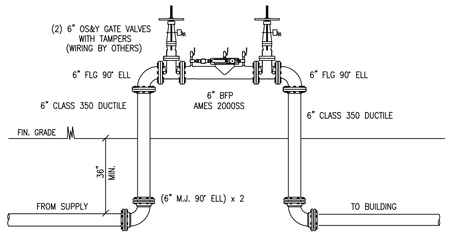
Fire Protection Notes:

1. Design Criteria:
   a. Guest Suites – Wet pipe system of residential fire sprinklers hydraulically designed to provide .10 gpm/sq ft. to be installed throughout. All sprinkler head spacing and locations to be in accordance with NFPA 13, 2016 edition, for residential occupancy in accorddance with manufacturers listings.
   b. Guest Suites corridor – Wet pipe system of residential fire sprinklers hydraulically designed to provide .10 gpm/sq ft. to be installed throughout. All sprinkler head spacing and locations to be in accordance with NFPA 13, 2016 edition.
   c. Laundry Rooms – Wet pipe system of standard spray quick response fire sprinklers hydraulically designed to provide .15 gpm/sq ft. to be installed throughout. All sprinkler head spacing and locations to be in accordance with NFPA 13, 2016 edition, for an Ordinary Hazard Group 1 Occupancy.
   d. Lobby and Function Rooms – Wet pipe system of standard spray quick response fire sprinklers hydraulically designed to provide .10 gpm/sq ft. to be installed throughout. All sprinkler head spacing and locations to be in accordance with NFPA 13, 2016 edition, for a light Hazard Occupancy.
   e. Standpipes – To be provided in accordance with NFPA 14, latest edition. Standpipes shall be manual-wet as defined by NFPA 14 for a Class I system. Fire department valves shall be 2-1/2" diameter with 1-1/2" reducing cap & chain.
2. All material, devices, and installation to comply with NFPA 13, 2016 edition, all manufacturers specifications, and the local authority.
3. All overhead piping to be hung with U.L. listed hangers properly spaced in accordance with NFPA 13, edition. All CPVC piping to be restrained to prevent upward movement.
4. All interior building concealed pipe, sizes 1" through 2" in diameter, to be C.P.V.C. per ASTM D1784/F442 and shall be joined by C.P.V.C. fittings. All interior building exposed piping sizes 1" through 2" in diameter, to be schedule 40/10 black steel per ASTM A-135/A-795 and shall be joined by cast iron threaded/ grooved fittings. All 2-1/2" and larger diameter pipe shall be Schedule 10 black steel per ASTM A-135/A-795 and shall be joined by mechanical couplings.
5. All piping to be hydrostatically tested at 200 psi for (2) hours. All underground piping to be flushed before any overhead piping is tied in.
6. All firewall penetrations to be sealed in accordance with their rating.
7. Per NFPA 13-8.4.5.1 Residential sprinklers shall be permitted in Guest Suites and their adjoining corridors, provided they are installed in conformance with their listing.

Underground Fire Main Notes:

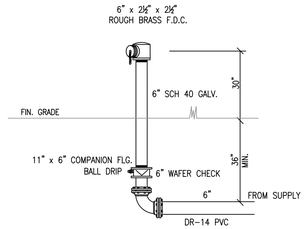
1. All material and installation to be in accordance with NFPA 24, 2016 edition, and the local authority.
2. All joints to be restrained in accordance with NFPA 24, 2016 edition, and the local authority.
3. All piping to have a 36" minimum depth of bury from top of pipe to finished grade.
4. All piping to be flushed and hydrostatically tested in accordance with NFPA 24, 2016 edition and the local authority.

FLOW TEST DATA	
STATIC:	78 PSI
RESIDUAL:	70 PSI
FLOW:	1186 GPM
DATE:	10/15/21
TIME:	10:00 AM
LOCATION:	177 NW KNIGHTS AVE
BY:	CITY OF LAKE CITY



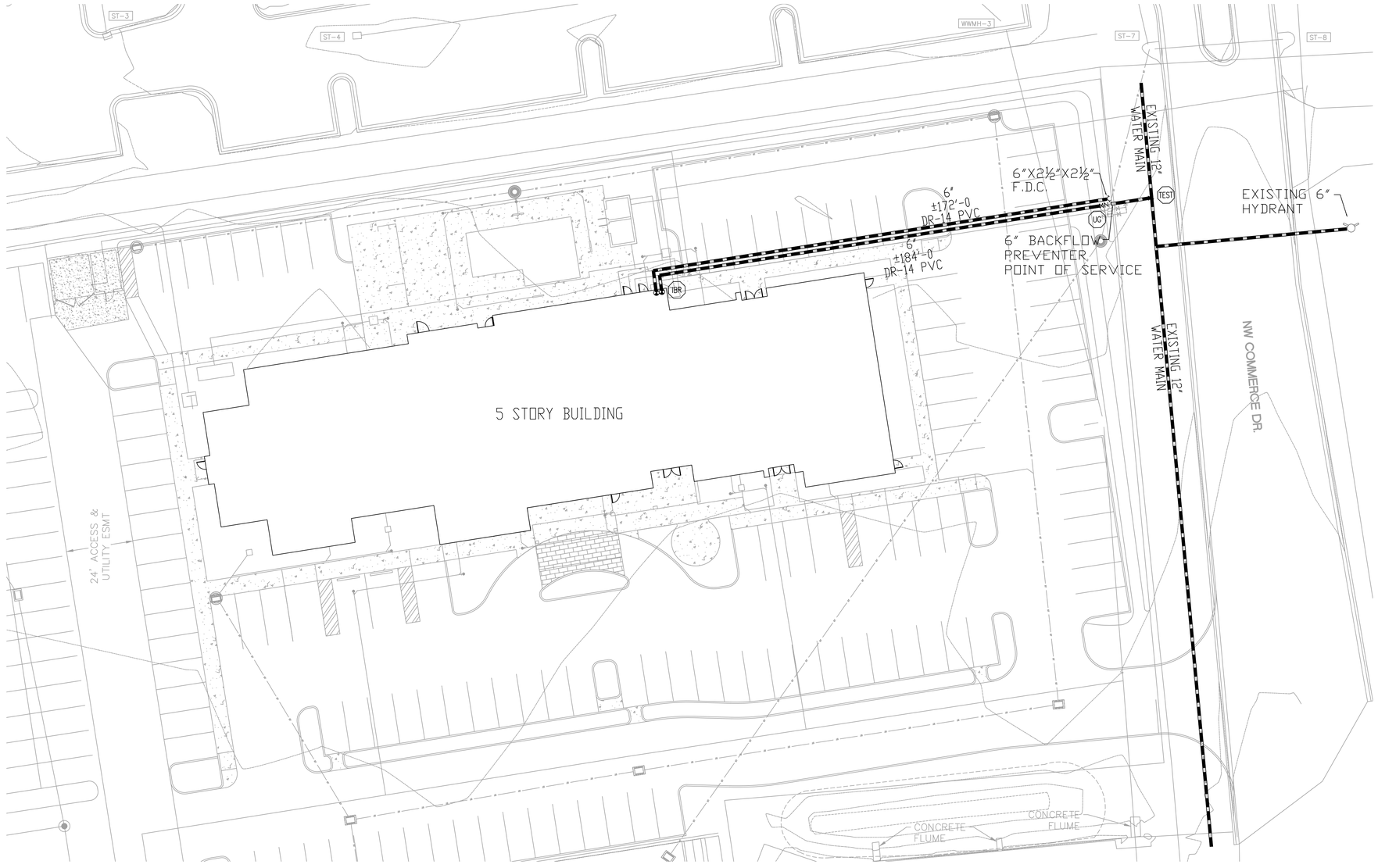
Backflow Preventor Detail

No Scale



F.D.C. Detail

No Scale



North

Site Fire Main Plan

SCALE 1"=20'

DAVIS & CLEATON ENGINEERING, INC.
101 SUNNYTOWN ROAD, SUITE 109
CASSELBERRY, FL 32707
PH: 407-539-2353 LIC#: 35816
CERTIFICATE OF AUTHORIZATION#: 8689

Precision Fire Systems Inc.
790 Monroe Road
Sanford, Florida 32771
Phone: 321-363-1560
Fax: 321-363-1320

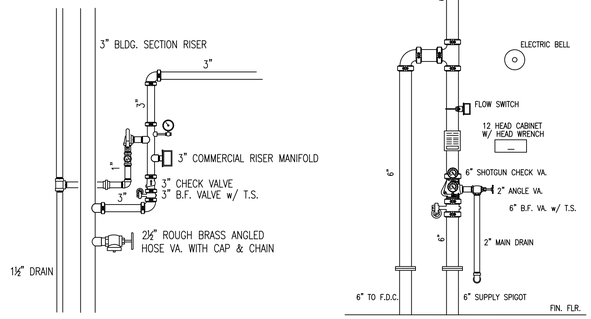
Townplace Suites
Highway 90 & NW Commerce Dr.
Lake City ——— Florida

Site
Fire Main
Plan

NO.	DATE	REVISION DESCRIPTION	BY
0	11/4/21	APPROVALS	W.B.M.

CONTRACT # 21066
DRAWN : W.B.M.
CHECKED : F.C.
DATE : 11/4/21
TOTAL HEADS : 525
SCALE : AS NOTED

FP-1



1st Floor Control Assembly

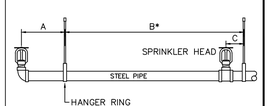
No Scale

Feed Main Riser

No Scale

HANGER LOCATION DETAIL

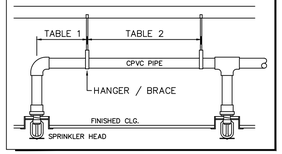
PIPE SIZE	A	B*	C
1"	3'-0" MAX.	12'-0" MAX.	3" MIN.
1¼"	4'-0" MAX.	12'-0" MAX.	3" MIN.
1½"-8"	5'-0" MAX.	15'-0" MAX.	3" MIN.

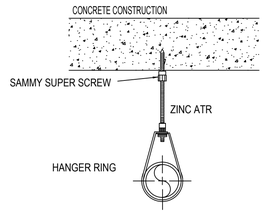


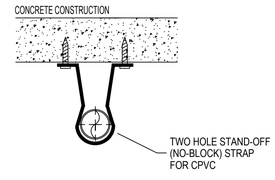
* MAXIMUM HANGER SPACING FOR STEEL PIPE

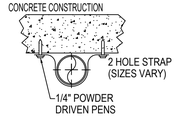
CPVC PIPE HANGER LOCATION DETAIL

PIPE SIZE	TABLE 1 LESS THAN 100 psi	TABLE 1 MORE THAN 100 psi	TABLE 2 LESS THAN 100 psi	TABLE 2 MORE THAN 100 psi
3/4"	9"	6"	4'-0"	3'-0"
1"	12"	9"	5'-0"	4'-0"
1-1/4"	16"	12"	6'-0"	5'-0"
1-1/2"	24"	12"	7'-0"	7'-0"
2"	24"	12"	7'-0"	7'-0"
2-1/2"	24"	12"	7'-0"	7'-0"
3"	24"	12"	7'-0"	7'-0"









Hanger Detail

No Scale

Hydraulically Designed System	
Location	REMOTE AREA #3
No. of Sprinklers	10
Density	.10
Design Area Size	900 SQ FT
System Demand At Base of Riser	
GPM Discharge	187.94
Residual PSI	23.66

Hydraulically Designed System	
Location	REMOTE AREA #2
No. of Sprinklers	12
Density	.15
Design Area Size	900 SQ FT
System Demand At Base of Riser	
GPM Discharge	299.20
Residual PSI	50.05

NOTE:
BRANCH LINES IN LAUNDRY AREA ARE TO BE SCHEDULE 10/40 BLACK STEEL. ALL OTHER BRANCH LINES TO BE CPVC.
– – – – – – – – – INDICATES BLACK STEEL PIPE BRANCH LINES.

1st Floor Fire Sprinkler Piping Plan

North

2 1 0 4 8
SCALE 1/8"=1'-0"

S.I.N. TY323: 121 — 1/2" (5.6K) 175° QR TYCO TY-FRB WHITE PENDENT RECESSED — STANDARD SPRAY

S.I.N. TY2234: 12 — 1/2" (4.9K) 175° RR TYCO LFII WHITE PENDENT RECESSED — STANDARD SPRAY

S.I.N. TY4334: 8 — 1/2" (5.8K) 175° QR TYCO LFII WHITE HSW RECESSED — STANDARD SPRAY

DAVIS & CLEATON ENGINEERING, INC.
101 SUNNYTOWN ROAD, SUITE 109
CASSELBERRY, FL 32707
PH: 407-539-2353 LIC#: 35816
CERTIFICATE OF AUTHORIZATION#: 8689

Precision Fire Systems Inc.
790 Monroe Road
Sanford, Florida 32771
Phone: 321-363-1560
Fax: 321-363-1320

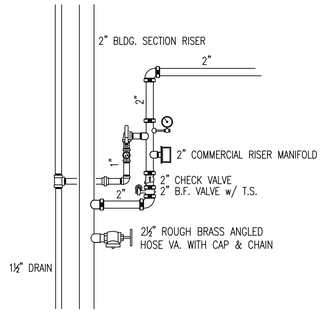
Townplace Suites
Highway 90 & NW Commerce Dr.
Lake City, Florida

Building Fire Sprinkler Piping Plan

NO.	DATE	REVISION DESCRIPTION	BY
0	11/4/21	APPROVALS	W.B.M.

CONTRACT # 21066
DRAWN : W.B.M.
CHECKED : F.C.
DATE : 11/4/21
TOTAL HEADS : 525
SCALE : AS NOTED

FP-2

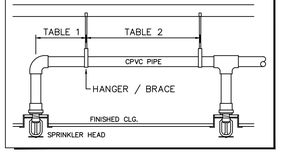


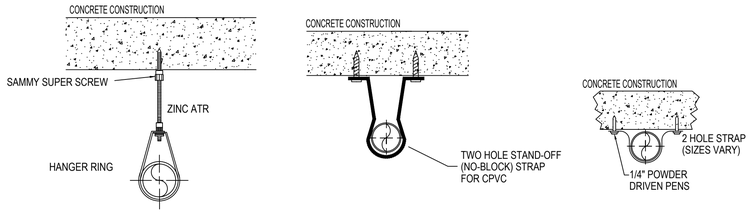
2nd-5th Floor Control Assembly

No Scale

CPVC PIPE HANGER LOCATION DETAIL

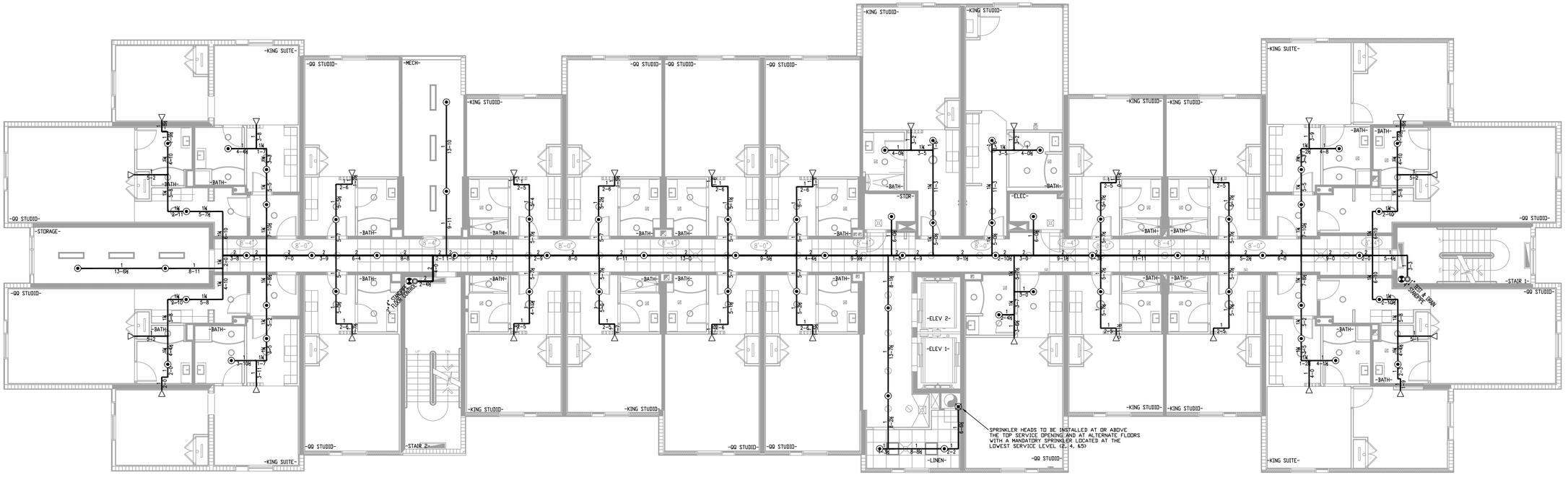
	TABLE 1		TABLE 2	
PIPE SIZE	LESS THAN 100 psi	MORE THAN 100 psi	LESS THAN 100 psi	MORE THAN 100 psi
3/4"	9"	6"	4'-0"	3'-0"
1"	12"	9"	5'-0"	4'-0"
1-1/4"	16"	12"	6'-0"	5'-0"
1-1/2"	24"	12"	7'-0"	7'-0"
2"	24"	12"	7'-0"	7'-0"
2-1/2"	24"	12"	7'-0"	7'-0"
3"	24"	12"	7'-0"	7'-0"





Hanger Detail

No Scale



2nd-3rd Floor Fire Sprinkler Piping Plan

SCALE 1/8"=1'-0"

S.I.N. TY2234
66
1/2" (4.9K)
175° RR
TYCO LFII
WHITE PENDENT
RECESSED
STANDARD SPRAY

S.I.N. TY4332
29
3/4" (5.8K)
135° QR
TYCO TY-FRB
WHITE HSW
RECESSED
STANDARD SPRAY

DAVIS & CLEATON ENGINEERING, INC.
101 SUNNYTOWN ROAD, SUITE 109
CASSELBERRY, FL 32707
PH: 407-539-2353 LIC#: 35816
CERTIFICATE OF AUTHORIZATION#: 8689

Precision Fire Systems Inc.
790 Monroe Road
Sanford, Florida 32771
Phone: 321-363-1560
Fax: 321-363-1320

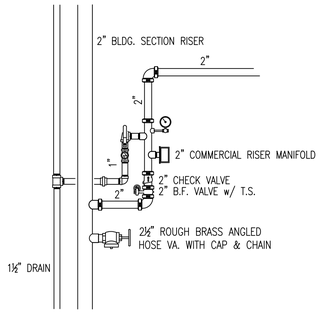
Townplace Suites
Highway 90 & NW Commerce Dr.
Lake City, Florida

Building Fire Sprinkler Piping Plan

NO.	DATE	REVISION DESCRIPTION	BY
0	11/4/21	APPROVALS	W.B.M.

