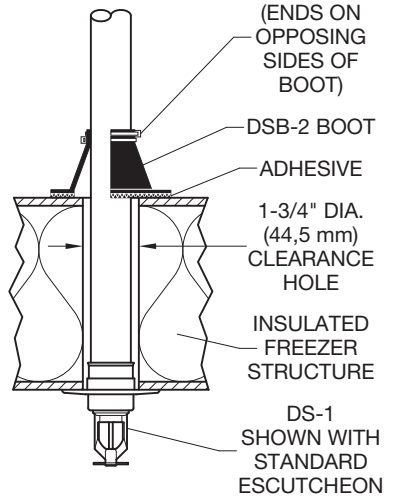


FIGURE 14
MODEL DSB-2 SPRINKLER BOOT WITH PENDENT SERIES DS-1 DRY SPRINKLER

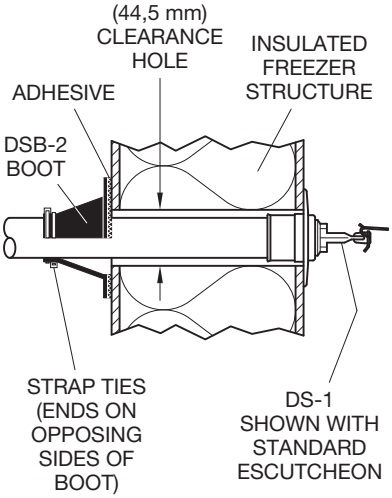


FIGURE 15
MODEL DSB-2 SPRINKLER BOOT WITH SIDEWALL SERIES DS-1 DRY SPRINKLER

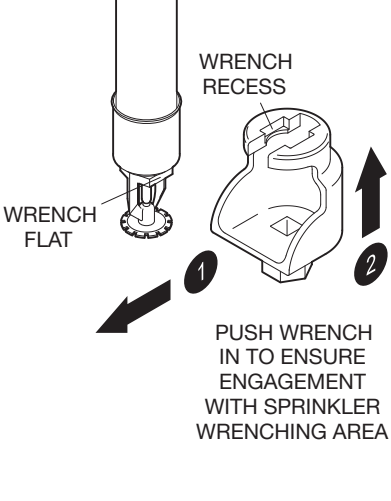


FIGURE 16
W-TYPE 7 SPRINKLER WRENCH

Ambient Temperature Exposed to Discharge End of Sprinkler	Temperatures for Heated Area[1]		
	40°F (4°C)	50°F (10°C)	60°F (16°C)
	Minimum Exposed Barrel Length[2], Inches (mm)		
40°F (4°C)	0	0	0
30°F (-1°C)	0	0	0
20°F (-7°C)	4 (100)	0	0
10°F (-12°C)	8 (200)	1 (25)	0
0°F (-18°C)	12 (305)	3 (75)	0
-10°F (-23°C)	14 (355)	4 (100)	1 (25)
-20°F (-29°C)	14 (355)	6 (150)	3 (75)
-30°F (-34°C)	16 (405)	8 (200)	4 (100)
-40°F (-40°C)	18 (455)	8 (200)	4 (100)
-50°F (-46°C)	20 (510)	10 (255)	6 (150)
-60°F (-51°C)	20 (510)	10 (255)	6 (150)

Notes:
1. For protected area temperatures that occur between values listed above, use the next cooler temperature.
2. These lengths are inclusive of wind velocities up to 30 mph (18,6 kph).

TABLE C
EXPOSED SPRINKLER BARRELS IN WET PIPE SYSTEMS
MINIMUM RECOMMENDED LENGTHS

Table C to determine a sprinkler's appropriate exposed barrel length to prevent water from freezing in the connecting pipes due to conduction. The exposed barrel length measurement must be taken from the face of the sprinkler fitting to the surface of the structure or insulation that is exposed to the heated area. Refer to Figure 11 for an example.

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

Use of the Model DSB-2 Dry Sprinkler Boot, described in Technical Data Sheet TFP591 and shown in Figures 14 and 15, can provide the recommended seal.

Installation

The TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage must be installed in accordance with this section.

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

Do not install any bulb-type sprinkler if the bulb is cracked or there is a loss of liquid from the bulb. With the sprinkler held horizontally, a small air bubble should be present. The diameter of the air bubble is approximately 1/16 inch (1,6 mm) for the 135°F (57°C) rating to 1/8 inch (3,2 mm) for the 286°F (141°C) rating.

- A leak-tight 3/4 inch NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 10 to 20 ft.-lbs. (13,4 to 26,8 Nm).
- A leak-tight 1 inch NPT sprinkler joint should be obtained by applying a minimum-to-maximum torque of 20 to 30 ft.-lbs. (26,8 to 40,2 Nm).

Higher levels of torque can distort the sprinkler Inlet with consequent leakage or impairment of the sprinkler.

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

Step 1. Install pendent sprinklers only in the pendent position, and install upright sprinklers only in the upright position. The deflector of a pendent or upright sprinkler must be parallel to the ceiling.

Install horizontal sidewall sprinklers in the horizontal position with their centerline of waterway perpendicular to the back wall and parallel to the ceiling. Ensure the word "TOP" on the Deflector faces the ceiling.

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

Step 3. Wrench-tighten the sprinkler using either:

- a pipe wrench on the Inlet Band or the Casing (Ref. Figures 1 and 2)
- the W-Type 7 Sprinkler Wrench on the Wrench Flat (Ref. Figure 16)

Apply the Wrench Recess of the W-Type 7 Sprinkler Wrench to the Wrench Flat.

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

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

When using the Deep Escutcheon, hold the outer piece in contact with the mounting surface (ceiling or wall). Then rotate the inner piece approximately 1/4 turn with respect to the outer piece, to hold the Deep Escutcheon firmly together.

Care and Maintenance

The TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage 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 the time to sprinkler operation in a fire situation.

A Vent Hole is provided in the Bulb Seat (Ref. Figures 1 and 2) to indicate if the Dry-Type Sprinkler is remaining dry. Evidence of leakage from the Vent Hole indicates potential leakage past the Inlet seal and the need to remove the sprinkler to determine the cause of leakage (e.g., an improper installation or an ice plug). Close the fire protection system control valve and drain the system before removing the sprinkler.

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

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

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

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

Limited Warranty

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

Ordering Procedure

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

DS-1 Dry-Type Sprinklers
When ordering TYCO Series DS-1 Dry-Type Sprinklers, 5.6K Pendent, Upright, and Horizontal Sidewall, Quick Response (3 mm bulb) and Standard Coverage, specify the following information:

- SIN:
  Pendent – TY3935 or TY3235
  Sidewall – TY3735 or TY3335
  Upright – TY3135
- 5.6 K-factor
- Deflector Style:
  Upright, Pendent, or Horizontal Sidewall
- Quick Response, Standard Coverage, Dry-Type Sprinkler
- Order Length:
  Dry-Type Sprinklers are furnished based upon Order Length as measured per Figures 3 through 10. After taking the measurement, round it to the nearest 1/4 inch increment.
- Inlet Connections:
  3/4 in. NPT, 1 in. NPT, or ISO 7-R 1
- Temperature Rating
- Sprinkler Finish
- Escutcheon Style and Finish, as applicable
- Part Number (P/N) from Table D

  The Upright Sprinkler without an Escutcheon (TY3135) is available in 1 in. NPT only.

  Part Numbers are for 3/4 in. and 1 in. NPT standard order sprinklers. Orders for all other sprinkler assemblies must be accompanied by a complete description. Refer to the Price List for a complete listing of Part Numbers.

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

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

This Part Number includes one (1) Boot, two (2) Strap Ties, and 1/3 oz. of Adhesive (a sufficient quantity for installing one boot).

P/N* 60 – XXX – X – XXX

		SIN
01	Pendent with Standard Escutcheon (3/4" NPT)	TY3935 (Figure 3)
02	Pendent with Deep Escutcheon (3/4" NPT)	TY3935 (Figure 5)
03	Pendent with Recessed Escutcheon (3/4" NPT)	TY3935 (Figure 4)
04	Pendent without Escutcheon (3/4" NPT)	TY3935 (Figure 6)
05	Sidewall with Standard Escutcheon (3/4" NPT)	TY3735 (Figure 8)
06	Sidewall with Deep Escutcheon (3/4" NPT)	TY3735 (Figure 9)
07	Sidewall without Escutcheon (3/4" NPT)	TY3735 (Figure 10)
36	Pendent with Standard Escutcheon (1" NPT)	TY3235 (Figure 3)
33	Pendent with Deep Escutcheon (1" NPT)	TY3235 (Figure 5)
37	Pendent with Recessed Escutcheon (1" NPT)	TY3235 (Figure 4)
32	Pendent without Escutcheon (1" NPT)	TY3235 (Figure 6)
34	Sidewall with Standard Escutcheon (1" NPT)	TY3335 (Figure 8)
43	Sidewall with Deep Escutcheon (1" NPT)	TY3335 (Figure 9)
44	Sidewall without Escutcheon (1" NPT)	TY3335 (Figure 10)
38	Upright without Escutcheon (1" NPT)	TY3135 (Figure 7)

	SPRINKLER FINISH	ESCUTCHEON FINISH[1]
0	CHROME PLATED	SIGNAL WHITE (RAL9003)
1	NATURAL BRASS	SIGNAL WHITE (RAL9003)
2	NATURAL BRASS	BRASS PLATED
4	SIGNAL WHITE (RAL9003)	SIGNAL WHITE (RAL9003)
9	CHROME PLATED	CHROME PLATED

	TEMPERATURE RATINGS
0	135°F (57°C)
1	155°F (68°C)
2	175°F (79°C)
3	200°F (93°C)
4	286°F (141°C)

	SAMPLE ORDER LENGTHS[2]
055	5.50”
082	8.25”
180	18.00”
187	18.75”
372	37.25”
480	48.00”

Notes:
1. Escutcheon Finish applies to sprinklers provided with escutcheons.
2. Dry-Type Sprinklers are furnished based upon “Order Length” as measured per Figures 3 through 10, as applicable, and for each individual sprinkler where it is to be installed. After the measurement is taken, round it to the nearest 1/4 inch increment.

* Use Prefix “I” for ISO 7-R 1 Connection (e.g., I-60-010-4-055).

TABLE D
SERIES DS-1 DRY-TYPE SPRINKLERS
PART NUMBER SELECTION

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

Flexible Drop

Be sure that these are appropriate lengths for each application, I remember this was a issue with building inspector in past projects.

COMMERCIAL FLEXIBLE SPRINKLERS

COMMERCIAL FLEXIBLE SPRINKLERS

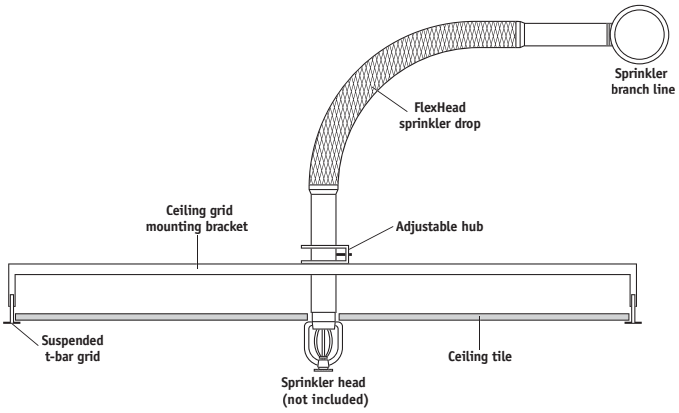
Unlike traditional hard-piped fire protection systems, FlexHead sprinkler connections allow engineers, architects, contractors and building owners a degree of versatility previously unavailable, featuring:

- FM approved & UL listed system
- Industrial grade material
- Acceptable for use in a return-air plenum
- Perfect center-of-tile and aesthetic uniformity
- Approved for use with medium and heavy load grids (ASTM C635, 636)
- 100% leak-tested connections
- All welded, no o-rings
- Adjustable height and sprinkler alignment
- Proven technology
- Ceiling system compatibility
- Compatible with FM / UL sprinklers
- Meets 2013 NFPA 13 guidelines

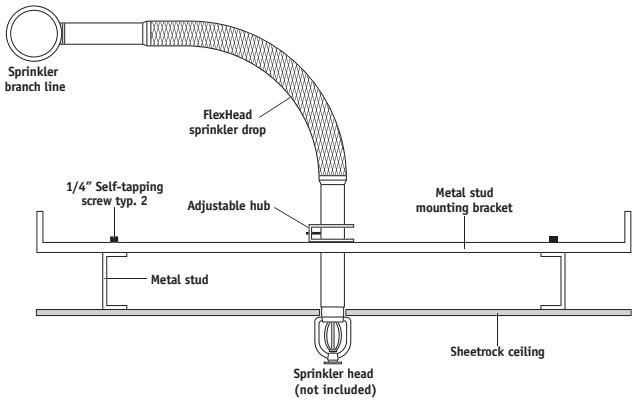
The benefits of installing FlexHead Commercial Connections include:

- Uniform bids / construction schedules
- Reduced man power and labor costs
- Retrofit existing buildings within confined spaces quickly and easily
- Increased efficiency
- Quick and easy installation
- Simple friction loss / water pressure calculations
- Relocate and reconfigure without draining and disassembling
- Flexible design provides versatility for changes in floor plan or occupancy
- Reduced service calls
- No call-backs due to quality manufacturing
- Rapid construction schedules allowing fast-track building occupancy

FlexHead Suspended Ceiling Detail



FlexHead Sheetrock Ceiling Detail



Each FM approved and UL listed unit is ready to install, pressure- and leak-tested, and comes complete with a flexible stainless steel hose and mounting bracket with adjustable hub.

FRICTION DATA LOSS & SPECIFICATIONS

FlexHead Model #	Internal I.D. in	Outlet Orifice Size in (cm)	Hose Assembly Length ft (cm)	Maximum Number of 90-degree Bends 3" – UL	8" – FM 175psi	8" – FM 300psi	Maximum Equivalent Length of Schedule 40, Nominal 1in. Diameter Pipe, ft FM	UL	Maximum Ambient Temperature Rating F (C)	Maximum Rated Pressure psi (kPa) / psi (kPa) Standard	H-Series	Maximum K-factor
2024, 2024H	1	1/2 (1.27)	2 (0.6)	3	1	2	18.4	11	300º (148º)	175 (1205) / 300 (2068)		5.62
2036, 2036H	1	1/2 (1.27)	3 (0.9)	3	2	3	26.6	16	300º (148º)	175 (1205) / 300 (2068)		5.62
2048, 2048H	1	1/2 (1.27)	4 (1.2)	4	3	4	30.3	24	300º (148º)	175 (1205) / 300 (2068)		5.62
2060, 2060H	1	1/2 (1.27)	5 (1.5)	4	4	4	35.8	29	300º (148º)	175 (1205) / 300 (2068)		5.62
2072, 2072H	1	1/2 (1.27)	6 (1.8)	4	4	4	45.6	35	300º (148º)	175 (1205) / 300 (2068)		5.62
2024 75, 2024H 75	1	3/4 (1.90)	2 (0.6)	3	1	2	14.7	12	300º (148º)	175 (1205) / 300 (2068)		14.0
2036 75, 2036H 75	1	3/4 (1.90)	3 (0.9)	3	2	3	21.8	18	300º (148º)	175 (1205) / 300 (2068)		14.0
2048 75, 2048H 75	1	3/4 (1.90)	4 (1.2)	4	3	4	29.0	23	300º (148º)	175 (1205) / 300 (2068)		14.0
2060 75, 2060H 75	1	3/4 (1.90)	5 (1.5)	4	4	4	36.1	29	300º (148º)	175 (1205) / 300 (2068)		14.0
2072 75, 2072H 75	1	3/4 (1.90)	6 (1.8)	4	4	4	43.2	32	300º (148º)	175 (1205) / 300 (2068)		14.0
							175psi, 300psi					
2024E, 2024HE	1	1/2 (1.27)	2 (0.6)	3	1	2	26.4, 14.7	19	300º (148º)	175 (1205) / 300 (2068)		5.62
2036E, 2036HE	1	1/2 (1.27)	3 (0.9)	3	2	3	30.1, 21.8	23	300º (148º)	175 (1205) / 300 (2068)		5.62
2048E, 2048HE	1	1/2 (1.27)	4 (1.2)	4	3	4	33.8, 29.0	27	300º (148º)	175 (1205) / 300 (2068)		5.62
2060E, 2060HE	1	1/2 (1.27)	5 (1.5)	4	4	4	37.5, 36.1	32	300º (148º)	175 (1205) / 300 (2068)		5.62
2072E, 2072HE	1	1/2 (1.27)	6 (1.8)	4	4	4	41.2, 43.2	35	300º (148º)	175 (1205) / 300 (2068)		5.62
2024E 75, 2024HE 75	1	3/4 (1.90)	2 (0.6)	3	1	1	14.7	18	300º (148º)	175 (1205) / 300 (2068)		14.0
2036E 75, 2036HE 75	1	3/4 (1.90)	3 (0.9)	3	2	2	21.8	23	300º (148º)	175 (1205) / 300 (2068)		14.0
2048E 75, 2048HE 75	1	3/4 (1.90)	4 (1.2)	4	3	3	29.0	23	300º (148º)	175 (1205) / 300 (2068)		14.0
2060E 75, 2060HE 75	1	3/4 (1.90)	5 (1.5)	4	4	4	36.1	29	300º (148º)	175 (1205) / 300 (2068)		14.0
2072E 75, 2072HE 75	1	3/4 (1.90)	6 (1.8)	4	4	4	43.2	32	300º (148º)	175 (1205) / 300 (2068)		14.0
2036F	1.25	1/2 (5.6)	3 (0.9)	3	-		16.0		300º (148º)	175 (1205) / 300 (2068)		5.62
2048F	1.25	1/2 (5.6)	4 (1.2)	4	-		19.6		300º (148º)	175 (1205) / 300 (2068)		5.62
2072F	1.25	1/2 (5.6)	6 (1.8)	4	-		22.8		300º (148º)	175 (1205) / 300 (2068)		5.62
2036F75	1.25	3/4 (14)	3 (0.9)	3	-		9.3		300º (148º)	175 (1205)		14.0
2048F75	1.25	3/4 (14)	4 (1.2)	4	-		11.4		300º (148º)	175 (1205)		14.0
2072F75	1.25	3/4 (14)	6 (1.8)	4	-		15		300º (148º)	175 (1205)		14.0
2036F100	1.25	1 (14)	3 (0.9)	3	-		7.1		300º (148º)	175 (1205)		22.4
2048F100	1.25	1 (14)	4 (1.2)	4	-		8.3		300º (148º)	175 (1205)		22.4
2072F100	1.25	1 (14)	6 (1.8)	4	-		10.1		300º (148º)	175 (1205)		22.4

Model Numbers: The "H" designates high pressure unit rated to 300 psig and the "E" designates elbow style unit. The "F" designates high flow rate using 1 1/4" internal hose diameter.

FlexHead products are intended for use in hydraulically designed wet, pre-action, deluge or dry pipe sprinkler connections per NFPA 13, 13R, and 13D guidelines. The hydraulic loss of the FlexHead connector needs to be included in the hydraulic design calculations the same as a valve or fitting. *Each FlexHead sprinkler drop has a **3" minimum bend radius per UL guidelines, and a 8" minimum bend radius per FM guidelines.***

****FM Equivalent Length Numbers include maximum "K" factor sprinkler head that is listed.****

* Equivalent lengths are shown with maximum number of 90 degree bends at the minimum bend-radius. Different values were obtained by FM and UL due to the differences in minimum bend radius, testing protocol and calculation methods. Please see individual testing standards for more information relative to friction loss (Equivalent Length of Pipe).

FLEXHEAD STANDARD SPECIFICATION

DIVISION 21 MECHANICAL – SECTION 15300
FIRE PROTECTION PIPING

FLEXIBLE SPRINKLER HOSE FITTINGS FOR FIRE PROTECTION SERVICE

A. Manufacturer: FlexHead Industries, Inc.

1. Contact: 56 Lowland Street, Holliston, MA 01746; Telephone: (800)829-6975; Fax: (508)893-6020; Email: sales1@flexhead.com; Website: www.flexhead.com
2. Substitutions: Allowed if substitute product meets regulatory requirements, performance criteria and material specifications listed below.

B. Description:

1. Regulatory Requirements: Provide flexible stainless steel hose fittings that comply with the following requirements:
   a. In accordance with General Requirements contained in Division 1 of specification.
   b. In accordance with NFPA 13.

C. Performance Criteria: Comply with the following to suit project requirements:

1. FM 1637 Approval Standard for Flexible Sprinkler Hose with Threaded End Fittings.
2. UL 2443 Standard for Flexible Sprinkler Hose with Fittings for Fire Protection Service.
3. ICC-ES AC-156 Acceptance Criteria for Seismic Qualification by Shake-Table Testing of Nonstructural Components and Systems.

D. Materials: FlexHead Commercial Sprinkler Connections

1. FlexHead flexible stainless steel hose assemblies:
   a. Straight Hose Assembly Lengths: {2ft length, Model #2024} {3ft length, Model #2036} {4ft length, Model #2048} {5ft length, Model #2060} {6ft length, Model #2072}
      1. {½ inch} {¾ inch} outlet.
      2. {175 psi} {300 psi} maximum rated pressure
      3. Fully welded non-mechanical fittings, braided, leak-tested with minimum 1 inch true-bore internal corrugated hose diameter made of 100% 304 stainless steel including end fittings.
   b. Elbow Hose Assembly Lengths (For use in confined spaces): {2ft length, Model #2024E} {3ft length, Model #2036E} {4ft length, Model #2048E} {5ft length, Model #2060E} {6ft length, Model #2072E}
      1. {½ inch} {¾ inch} outlet.
      2. {175 psi} {300 psi} maximum rated pressure
      3. Fully welded non-mechanical fittings, braided, leak-tested with minimum 1 inch true-bore internal corrugated hose diameter made of 100% 304 stainless steel including end fittings.
2. FlexHead Ceiling Bracket: Direct attachment type having integrated snap-on clip ends positively attached to the ceiling using tamper-resistant screws and removable attachment hub with set screw for attaching and adjusting flexible hose.

APPLICABLE STANDARDS

American Society of Civil Engineers (ASCE) -SEI/ASCE 7-05, Section 13.5.6 Suspended Ceilings

ASTM International

- ASTM C635 Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-in Panel Ceilings
- ASTM C636 Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels

FM Global Technologies LLC (FM) - FM Class Number 1637 Approval Standard for Flexible Sprinkler Hose with Threaded End Fittings

International Code Council (ICC)

- ICC International Building Code (IBC), 2006
  - Section 803.9 Acoustical Ceiling Systems
  - Section 1613 Earthquake Loads

National Fire Protection Association (NFPA)

- NFPA 13 Standard for the Installation of Sprinkler Systems
- NFPA 13D Standard for the Installation of Sprinkler Systems in One- and Two-Family Dwellings and Manufactured Homes
- NFPA 13R Standard for the Installation of Sprinkler Systems in Residential Occupancies up to and Including Four Stories in Height Underwriters Laboratories, Inc. (UL) - UL 2443 Standard for Flexible Sprinkler Hose with Fittings for Fire Protection Service

APPROVALS

Underwriters Laboratories, Inc. (UL) - UL Listed, VENF. EX5269, Flexible Sprinkler Hose Fitting

PHYSICAL/CHEMICAL PROPERTIES

Test reports are available to design professionals upon request.

PREPARATORY WORK

Installation should only be performed by qualified and licensed technicians in the fire protection field. Consult NFPA, FM, UL and state and local guidelines prior to installation.

METHODS

Each FlexHead ceiling sprinkler connection includes a mounting bracket and a 1-piece, leak tested FlexHead sprinkler drop.

Attach the bracket to the t-bar ceiling grid; then attach the FlexHead sprinkler to the sub-main. Secure the sprinkler to the bracket. Test installation of sprinkler system for any leaks per NFPA guidelines.

PRECAUTIONS

Consult the manufacturer's installation instructions for complete installation information. Failure to follow the cited instructions may cause personal injury. During maintenance or inspection of FlexHead product, the facility fire protection system must be inactive. Do not attempt relocation or maintenance of FlexHead product while fire protections system is live.

BUILDING CODES

Current data on building code requirements and product compliance may be obtained from the manufacturer's technical support specialists. Installation must comply with the requirements of applicable local, state and national code jurisdictions.

AVAILABILITY

For information on product availability or to locate an authorized FlexHead distributor, contact FlexHead Industries, Inc.

COST

Budget installed cost information may be obtained from the manufacturer upon request.

MAINTENANCE

Contact the manufacturer for complete maintenance information.

TECHNICAL SERVICES

Design assistance and technical support are available upon request from the manufacturer's trained staff.

FILING SYSTEMS

- MANU-SPEC®
- Additional product information is available from the manufacturer upon request

FLEXIBLE HOSE DATA SHEET

EASYFLEX Flexible Sprinkler Drops are designed to significantly reduce labor and installation costs. By eliminating the need for pipe cutting and midline connections, you save valuable time and money.

EASYFLEX Flexible Sprinkler Drops can be installed on almost any suspended commercial ceilings. The flexible hose allows for fast installation while our innovative brackets are simple and easy to install. Brackets for T-Bar ceiling grids, wall mount, metal studs, woodbeams, open hat channels, industrial ducts, and cleanrooms. No special tools required, and installation completed in a few easy steps.
Flexible hoses come in braided or unbraided types, from 24" to 72" in length.

EASYFLEX Flexible Sprinkler Drops Appliance Standards

- **National Fire Protection Association (NFPA):**
  - NFPA 13: Standard for the Installation of Sprinkler Systems
  - NFPA 13D: Standard for the Installation of Sprinkler Systems in One and Two-Family Dwellings and Manufactured Homes
  - NFPA 13R: Standard for Installation of Sprinkler Systems in residential Occupancies up to and including four stories in height
- **American Society for Testing and Methods (ASTM):**
  - ASTM C635: Standards specifications for the manufacture, performance, and testing of metal suspension systems for acoustical tile and lay-in panel ceilings
  - ASTM C636: Standards practice for installation of metal ceiling suspension systems for acoustical tile and lay-in panels
- **Factory Mutual (FM), FM Class No, 1637:** Approved standard for flexible sprinkler hose with threaded end fittings
- **Underwriter's Laboratories, Inc. (UL/ULC), cULus 2443:** Standards for flexible sprinkler hose with fittings for fire protection services

TECHNICAL DATA

Maximum Working Pressure Rating	175 psig UL/ULC/FM		Minimum Bending Radius	4" (UL/ULC) and 8" (FM) * DO NOT bend within 2.52 inches from connection nuts	
Maximum Ambient Temperature Rating	225°F				
Connection	**Inlet**	1" NPT	K-Factor	**½" Outlet**	5.6
	Outlet	½" or ¾" NPT		**¾" Outlet**	8.0

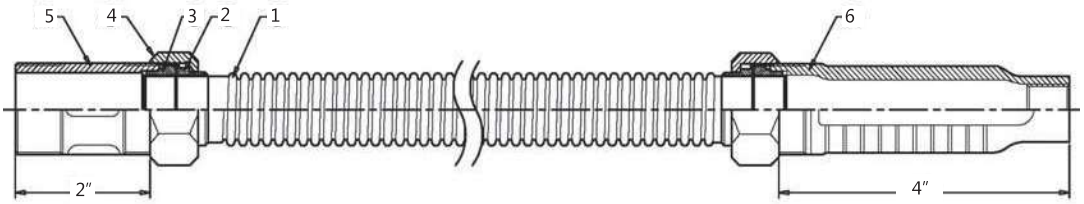
** No hangers and seismic escutcheons required*
** Required torque to assemble reducer and nipple with the flexible hose: 50 feet per pound*

SUBMITTAL

Job Name		Job Location	
Submitted By		Date	
Approved By		Date	

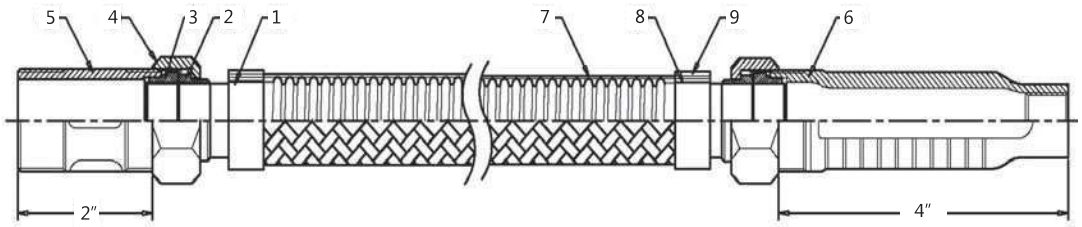
Tel: (714) 258-2600 • Fax: (714) 258-2602 • E-mail: info@easyflexusa.com www.easyflexusa.com
Ver.1 August, 2013

UNBRAIDED FLEXIBLE HOSE



1. TUBE
2. ISOLATION RING
3. SEALING GASKET
4. NUT
5. NIPPLE (1″)
6. REDUCER

BRAIDED FLEXIBLE HOSE



1. TUBE
2. ISOLATION RING
3. SEALING GASKET
4. NUT
5. NIPPLE (1″)
6. REDUCER
7. BRAID
8. PRESS RING (INNER)
9. PRESS RING (OUTER)

FEATURES & MATERIALS

HOSES		MATERIALS	
Lengths	24", 36", 48", 60" and 72"	HOSE/ BRAID	Stainless Steel 304
Sizes	1/2" or 3/4"	NUT & NIPPLE	Zinc-Plated Steel
Type	Braided(UL/ULC/ FM)	SEALING GASKET/ ISOLATION RING	EPDM/ NYLON
	Unbraided(UL/ULC)		

FRICTION LOSS DATA

Length	Outlet Connections	MAX number of 90° Bends (UL)	Equivalent Length of 1″ Schedule 40 Pipe, ft (FM/UL)
24″	1/2″	1	6.8 / 18
	3/4″	1	4.7 / 18
36″	1/2″	2	11.5 / 31
	3/4″	2	10.6 / 34
48″	1/2″	3	16.7 / 48
	3/4″	3	12.7 / 51
60″	1/2″	4	20.6 / 60
	3/4″	4	17.0 / 65
72″	1/2″	4	24.0 / 71
	3/4″	4	19.8 / 72

** Differences of Friction Loss Data are due to the different test methods and conditions between UL and FM approvals.*
FM: 8″ minimum bend radius, where C=120/ UL: 4″ minimum bend radius, where C=120

4

Hanger

- Hanger Rings
- Clamps
- Hanger Rods
- Anchors & Screws

Hanger Rings

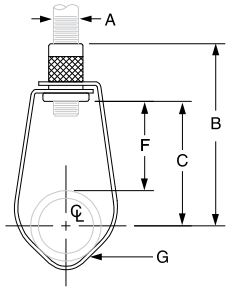
Fig. 69 Adjustable Swivel Ring, Tapped Per NFPA Standards

Size Range: 1/2" through 8"
Material: Carbon steel
Finish: Strap is Pre-Galvanized Zinc Material. Nut is Zinc Plated.
Service: Recommended for suspension of non-insulated **stationary** pipe line.
Maximum Temperature: 650° F
Approvals: Complies with Federal Specification A-A-1192A (Type 10), *WW-H-171-E (Type 10)*, ANSI/MSS SP-69 and MSS SP-58 (Type 10). UL Listed and FM Approved (Sizes 3/4" - 8").
Features:

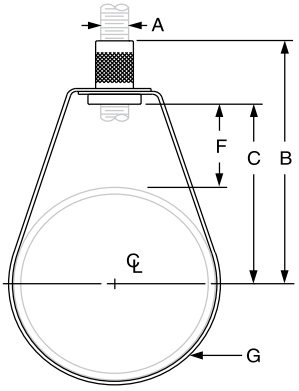
- Threads are countersunk so that they cannot become burred or damaged.
- Knurled swivel nut provides vertical adjustment after piping is in place.
- Captured swivel nut in the 1/2" through 6" sizes. The capture is permanent in the bottom portion of the band, allowing the hanger to be opened during installation if desired, but not allowing the nut to fall completely out.

Ordering: Specify size, figure number and name.
Note: The acceptability of galvanized coatings at temperatures above 450°F is at the discretion of the end user.
Metric nut available upon request. Non-captured nut also available upon request.

UL LISTED FM APPROVED



1/2" through 1" pipe



1 1/4" through 8" pipe

FIG. 69: LOADS (LBS) • WEIGHT (LBS) • DIMENSIONS (IN)							
Pipe Size	Max Load	Weight	Rod Size A	B	C	F	G Width
1/2	300	0.10	3/8	2 7/8	2	1 9/16	5/8
3/4		0.10		2 3/4	1 7/8	1 5/16	
1		0.10		2 9/16	1 11/16	1	
1 1/4		0.10		2 5/8	1 3/4	7/8	
1 1/2		0.10		2 3/4	1 7/8		
2		0.11		3 1/4	2 3/8	1 1/8	
2 1/2	525	0.20		4	2 3/4	1 5/16	3/4
3		0.20		3 13/16	2 15/16	1 3/16	
4	650	0.30		4 11/16	3 13/16	1 9/16	
5	1,000	0.54	1/2	5 5/16	4 3/8		
6		0.65		6 11/16	5 9/16	2 1/4	
8		1.00		8	7	2 11/16	1

Note: Reflects changes in rod diameter from previously published data per recent revisions in MSS-SP-58 & 69

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

ADJUSTABLE SWIVEL RING HANGERS

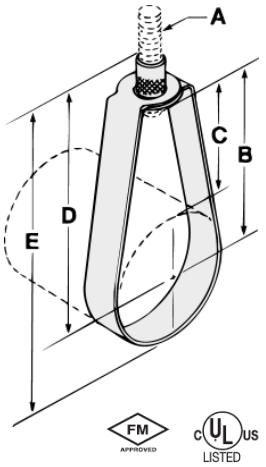
Fig. 141 & 141F NFPA SWIVEL RING HANGER

Fig. 141 PRE-GALVANIZED
Fig. 141F PRE-GALVANIZED WITH FELT LINING

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. Fig. 141F has a layer of felt which separates the pipe from the hanger to reduce vibration and sound.

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 sizes ¾" (20mm) to 4"(100MM). Factory Mutual Approved for sizes ¾" (20mm) to 8"(200MM). Complies with Federal Specifications A-A-1192A (Type 10), and Manufacturers' Standardization Society ANSI/SP-69 and SP-58 (Type 10).

ORDERING: Specify pipe size and figure number.



MATERIAL: Low carbon steel

Pipe Size		Rod Size	B		Adj. C		D		E		Max. Rec. Load		Wt. Per Inch	
											lbs.	Kn	lbs.	kg
1/2	(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)
3/4	(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)
1 1/4	(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)
1 1/2	(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)
2 1/2	(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)
3 1/2	(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)

Note: *If ordering Fig. 141F felt lined hangers for pipe sizes of 3 1/2"(90mm) or under, order the next largest size to allow for the thickness of the felt lining.*

Fig. 151 & 151F SWIVEL RING HANGER

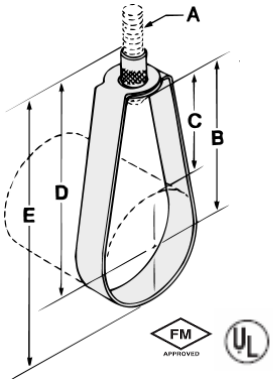
Fig. 151 PRE-GALVANIZED
Fig. 151F PRE-GALVANIZED WITH FELT LINING

FUNCTION: Designed for the suspension of non-insulated stationary pipe lines. The knurled insert nut, allows for vertical adjustment after installation. Fig. 151F has a layer of felt which separates the pipe from the hanger to reduce vibration and sound.

APPROVALS: Underwriters' Laboratories Listed in the U.S. (UL) and Factory Mutual Approved for all sizes. Complies with Federal Specification A-A-1192A (Type 10), and Manufacturers' Standardization Society ANSI/SP-69 and SP-58 (Type 10).

ORDERING: Specify pipe size and figure number.

MATERIAL: Low carbon steel



Pipe Size		Rod Size	B		Adj. C		D		E		Max. Rec. Load		Wt. Per Inch	
											lbs.	Kn	lbs.	kg
2 1/2	(65)	1/2	2 3/4	(69.85)	1 1/4	(31.75)	3 11/16	(93.66)	5 1/8	(130.18)	600	(2.67)	.33	(.15)
3	(80)	1/2	3 1/8	(79.38)	1 1/8	(28.58)	4	(101.60)	5 7/8	(149.23)	600	(2.67)	.35	(.16)
3 1/2	(90)	1/2	3 5/8	(92.08)	1 1/2	(38.10)	4 5/16	(109.54)	6 5/8	(168.28)	600	(2.67)	.37	(.17)
4	(100)	5/8	3 7/8	(98.43)	1 1/4	(31.75)	4 15/16	(125.41)	7 1/8	(180.98)	1000	(4.45)	.48	(.22)
5	(125)	5/8	3 3/8	(85.73)	1 3/8	(34.93)	5 5/8	(142.88)	8 1/2	(215.90)	1000	(4.45)	.57	(.26)
6	(150)	3/4	5 5/16	(134.94)	2	(50.80)	6 11/16	(169.86)	10 1/8	(257.18)	1250	(5.56)	1.06	(.48)
8	(200)	3/4	6 15/16	(176.21)	2 5/8	(66.68)	8 5/16	(211.14)	12 7/8	(327.03)	1250	(5.56)	1.32	(.60)

Note: *If ordering Fig. 151F felt lined hangers for pipe sizes of 3 1/2"(90mm) or under, order the next largest size to allow for the thickness of the felt lining.*

Unless otherwise specified, all dimensions on drawings and in charts are in inches and dimensions shown in parentheses are in millimeters.

Clamps

NOTE: 211300-14 (2.6)(B)

B. Shared support structures shall be certified by a registered professional engineer in the state of North Carolina in accordance with the following:
1. The design of a shared support structure shall be based on either of the following:
a. Sprinkler pipe and other distribution systems shall be permitted to be supported from a shared support structure designed to support five (5) times the weight of water-filled sprinkler pipe and other supported distribution systems plus two-hundred-fifty (250) pounds, based on the allowable ultimate stress.
b. Sprinkler pipe and other distribution systems shall be permitted to be supported from a shared support structure designed to support five (5) times the weight of the water-filled sprinkler pipe plus two-hundred-fifty (250) pounds, and one-and-one-half (1.5) times the weight of all other supported distribution systems.
2. The building structure shall not be considered a shared support structure.
3. Systems that are incompatible with the fire sprinkler systems based on vibration, thermal expansion and contraction, or other factors shall not share support structures.

Fig. 92

Universal C-type Clamp (Standard Throat)

Size Range: 3/8" and 1/2"
Material: Ductile iron, hardened steel cup point set screw and locknut.
Finish: ☐ Plain or ☐ Galvanized
Service: Recommended for use under roof installations with bar joist type construction, or for attachment to the top or bottom flange of structural shapes where the vertical hanger rod is required to be offset from the edge of the flange and where the thickness of joist or flange does not exceed 3/4".
Approvals: Complies with Federal Specification A-A-1192A (Type 19 & 23) *WW-H-171-E (Type 23)*, ANSI/MSS SP-69 and MSS SP-58 (Type 19 & 23).
UL, ULC Listed and FM Approved.
How to size: Size of clamp is determined by size of rod to be used.
Installation: Follow recommended set screw torque values per MSS-SP-69
(See table on page 233)
Features:

- They may be attached to horizontal flanges of structural members in either the top beam or bottom beam positions.
- Secured in place by a cup-pointed Set Screw tightened against the flange. A Jam Nut is provided for tightening the Set Screw against the Body Casting.
- Thru tapping of the body casting permits extended adjustment of the threaded rod.
- Can be used with Fig 89X retaining clip for seismic applications.

Ordering: Specify rod size, figure number, name of clamp and finish.

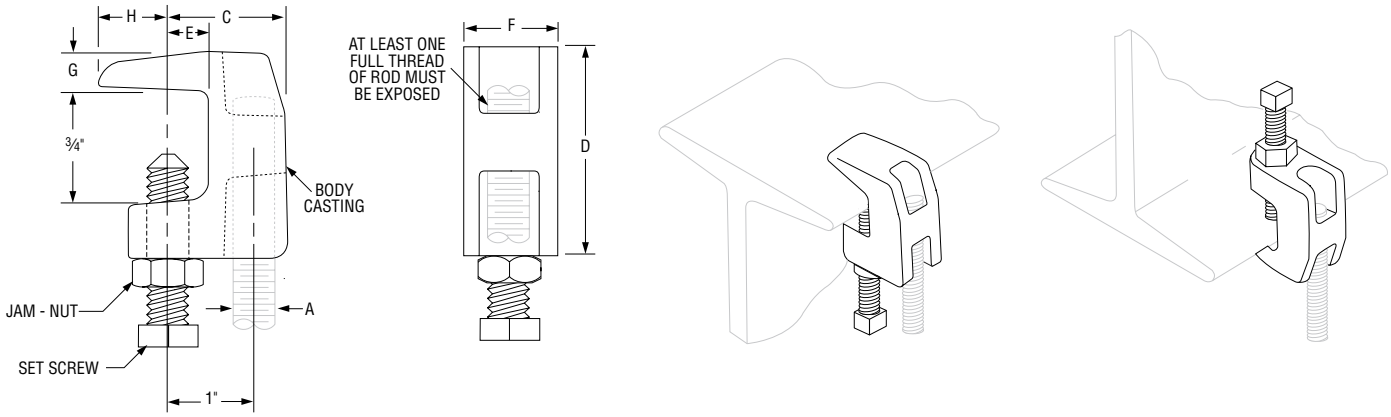


FIG. 92: LOAD (LBS) • WEIGHT (LBS) • DIMENSIONS (IN) • TORQUE (IN-LBS)											
Rod Size A	Set Screw Size	Torque Value	Max Loads ■		Weight	C	D	E	F	G	H
			Top	Bottom							
3/8	3/8	60	500	250	0.34	1 5/16	1 9/16	9/16	1 3/16	3/8	1/2
1/2	1/2	125	950	760	0.63	1 3/8	1 13/16	1/2	1 1/16	7/16	23/32

■ Maximum temperature of 450° F

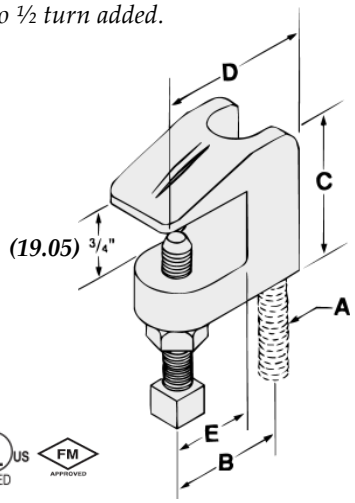
PROJECT INFORMATION	APPROVAL STAMP
Project:	☐ Approved
Address:	☐ Approved as noted
Contractor:	☐ Not approved
Engineer:	**Remarks:**
Submittal Date:	
Notes 1:	
Notes 2:	

BEAM CLAMPS

Fig. 350
BEAM CLAMP

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)	

Note: *When a torque wrench is unavailable, the setscrew should be tightened so it contacts the I-beam and then an additional ¼ to ½ turn added.*



3/8 & 1/2 Available in stainless steel. To order, specify 304 or 316 and add suffix SS to figure number. Price on request.

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 inch (19.05mm). The open U design permits rod adjustment. The universal design of the 3/8" Fig. 350 allows it to be used in an inverted position on the bottom flange of a beam as well.

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/SP-69 and SP-58 (Type 19). Fig. 350 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. 350 also complies with Federal Specifications A-A-1192A (Type 23) and Manufacturers' Standardization Society ANSI/SP-69 and SP-58 (Type 23) (Approvals are only for Fig. 350 with locknut).

MATERIAL: Malleable iron with hardened steel cup point set screw

FINISH: Plain or electro-galvanized

ORDERING: Specify rod size, finish and figure number.

Rod Size A	B		C		D		E		Max. Pipe Size		Max. Rec. Load		Wt. Each	
											lbs.	kN	lbs.	kg
*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 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)
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)
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)
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)
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 Not UL or FM approved.**

Δ 3/8 Reversible design approved for bottom beam

Fig. 261

Extension Pipe or Riser Clamp

Size Range: 3/4" through 24"
Material: Carbon steel
Finish: ☐ Plain, ☐ Galvanized or ☐ Epoxy coated
Service: For support of stationary steel pipe risers, cast iron pipe or conduit. This product is not intended for use with hanger rods. For this application refer to Fig. 40 Riser Clamp, page 43.
Maximum Temperature: Plain 650° F, Galvanized and Epoxy 450° F
Approvals: Complies with Federal Specification A-A-1192A (Type 8) *WW-H-171-E (Type 8)*, ANSI/MSS SP-69 and MSS SP-58 (Type 8). UL, ULC Listed (Sizes 1 1/2" - 8").
Installation: Clamp is fitted and bolted preferably below a coupling, hub or welded lugs on steel pipe. Bolt torques should be per industry standards (see page 233). Clamp is designed for standard steel pipe O.D. and this must be considered in sizing the riser for other types of piping.
Ordering: Specify pipe size, figure number, name and finish.

Note: Refer to Technical Data Section for cast iron soil pipe data.

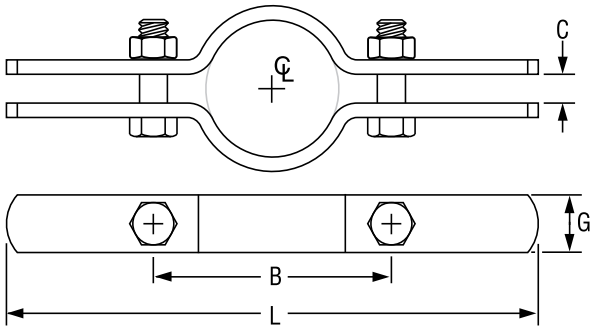


FIG. 261: LOADS (LBS) • WEIGHT (LBS) • DIMENSIONS (IN) • TORQUE (FT-LBS)

Pipe Size	Max Load	Weight	L	G Width	B	C	Bolt Diameter	Torque Values
3/4	220	1.1	8 7/8	1	2 7/8	3/8	3/8	21
1		1.1			3 1/8			
1 1/4	250	1.6	10		3 1/2			
1 1/2		1.6	10 1/4		3 7/8			
2	300	1.7			4 1/4	1/2	7/16	32
2 1/2	400	1.9	11 1/4		4 3/4			
3	500	1.9	11 3/8		5 1/2			
3 1/2	600	2.3	12 7/8		6 1/2	1/2	1/2	46
4	750	2.4			7			
5	1,500	3.6	13 3/4	1 1/2	8			
6	1,600	4.0	14 3/4		9			
8	2,500	7.6	18 1/2		12	5/8	5/8	100
10		11.1	20 1/4	2	13 3/4			
12	2,700	16.5	22 3/4		15 3/4			
14		17.7	24		17 1/4			
16	2,900	30.4	26	2 1/2	19 3/4	3/4	3/4	150
18		33.8	28		21 3/4			
20		35.0	30		23 3/4			
24	3,200	82.0	36 3/4	3	30	1	7/8	190

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

RISER CLAMPS

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.

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 Specifications A-A-1192A (Type 8) and Manufacturers' Standardization Society ANSI/SP-69 and SP-58 (Type 8).

MATERIAL: Low carbon steel

ORDERING: Specify pipe size and figure number.

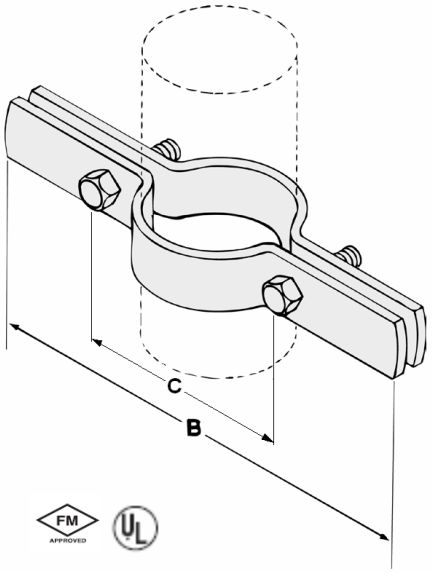
Fig. 550, 551 & 553 RISER CLAMP

Fig. 550* PLAIN

Fig. 551 ELECTRO-GALVANIZED

Fig. 553 PLAIN WITH PVC COATING

*Available in stainless steel. To order, specify 304 or 316 and add suffix SS to figure number. Price on request.