CONTRACT # 21066
DRAWN : W.B.M.
CHECKED : F.C.
DATE : 11/4/21
TOTAL HEADS : 525
SCALE : AS NOTED

FP-3

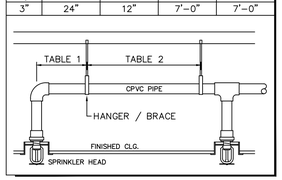


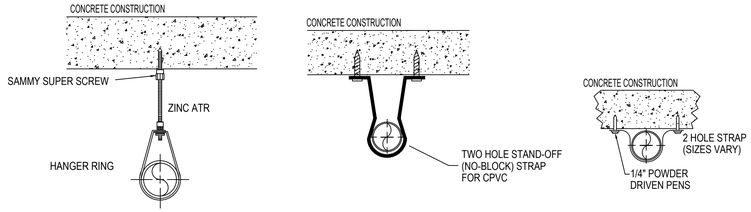
2nd–5th Floor Control Assembly

No Scale

CPVC PIPE HANGER LOCATION DETAIL

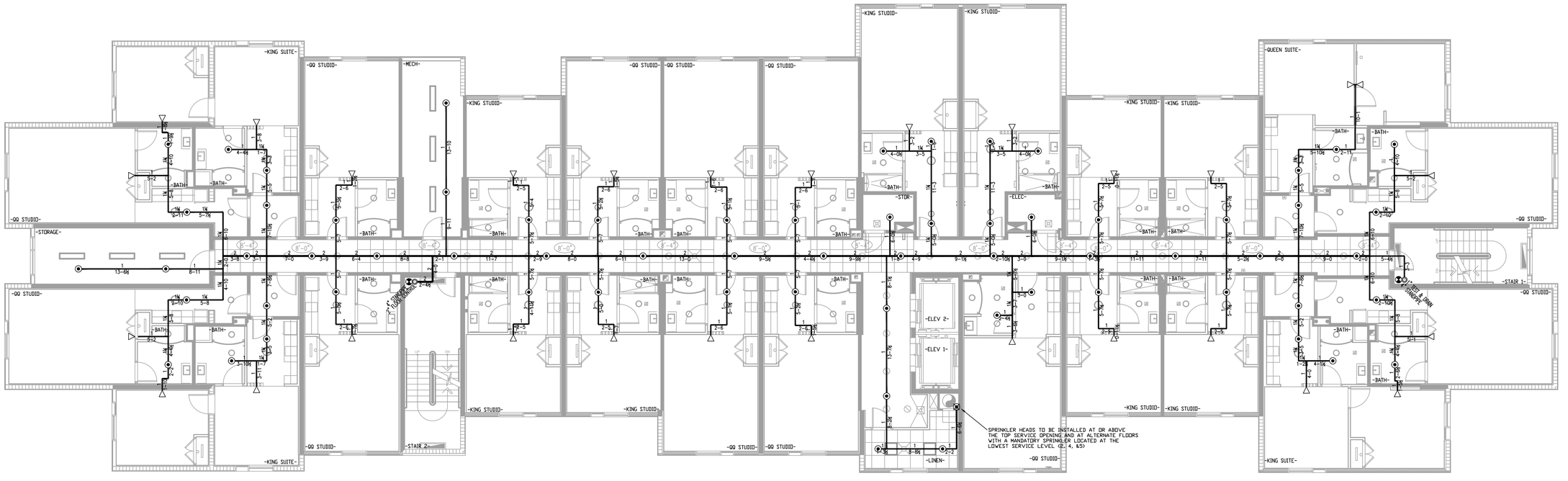
	TABLE 1		TABLE 2	
PIPE SIZE	LESS THAN 100 psi	MORE THAN 100 psi	LESS THAN 100 psi	MORE THAN 100 psi
3/4"	9"	6"	4'–0"	3'–0"
1"	12"	9"	5'–0"	4'–0"
1–1/4"	16"	12"	6'–0"	5'–0"
1–1/2"	24"	12"	7'–0"	7'–0"
2"	24"	12"	7'–0"	7'–0"
2–1/2"	24"	12"	7'–0"	7'–0"
3"	24"	12"	7'–0"	7'–0"





Hanger Detail

No Scale



4th Floor Fire Sprinkler Piping Plan

North

SCALE 1/8"=1'-0"

S.I.N. TY2234
66
1/2" (4.9K)
175° QR
TYCO LFII
WHITE PENDENT
RECESSED
STANDARD SPRAY

S.I.N. TY4332
29
3/4" (8.0K)
135° QR
TYCO TY-FRB
WHITE HSW
RECESSED
STANDARD SPRAY

DAVIS & CLEATON ENGINEERING, INC.
101 SUNNYTOWN ROAD, SUITE 109
CASSELBERRY, FL 32707
PH: 407-539-2353 LIC#: 35816
CERTIFICATE OF AUTHORIZATION#: 8689

Precision Fire Systems Inc.
790 Monroe Road
Sanford, Florida 32771
Phone: 321-363-1560
Fax: 321-363-1320

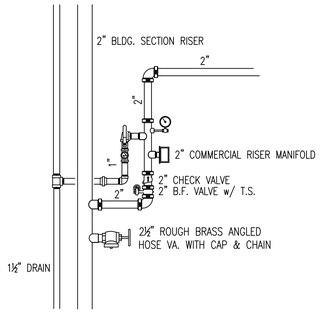
Townplace Suites
Highway 90 & NW Commerce Dr.
Lake City Florida

Building Fire Sprinkler Piping Plan

NO.	DATE	REVISION DESCRIPTION	BY
0	11/4/21	APPROVALS	W.B.M.

CONTRACT # 21066
DRAWN : W.B.M.
CHECKED : F.C.
DATE : 11/4/21
TOTAL HEADS : 525
SCALE : AS NOTED

FP–1

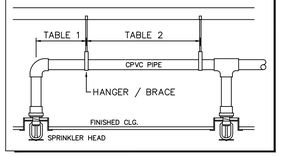


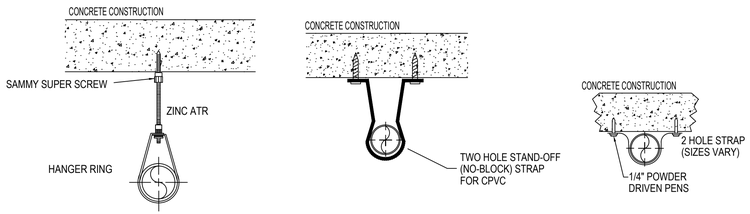
2nd–5th Floor Control Assembly

No Scale

CPVC PIPE HANGER LOCATION DETAIL

	TABLE 1		TABLE 2	
PIPE SIZE	LESS THAN 100 psi	MORE THAN 100 psi	LESS THAN 100 psi	MORE THAN 100 psi
3/4"	9"	6"	4'–0"	3'–0"
1"	12"	9"	5'–0"	4'–0"
1–1/4"	16"	12"	6'–0"	5'–0"
1–1/2"	24"	12"	7'–0"	7'–0"
2"	24"	12"	7'–0"	7'–0"
2–1/2"	24"	12"	7'–0"	7'–0"
3"	24"	12"	7'–0"	7'–0"



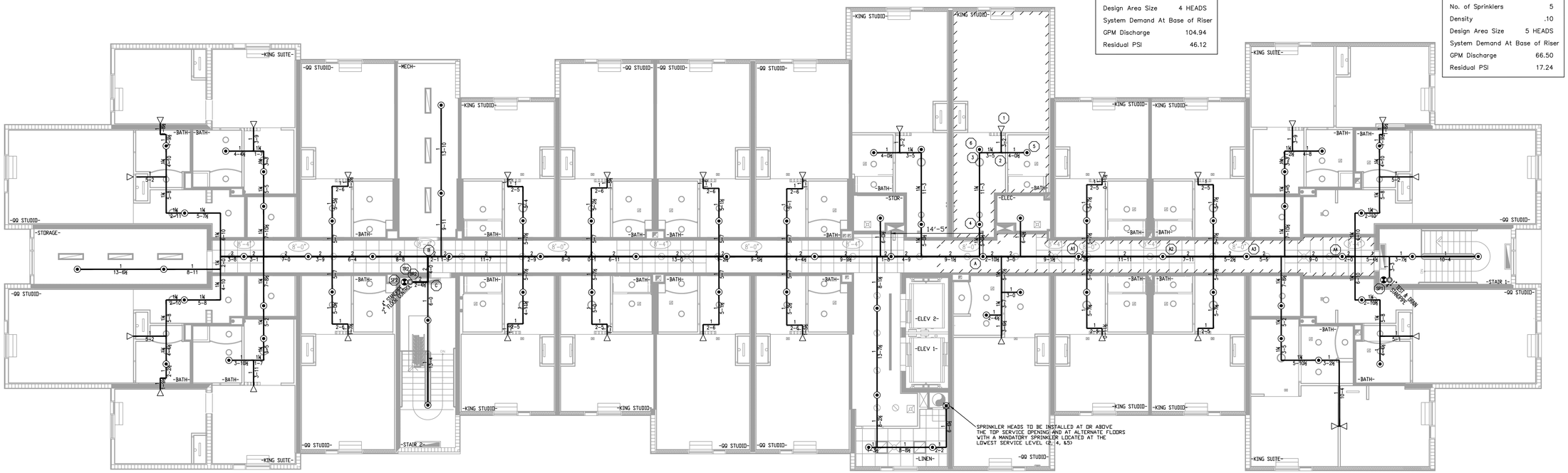


Hanger Detail

No Scale

Hydraulically Designed System	
Location	REMOTE AREA #1
No. of Sprinklers	4
Density	.10
Design Area Size	4 HEADS
System Demand At Base of Riser	
GPM Discharge	104.94
Residual PSI	46.12

Hydraulically Designed System	
Location	REMOTE AREA #4
No. of Sprinklers	5
Density	.10
Design Area Size	5 HEADS
System Demand At Base of Riser	
GPM Discharge	66.50
Residual PSI	17.24



5th Floor Fire Sprinkler Piping Plan

SCALE 1/8"=1'-0"

North

S.I.N. TY2234
70
1/2" (4.9K)
175° QR
TYCO LFII
WHITE PENDENT
RECESSED
STANDARD SPRAY

S.I.N. TY4332
29
3/4" (8.0K)
135° QR
TYCO TY-FRB
WHITE HSW
RECESSED
STANDARD SPRAY

DAVIS & CLEATON ENGINEERING, INC.
101 SUNNYTOWN ROAD, SUITE 109
CASSELBERRY, FL 32707
PH: 407-539-2353 LIC#: 35816
CERTIFICATE OF AUTHORIZATION#: 8689

Precision Fire Systems Inc.
790 Monroe Road
Sanford, Florida 32771
Phone: 321-363-1560
Fax: 321-363-1320

Townplace Suites
Highway 90 & NW Commerce Dr.
Lake City — Florida

Building
Fire
Sprinkler
Piping Plan

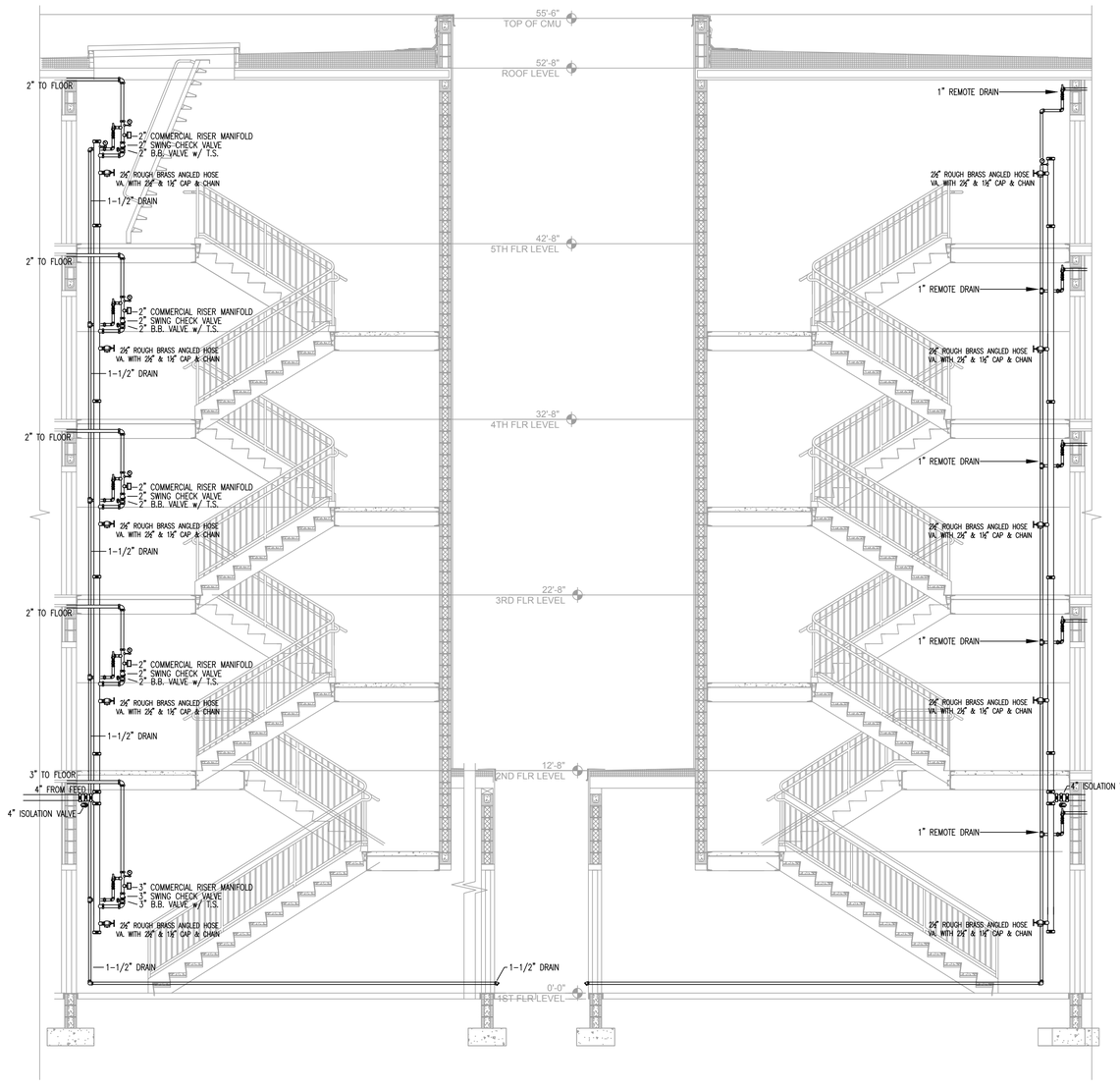
NO.	DATE	REVISION DESCRIPTION	BY
0	11/4/21	APPROVALS	W.B.M.

CONTRACT # 21066
DRAWN : W.B.M.
CHECKED : F.C.
DATE : 11/4/21
TOTAL HEADS : 525
SCALE : AS NOTED

FP–5

SHEET 5 OF 6

Hydraulically Designed System	
Location	REMOTE AREA #5
No. of Sprinklers	N/A
Density	N/A
Design Area Size	Standpipes
System Demand At Base of Riser	
GPM Discharge	750
Residual PSI	133.70



Stair 2 Standpipe Section View

No Scale

Stair 1 Standpipe Section View

No Scale

DAVIS & CLEATON ENGINEERING, INC.
101 SUNNYTOWN ROAD, SUITE 109
CASSELBERRY, FL 32707
PH: 407-539-2353 LIC#: 35816
CERTIFICATE OF AUTHORIZATION#: 8689

Precision Fire Systems Inc.
790 Monroe Road
Sanford, Florida 32771
Phone: 321-363-1560
Fax: 321-363-1320

Townplace Suites
Highway 90 & NW Commerce Dr.
Lake City — Florida

Building Standpipe Sections & Details

NO.	DATE	REVISION DESCRIPTION	BY
0	11/4/21	APPROVALS	W.B.M.

CONTRACT #	21066
DRAWN :	W.B.M.
CHECKED :	F.C.
DATE :	11/4/21
TOTAL HEADS :	525
SCALE :	AS NOTED

FP-6

PRECISION
FIRE SYSTEMS, INC.