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)	2 3/4	(69.85)	3/8 x 1 1/4	250	(1.11)	1.17	(.53)
2	(50)	10 1/4	(260.35)	3 1/2	(88.90)	3/8 x 1 1/4	300	(1.33)	1.20	(.54)
2 1/2	(65)	11 1/8	(282.58)	3 3/4	(95.25)	3/8 x 1 1/2	400	(1.78)	1.89	(.86)
3	(80)	11 3/4	(298.45)	4 5/8	(117.48)	3/8 x 1 1/2	500	(2.22)	1.99	(.90)
3 1/2	(90)	12 1/2	(317.50)	5 1/4	(133.35)	3/8 x 1 1/2	600	(2.67)	2.17	(.98)
4	(100)	13	(330.20)	6	(152.40)	1/2 x 1 3/4	750	(3.34)	2.21	(1.00)
5	(125)	14 1/4	(361.95)	6 1/2	(165.10)	1/2 x 1 3/4	1500	(6.67)	3.24	(1.47)
6	(150)	15 3/8	(390.53)	7 3/4	(196.85)	1/2 x 1 3/4	1600	(7.12)	3.89	(1.76)
8	(200)	18 1/2	(469.90)	8 7/8	(225.43)	5/8 x 2	2500	(11.12)	7.60	(3.45)
10	(250)	20 1/2	(520.70)	12	(304.80)	5/8 x 2	2500	(11.12)	11.10	(5.03)
12	(300)	22 1/2	(571.50)	14	(355.60)	5/8 x 2 1/2	2700	(12.01)	16.50	(7.48)
14	(350)	25 1/8	(638.18)	16	(406.40)	5/8 x 3	2700	(12.01)	17.70	(8.03)
16	(400)	26 1/4	(666.75)	18 5/8	(473.08)	3/4 x 3 1/2	2900	(12.90)	30.40	(13.79)
18	(450)	27 7/8	(708.03)	20 3/4	(527.05)	3/4 x 3 1/2	2900	(12.90)	33.30	(15.10)
20	(500)	30	(762.00)	22 3/8	(568.33)	3/4 x 3 1/2	2900	(12.90)	36.30	(16.47)
24	(600)	35	(889.00)	24 1/2	(622.30)	7/8 x 3 1/2	2900	(12.90)	48.68	(22.08)
30	(750)	42 3/8	(1076.33)	29 1/2	(749.30)	7/8 x 3 1/2	2900	(12.90)	60.16	(27.29)

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.

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.

Hanger Rod

Fig. 20 & 21 CONTINUOUS THREADED ROD

Fig. 20* **PLAIN**

Fig. 21 **ELECTRO-GALVANIZED**

*Available in stainless steel. To order, specify 304 or 316 and add suffix SS to figure number.
Price on request.

FUNCTION: Useful in applications where stud lengths cannot be predetermined.

MATERIAL: Low carbon steel

ORDERING: Specify rod size, length and figure number.

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)

Unless otherwise specified, all dimensions on drawings and in charts are in inches and dimensions shown in parentheses are in millimeters.

Anchors
&
Screws

HDI-P Drop-in Anchor 3.3.12

3.3.12.1 Product description

The Hilti HDI-P drop-in anchor is an internally threaded, flush mounted expansion anchor for solid and hollow concrete.

Product features

- 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
- Setting tool leaves mark on flange when anchor is set properly to enable inspection and verification of proper expansion

Guide specifications

Expansion anchor shall be flush or shell type and zinc plated in accordance with ASTM B633, SC 1, Type III. Anchors shall be Hilti HDI-P anchors as supplied by Hilti.

Install shell or flush type anchors in holes drilled with Hilti carbide tipped drill bits. Install anchors in accordance with manufacturer's instructions.

Listings/Approvals

FM (Factory Mutual) for 3/8-in. model

FM APPROVED

3.3.12.2 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.

3.3.12.3 Technical data

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

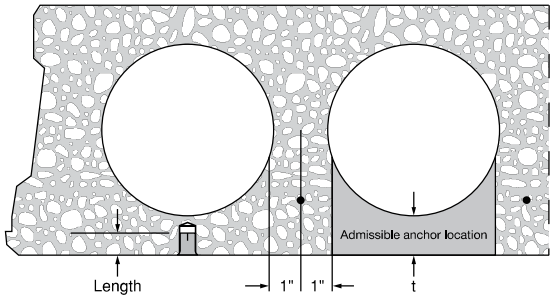
Nominal anchor diameter	Length in. (mm)	Nom. bit dia. in.	Ultimate loads, lb (kN)								Allowable loads, lb (kN)[3]							
			f'_c = 4000 psi concrete				Hollow core[1,2]				f'_c = 4000 psi concrete				Hollow core[1,2]			
			Tension		Shear		Tension		Shear		Tension		Shear		Tension		Shear	
1/4	5/8	(15.9)	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.

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



3.3.12.4 Installation instructions

Installation Instructions For Use (IFU) are included with each product package. They can also be viewed or downloaded online at www.us.hilti.com (US) and www.hilti.ca (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.

3.3.12.5 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

3.3.9.1 Product Description

The Hilti HDI/HDI-L Drop-in anchor is an internally threaded, flush mounted expansion anchor for use in concrete.

Product Features

HDI

- Anchor, setting tool and Hilti drill bit form a matched tolerance system to provide reliable fastenings
- Allows shallow embedment without sacrificing performance
- Lip provides flush installation, consistent anchor depth, and easy rod alignment (HDI-L)
- Lip allows accurate flush surface setting, independent of hole depth (HDI-L)
- Ideal for repetitive fastenings with threaded rods of equal length
- Intelligent expansion section adapts to the base material and reduces number of hammer blows up to 50% (HDI-L)

Guide Specifications

Expansion Anchor Expansion anchors shall be flush or shell type and zinc plated in accordance with ASTM B633, SC 1, Type III. Anchors shall be Hilti HDI/HDI-L anchors as supplied by Hilti.

Installation Install shell or flush type anchors in holes drilled with Hilti carbide tipped drill bits. Install anchors as per manufacturer's recommendations.

3.3.9.2 Material Specifications

HDI/HDI-L, 1/4", 3/8", 1/2", and HDI 5/8" and 3/4" are manufactured from mild carbon steel which is plated with a zinc finish for corrosion protection in accordance with ASTM B633, SC 1, Type III

HDI Stainless Steel material meets the requirements of AISI 303

Listings/Approvals

FM (Factory Mutual)
Pipe Hanger Components for Automatic Sprinkler Systems (3/8" - 3/4")
(HDI and HDI-L)

UL (Underwriters Laboratories)
UL 203 Pipe Hanger Equipment for Fire Protection Services (3/8" - 3/4")

3.3.9.3 Technical Data

Table 1 - HDI/HDI-L Specification Table

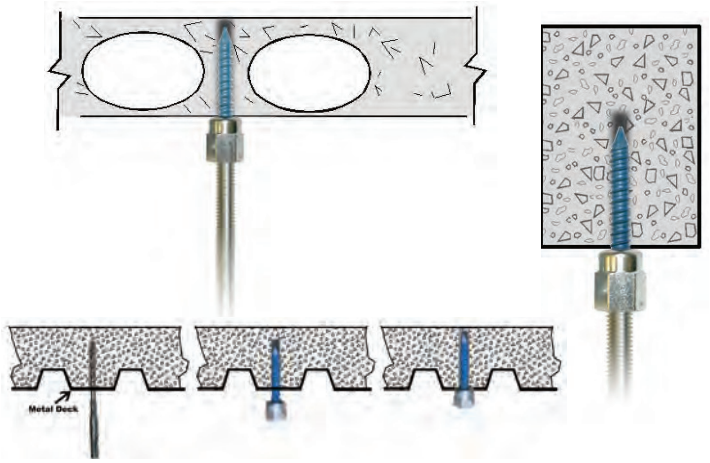
Details: Anchor Size		in. / (mm)	HDI/HDI-L 1/4 (6.4)	HDI/HDI-L 3/8 (9.5)	HDI/HDI-L 1/2 (12.7)	HDI 5/8 (15.9)	HDI 3/4 (19.1)
d_{bit}	nominal bit diameter	in.	3/8	1/2	5/8	27/32	1
h_{nom}	std. depth of embedment	in.	1	1-9/16	2	2-9/16	3-3/16
ℓ	anchor length						
h_1	hole depth	(mm)	(25)	(40)	(51)	(65)	(81)
ℓ_{th}	useable thread length	in.	7/16	5/8	11/16	7/8	1-3/8
		(mm)	(11)	(15)	(17)	(22)	(34)
	threads per inch		20	16	13	11	10
h	min. base material thickness	in.	3	3-1/8	4	5-1/8	6-3/8
		(mm)	(76)	(79)	(102)	(130)	(162)
T_{inst}	installation torque	ft-lb	4	11	22	37	80
		(Nm)	(5.4)	(14.9)	(29.8)	(50.2)	(108.5)

Combined Shear and Tension Loading

$$\left(\frac{N_d}{N_{rec}}\right)^{5/3} + \left(\frac{V_d}{V_{rec}}\right)^{5/3} \leq 1.0 \quad \text{(Ref. Section 4.1.8.3)}$$

SAMMYS® FOR CONCRETE - Vertical Application

Application



Product Features

- Easy two step process (Drill hole & drive Sammys concrete anchor).
- ¼" pre-drilled pilot hole required.
- Concrete Installation Tool available for a one tool installation process.
- Made in the U.S.A.

Watch a video demonstration at www.itwbuildex.com

Approvals	Rod Size	Part Number	Model	Screw Descriptions	Ultimate Pullout (lbs)*	FM Test Load (lbs)	Box Qty	Case Qty
VERTICAL MOUNT								
	1/4"	8058957	CST 200	5/16 x 1-3/4"	2400		25	125
FM	3/8"	8059957	CST 20	5/16 x 1-3/4"	2400	1475	25	125
	3/8"	8145925	CST 20-SS	5/16 x 1-3/4"	2400		25	125
	1/2"	8060925	CST 2	5/16 x 1-3/4"	2400		25	125

#14 Black Nut Driver Part # 8113910

#14SW Red Nut Driver Part # 8114910

* Tested in 3000 PSI concrete

SIDEWINDER® FOR CONCRETE - Horizontal Application

Application

Product Features

- Easy two step process (Drill hole & drive Sammys concrete anchor).
- ¼" pre-drilled pilot hole required.
- Concrete Installation Tool available for a one tool installation process.
- Made in the U.S.A.

Watch a video demonstration at www.itwbuildex.com

Approvals	Rod Size	Part Number	Model	Screw Descriptions	Ultimate Pullout (lbs)*	FM Test Load (lbs)	Box Qty	Case Qty
HORIZONTAL MOUNT								
	1/4"	8062957	SWC 200	5/16 x 1-3/4"	2450		25	125
FM	3/8"	8061957	SWC 20	5/16 x 1-3/4"	2450	1475	25	125

#14SW Red Nut Driver Part # 8114910

* Tested in 3000 PSI concrete

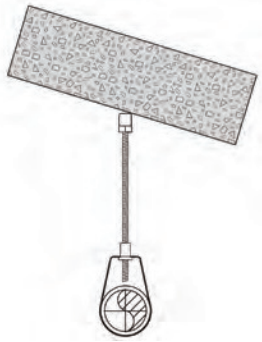
MADE IN U.S.A.

RoHS Compliant

SPECIAL NUT DRIVER SYSTEM: The nut drivers were designed with a unique spin-off feature which provides a fast and safe installation each time. When the face of the driver comes into contact with the material you are installing into, continue drilling until nut driver spins free. Installation is then complete. Warranty requires the use of the appropriate nut driver for installations.

SAMMYS SWIVEL HEAD™ FOR CONCRETE - Swivel Application

Application



Product Features

- Installs vertically and swivels up to 89° in wood & concrete structures.
- Eliminates distortion of threaded rod.
- 1/4" pre-drilled pilot hole required.
- Concrete installation tool available for a one piece installation process.
- Made in the U.S.A.

Approvals	Rod Size	Part Number	Model	Screw Descriptions	Ultimate Pullout (lbs)*	Box Qty	Case Qty
SWIVEL MOUNT							
	3/8"	8269957	SH-GST/CST 20	5/16 x 1-3/4"	2537 in 3000 psi concrete 1459 @ 45°off vertical in 3000 psi concrete 2852 in 6000 psi concrete 1636 @ 45°off vertical in 6000 psi concrete	25	125
	1/2"	8303957	SH-GST/CST 2.0	5/16 x 1-3/4"	2537 in 3000 psi concrete 1459 @ 45°off vertical in 3000 psi concrete 2852 in 6000 psi concrete 1636 @ 45°off vertical in 6000 psi concrete	25	125

#14 SH Orange Nut Driver Part # 8273910

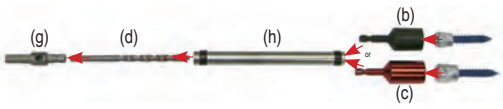
Note: UL Listed for wood - see page 5

* Tested in 3000 PSI concrete

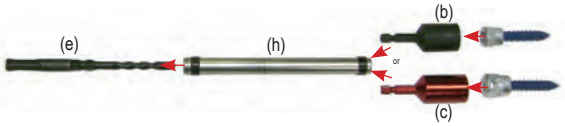
CONCRETE / WOOD INSTALLATION KIT

Application

Rotary Hammer Drill into concrete



Hammer Drill into concrete

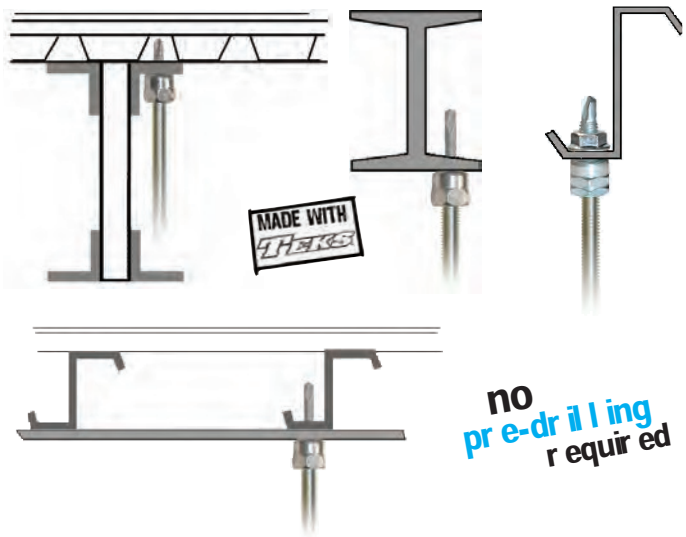


Part Number	Description	Each Qty
8122910	**Concrete Installation Kit (a)**	
	Kit includes the following items:	
8113910	#14 Black Nut Driver (b)	1
8114910	#14 SW Red Nut Driver (c)	1
8116910	#250 Bit (1/4") (d)	1
8117910	SDS Bit (1/4") (e)	1
8118910	7/32 Wood Bit (f)	1
8120910	HEX 250 Bit Receiver (1/4") (g)	1
8098910	SL 250 Sleeve (h)	1
8121910	SDS B250 Bit Receiver (1/4")*	1

**Only sold separately - not included in kit.*

SAMMYS® FOR STEEL -Vertical Application

Application



Product Features

- Made with Teks® self-drilling fasteners - no pre-drilling required.
- Installs into steel range from 20 gauge – 1/2" thicknesses.
- Saves time from traditional methods.
- Reduces installation costs.
- Quick to install using the Sammys Nut Driver with an 18V cordless drill/driver.
- A standard screwgun with a depth sensitive nosepiece should be used to install Teks. For optimal fastener performance, the screwgun should be a minimum of 6 amps and have an RPM range of 0-2500.
- Made in the U.S.A.

Watch a video demonstration at www.itwbuildex.com

#14 Black Nut Driver Part # 8113910

#14 SW Red Nut Driver Part # 8114910

Approvals	Rod Size	Part Number	Model	Screw Descriptions	Ultimate Pullout (lbs)	UL Test Load (lbs)	FM Test Load (lbs)	Min Thick	Max Thick	Box Qty	Case Qty
VERTICAL MOUNT											
	1/4"	8024957	DSTR 100 *	1/4-20 x 1" TEKS 3	1510 (20 ga.)			.036"-20 ga	3/16"	25	125
	1/4"	8025957	DST 100	1/4-14 x 1" TEKS 3	446 (20 ga.)			.036"-20 ga	3/16"	25	125
	1/4"	8026957	DST 150	1/4-14 x 1-1/2" TEKS 3	970 (16 ga.)			.036"-20 ga	3/16"	25	125
	1/4"	8027957	DST 200	1/4-14 x 2" TEKS 3	446 (20 ga.)			.036"-20 ga	3/16"	25	125
	1/4"	8030957	TEK 500	12-24 x 1-1/2" TEKS 5	3125 (3/16")			.188"-3/16"	1/2"	25	125
UL FM	3/8"	8038957	DSTR 1 *	1/4-20 x 1" TEKS 3	1510 (20 ga.)	1500	1475	.036"-20 ga	3/16"	25	125
UL FM	3/8"	8037957	DSTR 1-1/2 *	12-24 x 1-1/2" TEKS 5	1510 (3/16")	1500	1475	.060"-16 ga.	1/2"	25	125
UL FM	3/8"	8039957	DSTR 516 *	5/16-18 x 1-1/4" TEKS 3	2200 (20 ga.)	1500	1475	.036"-20 ga	3/16"	25	125
	3/8"	8040957	DST 10	1/4-14 x 1" TEKS 3	446 (20 ga.) 970 (16 ga.)			.036"-20 ga	3/16"	25	125
	3/8"	8077925	DST 10-SS	1/4-14 x 1" TEKS 3	446 (20 ga.) 970 (16 ga.)			.036"-20 ga	3/16"	25	125
	3/8"	8041957	DST 15	1/4-14 x 1-1/2" TEKS 3	446 (20 ga.) 970 (16 ga.)			.036"-20 ga	3/16"	25	125
	3/8"	8078925	DST 15-SS	1/4-14 x 1-1/2" TEKS 3	446 (20 ga.) 970 (16 ga.)			.036"-20 ga	3/16"	25	125
	3/8"	8042957	DST 20	1/4-14 x 2" TEKS 3	446 (20 ga.) 970 (16 ga.)			.036"-20 ga	3/16"	25	125
	3/8"	8043957	DST 25	1/4-14 x 2-1/2" TEKS 3	446 (20 ga.) 970 (16 ga.)			.036"-20 ga	3/16"	25	125
	3/8"	8044957	DST 30	1/4-14 x 3" TEKS 3	446 (20 ga.) 970 (16 ga.)			.036"-20 ga	3/16"	25	125
UL FM	3/8"	8045957	DST 516	5/16-18 x 1-1/4" TEKS 3	1500 (3/16")	1500	1475	.125"-1/8"	3/16"	25	125
UL FM	3/8"	8046957	TEK 50	12-24 x 1-1/2" TEKS 5	3125 (3/16")	1500	1475	.250"-1/4"	1/2"	25	125
	1/2"	8031925	DST 2.0	1/4-14 x 2" TEKS 3	446 (20 ga.) 970 (16 ga.)			.188"-3/16"	1/4"	25	125
	1/2"	8033925	DSTR 1.0 *	1/4-20 x 1" TEKS 3	1510 (20 ga.)			.036"-20 ga	3/16"	25	125
	1/2"	8034925	DSTR 5.16 *	5/16-18 x 1-1/4" TEKS 3	2220 (20 ga.)			.036"-20 ga	3/16"	25	125
	1/2"	8035925	DST 5.16	5/16-18 x 1-1/4" TEKS 3	1500 (3/16")			.125"-1/8"	3/16"	25	125
	1/2"	8036925	TEK 5.0	12-24 x 1-1/2" TEKS 5	3125 (3/16")			.188"-3/16"	1/2"	25	125

*Includes retaining nut

MADE IN U.S.A. RoHS Compliant

SPECIAL NUT DRIVER SYSTEM: The nut drivers were designed with a unique spin-off feature which provides a fast and safe installation each time. When the face of the driver comes into contact with the material you are installing into, continue drilling until nut driver spins free. Installation is then complete. Warranty requires the use of the appropriate nut driver for installations.

SIDEWINDER® FOR STEEL -Horizontal Application

Application

Product Features

- Made with Teks® self-drilling fasteners - no pre-drilling required.
- Installs into steel range from 20 gauge – 1/2" thicknesses.
- A standard screwgun with a depth sensitive nosepiece should be used to install Teks. For optimal fastener performance, the screwgun should be a minimum of 6 amps and have an RPM range of 0-2500.
- Saves time from traditional methods.
- Reduces installation costs.
- Quick to install using the Sammys Nut Driver with an 18V cordless drill/driver.
- Made in the U.S.A.

Watch a video demonstration at www.itwbuildex.com

Approvals	Rod Size	Part Number	Model	Screw Descriptions	Ultimate Pullout (lbs)	UL Test Load (lbs)	FM Test Load (lbs)	Min Thickness	Max Thickness	Box Qty	Case Qty
HORIZONTAL MOUNT											
	1/4"	8047957	SWD 100	1/4-14 x 1" TEKS 3	1477 (16 ga.)			.060"-16 ga	3/16"	25	125
	1/4"	8049957	SWDR 100 *	1/4-20 x 1" TEKS 3	1900 (20 ga.)			.036"-20 ga	3/16"	25	125
	3/8"	8050957	SWD 10	1/4-14 x 1" TEKS 3	1477 (16 ga.)			.060"-16 ga	3/16"	25	125
	3/8"	8080925	SWD 10-SS	1/4-14 x 1" TEKS 3	1477 (16 ga.)			.060"-16 ga	3/16"	25	125
	3/8"	8051957	SWD 15	1/4-14 x 1-1/2" TEKS 3	1477 (16 ga.)			.060"-16 ga	3/16"	25	125
	3/8"	8052957	SWD 20	1/4-14 x 2" TEKS 3	1477 (16 ga.)			.060"-16 ga	3/16"	25	125
	3/8"	8053957	SWD 516	5/16-18 x 1-1/4" TEKS 3	2480 (20 ga.)			.036"-20 ga	3/16"	25	125
UL FM	3/8"	8055957	SWDR 1 *	1/4-20 x 1" TEKS 3	1900 (20 ga.)	1500	1475	.036"-20 ga	3/16"	25	125
UL FM	3/8"	8054957	SWDR 1-1/2 *	12-24 x 1-1/2" TEKS 5	2375 (3/16")	1500	1475	.188"-3/16"	1/2"	25	125
UL FM	3/8"	8056957	SWDR 516 *	5/16-18 x 1-1/4" TEKS 3	2480 (20 ga.)	1500	1475	.036"-20 ga	3/16"	25	125
	3/8"	8057957	SWT 15	12-24 x 1-1/2" TEKS 5	2375 (3/16")			.188"-3/16"	1/2"	25	125

#14 SW Red Nut Driver Part # 8114910

*Includes retaining nut

SAMMYS SWIVEL HEAD™ FOR STEEL -Swivel Application

Application

Product Features

- Eliminates distortion of threaded rod in sloped roof applications.
- Accommodates 3-1/2 x 12 pitch.
- Installs into angled z-purlin; allows threaded rod to hang plumb.
- Allows 17° deflection from vertical.
- Made in the U.S.A.

Watch a video demonstration at www.itwbuildex.com

Approvals	Rod Size	Part Number	Model	Screw Descriptions	Ultimate Pullout (lbs)	UL Test Load (lbs)	FM Test Load (lbs)	Min Thick	Max Thick	Box Qty	Case Qty
SWIVEL MOUNT											
UL FM	3/8"	8137957	SH-DSTR 1*	1/4-20 X 1" TEKS 3	3220 (3/16")	1500	1475	.035"	3/16"	25	125
UL	3/8"	8268957	SH-TEK 50	12-24 x 1-3/4" TEKS 5	2368 (1/2" steel Vertical) 1306 (45° off Vertical) 2281 (3/16" HSS) 1585 (3/16" HSS 45° off Vertical)	1500 (Vertical) 850 (45° off Vertical)	4" 2-1/2"	3/16"	1/2"	25	125
	1/2"	8270957	SH-TEK 5.0	12-24 x 1-3/4" TEKS 5	2368 (1/2" steel Vertical) 1306 (45° off Vertical) 2281 (3/16" HSS) 1585 (3/16" HSS 45° off Vertical)			3/16"	1/2"	25	125

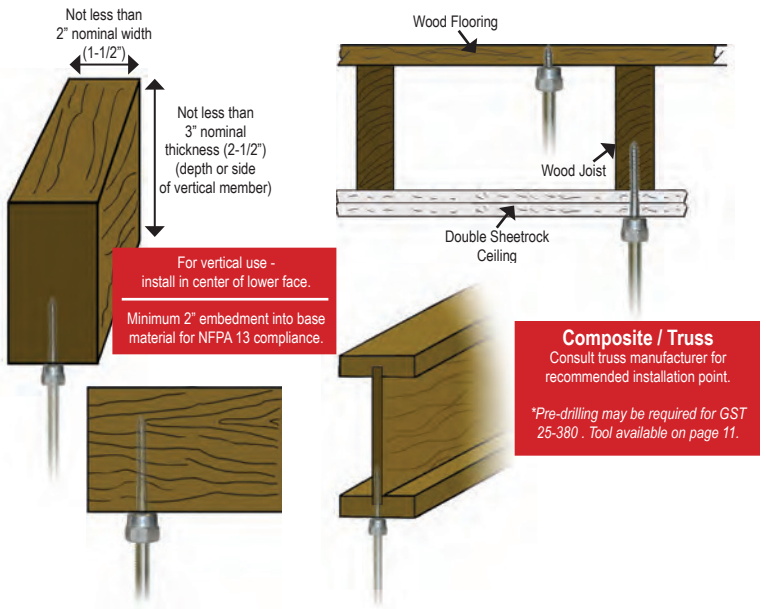
#14 Black Nut Driver Part # 8113910

#14 SH Orange Nut Driver Part # 8273910

*Does not comply with ROHS requirements / Includes retaining nut

SAMMYS® FOR WOOD -Vertical Application

Application



Product Features

- No pre-drilling required.
- Quick to install using the Sammy Nut Driver with an 18V cordless drill/driver.
- Saves time from traditional methods.
- Reduces installation costs.
- Made in the U.S.A.

Watch a video demonstration at www.itwbuildex.com

Approvals	Rod Size	Part Number	Model	Screw Descriptions	Ultimate Pullout (lbs)	UL Test Load (lbs)	FM Test Load (lbs)	Box Qty	Case Qty
VERTICAL MOUNT									
	1/4"	8002957	GST 100	1/4 x 1"	210 (7/16" OSB) 670 (3/4" Ply)			25	125
	1/4"	8003957	GST 200	1/4 x 2"	1760 (Fir)			25	125
	1/4"	8004957	GST 300	1/4 x 3"	2060 (Fir)			25	125
UL	3/8"	8007957	GST 10	1/4 x 1"	210 (7/16" OSB) 670 (3/4" Ply)	300		25	125
UL, FM	3/8"	8008957	GST 20	1/4 x 2"	1760 (Fir)	850	1475	25	125
UL	3/8"	8068925	GST 20-SS	1/4 x 2"	1760 (Fir)	850		25	125
UL	3/8"	8009925	GST 25-380	3/8 x 2-1/2"	2113 (Fir)	1500		25	125
UL, FM	3/8"	8010957	GST 30	1/4 x 3"	2060 (Fir)	1500	1475	25	125
	3/8"	8069925	GST 30-SS	1/4 x 3"	2060 (Fir)			25	125
	3/8"	8011925	GST 40	1/4 x 4"	2180 (Fir)			25	125
	1/2"	8013925	GST 2	1/4 x 2"	1760 (Fir)			25	125
	1/2"	8014925	GST 2.5-380	3/8 x 2-1/2"	2113 (Fir)			25	125
	1/2"	8015925	GST 3	1/4 x 3"	2275 (Fir)			25	125

#14 Black
Nut Driver
Part # 8113910

#14 SW Red
Nut Driver
Part # 8114910

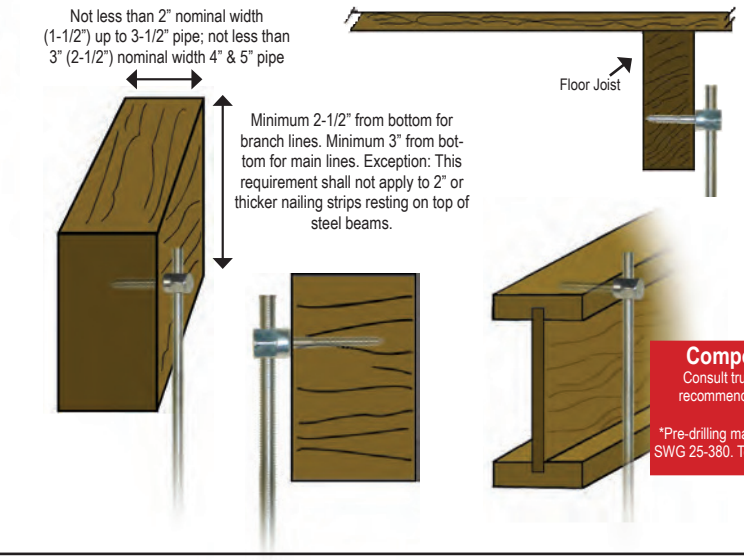
MADE IN U.S.A

RoHS Compliant

SPECIAL NUT DRIVER SYSTEM: The nut drivers were designed with a unique spin-off feature which provides a fast and safe installation each time. When the face of the driver comes into contact with the material you are installing into, continue drilling until nut driver spins free. Installation is then complete. Warranty requires the use of the appropriate nut driver for installations.

SIDEWINDER® FOR WOOD -Horizontal Application

Application



Composite / Truss
Consult truss manufacturer for recommended installation point.

*Pre-drilling may be required for Model SWG 25-380. Tool available on page 11.

Product Features

- No pre-drilling required.
- Quick to install using the Sammy Nut Driver with an 18V cordless drill/driver.
- Saves time from traditional methods.
- Reduces installation costs.
- Made in the U.S.A.

Watch a video demonstration at www.itwbuildex.com

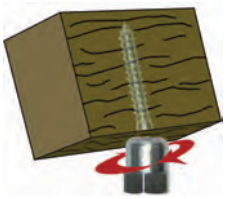
Approvals	Rod Size	Part Number	Model	Screw Descriptions	Ultimate Pullout (lbs)	UL Test Load (lbs)	Box Qty	Case Qty
HORIZONTAL MOUNT								
	1/4"	8019957	SWG 200	1/4 x 2"	1725 (Fir)		25	125
	3/8"	8020957	SWG 10	1/4 x 1"	622 (Fir)	300	25	125
	3/8"	8021957	SWG 20	1/4 x 2"	1725 (Fir)	1050	25	125
	3/8"	8073925	SWG 20-SS	1/4 x 2"	1725 (Fir)	850	25	125
	3/8"*	8022925	SWG 25-380	3/8 x 2-1/2"	2249 (Fir)	1500	25	125
	3/8"	8023925	SWG 30	1/4 x 3"	1884 (Fir)		25	125

#14 SW Red Nut Driver Part # 8114910

* May require pre-drilling; consult joist manufacturer.

SAMMYS SWIVEL HEAD™ FOR WOOD -Swivel Application

Application



Product Features

- Eliminates distortion of threaded rod.
- Accommodates up to 3 ½" x 12 pitch roof.
- Allows 17° deflection from vertical.
- Saves time from traditional methods.
- Reduces installation costs.
- Made in the U.S.A.

Approvals	Rod Size	Part Number	Model	Screw Descriptions	Ultimate Pullout (lbs)	UL Test Load (lbs)	FM Test Load (lbs)	Min Thickness	Box Qty	Case Qty
SWIVEL MOUNT										
	3/8"	8139957	SH-GST 20	1/4 x 2"	1257 (Fir)	1050	1475		25	125
	3/8"	8141957	SH-GST 30	1/4 x 3"	1720 (Fir)	1500	1475		25	125
	3/8"*	8269957	SH-GST/CST 20	5/16 x 1-3/4"	1903 Dim. Lumber 1406 @ 45°off vertical Dim. Lumber	1500 850 @ 45°			25	125
	1/2"	8303957	SH-GST/CST 2.0	5/16 x 1-3/4"	903 Dim. Lumber 1406 @ 45°off vertical Dim. Lumber				25	125

#14 Black Nut Driver Part # 8113910

#14 SH Orange Nut Driver Part # 8273910

* May require pre-drilling; consult joist manufacturer.

Fig. 206 (Formerly Afcon Fig. 556/560/565) Steel Side Beam Bracket

Size Range: 3/8" through 5/8"
Material: Carbon steel
Finish: ☐ Plain or ☐ Zinc Plated (Hot-Dip Galvanized optional)
Service: Clip can be fastened to side of joist or wall to support hanger rod.
Approvals: Complies with Federal Specification A-A-1192A (Type 34), *WW-H-171-E (Type 35)* and ANSI/MSS SP-69 and MSS SP-58 (Type 34). UL Listed and FM Approved (steel beam only).
Ordering: Specify rod size, figure number, name and finish.

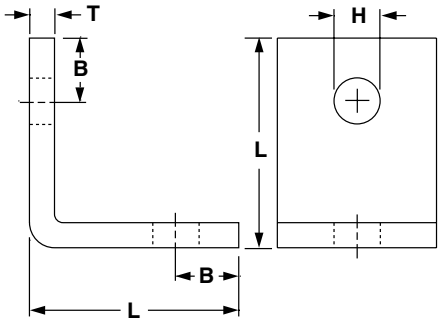


FIG. 206: DIMENSIONS (IN) • LOADS (LBS) • WEIGHT (LBS)

Rod Size A	Max Load		Weight (lbs).	L	B	Hole Size H	T
	With Lag Screw	With Bolt to Steel					
3/8	650	1,150	0.44	2 1/16	5/8	7/16	1/4
1/2			0.43			9/16	
5/8	850	2,000	0.84	2 1/2	3/4	11/16	3/8

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

5

Valves

- Butterfly Valve
- Riser Check Valve
- Swing Check Valve
- OS & Y Gate Valve
- Ball Valves, Globe Valve
- Hose Valve

Butterfly Valve

FIG. AN7722-3A Grooved End Butterfly Valve

GRUVLOK®

The Gruvlok® Figure AN7722-3A Grooved End Butterfly Valve is UL Listed and FM Approved as a system control valve. The valve is rated at 300 psi for steel pipe in the 2" to 10" sizes. The 2" through 10" sizes are agency rated for both indoor and outdoor service.

The valve is supplied with two internal switches. One is wired for supervisory service and the other is wired for use as an auxiliary switch. Both switches are rated for 11 amp at 125, 250 VAC and 0.5 amp at 125 VDC, 0.25 amp at 250 VDC. The switches and actuator internal spaces are protected from tampering.

The ductile iron valve body is encapsulated with a durable nylon coating to ensure long term service. The valve features double-seal disc design with resilient EPDM coating, and stems are 416 stainless steel. Detailed instructions for valve installation and switch wiring are included with each valve.

c UL us LISTED FM APPROVED

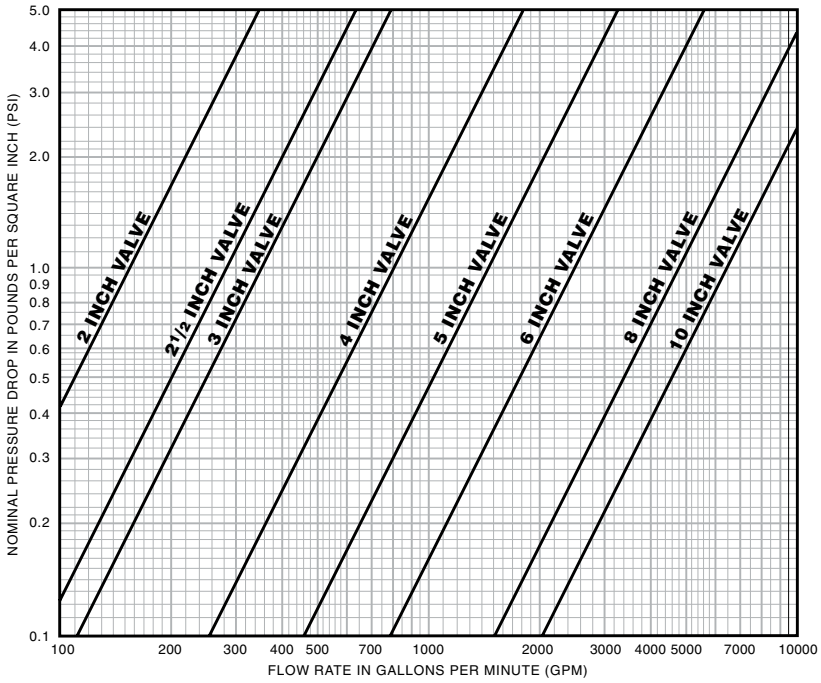
For Listings/Approval Details and Limitations, visit our website at www.anvilintl.com or contact an Anvil® Sales Representative.

HEADLOSS EQUIVALENT LENGTH OF PIPE

Valve Size	Pipe O.D.	Equivalent Feet of Pipe* C=120		
		Sch. 10	Sch. 30	Sch. 40
In./mm	*In./mm*	*Ft./m*	*Ft./m*	*Ft./m*
2 *50*	2.375 *60.3*	5.8 *1.8*	- -	4.7 *1.4*
2½ *65*	2.875 *73.0*	5.1 *1.6*	- -	3.7 *1.1*
3 *80*	3.500 *88.9*	9.6 *2.9*	- -	7.2 *2.2*
4 *100*	4.500 *114.3*	7.5 *2.3*	- -	5.7 *1.7*
5 *125*	5.563 *141.3*	7.0 *2.1*	- -	5.6 *1.7*
6 *150*	6.625 *168.3*	6.1 *1.9*	- -	4.8 *1.5*
8 *200*	8.625 *219.1*	6.3 *1.9*	5.7 *1.7*	5.3 *1.6*
10 *250*	10.750 *273.1*	11.3 *3.4*	10.2 *3.1*	9.6 *2.9*

* The equivalent feet of pipe is based on the Hazen and Williams formula and the flow rates typically used with each size valve.

PRESSURE DROP (PSI) VS. (GPM)



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

FIG. AN7722-3A Grooved End Butterfly Valve

GRUVLOK®

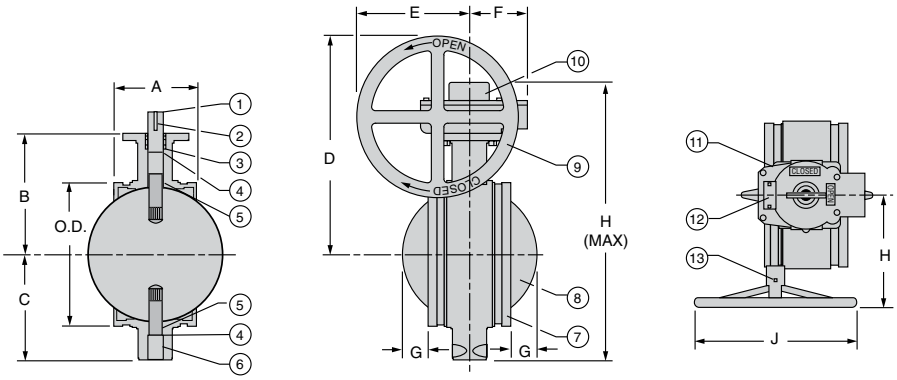


FIGURE AN7722-3A UL/ULC/FM BUTTERFLY VALVE

Valve Size	Pipe O.D.	Valve Dimensions									Approx. Wt. Ea.
		A	B	C	D	E	F	G	H	J	
In./DN(mm)	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*In./mm*	*Lbs./Kg*
2	2.375	3.19	2.97	3.87	6.17	4.18	2.25	–	4	3	19
50	*60.3*	*81*	*75*	*98*	*157*	*106*	*57*	*–*	*102*	*76*	*9*
2½	2.875	3.81	3.18	4.38	6.68	4.18	2.25	–	4	3	20
65	*73.0*	*97*	*81*	*111*	*170*	*106*	*57*	*–*	*102*	*76*	*9*
3	3.500	3.81	3.80	4.62	6.92	4.18	2.25	–	4	3	22
80	*88.9*	*97*	*97*	*117*	*176*	*106*	*57*	*–*	*102*	*76*	*10*
4	4.500	4.62	4.27	5.38	9.98	5.10	3.5	–	5	6	26
100	*114.3*	*117*	*108*	*137*	*253*	*130*	*89*	*–*	*127*	*152*	*11.8*
5	5.563	5.81	4.98	5.88	10.48	5.10	3.5	–	5	6	29
125	*141.3*	*148*	*126*	*149*	*266*	*130*	*89*	*–*	*127*	*152*	*13.2*
6	6.625	5.81	5.47	6.37	10.97	5.10	3.5	0.13	5	6	30
150	*168.3*	*148*	*139*	*162*	*279*	*130*	*89*	*3*	*127*	*152*	*13.6*
8	8.625	5.25	6.92	7.75	15.40	9.54	4	1.36	7.89	12	52
200	*219.1*	*133*	*176*	*197*	*391*	*242*	*102*	*35*	*200*	*305*	*23.6*
10	10.750	6.25	7.99	9.00	16.65	9.54	4	1.84	7.89	12	75
250	*273.1*	*159*	*203*	*229*	*423*	*242*	*102*	*47*	*200*	*305*	*34.1*

MATERIAL SPECIFICATIONS

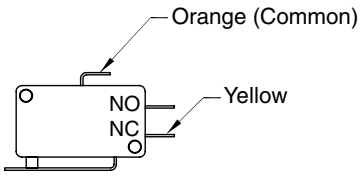
1. **UPPER STEM:** Stainless Steel, ASTM A-582, Type 416
2. **STEM SHEAR PIN:** for 2" thru 6" valves.
   STEM SHEAR KEY: for 8" and 10" valves.
3. **UPPER BUSHING:** Sintered Bronze (8" and 10" valves only)
4. **"O" RING:** Nitrile
5. **LOWER BUSHING:** Sintered Bronze (8" and 10" valves only)
6. **LOWER STEM:** Stainless Steel, ASTM A-582, Type 416
7. **BODY:** Ductile Iron ASTM A-536 with Nylon Coating
8. **DISC:** Ductile Iron ASTM A-536 with EPDM Encapsulation
9. **HANDWHEEL:** Ductile Iron
10. **INDICATOR FLAG:** Steel
11. **GEAR OPERATOR:** Ductile Iron and Steel
12. **NAMEPLATE:** Stainless Steel
13. **HANDWHEEL SHEAR PIN:** Carbon Steel AISI 1070

CV VALUES

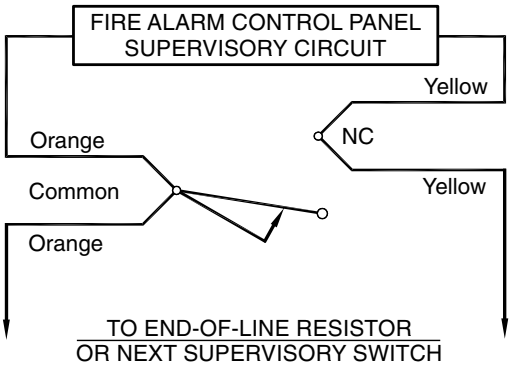
Valve Size	Pipe O.D.	Disc Position							
		25°	30°	40°	50°	60°	70°	80°	90°
In./mm	*In./mm*	*(Degrees Open)*							
2	2.375	4	7	19	44	48	80	111	158
50	*60.3*	*0.3*	*0.5*	*1.3*	*3.0*	*3.3*	*5.5*	*7.7*	*10.9*
2½	2.875	9	14	34	78	84	142	196	280
65	*73.0*	*0.6*	*1.0*	*2.3*	*5.4*	*5.8*	*9.8*	*13.5*	*19.3*
3	3.500	14	20	50	112	128	215	285	400
80	*88.9*	*1.0*	*1.4*	*3.4*	*7.7*	*8.8*	*14.8*	*19.7*	*27.6*
4	4.500	29	41	100	239	250	420	582	826
100	*114.3*	*2.0*	*2.8*	*6.9*	*16.5*	*17.2*	*29.0*	*40.1*	*57.0*
5	5.563	62	76	182	415	445	780	1,100	1,480
125	*141.3*	*4.3*	*5.2*	*12.5*	*28.6*	*30.7*	*53.8*	*75.8*	*102.0*
6	6.625	96	141	325	755	809	1,370	1,920	2,678
150	*168.3*	*6.6*	*9.7*	*22.4*	*52.1*	*55.8*	*94.5*	*132.4*	*184.6*
8	8.625	172	252	592	1,365	1,460	2,430	3,410	4,819
200	*219.1*	*11.9*	*17.4*	*40.8*	*94.1*	*100.7*	*167.5*	*235.1*	*332.3*
10	10.750	230	328	792	1,825	1,962	3,260	4,590	6,431
250	*273.1*	*15.9*	*22.6*	*54.6*	*125.8*	*135.3*	*224.8*	*316.5*	*443.4*

ACTUATOR WIRING

SUPERVISORY SWITCH

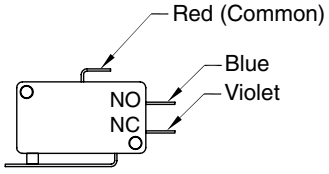


Normally Open (NO): Not Wired
Normally Closed (NC): (2) Yellow
Common: (2) Orange

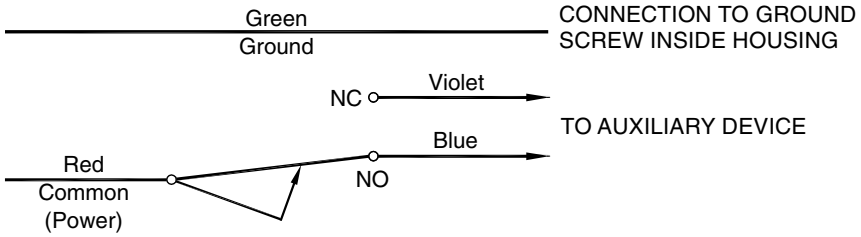


Notes:
1. Single Pole Double Throw Switch wired "Normally Closed"; supplied with Dual Wire leads.
2. Switch Schematic shown with Valve in the Full Open Position and Switch depressed.

AUXILIARY SWITCH



Normally Open (NO): Blue
Normally Closed (NC): Violet
Common: Red



Notes:
1. Single Pole Double Throw Switch wired "Normally Closed"; supplied with Single Wire leads.
2. Switch Schematic shown with Valve in the Full Open Position and Switch depressed.

Notes:
- Single Pole Double Throw Switch; Pre-Wired
- Wire Leads: 18 AWG, 10" (254 mm) Long
- Rated to 11A @ 125, 250 VAC and 0.5A @ 125 VDC, 0.25A @ 250 VDC
- Operating Temperature: -40˚C (-40˚F) to 180˚F (82˚C)

Riser Check Valve

Model CV-1FR Grooved-End Riser Check Valves 2 to 12 Inch (DN50 to DN300)

General Description

The TYCO Model CV-1FR Grooved-End Riser Check Valve is a compact and rugged swing-type unit that allows water flow in one direction and prevents flow in the opposite direction. A resilient elastomer seal facing on the spring-loaded clapper ensures a leak-tight seal and non-sticking operation. The Model CV-1FR Riser Check Valves are designed to minimize water hammer caused by flow reversal.

The Model CV-1FR Riser Check Valve is furnished with grooved ends and can be installed using GRINNELL Grooved Couplings or GRINNELL Figure 71 Flange Adapters. The Model CV-1FR Riser Check Valves have been designed with a removable cover for ease of field maintenance. These valves can be installed horizontally (with cover in the upward position) or vertically with the flow in the upward direction. Refer to Figure 6.

To facilitate their use in wet-type automatic sprinkler system risers, the Model CV-1FR Riser Check Valves are provided with threaded outlets for pressure gauges and a drain connection. They provide a more compact and economical alternative to an alarm check valve where a water motor alarm is not required. Provisions must be made for a local alarm using an approved flow switch (not included).

The Model CV-1FR Riser Check Valve is also Listed for use in conjunction with the TYCO DV-5 Deluge Valve in Preaction Systems under air pressure without the use of prime water.

The Model CV-1FR Riser Check Valves are a redesign for the Central Figure 590FR and GRINNELL Figure 590FR.

NOTICE

The Model CV-1FR Riser Check Valve described herein must be installed and maintained in compliance with this document and with the applicable standards of the National Fire Protection Association, in addition to the standards of any authorities having jurisdiction. Failure to do so may impair the performance of this device.

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

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

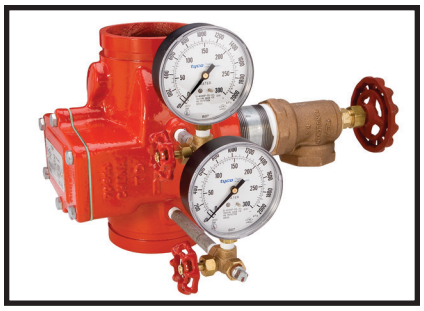
Technical Data

Approvals
UL, C-UL Listed
FM Approved

Sizes
2 to 12 Inch (DN50 to DN300)

Maximum Working Pressure
300 psi (20,7 bar)

Valve Assembly Finish
Red, non-lead paint

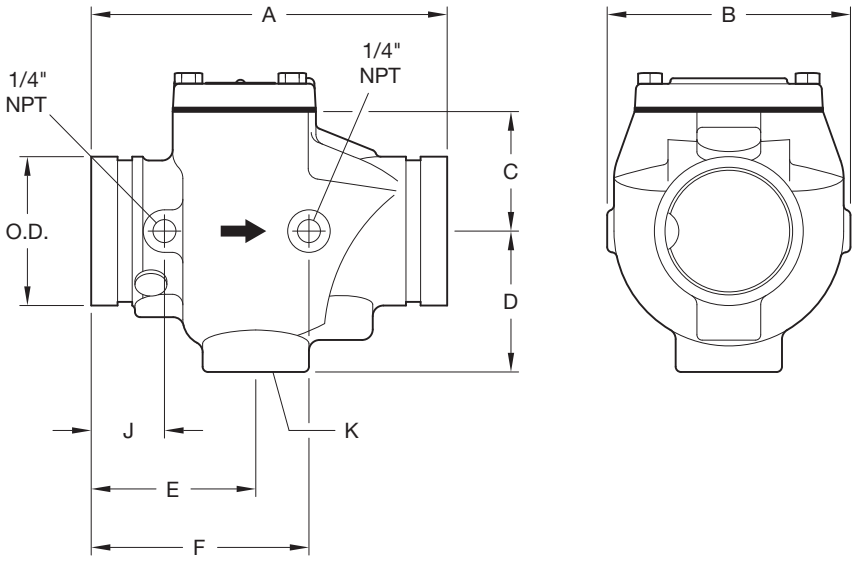


Installation

The Model CV-1FR Riser Check Valves are to be installed in accordance with this section:

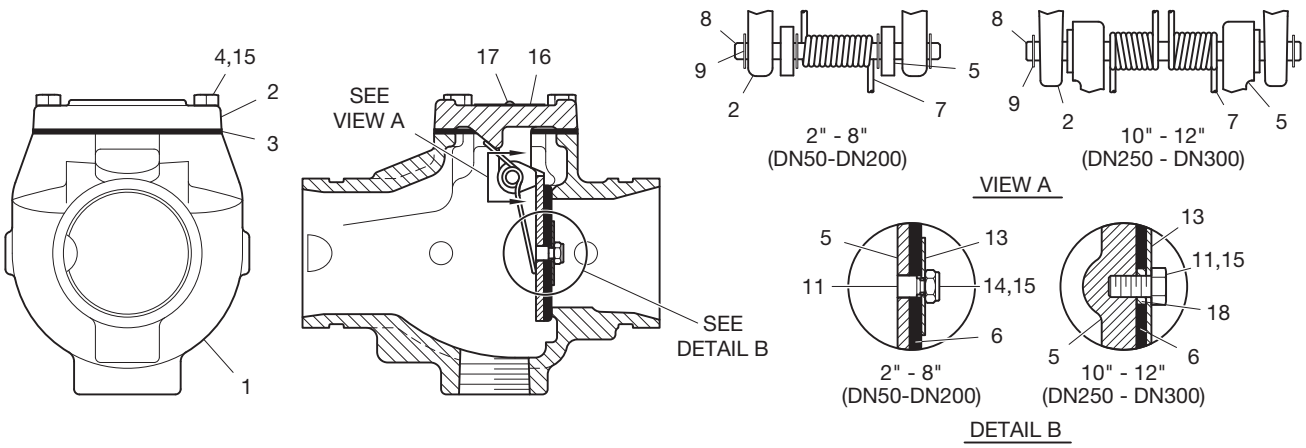
1. The arrow cast on the Body must point in the direction of the flow.
2. Valves installed vertically must be positioned with the flow in the upward direction.
3. Valves installed horizontally must be positioned with the Cover facing up. Refer to Figure 6.
4. Grooved-end pipe couplings used with the Model CV-1FR Riser Check Valve must be installed in accordance with manufacturer's instructions.

NOTE: *Valves should be installed a reasonable distance downstream from pumps, elbows, expanders, reducers, or other similar devices to extend the valve life. Standard piping practices call for a minimum of five (5) times the pipe diameter for general use.*



Nominal Pipe Size		Nominal Dimensions Inches (mm)								Cover Bolt Torque Lbs.-ft. (Nm)	Approx. Weight Lbs. (kg)
ANSI Inches DN	O.D. Inches (mm)	A	B	C	D	E	F	J	K Inches NPT		
2 DN50	2.375 (60,3)	6.75 (171,5)	4.38 (111,3)	1.96 (49,8)	2.57 (65,3)	3.25 (82,3)	4.37 (111,0)	1.56 (39,6)	1	18 (25)	9.0 (4,5)
2-1/2 DN65	2.875 (73,0)	8.00 (203,2)	5.38 (136,7)	2.63 (66,8)	3.09 (78,5)	3.87 (98,3)	5.12 (130,0)	1.73 (43,9)	1-1/4	39 (54)	10.0 (4,5)
76,1 DN65	- (76,1)	8.00 (203,2)	5.38 (136,7)	2.63 (66,8)	3.09 (78,5)	3.87 (98,3)	5.12 (130,0)	1.72 (43,7)	1-1/4	39 (54)	10.0 (4,5)
3 DN80	3.500 (88,9)	8.37 (212,6)	5.72 (145,3)	2.81 (71,4)	3.31 (84,1)	3.87 (98,3)	5.12 (130,0)	1.72 (43,7)	1-1/4	39 (54)	11.0 (5,0)
4 DN100	4.500 (114,3)	9.63 (245,6)	6.68 (169,7)	3.80 (96,5)	3.63 (92,2)	4.53 (115,4)	5.78 (146,8)	2.12 (53,8)	2	50 (69)	25.0 (11,3)
139.7 DN125	- (139,7)	10.50 (266,7)	7.40 (188,0)	4.46 (113,2)	4.13 (104,9)	4.90 (124,5)	7.00 (177,8)	2.09 (53,1)	2	39 (54)	29.0 (13,2)
5 DN125	5.563 (141,3)	10.50 (266,7)	7.40 (188,0)	4.46 (113,2)	4.13 (104,9)	4.90 (124,5)	7.00 (177,8)	2.09 (53,1)	2	39 (54)	29.0 (13,2)
165.1 DN150	- (165,1)	11.50 (292,1)	8.00 (203,2)	4.62 (117,4)	4.50 (114,3)	5.00 (127,0)	7.25 (184,2)	2.00 (50,8)	2	60 (82)	47.0 (21,3)
6 DN150	6.625 (168,3)	11.50 (292,1)	8.00 (203,2)	4.62 (117,4)	4.50 (114,3)	5.00 (127,0)	7.25 (184,2)	2.00 (50,8)	2	60 (82)	47.0 (21,3)
8 DN200	8.625 (219,1)	14.00 (355,6)	10.14 (257,6)	6.67 (169,4)	5.52 (140,2)	5.46 (138,7)	10.50 (266,7)	2.43 (61,7)	2	120 (164)	66.0 (30,0)
10 DN250	10.750 (273,1)	18.00 (457,2)	12.38 (314,5)	8.62 (218,9)	6.41 (162,8)	7.50 (190,5)	10.75 (273,1)	3.38 (85,9)	2	130 (178)	109.7 (49,4)
12 DN300	12.750 (323,9)	21.0 (533,4)	14.28 (362,7)	9.93 (252,2)	7.27 (184,7)	7.62 (193,5)	10.00 (254,0)	3.13 (79,5)	2	130 (178)	151.0 (68,0)

FIGURE 1
MODEL CV-1FR RISER CHECK VALVES
NOMINAL DIMENSIONS



Detail	Part	Material	Qty.
1	Body	Ductile Iron	1
2	Cover	Ductile Iron	1
3	Cover Gasket	Nitrile Rubber	1
4	Hex Cap Screw	Steel, Zinc Plated	AR
5	Clapper 2″ - 8″ (DN50-200)	Stainless Steel	1
	Clapper 10″ - 12″ (DN250-300)	Ductile Iron	

Detail	Part	Material	Qty.
6	Clapper Facing	EPDM Grade “E”	1
7	Spring	Stainless Steel	1
8	Hinge Shaft	Stainless Steel	1
9	Retaining Ring	Stainless Steel	AR
11	Retention Bolt	Stainless Steel	1
13	Retaining Disc	Stainless Steel	1

Detail	Part	Material	Qty.
14	Locknut	Stainless Steel	1
15	Adhesive	Thread Sealer	AR
16	Nameplate	Aluminum	1
17	Rivet	Steel	2
18	Spacer	Stainless Steel	1

FIGURE 2
MODEL CV-1FR RISER CHECK VALVES
ASSEMBLY

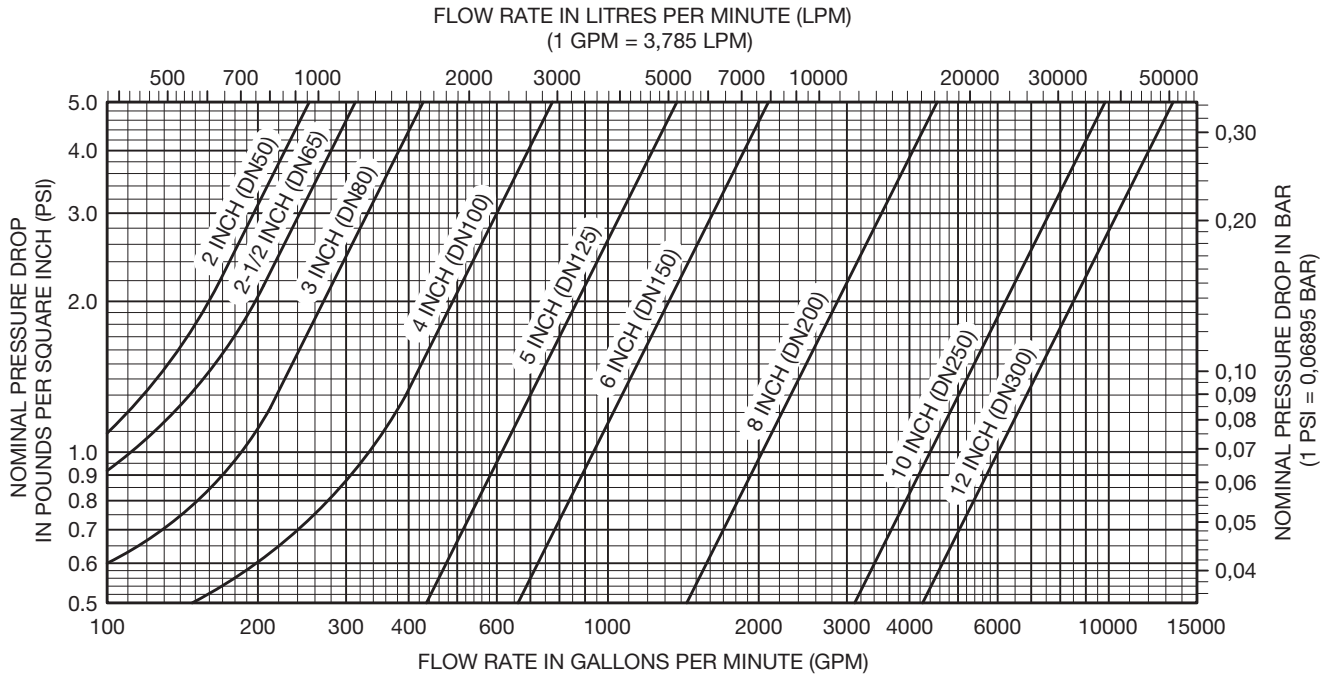
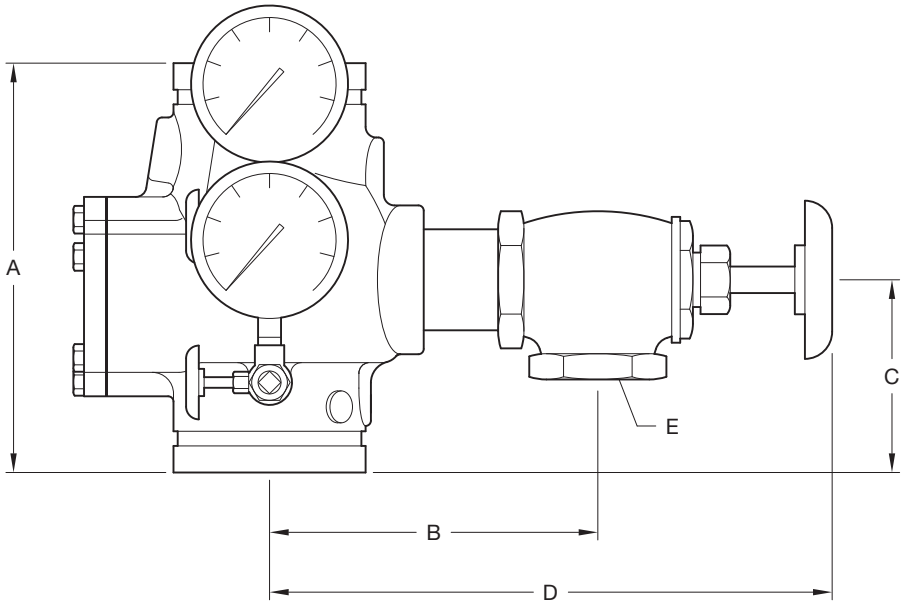


FIGURE 3
MODEL CV-1FR RISER CHECK VALVES
PRESSURE LOSS DATA



Nominal Pipe Size		Nominal Dimensions Inches (mm)				
ANSI Inches DN	O.D. Inches (mm)	A	B	C	D	E Inches NPT
2 DN50	2.375 (60,3)	6.75 (171,5)	5.87 (149,1)	3.25 (82,6)	9.52 (241,9)	1
2-1/2 DN65	2.875 (73,0)	8.00 (203,2)	6.66 (169,2)	3.87 (98,3)	10.80 (274,3)	1-1/4
76,1 DN65	– (76,1)	8.00 (203,2)	6.66 (169,2)	3.87 (98,3)	10.80 (274,3)	1-1/4
3 DN80	3.500 (88,9)	8.37 (212,6)	6.88 (174,8)	3.87 (98,3)	11.02 (279,9)	1-1/4
4 DN100	4.500 (114,3)	9.63 (244,6)	7.63 (193,7)	4.53 (115,1)	11.92 (302,7)	2
139,7 DN125	– (139,7)	10.50 (266,7)	8.13 (206,4)	4.90 (124,5)	12.42 (315,4)	2
5 DN125	5.563 (141,3)	10.50 (266,7)	8.13 (206,4)	4.90 (124,5)	12.42 (315,4)	2
165,1 DN150	– (165,1)	11.50 (292,1)	8.50 (215,8)	5.00 (127,0)	12.79 (324,8)	2
6 DN150	6.625 (168,3)	11.50 (292,1)	8.50 (215,8)	5.00 (127,0)	12.79 (324,8)	2
8 DN200	8.625 (219,1)	14.00 (355,6)	9.52 (241,7)	5.46 (138,7)	13.81 (350,7)	2
10 DN250	10.750 (273,1)	18.00 (457,2)	10.41 (264,3)	7.50 (190,5)	14.70 (373,3)	2
12 DN300	12.750 (323,9)	21.00 (533,4)	11.27 (286,1)	7.62 (193,5)	15.56 (395,2)	2

FIGURE 4
MODEL CV-1FR RISER CHECK VALVE WITH TRIM COMPONENTS
NOMINAL DIMENSIONS

P/N 59-591-1-020
2 Inch (DN50)

NO.	DESCRIPTION	QTY.	P/N
1	300 psi/ 2000 kPa Water Pressure Gauge	2	92-343-1-005
2	1/4" Gauge Test Valve	2	46-005-1-002
3	1/4" Plug	2	CH
4	1" Angle Valve	1	46-048-1-006
5	1/4" x 2" Nipple	1	CH
6	1/4" x 5" Nipple	1	CH
7	1" x 3" Nipple	1	CH

P/N 59-591-1-030
2-1/2 Inch (DN65) through 3 Inch (DN80)

NO.	DESCRIPTION	QTY.	P/N
1	300 psi/ 2000 kPa Water Pressure Gauge	2	92-343-1-005
2	1/4" Gauge Test Valve	2	46-005-1-002
3	1/4" Plug	2	CH
4	1-1/4" Angle Valve	1	46-048-1-007
5	1/4" x 2" Nipple	1	CH
6	1/4" x 5" Nipple	1	CH
7	1-1/4" x 3" Nipple	1	CH

P/N 59-591-1-080
4 Inch (DN100) through 12 Inch (DN300)

NO.	DESCRIPTION	QTY.	P/N
1	300 psi/ 2000 kPa Water Pressure Gauge	2	92-343-1-005
2	1/4" Gauge Test Valve	2	46-005-1-002
3	1/4" Plug	2	CH
4	2" Angle Valve	1	46-048-1-009
5	1/4" x 2" Nipple	1	CH
6	1/4" x 5" Nipple	1	CH
7	2" x 3" Nipple	1	CH

NOTES:
1. All Fittings and Nipples are galvanized (Standard Order).
2. CH: Common Hardware.

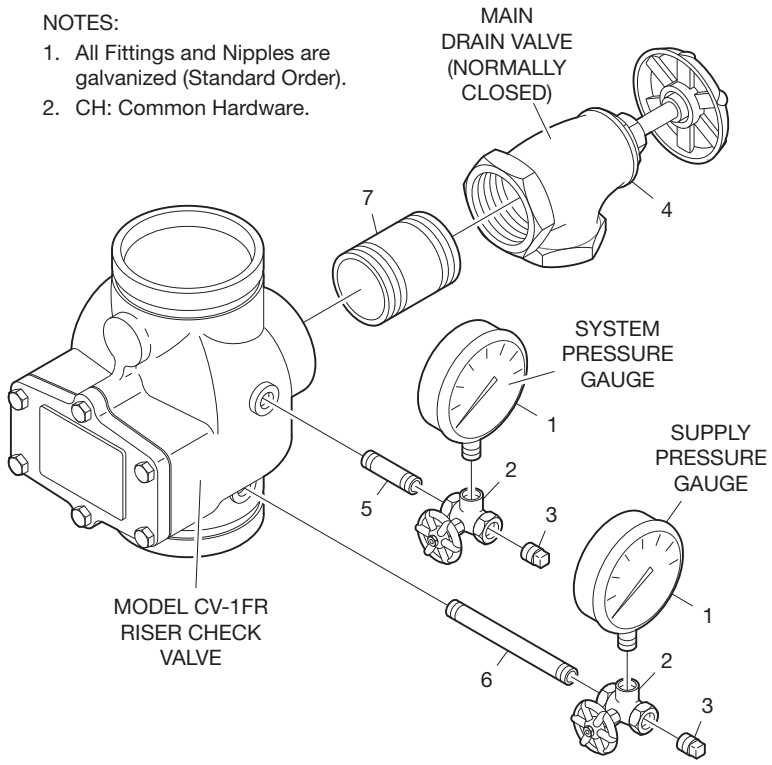
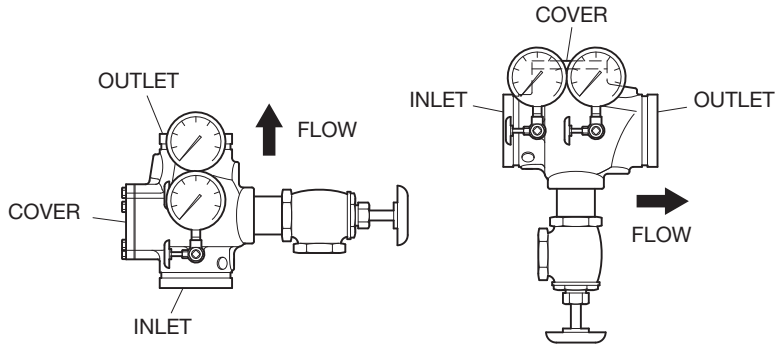


FIGURE 5
MODEL CV-1FR RISER CHECK VALVES
TRIM PARTS LIST



VERTICAL ORIENTATION **HORIZONTAL ORIENTATION**

FIGURE 6
MODEL CV-1FR RISER CHECK VALVES
INSTALLATION

Care and Maintenance

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

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

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

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

Limited Warranty

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

Ordering Procedure

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

Model CV-1FR Check Valves
Specify: Size and P/N (below).

2″ (DN50) . . . . . P/N 59-590-1-020
2-1/2″ (DN65). . . . . P/N 59-590-1-025
76,1 mm (DN65) . . . . . P/N 59-590-1-076
3″ (DN80) . . . . . P/N 59-590-1-030
4″ (DN100) . . . . . P/N 59-590-1-040
139,7 mm (DN125) . . . . . P/N 59-590-1-139
5″ (DN125) . . . . . P/N 59-590-1-050
165,1 mm (DN150) . . . . . P/N 59-590-1-165
6″ (DN150) . . . . . P/N 59-590-1-060
8″ (DN200) . . . . . P/N 59-590-1-080
10″ (DN250) . . . . . P/N 59-590-1-100
12″ (DN300) . . . . . P/N 59-590-1-120

Model CV-1FR
Riser Check Valve Trim Assembly
Specify: Size and P/N (below).

2″ (DN50) . . . . . P/N 59-591-1-020
2-1/2″ (DN65). . . . . P/N 59-591-1-030
76,1 mm (DN65) . . . . . P/N 59-591-1-030
3″ (DN80) . . . . . P/N 59-591-1-030
4″ (DN100) . . . . . P/N 59-591-1-080
139,7 mm (DN125) . . . . . P/N 59-591-1-080
5″ (DN125) . . . . . P/N 59-591-1-080
165,1 mm (DN150) . . . . . P/N 59-591-1-080
6″ (DN150) . . . . . P/N 59-591-1-080
8″ (DN200) . . . . . P/N 59-591-1-080
10″ (DN250) . . . . . P/N 59-591-1-080
12″ (DN300) . . . . . P/N 59-591-1-080

Swing Check Valve

Model CV-1F Grooved End Swing Check Valves

General Description

The TYCO Model CV-1F Grooved End Swing Check Valves are compact and rugged swing-type units that allow water flow in one direction and prevent flow in the opposite direction. A resilient elastomer seal facing on the spring-loaded clapper ensures a leak-tight seal and non-sticking operation. The Model CV-1F Check Valves are designed to minimize water hammer caused by flow reversal.

The Model CV-1F Grooved End Swing Check Valves are furnished with grooved ends and can be installed using GRINNELL Grooved Couplings or GRINNELL Figure 71 Flange Adapters. The Model CV-1F Check Valves have been designed with a removable cover for ease of field maintenance. These valves can be installed horizontally (with cover in the upward position) or vertically with the flow in the upward direction, see Figure 3.

A check valve maintenance kit is available to allow backflushing through a fire department connection without removing the Model CV-1F Grooved End Swing Check Valve from the riser. Refer to technical data sheet TFP1555.

Model CV-1F is a re-designation for Central Figure 590F and GRINNELL Figure 590F Grooved End Swing Check Valves.

NOTICE

The TYCO Model CV-1F Grooved End Swing Check Valves 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.

IMPORTANT

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

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

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

Technical Data

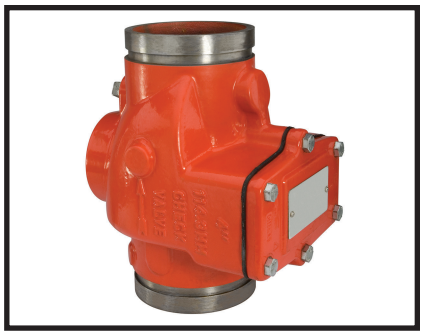
Approvals
Compliance with CE Pressure Equipment Directive (PED) and Standards of Engineering Practice

- 2 in. to 12 in. (DN50 to DN300): UL and C-UL Listed, FM Approved, Bureau Veritas
- 2 1/2 in. to 10 in. (DN65 to DN250): VdS Approved Certificate No. G4060018

Sizes
2 in. to 12 in. (DN50 to DN300)

Maximum Working Pressure
UL/FM - 300 psi (20,7 bar)
VdS - 16 bar

Valve Assembly Finish
Red, non-lead paint



For fire protection pressure rating, listing and approval information, contact your TYCO representative.

Installation

The Model CV-1F Grooved End Swing Check Valves are to be installed in accordance with this section:

Step 1. The arrow cast on the body must point in the direction of the flow.

Step 2. Valves installed vertically must be positioned with the flow in the upward direction.

Step 3. Valves installed horizontally must be positioned with the cover facing up, see Figure 3.

Step 4. Grooved end pipe couplings used with the Model CV-1F Grooved End Swing Check Valves must be installed in accordance with manufacturer's instructions.

Note: *Valves should be installed a reasonable distance downstream from pumps, elbows, expanders, reducers, or other similar devices to extend the valve life. Standard piping practices call for a minimum of five (5) times the pipe diameter for general use.*

Nominal Pipe Size		Nominal Dimensions In. (mm)							Cover Bolt Torque lb-ft (N·m)	Approx. Weight lb (kg)
Valve Size In. (DN)	Pipe O.D. In. (mm)	A	B	C	D	E	F	J		
2 (50)	2.37 (60.3)	6.75 (171.5)	1.96 (49.8)	1.96 (49.8)	2.57 (65.3)	3.25 (82.3)	4.75 (120.7)	1.62 (41.5)	7 (10)	9.0 (4.5)
2 1/2 (65)	2.88 (73.0)	8.00 (203.2)	5.38 (136.7)	2.63 (66.7)	3.09 (78.5)	3.87 (98.3)	5.87 (149.1)	1.63 (41.7)	10 (14)	10.0 (4.5)
76.1 mm (65)	3.00 (76.1)	8.00 (203.2)	5.38 (136.7)	2.63 (66.7)	3.09 (78.5)	3.87 (98.3)	5.87 (149.1)	1.63 (41.7)	10 (14)	10.0 (4.5)
3 (80)	3.50 (88.9)	8.37 (212.6)	5.72 (145.3)	2.81 (71.4)	3.31 (84.1)	3.87 (98.3)	5.87 (149.1)	1.63 (41.7)	10 (14)	11.0 (5.0)
4 (100)	4.50 (114.3)	9.63 (244.6)	6.68 (169.7)	3.80 (96.5)	3.63 (92.2)	4.53 (115.4)	7.13 (181.1)	1.84 (46.7)	10 (14)	25.0 (11.3)
139.7 mm (125)	5.50 (139.7)	10.50 (266.7)	7.40 (188.0)	4.46 (113.3)	4.13 (104.9)	4.90 (124.5)	7.50 (190.5)	1.75 (44.5)	10 (14)	29.0 (13.2)
5 (125)	5.56 (141.3)	10.50 (266.7)	7.40 (188.0)	4.46 (113.3)	4.13 (104.9)	4.90 (124.5)	7.50 (190.5)	1.75 (44.5)	10 (14)	29.0 (13.2)
165.1 mm (150)	6.50 (165.1)	11.50 (292.1)	8.00 (203.2)	4.62 (117.3)	4.50 (114.3)	5.00 (127.0)	7.60 (193.0)	1.85 (47.0)	30 (40)	47.0 (21.3)
6 (150)	6.63 (168.3)	11.50 (292.1)	8.00 (203.2)	4.62 (117.3)	4.50 (114.3)	5.00 (127,0)	7.60 (193,0)	1.85 (47.0)	30 (40)	47.0 (21.3)
8 (200)	8.63 (219.1)	14.00 (355.6)	10.14 (257.8)	6.67 (169.4)	5.52 (140.2)	5.46 (138.7)	8.46 (214.9)	2.13 (54.1)	50 (68)	66.0 (29.9)
10 (250)	10.75 (273.1)	18.00 (457.2)	12.38 (314.5)	8.62 (218.9)	6.41 (162.8)	7.50 (190.5)	10.50 (266.7)	3.00 (76.2)	70 (95)	109.7 (49.4)
12 (300)	12.75 (323.9)	21.00 (533.4)	14.28 (362.7)	9.93 (252.2)	7.27 (184.7)	7.62 (193.5)	10.62 (269.7)	2.75 (69.9)	80 (108)	151.0 (68.0)

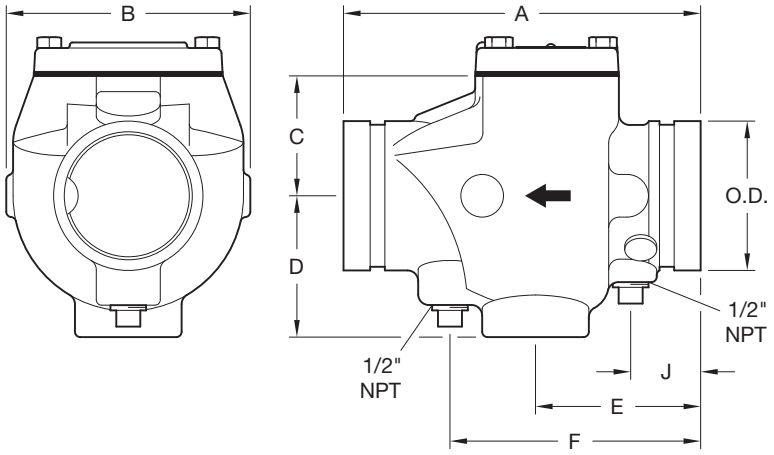


FIGURE 1
MODEL CV-1F GROOVED END SWING CHECK VALVES
NOMINAL DIMENSIONS

Care and Maintenance

The TYCO Model CV-1F Grooved End Swing Check Valves 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 system from the proper authorities and notify all personnel who may be affected by this decision.

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

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

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

No.	Part	Material	Qty.
1	Body	Ductile Iron	1
2	Cover	Ductile Iron	1
3	Cover Gasket	Nitrile Rubber	1
4	Hex Cap Screw	Steel, Zinc Plated	AR
5	Clapper, 2 in. to 8 in. (DN50 to DN200)	Stainless Steel	1
	Clapper, 10 in. to 12 in. (DN250 to DN300)	Ductile Iron	

No.	Part	Material	Qty.
6	Clapper Facing	EPDM Grade "E"	1
7	Spring	Stainless Steel	1
8	Hinge Shaft	Stainless Steel	1
9	Retaining Ring	Stainless Steel	AR
11	Retention Bolt	Stainless Steel	1
13	Retaining Disc	Stainless Steel	1

No.	Part	Material	Qty.
14	Locknut	Stainless Steel	1
15	Plug 1/2 in. NPT	Cast Iron	2
16	Adhesive	Thread Sealer	AR
17	Nameplate	Aluminum	1
18	Rivet	Steel	2
19	Spacer	Stainless Steel	1

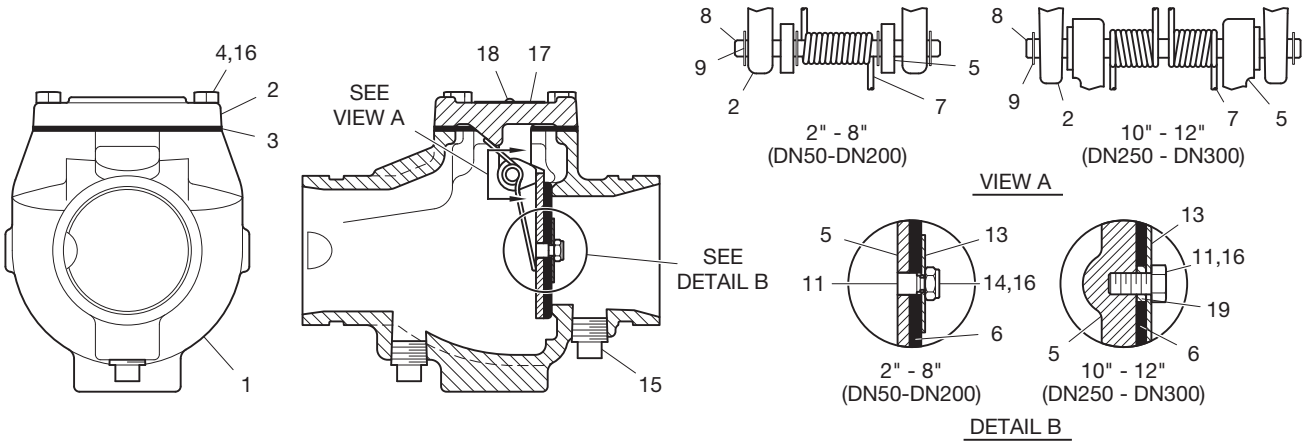
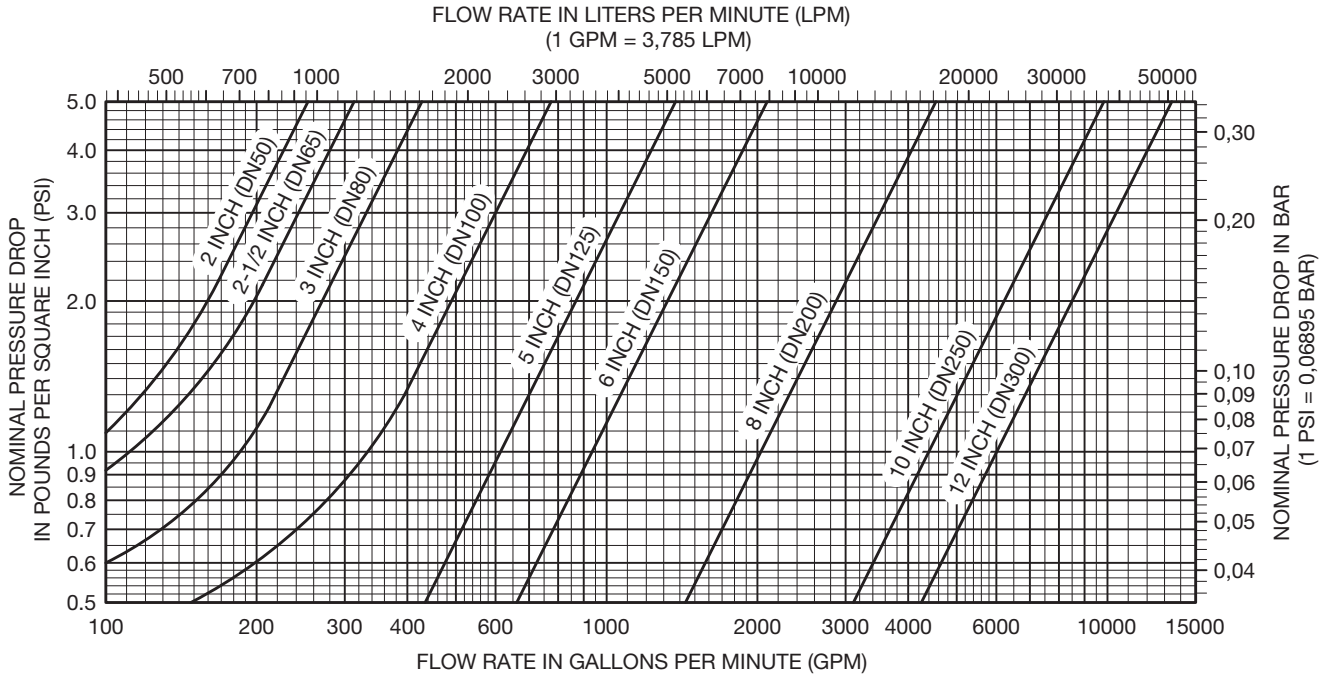


FIGURE 2
MODEL CV-1F GROOVED END SWING CHECK VALVES
ASSEMBLY



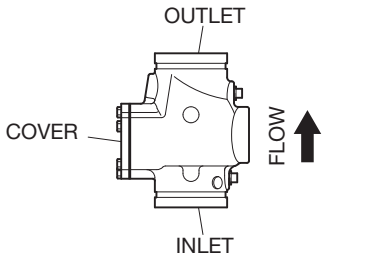
GRAPH A
MODEL CV-1F GROOVED END SWING CHECK VALVES
NOMINAL PRESSURE LOSS VS. FLOW

Valve Size In. (DN)	Pipe O.D. In. (mm)	Part Number
2 (50)	2.37 (60.3)	59-590-0-020
2 1/2 (65)	2.88 (73.0)	59-590-0-025
76.1 mm (65)	3.00 (76.1)	59-590-0-076
3 (80)	3.50 (88.9)	59-590-0-030
4 (100)	4.50 (114.3)	59-590-0-040
139.7 mm (125)	5.50 (139,7)	59-590-0-139
5 (125)	5.56 (141.3)	59-590-0-050
165.1 mm (150)	6.50 (165.1)	59-590-0-165
6 (150)	6.63 (168.3)	59-590-0-060
8 (200)	8.63 (219.1)	59-590-0-080
10 (250)	10.75 (273.1)	59-590-0-100
12 (300)	12.75 (323.9)	59-590-0-120

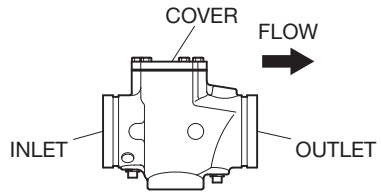
TABLE A
MODEL CV-1F GROOVED END SWING CHECK VALVES
PART NUMBER SELECTION

Valve Size In. (DN)	Pipe O.D. In. (mm)	Cover Gasket Part Number		Clapper Facing Part Number		Clapper Assembly Part Number	
		Americas Only	EMEA/APAC	Americas Only	EMEA/APAC	Americas Only	EMEA/APAC
2 (50)	2.37 (60.3)	595907020	97670501	59020EPDM	59020EPDM	97670201A	97670201
2 1/2 (65)	2.88 (73.0)	595907030	97561801	59025EPDME	59025EPDM	97562801A	97562065
76.1 mm (65)	3.00 (76.1)	595907030	97561801	59025EPDME	59025EPDM	—	97562801
3 (80)	3.50 (88.9)	595907030	97561801	59030EPDME	59030EPDM	97562201A	97562201
4 (100)	4.50 (114.3)	595907040	97512001	59040EPDME	59040EPDM	97549001A	97549001
139.7 mm (125)	5.50 (139.7)	595907040	97512001	59050EPDME	59050EPDM	—	97565501
5 (125)	5.56 (141.3)	595907040	97512001	59050EPDME	59050EPDM	97565501A	97562125
165.1 mm (150)	6.50 (165.1)	595907060	97521801	59060EPDME	59060EPDM	—	97524101
6 (150)	6.63 (168.3)	595907060	97521801	59060EPDME	59060EPDM	97524101A	97562150
8 (200)	8.63 (219.1)	595907080	97547901	59080EPDME	59080EPDM	97592201A	97592201
10 (250)	10.75 (273.1)	595907100	97600001	59100EPDM	59100EPDM	97598001A	97598001
12 (300)	12.75 (323.9)	595907120	97600002	59120EPDM	59120EPDM	97647701A	97647701

TABLE B
MODEL CV-1F GROOVED END SWING CHECK VALVES REPLACEMENT VALVE PARTS
PART NUMBER SELECTION



VERTICAL ORIENTATION



HORIZONTAL ORIENTATION

FIGURE 3
MODEL CV-1F GROOVED END SWING CHECK VALVES PROPER ORIENTATION

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).

Model CV-1F Check Valve
Specify: Model CV-1F Grooved End Swing Check Valve, size (specify), P/N (specify per Table A)

Replacement Valve Parts
See Figure 2 to identify Parts.

Cover Gasket
Specify: Model CV-1F Grooved End Swing Check Valve, Cover Gasket, size (specify), P/N (specify per Table B)

Clapper Facing
Specify: Model CV-1F Grooved End Swing Check Valve, Clapper Seal Facing, EPDM Grade “E”, size (specify), P/N (specify per Table B)

Clapper Assembly
Includes items 2, 3, 5 to 14, and 17 to 19.

Specify: Model CV-1F Grooved End Swing Check Valve, Clapper Assembly, size (specify), P/N (specify per Table B)

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

OS & Y Gate Valve

KENNEDY VALVE AWWA C509 Resilient Wedge Gate Valves
Meet or Exceed the Requirements of
AWWA Standard C509
UL-262/FM-1120/1130
ULC-Underwriters' of Canada

Size Range	Water Working Pressure psi	Seat Test psi	Hydrostatic Shell Test psi
AWWA 2"-12"	250 Water Works	250 & 400	500
ULFM 4"-12"	200 Fire Protection	250 & 400	500

Available in either non-rising stem or outside screw & yoke.

Available End Connections & Size Range		Figure No. (STD)	Figure No. with Post Plate
Flg. End (NRS)	2" - 12"	8561A	8701A (3" - 12")
M.J.	2" - 12" (except 2 1/2")	8571	8071 (3" - 12")
Flg. & M.J.	3" - 12"	8572	8702 (3" - 12")
Push-on for PVC (SDR)	2" - 8"	8597	8597P (3" - 8")
Flg. End (OS & Y)	2 1/2" - 12"	8068A	N/A
M.J. for Tapping	4" - 12"	8950	8950P
Push-on for D.I. & C900 PVC	4" - 12"	8901	8901P
M.J. Cutting-in	4" - 12"	8576	8576P
Push-on D.I. X Flg.	4" - 12"	8902	8902P
Threaded	2" - 3"	8057	8057P (3" only)
Threaded (OS&Y)	2" - 3"	8067	

Accessories

Indicator Posts	Handwheels
"T" Handles	Extension Stems
Stem Guides	Floor Boxes
2" Sq. Operating Nuts	Chain Wheels
Floorstands (non-rising stem)	EPDM Wedges Available

2" size not UL Listed

LISTED UL 888H

FM APPROVED

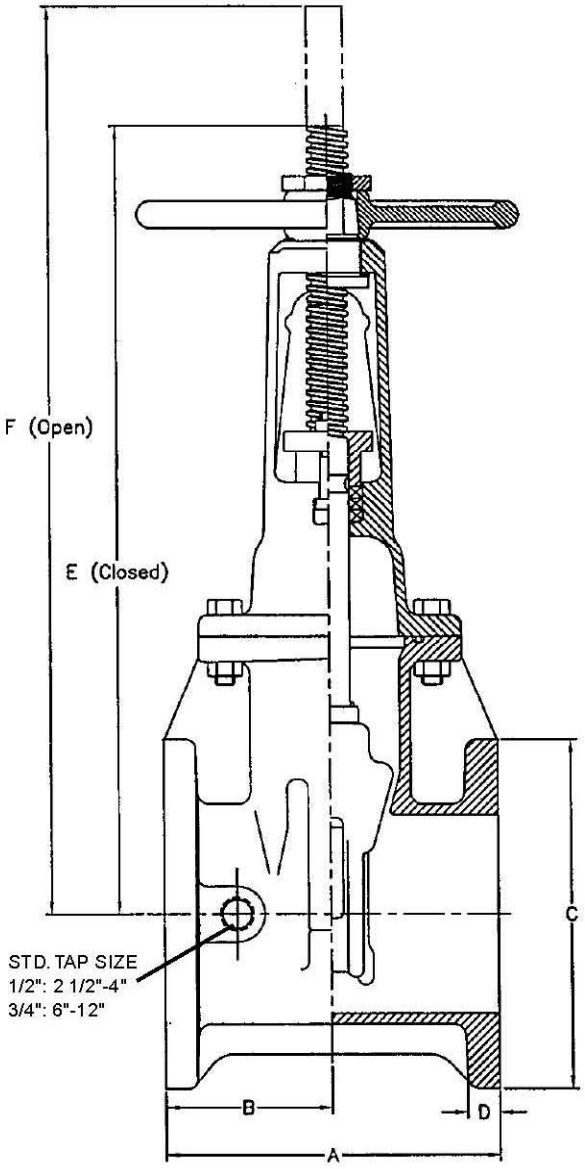
ULC

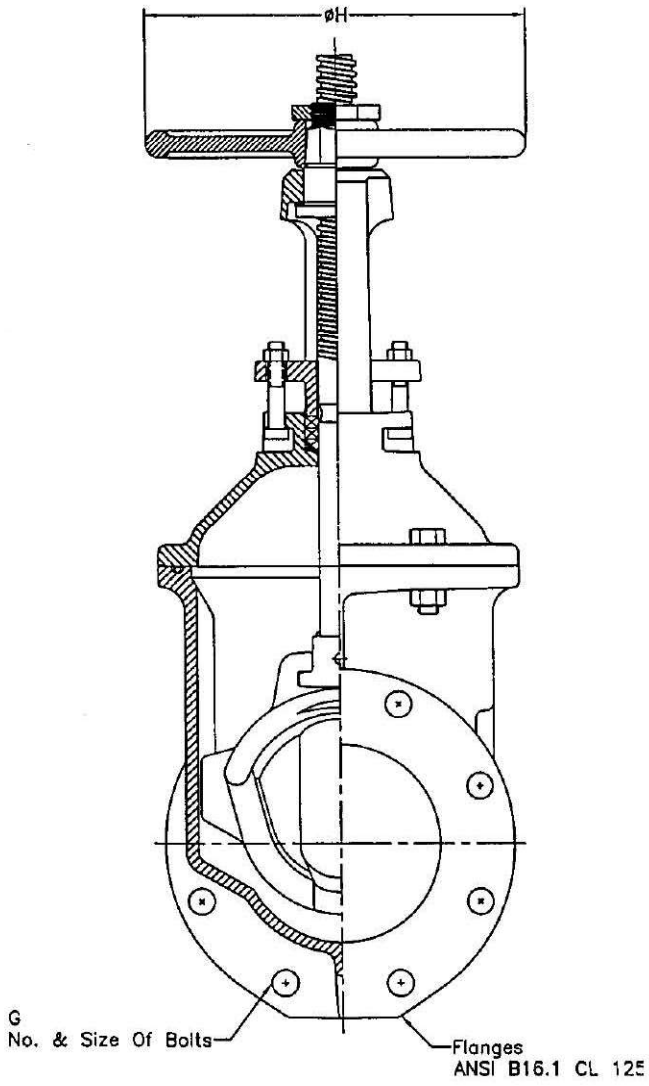
Complies with applicable requirements of AWWA C509

2" - 12" R/S VALVE FLANGE ENDS OS&Y GENERAL DIMENSIONS

KENNEDY VALVE MODEL KS-FW

8068A





VALVE SIZE	A	B	C	D	E	F	G	H	WEIGHT
2	7	3 1/2	6	11/16	12	10	4 5/8	7 1/4	N/A
2 1/2	7 1/2	3 3/4	7	11/16	13 7/8	16 3/8	4 5/8	7 1/4	51
3	8	4	7 1/2	3/4	15 5/8	18 7/8	4 5/8	10	64
4	9	4 1/2	9	15/16	18 1/4	22 3/4	8 5/8	10	105
6	10 1/2	5 1/4	11	1	23 3/4	30 1/8	8 3/4	12	152
8	11 1/2	5 3/4	13 1/2	1 1/8	29 1/4	37 3/4	8 3/4	14	253
10	13	6 1/2	16	1 3/16	35 3/8	45 3/4	12 7/8	18	427
12	14	7	19	1 1/4	40 5/8	53 1/8	12 7/8	18	581

ALL FLANGE VALVES TAPPED & PLUGGED @ POSITION "A"

Ball Valve

Globe Valve

TrimFit® Ball Valve

INSIST ON FPPI®

Description

FPPI's complete line of TrimFit Forged Brass*, Full Port Ball Valves feature forged components machined to exacting specifications. UL/ULc listed and FM approved. Listed for fire sprinkler systems for trim, test or drain applications, our Full Port Ball Valves are rated 600 PSI for sizes ¼" - 1½" IPS and 300 PSI for the 2" size. Each valve is complete with plastic coated valve handle marked as required by UL. Blow out proof stem.