Precision Fire Systems
790 Monroe Rd.
Sanford, FL 32771
321-363-1560

Job Name	:	Townplace Suites Lake City
Drawing	:	FP-5
Location	:	Highway 90 & NW Commerce Dr.
Remote Area	:	1
Contract	:	21066
Data File	:	Townplace Suites Lake City Unit Calc Area 1.WXF

HYDRAULIC CALCULATIONS
for

JOB NAME Townplace Suites Lake City
Location Highway 90 & NW Commerce Dr.
Drawing # FP-5
Contract # 21066
Date 11/4/21

DESIGN

Remote area # 1
Remote area location 5th Floor King Studio
Occupancy classification Light
Density .10 - Gpm/SqFt
Area of application 4 Heads - SqFt
Coverage/sprinkler 117 - SqFt
Type of sprinkler calculated Residential Pendents and Sidewall
 # Sprinklers calculated 4
In-rack demand - GPM
Hose streams 100 - GPM
Total water required (including hose streams) 204.935 - GPM @ 69.2276 - Psi
Type of system Wet
Volume of system (dry or pre-action) N/A - Gal

WATER SUPPLY INFORMATION

Test date 10/15/21
Location NW Knights Ave.
Source of info City of Lake City

CONTRACTOR INFO Precision Fire Systems
Address 790 Monroe Rd. / Sanford, FL 32771
Phone # 321-363-1560
Name of designer Brian Musial
Authority having jurisdiction City of Lake City
NOTES:

text1(35) - invisible

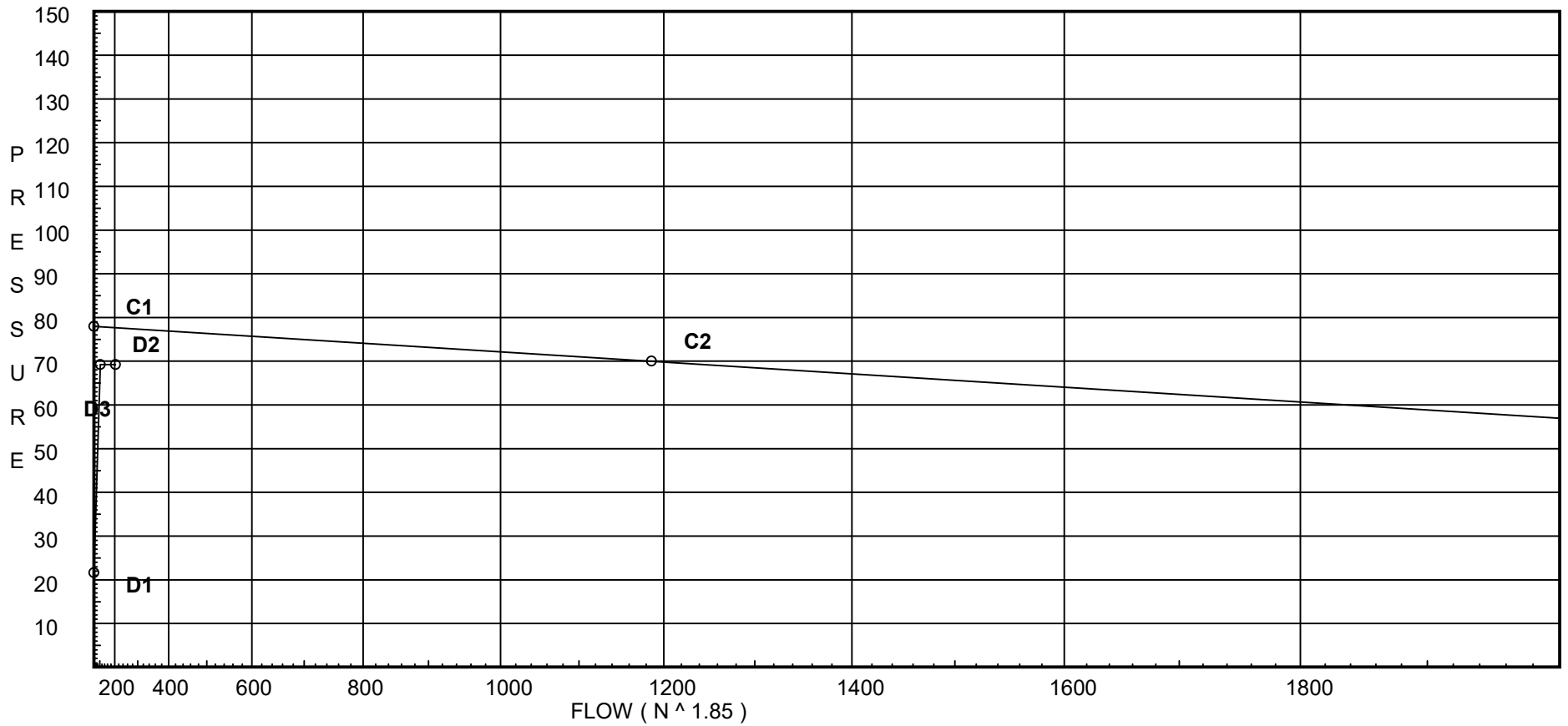
Water Supply Curve

Precision Fire Systems
Townplace Suites Lake City

Date 11/4/21

City Water Supply:
- C1 - Static Pressure : 78
- C2 - Residual Pressure: 70
- C2 - Residual Flow : 1186

Demand:
- D1 - Elevation : 21.655
- D2 - System Flow : 104.935
- D2 - System Pressure : 69.228
- Hose (Demand) : 100
- D3 - System Demand : 204.935
- Safety Margin : 8.462



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
N *	CPVC 90'Ell Harvel-Spears	0	2.0	2.5	3.8	4	5.7	6.9	7.9	0	0	0	0	0	0	0	0	0	0	0	0
O *	CPVC Tee - Branch	0	4.9	6	7.3	8.4	12.0	14.7	16.4	0	0	0	0	0	0	0	0	0	0	0	0
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Zac	Ames 2000SS	Fitting generates a Fixed Loss Based on Flow																			

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	78.0	70	1186.0	77.689	204.94	69.228

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
1	52.0	8	19.1	34.96	0.1	117
2	52.0		20.85			
3	52.0		22.46			
4	52.0	4.9	25.62	24.8	0.1	117
A	52.0		31.35			
B	52.0		38.21			
C	52.0		39.48			
TR2	52.0		40.12			
BR2	47.667		46.12			
BSP2	11.167		62.04			
S1	11.167		62.14			
IBR	11.167		62.17			
UG	0.0		67.08	100.0		
TEST	2.0		69.23			
5	52.0	4.9	20.31	22.09	0.1	117
6	52.0	4.9	22.19	23.08	0.1	117

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
1	52	8.00	34.96	1	O	6.0	3.167	150	19.100	
to							6.000		0.0	
2	52		34.96	1.101			9.167	0.1912	1.753	Vel = 11.78
2	52		22.09	1.25	O	7.3	3.417	150	20.853	
to							7.300		0.0	
3	52		57.05	1.394			10.717	0.1499	1.607	Vel = 11.99
3	52		23.08	1.25			11.250	150	22.460	
to									0.0	
4	52		80.13	1.394			11.250	0.2811	3.162	Vel = 16.84
4	52	4.90	24.81	1.25	O	7.3	5.083	150	25.622	
to							7.300		0.0	
A	52		104.94	1.394			12.383	0.4629	5.732	Vel = 22.06
A	52		0.0	2			86.583	150	31.354	
to									0.0	
B	52		104.94	2.003			86.583	0.0792	6.860	Vel = 10.68
B	52		0.0	2	O	12.0	4.000	150	38.214	
to							12.000		0.0	
C	52		104.94	2.003			16.000	0.0792	1.268	Vel = 10.68
C	52		0.0	2	N	5.7	2.417	150	39.482	
to							5.700		0.0	
TR2	52		104.94	2.003			8.117	0.0792	0.643	Vel = 10.68
TR2	52		0.0	2	B	7.384	6.000	120	40.125	
to					Fsp	0.0	7.384		4.877	* * Fixed Loss = 3
BR2	47.667		104.94	2.157			13.384	0.0835	1.117	Vel = 9.21
BR2	47.667		0.0	4			36.583	120	46.119	
to									15.808	
BSP2	11.167		104.94	4.26			36.583	0.0030	0.111	Vel = 2.36
BSP2	11.167		0.0	4	T	26.334	8.000	120	62.038	
to							26.334		0.0	
S1	11.167		104.94	4.26			34.334	0.0030	0.104	Vel = 2.36
S1	11.167		0.0	6	T	37.72	33.292	120	62.142	
to							37.720		0.0	
IBR	11.167		104.94	6.357			71.012	0.0004	0.031	Vel = 1.06
IBR	11.167		0.0	6	E	21.583	184.000	150	62.173	
to							21.583		4.836	
UG	0		104.94	6.09			205.583	0.0004	0.073	Vel = 1.16
UG	0	H100	100.00	6	Zac	0.0	18.167	150	67.082	
to									2.124	* * Fixed Loss = 2.99
TEST	2		204.94	6.09			18.167	0.0012	0.022	Vel = 2.26
			0.0							
TEST			204.94						69.228	K Factor = 24.63
5	52	4.90	22.09	1	N	2.5	4.083	150	20.315	
to							2.500		0.0	
2	52		22.09	1.101			6.583	0.0817	0.538	Vel = 7.44
			0.0							
2			22.09						20.853	K Factor = 4.84
6	52	4.90	23.08	1	N	2.5	0.500	150	22.194	
to							2.500		0.0	
3	52		23.08	1.101			3.000	0.0887	0.266	Vel = 7.78

Final Calculations : Hazen-Williams

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	*******	Notes	******
			0.0									
3			23.08						22.460	K Factor =	4.87	

PRECISION
FIRE SYSTEMS, INC.

Precision Fire Systems
790 Monroe Rd.
Sanford, FL 32771
321-363-1560

Job Name	:	Townplace Suites Lake City
Drawing	:	FP-2
Location	:	Highway 90 & NW Commerce Dr.
Remote Area	:	2
Contract	:	21066
Data File	:	Townplace Suites Lake City Laundry Calc Area 2.WXF

HYDRAULIC CALCULATIONS
for

JOB NAME Townplace Suites Lake City
Location Highway 90 & NW Commerce Dr.
Drawing # FP-2
Contract # 21066
Date 11/4/21

DESIGN

Remote area # 2
Remote area location Laundry
Occupancy classification Ordinary Hazard Group 1
Density .15 - Gpm/SqFt
Area of application 900 - SqFt
Coverage/sprinkler 154 - SqFt
Type of sprinkler calculated Quick Response Pedents
 # Sprinklers calculated 12
In-rack demand - GPM
Hose streams 250 - GPM
Total water required (including hose streams) 549.199 - GPM @ 58.6137 - Psi
Type of system Wet
Volume of system (dry or pre-action) N/A - Gal

WATER SUPPLY INFORMATION

Test date 10/15/21
Location NW Knights Ave.
Source of info City of Lake City

CONTRACTOR INFO Precision Fire Systems
Address 790 Monroe Rd. / Sanford, FL 32771
Phone # 321-363-1560
Name of designer Brian Musial
Authority having jurisdiction City of Lake City
NOTES:

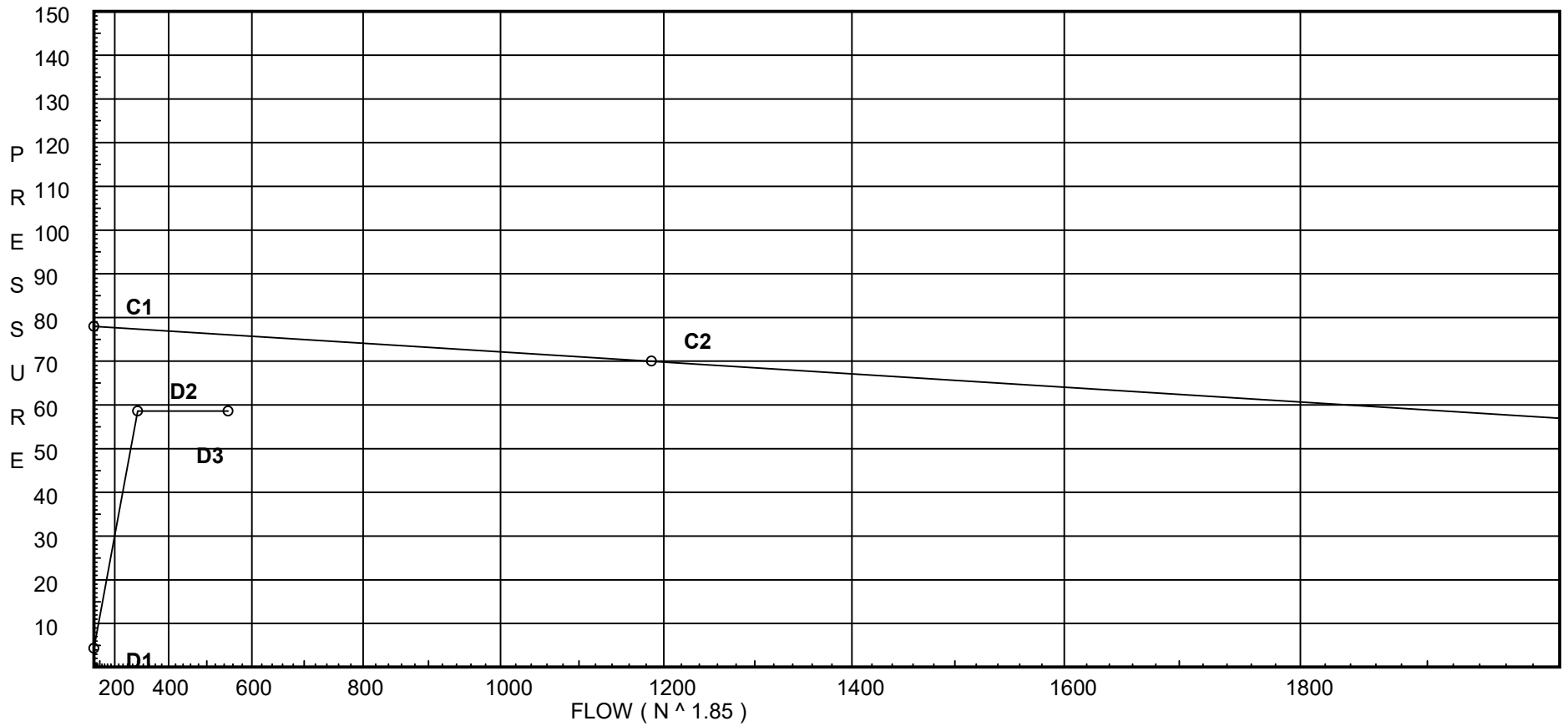
text1(35) - invisible

Water Supply Curve

Precision Fire Systems
Townplace Suites Lake City

City Water Supply:
- C1 - Static Pressure : 78
- C2 - Residual Pressure: 70
- C2 - Residual Flow : 1186

Demand:
- D1 - Elevation : 4.367
- D2 - System Flow : 299.199
- D2 - System Pressure : 58.614
- Hose (Demand) : 250
- D3 - System Demand : 549.199
- Safety Margin : 17.461



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
J	90'Tee-Branch Grv Vic #20	0	0	4.5	6	8	8.5	10.8	13	17	16	21	25	33	41	50	65	78	88	98	120
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
V	90' Ell Firelock #001	0	0	0	0	0	3.5	4.3	5	0	6.8	8.5	10	13	4.5	5.1	0	0	0	0	0
Zac	Ames 2000SS	Fitting generates a Fixed Loss Based on Flow																			

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	78.0	70	1186.0	76.075	549.2	58.614

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
20	12.083	5.6	19.0	24.41	0.15	129
21	12.083		19.08			
22	12.083		20.18			
M1	12.083		33.61			
M2	12.083		33.76			
M3	12.083		34.3			
M4	12.083		34.86			
M5	12.083		35.85			
M6	12.083		36.42			
M7	12.083		37.27			
M8	12.083		42.74			
M9	12.083		44.41			
TR1	11.167		45.54			
BR1	11.167		50.05			
BSP2	11.167		50.21			
S1	11.167		50.93			
IBR	11.167		51.14			
UG	0.0		56.48	250.0		
TEST	2.0		58.61			
23	12.083	5.6	17.02	23.1	0.15	154
24	12.083	5.6	18.19	23.88	0.15	118
25	12.083	5.6	18.87	24.33	0.15	80
26	12.083	5.6	21.31	25.85	0.15	165
27	12.083		21.67			
28	12.083	5.6	26.25	28.69	0.15	190
29	12.083	5.6	19.45	24.7	0.15	118
30	12.083	5.6	20.36	25.27	0.15	118
31	12.083	5.6	15.82	22.28	0.15	59
32	12.083		17.32			
33	12.083		22.98			
34	12.083		25.33			
35	12.083	5.6	16.3	22.61	0.15	65
36	12.083	5.6	22.92	26.81	0.15	93
37	12.083	5.6	23.71	27.27	0.15	103

Node1 / to / Node2	Elev1 / Elev2	K Fact	Qa / Qt	Nom / Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt / Pe / Pf	******* Notes ******
20	12.083	5.60	24.41	1.25			2.000	120	19.003	
to									0.0	
21	12.083		24.41	1.442			2.000	0.0400	0.080	Vel = 4.80
21	12.083		23.10	1.25			8.000	120	19.083	
to									0.0	
22	12.083		47.51	1.442			8.000	0.1369	1.095	Vel = 9.33
22	12.083		48.21	1.25	J	7.432	19.417	120	20.178	
to							7.432		0.0	
M1	12.083		95.72	1.442			26.849	0.5005	13.437	Vel = 18.80
M1	12.083		0.0	3			15.500	120	33.615	
to									0.0	
M2	12.083		95.72	3.26			15.500	0.0094	0.146	Vel = 3.68
M2	12.083		104.51	3			14.500	120	33.761	
to									0.0	
M3	12.083		200.23	3.26			14.500	0.0369	0.535	Vel = 7.70
M3	12.083		98.97	3			7.250	120	34.296	
to									0.0	
M4	12.083		299.2	3.26			7.250	0.0777	0.563	Vel = 11.50
M4	12.083		0.0	3			12.750	120	34.859	
to									0.0	
M5	12.083		299.2	3.26			12.750	0.0776	0.989	Vel = 11.50
M5	12.083		0.0	3			7.333	120	35.848	
to									0.0	
M6	12.083		299.2	3.26			7.333	0.0776	0.569	Vel = 11.50
M6	12.083		0.0	3			11.000	120	36.417	
to									0.0	
M7	12.083		299.2	3.26			11.000	0.0775	0.853	Vel = 11.50
M7	12.083		0.0	3	J	17.471	53.083	120	37.270	
to							17.471		0.0	
M8	12.083		299.2	3.26			70.554	0.0776	5.475	Vel = 11.50
M8	12.083		0.0	3	J	17.471	4.000	120	42.745	
to							17.471		0.0	
M9	12.083		299.2	3.26			21.471	0.0776	1.666	Vel = 11.50
M9	12.083		0.0	3	V	6.72	2.750	120	44.411	
to							6.720		0.397	
TR1	11.167		299.2	3.26			9.470	0.0775	0.734	Vel = 11.50
TR1	11.167		0.0	3	B	13.44	6.000	120	45.542	
to					Fsp	0.0	13.440		3.000	* * Fixed Loss = 3
BR1	11.167		299.2	3.26			19.440	0.0776	1.508	Vel = 11.50
BR1	11.167		0.0	3			2.000	120	50.050	
to									0.0	
BSP2	11.167		299.2	3.26			2.000	0.0780	0.156	Vel = 11.50
BSP2	11.167		0.0	4	T	26.334	8.000	120	50.206	
to							26.334		0.0	
S1	11.167		299.2	4.26			34.334	0.0211	0.724	Vel = 6.73
S1	11.167		0.0	6	T	37.72	33.292	120	50.930	
to							37.720		0.0	
IBR	11.167		299.2	6.357			71.012	0.0030	0.213	Vel = 3.02