Installation

Installation practices consistent with those of the fire sprinkler industry are appropriate for the installation of this product. Always make sure to properly "hold back" the valve and each component being installed to the valve to prevent over tightening or stressing of the valve body. It is also necessary to make sure all components are in proper alignment in the assembly where the ball valve is present. Improper alignment of attached components may create stress on the valve leading to valve failure. Use a suitable thread sealant such as PTFE tape or PipeFit Thread Sealant Paste with PTFE. Never use tape and paste together. We do not recommend the use of anaerobic sealants with this product. The materials used in this sealant type are highly caustic and may cause failure of the synthetic components present in this product.

*UL/ULc Listed 2R97

DO NOT USE MORE THAN ONE SEALANT TYPE PER THREADED CONNECTION. DO NOT OVER TIGHTEN THREADS. OVER TIGHTENING WILL CAUSE LEAKS IN THIS AND OTHER THREADED COMPONENTS.

Specifications

Nomenclature and Material:

Part:	Material:
Nut	Steel
Handle	Steel
Stem Gland	Brass*
Stem Packing	PTFE
Stem	Brass*
Body	Forged Brass*
Ball Disc Pack	PTFE
Ball Disc	Chrome Plated Brass or Forged Brass*
End Plug	Forged Brass*

Part No.:	Size:	Take-Out:
06-838-00	¼" IPS	1 11/16"
06-840-00	½"	2 1/16"
06-842-00	¾"	2 3/8"
06-844-00	1"	2 7/8"
06-845-00	1¼"	3 7/16"
06-846-00	1½"	3 13/16"
06-848-00	2"	4 3/8"

*Full port valves have slightly larger "take out" dimensions than standard port valves. You may need to adjust trim components accordingly.

*Contains lead. Not for use in water systems intended for human consumption.

3198 LIONSHEAD AVE
CARLSBAD, CA 92010
+ 1 (760) 599-1168
+ 1 (800) 344-1822
+ 1 (800) 344-3775 FAX

c UL us LISTED FM APPROVED

TrimFit® Globe Valve with PTFE

INSIST ON FPPI®

UL/ULC Listed 300 psi

Description

FPPI® TrimFit® Bronze* Globe Valves are precision cast then machined using state of the art facilities. Each valve features a full floating seat holder for reduced seat wear when closing the valve. Seat is made of pure virgin PTFE for longer seat life and reduced maintenance as compared to rubber seat valves. TrimFit trim valves are suitable for use in regular (175psi) and high pressure (300psi) sprinkler systems. Standard configuration is FNPT x FNPT and is available in ¼" IPS through 2" IPS sizes. Each valve carries the UL Listing UL/ ULC Listed 2R97

Installation

Install in accordance with usual and customary installation techniques for fire sprinkler systems. Use a suitable thread sealant on the male threads of the pipe being threaded into the valve body. We recommend either FPPI PTFE Thread Sealing Tape or PipeFit® Thread Sealing Paste with PTFE. **NEVER USE BOTH. DO NOT OVERTIGHTEN. OVERTIGHTENING MAY CAUSE CRACKS OR LEAKS.**

Specifications

Material:
Brass* or Bronze*
Seat-PTFE
Hand wheel-JIS FC 20 painted red.

Sizes:
06-798-00 ¼" IPS FNPT
06-800-00 ½"
06-802-00 ¾"
06-804-00 1"
06-806-00 1¼"
06-808-00 1½"
06-810-00 2"

*Contains lead. Not for use in water systems intended for human consumption.

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CARLSBAD, CA 92010
TEL + 1 760 599-1168
+ 1 800 344-1822
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UL LISTED c UL LISTED

WARNING: Cancer and Reproductive Harm - www.P65Warnings.ca.gov

Hose Valve

POTTER ROEMER
FIRE PROTECTION EQUIPMENT

Cerritos, California
Union, New Jersey

Fire Protection Products

MEMBER

HOSE VALVES

ANGLE

FEMALE X MALE

REGULARLY FURNISHED: Cast brass valve with red hand wheel. Female N.P.T. inlet X male hose thread outlet. 300 lb. rated

Fig.
☐ **4060** . . . . . 1½" Size
☒ **4065** . . . . . 2½" Size

OPTIONAL FINISHES:
☐ – **B** Polished Brass
☐ – **C** Rough Chrome Plated
☐ – **D** Polished Chrome Plated

THREADS:
☐ N.S.T.
☐ Other _____

VARIATIONS: Extended stem up to 24", **SPECIFY** length
⅛" petcock **SPECIFY** location

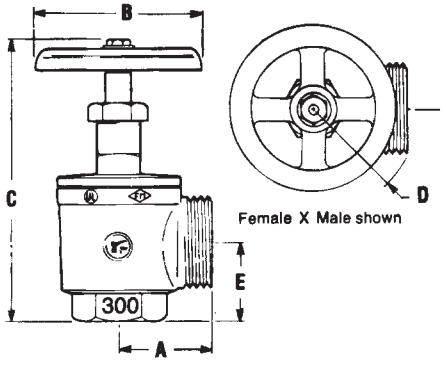
✓	Size	A	B	Closed C	Open C	D	E
	1½	2¼	3½	6½	7½	2½	2
✓	2½	3½	5	9½	11½	3½	2¾

ALL DIMENSIONS IN INCHES

DOUBLE FEMALE

REGULARLY FURNISHED: Cast brass valve with red hand wheel. Female N.P.T. inlet and outlet. 300 lb. rated

Fig.
☐ **4070** . . . . . 1½" Size
☐ **4075** . . . . . 2½" Size



Female X Male shown

ADJUSTABLE PRESSURE RESTRICTING ANGLE VALVE

FEMALE X MALE

REGULARLY FURNISHED: Cast brass valve with red hand wheel with pressure restricting feature. Female N.P.T. inlet X male hose thread outlet. 175 lb. rated. Furnished with field setting chart.

Fig.
☐ **4080** . . . . . 1½" Size
☐ **4085** . . . . . 2½" Size

OPTIONAL FINISHES:
☐ – **B** Polished Brass
☐ – **C** Rough Chrome Plated
☐ – **D** Polished Chrome Plated

THREADS:
☐ N.S.T.
☐ Other _____

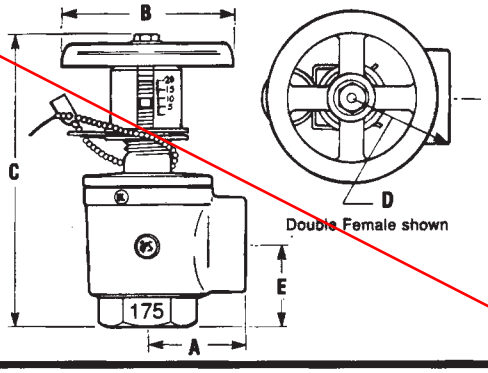
✓	Size	A	B	Closed C	Open C	D	E
	1½	2¼	3½	6½	7½	2½	2
	2½	3½	5	9½	11½	3½	2¾

ALL DIMENSIONS IN INCHES

DOUBLE FEMALE

REGULARLY FURNISHED: Cast brass valve with red hand wheel with pressure restricting feature. Female N.P.T. inlet and outlet. 175 lb. rated. Furnished with field setting chart.

Fig.
☐ **4090** . . . . . 1½" Size
☐ **4095** . . . . . 2½" Size

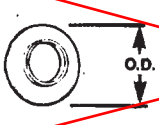


Double Female shown

CAST BRASS CAP WITH CHAIN.

Fig.	Size	CAP VARIATION:
☐ **4615**	1½"	☐ With Rocker Lugs
☒ **4625**	2½"	

Threads: ☐ N.S.T. ☐ Other _____



CAST BRASS FLANGE WITH SET SCREW.

Fig	Size	O.D.
☐ **4711**	1½"	3"
☐ **4712**	2½"	6¼"

DATE
1-25-90

OPTIONAL FINISHES: ☐ – **B** Polished Brass
☐ – **C** Rough Chrome Plated ☐ – **D** Polished Chrome Plated

FIGURE NUMBER
4060-4095

Angle Hose Valves

INSIST ON FPPI®

Description

Angle hose valves feature all brass* construction with forged or cast bodies for rigidity and light weight. Typical uses are in rack assemblies or any other application which requires a listed fire hose valve. Available in rough brass or polished chrome finish with a red hand wheel. **UL, ULc Listed, FM Approved. Rated 300psi**

Installation

Install in accordance with customary installation practices. Use an approved thread sealant such as PipeFit® Thread Sealing Paste with PTFE on the male threads to which the valve is being installed.

DO NOT OVER TIGHTEN. Over tightening of the valve during installation to the male pipe threads may crack or deform the valve body. Only use tools suitable for the installation of this product. Do not use pipe wrench extenders to increase leverage on pipe wrenches. This may result in valve damage as well as personal injury.

Specifications

Material:
Cast or Forged Brass* Body

Finish:
Rough Brass
Polished Chrome*

Threads:

2 ½"	FNPT	x	FNPT
		x	MNST
		x	MBCT
		x	MQST
		x	MONT
		x	MPHX
		x	MTEM
		x	MCLV
		x	MNYFD
		x	MDET
		x	MCF
		x	MRCH
2 ½"	GRV	x	FNPT
		x	MNST
		x	MQST
		x	MNYFD
2 ½"	FNPT	x	3 MNST
1 ½"	FNPT	x	FNPT
		x	MNST

Friction loss is less than 3 psi thru an equivalent length of pipe per UL Standards.

*Contains lead. Not for use in water systems intended for human consumption.

c UL us FM APPROVED

3198 LIONSHEAD AVE
CARLSBAD, CA 92010
+ 1 (760) 599-1168
+ 1 (800) 344-1822
+ 1 (800) 344-3775 FAX

6

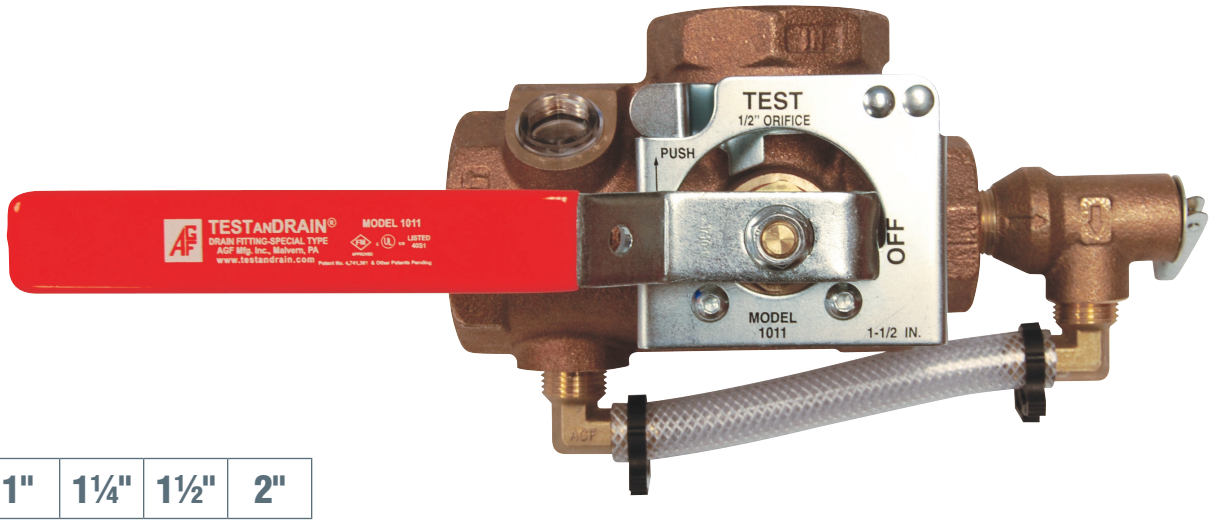
Devices

- Test & Drain
- Fire Department Connection
- Riser Manifold
- Pressure Gauges
- Waterflow Switch
- Tamper Switch
- Electric Bell
- Air Vent

Test & Drain

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

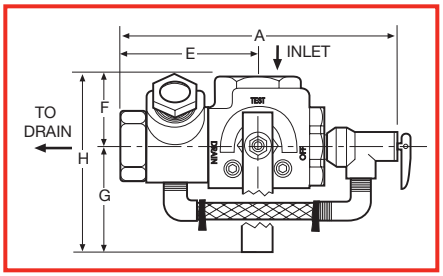
SIZE	A	B	C	D	E	F	G	H
¾"	7 9/16" (191 mm)	1 1/2" (37.5 mm)	2 3/16" (57 mm)	3 5/8" (93 mm)	3 3/8" (86 mm)	1 13/16" (46 mm)	4 9/16" (117 mm)	6 3/8" (162.5 mm)
1"	7 9/16" (191 mm)	1 1/2" (37.5 mm)	2 3/16" (57 mm)	3 5/8" (93 mm)	3 3/8" (86 mm)	1 13/16" (46 mm)	4 9/16" (117 mm)	6 3/8" (162.5 mm)
1¼"	7 15/16" (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…

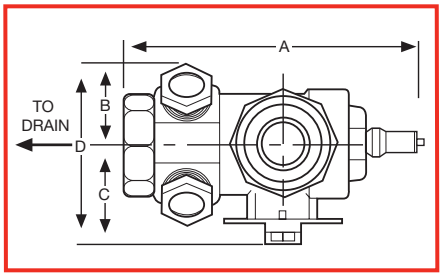
From the 2019 Edition of NFPA 13

Chapter 16.10.4.1*	Provisions shall be made to properly drain all parts of the system.
Chapter 16.10.4.2 & 16.10.4.3	Drain connections, interior sectional or floor control valve(s) – shall be provided with a drain connection having a minimum size as shown in Table 16.10.4.2.
Chapter 16.10.4.4	Drains shall discharge outside or to a drain capable of handling the flow of the drain.
Chapter A.16.4.1	(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 16.14.1.2	The test connection valve shall be accessible.
Chapter 16.14.1.4	shall be permitted to be installed in any location… downstream of the waterflow alarm.
Chapter 16.14.2.1	(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 16.14.2.2	The trip test connection… with a shutoff valve and plug not less than 1", at least one of which shall be brass.
Chapter 8.1.2.1	- a wet pipe system shall be provided with a listed relief valve not less than 1/2" in size and set to operate at 175 PSI or 10 PSI in excess of the maximum system pressure, whichever is greater.
Chapter 16.9.8.3*	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 components of the system.
Chapter A.16.9.8.3	- consideration should be given to piping the discharge from the (pressure relief) valve

Model 1011A - Front View



Model 1011A - Plan View



Orifice Sizes

⅜", 7/16", ½", 17/32", ⅝" 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

FDC

Fire Department Connections

GUARDIAN
FIRE EQUIPMENT, INC.
MIAMI, FL
Ph. 800.327.6584 • Fax 800.827.3869

DETAIL AND SUBMITTAL SHEET

6600 Series - Storz Fire Dept Connections and Dry Hydrants

Project/Location: _____ **Date:** _____

Architect/Engineer: _____ **Qty:** _____

Contractor: _____

☑ *Appropriate Selection*

Storz Connections - Used as auxiliary connections through which the fire department can pump water to supplement existing water supplies.

Straight and 30º Angle Pattern Adapters - Locking Storz inlet x Female NPT outlet, hard-coated aluminum construction.

Optional Components

- Identification plate - refer to 6400 Series
- Storz caps - refer below

Free-Standing Type - Straight pattern Storz adapter with Storz cap, hard-coated aluminum construction and galvanized steel elbow.

Components

- Brass identification plate lettered as required and 18" high cover sleeve.
- Rough chrome plated* finish

Straight Model No.	30º Angle Model No.	Free-Standing	Size
☐ 6614	☐ 6624	☐ 6634	4" NPT x 4" Storz
☐ 6615	☐ 6625	☐ 6635	4" NPT x 5" Storz
☐ 6616	☐ 6626	☐ 6636	4" NPT x 6" Storz
☐ 6617	☐ 6627	☐ 6637	6" NPT x 4" Storz
☐ 6618	☒ 6628	☐ 6638	6" NPT x 5" Storz
Identification Plate Lettering (Models 6634 - 6639) ☐ **AUTO SPKR** ☐ **STANDPIPE** ☐ **AUTO SPKR & STANDPIPE**			

***Optional Finish:** ☐ **-D** Polished chrome plated

Storz Caps - Blind cap with securing wire or chain, hard-coated aluminum

Model No.	Size
☐ 6644	4" Storz
☒ 6645	5" Storz

Model No.	Size
☐ 6646	6" Storz

Dry Hydrants - Provides a fire water supply in rural settings where pressurized water systems are insufficient or unavailable. Assemblies include hose thread adapter and strainer constructed of hard-coated aluminum and schedule 40 PVC 5" 90º elbow. Caps (optional) are hard-coated aluminum

Model No.	Hydrant Size
☐ 6664	6" PVC x 4½" male NST
☐ 6665	6" PVC x 5" male NST
☐ 6667	6" PVC x 6" male NST

Model No.	Cap Size
☐ 6674	4½" NST
☐ 6675	5" NST
☐ 6676	6" NST

PVC Suction Strainer

Model No.	Size
☐ 6686	6" Horizontal
☐ 6687	8" Horizontal

Model No.	Size
☐ 6688	6" Vertical (Barrel)
☐ 6689	8" Vertical (Barrel)

Straight Pattern

6614-6619

30º Angle Pattern

6624-6629

Free-Standing Type

6634-6639

Storz Cap

6644-6646

Dry Hydrant

6664-6667

Hydrant Cap

6674-6676

Strainer

6686/6687

Riser Manifold

tyco / Fire & Building Products

Technical Services: Tel: (800) 381-9312 / Fax: (800) 791-5500

Model 513 (13) Riser Manifold 1-1/2 thru 6 Inch (DN40 thru DN150) For NFPA 13 Sprinkler Systems

General Description

The Figure 513 (13) Riser Manifolds described in this technical data sheet provide the necessary waterflow alarm, pressure gauge, alarm test orifice, drain, and sight glass equipment in a single assembly for use in NFPA 13 sprinkler systems as follows:

NFPA 13*

- 1-1/2 Inch (DN40)
  Male Thread x Female Thread
- 1-1/2 thru 6 Inch (DN40 thru DN150)
  Groove x Groove

*Although the Riser Manifold described in this data sheet is intended for NFPA 13 sprinkler systems, it may be used for NFPA 13D or 13R residential sprinkler systems, where a test orifice of 5.6K (80K) is acceptable.

The variety of sizes and grooved end connections allow cost effective and easy transition to check valves, control valves, and system piping. The Riser Manifolds may be installed in either the horizontal (flow switch on top) or vertical (flow going up) for both single sprinkler rises and floor control in high rises.

WARNING

The Riser Manifolds described herein must be installed and maintained in compliance with this document, as well as with the applicable standards of the National Fire Protection Association, in addition to the standards of any other authorities having jurisdiction. ***Failure to do so may impair the performance of these devices.***

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

Technical Data

Approvals
The Figure 513 (13) Riser Manifolds with a cover tamper switch for the waterflow alarm switch are UL Listed, ULC Listed, and FM Approved.

The Figure 513 (13) Riser Manifolds without a cover tamper switch for the waterflow alarm switch are UL Listed and FM Approved.

Maximum Working Pressure
175 psi (12,1 bar)

Test Orifice
5.6K (80K)

Assembly
The manifold body of the Figure 513 is ductile iron, whereas the manifold body of the Figure 13 is cast iron. The two assemblies are completely interchangeable in function, application, and end-to-end laying length.

Finish
Red painted.

Installation

The Riser Manifolds may be installed in either the horizontal (flow switch on top) or vertical (flow going up). The inlet of the Riser Manifold may be directly connected to a shut-off control valve.

NOTES

Where applicable pipe thread sealant is to be applied sparingly. Use of a non-hardening pipe thread sealant is recommended.

Never remove any piping component nor correct or modify any piping deficiencies without first depressurizing and draining the system.

Step 1. Install the manifold body with the flow arrow pointing in the downstream position using threaded connections and/or listed mechanical grooved connections, as applicable

Step 2. Connect the drain line, and then close the drain valve.

Step 3. Refer to Figure 3 for wiring guidance. All wiring must be performed in accordance with the Authority Having Jurisdiction and/or the National Electrical Code.

Step 4. Refer to Figure 4 for optional relief valve.

Step 5. Place the system in service by filling the system with water. When filling the system, partially open the control valve to slowly fill the system. *Filling the system slowly will help avoid damaging the waterflow alarm switch.*

After the system is fully pressurized, completely open the control valve.

Step 6. Secure all supply valves open.

NO.	DESCRIPTION	QTY.	P/N
1	1-1/2" Manifold Body,		
	Male x Female NPT	1	N/A
	Groove x Groove	1	N/A
2	Waterflow Alarm Switch:		
	VSR-SF with Paddle, UL/FM	1	971-096-00
	VSR-SF with Paddle and Cover Tamper Switch, ULC/FM	1	976-519-02
3	300 psi/2000 kPa Water Pressure Gauge	1	2341

NOTES:
1. Approximate weight, 11.2 lbs. (5,1 kg).
2. ULC Listed Manifolds are equipped with Cover Tamper Switches installed internal to the Waterflow Alarm Switches.
3. CH: Common Hardware

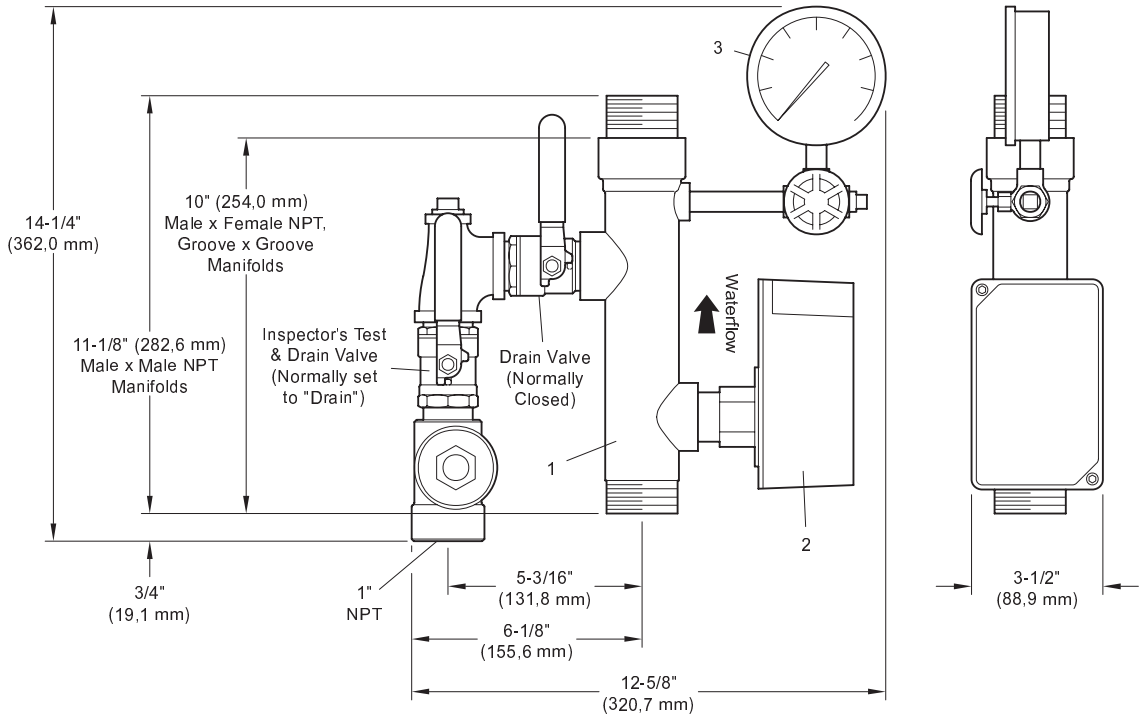


FIGURE 1
1-1/2 INCH (DN40) RISER MANIFOLD ASSEMBLY AND DIMENSIONS

2 INCH (DN50) MANIFOLD

NO.	DESCRIPTION	QTY.	P/N
1	2" Manifold Body, Groove x Groove	1	N/A
2	Waterflow Alarm Switch: VSC with Paddle, UL/FM	1	976-357-01
	VSC with Paddle and Cover Tamper Switch, ULC/FM	1	976-520-01
3	300 psi/2000 kPa Water Pressure Gauge	1	2341

4 INCH (DN100) MANIFOLD

NO.	DESCRIPTION	QTY.	P/N
1	4" Manifold Body, Groove x Groove	1	N/A
2	Waterflow Alarm Switch: VSC with Paddle, UL/FM	1	976-357-04
	VSC with Paddle and Cover Tamper Switch, ULC/FM	1	976-520-04
3	300 psi/2000 kPa Water Pressure Gauge	1	2341

6 INCH (DN150) MANIFOLD

NO.	DESCRIPTION	QTY.	P/N
1	6" Manifold Body, Groove x Groove	1	N/A
2	Waterflow Alarm Switch: VSC with Paddle, UL/FM	1	976-357-05
	VSC with Paddle and Cover Tamper Switch, ULC/FM	1	976-520-05
3	300 psi/2000 kPa Water Pressure Gauge	1	2341

2-1/2 INCH (DN65) MANIFOLD

NO.	DESCRIPTION	QTY.	P/N
1	2-1/2" Manifold Body, Groove x Groove	1	N/A
2	Waterflow Alarm Switch: VSC with Paddle, UL/FM	1	976-357-02
	VSC with Paddle and Cover Tamper Switch, ULC/FM	1	976-520-02
3	300 psi/2000 kPa Water Pressure Gauge	1	2341

Manifold Size	Nominal Installation Dimensions in Inches and (mm)							Drain Size	Weight
	A	B	C	D	E	F	G	H	lbs. (kg)
2 Inch (DN50)	16-3/4 (425,5)	13 (330,2)	9/16 (14,3)	5-3/8 (136,5)	6-3/8 (161,9)	13-1/16 (331,8)	3-1/2 (88,9)	1" NPT	13.5 (6,1)
2-1/2 Inch (DN65)	17-3/16 (436,6)	13 (330,2)	1 (25,4)	5-3/4 (146,1)	6-7/8 (174,6)	13-3/4 (349,3)	3-1/2 (88,9)	1-1/4" NPT	16.8 (7,6)
3 Inch (DN80)	17-3/16 (436,6)	13 (330,2)	1 (25,4)	6 (152,4)	7-1/8 (181,0)	14-1/4 (362,0)	3-1/2 (88,9)	1-1/4" NPT	18.7 (8,5)
4 Inch (DN100)	20-1/2 (520,7)	13 (330,2)	4-5/16 (109,5)	7-9/16 (192,1)	9-1/16 (230,2)	16-5/8 (422,3)	4-1/2 (114,3)	2" NPT	32.7 (14,8)
6 Inch (DN150)	20-1/2 (520,7)	13 (330,2)	4-5/16 (109,5)	8-1/2 (215,9)	10 (254,0)	18-1/2 (469,9)	6-5/8 (168,3)	2" NPT	41.6 (18,9)

3 INCH (DN80) MANIFOLD

NO.	DESCRIPTION	QTY.	P/N
1	3" Manifold Body, Groove x Groove	1	N/A
2	Waterflow Alarm Switch: VSC with Paddle, UL/FM	1	976-357-03
	VSC with Paddle and Cover Tamper Switch, ULC/FM	1	976-520-03
3	300 psi/2000 kPa Water Pressure Gauge	1	2341

NOTES:

1. ULC Listed Manifolds are equipped with Cover Tamper Switches installed internal to the Waterflow Alarm Switches.
2. CH: Common Hardware

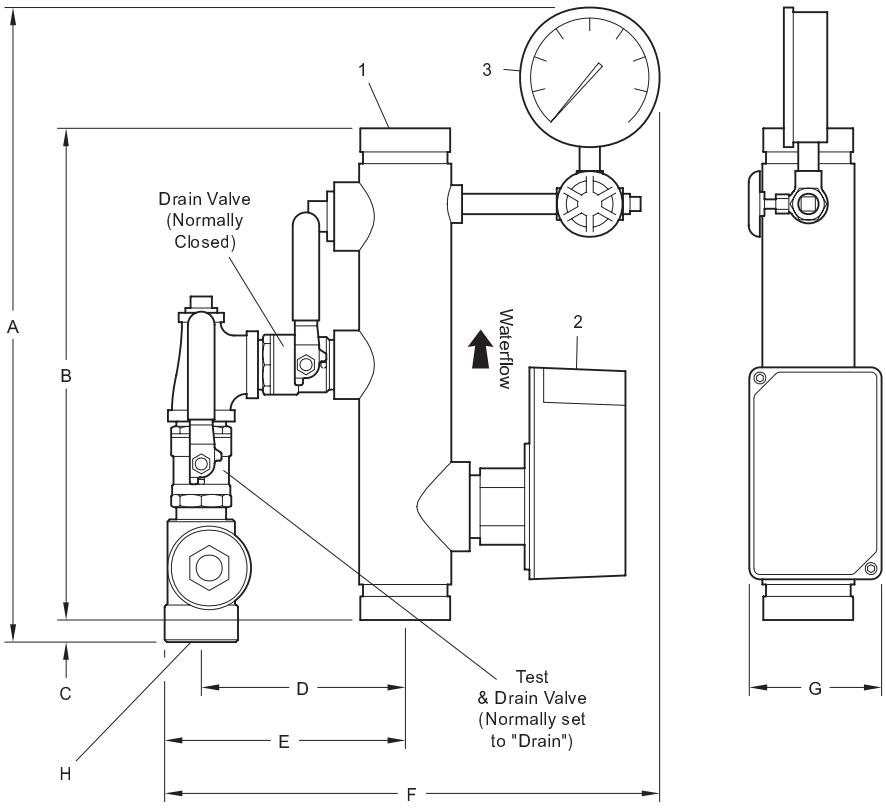
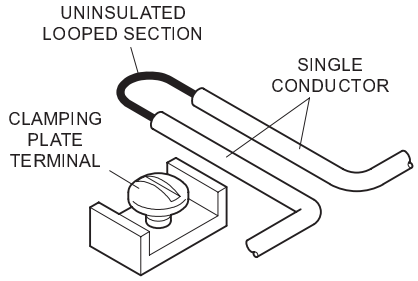


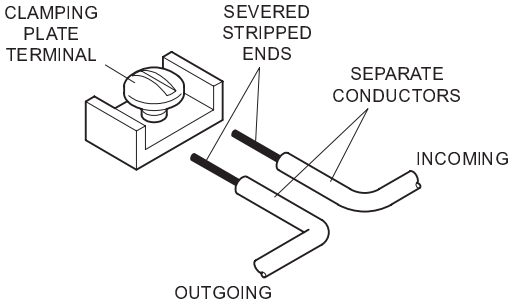
FIGURE 2
2 thru 6 INCH (DN50 thru DN150) RISER MANIFOLD ASSEMBLY AND DIMENSIONS

SWITCH TERMINAL CONNECTIONS



IMPROPER CONNECTION METHOD

CAUTION:
An uninsulated section of a single conductor is not permitted to be looped around the terminal and serve as two separate connections. The wire must be severed to serve as two separate connections, thereby providing supervision of the connection in the event that the wire becomes dislodged from the terminal.



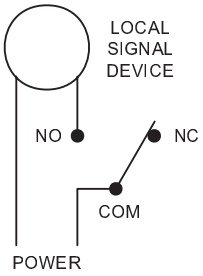
PROPER CONNECTION METHOD

WATERFLOW SWITCH TYPICAL ELECTRICA CONNECTIONS

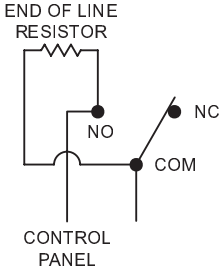
CONTACTS . . . . . SPDT (Form C)

CONTACT RATING . . . . 5A @ 125 VAC
2.5A @ 30 VDC

NO FLOW
CONDITION



NON-SUPERVISED
CIRCUIT



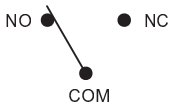
STYLE B/CLASS B
SUPERVISED CIRCUIT
(SEE NOTE)

NOTE:
For supervised circuits, see "Switch Terminal Connections" above. The Waterflow Alarm Switch has two switches, one can be used to operate a central station, proprietary or remove signaling unit, while the other contact is used to operate a local audible or visual annunciator.

COVER TAMPER SWITCH (ULC ASSEMBLIES ONLY)

CONTACTS . . . . . SPDT (Form C)

CONTACT RATING . . . . 3A @ 250 VAC
5A @ 125 VAC
1mA @ 5 VDC min.



CONTACTS SHOWN
WITH COVER IN PLACE

FIGURE 3
WIRING GUIDANCE

NO.	DESCRIPTION	QTY.	P/N
1	3/8" Copper Tubing, 2" (DN50) Manifolds	1	971-124-01
	2-1/2" (DN65) and 3" (DN80) Manifolds	1	971-124-02
	4" (DN100) and 6" (DN150) Manifolds	1	971-124-03

NO.	DESCRIPTION	QTY.	P/N
2	Pressure Relief Valve, 175 psi, Nonadjustable	1	198-066-00
3	90° Compression Fitting Fitting	2	CH
4	1" x 1/2" Reducing Hex Bushing	1	CH

CH: Common Hardware

1-1/2" (DN40) Manifold Only:
To install optional Pressure Relief Trim on a 1-1/2" (DN40) Manifold, a 1/2" NPT outlet must be provided by the installer on the system outlet piping, and a connection back to the manifold drain trim must be fabricated with installer supplied 3/8" copper tubing. Discard unused trim components.

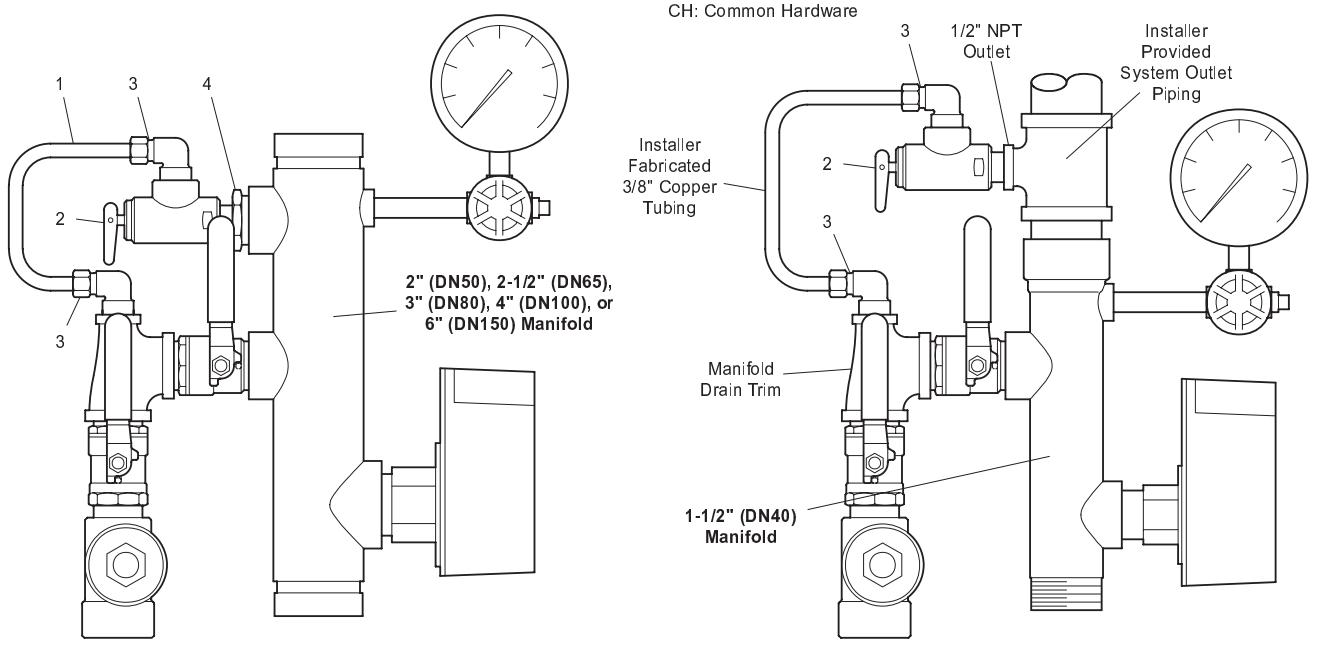


FIGURE 4
OPTIONAL PRESSURE RELIEF VALVE

Care and Maintenance

The following inspection procedure must be performed as indicated, in addition to any specific requirements of the NFPA, and any impairment must be immediately corrected.

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 authority having jurisdiction. The installing contractor or product manufacturer should be contacted relative to any questions.

It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified Inspection Service in accordance with local requirements and/or national codes.

NOTES

No attempt is to be made to repair any Riser Manifold component in the field. Only the pressure gauge, waterflow alarm switch, or relief valve can be replaced. If any other problems are encountered the entire riser manifold must be replaced.

The alarm/flow test procedure will result in operation of the associated alarms. Consequently, notification must be given to the owner and the fire department, central station, or other signal station to which the alarms are connected, and notification must be given to the building occupants.

Before closing a fire protection system control valve for inspection or maintenance work on the fire protection system that it controls, permission to shut down the effected fire protection system must first be obtained from the proper authorities and all personnel who may be affected by this action must be notified.

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

Alarm/Flow Test Procedure

Step 1. Place the test & drain Valve in the “test” position.

Step 2. Fully open the drain valve. Make certain that drainage water will not cause any damage or injury.

Step 3. Verify operation of associated alarms.

Step 4. Close the drain valve.

Step 5. Place the test & drain Valve in the “drain” position.

Step 6. Verify that the residual (flowing) pressure indicated by the pressure gauge is no less that originally recorded for the system when it was first installed.

Step 7. Close the drain valve.

Step 8. Verify that the static (not flowing) pressure indicated by the pressure gauge is no less that originally recorded for the system when it was first installed.

Limited Warranty

Products manufactured by Tyco Fire & Building Products (TFBP) are warranted solely to the original Buyer for ten (10) years against defects in material and workmanship when paid for and properly installed and maintained under normal use and service. This warranty will expire ten (10) years from date of shipment by TFBP. No warranty is given for products or components manufactured by companies not affiliated by ownership with TFBP or for products and components which have been subject to misuse, improper installation, corrosion, or which have not been installed, maintained, modified or repaired in accordance with applicable Standards of the National Fire Protection Association, and/or the standards of any other Authorities Having Jurisdiction. Materials found by TFBP to be defective shall be either repaired or replaced, at TFBP's sole option. TFBP neither assumes, nor authorizes any person to assume for it, any other obligation in connection with the sale of products or parts of products. TFBP shall not be responsible for sprinkler system design errors or inaccurate or incomplete information supplied by Buyer or Buyer's representatives.

In no event shall TFBP be liable, in contract, tort, strict liability or under any other legal theory, for incidental, indirect, special or consequential damages, including but not limited to labor charges, regardless of whether TFBP was informed about the possibility of such damages, and in no event shall TFBP's liability exceed an amount equal to the sales price.

The foregoing warranty is made in lieu of any and all other warranties, express or implied, including warranties of merchantability and fitness for a particular purpose.

This limited warranty sets forth the exclusive remedy for claims based on failure of or defect in products, materials or components, whether the claim is made in contract, tort, strict liability or any other legal theory.

This warranty will apply to the full extent permitted by law. The invalidity, in whole or part, of any portion of this warranty will not affect the remainder.

Ordering Information

Riser Manifold:
Specify; Size (specify), Figure 513, (specify connection type inlet x outlet) Riser Manifold (specify - without or with) a cover tamper switch for the waterflow alarm switch, P/N (specify).

NOTES

Orders for Figure 513 may be filled with a Figure 13. The two assemblies are completely interchangeable in function, application, and end-to-end laying length.

If a ULC Listing is required, the Riser Manifold must be ordered with a cover tamper switch for the waterflow alarm switch.

UL/ULC/FM Assemblies
With Cover Tamper Switch

1-1/2 Inch (DN40)	
MT x FT	P/N 4086
1-1/2 Inch (DN40)	
MT x MT	P/N 4087
2 Inch (DN50)	
G x G	P/N 4090
2-1/2 Inch (DN65)	
G x G	P/N 4091
3 Inch (DN80)	
G x G	P/N 4092
4 Inch (DN100)	
G x G	P/N 4095
6 Inch (DN150)	
G x G	P/N 4096

UL/FM Assemblies
Without Cover Tamper Switch

1-1/2 Inch (DN40)	
MT x FT	P/N 4055
1-1/2 Inch (DN40)	
MT x MT	P/N 4056
2 Inch (DN50)	
G x G	P/N 4060
2-1/2 Inch (DN65)	
G x G	P/N 4061
3 Inch (DN80)	
G x G	P/N 4062
4 Inch (DN100)	
G x G	P/N 4065
6 Inch (DN150)	
G x G	P/N 4066

Optional Pressure Relief Valve:
Specify: Operational Pressure Relief Valve and Trim for use with (specify size) Figure 513 or 13 Series Riser Manifold, P/N (specify).

1-1/2" or 2"	P/N 4063
2-1/2" or 3"	P/N 4072
4" or 6"	P/N 4073

Replacement Parts:
Specify: (description) for use with Figure 513 or 13 Riser Manifold, P/N (Ref. Figure 1 or 2, as applicable).

Model 8000/8011

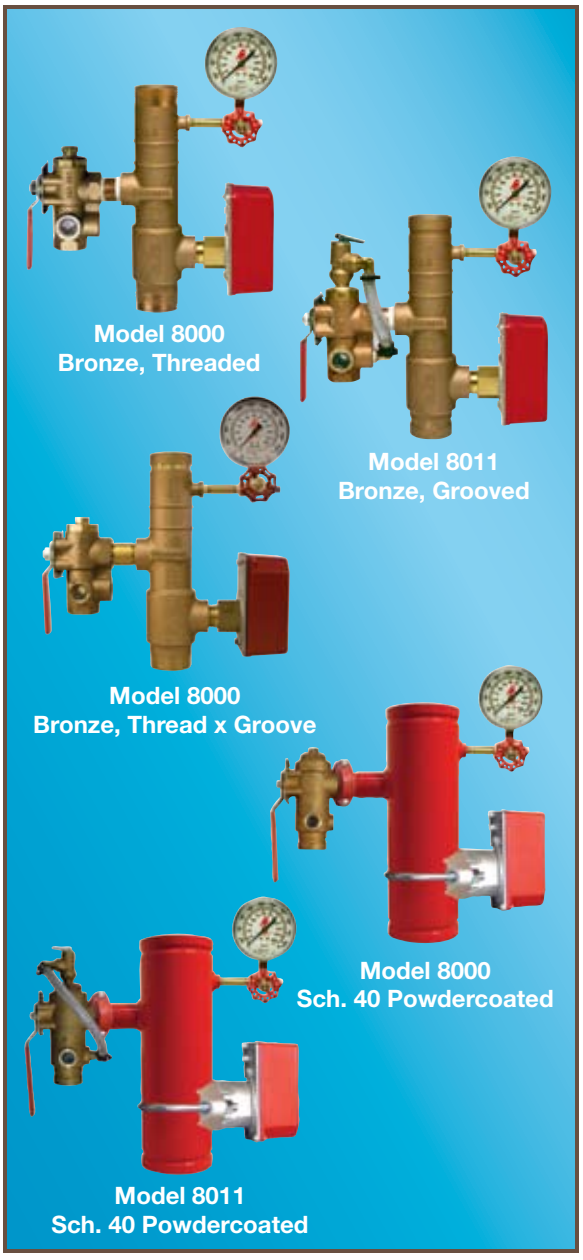
COMMERCIAL RISERPACK®

Pre-Assembled TESTANDRAIN Riser

1¼" 1½" 2" 2½" 3" 4" 6"

Bronze — Sch. 40 Powdercoated

- The AGF Manufacturing Inc. **Model 8000/8011 COMMERCIAL RISERPACK®** is a compact prepackaged economical riser assembly designed for NFPA 13 wet fire sprinkler systems.
- The **Model 8000/8011 COMMERCIAL RISERPACK®** utilize the appropriate sized UL Listed/FM Approved patented AGF **Model 2500** or **2511 TESTANDRAIN®** valves designed to comply with the NFPA 13 requirement regarding providing sight glasses for verification while testing through a properly sized test orifice. The **Model 8000/8011 COMMERCIAL RISERPACK®** is available with ⅜", 7/16", ½", 17/32", ⅝" (ELO), ¾" (ESFR) and K25 orifices to meet K-Factors of 2.8 to 25.
- The UL Listed, made and machined in the **U.S.A.**, cast bronze 1¼", 1½" and 2" **RISERPACK®s** are available with male threaded, grooved, and threaded x grooved ends and are rated at 300 PSI; castings are lettered on both sides allowing right or left side draining, horizontal or vertical installation. The Schedule 40 fabricated steel body with 3mil powder coated red finish 2½", 3", 4", and 6" **RISERPACK®** are available with grooved ends and are rated at 300 PSI.
- All **RISERPACK®s** are assembled with UL Listed/FM Approved AGF **Model 7500 300 PSI Pressure Gauge**, **Model 7600 ¼" 3-way Globe Valve** and either a 1" NPT threaded or saddle mount water flow switch as required by NFPA 13.
- The **Model 8000/8011 COMMERCIAL RISERPACK®** through the **Model 2500/2511 TESTANDRAIN®** valves offer a unique design benefit that allows system access through the valve for system integrity testing and/or installation of the optional relief valve trim kit (**Model 8011**) without system draining.
- 1¼", 1½", an 2" **RISERPACK®s** utilize a 1" FNPT **M2500** or **2511** and are available with orifice sizes of ⅜" to ⅝" (ELO); 2½" and 3" **RISERPACK®s** utilize a 1¼" FNPT **M2500** or **2511** and are available with orifice sizes of ⅜" to ¾" (ESFR); and 4" and 6" **RISERPACK®s** utilize a 2" Grooved **M2500** or **2511** and are available with orifice sizes of ⅜" to K-25.
- Available as the **Model 8011** with UL Listed/FM Approved AGF **Model 7000 Pressure Relief Valve**, factory rated at 175 PSI. Other ratings are available and may be substituted: 165, 185, 195, 205, 225, & 250.



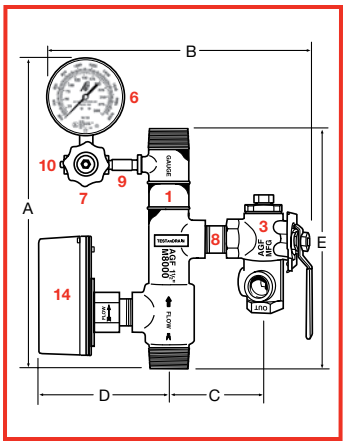
NOTE: It is important to note that the pressure rating of the relief valve indicates an operating range of pressure for both opening and closing of the valve. Standard relief valves are required to OPEN in a range of pressure between 90% and 105% of their rating. The valves are required to CLOSE at a 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

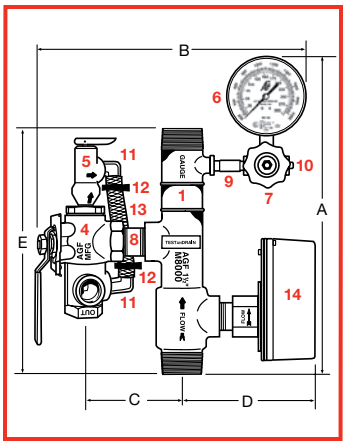
Model 8000/8011

Commercial RiserPACK®

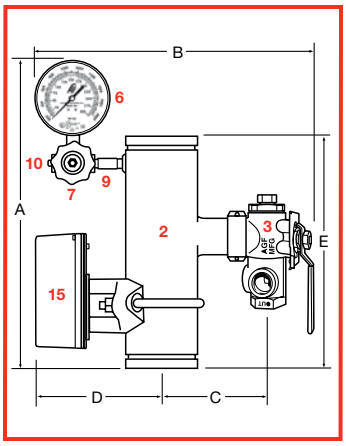
1¼" — 2" Model 8000



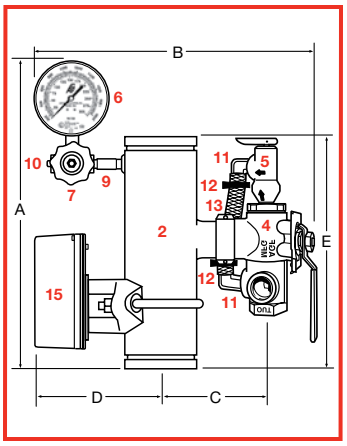
1¼" — 2" Model 8011



2½" — 6" Model 8000



2½" — 6" Model 8011



Dimensions

SIZE	A	B	C	D	E
1¼"	14½" (369 mm)	14" (356 mm)	4¾" (120 mm)	6½" (165 mm)	11" (279 mm)
1½"	15½" (394 mm)	14¼" (362 mm)	4¾" (120 mm)	6¾" (171 mm)	12" (305 mm)
2"	15½" (394 mm)	14¾" (374 mm)	5" (127 mm)	7" (178 mm)	12" (305 mm)
2½"	17⅛" (435 mm)	14¼" (362 mm)	5⅝" (143 mm)	6" (152 mm)	14" (356 mm)
3"	17⅛" (435 mm)	15" (381 mm)	5⅞" (149 mm)	6⅜" (162 mm)	14" (356 mm)
4" *	17⅛" (435 mm)	19" (483 mm)	8" (203 mm)	6⅞" (175 mm)	14" (356 mm)
6" *	17⅛" (435 mm)	21⅛" (537 mm)	9⅛" (232 mm)	7⅞" (200 mm)	14" (356 mm)

* 4" and 6" RiserPACKs utilize a 2" groove x groove M2500/2511 TESTanDRAIN valve.

Dimensions have been rounded to the nearest ¼", except "E".

Confirm that enough space is left between the RiserPACK and any obstructions to move handle of M2500/2511 TESTanDRAIN valve into the "TEST" position and into the "DRAIN" position.

MADE IN U.S.A.

Components

Item No.	Part	Qty.
1	RiserPACK - Bronze Casting	1
2	RiserPACK - Sch. 40 Powdercoated	1
3	M2500 TESTanDRAIN Valve	1
4	M2511 TESTanDRAIN Valve	1
5	M7000 Pressure Relief Valve	1
6	M7500 Pressure Gauge	1
7	M7600 ¼" 3-Way Globe Valve	1
8	Brass Nipple	1
9	Brass Nipple	1
10	¼" Brass Plug	1
11	½" Brass NPT x Barb 90° Elbow	2
12	Clamps	2
13	Nylobraid Drain Tubing	1
14	NPT Water Flow Switch	1
15	Saddle Mount Water Flow Switch	1

USA Patent 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:_____

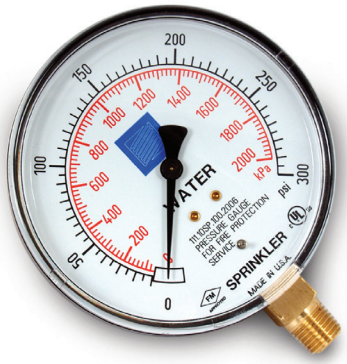
Pressure Gauges

Sprinkler Gauge

INSIST ON FPPI®

Description

FPPI pressure gauges feature an impact and corrosion resistant case made from ABS (plastic). Features phosphor bronze bourdon tube movement with white enameled brass dial face with large numbers for easy reading. Dual scale to 300 PSI/2000Kpa. UL/ULc Listed (Sprinkler Gauge Model 111.10SP, UL Listed file EX5232) and FM Approved.



Applications

- Fire sprinkler systems
- Suitable for all media that will not obstruct the pressure system or attack copper alloy parts

Special Features

- UL-listed (UL-393), United States and Canada (Sprinkler Gauge Model 111.10SP, UL Listed file EX5232)
- Factory Mutual (FM) approved
- Reliable and economical

Standard Features

Design
EN 837-1 & ASME B40.100

Sizes
4" (100 mm)

Accuracy class
± 3⅔% of span
(ASME B40.100 Grade B)

Ranges
0/80 psi, retard to 250 psi (air)
0/300 psi (air, water, air/water)

Working Pressure
Steady: ¾ of full scale value
Fluctuating: ⅔ of full scale value
Short time: full scale value

Operating Temperature
Ambient: -40°F to 140°F
(-40°C to 60°C)
Media: 140°F (+60°C) maximum

Temperature Error
Additional error when temperature changes from reference temperature of 68°F (20°C) +0.4% for every 18°F (10°C) rising or falling. Percentage of span.

Specifications

Bourdon Tube
Material: copper alloy C-type

Pressure Connection
Material: copper alloy
¼" NPT lower mount (LM)

Movement
Copper alloy

Dial
White aluminum with stop pin; black and red lettering

Pointer
Black aluminum

Case
Black polycarbonate

Window
Snap-in clear polycarbonate

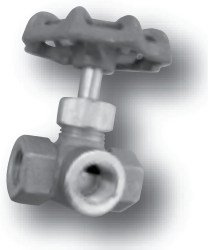
3198 LIONSHEAD AVE
CARLSBAD, CA 92010
TEL + 1 760 599-1168
+ 1 800 344-1822
FAX + 1 800 344-3775

Gauges

For use with wet or dry systems.
Gauges have a bronze burbon tube movement in a stainless steel case.*

- 3-1/2" Diameter
- UL and FM approved.*
- Custom gauges can be made.

*Unless otherwise noted.



3-Way Valve Included in Accessory Pack!

*Gauges can be custom branded with **your** name and logo. Please call for more information.*

Part No.	Description	Box Qty.	Box Weight	Crate Qty.	Case Weight
GAAWSS350	AIR/WATER 0-300 PSI W/ STAINLESS STEEL CASE	60	42 Lbs.	480	535 Lbs.
GAASS250	AIR W/ RETARD 250 PSI 3-1/2" DIAMETER, W/ STAINLESS STEEL CASE	60	40 Lbs.	480	530 Lbs.
GAWP200	2" RESIDENTIAL GAUGE 300 PSI W/ BLACK STEEL CASE (NOT UL OR FM APPROVED)	150	45 Lbs.	1200	580 Lbs.
GAUGE KITS - AIR OR AIR/WATER					
GAKITAWSS350	AIR/WATER GAUGE 0-300 PSI W/ STAINLESS STEEL CASE, 1/4" x 4" NIPPLE, 1/4" 3 WAY VALVE, 1/4" PLUG, 1/2" x 1/4" HEXHEAD REDUCING BUSHING	10	14 Lbs.	NA	NA
GAKITAOSS250	AIR GAUGE 0-250 PSI W/ STAINLESS STEEL CASE, 1/4" x 4" NIPPLE, 1/4" 3 WAY VALVE, 1/4" PLUG, 1/2" x 1/4" HEXHEAD REDUCING BUSHING	10	14 Lbs.	NA	NA

Water Flow Switches

VSR
VANE TYPE WATERFLOW ALARM SWITCH WITH RETARD

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

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

⚠ 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.

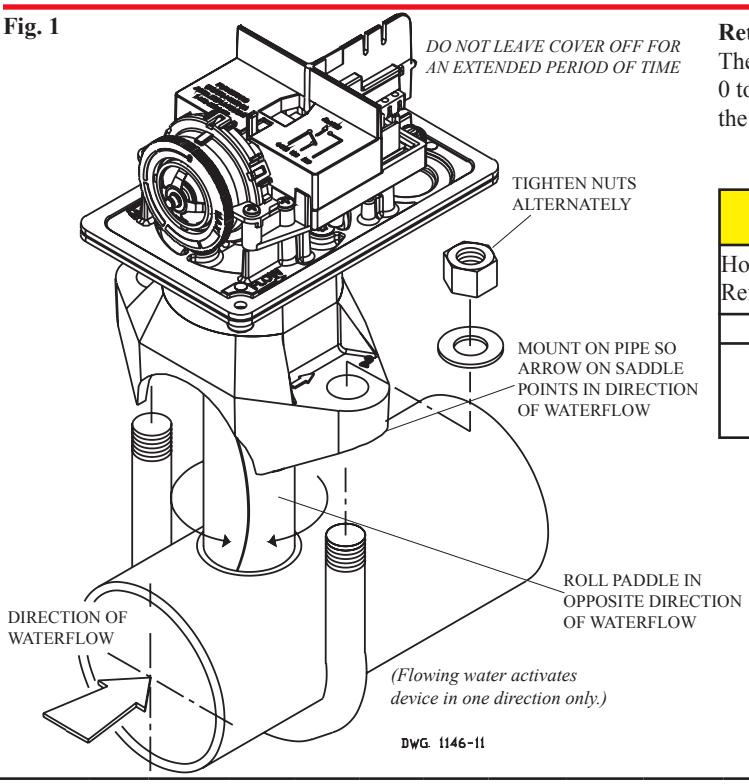
NOTE: Do not leave cover off for an extended period of time.

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

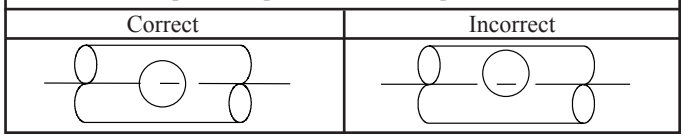


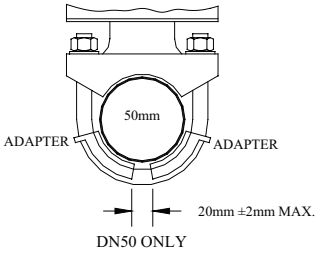
Retard Adjustment

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

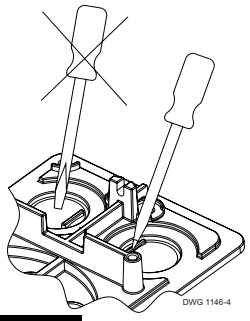
DWG# 1146-1F

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.

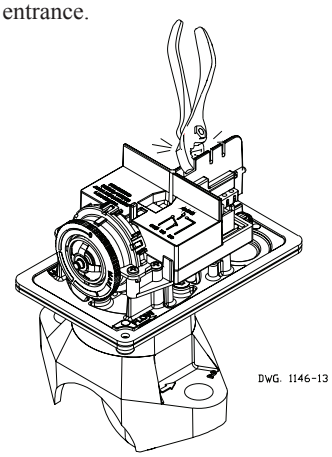
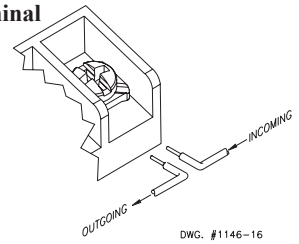


Fig. 4 Switch Terminal Connections Clamping Plate Terminal

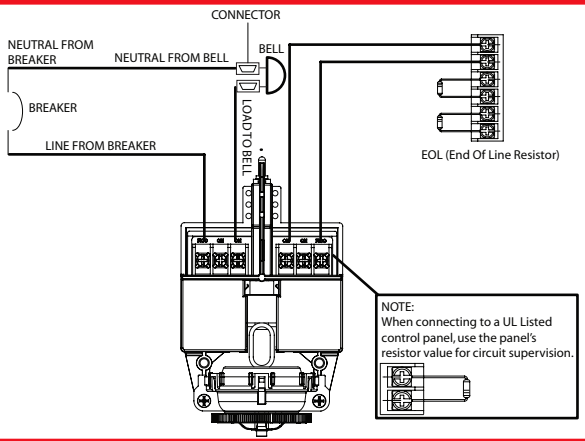


⚠ WARNING

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

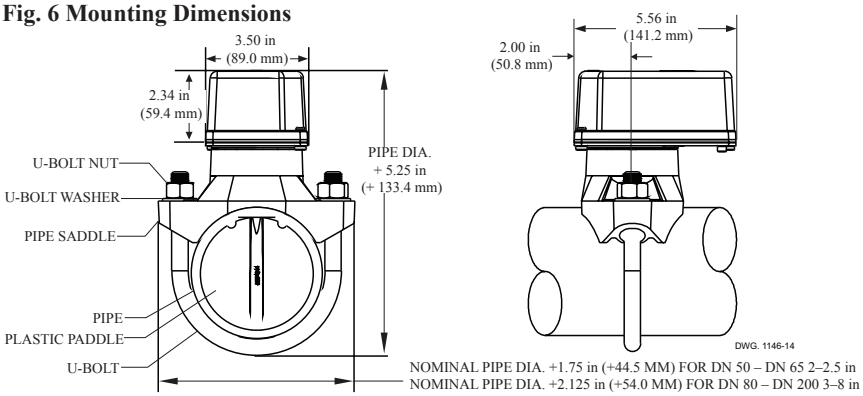
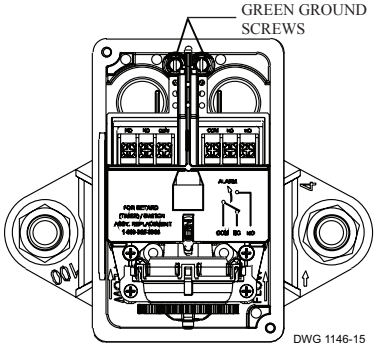


Fig. 7



Maintenance

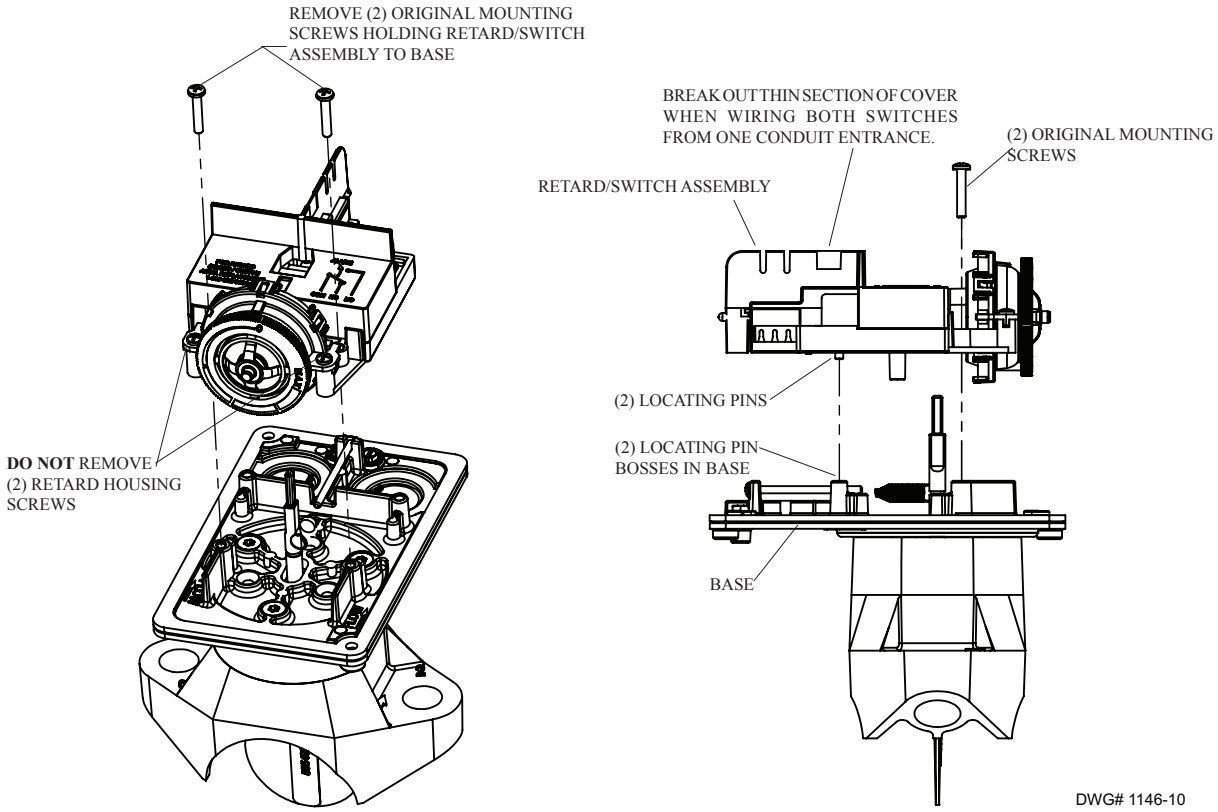
Inspect detectors monthly. If leaks are found, replace the detector. The VSR waterflow switch should provide years of trouble-free service. The retard and switch assembly are easily field replaceable. In the unlikely event that either component does not perform properly, please order replacement retard 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.

WFD Series Waterflow Detector

The System Sensor WFD series is compatible with schedule 10 through 40 steel pipe, sizes 2˝ through 8˝, and can be mounted in a vertical or horizontal position.

Features

- Two-inch mounting hole provided in new WFD30-2 models
- UL-listed models are NEMA 4 rated
- Sealed retard mechanism immune to dust and other contaminants
- Visual switch activation
- Field-replaceable retard mechanism and SPDT switches
- Rugged, dual SPDT switches enclosed in a durable terminal block
- Accommodates up to 12 AWG wire
- Designed for both indoor and outdoor use
- 100 percent synchronization activates both alarm panel and local bell
- Tamper-resistant cover screws

Robust Construction. The WFD series consists of a rugged, NEMA 4-rated enclosure. Designed for both indoor and outdoor use, the WFD series operates across a wide temperature range, from 32°F to 120°F.

Reliable Performance. UL-listed models are equipped with tamper-resistant cover screws to prevent unauthorized entry. Inside, two sets of SPDT (Form C) synchronized switches are enclosed in a durable terminal block to assure reliable performance.

False Alarm Immunity. The WFD series incorporates a mechanical retard feature, which minimizes the risk of false alarm due to pressure surges or air trapped in the sprinkler system. In addition, the mechanical retard's unique sealed design is immune to dust and other contaminants.

Simplified Operation. The WFD series is designed to simplify installation. Two conduit openings permit easy attachment to the local alarm system. The retard mechanism and dual SPDT switches are field-replaceable.

Agency Listings

S739 CS169 7770-1653:114 167-93-E 3006195

Waterflow Detector Specifications

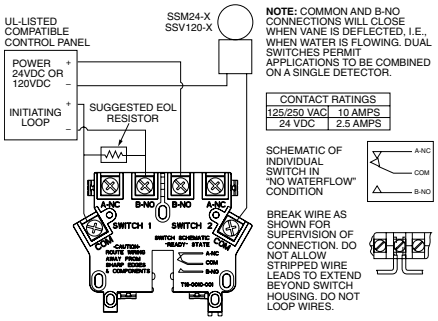
Engineering Specifications

Vane-type waterflow detectors shall be installed on system piping as designated on the drawing and/or as specified herein. Detectors shall mount on any clear pipe span of the appropriate nominal size, either a vertical upflow or horizontal run, at least 6″ from any fittings that may change water direction, flow rate, or pipe diameter or no closer than 24″ from a valve or drain. Detectors shall have a sensitivity in the range of 4 to 10 gallons per minute and a static pressure rating of 450 psi* for 2″ – 8″ pipes. The detector shall respond to waterflow in the specified direction after a preset time delay that is field adjustable. The delay mechanism shall be a sealed mechanical pneumatic unit with visual indication of actuation. The actuation mechanism shall include a polyethylene vane inserted through a hole in the pipe and connected by a mechanical linkage to the delay mechanism. Outputs shall consist of dual SPDT switches (Form C contacts). Two conduit entrances for standard fittings of commonly used electrical conduit shall be provided on the detectors. A grounding provision is provided. Unless noted, enclosures shall be NEMA 4 listed by Underwriters Laboratories Inc. All detectors shall be listed by Underwriters Laboratories Inc. for indoor or outdoor use.

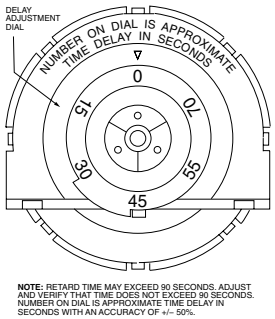
Standard Specifications

Static Pressure Rating	450 PSI*	**Operating Temperature Range**	32°F to 120°F (0°C to 49°C)
Maximum Surge	18 Feet Per Second (FPS)	**Enclosure Rating***	NEMA 4 – suitable for indoor/outdoor use
Triggering Threshold Bandwidth (Flow Rate)	4–10 GPM	**Cover Tamper Switch**	Standard with ULC models, optional for UL models, part no. 546-7000
Conduit Entrances	Two openings for ½″ conduit. One open, one knock-out type	**Service Use**	Automatic Sprinkler: NFPA-13 One or Two Family Dwelling: NFPA 13D Residential Occupancies up to 4 Stories: NFPA 13R National Fire Alarm Code: NFPA-72
Contact Ratings	Two sets of SPDT (Form C) 10.0 A, ½ HP @ 125/250 VAC 2.5 A @ 6/12/24 VDC	**U.S. Patent Numbers**	5,213,205
Compatible Pipe	Steel water pipe, schedule 10 through 40	**Warranty**	3 Years

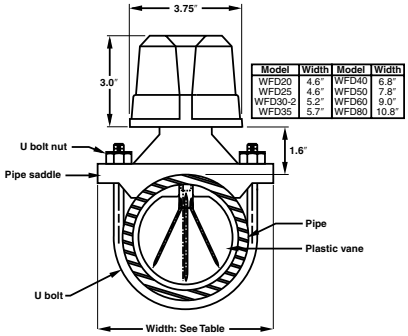
WFD Field Wiring Diagram



Delay Adjustment Dial



Overall Dimensions, Installed



Model	Width	Model	Width
WFD20	4.6″	WFD40	6.8″
WFD25	4.6″	WFD50	7.8″
WFD30-2	5.2″	WFD60	9.0″
WFD35	5.7″	WFD80	10.8″

Ordering Information

UL Model	ULC Model	Pipe Size	Hole Size	Shipping Weight
WFD20	WFD20A	2″	1¼″	4.2 lbs.
WFD25	WFD25A	2½″	1¼″	4.3 lbs.
WFD30-2	WFD30-2A	3″	2″	4.5 lbs.
WFD35	WFD35A	3½″	1¼″	4.7 lbs.
WFD40	WFD40A	4″	2″	5.2 lbs.
WFD50	WFD50A	5″	2″	6.3 lbs.
WFD60*	WFD60A	6″	2″	6.8 lbs.
WFD80*	WFD80A	8″	2″	7.5 lbs.

Accessories

A3008-00	Retard mechanism
A77-01-02	Terminal block
546-7000	Tamper-proof switch kit
WFDW	Tamper-proof wrench for cover
WFDN4	Gasket kit

*Maximum pressure rating 400 psi as approved by Factory Mutual.

SYSTEM SENSOR®

3825 Ohio Avenue • St. Charles, IL 60174
Phone: 800-SENSOR2 • Fax: 630-377-6495

A05-0180-013 • 1/09 • #1922

Tamper Switches

OSYSU-1,-2

OUTSIDE SCREW AND YOKE VALVE SUPERVISORY SWITCH

UL, ULC and CSFM Listed, FM Approved, NYMEA Accepted, CE Marked

Dimensions: 6.19"L X 2.25"W X 5.88"H
15,7cm L X 5,7cm W X 14,6cm H

Weight: 2 lbs (0,9 kg)

Enclosure: Cover - Die-Cast
Finish - Red Spatter Enamel
Base - Die Cast Zinc
All parts have corrosion resistant finishes

Cover Tamper: Tamper Resistant Screws
Optional Cover Tamper Switch Available

Contact Ratings:
OSYSU-1: One set of SPDT (Form C)
OSYSU-2: Two sets of SPDT (Form C)
15 Amps at 125/250VAC
2.5 Amps at 30VDC resistive

Environmental Limitations:
-40°F to 140°F (-40°C to 60°C)
NEMA 4 and NEMA 6P Enclosure (IP67)
Indoor or outdoor use (Not for use in hazardous locations. See Bulletin No. 5400705 OSYS-U-EX for hazardous locations).

Conduit Entrances:
2 knockouts for 1/2" conduit provided

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

General Information

The OSYSU is used to monitor the open position of an OS&Y (outside screw and yoke) type gate valve. This device is available in two models; the OSYSU-1, containing one set of SPDT (Form C) contacts and the OSYSU-2, containing two sets of SPDT (Form C) contacts. These switches mount conveniently to most OS&Y valves ranging in size from 2" to 12" (50mm to 300mm). They will mount on some valves as small as ½" (12,5mm).

The cover is held in place by two tamper resistant screws that require a special tool to remove. The tool is furnished with each device and should be left with the building owner or responsible party. Replacement or additional cover screws and hex keys are available. See Ordering Information.

Optional Cover Tamper Switch

A field installable cover tamper switch is available as an option which may be used to indicate removal of the cover. See Ordering Information.

Testing

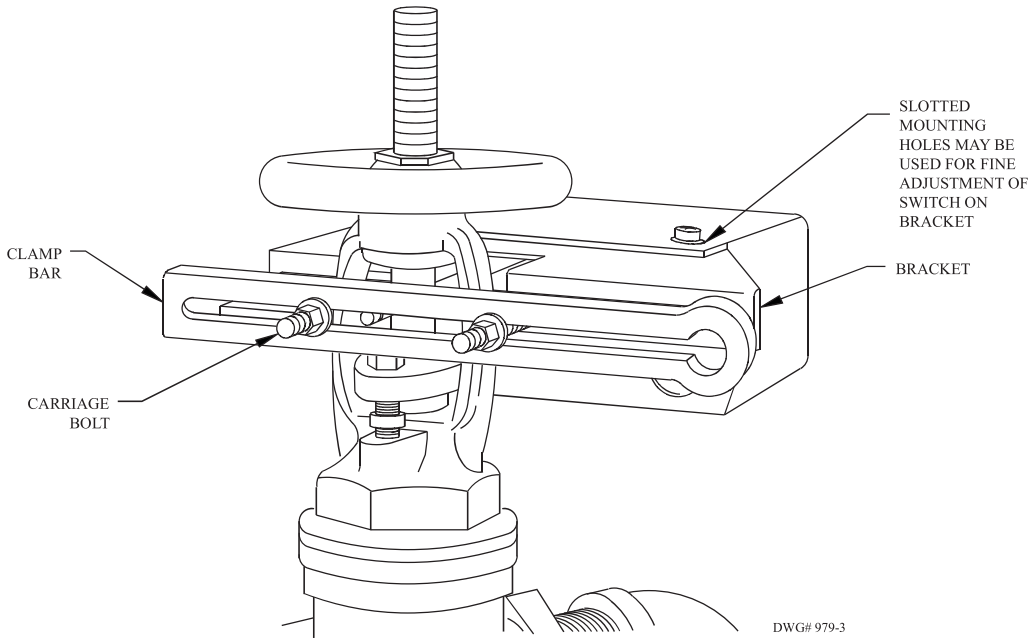
The OSYSU and its associated protective monitoring system should be inspected and tested in accordance with applicable NFPA codes and standards and/or the authority having jurisdiction (manufacturer recommends quarterly or more frequently).

Ordering Information

Model	Description	Stock No.
OSYSU-1	Outside Screw & Yoke Supervisory Switch (Single switch)	1010106
OSYSU-2	Outside Screw & Yoke Supervisory Switch (Double switch)	1010206
	Cover Screw	5490424
	Hex Key for Cover Screws and Installation Adjustments	5250062
	Optional Cover Tamper Switch Kit	0090131

FIG. 1 **SMALL VALVE INSTALLATION - 1/2" THRU 2 1/2" SIZES**

These switches mount conveniently to most 2" to 12" OS&Y valves. They will mount on some valves as small as 1/2". J-hooks may be required on valves with limited clearance.



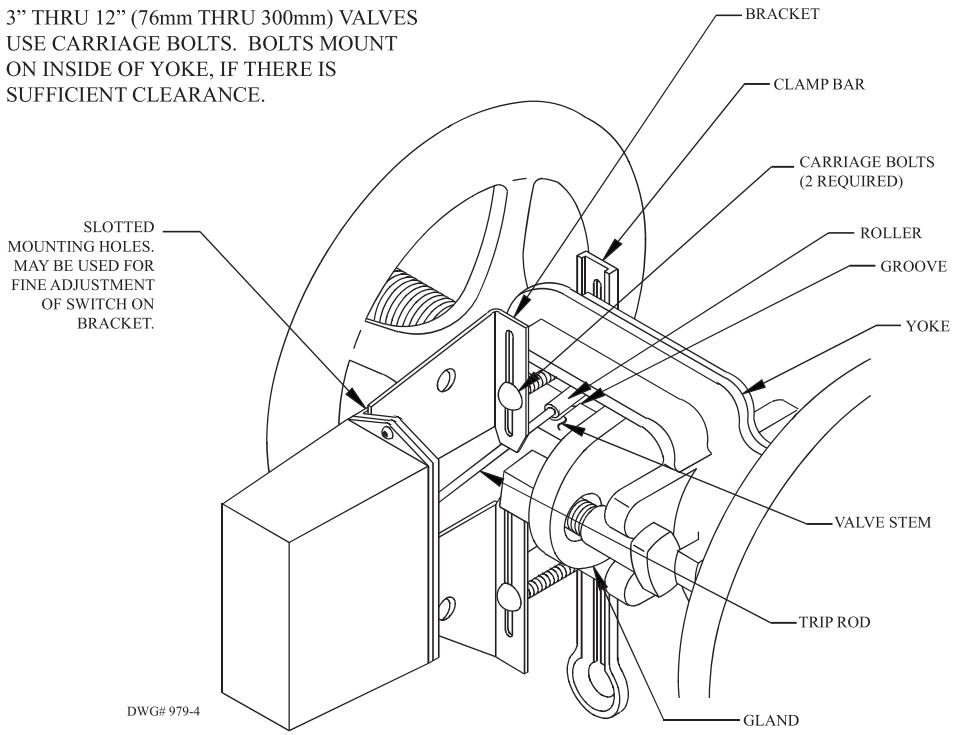
SMALL VALVE INSTALLATION

1. Remove and discard "C" washer and roller from the trip rod.
2. With the valve in the FULL OPEN position, locate the OSYSU across the valve yoke as far as possible from the valve gland, so that the trip rod lays against the non-threaded portion of the valve stem.
3. Loosen the locking screw that holds the trip rod in place and adjust the rod length (see Fig. 4). When adjusted properly, the rod should extend past the valve screw, but not so far that it contacts the clamp bar. Tighten the locking screw to hold the trip rod in place.

   NOTE: If trip rod length is excessive, loosen the locking screw and remove the trip rod from the trip lever. Using pliers, break off the one (1) inch long notched section (see Fig. 5). Reinstall trip rod and repeat Step 3 procedure.
4. Mount the OSYSU loosely with the carriage bolts and clamp bar supplied. On valves with limited clearance use J-hooks supplied instead of the carriage bolts and clamp bar to mount the OSYSU.
5. Mark the valve stem at the center of the trip rod.
6. Remove the OSYSU. File a 1/8" deep groove centered on the mark on the valve stem utilizing a 3/16" diameter straight file. Round and smooth the edges of the groove to prevent damage to the valve packing and to allow the trip rod to move easily in and out of the groove as the valve is operated.
7. Mount the OSYSU with the trip rod centered in groove.
8. Final adjustment is made by loosening 2 screws (see Fig. 1) and sliding the OSYSU on the bracket. Adjustment is correct when switches are not activated with the trip rod seated in the valve stem groove and that the switches activate when the trip rod moves out of the groove.
9. Tighten the adjustment screws and all mounting hardware. Check to insure that the rod moves out of the groove easily and that the switches activate within one turn when the valve is operated from the FULL OPEN towards the CLOSED position.

NOTE: CLOSE THE VALVE FULLY TO DETERMINE THAT THE STEM THREADS DO NOT ACTIVATE THE SWITCH. THE SWITCH BEING ACTIVATED BY THE STEM THREADS COULD RESULT IN A ***FALSE VALVE OPEN*** INDICATION.

FIG. 2 LARGE VALVE INSTALLATION - 3" THRU 12" SIZES



LARGE VALVE INSTALLATION

1. With the valve in the FULL OPEN position, locate the OSYSU across the valve yoke as far as possible from the valve gland, so that the trip rod lays against the non-threaded portion of the valve stem.
2. Mount the OSYSU loosely with the carriage bolts and clamp bar supplied.
3. Loosen the locking screw that holds the trip rod in place and adjust the rod length (see Fig. 4). When adjusted properly, the rod should extend past the valve screw, but not so far that it contacts the clamp bar. Tighten the locking screw to hold the trip rod in place.

   NOTE: If trip rod length is excessive, loosen the locking screw and remove the trip rod from the trip lever. Using pliers, break off the one (1) inch long notched section (see Fig. 5). Reinstall trip rod and repeat Step 3 procedure.
4. Mark the valve stem at the center of the trip rod.
5. Remove the OSYSU. File a 1/8" deep groove centered on the mark of the valve stem utilizing a 3/8" diameter straight file. Round and smooth the edges of the groove to prevent damage to the valve packing and to allow the trip rod to move easily in and out of the groove as the valve is operated.
6. Mount the OSYSU loosely with the trip rod centered in groove.
7. Final adjustment is made by loosening 2 screws (see Fig. 2) and sliding the OSYSU on the bracket. Adjustment is correct when switches are not activated with the trip rod seated in the valve stem groove and that the switches activate within one turn when the valve is operated from the FULL OPEN towards the CLOSED position.
8. Tighten the adjustment screws and mounting hardware. Check to insure that the rod moves out of the groove easily and that the switches activate within one turn when the valve is operated from the FULL OPEN towards the CLOSED position.

NOTE: CLOSE THE VALVE FULLY TO DETERMINE THAT THE STEM THREADS DO NOT ACTIVATE THE SWITCH. THE SWITCH BEING ACTIVATED BY THE STEM THREADS COULD RESULT IN A ***FALSE VALVE OPEN*** INDICATION.

OSYSU-1,-2
OUTSIDE SCREW AND YOKE VALVE SUPERVISORY SWITCH

FIG. 3 **DIMENSIONS**

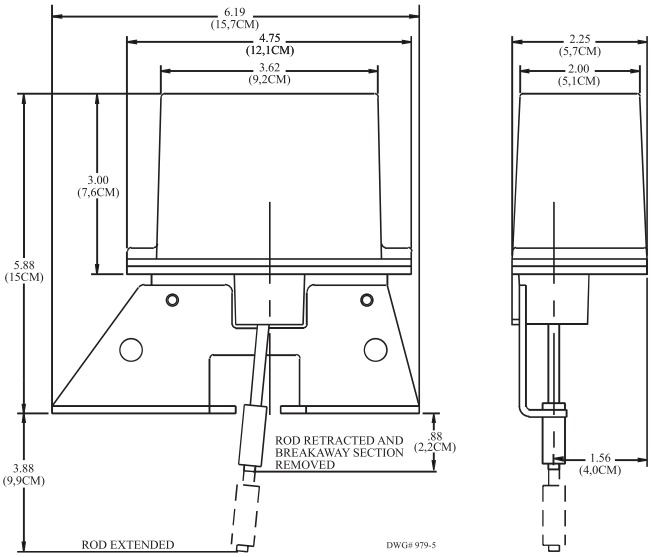
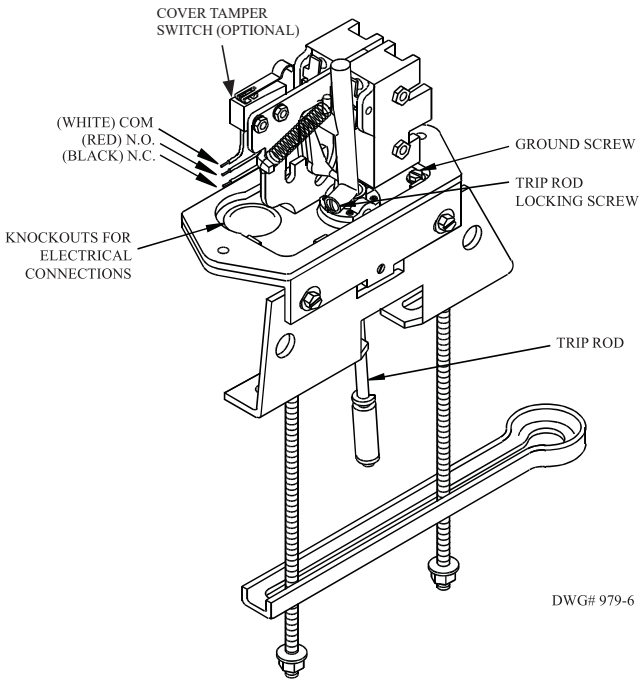
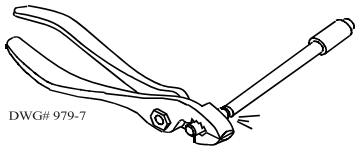


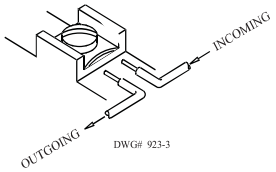
FIG. 4 **PARTS**



BREAKING EXCESSIVE ROD LENGTH

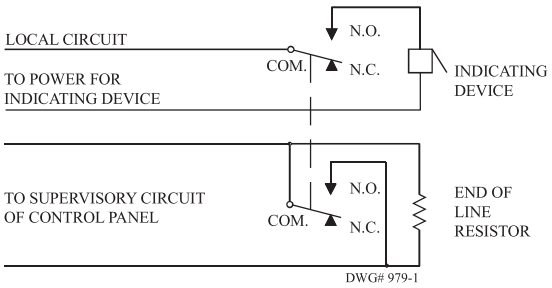


SWITCH TERMINAL CONNECTIONS CLAMPING PLATE TERMINAL



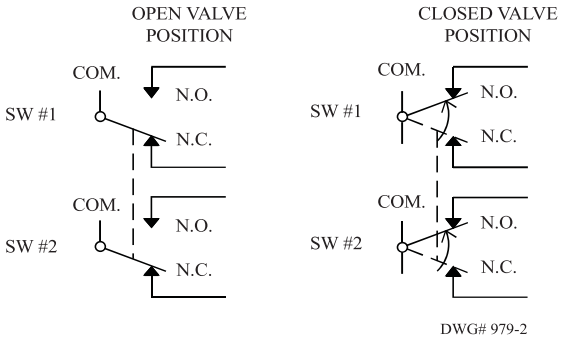
CAUTION:
An uninsulated section of a single conductor should not be looped around the terminal and serve as two separate connections. The wire must be severed, thereby providing supervision of the connection in the event that the wire becomes dislodged from under the terminal.

TYPICAL ELECTRICAL CONNECTIONS



Contacts shown in normal (valve open) condition.

TYPICAL SWITCH ACTION



Electric Bell

BELLS

PBA-AC & PBD-DC

6" BELL SHOWN

UL Listed, FM Approved

Sizes Available: 6" (150mm), 8" (200mm) and 10" (250mm)

Voltages Available: 24VAC
120VAC
12VDC (10.2 to 15.6) Polarized
24VDC (20.4 to 31.2) Polarized

Service Use: Fire Alarm
General Signaling
Burglar Alarm

Environment: Indoor or outdoor use (See Note 1)
-40° to 150°F (-40° to 66°C)
(Outdoor use requires weatherproof backbox.)

Termination: 4 No. 18 AWG stranded wires

Finish: Red powder coating

Optional: Model BBK-1 weatherproof backbox

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

ALL DC BELLS ARE POLARIZED AND HAVE BUILT-IN TRANSIENT PROTECTION:

SIZE INCHES (mm)	VOLTAGE	MODEL NO.	STOCK NO.	CURRENT (MAX.)	TYPICAL dB AT 10 FT. (3m) (2)	MINIMUM dB AT 10 FT. (3m) (1)
6 (150)	12VDC	PBD126	1706012	.12A	85	76
8 (200)	12VDC	PBD128	1708012	.12A	90	76
10 (250)	12VDC	PBD1210	1710012	.12A	92	76
6 (150)	24VDC	PBD246	1706024	.06A	87	76
8 (200)	24VDC	PBD248	1708024	.06A	91	79
10 (250)	24VDC	PBD2410	1710024	.06A	94	79
6 (150)	24VAC	PBA246	1806024	.17A	91	76
8 (200)	24VAC	PBA248	1808024	.17A	94	76
10 (250)	24VAC	PBA2410	1810024	.17A	94	76
6 (150)	120VAC	PBA1206	1806120	.05A	92	82
8 (200)	120VAC	PBA1208	1808120	.05A	99	82
10 (250)	120VAC	PBA12010	1810120	.05A	99	85

Notes:

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

DIMENSIONS
INCHES (mm)

FIG. 1 **BELLS**

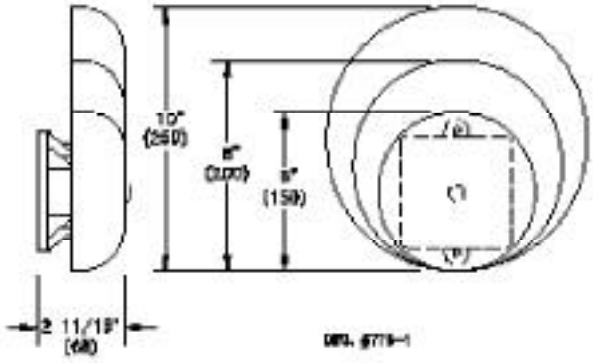


FIG. 2 **WEATHERPROOF BACKBOX**

BOX HAS ONE THREADED 1/2" CONDUIT ENTRANCE

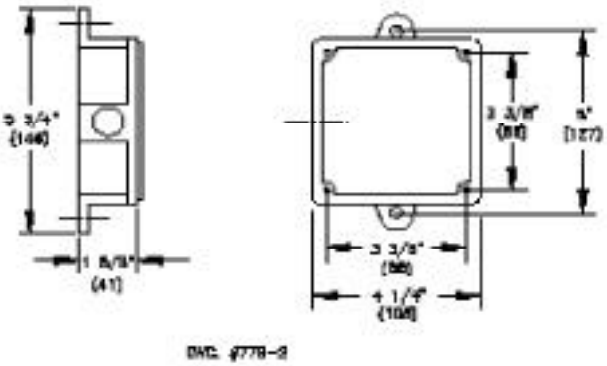
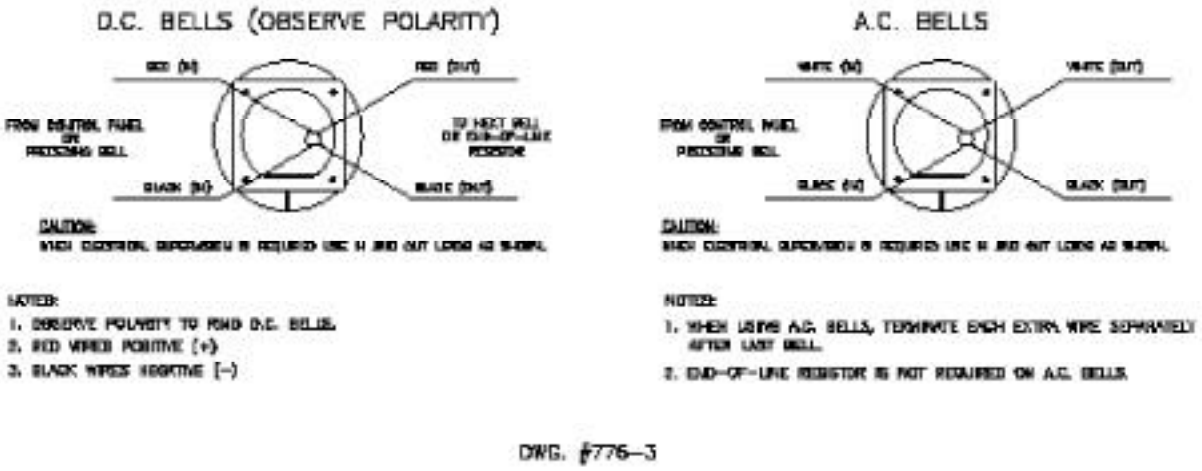


FIG. 3 **WIRING (REAR VIEW)**



INSTALLATION

1. The bell should be mounted a minimum of 8 ft. (2,4m) from the floor or as close to the ceiling as possible.
2. Remove the gong.
3. Connect wiring (see Fig. 3).
4. Mount bell mechanism to backbox (bell mechanism must be mounted with the striker pointing down).
5. Reinstall the gong (be sure that the gong positioning pin, in the mechanism housing, is in the hole in the gong).
6. Test all bells for proper operation and observe that they can be heard where required (bells must be heard in all areas as designated by the authority having jurisdiction).

Bells - Electric

Features four wire, 120V and 24V Red enamel heavy steel gong.
Indoor and outdoor installation.

UL Approved.

Part No.	Description	Box Qty.	Box Weight	Case Qty.	Case Weight
ELAB12006	6” 120V	1	3.3 Lbs.	20	68 Lbs.
ELAB12008	8” 120V	1	3.4 Lbs.	10	37 Lbs.
ELAB12010	10” 120V	1	4.4 Lbs.	10	47 Lbs.
ELAB12006	6” 24V	1	3.3 Lbs.	20	68 Lbs.
ELAB12010	10” 24V	1	4.4 Lbs.	10	47 Lbs.

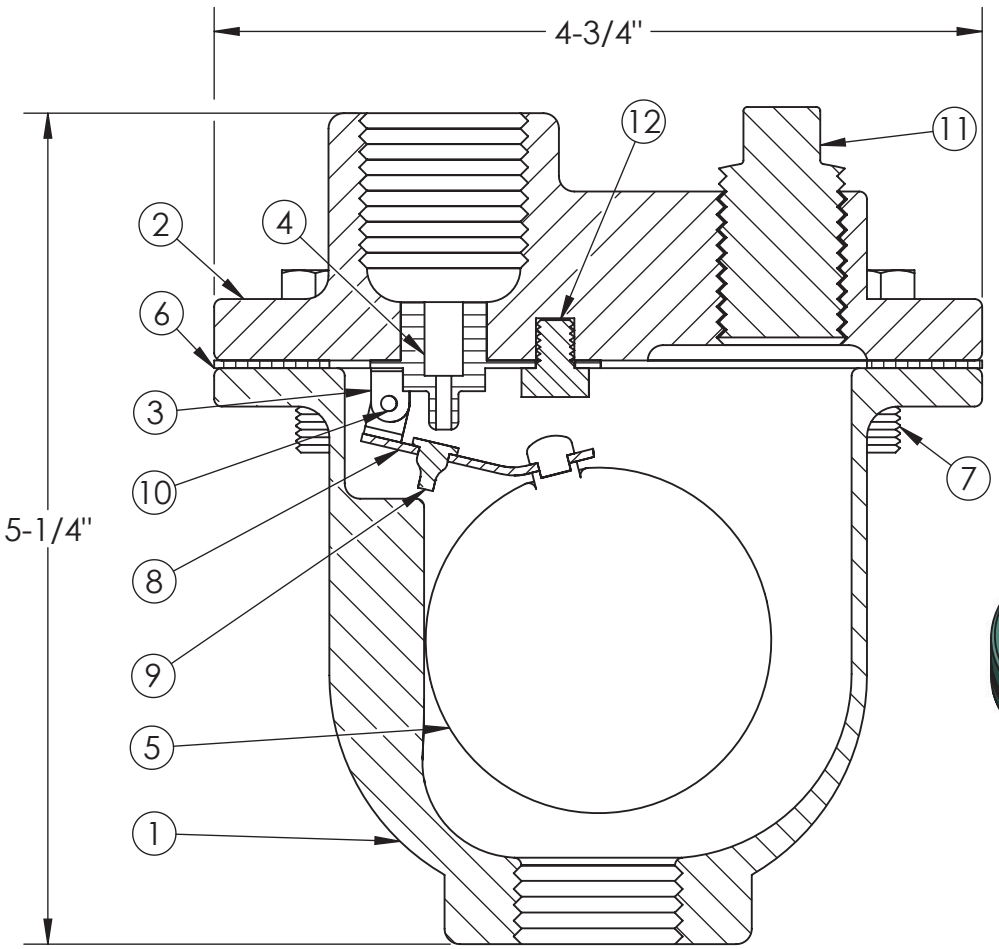
Back Boxes

Weatherproof.
For use in attaching electric bells to walls.