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
IBR	11.167		0.0	6	E	21.583	184.000	150	51.143	
to							21.583		4.836	
UG	0		299.2	6.09			205.583	0.0024	0.503	Vel = 3.30
UG	0	H250	250.00	6	Zac	0.0	18.167	150	56.482	
to									1.995	* * Fixed Loss = 2.861
TEST	2		549.2	6.09			18.167	0.0075	0.137	Vel = 6.05
			0.0							
TEST			549.20						58.614	K Factor = 71.73
23	12.083	5.60	23.10	1	T	5.0	7.167	120	17.016	
to							5.000		0.0	
21	12.083		23.1	1.049			12.167	0.1699	2.067	Vel = 8.58
			0.0							
21			23.10						19.083	K Factor = 5.29
24	12.083	5.60	23.88	1	T	5.0	6.000	120	18.190	
to							5.000		0.0	
22	12.083		23.88	1.049			11.000	0.1807	1.988	Vel = 8.86
			0.0							
22			23.88						20.178	K Factor = 5.32
25	12.083	5.60	24.33	1	T	5.0	2.000	120	18.870	
to							5.000		0.0	
22	12.083		24.33	1.049			7.000	0.1869	1.308	Vel = 9.03
			0.0							
22			24.33						20.178	K Factor = 5.42
26	12.083	5.60	25.85	1.25			8.000	120	21.311	
to									0.0	
27	12.083		25.85	1.442			8.000	0.0444	0.355	Vel = 5.08
27	12.083		49.97	1.25			14.083	120	21.666	
to									0.0	
28	12.083		75.82	1.442			14.083	0.3251	4.579	Vel = 14.90
28	12.083	5.60	28.69	1.25	T	7.432	5.333	120	26.245	
to							7.432		0.0	
M2	12.083		104.51	1.442			12.765	0.5888	7.516	Vel = 20.53
			0.0							
M2			104.51						33.761	K Factor = 17.99
29	12.083	5.60	24.70	1	T	5.0	6.500	120	19.455	
to							5.000		0.0	
27	12.083		24.7	1.049			11.500	0.1923	2.211	Vel = 9.17
			0.0							
27			24.70						21.666	K Factor = 5.31
30	12.083	5.60	25.27	1	T	5.0	1.500	120	20.362	
to							5.000		0.0	
27	12.083		25.27	1.049			6.500	0.2006	1.304	Vel = 9.38
			0.0							
27			25.27						21.666	K Factor = 5.43
31	12.083	5.60	22.28	1	T	5.0	4.417	120	15.825	
to							5.000		0.0	
32	12.083		22.28	1.049			9.417	0.1589	1.496	Vel = 8.27

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
32	12.083		22.61	1	T	5.0	4.750	120	17.321	
to							5.000		0.0	
33	12.083		44.89	1.049			9.750	0.5806	5.661	Vel = 16.66
33	12.083		26.81	1.25			8.000	120	22.982	
to									0.0	
34	12.083		71.7	1.442			8.000	0.2932	2.346	Vel = 14.09
34	12.083		27.27	1.25	J	7.432	9.417	120	25.328	
to							7.432		0.0	
M3	12.083		98.97	1.442			16.849	0.5323	8.968	Vel = 19.44
			0.0							
M3			98.97						34.296	K Factor = 16.90
35	12.083	5.60	22.61	1	T	5.0	1.250	120	16.300	
to							5.000		0.0	
32	12.083		22.61	1.049			6.250	0.1634	1.021	Vel = 8.39
			0.0							
32			22.61						17.321	K Factor = 5.43
36	12.083	5.60	26.81	1.25			1.250	120	22.922	
to									0.0	
33	12.083		26.81	1.442			1.250	0.0480	0.060	Vel = 5.27
			0.0							
33			26.81						22.982	K Factor = 5.59
37	12.083	5.60	27.27	1	T	5.0	2.000	120	23.711	
to							5.000		0.0	
34	12.083		27.27	1.049			7.000	0.2310	1.617	Vel = 10.12
			0.0							
34			27.27						25.328	K Factor = 5.42

PRECISION
FIRE SYSTEMS, INC.

Precision Fire Systems
790 Monroe Rd.
Sanford, FL 32771
321-363-1560

Job Name	:	Townplace Suites Lake City
Drawing	:	FP-2
Location	:	Highway 90 & NW Commerce Dr.
Remote Area	:	3
Contract	:	21066
Data File	:	Townplace Suites Lake City Lobby Calc Area 3.WXF

HYDRAULIC CALCULATIONS
for

JOB NAME Townplace Suites Lake City
Location Highway 90 & NW Commerce Dr.
Drawing # FP-2
Contract # 21066
Date 11/4/21

DESIGN

Remote area # 3
Remote area location Lobby
Occupancy classification Light
Density .10 - Gpm/SqFt
Area of application 900 - SqFt
Coverage/sprinkler Varies - SqFt
Type of sprinkler calculated Quick Response Pendents
 # Sprinklers calculated 10
In-rack demand - GPM
Hose streams 100 - GPM
Total water required (including hose streams) 287.937 - GPM @ 31.1691 - Psi
Type of system Wet
Volume of system (dry or pre-action) N/A - Gal

WATER SUPPLY INFORMATION

Test date 10/15/21
Location NW Knights Ave.
Source of info City of Lake City

CONTRACTOR INFO Precision Fire Systems
Address 790 Monroe Rd. / Sanford, FL 32771
Phone # 321-363-1560
Name of designer Brian Musial
Authority having jurisdiction City of Lake City
NOTES:

text1(35) - invisible

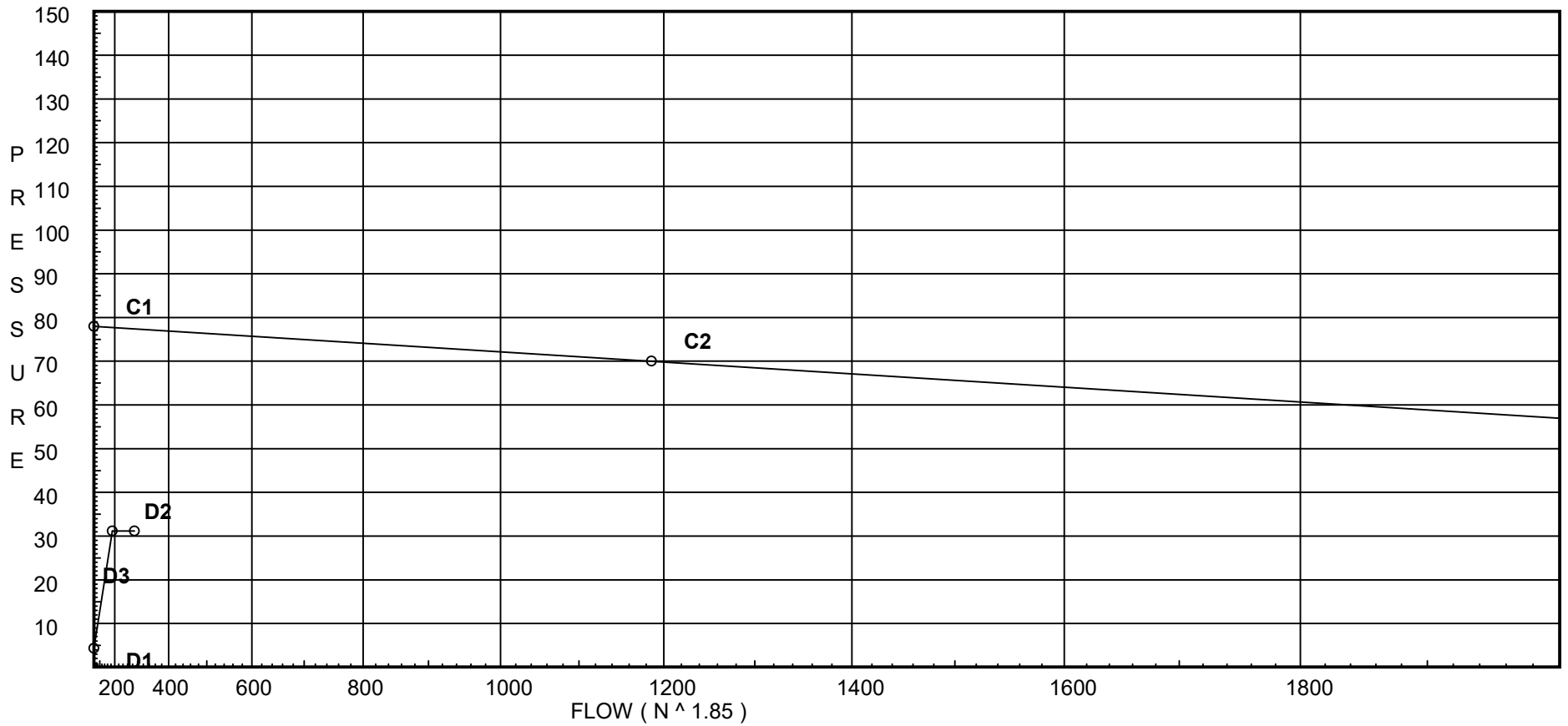
Water Supply Curve

Precision Fire Systems
Townplace Suites Lake City

Date 11/4/21

City Water Supply:
- C1 - Static Pressure : 78
- C2 - Residual Pressure: 70
- C2 - Residual Flow : 1186

Demand:
- D1 - Elevation : 4.367
- D2 - System Flow : 187.937
- D2 - System Pressure : 31.169
- Hose (Demand) : 100
- D3 - System Demand : 287.937
- Safety Margin : 46.248



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
N *	CPVC 90'Ell Harvel-Spears	0	2.0	2.5	3.8	4	5.7	6.9	7.9	0	0	0	0	0	0	0	0	0	0	0	0
O *	CPVC Tee - Branch	0	4.9	6	7.3	8.4	12.0	14.7	16.4	0	0	0	0	0	0	0	0	0	0	0	0
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
V	90' Ell Firelock #001	0	0	0	0	0	3.5	4.3	5	0	6.8	8.5	10	13	4.5	5.1	0	0	0	0	0
X	90'Tee-BranchFirelock002	0	0	0	0	0	8.5	10.8	13	0	16	21	25	33	9.3	11	0	0	0	0	0
Zac	Ames 2000SS	Fitting generates a Fixed Loss Based on Flow																			

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	78.0	70	1186.0	77.417	287.94	31.169

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
40	12.083	5.6	12.72	19.97	0.1	65
41	12.083		13.43			
42	12.083		13.96			
43	12.083	5.6	15.82	22.27	0.1	125
M4	12.083		15.91			
M5	12.083		15.97			
M6	12.083		16.06			
M7	12.083		16.29			
M8	12.083		18.61			
M9	12.083		19.31			
TR1	11.167		20.02			
BR1	11.167		23.66			
BSP2	11.167		23.72			
S1	11.167		24.03			
IBR	11.167		24.12			
UG	0.0		29.17	100.0		
TEST	2.0		31.17			
44	12.083	5.6	13.29	20.42	0.1	105
45	12.083	5.6	7.0	14.82	0.1	71
46	12.083	5.6	7.37	15.21	0.1	65
47	12.083	5.6	9.37	17.14	0.1	164
48	12.083	5.6	11.53	19.02	0.1	166
49	12.083	5.6	12.62	19.89	0.1	166
50	12.083	5.6	11.71	19.16	0.1	166
51	12.083	5.6	12.81	20.04	0.1	166

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
40	12.083	5.60	19.97	1	O	6.0	4.500	150	12.719	
to							6.000		0.0	
41	12.083		19.97	1.101			10.500	0.0679	0.713	Vel = 6.73
41	12.083		0.0	1			7.833	150	13.432	
to									0.0	
42	12.083		19.97	1.101			7.833	0.0678	0.531	Vel = 6.73
42	12.083		20.42	1			7.417	150	13.963	
to									0.0	
43	12.083		40.39	1.101			7.417	0.2498	1.853	Vel = 13.61
43	12.083	5.60	22.27	3	O	16.4	6.417	120	15.816	
to							16.400		0.0	
M4	12.083		62.66	3.26			22.817	0.0043	0.098	Vel = 2.41
M4	12.083		0.0	3			12.750	120	15.914	
to									0.0	
M5	12.083		62.66	3.26			12.750	0.0043	0.055	Vel = 2.41
M5	12.083		47.16	3			7.333	120	15.969	
to									0.0	
M6	12.083		109.82	3.26			7.333	0.0121	0.089	Vel = 4.22
M6	12.083		38.92	3			11.000	120	16.058	
to									0.0	
M7	12.083		148.74	3.26			11.000	0.0213	0.234	Vel = 5.72
M7	12.083		39.20	3	X	17.471	53.083	120	16.292	
to							17.471		0.0	
M8	12.083		187.94	3.26			70.554	0.0328	2.316	Vel = 7.22
M8	12.083		0.0	3	X	17.471	4.000	120	18.608	
to							17.471		0.0	
M9	12.083		187.94	3.26			21.471	0.0328	0.705	Vel = 7.22
M9	12.083		0.0	3	V	6.72	2.750	120	19.313	
to							6.720		0.397	
TR1	11.167		187.94	3.26			9.470	0.0327	0.310	Vel = 7.22
TR1	11.167		0.0	3	B	13.44	6.000	120	20.020	
to					Fsp	0.0	13.440		3.000	* * Fixed Loss = 3
BR1	11.167		187.94	3.26			19.440	0.0328	0.638	Vel = 7.22
BR1	11.167		0.0	3			2.000	120	23.658	
to									0.0	
BSP2	11.167		187.94	3.26			2.000	0.0330	0.066	Vel = 7.22
BSP2	11.167		0.0	4	T	26.334	8.000	120	23.724	
to							26.334		0.0	
S1	11.167		187.94	4.26			34.334	0.0089	0.306	Vel = 4.23
S1	11.167		0.0	6	T	37.72	33.292	120	24.030	
to							37.720		0.0	
IBR	11.167		187.94	6.357			71.012	0.0013	0.090	Vel = 1.90
IBR	11.167		0.0	6	E	21.583	184.000	150	24.120	
to							21.583		4.836	
UG	0		187.94	6.09			205.583	0.0010	0.214	Vel = 2.07
UG	0	H100	100.00	6	Zac	0.0	18.167	150	29.170	
to									1.958	* * Fixed Loss = 2.824
TEST	2		287.94	6.09			18.167	0.0023	0.041	Vel = 3.17

Final Calculations : Hazen-Williams

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
			0.0							
TEST			287.94						31.169	K Factor = 51.58
44	12.083	5.60	20.42	1	N	2.5	1.000	150	13.292	
to					O	6.0	8.500		0.0	
42	12.083		20.42	1.101			9.500	0.0706	0.671	Vel = 6.88
			0.0							
42			20.42						13.963	K Factor = 5.46
45	12.083	5.60	14.82	1	N	2.5	7.083	150	7.000	
to							2.500		0.0	
46	12.083		14.82	1.101			9.583	0.0390	0.374	Vel = 4.99
46	12.083	5.60	15.20	1	O	6.0	7.833	150	7.374	
to							6.000		0.0	
47	12.083		30.02	1.101			13.833	0.1443	1.996	Vel = 10.12
47	12.083	5.60	17.15	1	O	6.0	13.833	150	9.370	
to							6.000		0.0	
M5	12.083		47.17	1.101			19.833	0.3327	6.599	Vel = 15.90
			0.0							
M5			47.17						15.969	K Factor = 11.80
48	12.083	5.60	19.02	1	N	2.5	15.000	150	11.535	
to							2.500		0.0	
49	12.083		19.02	1.101			17.500	0.0620	1.085	Vel = 6.41
49	12.083	5.60	19.89	1	O	6.0	8.750	150	12.620	
to							6.000		0.0	
M6	12.083		38.91	1.101			14.750	0.2331	3.438	Vel = 13.11
			0.0							
M6			38.91						16.058	K Factor = 9.71
50	12.083	5.60	19.16	1	N	2.5	15.000	150	11.707	
to							2.500		0.0	
51	12.083		19.16	1.101			17.500	0.0628	1.099	Vel = 6.46
51	12.083	5.60	20.04	1	O	6.0	8.750	150	12.806	
to							6.000		0.0	
M7	12.083		39.2	1.101			14.750	0.2363	3.486	Vel = 13.21
			0.0							
M7			39.20						16.292	K Factor = 9.71

PRECISION
FIRE SYSTEMS, INC.

Precision Fire Systems
790 Monroe Rd.
Sanford, FL 32771
321-363-1560

Job Name	:	Townplace Suites Lake City
Drawing	:	FP-5
Location	:	Highway 90 & NW Commerce Dr.
Remote Area	:	4
Contract	:	21066
Data File	:	Townplace Suites Lake City Corridor Calc Area 4.WXF

HYDRAULIC CALCULATIONS
for

JOB NAME Townplace Suites Lake City
Location Highway 90 & NW Commerce Dr.
Drawing # FP-5
Contract # 21066
Date 11/4/21

DESIGN

Remote area # 4
Remote area location 5th Floor Corridor
Occupancy classification Light
Density .10 - Gpm/SqFt
Area of application 5 Heads - SqFt
Coverage/sprinkler Varies - SqFt
Type of sprinkler calculated Residential Pendents
 # Sprinklers calculated 5
In-rack demand - GPM
Hose streams 100 - GPM
Total water required (including hose streams) 166.505 - GPM @ 40.5743 - Psi
Type of system Wet
Volume of system (dry or pre-action) N/A - Gal

WATER SUPPLY INFORMATION

Test date 10/15/21
Location NW Knights Ave.
Source of info City of Lake City

CONTRACTOR INFO Precision Fire Systems
Address 790 Monroe Rd. / Sanford, FL 32771
Phone # 321-363-1560
Name of designer Brian Musial
Authority having jurisdiction City of Lake City
NOTES:

text1(35) - invisible

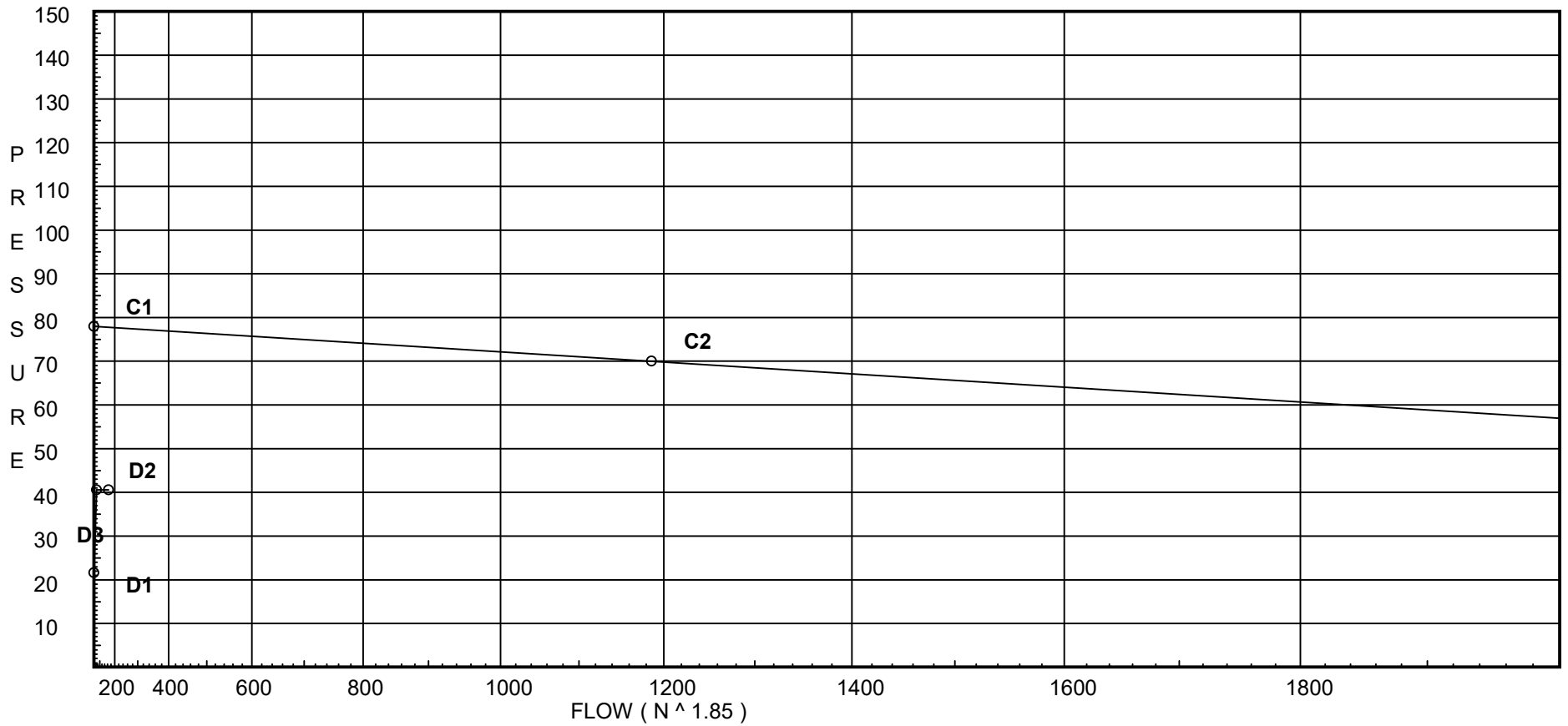
Water Supply Curve

Precision Fire Systems
Townplace Suites Lake City

Date 11/4/21

City Water Supply:
- C1 - Static Pressure : 78
- C2 - Residual Pressure: 70
- C2 - Residual Flow : 1186