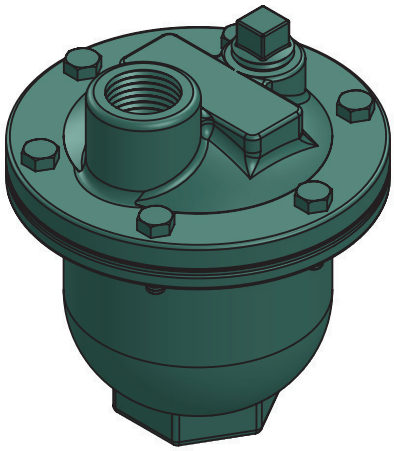
Part No.	Description	Case Qty.	Case Weight
ELBBB	BELL BACK BOX W/ GASKET AND SCREWS	50	33 Lbs.

Air Vent

MODEL MVC-15
METRAVENT AUTOMATIC AIR VENT



FM APPROVED
175 P.S.I.



PART	PART NAME	MATERIAL	PART	PART NAME	MATERIAL
1	BODY	CAST IRON A126	7	COVER BOLT	CARBON STEEL
2	COVER	CAST IRON A126	8	FLOAT ARM	STAINLESS STEEL
3	LEVER FRAME	STAINLESS STEEL	9	ORIFICE BUTTON	FLUOROELASTOMER
4	SEAT	STAINLESS STEEL	10	PIVOT PIN/RETAINER	STAINLESS STEEL
5	FLOAT	STAINLESS STEEL	11	PIPE PLUG (0.5")	STAINLESS STEEL
6	GASKET	NON ASBESTOS	12	LOCATOR	STAINLESS STEEL

QTY	SIZE	PART NUMBER	MAX TEMP	INLET SIZE	OUTLET SIZE	ORIFICE SIZE	WT (LBS)
	1/2" (15mm)	MVC150050	250°F	1/2" NPT	1/2" NPT	1/16"	5-1/2
	3/4" (20mm)	MVC150075	250°F	3/4" NPT	1/2" NPT	1/16"	5-1/2
	1" (25mm)	MVC150100	250°F	1" NPT	1/2" NPT	1/16"	5-1/2

NSF 372 - LEAD FREE

The wetted surface of this product contacted by consumable water contains less than one quarter of one percent (0.25%) of lead by weight. Material complies with state codes and standards, where applicable, requiring reduced lead content.

CUSTOMER:_____

PROJECT:_____

ENGINEER:_____

REV.	1	PART NUMBER UPDATED	DATE 2/28/2017

Metraflex® for pipes in motion
2323 W. HUBBARD ST.
CHICAGO, IL 60612
TEL: 312-738-3800
FAX: 312-738-0415
WWW.METRAFLEX.COM

MODEL MVC-15
METRAVENT AUTOMATIC AIR VENT

DRAWN BY: **DKISH**	DATE: **9/3/2015**
APPROVED: **ZB**	DATE: **9/4/2015**
SCALE: N/A	DRAWING NUMBER: MVC15-1

Reliable

Model AAV Automatic Air Vent

cULus Listed,
FM Approved

Features

- Stainless Steel Construction
- 175 psi and 300 psi option

Product Description

The Reliable Model AAV Automatic Air Vent is designed to reduce the amount of trapped air in a wet pipe fire sprinkler system. Reducing the amount of air in the system reduces internal corrosion of piping by limiting the supply of oxygen and can also reduce the incidence of false alarms. The Model AAV is designed to automatically vent air from a high point in the system as the piping is filled and will automatically close when water reaches the vent. Air that subsequently migrates to the Model AAV will also be vented. The Model AAV is provided with a ½" NPT inlet for connection to the system, and a ½" NPT outlet connection for routing to drain (if desired).

Model AAV Automatic Air Vent

Installation

The Model AAV shall be installed in accordance with the requirements of NFPA 13 and any applicable local codes or standards. The recommended location is near a high point of the wet pipe system. Install the Model AAV in a location that does not obstruct the distribution pattern of any fire sprinkler. If desired, a ball valve (not included) may be installed in line with the device to facilitate inspection and servicing. Immediately after filling the wet pipe system, inspect the Model AAV for leaks and proper operation.

Maintenance

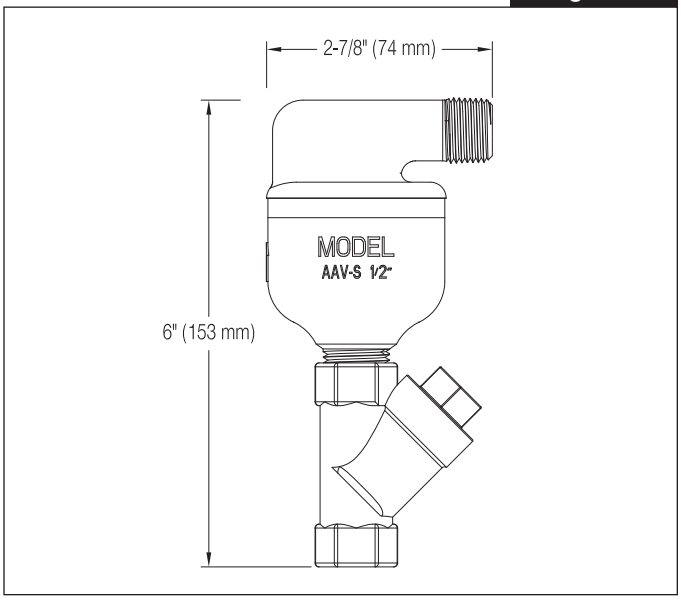
The owner is responsible for maintaining all parts of the fire protection system in proper operating condition. Any system maintenance or testing that involves placing a system component out of service may eliminate the fire protection that is provided by the fire protection system.

The Reliable Model AAV Automatic Air Vent 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.

Listings and Approvals

- UL Listed to Subject 2573, Automatic Air Release Valves and Air/Vacuum Valves for Fire Protection Service
- FM Approved to Approval Standard for Air Release Valves, Class 1344

Dimensions **Figure 1**



Guarantee

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

Ordering Information

Specify the following when ordering:
Model AAV Automatic Air Vent

- 175 psi
- 300 psi

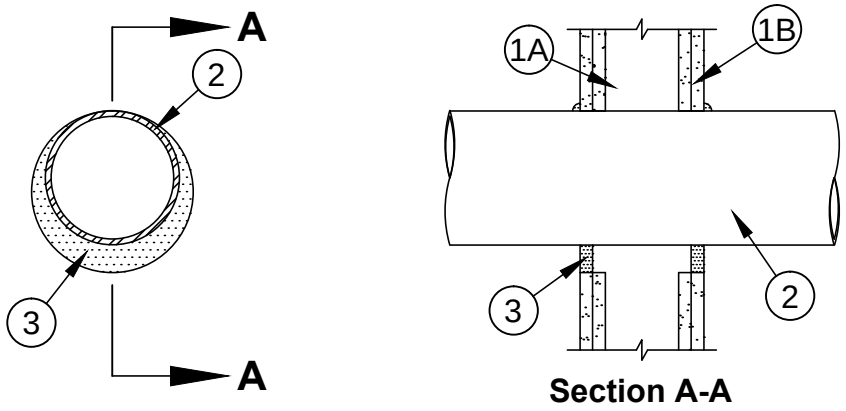
P/N 9999970535

7

Fire Stop

System No. W-L-1049

F Ratings -1 and 2 Hr (See Item 1)
T Rating -0 Hr
L Rating At Ambient -Less Than 1 CFM/sq ft
L Rating At 400 F -Less Than 1 CFM/sq ft



Section A-A

1. **Wall Assembly -**The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

   A. **Studs -**Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-5/8 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC. When steel studs are used and the diam of opening exceeds the width of stud cavity, the opening shall be framed on all sides using lengths of steel stud installed between the vertical studs and screw-attached to the steel studs at each end. The framed opening in the wall shall be 4 to 6 in. (102 to 152 mm) wider and 4 to 6 in. (102 to 152 mm) higher than the diam of the penetrating item such that, when the penetrating item is installed in the opening, a 2 to 3 in. (51 to 76 mm) clearance is present between the penetrating item and the framing on all four sides.

   B. **Gypsum Board* -**5/8 in. (16 mm) thick, 4 ft (1.22 m) wide with square or tapered edges. The gypsum board type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 26 in. (660 mm) for steel stud walls. Max diam of opening is 14-1/2 in. (368 mm) for wood stud walls.

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

1A. **Metallic Sleeve -**(Optional, Not Shown) - Cylindrical sleeve fabricated from min 0.016 in. (0.41 mm) to max 0.105 in. (2.7 mm) thick sheet steel. Length of steel sleeve to be equal to the thickness of wall. Longitudinal seam of sleeve welded or overlapped min 1 in. (25 mm). The ends of the steel sleeve shall be flush or recessed max 1/4 in. (6 mm) from wall surfaces.

2. **Through Penetrant -**One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. Pipe, conduit or tubing may be installed at an angle not greater than 45 degrees from perpendicular. The annular space between pipe, conduit or tubing and periphery of opening shall be min 0 in. (0 mm, point contact) to max 2 in. (51 mm). Pipe, conduit or tubing to be rigidly supported on both sides of wall assembly. The following types and sizes of metallic pipes, conduits or tubing may be used:

   A. **Steel Pipe -**Nom 24 in. (610 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.

   B. **Iron Pipe -**Nom 24 in. (610 mm) diam (or smaller) cast or ductile iron pipe.

   C. **Conduit -**Nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing, nom 6 in. (152 mm) diam (or smaller) steel conduit or nom 1 in. (25 mm) diam (or smaller) flexible steel conduit.

   D. **Copper Tubing -**Nom 6 in. (152 mm) diam (or smaller) Type L (or heavier) copper tubing.

   E. **Copper Pipe -**Nom 6 in. (152 mm) diam (or smaller) Regular (or heavier) copper pipe.

3. **Fill, Void or Cavity Material* -Sealant -**Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall. At the point contact location between through penetrant and gypsum board, a min 3/8 in. (10 mm) diam bead of fill material shall be applied at the gypsum board/through penetrant interface on both surfaces of wall.

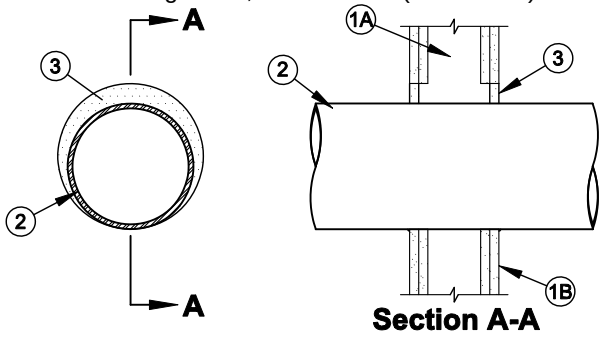
   SPECIFIED TECHNOLOGIES INC -SpecSeal Series SSS Sealant or SpecSeal LCI Sealant

   *Bearing the UL Classification Mark

System No. W-L-1222

F Ratings - 1 and 2 Hr (See Item 1)

T Ratings - 1/4, 3/4 and 1 Hr (See Item 2)



1. **Wall Assembly -** The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

   A. **Studs -** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC.

   B. **Gypsum Board* -** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Max diam of opening is 10-5/8 in. (270 mm).

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Through Penetrant -** One metallic pipe, conduit or tube to be installed eccentrically or concentrically within the firestop system. Pipe, conduit or tubing may be installed at an angle not greater than 45 degrees from perpendicular. The annular space between the pipe, conduit or tube and the periphery of the opening shall be min 0 in. (0 mm, point contact) to max 2 in. (51 mm). Pipe, conduit or tube to be rigidly supported on both sides of the wall assembly. The following types and sizes of metallic pipes, conduits and tubes may be used:

   A. **Steel Pipe -** Nom 8 in. (203 mm) diam (or smaller) Schedule 5 (or heavier) steel pipe.

   B. **Iron Pipe -** Nom 8 in. (203 mm) diam (or smaller) cast or ductile iron pipe.

   C. **Conduit -** Nom 6 in. (152 mm) diam (or smaller) rigid steel conduit, nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing (EMT) or nom 4 in. (102 mm) diam (or smaller) flexible steel conduit.

   D. **Copper Pipe -** Nom 4 in. (102 mm) diam (or smaller) Regular (or heavier) copper pipe.

   E. **Copper Tube -** Nom 4 in. (102 mm) diam (or smaller) Type L (or heavier) copper tube.

Type of Penetrant	Max Diam	T Rating
Steel or iron pipe, steel conduit or EMT	2 in. (51 mm)	1 hr
Steel or iron pipe, steel conduit or EMT	8 in. (203 mm)	3/4 hr
Copper pipe or tube	4 in. (102 mm)	1/4 hr

2A. **Through Penetrating Product* - Flexible Metal Piping -** As an alternate to Item 2, one nom 1-1/4 in. (32 mm) diam (or smaller) steel flexible metal pipe to be installed either concentrically or eccentrically within the firestop system. The annular space between the pipe and the periphery of the opening shall be min 0 in. (0 mm, point contact) to max 2 in. (51 mm). Pipe to be rigidly supported on both sides of the wall assembly.

OMEGA FLEX INC

TITEFLEX CORP

A BUNDY CO

WARD MFG INC

3. **Fill, Void or Cavity Material* - Sealant -** Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall assembly. At point contact location, min 1/4 in. (6 mm) diam bead of fill material applied at metallic pipe/gypsum board interface on both surfaces of wall.

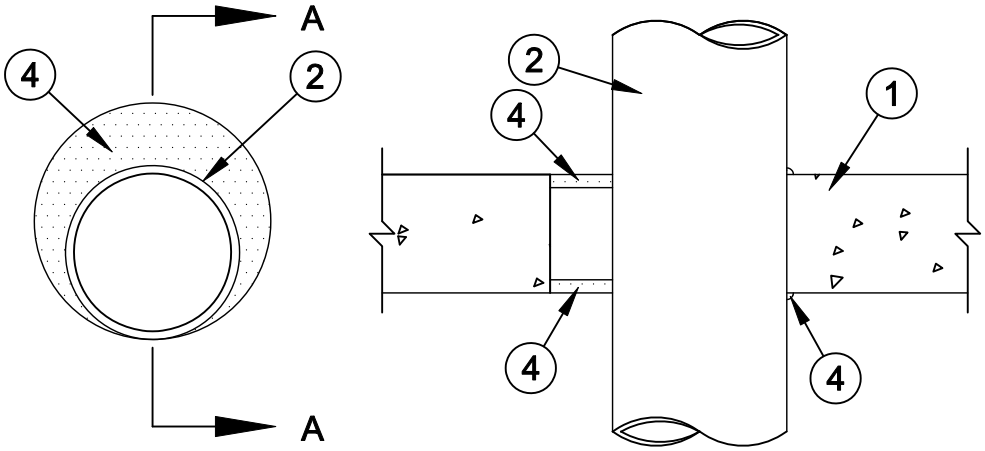
SPECIFIED TECHNOLOGIES INC - SpecSeal LCI Sealant

*Bearing the UL Classification Mark

System No. C-AJ-1259

F Rating - 3 Hr

T Rating - 0 Hr



Section A-A

1. **Floor or Wall Assembly -** Min 4-1/2 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Floor may also be constructed of any min 6 in. thick UL Classified hollow-core **Precast Concrete Units*.** Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 7 in.

   See **Concrete Blocks** (CAZT) and **Precast Concrete Units** (CFTV) categories in the Fire Resistance Directory for names of manufacturers.

2. **Through Penetrants -** One metallic pipe, conduit or tubing to be installed either concentrically or eccentrically within the firestop system. The annular space between the pipe, conduit or tubing and the periphery of the opening shall be a min of 0 in. (point contact) to a max of 3 in. Pipe, conduit or tubing to be rigidly supported on both sides of floor or wall assembly. The following types and sizes of metallic pipes, conduit or tubing may be used:

   A. **Steel Pipe -** Nom 6 in. diam (or smaller) Schedule 10 (or heavier) steel pipe.

   B. **Iron Pipe -** Nom 6 in. diam (or smaller) cast or ductile iron pipe.

   C. **Conduit -** Nom 4 in. diam (or smaller) steel electrical metallic tubing or steel conduit.

   D. **Copper Tube -** Nom 4 in. diam (or smaller) Type L (or heavier) copper tube.

3. **Forming Material -** (Optional, Not Shown) - Mineral wool batt packing material or polyurethane backer rod friction fitted into opening and recessed from floor or wall surfaces as required to accommodate required thickness of fill material.

4. **Fill, Void or Cavity Material* - Sealant -** Min 1/2 in. thickness of fill material applied within the annulus, flush with both surfaces of floor or wall. At the point contact location between penetrating item and concrete, a min 1/4 in. thick bead of fill material shall be applied at the concrete/penetrating item interface on both sides of floor or wall.

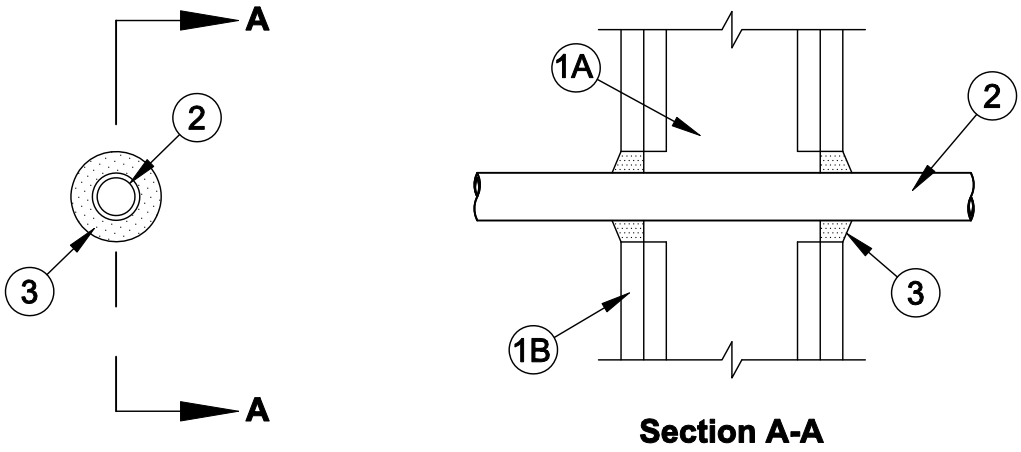
   SPECIFIED TECHNOLOGIES INC - SpecSeal Series SSS Sealant or SpecSeal LCI Sealant

   *Bearing the UL Classification Mark

System No. W-L-2100

F Ratings - 1 and 2 Hr (See Item 1)

T Ratings - 0, 1/4 , 1 and 1-1/2 Hr (See Item 2)



Section A-A

1. **Wall Assembly -** The 1 or 2 hr fire-rated gypsum wallboard/stud wall assembly shall be constructed of the materials and in the manner described in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

   A. **Studs -** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. lumber spaced 16 in. OC. Steel studs to be min 3-5/8 in. wide and spaced max 24 in. OC.

   B. **Gypsum Board* -** 5/8 in. thick, 4 ft wide with square or tapered edges. The gypsum wallboard type, thickness, number of layers, fastener type and sheet orientation shall be as specified in the individual U300 or U400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 3-1/2 in.

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed.

2. **Nonmetallic Pipe -** One nonmetallic pipe or tubing to be centered within the firestop system. Pipe or tubing to be rigidly supported on both sides of wall assembly. The following types of nonmetallic pipes or tubing may be used:

   A. **Polybutylene Pipe -** Nom 1 in diam (or smaller) SDR 11 (or heavier) polybutylene (PB) pipe for use in closed (process or supply) piping systems. A nom annular space of 1/4 in. is required within the firestop system.

   B. **Cross Linked Polyethylene (PEX) Tubing -** Nom 1 in. diam (or smaller) SDR 9 PEX tubing for use in closed (process or supply) piping systems. A nom annular space of 1/4 in. is required within the firestop system.

   C. **Acrylonitrile Butadiene Styrene (ABS) Pipe -** Nom 1-1/2 in. diam (or smaller) Schedule 40 cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. The annular space shall be min 1/4 in. to max 1 in.

   D. **Polyvinyl Chloride (PVC) Pipe -** Nom 2 in. diam (or smaller) Schedule 40 cellular or solid core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. The annular space shall be min 0 in. (point contact) to max 1 in.

   E. **Chlorinated Polyvinyl Chloride (CPVC) Pipe -** Nom 2 in. diam (or smaller) SDR 17 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. The annular space shall be min 0 in. (point contact) to max 1 in.

The hourly T Rating of the firestop system is dependent on the hourly fire rating of the wall assembly in which it is installed and the type of through penetrant, as shown in the table below:

Rating OF Wall Hr	Type Of Throught Penetrant	T Rating Hr
2	PB pipe	1-1/2
2	PEX tubing	1-1/2
2	PVC or CPVC pipe	1/4
2	ABS pipe	0
1	PB pipe	1
1	PEX tubing	1
1	PVC or CPVC pipe	1/4
1	ABS pipe	0

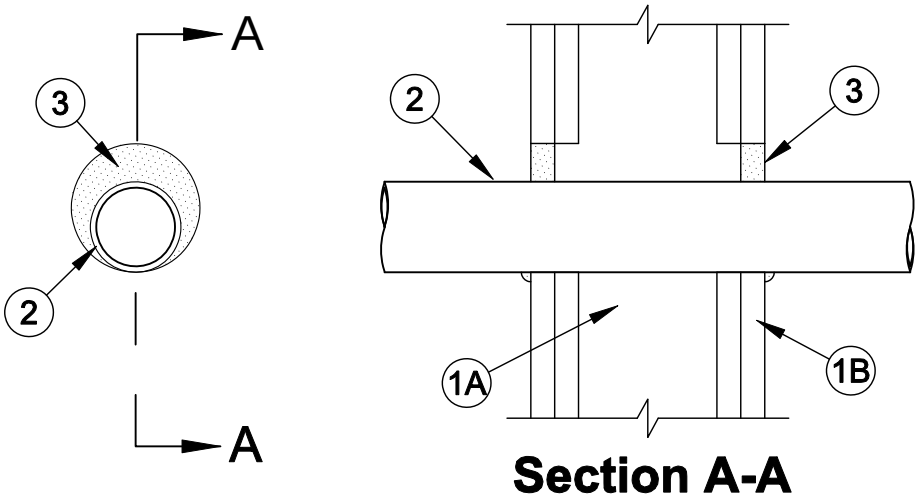
3. **Fill, Void or Cavity Material* - Sealant -** Min 5/8 in. thickness of fill material applied within annulus, flush with both surfaces of wall. Additional fill material to be installed such that a min 1/4 in. thick crown is formed around the penetrating item.

   SPECIFIED TECHNOLOGIES INC - SpecSeal Series SSS Sealant or SpecSeal LCI Sealant

   *Bearing the UL Classification Mark

System No. W-L-2241

F Ratings - 1 and 2 Hr (See Item 1)
T Ratings - 0, 1/4, 1 and 1-3/4 Hr (See Item 2)
L Rating At Ambient - Less Than 1 CFM/sq ft
L Rating At 400 F - Less Than 1 CFM/sq ft



Section A-A

1. **Wall Assembly -** The 1 or 2 hr fire-rated gypsum board/stud wall assembly shall be constructed of the materials and in the manner specified in the individual U300 or U400 Series Wall or Partition Design in the UL Fire Resistance Directory and shall include the following construction features:

   A. **Studs -** Wall framing may consist of either wood studs or steel channel studs. Wood studs to consist of nom 2 by 4 in. (51 by 102 mm) lumber spaced max 16 in. (406 mm) OC. Steel studs to be min 3-1/2 in. (89 mm) wide and spaced max 24 in. (610 mm) OC.

   B. **Gypsum Board* -** Thickness, type, number of layers and fasteners as specified in the individual Wall and Partition Design. Diam of opening to be 1 in. to 1-1/8 in. (25 to 29 mm) larger than outside diam of pipe.

   The hourly F Rating of the firestop system is equal to the hourly fire rating of the wall assembly in which it is installed. When Item 2G or 2H is used, the hourly F Rating is 1 hr.

2. **Through Penetrant -** One nonmetallic pipe, conduit or tube to be installed eccentrically or concentrically within the firestop system. Pipe, conduit or tube to be rigidly supported on both sides of the wall assembly. The following types and sizes of nonmetallic pipes, conduits and tubes may be used:

   A. **Polyvinyl Chloride (PVC) Pipe -** Nom 2 in. (51 mm) diam (or smaller) Schedule 40 solid or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. Annular space shall be min 0 in. (0 mm, point contact) to max 1 in. (25 mm).

   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe -** Nom 2 in. (51 mm) diam (or smaller) SDR 13.5 or Schedule 80 CPVC pipe for use in closed (process or supply) piping systems. Annular space shall be min 0 in. (0 mm, point contact) to max 1 in. (25 mm).

   C. **Rigid Nonmetallic Conduit+ -** Nom 2 in. (51 mm) diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA 70). Annular space shall be min 0 in. (0 mm, point contact) to max 1 in. (25 mm).

   D. **Electrical Nonmetallic Tubing+ -** Nom 2 in. (51 mm) diam (or smaller) PVC tubing installed in accordance with Article 331 of the National Electrical Code (NFPA 70). Annular space shall be min 0 in. (0 mm, point contact) to max 1 in. (25 mm).

   E. **Cross Linked Polyethylene (PEX) Tubing -** Nom 1 in. (25 mm) diam (or smaller) SDR9 PEX tubing for use in closed (process or supply) piping systems. Annular space shall be min 0 in. (0 mm, point contact) to max 1 in. (25 mm).

F. **Acrylonitrile Butadiene Styrene (ABS) pipe -** Nom 1-1/2 in. (38 mm) diam (or smaller) Schedule 40 solid-core or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. Annular space shall be min 1/4 in. (6 mm) to max 3/4 in. (19 mm).

G. **Polyvinyl Chloride (PVC) Pipe -** Nom 3 in. (76 mm) diam (or smaller) Schedule 40 solid or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. Annular space shall be min 0 in. (0 mm, point contact) to max 1 in. (25 mm).

H. **Chlorinated Polyvinyl Chloride (CPVC) Pipe -** Nom 3 in. (76 mm) diam (or smaller) SDR 17 CPVC pipe for use in closed (process or supply) piping systems. Annular space shall be min 0 in. (0 mm, point contact) to max 1 in. (25 mm).

When Item 2A or 2B is used, the T Rating is 1/4 hr. When Item 2C, 2D, or 2E is used, the T Rating is 1 hr and 1-3/4 hr for 1 hr and 2 hr fire rated walls, respectively. When Item 2F, 2G, or 2H is used, T Rating is 0 hr.

3. **Fill, Void or Cavity Material* - Sealant -** Min 5/8 in. (16 mm) thickness of fill material applied within annulus, flush with both surfaces of wall assembly. At point contact location, min 1/4 in. (6 mm) diam bead of fill material applied at nonmetallic pipe/gypsum board interface on both surfaces of wall.

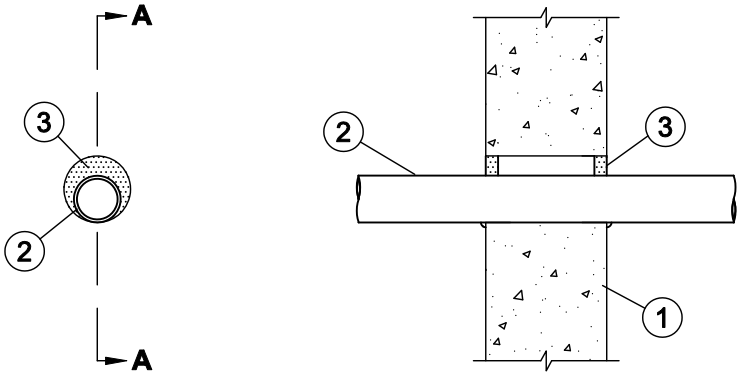
SPECIFIED TECHNOLOGIES INC - SpecSeal LCI Sealant or Type WF300 Firestop Caulk (for wood studs only)

*Bearing the UL Classification Mark

System No. W-J-2076

F Rating - 2 Hr

T Ratings - 0, 1/4 and 1-3/4 Hr (See Item 2)



Section A-A

1. **Wall Assembly** - Min 6 in. thick reinforced lightweight or normal weight (100-150 pcf) concrete. Wall may also be constructed of any UL Classified **Concrete Blocks*.** Max diam of opening is 3-1/2 in.
   See **Concrete Blocks** (CAZT) category in the Fire Resistance Directory for names of manufacturers.
2. **Through Penetrant** - One nonmetallic pipe, conduit or tube to be installed eccentrically or concentrically within the firestop system. Pipe, conduit or tube to be rigidly supported on both sides of the wall assembly. The following types and sizes of nonmetallic pipes, conduits and tubes may be used:
   A. **Polyvinyl Chloride (PVC) Pipe** - Nom 2 in. diam (or smaller) Schedule 40 solid or cellular core PVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. Annular space shall be min 0 in. (point contact) to max 1 in.
   B. **Chlorinated Polyvinyl Chloride (CPVC) Pipe** - Nom 2 in. diam (or smaller) SDR17 CPVC pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. Annular space shall be min 0 in. (point contact) to max 1 in.
   C. **Rigid Nonmetallic Conduit+** - Nom 2 in. diam (or smaller) Schedule 40 PVC conduit installed in accordance with Article 347 of the National Electrical Code (NFPA 70). Annular space shall be min 0 in. (point contact) to max 1 in.
   D. **Electrical Nonmetallic Tubing+** - Nom 2 in diam (or smaller) PVC tubing installed in accordance with Article 331 of the National Electrical Code (NFPA 70). Annular space shall be min 0 in. (point contact) to max 1 in.
   E. **Cross Linked Polyethylene (PEX) Tubing** - Nom 1 in. diam (or smaller) SDR9 PEX tubing for use in. closed (process or supply) piping systems. Annular space shall be min 0 in. (point contact) to max 1 in.
   F. **Acrylonitrile Butadiene Styrene (ABS) Pipe** - Nom 1-1/2 in. diam (or smaller) Schedule 40 solid-core or cellular core ABS pipe for use in closed (process or supply) or vented (drain, waste or vent) piping systems. Annular space shall be min 1/4 in. to max 3/4 in.
   When Item 2A or 2B is used, the T Rating is 1/4 hr. When Item 2C, 2D, or 2E is used, the T Rating is 1-3/4 hr. When Item 2F is used, T Rating is 0 hr.
3. **Fill, Void or Cavity Material*** - **Sealant** - Min 5/8 in. thickness of fill material applied within annulus, flush with both surfaces of wall assembly. At point contact location, min 1/4 in. diam bead of fill material applied at nonmetallic pipe/concrete interface on both surfaces of wall
   SPECIFIED TECHNOLOGIES INC - SpecSeal LCI Sealant
   *Bearing the UL Classification Marking

FS-ONE
High Performance Intumescent Firestop Sealant

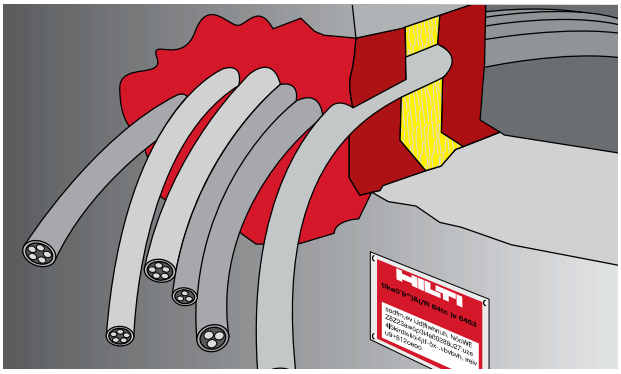
Product description
- Intumescent (expands when exposed to fire) firestop sealant that helps protect combustible and non-combustible penetrations for up to 4 hours fire rating

Product features
- Smoke, gas and water resistant after material has cured
- Contains no halogen, solvents or asbestos
- High fire rating properties
- Water based, easy to clean
- Protects most typical firestop penetration applications
- Paintable
- Single component systems available
- Meets LEED™ requirements for indoor environmental quality credit 4.1 Low Emitting Materials, Sealants and Adhesives and 4.2 Paints and Coatings

Areas of application
- Steel, copper and EMT pipes
- Insulated steel and copper pipes
- Cable bundles
- Closed or vented plastic pipes
- HVAC penetrations

For use with
- Concrete, masonry, drywall and wood floor assemblies
- Wall and floor assemblies rated up to 4 hours

Examples
- Sealing around combustible pipe penetrations in fire rated construction
- Sealing around non-combustible penetrations in fire rated construction



Technical Data*	FS-ONE
Chemical basis	Water-based intumescent acrylic dispersion
Color	Red
Application temperature	40°F to 104°F (5°C to 40°C)
Skin forming time	Approx. 20-30 min.
Curing time	Approx. 2 mm / 3 days
Movement capability	Approx. 5%
Expansion rate (unrestricted)	Up to 3-5 times original volume
Temperature resistance (cured)	–40°F to 212°F (–40°C to 100°C)
Surface burning characteristics (ASTM E 84-96)	Flame Spread: 0 Smoke Development: 5
Sound transmission classification (ASTM E 90-99)	56 (Relates to specific construction)
Approvals • California State Fire Marshal - No. 4485-1200:108 • City of New York - MEA 326-96-M Vol. IV	
Tested in accordance with • UL 1479 • ASTM E 814 • ASTM E 84	

*At 73°F (23°C) and 50% relative humidity

CLASSIFIED C UL US — FILL, VOID OR CAVITY MATERIAL FOR USE IN THROUGH-PENETRATION FIRESTOP SYSTEMS SEE UL FIRE RESISTANCE DIRECTORY 66Y7

FM APPROVED

FCC -SM- CZ SYSTEM COMPATIBLE

Installation instructions for FS-ONE

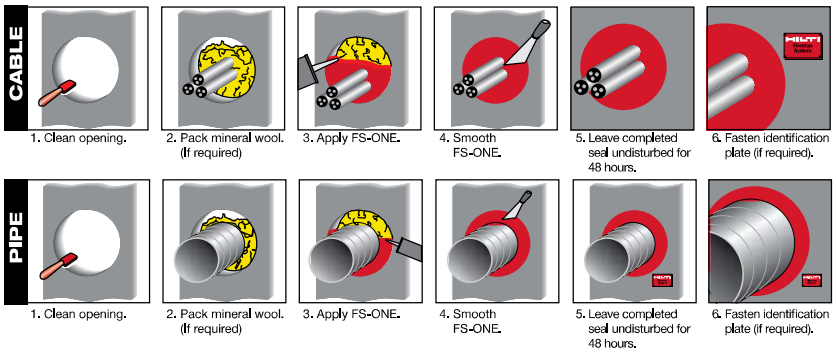
Notice
- Before handling, read Material Safety Data Sheet and product label for safe usage and health information.
- Instructions below are general guidelines — always refer to the applicable drawing in the UL Fire Resistance Directory or Hilti Firestop Systems Guide for complete installation information

Opening
1. Clean the opening. Surfaces to which FS-ONE will be applied should be cleaned of loose debris, dirt, oil, moisture, frost and wax. Structures supporting penetrating items must be installed in compliance with local building and electrical standards.

Application of firestop sealant
2. Install the prescribed backfilling material type and depth to obtain the desired rating (if required). Leave sufficient depth for applying FS-ONE.
3. Application of firestop sealant: Apply FS-ONE to the required depth in order to obtain the desired fire rating. Make sure FS-ONE contacts all surfaces to provide maximum adhesion. For application of FS-ONE use a standard caulking gun, foil pack gun, bulk loader and bulk gun. With FS-ONE buckets, Graco type sealant pumps may be used. (Contact pump manufacturer for proper selection).
4. Smoothing of firestop sealant: To complete the seal, tool immediately to give a smooth appearance. Excess sealant, prior to curing, can be cleaned away from adjacent surfaces and tools with water.
5. Leave completed seal undisturbed for 48 hours.
6. For maintenance reasons, a penetration seal could be permanently marked with an identification plate. In such a case, mark the identification plate and fasten it in a visible position next to the seal.

Not for use
- High movement expansion joints
- Underwater
- On materials where oil, plasticizers or solvents may bleed i.e. impregnated wood, oil based seals, green or partially vulcanized rubber
- In any penetration other than those specifically described in this manual or the test reports

Storage
- Store only in the original packaging in a location protected from moisture at temperatures between 40°F (5°C) and 86°F (30°C)
- Observe expiration date on the packag



Product name: **FS-ONE High Performance Intumescent Firestop Sealant**
Description: One-part acrylic-based sealant
Supplier: Hilti, Inc. P.O. Box 21148, Tulsa, OK 74121
Emergency # (Chem-Trec.): 1 800 424 9300 (USA, PR, Virgin Islands, Canada); 001 703 527 3887 (other countries)

INGREDIENTS AND EXPOSURE LIMITS

Ingredients:	CAS Number:	PEL:	TLV:	STEL:
Polyacrylate dispersion	Mixture	NE	NE	NE
Calcium carbonate	001317-65-3	5 mg/m³ (T)	10 mg/m³ (T)	NE
Zinc borate	138265-88-0	NE	NE	NE
Ammonium polyphosphate	068333-79-9	NE	NE	NE
Talc	014807-96-6	20 mppcf	2 mg/m³	NE
Expandable graphite	012777-87-6	5 mg/m³ (T)	2 mg/m³ (T)	NE
Ethylene glycol	000107-21-1	NE	C:100 mg/m³ (A)	NE
Polybutene	009003-29-6	NE	NE	NE
Iron oxide	001309-37-1	10 mg/m³	5 mg/m³	NE
Glass filament	065997-17-3	NE	5 mg/m³ (T)	NE
Silicon dioxide	014808-60-7	0.05 mg/m³ (T)	0.1 mg/m³ (T)	NE
Water	007732-18-5	NE	NE	NE

Abbreviations: **PEL** = OSHA Permissible Exposure Limit. **TLV** = ACGIH Threshold Limit Value. **C** = Ceiling. **STEL** = Short Term Exposure Limit. **NE** = None Established. **NA** = Not Applicable. **(T)** indicates "as total dust". **(R)** indicates "as respirable fraction". **(A)** indicates "as an aerosol". **mppcf** = million particles per cubic foot.

PHYSICAL DATA

Appearance:	Red paste.	**Odor:**	Odorless.
Vapor Density: (air = 1)	Not determined.	**Vapor Pressure:**	23mbar @ 20C / 68F
Boiling Point:	Not applicable.	**VOC Content:**	75.0 g/L.
Evaporation Rate:	Not applicable.	**Solubility in Water:**	Soluble.
Specific Gravity:	1.5	**pH:**	Not determined.

FIRE AND EXPLOSION HAZARD DATA

Flash Point:	Non-flammable.	**Flammable Limits:**	Not applicable.
Extinguishing Media:	Not applicable. Use extinguishing media as appropriate for surrounding fire.		
Special Fire Fighting Procedures:	None known. Use a self-contained breathing apparatus when fighting fires involving chemicals.		
Unusual Fire and Explosion Hazards:	None known. Thermal decomposition products can be formed such as oxides of carbon, sulfur and phosphorous.		

REACTIVITY DATA

Stability:	Stable.	**Hazardous Polymerization:**	Will not occur.
Incompatibility:	Strong acids, peroxides, and oxidizing agents.		
Decomposition Products:	Thermal decomposition can yield CO and CO_2.		
Conditions to Avoid:	None known.		

HEALTH HAZARD DATA

Known Hazards:	None known.
Signs and Symptoms of Exposure:	Possibly irritating upon contact with the eyes or upon repeated contact with the skin.
Medical Conditions Aggravated by Exposure:	Eye and skin conditions.
Routes of Exposure:	Dermal.

Carcinogenicity:	IARC classifies crystalline silica (quartz sand) as Group I based upon evidence among workers in industries where there has been long-term and chronic exposure (via inhalation) to silica dust; e.g. mining, quarry, stone crushing, refractory brick and pottery workers. This product does not pose a dust hazard; therefore, this classification is not relevant. Based upon the nature and intended use of this product, it does not pose an increased cancer risk to workers.

EMERGENCY AND FIRST AID PROCEDURES

Eyes:	Immediately flush with plenty of water. Call a physician if symptoms occur.
Skin:	Immediately wipe off material and wash with soap and water. Material can adhere to the skin. If material has adhered to the skin, use an abrasive containing hand cleaner. If material does not come off, buff with a pumice stone.
Inhalation:	Move victim to fresh air if discomfort develops. Call a physician if symptoms persist.
Ingestion:	Seek medical attention. Do not induce vomiting unless directed by a physician. If a large quantity was ingested, give 1 to 2 glasses of water to dilute. Never give anything by mouth to an unconscious person.
Other:	Referral to a physician is recommended if there is any question about the seriousness of the injury/exposure.

CONTROL MEASURES AND PERSONAL PROTECTIVE EQUIPMENT

Ventilation:	General (natural or mechanically induced fresh air movements).
Eye Protection:	Not required, however, safety glasses should be worn in most industrial settings.
Skin Protection:	Avoid skin contact. Cloth gloves are suitable for hand protection.
Respiratory Protection:	None normally required. Where ventilation is inadequate to control vapors, use a NIOSH-approved respirator with organic vapor cartridges. Never enter a confined space without an appropriate air-supplied respirator.

PRECAUTIONS FOR SAFE HANDLING AND USE

Handling and Storing Precautions:	Store in a cool, dry area preferably between 40o and 77o F. Keep from freezing. Do not store in direct sunlight. Avoid contact with the eyes or skin. Practice good hygiene; i.e. always wash thoroughly after handling and before eating or smoking. For industrial use only. Keep out of reach of children. Follow label/use instructions.
Spill Procedures:	Immediately wipe away spilled material before it hardens. Place in a container for proper disposal in accordance with all applicable local, state, or federal requirements.

REGULATORY INFORMATION

Hazard Communication:	This MSDS has been prepared in accordance with the federal OSHA Hazard Communication Standard 29 CFR 1910.1200.
HMIS Codes:	Health 1, Flammability 0, Reactivity 0, PPE B
DOT Shipping Name:	Not regulated.
IATA / ICAO Shipping Name:	Not regulated.
TSCA Inventory Status:	Chemical components listed on TSCA inventory. SARA Title III, Section 313: This product contains < 3% ethylene glycol (CAS 107-21-1) and < 15% zinc borate (re: zinc compounds) which are subject to reporting under Section 313 of SARA Title III (40 CFR Part 372).
EPA Waste Code(s):	Not regulated by EPA as a hazardous waste.
Waste Disposal Methods:	Consult with regulatory agencies or your corporate personnel for disposal methods that comply with local, state, and federal safety, health and environmental regulations.

CONTACTS

Customer Service:	1 800 879 8000 **Technical Service:** 1 800 879 8000
Health / Safety:	1 800 879 6000 Jerry Metcalf (x6704)
Emergency # (Chem-Trec):	1 800 424 9300 (USA, PR, Virgin Islands, Canada); 001 703 527 3887 (other countries)

The information and recommendations contained herein are based upon data believed to be correct; however, no guarantee or warranty of any kind expressed or implied is made with respect to the information provided.

Certificate of Compliance

Certificate Number **20100512-R13240**
Report Reference **2010 May 12**
Issue Date **2010 May 12**

Underwriters Laboratories Inc.®

Issued to: Hilti, Inc.

54 S 122ND East AVe
Tulsa, OK 74146 USA

This is to certify that representative samples of Fill, Void or Cavity Materials
FS-ONE

Have been investigated by Underwriters Laboratories Inc.® (UL) or any authorized licensee of UL in accordance with the Standard(s) indicated on this Certificate.

Standard(s) for Safety: ANSI/UL 1479, ANSI/UL 2079, CAN/ULC-S115-05
Third Edition, revised March 1, 2010

Additional Information: FS-ONE Sealant for use in Joint Systems and FS-ONE for use in Through-Penetration Firestop Systems as currently described in the UL Fire Resistance Directory.

Only those products bearing the UL Classification Mark should be considered as being covered by UL's Classification and Follow-Up Service.

The UL Classification Mark includes: UL in a circle symbol: with the word "CLASSIFIED" (as shown); a control number (may be alphanumeric) assigned by UL; a statement to indicate the extent of UL's evaluation of the product; and, the product category name (product identity) as indicated in the appropriate UL Directory.

Look for the UL Classification Mark on the product

Issued by:
Mona Couloute
Mona Couloute
Underwriters Laboratories Inc.

Reviewed by:
Chris J. Johnson
Underwriters Laboratories Inc.

Certificate of Compliance

Certificate Number **20060214-R13240E**
Report Reference **2006 February 14**
Issue Date **2006 February 14**

Underwriters Laboratories Inc.®

Issued to: Hilti, Inc.
5400 S 122ND East Ave
Tulsa, OK 74146 USA

This is to certify that representative samples of Fill, Void or Cavity Materials
FS-ONE

Have been investigated by Underwriters Laboratories Inc.® in accordance with the Standard(s) indicated on this Certificate.

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Look for the UL Classification Mark on the product

Issued by:
Mona Couloute
Mona Couloute
Underwriters Laboratories Inc.

Reviewed by:
Christopher Johnson
Underwriters Laboratories Inc.

Hilti North America
5400 South 122nd East Avenue
Tulsa, OK 74146

P.O. Box 21148 I Tulsa, OK 74121-1148
T 1-800-879-8000 I **F** 918-252-6742
www.hilti.com

June 27, 2008

To Whom It May Concern:

Re: Hilti FS-ONE Intumescent Firestop

The Hilti FS-ONE Intumescent Firestop is manufactured in Kaufering, Germany.

The FS-ONE pail is made of polyethylene and can be completely recycled. There is no post-consumer or post-industrial content in FS-ONE and it cannot be recycled. The VOC content for FS-ONE is 75 grams/liter.

FS-ONE is not regulated as a hazardous waste by the Federal EPA Standards. The regulations for the disposal of non-regulated industrial waste can vary from state to state and even city to city. For this reason, you should consult your local and state regulatory agencies for direction on disposal.

Please feel free to contact me at (918) 252-6704 if you have questions.

Sincerely,

Jerry Metcalf MPH, CHMM
Safety/Environmental Manager
Hilti Inc
(918) 252 6704
jerry.metcalf@hilti.com

NOTES / DEFINITIONS:

1. ***Post-Consumer Recycled Content***: Portion of material or product derived from discarded consumer waste that has been recovered for use as a raw material [e.g., plastic bottles, newspaper]
2. ***Post-Industrial Recycled Content***: Portion of material or product derived from recovered industrial and mfg. materials that are diverted from municipal solid waste for use in a *different* mfg. process, prior to use by a consumer [e.g., fly-ash in concrete or synthetic gypsum board, both of which are by-products of coal-burning power plants]. Spills and scraps from the original manufacturing process that are combined with other constituents after a minimal amount of reprocessing for use in further production of the same product do not qualify.
3. ***Manufactured***: Final assembly of components into building product that is furnished and installed by trades [e.g., if the hardware comes from Dallas, TX, the lumber from Keene, NH, and the joist is assembled in Kent, WA; then the location of final assembly is Kent, WA]. www.gpsvisualizer.com/calculators can be used to calculate straight-line distance between project site / New York, NY and location of manufacture and raw material source. Note: location noted on material data sheets is often *corporate* location; need manufacturer to verify actual *manufacture* location.
4. ***Raw Materials***: Virgin or recovered resources from which the product's components are made [i.e., before processing or manufacturing].
5. ***Rapidly Renewable***: Materials and products made from raw materials that are harvested within a 10-year cycle [e.g., bamboo, cork, linoleum, fast-growing poplar, wheatboard, wool carpet].
6. ***FSC Certified***: Wood-based products that are certified by the Forest Stewardship Council and carry a Chain-of-Custody certificate number from the vendor or manufacturer.
7. ***VOC Content***: The quantity of volatile organic compounds contained in products such as adhesives, sealants and architectural coatings. VOC content is to be reported in grams/liter or lbs/gallon, less water and any exempt compounds/solvents.