Demand:
- D1 - Elevation : 21.655
- D2 - System Flow : 66.505
- D2 - System Pressure : 40.574
- Hose (Demand) : 100
- D3 - System Demand : 166.505
- Safety Margin : 37.214



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
E	NFPA 13 90' Standard Elbow	1	2	2	3	4	5	6	7	8	10	12	14	18	22	27	35	40	45	50	61
Fsp	Flow Switch Potter VSR	Fitting generates a Fixed Loss Based on Flow																			
N *	CPVC 90'Ell Harvel-Spears	0	2.0	2.5	3.8	4	5.7	6.9	7.9	0	0	0	0	0	0	0	0	0	0	0	0
O *	CPVC Tee - Branch	0	4.9	6	7.3	8.4	12.0	14.7	16.4	0	0	0	0	0	0	0	0	0	0	0	0
T	NFPA 13 90' Flow thru Tee	3	4	5	6	8	10	12	15	17	20	25	30	35	50	60	71	81	91	101	121
Zac	Ames 2000SS	Fitting generates a Fixed Loss Based on Flow																			

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

SUPPLY ANALYSIS

Node at Source	Static Pressure	Residual Pressure	Flow	Available Pressure	Total Demand	Required Pressure
TEST	78.0	70	1186.0	77.788	166.5	40.574

NODE ANALYSIS

Node Tag	Elevation	Node Type	Pressure at Node	Discharge at Node	Notes	
A4	52.0	4.9	7.0	12.96	0.1	1
A3	52.0	4.9	7.04	13.01	0.1	1
A2	52.0	4.9	7.2	13.14	0.1	1
A1	52.0	4.9	7.52	13.43	0.1	1
A	52.0	4.9	8.11	13.96	0.1	1
B	52.0		11.06			
C	52.0		11.61			
TR2	52.0		11.88			
BR2	47.667		17.24			
BSP2	11.167		33.1			
S1	11.167		33.14			
IBR	11.167		33.16			
UG	0.0		38.02	100.0		
TEST	2.0		40.57			

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
A4	52	4.90	12.96	2	O	12.0	15.000	150	7.000	
to							12.000		0.0	
A3	52		12.96	2.003			27.000	0.0017	0.045	Vel = 1.32
A3	52	4.90	13.01	2	O	12.0	13.167	150	7.045	
to							12.000		0.0	
A2	52		25.97	2.003			25.167	0.0060	0.150	Vel = 2.64
A2	52	4.90	13.14	2	O	12.0	13.250	150	7.195	
to							12.000		0.0	
A1	52		39.11	2.003			25.250	0.0128	0.323	Vel = 3.98
A1	52	4.90	13.44	2	O	12.0	15.000	150	7.518	
to							12.000		0.0	
A	52		52.55	2.003			27.000	0.0220	0.595	Vel = 5.35
A	52	4.90	13.95	2			86.583	150	8.113	
to									0.0	
B	52		66.5	2.003			86.583	0.0341	2.950	Vel = 6.77
B	52		0.0	2	O	12.0	4.000	150	11.063	
to							12.000		0.0	
C	52		66.5	2.003			16.000	0.0341	0.545	Vel = 6.77
C	52		0.0	2	N	5.7	2.417	150	11.608	
to							5.700		0.0	
TR2	52		66.5	2.003			8.117	0.0341	0.277	Vel = 6.77
TR2	52		0.0	2	B	7.384	6.000	120	11.885	
to					Fsp	0.0	7.384		4.877	* * Fixed Loss = 3
BR2	47.667		66.5	2.157			13.384	0.0359	0.480	Vel = 5.84
BR2	47.667		0.0	4			36.583	120	17.242	
to									15.808	
BSP2	11.167		66.5	4.26			36.583	0.0013	0.048	Vel = 1.50
BSP2	11.167		0.0	4	T	26.334	8.000	120	33.098	
to							26.334		0.0	
S1	11.167		66.5	4.26			34.334	0.0013	0.045	Vel = 1.50
S1	11.167		0.0	6	T	37.72	33.292	120	33.143	
to							37.720		0.0	
IBR	11.167		66.5	6.357			71.012	0.0002	0.013	Vel = 0.67
IBR	11.167		0.0	6	E	21.583	184.000	150	33.156	
to							21.583		4.836	
UG	0		66.5	6.09			205.583	0.0002	0.032	Vel = 0.73
UG	0	H100	100.00	6	Zac	0.0	18.167	150	38.024	
to									2.536	* * Fixed Loss = 3.402
TEST	2		166.5	6.09			18.167	0.0008	0.014	Vel = 1.83
			0.0							
TEST			166.50						40.574	K Factor = 26.14

PRECISION
FIRE SYSTEMS, INC.

Precision Fire Systems
790 Monroe Rd.
Sanford, FL 32771
321-363-1560

Job Name	:	Townplace Suites Lake City
Drawing	:	FP-6
Location	:	Highway 90 & NW Commerce Dr.
Remote Area	:	5
Contract	:	21066
Data File	:	Townplace Suites Lake City Standpipe Calc Area 5.WXF

HYDRAULIC CALCULATIONS
for

JOB NAME Townplace Suites Lake City
Location Highway 90 & NW Commerce Dr.
Drawing # FP-6
Contract # 21066
Date 11/4/21

DESIGN

Remote area # 5
Remote area location Standpipes
Occupancy classification N/A
Density N/A - Gpm/SqFt
Area of application Standpipes - SqFt
Coverage/sprinkler N/A - SqFt
Type of sprinkler calculated N/A
 # Sprinklers calculated N/A
In-rack demand - GPM
Hose streams 750 - GPM
Total water required (including hose streams) 750 - GPM @ 137.512 - Psi
Type of system Wet
Volume of system (dry or pre-action) N/A - Gal

WATER SUPPLY INFORMATION

Test date 10/15/21
Location NW Knights Ave.
Source of info City of Lake City

CONTRACTOR INFO Precision Fire Systems
Address 790 Monroe Rd. / Sanford, FL 32771
Phone # 321-363-1560
Name of designer Brian Musial
Authority having jurisdiction City of Lake City
NOTES:

text1(35) - invisible

Water Supply Curve

Precision Fire Systems
Townplace Suites Lake City

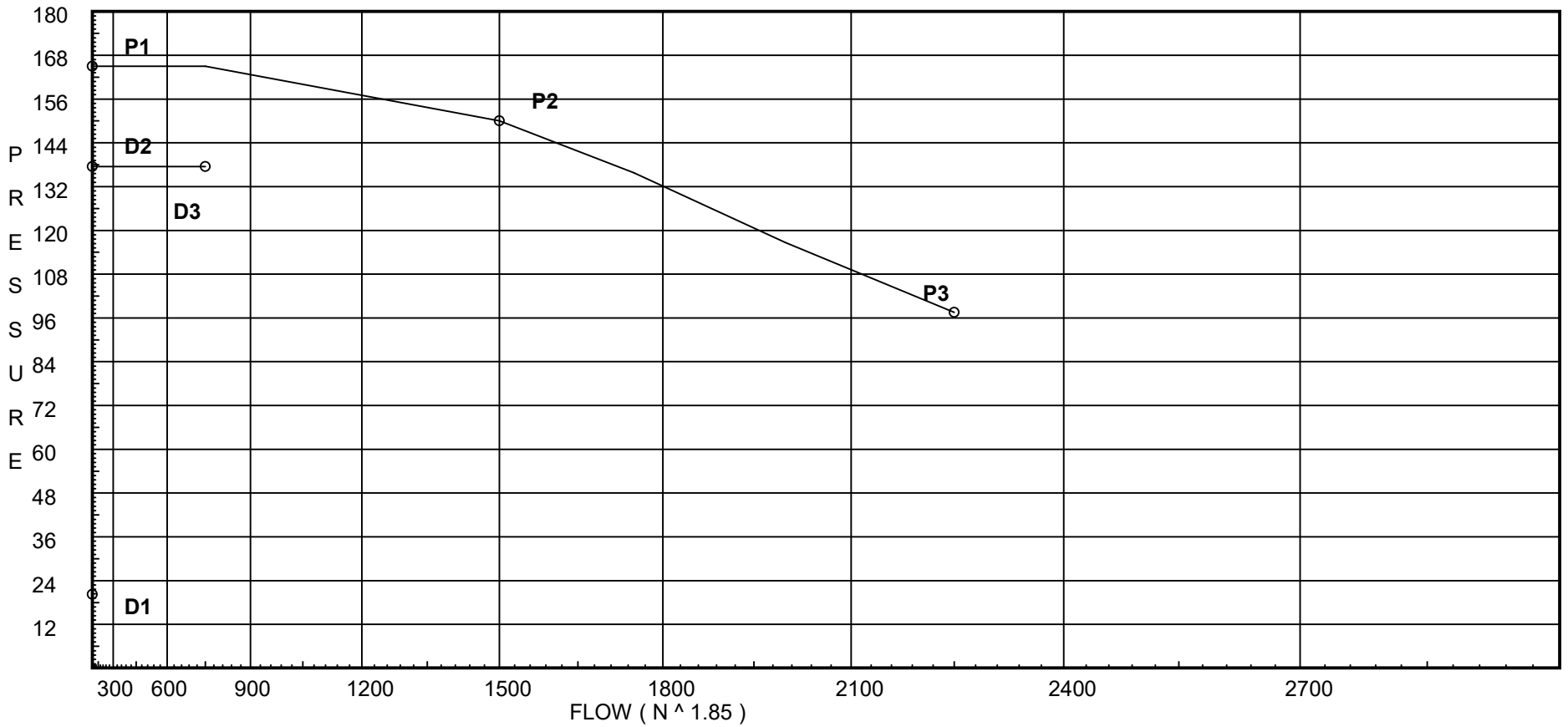
Date 11/4/21

Pump Data:

P1 - Pump Churn Pressure	:	165
P2 - Pump Rated Pressure	:	150
P2 - Pump Rated Flow	:	1500
P3 - Pump Pressure @ Max Flow	:	97.5
P3 - Pump Max Flow	:	2250

Demand:

D1 - Elevation	:	20.247
D2 - System Flow	:	_____
D2 - System Pressure	:	137.512
Hose (Demand)	:	750
D3 - System Demand	:	750
Safety Margin	:	27.478



Fittings Used Summary

Fitting Legend

Abbrev.	Name	½	¾	1	1¼	1½	2	2½	3	3½	4	5	6	8	10	12	14	16	18	20	24
B	NFPA 13 Butterfly Valve	0	0	0	0	0	6	7	10	0	12	9	10	12	19	21	0	0	0	0	0
L	NFPA 13 Long Turn Elbow	0.5	1	2	2	2	3	4	5	5	6	8	9	13	16	18	24	27	30	34	40
S	NFPA 13 Swing Check	0	0	5	7	9	11	14	16	19	22	27	32	45	55	65					
V	90' Ell Firelock #001	0	0	0	0	0	3.5	4.3	5	0	6.8	8.5	10	13	4.5	5.1	0	0	0	0	0
X	90'Tee-BranchFirelock002	0	0	0	0	0	8.5	10.8	13	0	16	21	25	33	9.3	11	0	0	0	0	0

Units Summary

Diameter Units	Inches
Length Units	Feet
Flow Units	US Gallons per Minute
Pressure Units	Pounds per Square Inch

Note: Fitting Legend provides equivalent pipe lengths for fittings types of various diameters. Equivalent lengths shown are standard for actual diameters of Sched 40 pipe and CFactors of 120 except as noted with *. The fittings marked with a * show equivalent lengths values supplied by manufacturers based on specific pipe diameters and CFactors and they require no adjustment. All values for fittings not marked with a * will be adjusted in the calculation for CFactors of other than 120 and diameters other than Sched 40 per NFPA.

SUPPLY ANALYSIS

Node at Source	*Static Pressure*	*Residual Pressure*	*Flow*	*Available Pressure*	*Total Demand*	*Required Pressure*
PUMP	See Information on Pump Curve			164.99	750.0	137.512

NODE ANALYSIS

Node Tag	*Elevation*	*Node Type*	*Pressure at Node*	*Discharge at Node*	*Notes*
SP1	46.75		100.0	500.0	
BSP1	11.167		117.34		
S1	11.167		127.59		
IBR	0.0		133.7		
PUMP	0.0		137.51		
SP2	46.75		110.82	250.0	
BSP2	10.583		127.02		

Final Calculations : Hazen-Williams

Node1 to Node2	Elev1 Elev2	K Fact	Qa Qt	Nom Act	Fitting or Eqiv	Len	Pipe Ftngs Total	CFact Pf/Ft	Pt Pe Pf	******* Notes ******
SP1	46.750	H500	500.00	4			35.333	120	100.000	
to									15.411	
BSP1	11.167		500.0	4.26			35.333	0.0545	1.926	Vel = 11.25
BSP1	11.167		0.0	4	X	21.067	151.250	120	117.337	
to					B	15.8	36.867		0.0	
S1	11.167		500.0	4.26			188.117	0.0545	10.256	Vel = 11.25
S1	11.167		250.00	6	V	12.573	33.292	120	127.593	
to					X	31.433	44.006		4.836	
IBR	0		750.0	6.357			77.298	0.0164	1.270	Vel = 7.58
IBR	0		0.0	6	2L	23.005	172.000	150	133.699	
to					S	40.899	63.904		0.0	
PUMP	0		750.0	5.86			235.904	0.0162	3.813	Vel = 8.92
			0.0							
PUMP			750.00						137.512	K Factor = 63.96
System Demand Pressure									137.512	
Safety Margin									27.478	
Continuation Pressure									164.990	
SP2	46.750	H250	250.00	4			35.333	120	110.819	
to									15.664	
BSP2	10.583		250.0	4.26			35.333	0.0151	0.534	Vel = 5.63
BSP2	10.583		0.0	4	2V	17.907	0.0	120	127.017	
to					X	21.067	54.774		-0.253	
S1	11.167		250.0	4.26	B	15.8	54.774	0.0151	0.829	Vel = 5.63
			0.0							
S1			250.00						127.593	K Factor = 22.13

FIRE PROTECTION EQUIPMENT SUBMITTAL

PRECISION FIRE SYSTEMS, INC.

790 Monroe Road
Sanford, Florida 32771
321-363-1560

PRECISION FS Project # - 21066

Townplace Suites

Highway 90 & NW Commerce Dr.
Lake City, FL
Submittal Revision:0
Dated: 11/4/21

The materials submitted in this package…

are intended to describe the type and quality of all materials to be used on this project. This submittal intends that all materials, appliances, pieces, parts, and craftsmanship, will be equal to and/or better than the specific item shown and that actual per foot friction losses will be equal to and/or less than indicated herein.

Some of the items included may be substituted due to common procurement, stocking and supply procedures, scheduling requirements, etc. at the option of Precision Fire Systems Inc., however ALL supplied and installed materials will meet the requirements of the applicable NFPA code in effect at the time of installation.

FIRE PROTECTION EQUIPMENT SUBMITTAL

PRECISION FIRE SYSTEMS, INC.

790 Monroe Road
Sanford, Florida 32771
321-363-1560

Sprinklers

tyco Fire Protection Products

Worldwide Contacts | www.tyco-fire.com

Series TY-FRB, 5.6 K-factor Upright, Pendent, and Recessed Pendent Sprinklers Quick Response, Standard Coverage

General Description

The TYCO Series TY-FRB, 5.6 K-factor, Upright (TY313) and Pendent (TY323) Sprinklers described in this data sheet are quick response, standard coverage, decorative 3 mm glass bulb-type spray sprinklers designed for use in light or ordinary hazard, commercial occupancies such as banks, hotels, and shopping malls.

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

- A two-piece Style 15 Recessed Escutcheon with recessed adjustment up to 5/8 inch (15,9 mm) from the flush pendent position.
- A two-piece Style 20 Recessed Escutcheon with recessed adjustment up to 1/2 inch (12,7 mm) 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.

Intermediate level versions of Series TY-FRB Sprinklers are described in Technical Data Sheet TFP357. Sprinkler guards and shields are described in Technical Data Sheet TFP780.

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.

NOTICE

The TYCO 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. The installing contractor or sprinkler manufacturer should be contacted with any questions.

Sprinkler Identification Number (SIN)

TY313 . . . . . Upright 5.6K, 1/2˝ NPT
TY323 . . . . . Pendent 5.6K, 1/2˝ NPT

Technical Data

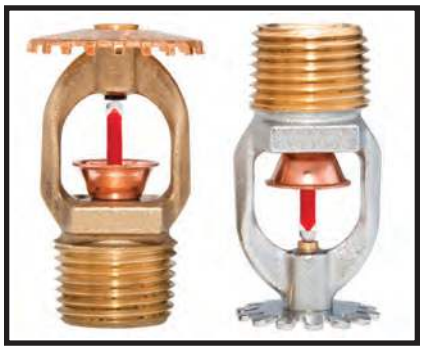
Approvals
UL and C-UL Listed
FM, LPCB, and VdS Approved
CE Certified

Sprinklers with Polyester Finish are UL and C-UL Listed as Corrosion-Resistant Sprinklers.

Maximum Working Pressure
175 psi (12.1 bar)
250 psi (17.2 bar)*

* The maximum working pressure of 250 psi (17.2 bar) only applies to the listing by Underwriters Laboratories, Inc. (UL).

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



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

Finishes
Sprinkler: Refer to Table A

Recessed Escutcheon: White Coated, Chrome Plated, or Brass Plated

Physical Characteristics

Frame	Bronze
Button	Brass/Copper
Sealing Assembly	Stainless Steel w/TEFLON
Bulb	Glass
Compression Screw	Bronze
Deflector	Bronze

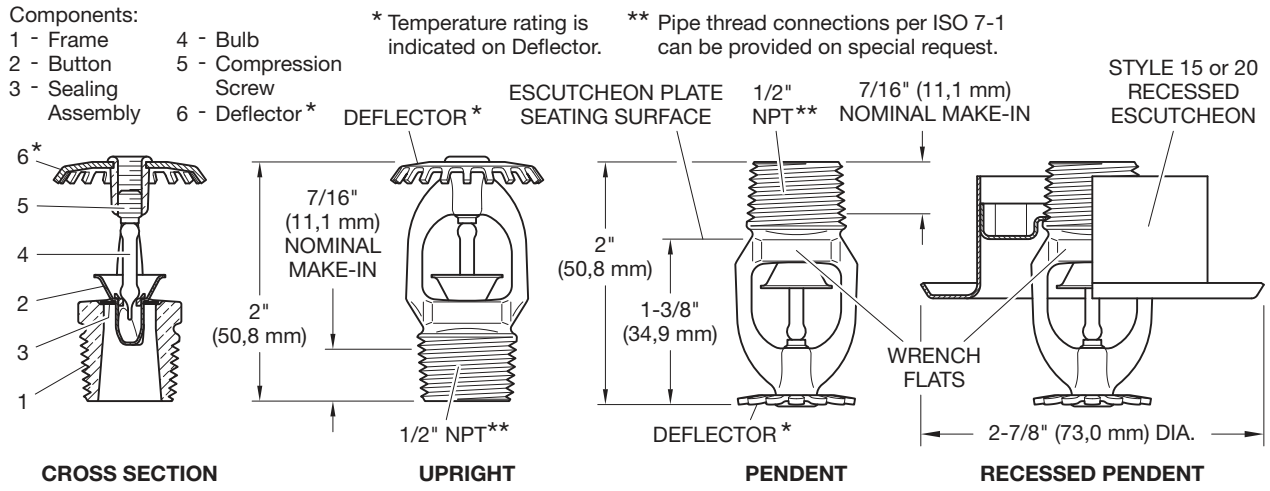


FIGURE 1
SERIES TY-FRB UPRIGHT (TY313) AND PENDENT (TY323) SPRINKLERS
5.6 K-FACTOR, 1/2 INCH NPT, QUICK RESPONSE

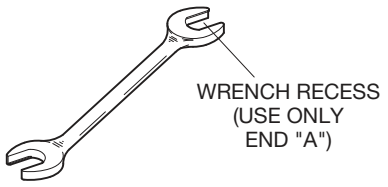


FIGURE 2
W-TYPE 6
SPRINKLER WRENCH

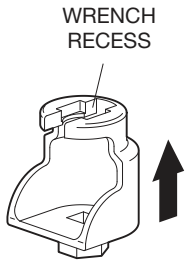


FIGURE 3
W-TYPE 7 RECESSED
SPRINKLER WRENCH

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 TYCO Series TY-FRB, 5.6 K-factor, Upright (TY313) and Pendent (TY323) 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 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 15 or Style 20 Recessed Escutcheon is to be used for recessed pendent installations.

Installation

The TYCO Series TY-FRB, 5.6 K-factor, Upright (TY313) and Pendent (TY323) 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 135°F (57°C) and 3/32 inch (2,4 mm) for the 286°F (141°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 Escutcheon Plate by under- or over-tightening the sprinkler. Re-adjust the position of the sprinkler fitting to suit.

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 (Figure 2). With reference to Figure 1, apply the W-Type 6 Sprinkler Wrench to the wrench flats. Torque sprinklers 7 to 14 ft.-lbs. (9,5 to 19,0 Nm).

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

Step A. After installing the Style 15 or Style 20 Mounting Plate over the sprinkler threads, and with pipe-thread sealant applied to the pipe threads, hand-tighten the sprinkler into the sprinkler fitting.

Step B. Tighten the sprinkler into the sprinkler fitting using only the W-Type 7 Recessed Sprinkler Wrench (Figure 3). With reference to Figure 1, apply the W-Type 7 Recessed Sprinkler Wrench to the sprinkler wrench flats. Torque sprinklers 7 to 14 ft.-lbs. (9,5 to 19,0 Nm).

Step C. After ceiling installation and finishing, slide on the Style 15 or Style 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.

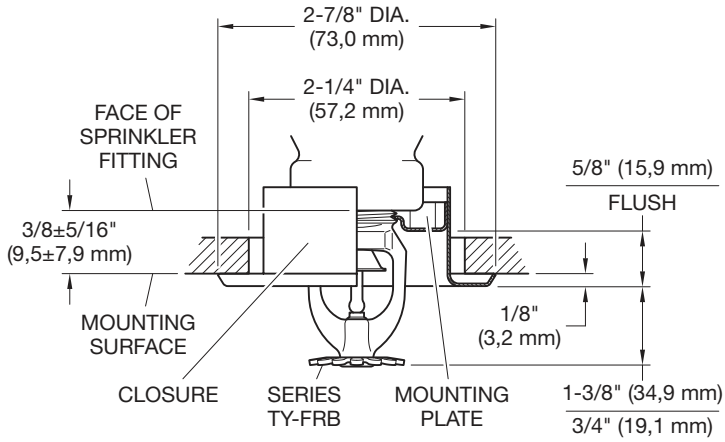


FIGURE 4
SERIES TY-FRB RECESSED PENDENT SPRINKLER ASSEMBLY (TY323) WITH TWO PIECE 5/8 INCH TOTAL ADJUSTMENT STYLE 15 RECESSED ESCUTCHEON

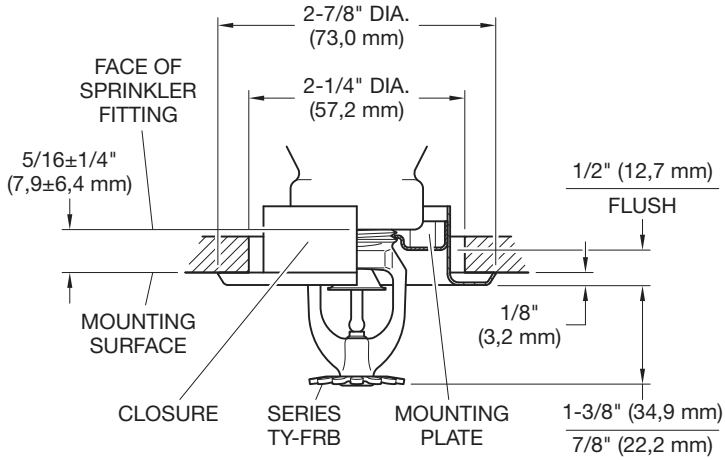


FIGURE 5
SERIES TY-FRB RECESSED PENDENT SPRINKLER ASSEMBLY (TY323) WITH TWO PIECE 1/2 INCH TOTAL ADJUSTMENT STYLE 20 RECESSED ESCUTCHEON

Care and Maintenance

The TYCO Series TY-FRB, 5.6 K-factor, Upright (TY313) and Pendent (TY323) 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.

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.

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 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.

P/N* 77 – XXX – X – XXX

		SIN
370	5.6K UPRIGHT (1/2″ NPT)	TY313
371	5.6K PENDENT (1/2″ NPT)	TY323

* Use suffix "I" for ISO 7-1 connection; for example, 77-370-4-175-I

	SPRINKLER FINISH
1	NATURAL BRASS
3	PURE WHITE (RAL9010)** POLYESTER
4	SIGNAL WHITE (RAL9003) POLYESTER
9	CHROME PLATED

** Eastern Hemisphere sales only

	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)

TABLE A
SERIES TY-FRB UPRIGHT AND PENDENT 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 Upright or Pendent (specify) Sprinkler, SIN (specify), K=5.6, Quick Response, (specify) temperature rating, (specify) finish, P/N (specify, refer to Table A).

Recessed Escutcheon
Specify: Style 15 Recessed Escutcheon with (specify*) finish, P/N (specify*)

Specify: Style 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

tyco Fire Protection Products

tyco Fire Protection Products

Worldwide Contacts | www.tyco-fire.com

RAPID RESPONSE Series LFII Residential 4.9 K-factor Pendent Sprinkler Wet Pipe and Dry Pipe Systems

General Description

TYCO RAPID RESPONSE Series LFII Residential 4.9K Pendent and Recessed Pendent Sprinklers (TY2234) are decorative, fast response, frangible bulb sprinklers designed for use in residential occupancies such as homes, apartments, dormitories, and hotels. When aesthetics and optimized flow characteristics are the major consideration, the Series LFII Residential Sprinklers (TY2234) should be the first choice.

The Series LFII Residential Sprinklers are intended for use in the following scenarios:

- wet and dry pipe residential sprinkler systems for one- and two-family dwellings and mobile homes per NFPA 13D
- wet and dry pipe residential sprinkler systems for residential occupancies up to and including four stories in height per NFPA 13R
- wet and dry pipe sprinkler systems for the residential portions of any occupancy per NFPA 13

The recessed version of the Series LFII Residential Sprinklers is intended for use in areas with finished ceilings. It employs a two-piece Style 20 Recessed Escutcheon. The Recessed Escutcheon provides 1/4 inch (6,4 mm) of recessed adjustment or up to 1/2 inch (12,7 mm) of total adjustment from the flush ceiling position. The adjustment provided by the Recessed Escutcheon reduces the accuracy to which the pipe drops to the sprinklers must be cut.

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.

The Series LFII Residential Sprinklers have been designed with heat sensitivity and water distribution characteristics proven to help in the control of residential fires and to improve the chance for occupants to escape or be evacuated.

Dry Pipe System Application

The Series LFII Residential Pendent and Recessed Pendent Sprinklers offers a laboratory approved option for designing dry pipe residential sprinkler systems, whereas, most residential sprinklers are laboratory approved for wet systems only.

Through extensive testing, it has been determined that the number of design sprinklers (hydraulic design area) for the Series LFII Residential Pendent and Recessed Pendent Sprinklers (TY2234) need not be increased over the number of design sprinklers (hydraulic design area) as specified for wet pipe sprinkler systems, as is accustomed for density/area sprinkler systems designed per NFPA 13.

Consequently, the Series LFII Residential Sprinklers offer the features of non-water filled pipe in addition to not having to increase the number of design sprinklers (hydraulic design area) for systems designed to NFPA 13, 13D, or 13R.

NOTICE

The Series LFII Residential Pendent and Recessed Pendent Sprinklers (TY2234) described herein must be installed and maintained in compliance with this document and 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.

NSF® Certified to NSF/ANSI 61

Sprinkler Identification Number (SIN)

TY2234

Technical Data

Approvals

UL Listed (for use with wet pipe and dry pipe systems)

C-UL Listed (for use only with wet pipe systems)

Certified to all requirements of NSF/ANSI 61

(Refer to the Design Criteria section for details on these approvals.)

Maximum Working Pressure

175 psi (12,1 bar)

Discharge Coefficient

K=4.9 gpm/psi$^{1/2}$ (70,6 lpm/bar$^{1/2}$)

Temperature Rating

155°F (68°C) or 175°F (79°C)

Finishes

Natural Brass, Pure White, Signal White, or Chrome Plated

Physical Characteristics

Frame	Brass
Button	Copper
Sealing Assembly	Beryllium Nickel w/TEFLON
Bulb (3 mm)	Glass
Compression Screw	Bronze
Deflector	Bronze

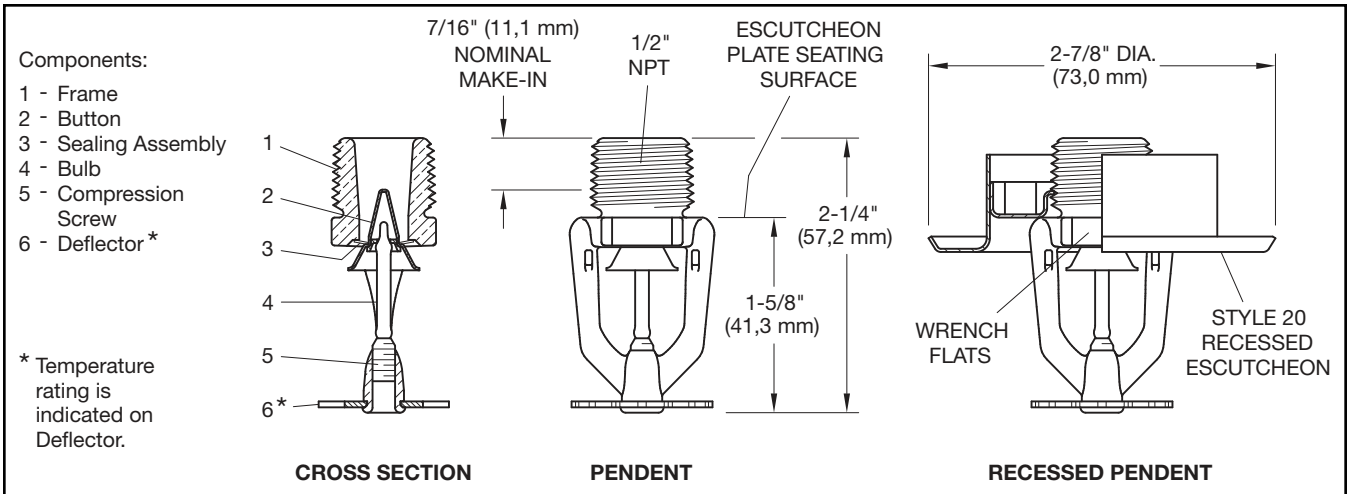


FIGURE 1
RAPID RESPONSE SERIES LFII RESIDENTIAL
4.9K PENDENT AND RECESSED PENDENT SPRINKLERS (TY2234)

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 flow water.

Design Criteria

The TYCO RAPID RESPONSE Series LFII Residential 4.9K Pendent and Recessed Pendent Sprinklers are UL and C-UL Listed for installation in accordance with this section.

Residential Sprinkler Design Guide
When conditions exist that are outside the scope of the provided criteria, refer to the Residential Sprinkler Design Guide TFP490 for the manufacturer's recommendations that may be acceptable to the local authority having jurisdiction.

System Types
Per the UL Listing, wet pipe and dry pipe systems may be utilized. Per the C-UL Listing, only wet pipe systems may be utilized.

Refer to Technical Data Sheet TFP485 for the use of residential sprinklers in residential dry pipe systems.

Ceiling Types
Smooth flat horizontal, or beamed, or sloped, in accordance with the 2013 Edition of NFPA 13D, 13R, or 13, as applicable.

Hydraulic Design (NFPA 13D and 13R)
For systems designed to NFPA 13D or NFPA 13R, the minimum required sprinkler flow rates are given in Tables A and B as a function of temperature rating and the maximum allowable coverage areas. The sprinkler flow rate is the minimum required discharge from each of the total number of "design sprinklers" as specified in NFPA 13D or NFPA 13R. The number of "design sprinklers" specified in NFPA 13D and 13R for wet pipe systems is to be applied when designing dry pipe systems.

Hydraulic Design (NFPA 13)
For systems designed to NFPA 13, the number of design sprinklers is to be the four most hydraulically demanding sprinklers. The minimum required discharge from each of the four sprinklers is to be the greater of the following:

- The flow rates given in Table A or B as a function of temperature rating and the maximum allowable coverage area.
- A minimum discharge of 0.1 gpm/ft^2 over the "design area" comprised of the four most hydraulically demanding sprinklers for actual coverage areas protected by the four sprinklers.

The number of design sprinklers specified in NFPA 13 for wet pipe systems is to be applied when designing dry pipe systems.

Dry Pipe System Water Delivery
When using the Series LFII Residential Sprinklers (TY2234) in dry pipe sprinkler systems, the time for water delivery must not exceed 15 seconds for the most remote operating sprinkler.

Obstruction to Water Distribution
Sprinklers are to be located in accordance with the obstruction rules of NFPA 13D, 13R, and 13 as applicable for residential sprinklers as well as with the obstruction criteria described within the Technical Data Sheet TFP490.

Operational Sensitivity
Sprinklers are to be installed with a deflector-to-ceiling distance of 1-1/4 to 4 inches.

Sprinkler Spacing
The minimum spacing between sprinklers is 8 feet (2,4 m). The maximum spacing between sprinklers cannot exceed the length of the coverage area (Table A or B) being hydraulically calculated (e.g., maximum 12 feet for a 12 ft. x 12 ft. coverage area, or 20 feet for a 20 ft. x 20 ft. coverage area).

Maximum Coverage Area [1] Ft. x Ft. (m x m)	WET PIPE SYSTEM Minimum Flow and Residual Pressure [2][3]				Deflector to Ceiling	Installation Type	Minimum Spacing Ft. (m)
	Ordinary Temperature Rating 155°F (68°C)		Intermediate Temperature Rating 175°F (79°C)				
	Flow gpm (l/min)	Pressure psi (bar)	Flow gpm (l/min)	Pressure psi (bar)			
12 x 12 (3,7 x 3,7)	13 (49,2)	7.0 (0,48)	13 (49,2)	7.0 (0,48)	Smooth Ceilings 1-1/4 to 4 inches Beamed Ceilings per NFPA 13D or 13R 1-1/4 to 1-3/4 inches below bottom of beam.	Recessed using Style 20 Escutcheon or non-recessed per NFPA 13D, 13R, or 13	8 (2,4)
14 x 14 (4,3 x 4,3)	13 (49,2)	7.0 (0,48)	13 (49,2)	7.0 (0,48)			
16 x 16 (4,9 x 4,9)	13 (49,2)	7.0 (0,48)	13 (49,2)	7.0 (0,48)			
18 x 18 (5,5 x 5,5)	17 (64,3)	12.0 (0,83)	17 (64,3)	12.0 (0,83)			
20 x 20 (6,1 x 6,1)	20 (75,7)	16.7 (1,15)	20 (75,7)	16.7 (1,15)			

Notes:
1. For coverage area dimensions less than or between those indicated, use the minimum required flow for the next highest coverage area for which hydraulic design criteria are stated.
2. Requirement is based on minimum flow in gpm (lpm) from each sprinkler. The associated residual pressures are calculated using the nominal K-factor. Refer to Hydraulic Design under the Design Criteria section.
3. For NFPA 13 residential applications, the greater of 0.1 gpm/ft.^{2} over the design area or the flow in accordance with the criteria in this table must be used.