CONTRACTOR CERTIFICATION:

I, _____ a duly authorized representative of _____ hereby certify that the information contained herein accurately represents the listed "green building" characteristics of the materials to be provided by our company as components of the building construction. Furthermore, I understand that any change in such "green building" material characteristics during the purchasing and/or installation period will require prior written approval from the Construction Manager and Owner.

SIGNATURE OF AUTHORIZED REPRESENTATIVE: _____ DATE: _____ p. ____ of ____

MATERIAL SAFETY DATA SHEET

Product name: **FS-ONE High Performance Intumescent Firestop Sealant**

Description: One-part acrylic-based sealant

Supplier: Hilti, Inc. P.O. Box 21148, Tulsa, OK 74121

Emergency # (Chem-Trec.): 1 800 424 9300 (USA, PR, Virgin Islands, Canada); 001 703 527 3887 (other countries)

INGREDIENTS AND EXPOSURE LIMITS

Ingredients:	CAS Number:	PEL:	TLV:	STEL:
Polyacrylate dispersion	Mixture	NE	NE	NE
Calcium carbonate	001317-65-3	5 mg/m^3 (T)	10 mg/m^3 (T)	NE
Zinc borate	138265-88-0	NE	NE	NE
Ammonium polyphosphate	068333-79-9	NE	NE	NE
Talc	014807-96-6	20 mppcf	2 mg/m^3	NE
Expandable graphite	012777-87-6	5 mg/m^3 (T)	2 mg/m^3 (T)	NE
Ethylene glycol	000107-21-1	NE	C:100 mg/m^3 (A)	NE
Polybutene	009003-29-6	NE	NE	NE
Iron oxide	001309-37-1	10 mg/m^3	5 mg/m^3	NE
Glass filament	065997-17-3	NE	5 mg/m^3 (T)	NE
Silicon dioxide	014808-60-7	0.05 mg/m^3 (T)	0.1 mg/m^3 (T)	NE
Water	007732-18-5	NE	NE	NE

Abbreviations: **PEL** = OSHA Permissible Exposure Limit. **TLV** = ACGIH Threshold Limit Value. **C** = Ceiling. **STEL** = Short Term Exposure Limit. **NE** = None Established. **NA** = Not Applicable. **(T)** indicates "as total dust". **(R)** indicates "as respirable fraction". **(A)** indicates "as an aerosol". **mppcf** = million particles per cubic foot.

PHYSICAL DATA

Appearance:	Red paste.	**Odor:**	Odorless.
Vapor Density: (air = 1)	Not determined.	**Vapor Pressure:**	23mbar @ 20C / 68F
Boiling Point:	Not applicable.	**VOC Content:**	75.0 g/L.
Evaporation Rate:	Not applicable.	**Solubility in Water:**	Soluble.
Specific Gravity:	1.5	**pH:**	Not determined.

FIRE AND EXPLOSION HAZARD DATA

Flash Point:	Non-flammable.	**Flammable Limits:**	Not applicable.
Extinguishing Media:	Not applicable. Use extinguishing media as appropriate for surrounding fire.		
Special Fire Fighting Procedures:	None known. Use a self-contained breathing apparatus when fighting fires involving chemicals.		
Unusual Fire and Explosion Hazards:	None known. Thermal decomposition products can be formed such as oxides of carbon, sulfur and phosphorous.		

REACTIVITY DATA

Stability:	Stable.	**Hazardous Polymerization:**	Will not occur.
Incompatibility:	Strong acids, peroxides, and oxidizing agents.		
Decomposition Products:	Thermal decomposition can yield CO and CO_2.		
Conditions to Avoid:	None known.		

HEALTH HAZARD DATA

Known Hazards:	None known.
Signs and Symptoms of Exposure:	Possibly irritating upon contact with the eyes or upon repeated contact with the skin.
Medical Conditions Aggravated by Exposure:	Eye and skin conditions.
Routes of Exposure:	Dermal.

Carcinogenicity:	IARC classifies crystalline silica (quartz sand) as Group I based upon evidence among workers in industries where there has been long-term and chronic exposure (via inhalation) to silica dust; e.g. mining, quarry, stone crushing, refractory brick and pottery workers. This product does not pose a dust hazard; therefore, this classification is not relevant. Based upon the nature and intended use of this product, it does not pose an increased cancer risk to workers.

EMERGENCY AND FIRST AID PROCEDURES

Eyes:	Immediately flush with plenty of water. Call a physician if symptoms occur.
Skin:	Immediately wipe off material and wash with soap and water. Material can adhere to the skin. If material has adhered to the skin, use an abrasive containing hand cleaner. If material does not come off, buff with a pumice stone.
Inhalation:	Move victim to fresh air if discomfort develops. Call a physician if symptoms persist.
Ingestion:	Seek medical attention. Do not induce vomiting unless directed by a physician. If a large quantity was ingested, give 1 to 2 glasses of water to dilute. Never give anything by mouth to an unconscious person.
Other:	Referral to a physician is recommended if there is any question about the seriousness of the injury/exposure.

CONTROL MEASURES AND PERSONAL PROTECTIVE EQUIPMENT

Ventilation:	General (natural or mechanically induced fresh air movements).
Eye Protection:	Not required, however, safety glasses should be worn in most industrial settings.
Skin Protection:	Avoid skin contact. Cloth gloves are suitable for hand protection.
Respiratory Protection:	None normally required. Where ventilation is inadequate to control vapors, use a NIOSH-approved respirator with organic vapor cartridges. Never enter a confined space without an appropriate air-supplied respirator.

PRECAUTIONS FOR SAFE HANDLING AND USE

Handling and Storing Precautions:	Store in a cool, dry area preferably between 40º and 77º F. Keep from freezing. Do not store in direct sunlight. Avoid contact with the eyes or skin. Practice good hygiene; i.e. always wash thoroughly after handling and before eating or smoking. For industrial use only. Keep out of reach of children. Follow label/use instructions.
Spill Procedures:	Immediately wipe away spilled material before it hardens. Place in a container for proper disposal in accordance with all applicable local, state, or federal requirements.

REGULATORY INFORMATION

Hazard Communication:	This MSDS has been prepared in accordance with the federal OSHA Hazard Communication Standard 29 CFR 1910.1200.
HMIS Codes:	Health 1, Flammability 0, Reactivity 0, PPE B
DOT Shipping Name:	Not regulated.
IATA / ICAO Shipping Name:	Not regulated.
TSCA Inventory Status:	Chemical components listed on TSCA inventory.
SARA Title III, Section 313:	This product contains < 3% ethylene glycol (CAS 107-21-1) and < 15% zinc borate (re: zinc compounds) which are subject to reporting under Section 313 of SARA Title III (40 CFR Part 372).
EPA Waste Code(s):	Not regulated by EPA as a hazardous waste.
Waste Disposal Methods:	Consult with regulatory agencies or your corporate personnel for disposal methods that comply with local, state, and federal safety, health and environmental regulations.

CONTACTS

Customer Service:	1 800 879 8000	**Technical Service:**	1 800 879 8000
Health / Safety:	1 800 879 6000 Jerry Metcalf (x6704)		
Emergency # (Chem-Trec):	1 800 424 9300 (USA, PR, Virgin Islands, Canada); 001 703 527 3887 (other countries)		

The information and recommendations contained herein are based upon data believed to be correct; however, no guarantee or warranty of any kind expressed or implied is made with respect to the information provided.

CALIFORNIA DEPARTMENT OF FORESTRY & FIRE PROTECTION
OFFICE OF THE STATE FIRE MARSHAL
FIRE ENGINEERING – BUILDING MATERIALS LISTING PROGRAM

LISTING SERVICE

LISTING No. 4485-1200:108

CATEGORY: Opening Protection (Firestopping)

LISTEE: Hilti, Inc., 5400 S. 122nd East Ave, Tulsa, OK 74146
Contact: *Clay Hensley (918) 252-6216 Fax (918) 254-1679

DESIGN: Model FS-ONE Firestop Sealant. Refer to listee's printed data sheet and UL Fire Resistance Directory for additional detailed product description and operational considerations.

INSTALLATION: In accordance with listee's printed installation instructions, applicable codes & ordinances and in a manner acceptable to the authority having jurisdiction.

MARKING: Listee's name, type identification and UL label.

APPROVAL: Listed as firestop devices for use in through-penetration firestop system up to 3 hour rating. For indoor use only.

Approved under Through-Penetration Fire Stop Systems: CAJ1155, CAJ2091, CAJ2118, CAJ3095, CAJ5044, CAJ8041, F-C-2025, WL1085, WL1056, WL3047, WL5029, WL8004. Refer to UL Fire Resistance Directory for detailed constructions.

*Rev. 06-20-2006

Date Issued: **JUNE 10, 2008** *Listing Expires* ***June 30, 2009***

Authorized By: ***BEN HO****, Chief*
Fire Engineering Division

NYC Department of Buildings
280 Broadway, New York, NY 10007
Patricia Lancaster, FAIA, Commissioner
(212) 566-5000, TTY: (212) 566-4769

Report of Materials and Equipment Acceptance Division

Pursuant to Administrative Code Section 27-131, the following equipment or material has been found acceptable for use subject to the terms and conditions contained herein.

MEA 326-96-M Vol. 5

Manufacturer:	Hilti, Inc., 5400 S. 122 East Avenue, Tulsa, OK 74146
Trade Name(s):	Hilti, Inc.
Product:	Fill, void or cavity material for fire protection
Pertinent Code Section(s):	27-345
Prescribed Test(s):	RS 5-19 (ASTM E814), UL 2079
Laboratory:	Underwriters Laboratories, Inc.
Test Report(s):	File R13240, dated July 16, 1993, July 21, 1993, July 13, 1993, July 22, 1993, April 1, 1993, March 25, 1994, March 3 and 6, 1995, September 4, 1996, September 27, 1997; File R13644, dated April 12, 1993 and May 3, 1993; File R12232, dated August 2, 1993; UL-design listings.

Description: Fill, void or cavity material for through-penetrations in fire-rated wall and/or floor/ceiling construction. The Hilti FS-ONE Firestop Sealant shall be applied in accordance with Underwriters Laboratories Inc. system numbers, listed on following pages, in achieving the required fire-resistance ratings.

8

Miscellaneous

- Spare Head Cabinet
- Wall Plate
- Head Guard

Spare Head Cabinets

All welded construction with full length hinge and 1/2" holes with 3/4" knock outs or sizes as noted.

Part No.	Description	Case Qty.	Case Weight
ACHB03	3 HEAD - 1/2" x 3/4" HOLES	50	59 Lbs.
ACHB06	6 HEAD - 1/2" x 3/4" HOLES	25	53 Lbs.
ACHB12	12 HEAD - 1/2" x 3/4" HOLES	20	54 Lbs.
ACHB6ESFR100	6 HEAD - ESFR 3/4" x 1" HOLES	10	28 Lbs.

Sight Glass

Bronze M x F Sight Glass offered in multiple restricted orifices.

Part No.	Description	Box Qty.	Box Weight	Case Qty.	Case Weight
ACSGFF100	1" FULL FLOW	5	8 Lbs.	40	54 Lbs.
ACSG100050	1" W/ 1/2" ORIFICE	5	8 Lbs.	40	58 Lbs.
ACSG1001732	1" W/ 17/32" ORIFICE	4	AR*	AR*	AR*
ACSGFF125	1-1/4" FULL FLOW	4	7 Lbs.	24	36 Lbs.
ACSGCUSTOM	1" OTHER ORIFICES	5	8 Lbs.	40	AR*

*As Requested.

Plastic Wall Plates

Floor/Ceiling

Description

FPPI Plastic Floor and Ceiling Plates are manufactured from light weight injection molded plastic and are of single piece construction and rustproof. They are suitable for both interior and exterior uses and are highly recommended in corrosive environments. Available in IP sizes 1/2” through 8”.

Installation

The plastic wall plates may be installed by two methods. The first is by placing the wall plate over the pipe while the pipe is being installed. The second is by splitting the wall plate at the area on the back of the wall plates that has been molded to break apart. Carefully bend the wall plate a this weakened area until fully separated. Then carefully twist the wall plate open just enough to be placed around the pipe. Allow the two ends of the separated wall plate to “spring” back into shape. Slide the wall plate up against the base material to finish the installation. The wall plates should not be painted. Certain chemicals contained in paint may cause the wall plates to deteriorate.

Specifications

Size(IP)*	ID	OD
1/2”	.827	2.787
3/4”	1.037	2.997
1”	1.298	3.210
1 1/4”	1.640	3.580
1 1/2”	1.900	3.900
2”	2.380	4.450
2 1/2”	2.900	5.280
3”	3.535	5.925
4”	4.575	6.935
5”	5.655	9.655
6”	6.740	9.820
8”	8.790	13.010

Depth:

3/16”

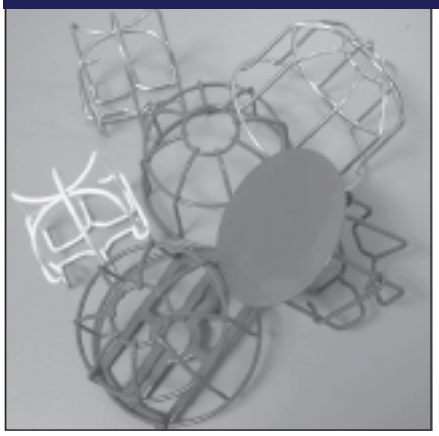
Finish:

Chrome

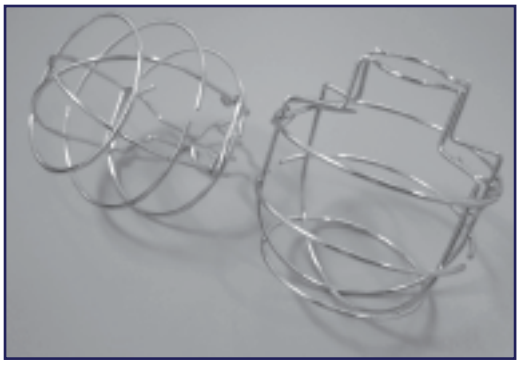
White

Fire Protection Products, Inc
6241 Yarrow Dr., Suite A, Carlsbad, CA 92011-1541
For questions: 1 800 344-1822 • 1 800 344-3775 fax • www.fppi.com

Headguards



Recessed Headguard!



Heavy wire construction helps protect fire sprinklers from damage.

Part No.	Description	Case Qty.	Case Weight
ACGH1C	1-PIECE C.P.	400	54 Lbs.
ACGH1R	1-PIECE RED	400	54 Lbs.
ACGH1W	1-PIECE WHITE	400	28 Lbs.
ACGH2C050	2-PIECE 1/2” C.P.	90	28 Lbs.
ACGH2C075	2-PIECE 3/4” C.P.	90	28 Lbs.
ACGH2R050	2-PIECE 1/2” RED	90	28 Lbs.
ACGH2R075	2-PIECE 3/4” RED	90	28 Lbs.
ACGH1RWS	1-PIECE W/ BAFFLE RED	200	55 Lbs.
ACGH1RSWS	1-PIECE W/ BAFFLE RED (SHORT)	200	55 Lbs.
ACGHWS2R	BAFFLE FOR 2-PIECE RED (UPRIGHT ONLY)	90	55 Lbs.
ACGH1CREC	1-PIECE C.P. FOR USE WITH RECESSED ESCUTCHEON	100	9 Lbs.

9

Fire Pump

ENGINEERING

SUBMITTALS

PROJECT: ABL Fire for:
Northwest Harnett Co. ES

ENGINEER:

SUBMITTED FOR:

X	APPROVAL	DATE:
	MANUFACTURING	DATE:
	RECORD ONLY	DATE:

SUBMITTED BY:

PSI/CAROLINAS, INC.
263 CHURCH ST. NE
CONCORD, NC 28025
Email: psicar@charlotte.twcbc.com

TELE: 704.782.3543

FAX: 704.784.8329

PSI/Carolinas, Inc.

263 Church St. N
Concord, NC 28025
(704) 782-3543
FAX 784-8329
Email: psicar@charlotte.twcbc.com

SUBMITTAL DATA

REFERENCE: ABL Fire for:
Northwest Harnett County Elementary School

CONDITIONS: 500 GPM @ 40 PSI

LISTING: U.L. / F.M.

ELECTRIC DRIVEN FIRE PUMP

Fairbanks 4" X 4" 1591CF Vertical In-line Fire Pump
Electric Motor: 20 HP / 3550 RPM – 3/6/460 Volt - ODP - 1.15 SF
Standard Fittings to Include:
- 0 - 300 PSI Discharge Gage - Ashcroft
- VAC - 300 PSI Suction Gage - Ashcroft
- 3/4" Casing Relief Valve - Hamilton

FIRE PUMP CONTROLS

Eaton FT30-20D: Across the Line – 20 HP / 460Volt
Power transfer switch

JOCKEY PUMP & CONTROLS

Fairbanks Morse PVM1-5: 5 GPM @ 50 PSI, .5 HP – 3/60/460 Volt
Jockey Pump Control: Eaton XTJP-.5D

TESTING MEANS

4" Header & (2) NST Valves

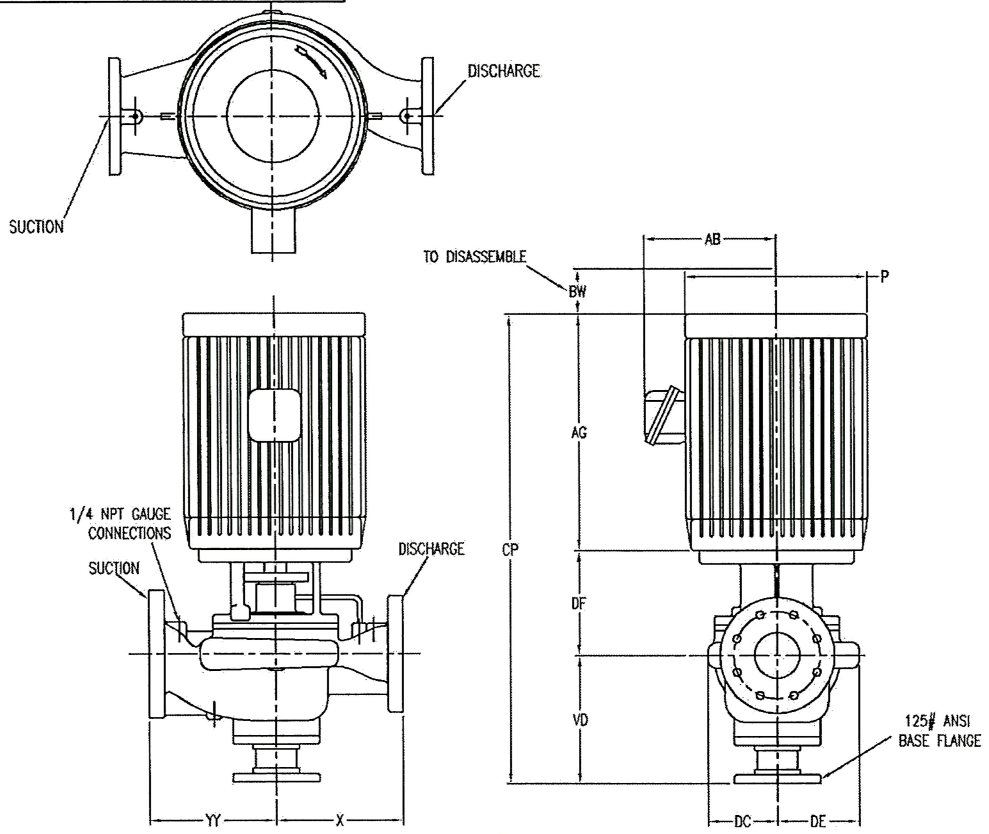
MISCELLANEOUS

6" X 4" Eccentric reducer
4" X 6" Concentric increaser

General Arrangement

⚠ WARNING

DO NOT OPERATE THIS MACHINE WITHOUT PROTECTIVE GUARD IN PLACE. ANY OPERATION OF THIS MACHINE WITHOUT PROTECTIVE GUARD CAN RESULT IN SEVERE BODILY INJURY.



X	YY	BW	VD	DF	DC
11.00	11.00	4.50	11.25	9.63	5.50

DE	AG	P	AB	CP	Base Flange Size
7.38	21.00	13.00	8.88	N/A	3.00

NOTES:

Not for construction, installation, or application purposes unless certified.

All dimensions are in inches

Dimensions may vary ± .38" (10mm) due to normal manufacturing tolerances.

See configuration for estimated total weight.

Pump Data	
Series	Inline
Model	4"-1591CF
Size	4x4x7
Flow	500.0 USgpm
Rated Pressure	40.00 psi.g
RPM	3560 rpm
Rotation	Right handed
Liquid Type	Water
Discharge Size	4.00 in
Suction Size	4.00 in
Impeller Diameter	5.62 in
Connection Type	125/125
Base Type	Pipe flange support
-	-
Pump Materials of Construction	
Pump	Bronze fitted with Cast Iron casing
Shaft	Carbon Steel
Motor Data	
Power	20.00 hp
Phase	3
Frequency	60 Hz
Volts	230/460 V
RPM	3560
Frame	254JP
Service Factor	1.15
Enclosure	ODP
Manufacturer	USEM
Site Information	
Elevation	300.0 ft
Temperature	77.00 deg F
Estimated Weights	
Pump	191.0 lb
Driver	217.0 lb

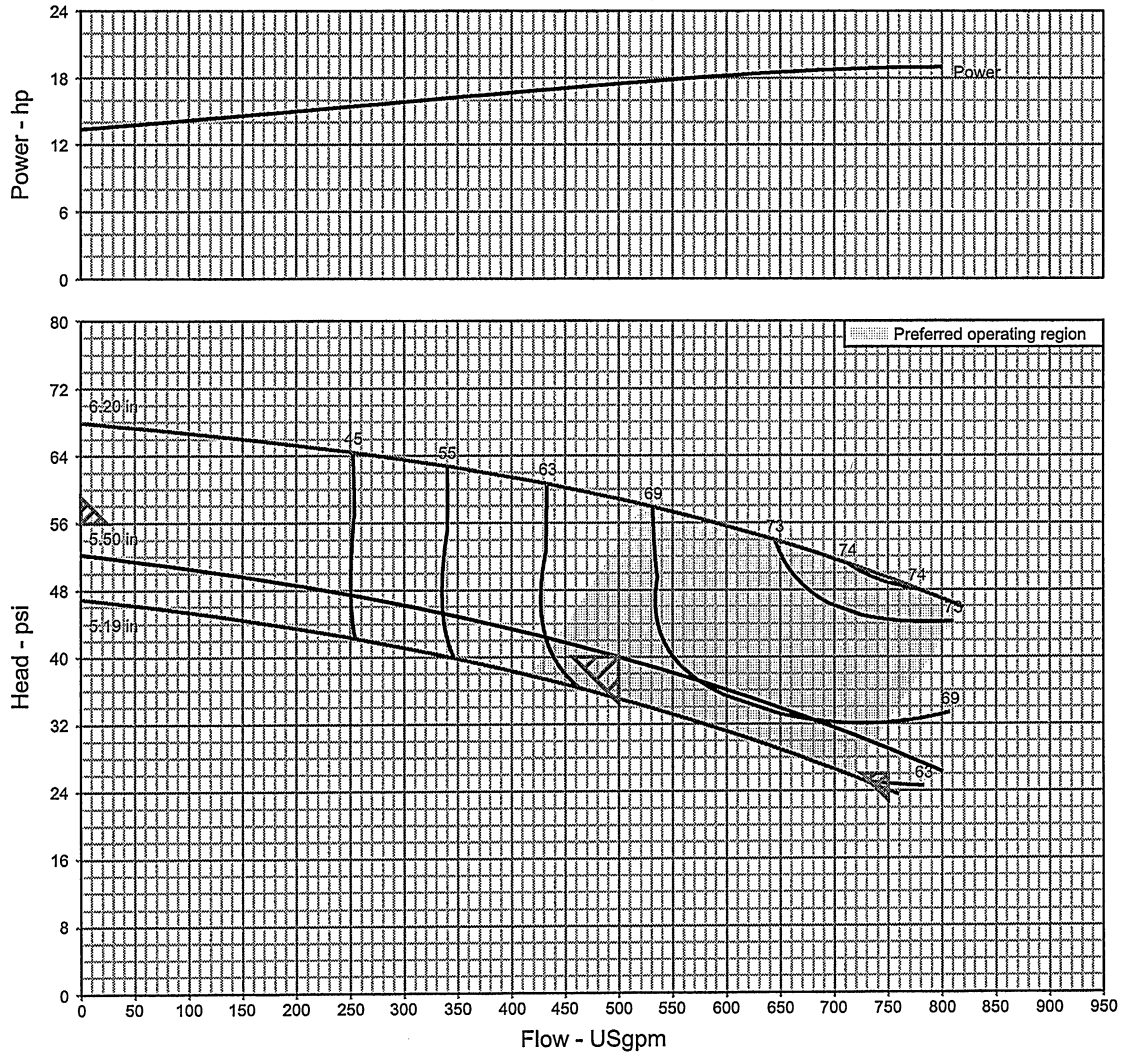
Quote Information			
Customer	PSI - CAROLINAS INC		
Customer Quote	1395487		
Job Name	NW Harnet County ES		
Market	-		
PENTAIR		Quote Item	001
		Quote Date	11 May 2021

PENTAIR

Customer : PSI - CAROLINAS INC
Project name : NW Harnet County ES

Pump Performance Curve

Encompass 2.0 - 21.4.1



Item number	: 001	Size	: 4"-1591CF
Service	:	Stages	: 1
Quantity	: 1	Driver type	: Motor
Quote number	: 21Q-0507	Frequency	: 60 Hz
Date last saved	: 11 May 2021 6:30 PM	Speed, rated	: 3560 rpm
Flow, rated	: 500.0 USgpm	Based on curve number	: 383-4X4X7C-3560
Differential head / pressure, rated	: 40.00 psi	Efficiency	: 66.74 %
		Max working pressure, allowable	: 175.0 psi.g
Flange rating (suction / discharge)	: 125/125	Shutoffhead, Typical	: 52.23 psi
		Max suction pressure, allowable	: 122.8 psi.g
Secondary Point (150% of rated flow)	: 750.0 USgpm	Suction pressure, max (user specified)	: 14.70 psi.a
Secondary Point (65% of rated head)	: 26.00 psi	Pump shutoff w/ suction pressure	: 52.23 psi.g
Max Shutoff per NFPA	: 56.00 psi	Power driver, minimum	: 20.00 hp

Curve performance is typical. Contact factory for guaranteed performance curve.

Electrical Data

Northwest Harnett County Elementary School

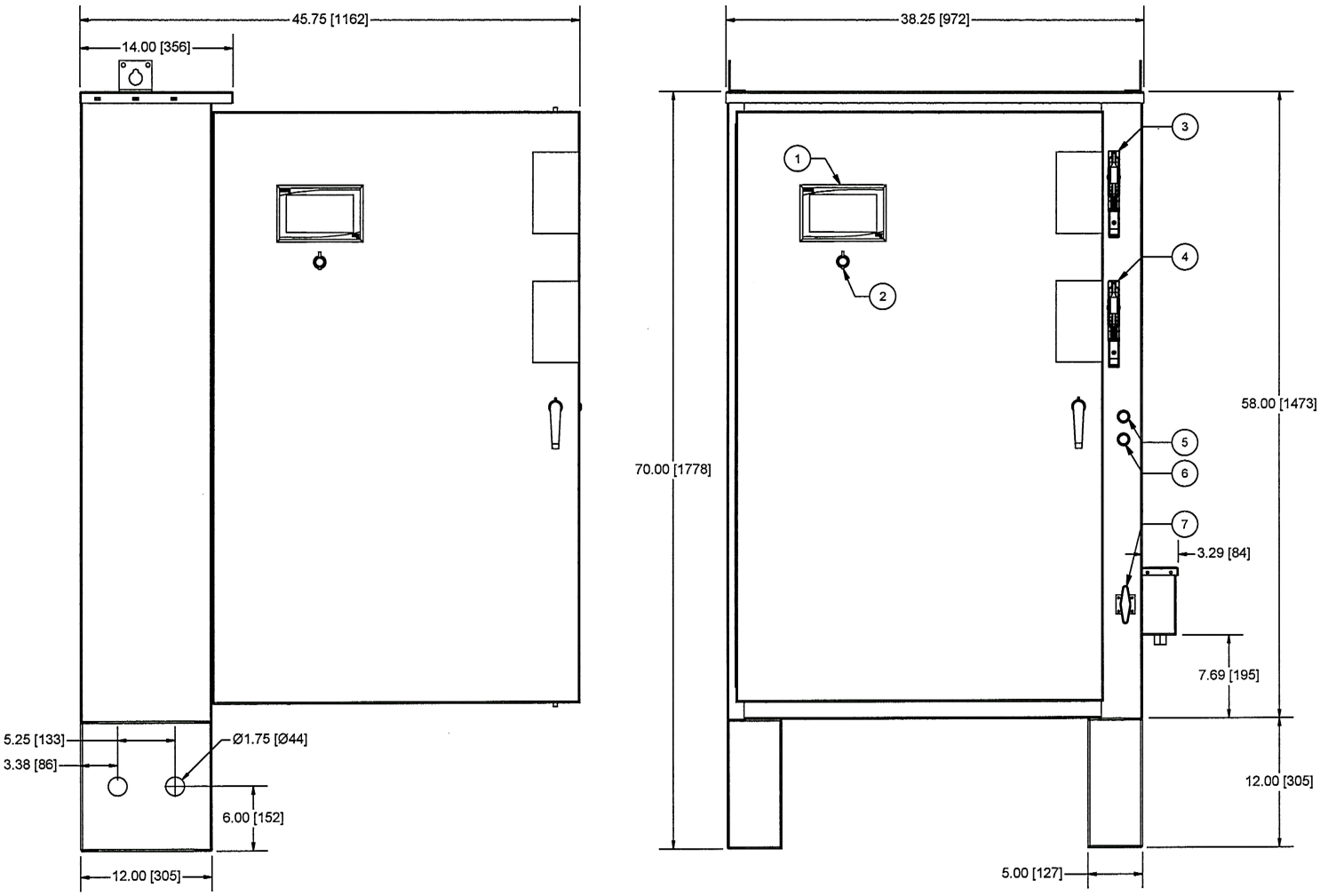
Fire Pump:

20 HP / 3600 RPM
3ph/60hz/460V
FLA 25
LRA 145
KVA Code G

Jockey Pump:

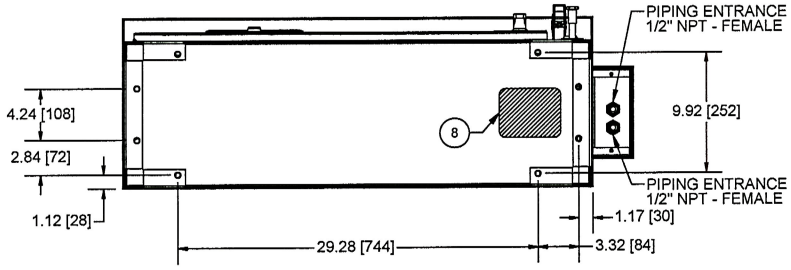
.5 HP / 3600 RPM
3ph/60hz/460V
FLA 1
LRA 6
KVA Code J

EPCT FIRE - FT30 SMALL HP
DIMENSIONAL DRAWING - TYPE 2, ~~3, 3R, 4, 4X, 12~~



1 - EPCT TOUCHSCREEN
2 - EXTERNAL USB PORT
3 - SOURCE 1 POWER SWITCH
4 - SOURCE 2 POWER SWITCH
5 - START PUSHBUTTON
6 - STOP PUSHBUTTON
7 - MSH (EMERGENCY START HANDLE)
8 - RECOMMENDED CABLE ACCESS (BOTTOM ONLY)

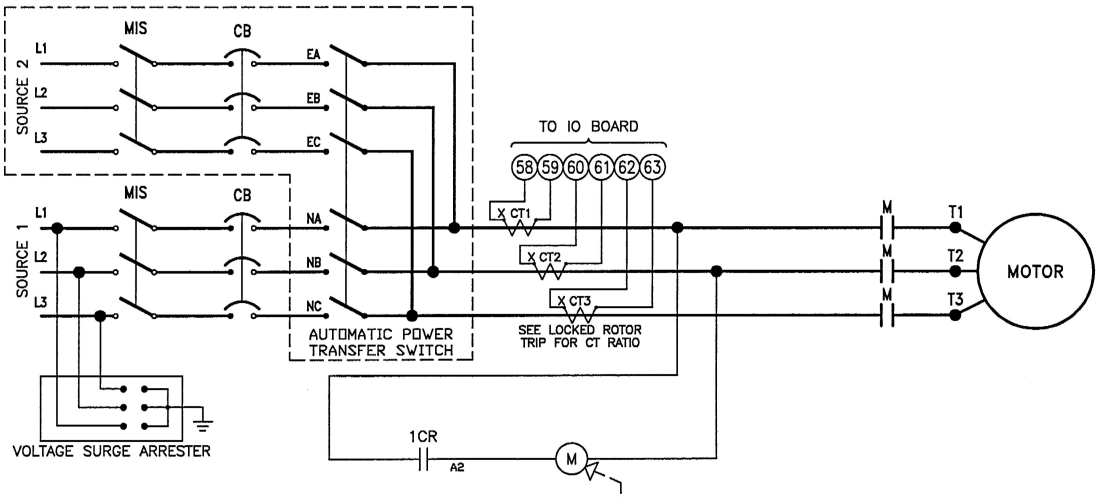
NOTES:
1 - DIMENSIONS: in [mm]
2 - ALL ENCLOSURES FINISHED IN RED
3 - STANDARD ENCLOSURE: TYPE (NEMA) 2



Motor HP	Line voltage	Withstand rating			Approximate weight
		Standard	Intermediate	High	Lbs. (Kg)
5 - 40	200 - 208V	100,000	150,000	200,000	315 (143)
5 - 50	220 - 240V				
5 - 75	380 - 415V				
5 - 100	440 - 480V				
5 - 100	550 - 600V	25,000	100,000		

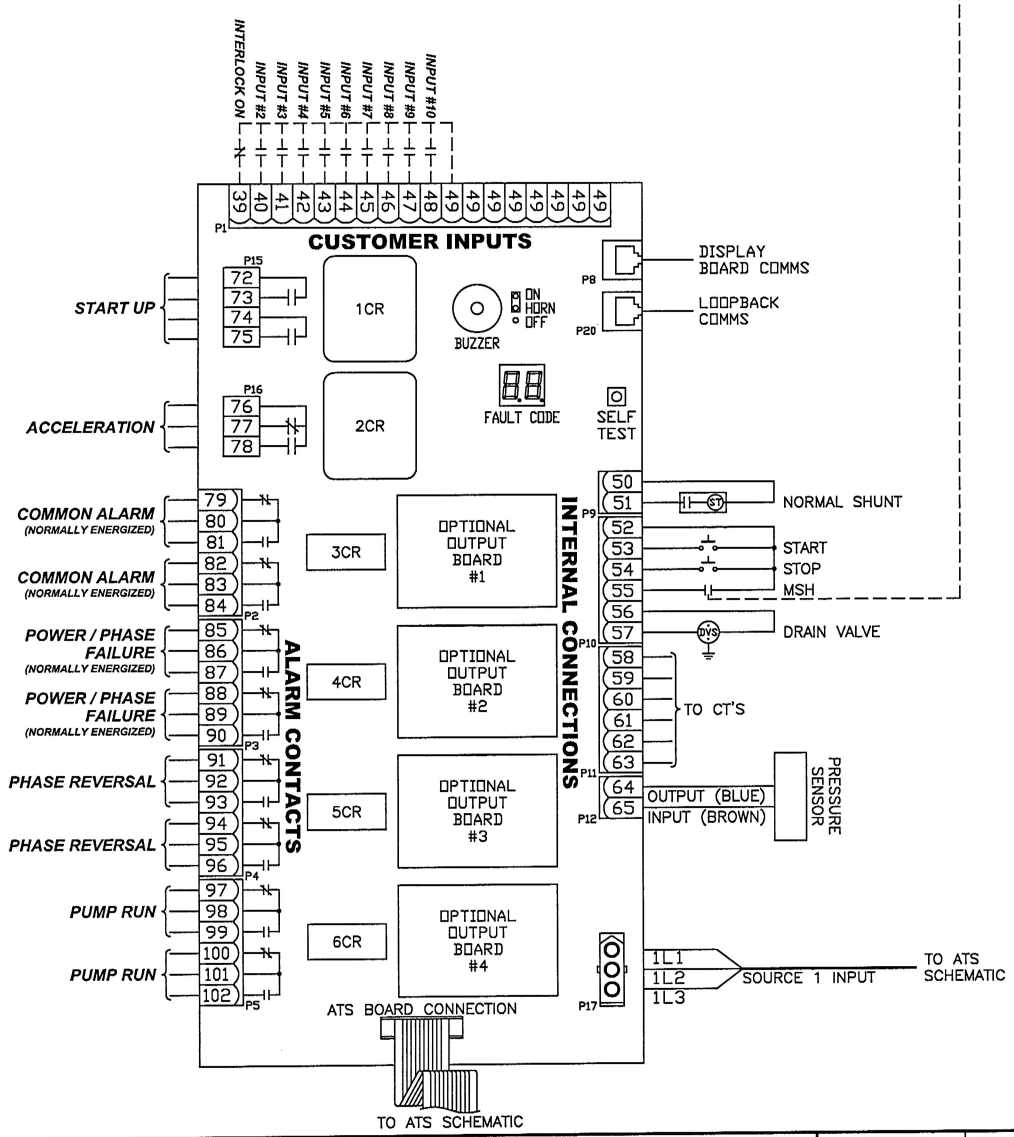
REVISION	DATE	DRAWING NO.
002	04/10/20	CE16491H02

EPCT FIRE - FT30 THREE PHASE WIRING SCHEMATIC



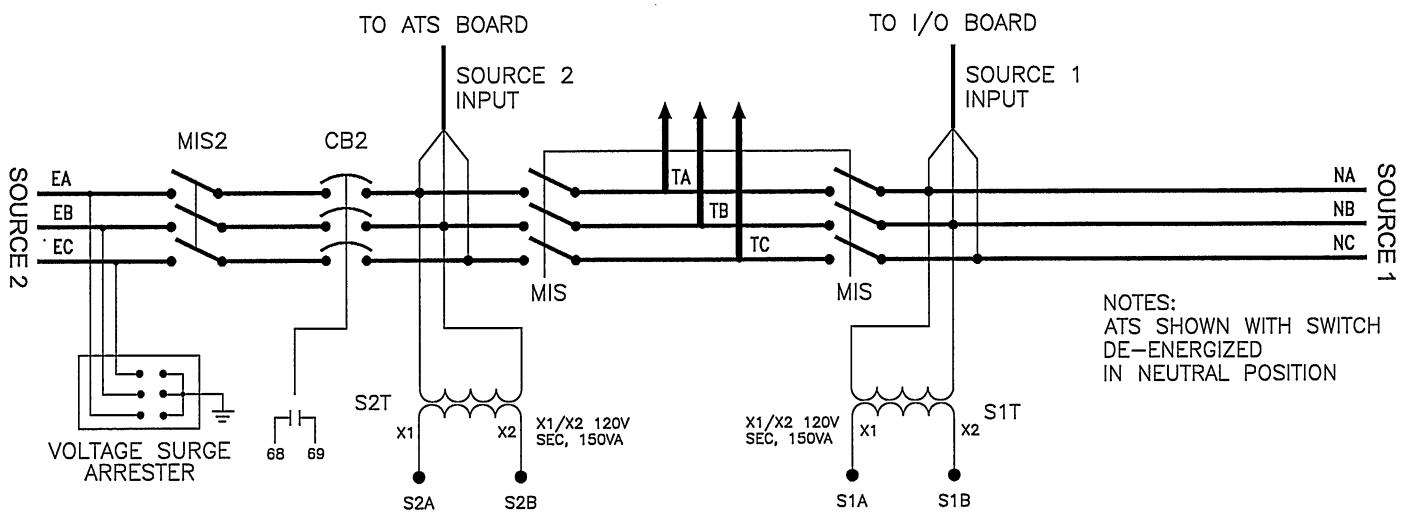
NOTES:
1. POWER/PHASE FAILURE AND COMMON ALARM RELAYS ARE ENERGIZED UNDER NORMAL CONDITIONS.
2. ALL RELAY CONTACTS ARE SHOWN IN NO POWER CONDITION.

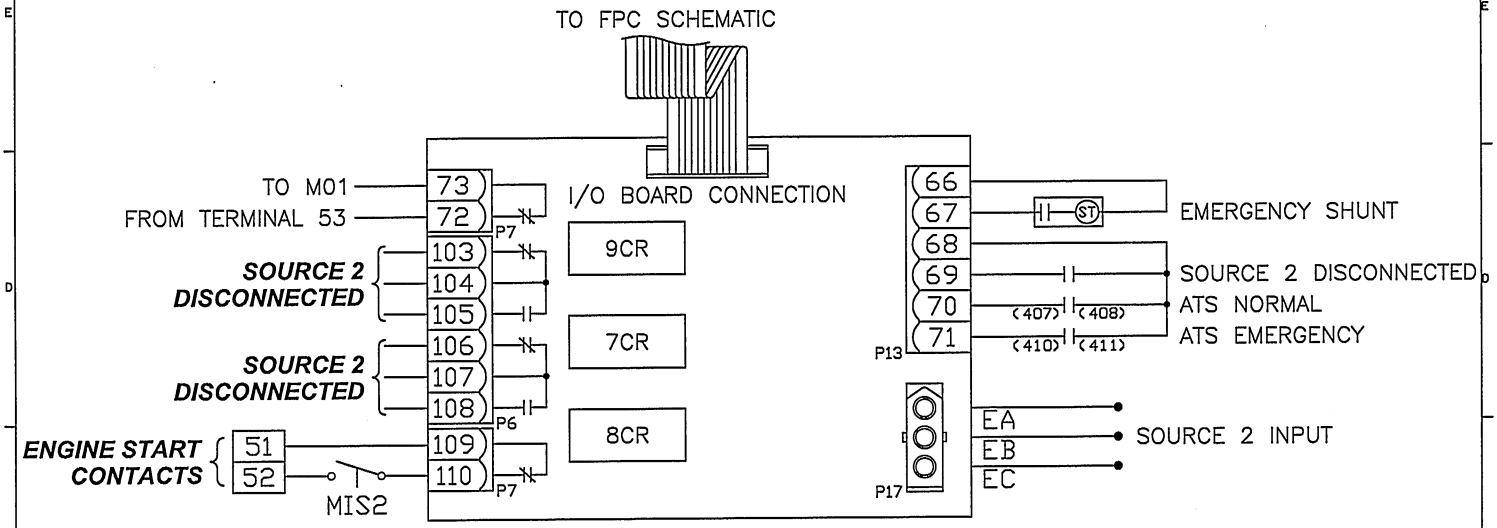
LEGEND:
CB - CIRCUIT BREAKER
CT - CURRENT TRANSFORMER
M - RUN CONTACTOR
MIS - MAIN ISOLATING SWITCH
MSH - MANUAL START HANDLE (EMERGENCY) MICRO SWITCH

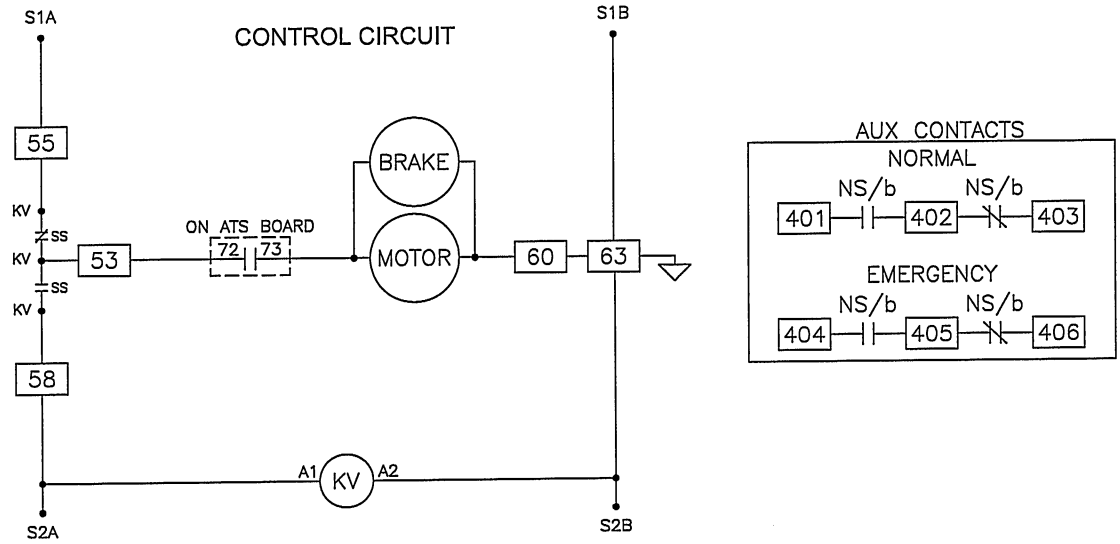


REVISION	DATE	DRAWING NO.
001	09/25/18	CE16492H06

EPCT FIRE - ATS THREE PHASE WIRING SCHEMATIC







REVISION	DATE	DRAWING NO.
001	09/25/18	CE16492H19

EPCT FIRE - FD/FT30 THREE PHASE FIELD CONNECTIONS

Line Terminals Connections

	Line Voltage					Line Lugs (QTY.) & Cable Size per Ø	Service Ground Lugs (QTY.) & Cable Size per Ø
	200-208	220-240	380-415	440-480	575-600		
Max HP	25	30	40	60	75	(1) #14 - 1/0 (CU/AL)	(1) #14 - 2/0 (CU/AL)
	40	50	75	100	100	(1) #4 - 4/0 (CU)	(1) #4 - 350MCM (CU/AL)
	75	75	150	200	200	(1) #3 - 350MCM (CU/AL)	(1) #4 - 350MCM (CU/AL)
	100	125	200	250	300	(2) 3/0 - 250MCM (CU/AL)	(2) 1/0 - 750MCM (CU/AL)
	150	200	300	400	500	(2) 250 - 350MCM (CU/AL)	(2) 1/0 - 750MCM (CU/AL)

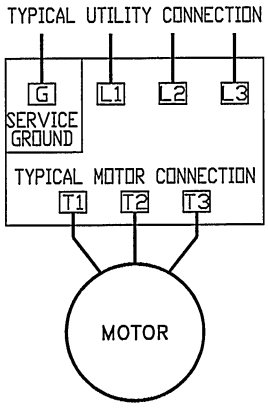
Load Terminals Connections

	Line Voltage					Single Run Cable Sizes	Double Run Cable Sizes
	200-208	220-240	380-415	440-480	575-600		
Max HP	10	10	15	20	25	#14 - #8 (CU/AL)	#14 - #8 (CU/AL)
	20	25	30	50	60	#14 - #1 (CU/AL)	#14 - #2 (CU/AL)
	40	60	75	125	100	#8 - 3/0 (CU/AL)	#8 - 2/0 (CU/AL)
	75	100	150	200	200	#2 - 750MCM (CU/AL)	1/0 - 250MCM (CU/AL)
	150	200	300	400	500	1/0 - 500MCM (CU/AL)	1/0 - 500MCM (CU/AL)

For ambient temperatures exceeding 30C (86F), the temperature rating of motor conductors is recommended to be a minimum of 90C (194F)

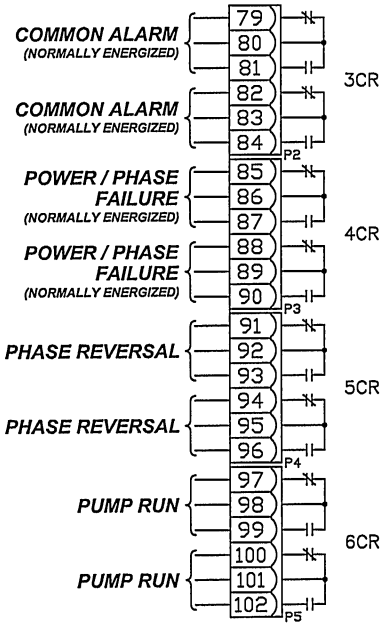
For proper cable size, refer to the National Electric Code (NEC - NFPA70)

CONTROLLER CONNECTIONS

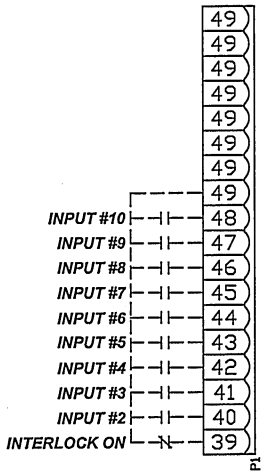


NOTES:
1. MOTOR CONNECTIONS VARY. REFER TO THE SPECIFIC MOTOR CONNECTION DIAGRAM.
2. OBSERVE PROPER PHASE ROTATION A-L1, B-L2, C-L3.
3. CABLE SIZE TO BE 125% OF FULL LOAD CURRENT. REFER TO NEC (NFPA 70)

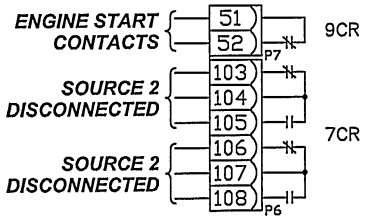
ALARM CONTACTS

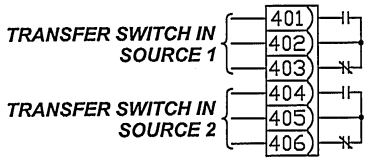


CUSTOMER INPUTS



TRANSFER SWTICH CONNECTIONS ~~(IF EQUIPPED)~~

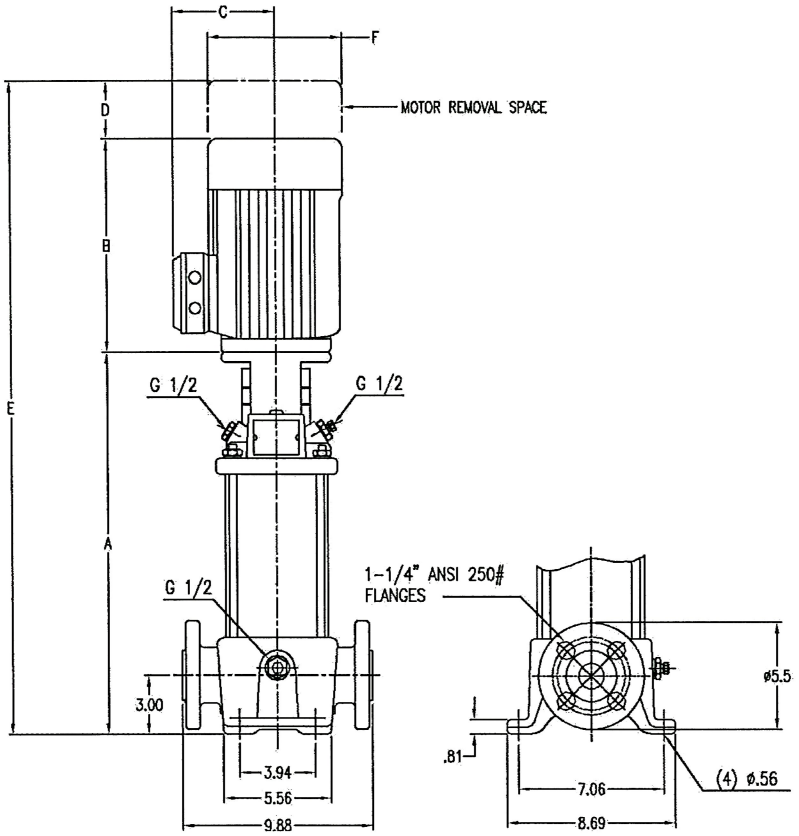




NOTES:
1. ENGINE START CONTACTS ARE TO BE CONNECTED TO THE REMOTE START CONTACTS ON THE GENERATOR/ENGINE.
2. CONTACTS SHOWN IN A DE-ENERGIZED, NEUTRAL POSITION

REVISION	DATE	DRAWING NO.
002	02/16/21	CE16493H03

General Arrangement



A	B	C	D	E	F
12.40	10.20	6.60	2.10	24.60	6.60

NOTES:

All dimensions are in inches.