TABLE A
WET PIPE SYSTEM
SERIES LFII RESIDENTIAL 4.9K PENDENT AND RECESSED PENDENT SPRINKLERS (TY2234)
NFPA 13D, 13R, AND 13 HYDRAULIC DESIGN CRITERIA

Maximum Coverage Area [1] Ft. x Ft. (m x m)	DRY PIPE SYSTEM Minimum Flow and Residual Pressure [2][3]				Deflector to Ceiling	Installation Type	Minimum Spacing Ft. (m)
	Ordinary Temperature Rating 155°F (68°C)		Intermediate Temperature Rating 175°F (79°C)				
	Flow gpm (l/min)	Pressure psi (bar)	Flow gpm (l/min)	Pressure psi (bar)			
12 x 12 (3,7 x 3,7)	13 (49,2)	7.0 (0,48)	13 (49,2)	7.0 (0,48)	Smooth Ceilings 1-1/4 to 4 inches Beamed Ceilings per NFPA 13D or 13R 1-1/4 to 1-3/4 inches below bottom of beam.	Recessed using Style 20 Escutcheon or non-recessed per NFPA 13D, 13R, or 13	8 (2,4)
14 x 14 (4,3 x 4,3)	14 (53,0)	8.2 (0,57)	14 (53,0)	8.2 (0,57)			
16 x 16 (4,9 x 4,9)	15 (56,8)	9.4 (0,65)	15 (56,8)	9.4 (0,65)			
18 x 18 (5,5 x 5,5)	18 (68,1)	13.5 (0,93)	18 (68,1)	13.5 (0,93)			
20 x 20 (6,1 x 6,1)	21 (79,5)	18.4 (1,27)	21 (79,5)	18.4 (1,27)			

Notes:
1. For coverage area dimensions less than or between those indicated, use the minimum required flow for the next highest coverage area for which hydraulic design criteria are stated.
2. Requirement is based on minimum flow in gpm (lpm) from each sprinkler. The associated residual pressures are calculated using the nominal K-factor. Refer to Hydraulic Design under the Design Criteria section.
3. For NFPA 13 residential applications, the greater of 0.1 gpm/ft.^{2} over the design area or the flow in accordance with the criteria in this table must be used.

TABLE B
DRY PIPE SYSTEM
SERIES LFII RESIDENTIAL 4.9K PENDENT AND RECESSED PENDENT SPRINKLERS (TY2234)
NFPA 13D, 13R, AND 13 HYDRAULIC DESIGN CRITERIA

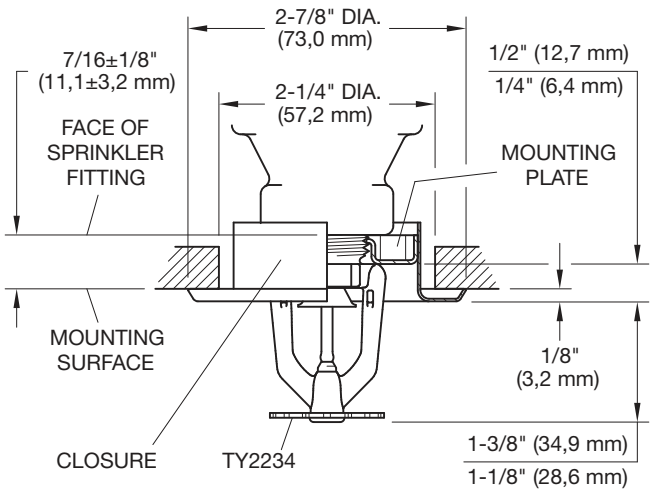


FIGURE 2
STYLE 20 RECESSED ESCUTCHEON FOR USE WITH THE RAPID RESPONSE SERIES LFII RESIDENTIAL PENDENT SPRINKLER

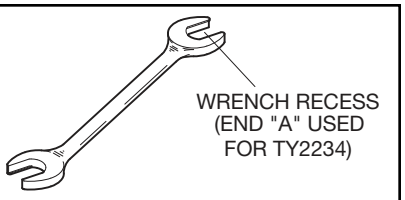


FIGURE 3
W-TYPE 6
SPRINKLER WRENCH

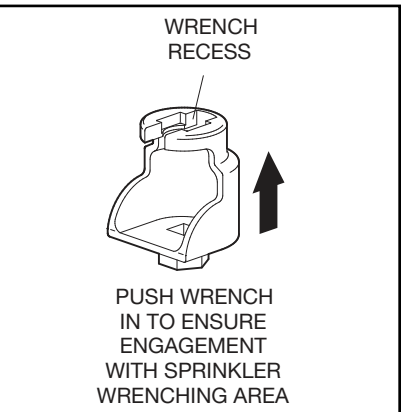


FIGURE 4
W-TYPE 7 RECESSED
SPRINKLER WRENCH

Installation

TYCO RAPID RESPONSE Series LFII Residential 4.9K 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 inch (1,6 mm).

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 an Escutcheon Plate by under- or over- tightening the sprinkler. Re-adjust the position of the sprinkler fitting to suit.

Pendent Sprinklers
The Series LFII Residential Pendent Sprinklers must be installed in accordance with the following instructions:

Step 1. Install pendent sprinklers in the pendent position with the deflector parallel to the ceiling.

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 (Figure 3). With reference to Figure 1, apply the W-Type 6 Sprinkler Wrench to the wrench flats.

Recessed Pendent Sprinklers
The Series LFII Residential Recessed Pendent Sprinklers must be installed in accordance with the following instructions:

Step A. Install recessed pendent sprinklers in the pendent position with the deflector parallel to the ceiling.

Step B. After installing the Style 20 Mounting Plate over the sprinkler threads and with pipe thread sealant applied to the pipe 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 (Figure 4). With reference to Figure 1, apply the W-Type 7 Recessed Sprinkler Wrench to the sprinkler wrench flats.

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

Care and Maintenance

TYCO RAPID RESPONSE Series LFII Residential 4.9K 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, permission to shut down the affected fire protection system must be obtained 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.

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.

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 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).

Sprinkler Assemblies
Specify: Series LFII 4.9K Residential Pendent Sprinkler (TY2234), (specify temperature rating), with (specify) finish, P/N (specify):

155°F (68°C)

Natural Brass	51-201-1-155
Pure White (RAL 9010)*	51-201-3-155
Signal White (RAL 9003)	51-201-4-155
Chrome Plated	51-201-9-155

175°F (79°C)

Natural Brass	51-201-1-175
Pure White (RAL 9010)*	51-201-3-175
Signal White (RAL 9003)	51-201-4-175
Chrome Plated	51-201-9-175

*** Eastern Hemisphere sales only**

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

*** Refer to Technical Data Sheet TFP770.**

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

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

tyco Fire Protection Products

Series TY-FRB – 5.6 and 8.0 K-factor Extended Coverage Horizontal Sidewall Sprinklers Quick and Standard Response (Light Hazard)

General Description

TYCO Series TY-FRB 5.6 and 8.0 K-factor Extended Coverage Horizontal Sidewall Sprinklers Quick and Standard Response (Light Hazard) are decorative 3 mm glass bulb type spray sprinklers designed for use in hydraulically calculated sprinkler systems in light hazard, commercial occupancies such as churches, restaurant seating areas, hotels, educational facilities, offices, etc. With their coverage up to 16 ft. (4,9 m) wide by 24 ft. (7,3 m) long, they are designed for installation along a wall or the side of a beam and just beneath a smooth and level ceiling. Horizontal sidewall (HSW) 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 fast response thermal sensitivity rating of the Series TY-FRB, 3 mm bulb type sprinklers provides for a quick response extended coverage (QREC) rating for many of the coverage areas detailed in Tables B and C.

The recessed version of the Series TY-FRB Extended Coverage Horizontal Sidewall Sprinkler utilizes either a two-piece Style 10 (1/2 inch NPT) or Style 40 (3/4 inch 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 sidewall position, or 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 sidewall position. The adjustment provided by the Recessed Escutcheon reduces the accuracy to which the fixed pipe lengths 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

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 (NFPA), in addition to the standards of any other authorities having jurisdiction. Failure to do so may impair the performance of these devices.

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

Sprinkler Identification Numbers (SINs)

TY3332 – EC HSW, 5.6K, 1/2" NPT

TY4332 – EC HSW, 8.0K, 3/4" NPT

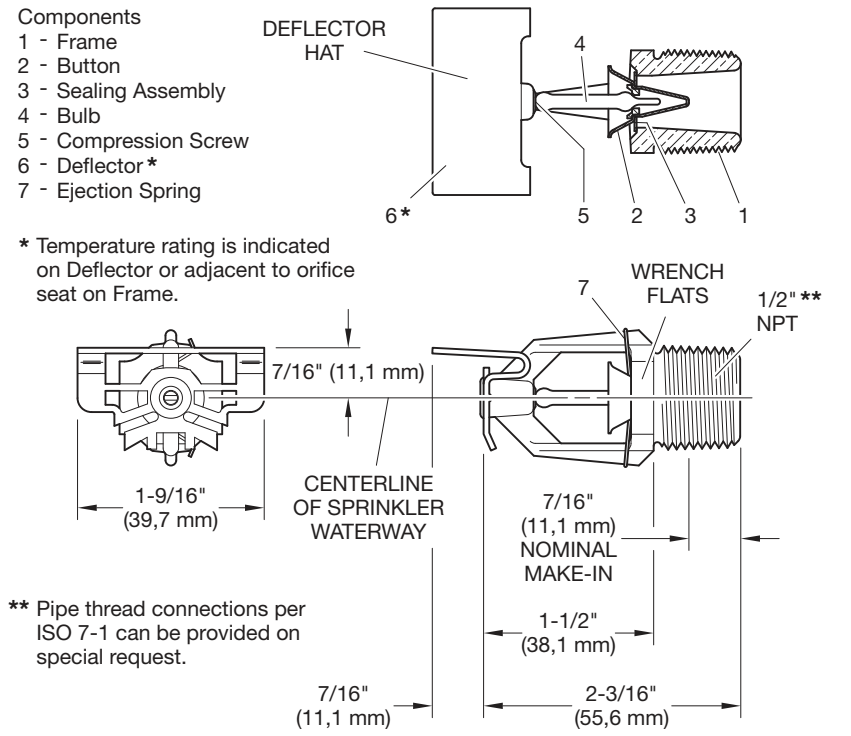


FIGURE 1
SERIES TY-FRB (TY3332)
EXTENDED COVERAGE
HORIZONTAL SIDEWALL SPRINKLER
5.6 K-FACTOR, 1/2 INCH NPT

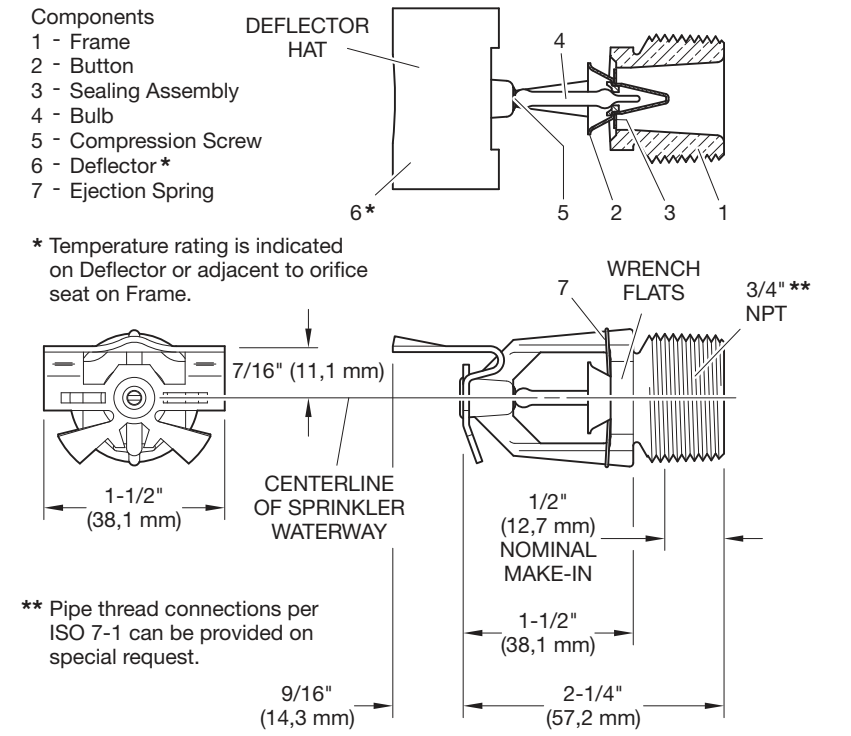


FIGURE 2
SERIES TY-FRB (TY4332)
EXTENDED COVERAGE
HORIZONTAL SIDEWALL SPRINKLER
8.0 K-FACTOR, 3/4 INCH NPT

Technical Data

Approvals
UL and C-UL Listed
FM and NYC Approved

(Refer to Table A for complete approval information including corrosion resistant status, as well as the Design Criteria section pertaining to special design considerations.)

Maximum Working Pressure
Refer to Table B.

Discharge Coefficient
K=5.6 gpm/psi$^{1/2}$ (80,6 lpm/bar$^{1/2}$)
K=8.0 gpm/psi$^{1/2}$ (115,2 lpm/bar$^{1/2}$)

Temperature Ratings
Refer to Table A.

Finishes
Sprinkler: Refer to Table E.

Recessed Escutcheon: White Coated, Chrome Plated, or Brass Plated

Physical Characteristics

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

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

TYCO Series TY-FRB 5.6 and 8.0 K-factor Extended Coverage Horizontal Sidewall Sprinklers Quick and Standard Response (Light Hazard) must be installed and utilized in Light Hazard Occupancies, under smooth level ceilings as outlined in the appliable installation standard recognized by the Approval Agency (e.g., UL recognizes NFPA 13, and FM recognize the FM Loss Prevention Data Sheets). Only the Style 10, 20, 30, or 40 Recessed Escutcheon, as applicable, is to be used for recessed installations.

K-FACTOR	SPRINKLER TYPE	TEMPERATURE RATING	BULB LIQUID COLOR	SPRINKLER FINISH[5]		
				NATURAL BRASS	CHROME PLATED	POLYESTER***
5.6 1/2" NPT	**EC HSW (TY3332)**	135°F (57°C)	Orange	1, 2, 3, 4		
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
5.6 1/2" NPT	**RECESSED EC HSW* (TY3332)**	135°F (57°C)	Orange	1, 2,4		
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
5.6 1/2" NPT	**RECESSED EC HSW** (TY3332)**	135°F (57°C)	Orange	1, 2, 3, 4		
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
8.0 3/4" NPT	**EC HSW (TY4332)**	135°F (57°C)	Orange	1, 2, 3, 4		
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			
8.0 3/4" NPT	**RECESSED EC HSW* (TY4332)**	135°F (57°C)	Orange	1, 2, 4		
		155°F (68°C)	Red			
		175°F (79°C)	Yellow	1, 2, 3, 4		
8.0 3/4" NPT	**RECESSED EC HSW** (TY4332)**	135°F (57°C)	Orange	1, 2, 3, 4		
		155°F (68°C)	Red			
		175°F (79°C)	Yellow			

Notes:
1. Listed by Underwriters Laboratories, Inc. (UL) per Table C
2. Listed by Underwriters Laboratories, Inc. for use in Canada per Table C
3. Approved by Factory Mutual Research Corporation (FM) per Table D
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 corrosion-resistant sprinklers.

* Installed with Style 10 (1/2" NPT) or Style 40 (3/4" NPT) 3/4" Total Adjustment Recessed Escutcheon, as applicable
** Installed with Style 20 (1/2" NPT) or Style 30 (3/4" NPT) 1/2" Total Adjustment Recessed Escutcheon, as applicable
*** Frame and deflector only

TABLE A
LABORATORY LISTINGS AND APPROVALS
(Refer to the Design Criteria Section)

K-FACTOR	SPRINKLER TYPE	SPRINKLER FINISH		
		NATURAL BRASS	CHROME PLATED	POLYESTER
5.6 1/2" NPT	**EC HSW (TY3332)**	250 PSI (17, 2 BAR) OR 175 PSI (12,1 BAR) (SEE NOTE 1)		
	RECESSED EC HSW (TY3332)			
8.0 3/4" NPT	**EC HSW (TY4332)**			
	RECESSED EC HSW (TY4332)			

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

5.6K EXTENDED COVERAGE HORIZONTAL SIDEWALL SPRINKLER (TY3332)

Response Rating	Coverage Area[1], Ft x Ft (m x m)	Minimum Flow[2], gpm (lpm)	Minimum Pressure[2], psi (bar)	Deflector-to-Ceiling Distance[3], Inches (mm)	Sprinkler Temperature Rating, °F	Minimum Spacing[4], Ft (m)
Quick	16 x 16 (4,9 x 4,9)	26 (98)	21.6 (1,48)	4 to 12 (100 to 300)	135, 155, 175	10 (3,1)
Quick	16 x 18 (4,9 x 5,5)	29 (110)	26.8 (1,85)	4 to 12 (100 to 300)	135, 155, 175	10 (3,1)
Quick	16 x 20 (4.9 x 6,1)	32 (121)	32.7 (2,25)	4 to 6 (100 to 150)	135	10 (3,1)
Quick	16 x 22 (4,9 x 6,7)	35 (133)	39.1 (2,70)	4 to 6 (100 to 150)	135	10 (3,1)
Standard	16 x 20 (4,9 x 6,1)	32 (121)	32.7 (2,25)	4 to 6 (100 to 150)	155	10 (3,1)
Standard	16 x 22 (4,9 x 6,7)	35 (133)	39.1 (2,70)	4 to 6 (100 to 150)	155, 175	10 (3,1)

8.0K EXTENDED COVERAGE HORIZONTAL SIDEWALL SPRINKLER (TY4332)