Dimensions may vary ± 1/4" (6mm) due to normal manufacturing tolerances

-

-

Pump Data	
Model	PVM1-5
Stages	5
Flow	5.00 USgpm
Head	50.00 psi
Rotation	Right Hand
Suc/Disch Size	0.00 in
Connection Suc/Disch	1.25" ANSI 250# flg w/ 1.25" NPT female

Motor Data	
Power	0.50 hp
Phase	3
Frequency	60 Hz
Voltage	230/460
Speed	3500
Frame Size	56CZ
Efficiency	premium
Enclosure	TEFC

Pump Materials of Construction	
Pump Material	Cast Iron
Elastomer	-

Estimated Weights	
Pump	77.00 lb
Motor	0.00 lb

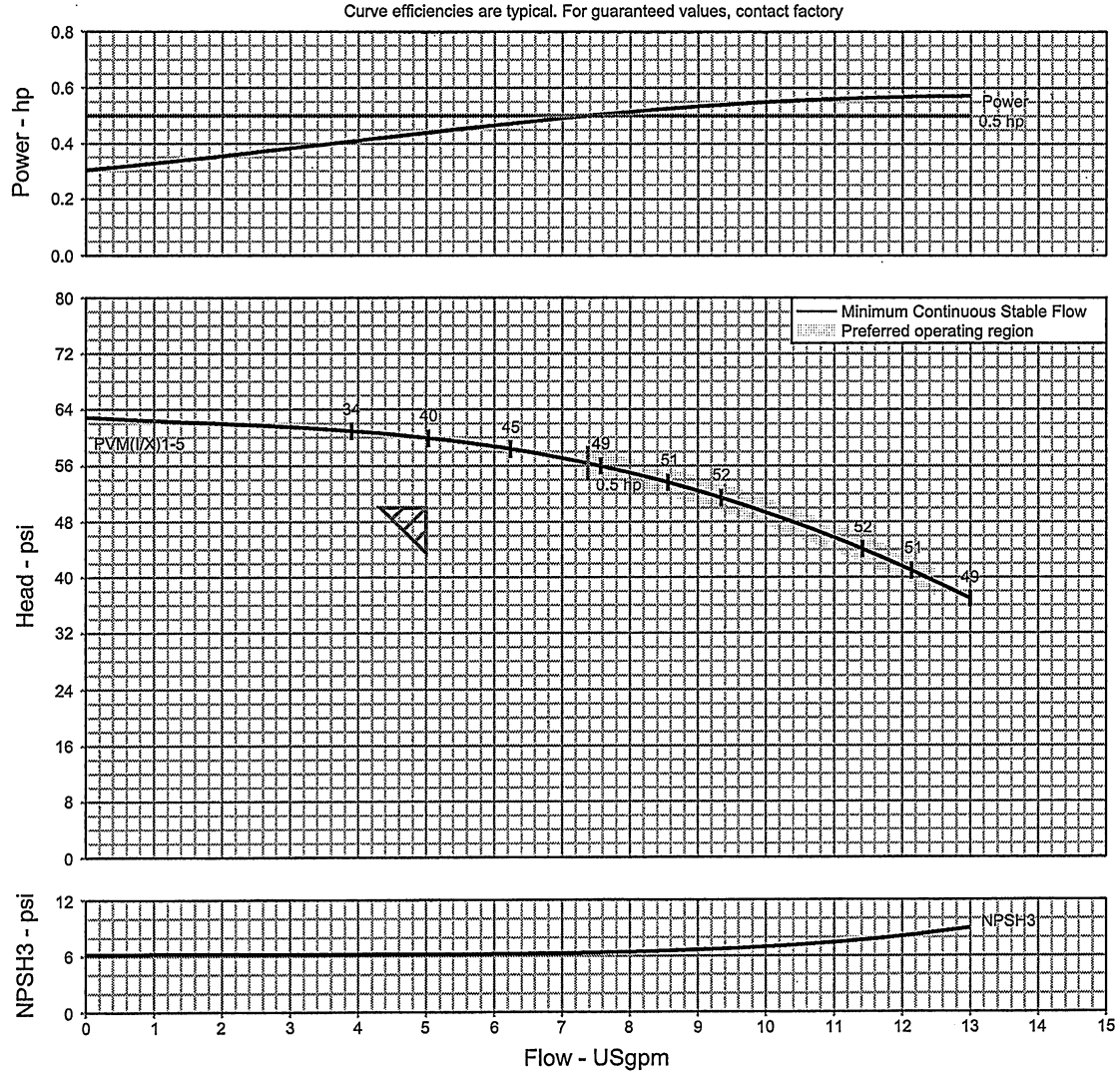
Additional Options

Quote Information	
Customer	PSI - CAROLINAS INC
Customer Quote	1395487
Job Name	NW Harnet County ES
Market	-

PENTAIR

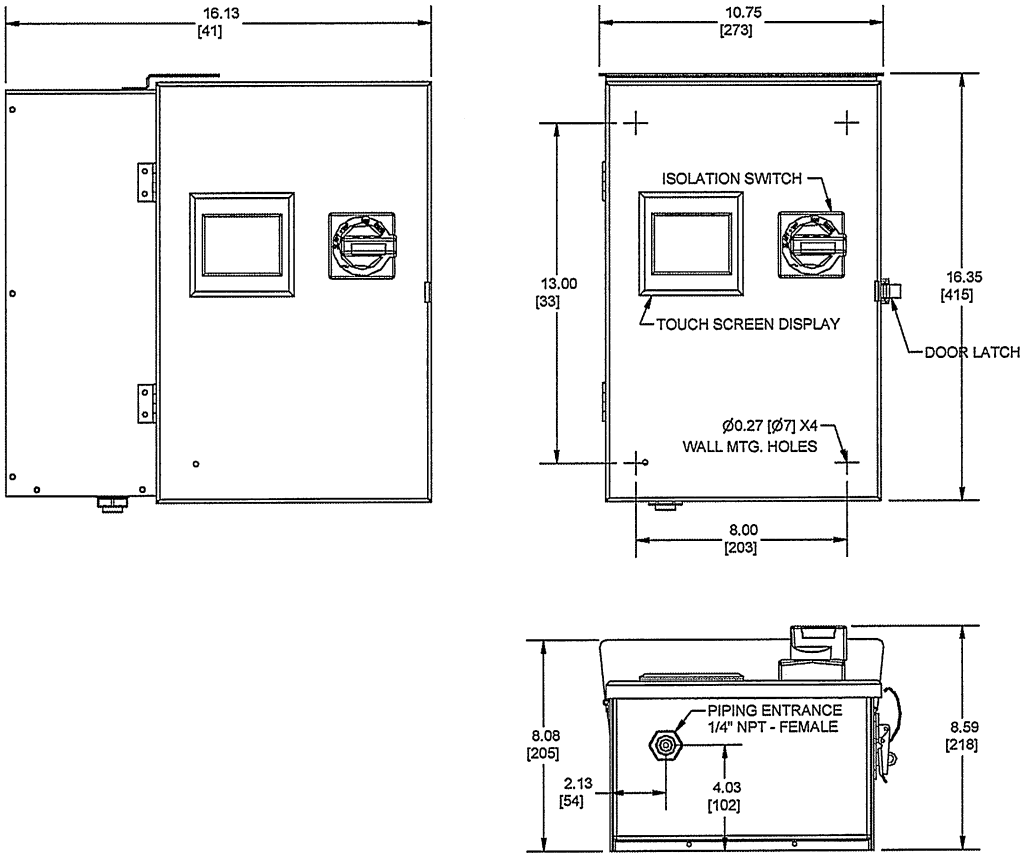
Quote Item	001
Quote Date	11 May 2021

Curve efficiencies are typical. For guaranteed values, contact factory



Item number	: 001	Size	: PVM(X)1-5
Service	:	Stages	: 5
Quantity	: 1	Speed, rated	: 3500 rpm
Quote number	: 21Q-0507	Based on curve number	: PVM(X)1-5
Date last saved	: 11 May 2021 6:30 PM	Efficiency	: 39.85 %
Flow, rated	: 5.00 USgpm	Power, rated	: 0.44 hp
Differential head / pressure, rated	: 50.00 psi	NPSH required	: 6.21 psi
		Viscosity	: 30.26 SSU
Fluid density, rated / max	: 0.998 / 0.998 kg/dm3	Cq/Ch/Ce/Cn [ANSI/HI 1.1-1.5-1994]	: 1.00 / 1.00 / 1.00 / 1.00

JOCKEY Touch™



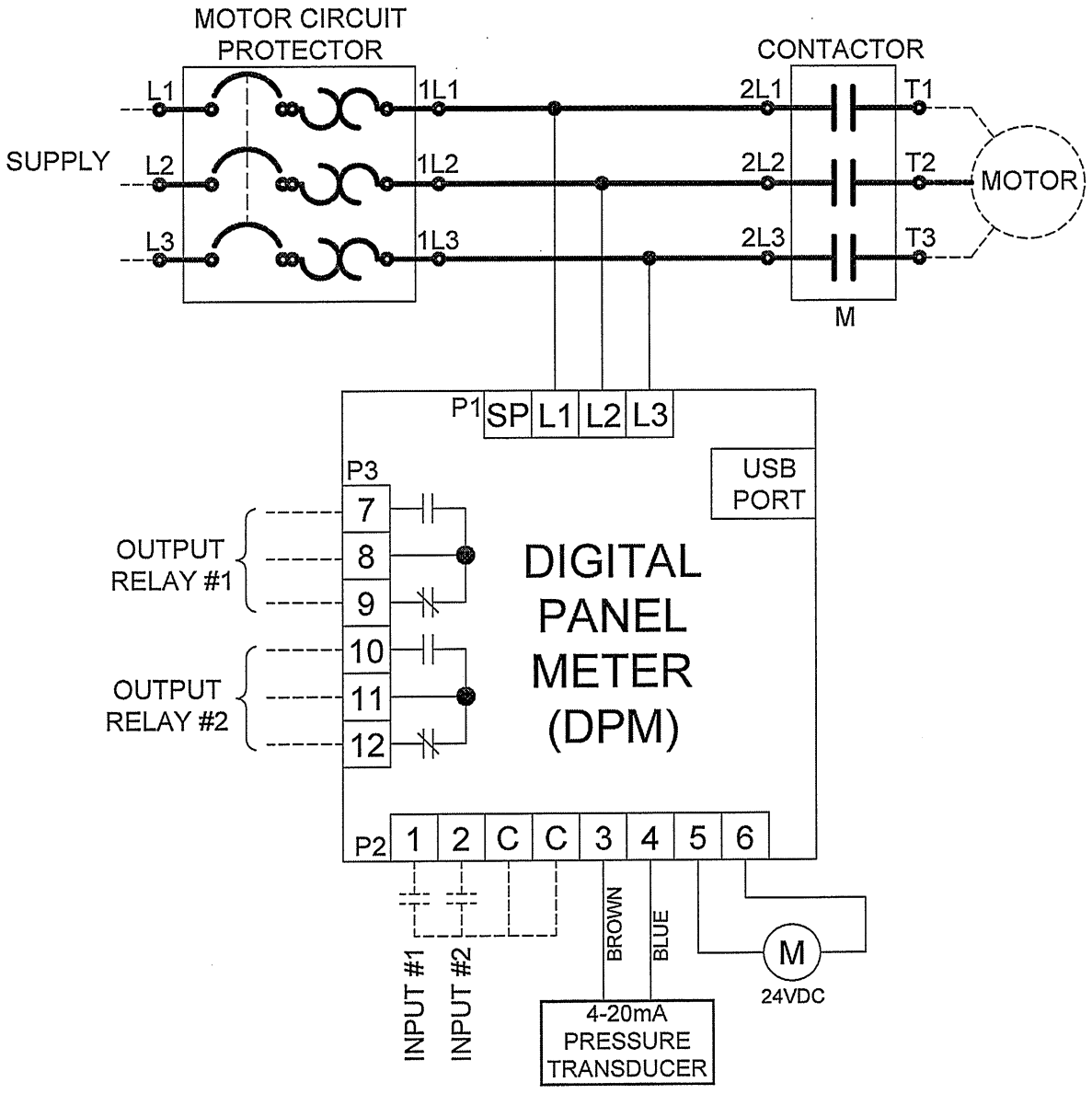
200-208V		220-240V		380-415V		440-480V		550-600V	
Motor Hp	Withstand Rating (kA)	Motor Hp	Withstand Rating (kA)	Motor Hp	Withstand Rating (kA)	Motor Hp	Withstand Rating (kA)	Motor Hp	Withstand Rating (kA)
0.33 - 0.75	50	0.33 - 0.75	50	0.33 - 1.5	50	0.33 - 2	50	0.33 - 7.5	50
1 - 2	65	1 - 3	65	2 - 5	65	3 - 5	65	10 - 30	10 *
3 - 4	42	4 - 5	42	7.5	42	7.5 - 10	42		
5 - 10	18	7.5 - 10	18	10 - 15	18	15 - 20	18		

120V 1ph		208V 1ph		240V 1ph		Approx. Weight
Motor Hp	Withstand Rating (kA)	Motor Hp	Withstand Rating (kA)	Motor Hp	Withstand Rating (kA)	Lbs (Kg)
0.33 - 0.5	65	0.33 - 1	65	0.33	50	18 (8)
0.75 - 1	42	1.5 - 2	42	0.5 - 1.5	65	
1.5 - 2	18	3 - 4	18	2	42	
				3 - 5	18	

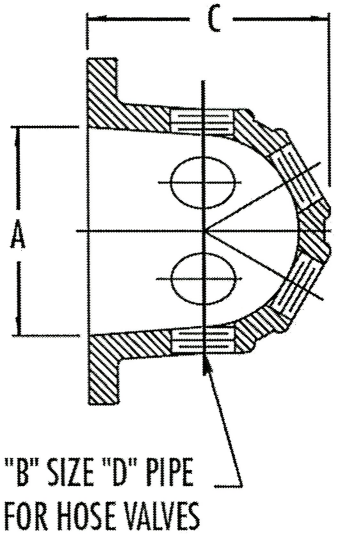
NOTES:
1. * Upstream circuit breaker required to maintain kA rating.
2. All enclosures finished in FirePump red.
3. Cable Entrance either top or bottom.
4. Standard Enclosure type NEMA 2

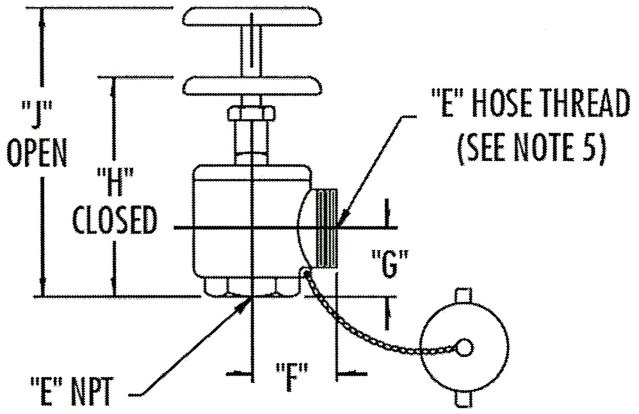
EATON
Powering Business Worldwide

JOCKEY Touch™



General Arrangement





A	B	C	D
4.00	2.00	8.50	2.50

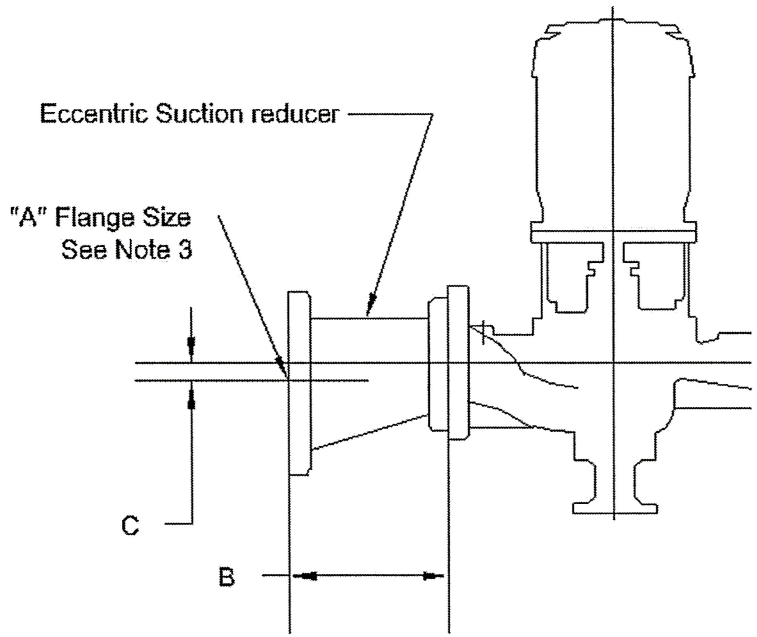
E	F	G	H	J
2.50	3.50	2.75	9.50	11.00

NOTES:

1. Dimensions are in inches (mm) and may vary ±1/4 (6).
2. Components shown are shipped loose for field installation and assembly.
3. Manifold supply size "A" and the number of hose valves ("B") meets or exceeds the minimums specified by N.F.P.A. 20 for the pump ratings indicated.
4. Manifolds for 3000 through 5000 GPM ratings consist of multiple sections and may require support (by others).
5. 1-1/2" Hose valves furnished with 1-1/2" National Standard Fire Hose Thread: 1.9900 (50.55) O.D. (max.) , 6 threads per inch. 2-1/2" Hose valves are furnished with 2-1/2" National Standard Fire Hose Thread: 3.0686 (77.94) O.D. (max.), 7-1/2 threads per inch. Refer to factory for other thread conventions or adaptors.

Quote Information			
Customer	PSI - CAROLINAS INC		
Customer Quote	1395487		
Job Name	NW Harnet County ES		
Market	-		
PENTAIR		Quote Item	001
		Quote Date	11 May 2021

General Arrangement



Suction Size	A	B	C	Suction Reducer Flange Rating
6x4	6.00	9.00	1.00	125 lb

NOTES:

1. Dimensions are in inches (mm) and may vary ± 1/4".
2. Dimensions applicable to both Class 125 & Class 250 fittings.
3. Illustrations show the intended installation positions and orientation of each fitting: Eccentric Suction Reducers are to be installed with the straight side to the top to prevent air entrapment.
4. Proper pipe supports are required to prevent strain on pump casing.
5. Fittings shown are intended to adapt the fire pump suction and discharge flanges to the actual system manifold pipe sizes. Refer to NFPA 20 for the minimum system manifold size for each flow rating (GPM), but in no case should the system suction pipe be a smaller pipe size than that of the pump suction flange.

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Market	-

PENTAIR

Quote Item	001
Quote Date	11 May 2021

10

Backflow Preventor

(Done by Others)

For Health Hazard Applications

Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

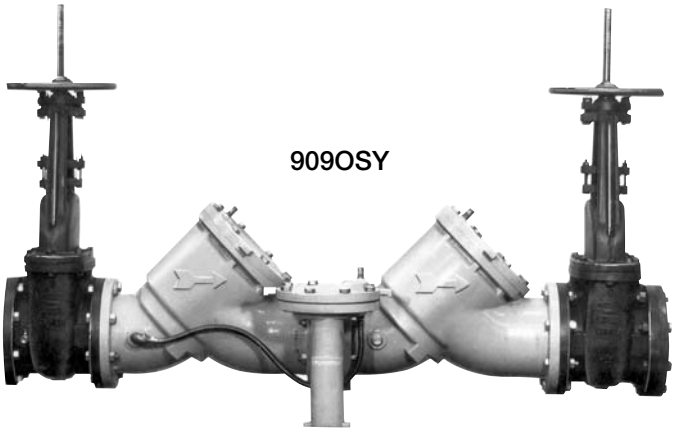
Approval _____ Representative _____

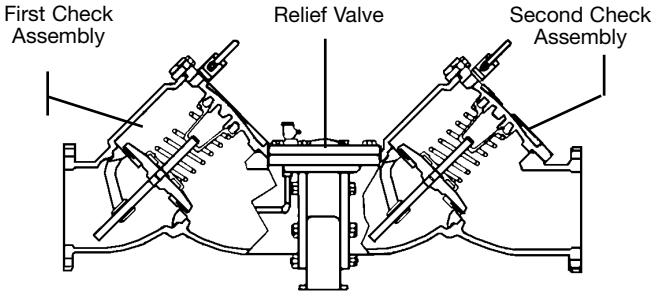
Series 909

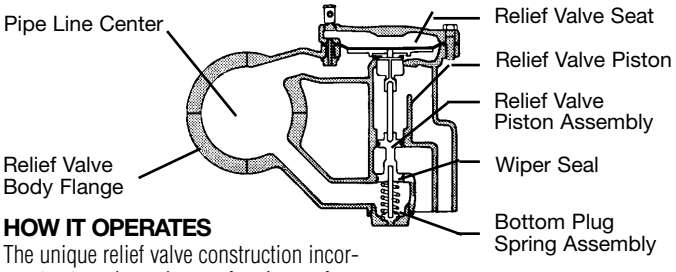
Reduced Pressure Zone Assemblies

Sizes: 2½" – 10" (65–250mm)

Series 909 Reduced Pressure Zone Assemblies are designed to provide cross-connection control protection of the potable water supply in accordance with national plumbing codes. This series can be utilized in a variety of installations, including health hazard cross-connections in plumbing systems or for containment at the service line entrance. With its exclusive patented relief valve design incorporating the "air-in/water-out" principle, it provides substantially improved relief valve discharge performance during the emergency conditions of combined backsiphonage and backpressure with both checks fouled.







Features

- Replaceable bronze seats
- Stainless steel internal parts
- No special tools required for servicing
- Captured spring check assemblies
- Fused epoxy coated & lined checks
- Industrial strength sensing hose
- Field reversible relief valve

Available Models

Suffix:

BB –	bronze body (2½", 3" only) (64, 76mm)
LF –	without shut-off valves
NRS –	non-rising stem resilient seated gate valves
OSY -	UL/FM outside stem & yoke resilient seated gate valves
QT –	quarter-turn ball valves
QT-FDA –	FDA epoxy coated quarter-turn ball valves
S –	cast iron strainer
S-FDA –	FDA epoxy coated strainer

Note: The installation of a drain line is recommended. When installing a drain line, an air gap is necessary.

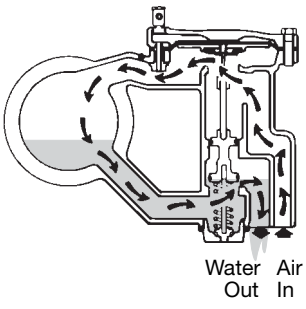
Specifications

For Reduced Pressure Zone Assemblies

A Reduced Pressure Zone Assembly shall be installed at each cross-connection to prevent backsiphonage and backpressure backflow of hazardous materials into the potable water supply. The assembly shall consist of a pressure differential relief valve located in a zone between two positive seating check valves and captured springs. Backsiphonage protection shall include provision to admit air directly into the reduced pressure zone via a separate channel from the water discharge channel. The assembly shall include two tightly closing shutoff valves before and after the valve and test cocks. The assembly shall meet the requirements of ASSE Std. 1013; AWWA Std. C511-92; CSA B64.5; and UL Classified File No. EX3185. Listed by IAPMO (UPC). Approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California. The valve shall be a Watts Regulator Company Series 909.

HOW IT OPERATES

The unique relief valve construction incorporates two channels: one for air, one for water. When the relief valve opens, as in the accompanying air-in/water-out diagram, the right-hand channel admits air to the top of the reduced pressure zone, relieving the zone vacuum. The channel on the left then drains the zone to atmosphere. Therefore, if both check valves foul, and simultaneous negative supply and positive backpressure develops, the relief valve uses the air-in/water-out principle to stop potential backflow.



Now Available, WattsBox Insulated Enclosures.

For more information, send for ES-WB

IMPORTANT: Inquire with governing authorities for local installation requirements.

WATTS® REGULATOR

Materials

Series 909 sizes: 2½" – 10" (65 – 250mm) have FDA approved epoxy coated cast iron check valve bodies with bronze seats, and 4" – 10" (100 – 250mm) have FDA approved epoxy coated cast iron relief valve with stainless steel trim.

Series 909NRS-BB and 909OSY-BB have bronze body construction with stainless steel trim. Sizes 2½" – 3" (60 – 80mm).

All sizes furnished with bronze body ball valve test cocks.

Pressure — Temperature

Suitable for supply pressure up to 175psi (12 bars) and water temperatures to 110°F (43°C) continuous and 140°F (60°C) intermittent.

Standards

ASSE No. 1013, AWWA C511-92, CSA B64.5

UL Classified File No. EX3185

IAPMO PS 31, SBCCI (Standard Plumbing Code)

USC manual for Cross-Connection Control, 8th Edition

Approvals

ASSE, AWWA, CSA, IAPMO

UL Classified (Sizes 2½" – 10") (65 – 250mm)

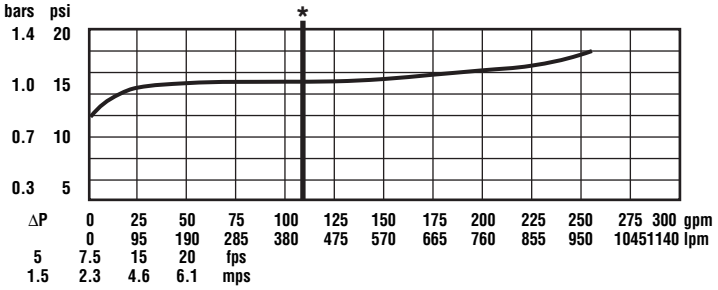
Approved by the Foundation for Cross-Connection Control and Hydraulic Research at the University of Southern California.

IMPORTANT: INQUIRE WITH GOVERNING AUTHORITIES FOR LOCAL INSTALLATION REQUIREMENTS.

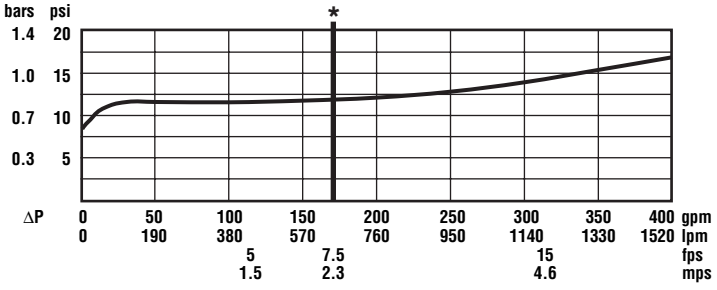
Capacity

*Typical maximum flow rate (7.5 feet/sec.)

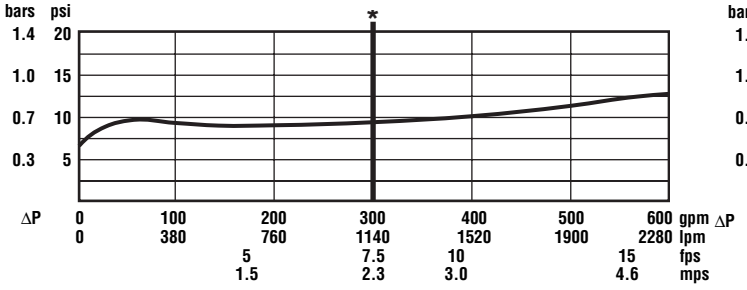
2½" (65mm) 909



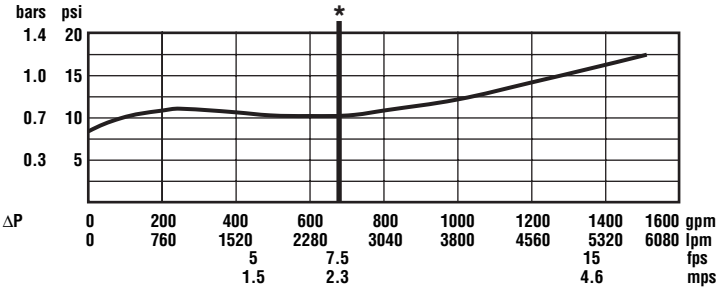
3" (80mm) 909



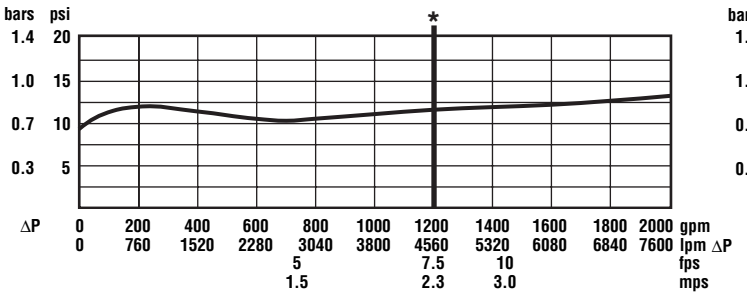
4" (100mm) 909



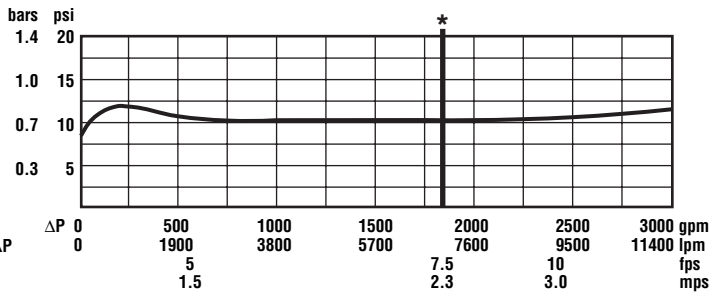
6" (150mm) 909



8" (200mm) 909M1

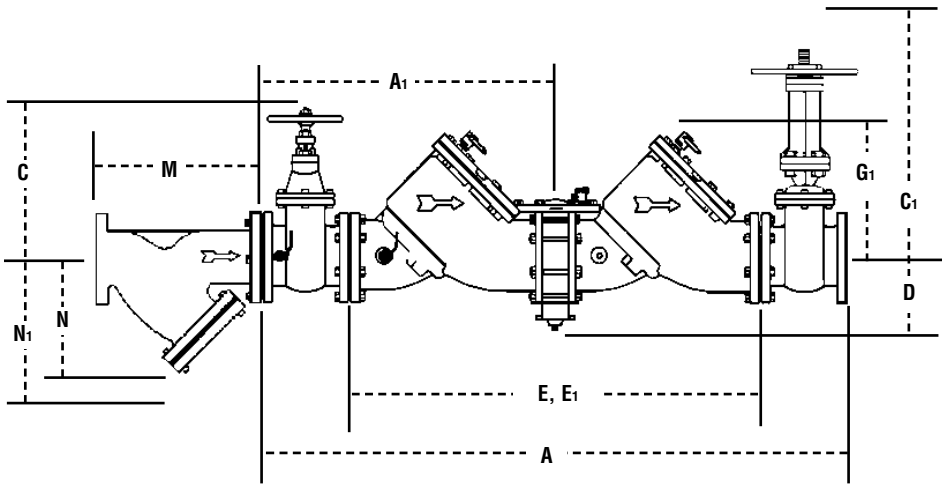


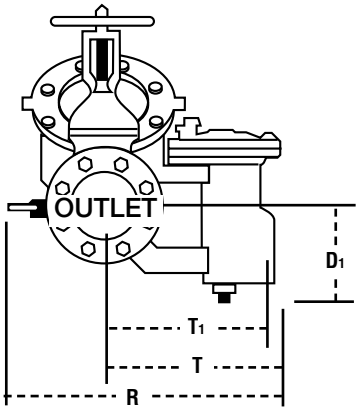
10" (250mm) 909M1



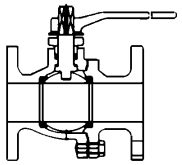
Dimensions — Weights

Watts 909





Quarter-turn (QT) Valve



Watts G-4000 Series Ball Valves Send for F-G4000

NOTES: Relief valve section is reversible, therefore, can be on either side and is furnished standardly as shown.

SIZE (DN)		DIMENSIONS								SERVICE CLEARANCE								SERVICE			
						C				for Gate OSY Open		for Gate NRS						Clearance For Check			
		A		A1		NRS		OSY*		C1		C2		D		E, E1		G1		M	
in.	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*
2½	65	41¼	1048	20⅝	524	11⅜	289	13⅞	352	16⅜	416	14	356	5¼	133	26⅛	663	11	279	10	254
3	80	42¼	1073	21¼	540	12¾	324	15⅝	397	18⅞	479	14	356	5¼	133	26⅛	663	11	279	10⅛	257
4	100	55⅛	1400	27⅝	702	15⅜	603	18¼	464	22¾	578	17	432	6	152	37	940	14	356	12⅛	308
6	150	65½	1664	32¾	832	19¾	825	23¾	603	30⅛	765	21	533	6	152	44½	1130	16	406	18½	470
8	200	78½	2000	39⅜	1000	24½	622	29¼	743	37¾	959	26	660	9¾	248	55¼	1403	21	533	21⅝	549
10	250	93⅝	2378	46⅞	1190	29¼	743	35⅜	899	45¾	1162	32	813	9¾	248	67⅜	1711	21	533	26	660

SIZE		DIMENSIONS												WEIGHT						STRAINER	
		N1†		N		QT		R		R❖		T		T1		NRS		OSY		QT		Weight	
in.	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*lbs.*	*kgs.*	*lbs.*	*kgs.*	*lbs.*	*kgs.*	*lbs.*	*kgs.*
2½	64	10	254	6½	165	7	178	4	102	16	406	9 1/16	230	7⅝	194	195	88.4	198	89.8	182	82.6	28	12.7
3	76	10	254	7	178	7	178	5	127	16	406	9 1/16	230	7⅝	194	225	102	230	104	190	86	34	15.4
4	102	12	305	8¼	210	10	254	6	152	19¾	502	14⅜	365	12½	318	455	206	470	213	352	160	60	27
6	152	20	508	13½	343	15	381	11	279	26	660	14⅜	365	12½	318	718	326	798	362	762	346	133	60
8	203	22¾	578	15½	394	19	483	11¼	286	11¼	286	19¼	489	17⅜	441	1350	612	1456	660	2286	1037	247	112
10	254	28	711	18½	470	22	559	12½	318	12½	318	21	533	19⅛	486	2160	980	2230	1011	3716	1685	370	168

*UL, FM approved backflow preventers must include UL/FM approved OSY gate valves.

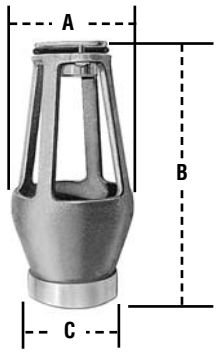
† – Dimension required for screen removal

❖ – Quarter-turn (QT) Valve dimensions

Air Gap Dimensions

When installing a drain line on Series 909 backflow preventers that are installed horizontally, use 909 AG series air gaps.

Iron Body Model No.	Ordering Code	Series/Sizes	Dimensions A in.	A mm	B in.	B mm	C in.	C mm	Weight lbs	Weight kgs
909AG-F	0881378	1¼" – 3" 009/909 1¼" – 2" 009 M1 2" 009 M2	4⅜	111	6¾	171	2	51	3.25	1.47
909AG-K	0881385	4" – 6" 909 8" – 10" 909 M1	6⅜	162	9⅝	244	3	76	6.25	2.83
909AG-M	0881387	8" – 10" 909	7⅜	187	11¼	286	4	102	15.50	7.03



For flange size backflow preventers installed vertically, a fabricated air gap is recommended.

Watts product specifications in U.S. customary units and metric are approximate and are provided for reference only. For precise measurements, please contact Watts Technical Service. Watts reserves the right to change or modify product design, construction, specifications, or materials without prior notice and without incurring any obligation to make such changes and modifications on Watts products previously or subsequently sold.

For Technical Assistance Call Your Authorized Watts Agent.

			Telephone #	Fax #
	HEADQUARTERS: Watts Regulator Company	815 Chestnut St., North Andover, MA 01845-6098 U.S.A.	978 688-1811	978 794-1848
North East	Vernon Bitzer Associates, Inc.	980 Thomas Drive, Warminster, PA 18974	215 443-7500	215 443-7573
	Edwards, Platt & Deely, Inc.	271 Royal Ave., Hawthorne, NJ 07506	973 427-2898	973 427-4246
	Edwards, Platt & Deely, Inc.	368 Wyandanch Ave., North Babylon, NY 11703	631 253-0600	631 253-0303
	J. B. O'Connor Company, Inc.	P.O. Box 12927, Pittsburgh, PA 15241	724 745-5300	724 745-7420
	The Joyce Agency, Inc.	8442 Alban Rd., Springfield, VA 22150	703 866-3111	703 866-2332
	W. P. Haney Co., Inc.	51 Norfolk Ave., South Easton, MA 02375	508 238-2030	508 238-8353
	WMS Sales, Inc. (Main office)	9580 County Rd., Clarence Center, NY 14032	716 741-9575	716 741-4810
South East	Billingsley & Associates, Inc.	2728 Crestview Ave., Kenner, LA 70062-4989	504 602-8100	504 602-8106
	Billingsley & Associates, Inc.	478 Cheyenne Lane, Madison, MS 39110	601 856-7565	601 856-8390
	Francisco J. Ortiz & Co., Inc.	Charlyn Industrial Pk., Road 190 KM1.9 - Lot #8, Carolina, Puerto Rico 00983	787 769-0085	787 750-5120
	Mid-America Marketing, Inc.	2776 B.M. Montgomery St., Birmingham, AL 35209	205 879-3469	205 870-5027
	Mid-America Marketing, Inc.	1364 Foster Avenue, Nashville, TN 37210	615 259-9944	615 259-5111
	Mid-America Marketing, Inc.	5466 Old Hwy. 78, Memphis, TN 38118	901 795-0045	901 795-0394
	RMI	Glenfield Bus. Ctr., 2535 Mechanicsville Tpk., Richmond, VA 23223	804 643-7355	804 643-7380
	Smith & Stevenson Co., Inc.	4935 Chastain Ave., Charlotte, NC 28217	704 525-3388	704 525-6749
	Spotswood Associates, Inc.	6235 Atlantic Blvd., Norcross, GA 30071	770 447-1227	770 263-6899
	Target Marketing Enterprises, Inc.	118 West Grant St., Building M, Orlando, FL 32806	407 245-7838	407 245-7833
South Central	Hugh M. Cunningham, Inc.	13755 Benchmark, Dallas, TX 75234	972 888-3800	972 888-3838
	Mack McClain & Associates	11132 South Towne Square, Suite 202, St. Louis, MO 63123	314 894-8188	314 894-8388
	Mack McClain & Associates, Inc.	1537 Ohio St., Des Moines, IA 50314	515 288-0184	515 288-5049
	Mack McClain & Associates, Inc.	15090 West 116th St., Olathe, KS 66062	913 339-6677	913 339-9518
	Phoenix Marketing, Ltd.	2416 Candelaria N.E., Albuquerque, NM 87107	505 883-7100	505 883-7101
	Pro-Spec, Inc.	P.O. Box 472226, Tulsa, OK 74147-2226	918 461-0066	918 461-0105
North Central	Aspinall Associates, Inc.	6840 Hillsdale Court, Indianapolis, IN 46250	317 849-5757	317 845-7967
	Associated Independent Marketing	1606 Commerce Dr., Sun Prairie, WI 53590	608 837-5005	608 837-2368
	Dave Watson Associates	1325 West Beecher, Adrian, MI 49221	517 263-8988	517 263-2328
	Disney-McLane-Woodcock, Inc.	428 McGregor Ave., Cincinnati, OH 45206	800 542-1682	877 476-1682
	Disney-McLane-Woodcock, Inc.	17610 S. Waterloo Rd., Cleveland, OH 44119	216 486-1010	216 486-2860
	Mid-Continent Marketing Services Ltd.	1724 Armitage Ct., Addison, IL 60101	630 953-1211	630 953-1067
South West	Delco Sales, Inc.	1930 Raymer Ave., Fullerton, CA 92833	714 888-2444	714 888-2448
	P I R Sales, Inc.	3050 North San Marcos Place, Chandler, AZ 85225	480 892-6000	480 892-6096
	Preferred Sales	31177 Wiegman Road, Hayward, CA 94544	510 487-9755	510 476-1595
North West	Delco Sales, Inc.	111 Sand Island Access Rd., Unit I-10, Honolulu, HI 96819	808 842-7900	808 842-9625
	Fanning & Associates, Inc.	6765 Franklin St., Denver, CO 80229-7111	303 289-4191	303 286-9069
	Hollabaugh Brothers & Associates	6915 South 194th St., Kent, WA 98032	253 867-5040	253 867-5055
	Hollabaugh Brothers & Associates	3028 S.E. 17th Ave., Portland, OR 97202	503 238-0313	503 235-2824
	R. E. Fitzpatrick Sales, Inc.	4109 West Nike Dr. (8250 South), West Jordan, UT 84088	801 282-0700	801 282-0600
	Soderholm & Associates, Inc.	7150 143rd Ave. N.W., Anoka, MN 55303	763 427-9635	763 427-5665
CANADA	Watts Industries (Canada) Inc. (Watts Regulator Co. Division)	5435 North Service Road, Burlington, Ontario L7L 5H7	905 332-4090	905 332-7068
	GTA Sales Team.	Greater Toronto Area	888 208-8927	888 479-2887
	Hydro-Mechanical Sales, Ltd.	3700 Joseph Howe Dr., Ste. 1 Halifax, Nova Scotia B3L 4H7	902 443-2274	902 443-2275
	Hydro-Mechanical Sales, Ltd.	297 Collishaw St., Ste. 7 (shipping) Moncton, New Brunswick E1C 9R2	506 859-1107	506 859-2424
	Hydro-Mechanical Sales, Ltd.	85 Tolt Rd., St. Phillips, Newfoundland A1B 3M7	709 895-0090	709 895-0091
	Le Groupe B.G.T., Inc.	2800 Rue Dalton Ste. 3, Ste-Foy, Quebec G1P 3S4	418 657-2800	418 657-2700
	Le Groupe B.G.T., Inc.	140 Rue Merizzi, Ville St. Laurent, Quebec H4T 1S4	514 341-9010	514 341-4464
	Walmar Mechanical Sales	24 Gurdwara Rd., Nepean, Ontario K2E 8B5	613 225-9774	613 225-0673
	Mar-Win Agencies, Ltd.	1123 Empress St., Winnipeg, Manitoba R3E 3H1	204 775-8194	204 786-8016
	Palser Enterprises, Ltd.	1885 Blue Heron Dr., #4, London, Ontario N6H 5L9	519 471-9382	519 471-1049
	Northern Mechanical Sales	P.O. Box 280 (mailing) 163 Pine St. (shipping), Garson, Ontario P3L 1S6	705 693-2715	705 693-4394
	RAM Mechanical Marketing	441 Quebec St., Regina, Saskatchewan S4R 1K8	306 525-1986	306 525-0809
	RAM Mechanical Marketing	2615-B Wentz Avenue, Saskatoon, Saskatchewan S7K 5J1	306 244-6622	306 244-0807
	Con-Cur West Marketing, Inc.	#109-42 Fawcett Rd., Coquitlam, British Columbia V3K 6X9	604 540-5088	604 540-5084
	D.C. Sales, Ltd.	10-6130 4th St. S.E., Calgary, Alberta T2H 2A6	403 253-6808	403 259-8331
	D.C. Sales, Ltd.	11420 142 Street, Edmonton, Alberta T5M 1V1	780 496-9495	780 496-9621
0249	**EXPORT Hdqtrs.:** Watts Regulator Co.	815 Chestnut St., North Andover, MA 01845-6098 U.S.A.	978 688-1811	978 794-1848

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