Response Rating	Coverage Area[1], Ft x Ft (m x m)	Minimum Flow[2], gpm (lpm)	Minimum Pressure[2], psi (bar)	Deflector-to-Ceiling Distance[3], Inches (mm)	Sprinkler Temperature Rating, °F	Minimum Spacing[4], Ft (m)
Quick	16 x 16 (4,9 x 4,9)	26 (98)	10.6 (0,73)	4 to 12 (100 to 300)	135, 155, 175	10 (3,1)/13 (4,0)[5]
Quick	16 x 18 (4,9 x 5,5)	29 (110)	13.1 (0,90)	4 to 12 (100 to 300)	135, 155, 175	10 (3,1)/13 (4,0)[5]
Quick	16 x 20 (4.9 x 6,1)	32 (121)	16.0 (1,10)	4 to 6 (100 to 150)	135	10 (3,1)/13 (4,0)[5]
Quick	16 x 20 (4.9 x 6,1)	33 (125)	17.0 (1,17)	4 to 12 (100 to 300)	135	10 (3,1)/13 (4,0)[5]
Quick	16 x 22 (4,9 x 6,7)	35 (133)	19.1 (1,32)	4 to 6 (100 to 150)	135	10 (3,1)/13 (4,0)[5]
Quick	16 x 22 (4,9 x 6,7)	36 (136)	20.3 (1,59)	4 to 12 (100 to 300)	135	10 (3,1)/13 (4,0)[5]
Quick	16 x 24 (4,9 x 7,3)	39 (148)	23.8 (1,64)	4 to 6 (100 to 150)	135	10 (3,1)/13 (4,0)[5]
Quick	16 x 24 (4,9 x 7,3)	40 (151)	25.0 (1,72)	4 to 12 (100 to 300)	135	10 (3,1)/13 (4,0)[5]
Standard	16 x 20 (4.9 x 6,1)	32 (121)	16.0 (1,10)	4 to 6 (100 to 150)	155	10 (3,1)/13 (4,0)[5]
Standard	16 x 20 (4.9 x 6,1)	33 (125)	17.0 (1,17)	4 to 12 (100 to 300)	155	10 (3,1)/13 (4,0)[5]
Standard	16 x 22 (4,9 x 6,7)	35 (133)	19.1 (1,32)	4 to 6 (100 to 150)	155, 175	10 (3,1)/13 (4,0)[5]
Standard	16 x 22 (4,9 x 6,7)	36 (136)	20.3 (1,59)	4 to 12 (100 to 300)	155, 175	10 (3,1)/13 (4,0)[5]
Standard	16 x 24 (4,9 x 7,3)	39 (148)	23.8 (1,64)	4 to 6 (100 to 150)	155, 175	10 (3,1)/13 (4,0)[5]
Standard	16 x 24 (4,9 x 7,3)	40 (151)	25.0 (1,72)	4 to 12 (100 to 300)	155, 175	10 (3,1)/13 (4,0)[5]

Notes:
1. Backwall (where sprinkler is located) by sidewall (length of throw)
2. Requirement is based on minimum flow in gpm from each sprinkler. The indicted residual pressures are based on the nominal K-factor.
3. The centerline of the sprinkler waterway is located 7/16 in. (11,1 mm) below the deflector (Ref. Figures 1 and 2).
4. Minimum spacing is for lateral distance between sprinklers located along a single wall, otherwise adjacent sprinklers (i.e., sidewall sprinklers on an adjacent wall, on an opposite wall, or pendent sprinklers) must be located outside of the maximum listed protection area of the extended coverage sidewall sprinkler being utilized.
5. Minimum spacing is 13 ft. (4,0 m) when design pressure exceeds 175 psi (12,1 bar), otherwise the minimum spacing is 10 ft. (3 m).

TABLE C
UL AND C-UL LISTING COVERAGE AND FLOW RATE CRITERIA

5.6K EXTENDED COVERAGE HORIZONTAL SIDEWALL SPRINKLER (TY3332)

Response Rating	Coverage Area[1], Ft x Ft (m x m)	Minimum Flow[2], gpm (lpm)	Minimum Pressure[2], psi (bar)	Deflector-to-Ceiling Distance[3], Inches (mm)	Sprinkler Temperature Rating, °F	Minimum Spacing[4], Ft (m)
Quick	16 x 16 (4,9 x 4,9)	26 (98)	22 (1,51)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Quick	16 x 18 (4,9 x 5,5)	30 (114)	29 (2,00)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Quick	16 x 20 (4.9 x 6,1)	33 (125)	35 (2,41)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Standard	16 x 16 (4,9 x 4,9)	26 (98)	22 (1,51)	4 to 12 (100 to 300)	175	10 (3,1)
Standard	16 x 20 (4,9 x 6,1)	30 (114)	29 (2,00)	4 to 12 (100 to 300)	175	10 (3,1)
Standard	16 x 22 (4,9 x 6,7)	33 (125)	35 (2,41)	4 to 12 (100 to 300))	175	10 (3,1)

8.0K EXTENDED COVERAGE HORIZONTAL SIDEWALL SPRINKLER (TY4332)

Response Rating	Coverage Area[1], Ft x Ft (m x m)	Minimum Flow[2], gpm (lpm)	Minimum Pressure[2], psi (bar)	Deflector-to-Ceiling Distance[3], Inches (mm)	Sprinkler Temperature Rating, °F	Minimum Spacing[4], Ft (m)
Quick	16 x 16 (4,9 x 4,9)	32 (121)	16 (1,10)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Quick	16 x 18 (4,9 x 5,5)	36 (136)	20 (1,38)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Quick	16 x 20 (4.9 x 6,1)	40 (151)	25 (1,72)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Quick	16 x 22 (4,9 x 6,7)	44 (167)	30 (2,06)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Quick	16 x 24 (4,9 x 6,7)	48 (182)	36 (2,48)	4 to 12 (100 to 300)	135, 155	10 (3,1)
Standard	16 x 16 (4,9 x 4,9)	32 (121)	16 (1,10)	4 to 12 (100 to 300))	175	10 (3,1)
Standard	16 x 18 (4,9 x 5,5)	36 (136)	20 (1,38)	4 to 12 (100 to 300)	175	10 (3,1)
Standard	16 x 20 (4.9 x 6,1)	40 (151)	25 (1,72)	4 to 12 (100 to 300))	175	10 (3,1)
Standard	16 x 22 (4,9 x 6,7)	44 (167)	30 (2,06)	4 to 12 (100 to 300)	175	10 (3,1)
Standard	16 x 24 (4,9 x 6,7)	48 (182)	36 (2,48)	4 to 12 (100 to 300)	175	10 (3,1)

Notes:

1. Backwall (where sprinkler is located) by sidewall (length of throw)
2. Requirement is based on maintaining both minimum flow and minimum residual pressure.
3. The centerline of the sprinkler waterway is located 7/16 inch (11,1 mm) below the deflector (Ref. Figures 1 and 2).
4. Minimum spacing is for lateral distance between sprinklers located along a single wall, otherwise adjacent sprinklers (i.e., sidewall sprinklers on an adjacent wall, on an opposite wall, or pendent sprinklers) must be located outside of the maximum listed protection area of the extended coverage sidewall sprinkler being utilized.

TABLE D
FM COVERAGE AND FLOW RATE CRITERIA

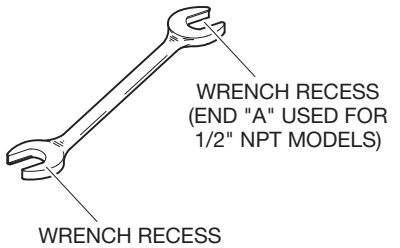


FIGURE 3
W-TYPE 6
SPRINKLER WRENCH

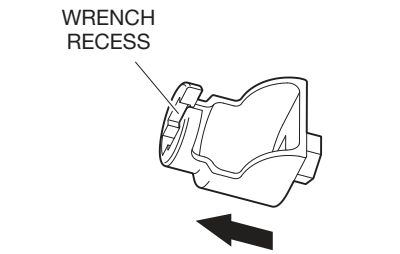


FIGURE 4
W-TYPE 7 RECESSED
SPRINKLER WRENCH

Installation

TYCO Series TY-FRB 5.6 and 8.0 K-factor Extended Coverage Horizontal Sidewall Sprinklers Quick and Standard Response (Light Hazard) must be installed in accordance with this section.

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).

A leak tight 1/2 inch NPT sprinkler joint should be obtained with a torque of 7 to 14 ft.-lbs. (9,5 to 19,0 Nm). A leak tight 3/4 inch NPT sprinkler joint should be obtained with a torque of 10 to 20 ft.-lbs. (13,4 to 26,8 Nm). Higher levels of torque may distort the sprinkler inlet 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 EC
Sidewall Sprinkler
The Series TY-FRB EC Sidewall Sprinklers must be installed in accordance with the following instructions:

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

Step 2. With 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 3). With reference to Figures 1 and 2, the W-Type 6 Sprinkler Wrench is to be applied to the sprinkler wrench flats.

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

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

Step 2. 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 3. Tighten the sprinkler into the sprinkler fitting using only the W-Type 7 Recessed Sprinkler Wrench (Ref. Figure 4). With reference to Figure 1 or 2, the W-Type 7 Recessed Sprinkler Wrench is to be applied to the sprinkler wrench flats.

Step 4. After the wall has been installed or the finish coat has been applied, slide on the Style 10, 20, 30, or 40 Closure over the Series TY-FRB Sprinkler and push the Closure over the Mounting Plate until its flange comes in contact with the wall.

Care and Maintenance

TYCO Series TY-FRB 5.6 and 8.0 K-factor Extended Coverage Horizontal Sidewall Sprinklers Quick and Standard Response (Light Hazard) 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.

The owner must assure that the sprinklers are not used for hanging of any objects; otherwise, non-operation in the event of a fire or inadvertent operation may result.

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. 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. (Refer to Installation Section.)

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.

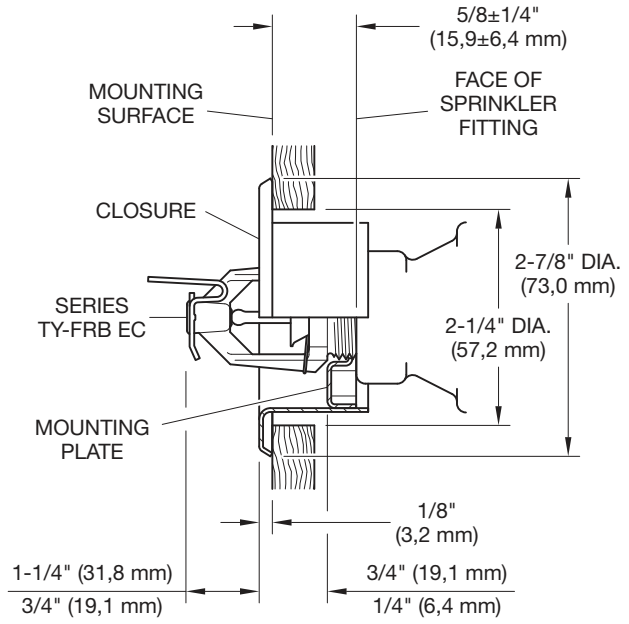


FIGURE 5
SERIES TY-FRB RECESSED EC SIDEWALL SPRINKLER ASSEMBLY WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT STYLE 10 RECESSED ESCUTCHEON 5.6 K-FACOTR, 1/2 INCH NPT

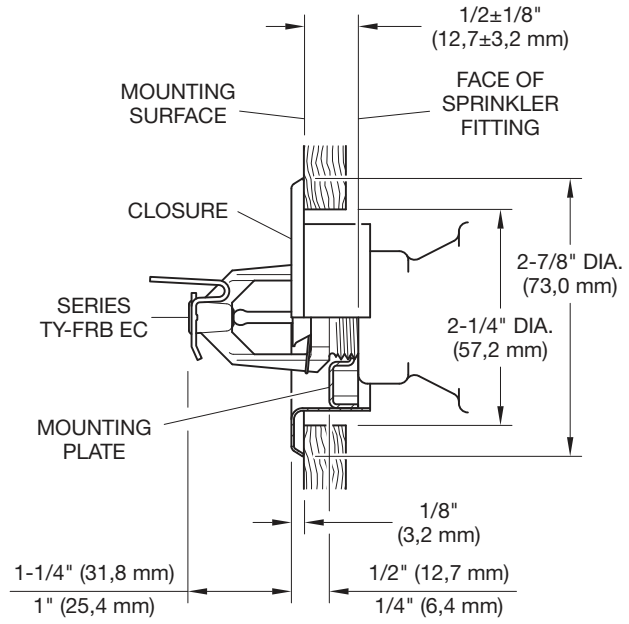


FIGURE 6
SERIES TY-FRB RECESSED EC SIDEWALL SPRINKLER ASSEMBLY WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT STYLE 20 RECESSED ESCUTCHEON 5.6 K-FACTOR, 1/2 INCH NPT

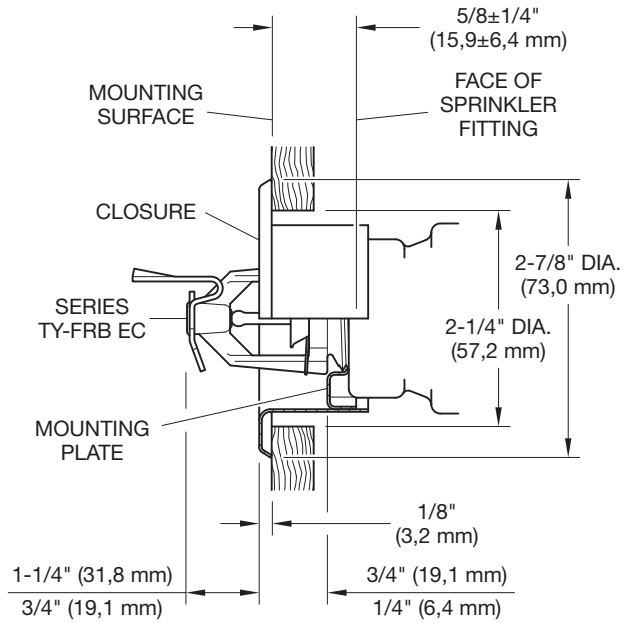


FIGURE 7
SERIES TY-FRB RECESSED EC SIDEWALL SPRINKLER ASSEMBLY WITH TWO-PIECE 3/4 INCH TOTAL ADJUSTMENT STYLE 40 RECESSED ESCUTCHEON 8.0 K-FACTOR, 3/4 INCH NPT

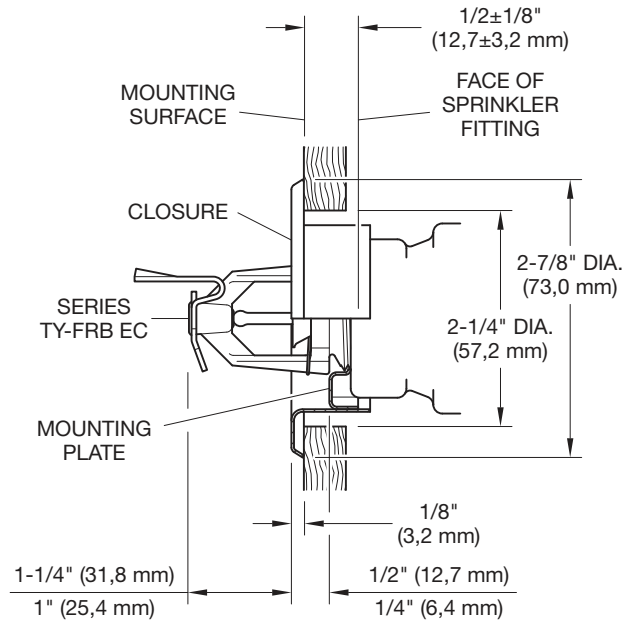


FIGURE 8
SERIES TY-FRB RECESSED EC SIDEWALL SPRINKLER ASSEMBLY WITH TWO-PIECE 1/2 INCH TOTAL ADJUSTMENT STYLE 30 RECESSED ESCUTCHEON 8.0 K-FACTOR, 3/4 INCH NPT

57 - XXX - X - XXX

		SIN
376	5.6K EC HSW	TY3332
396	8.0K EC HSW	TY4332

	SPRINKLER FINISH
1	NATURAL BRASS
3	PURE WHITE (RAL9010) POLYESTER
4	SIGNAL WHITE (RAL9003) POLYESTER
5	JET BLACK (RAL9005) POLYESTER
9	CHROME PLATED

	TEMPERATURE RATING
135	135°F (57°C)
155	155°F (68°C)
175	175°F (79°C)

TABLE E
SERIES TY-FRB EXTENDED COVERAGE HORIZONTAL SIDEWALL SPRINKLERS
PART NUMBER SELECTION

Limited Warranty

For warrany 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 Assembly with NPT Thread Connections
Specify: Series TY-FRB, (specify SIN), Extended Coverage Horizontal Sidewall Sprinkler, K=(specify), (specify) temperature rating, (specify) finish, P/N (specify from Table E)

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

tyco Fire Protection Products

FIRE PROTECTION EQUIPMENT SUBMITTAL

PRECISION FIRE SYSTEMS, INC.

790 Monroe Road
Sanford, Florida 32771
321-363-1560

Valves

tyco Fire Protection Products

Worldwide Contacts | www.tyco-fire.com

Model BFV-300/BFV-300C Butterfly Valve Grooved End

General Description

The TYCO Models BFV-300 and BFV-300C Grooved End Butterfly Valves are indicating type valves designed for use in fire protection systems where a visual indication of open or closed valve condition is required. They are used, for example, as system, sectional and pump water control valves. They have grooved inlet and outlet connections that are suitable for use with grooved end pipe couplings listed or approved for fire protection systems.

For applications requiring supervision of the open or closed state of the valve, the Gear Operators for the Model BFV-300/BFV-300C Butterfly Valves feature two sets of factory installed internal switches each having SPDT contacts (Ref. Figure 3). The supervisory switches transfer their electrical contacts when there is movement from the open or closed disc position during the first two revolutions of the handwheel.

NOTICE

The Model BFV-300/BFV-300C Grooved End Butterfly Valves 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
CE Certified
VdS Approved
Russian Fire Certificate
CNPP R1 Listed–APSAD
Listed by California State Fire Marshall

Refer to Tables A, B and C for applicability.

All laboratory listings and approvals are for indoor and outdoor use.

Sizes
2–12 Inch (DN50–DN300)

UL/FM Maximum Working Pressure
2–8 Inch (DN50–DN200) . . . . 300 psi (20,7 bar)
10–12 Inch (DN250–DN300) . . 175 psi (12,1 bar)

VdS Maximum Working Pressure
2–8 Inch (DN50–DN200) . . . . 300 psi (20,7 bar)
10 Inch (DN250) . . . . . 232 psi (16,0 bar)
12 Inch (DN300) . . . . . 175 psi (12,1 bar)

Maximum Working Temperature
212°F (100°C) in accordance with UL 1091

Materials of Construction
Body . . . . . Ductile Iron
Body Coating . . . . . RILSAN PA11 Black
Disc . . . . . Ductile Iron
Disc Seal . . . . . .EPDM Encapsulated
Upper & Lower Stem. . . . . Stainless Steel
Handwheel . . . . . Ductile Iron
(BFV-300 red painted; BFV-300C black painted)
Actuator, 2–6 Inch (DN50–DN150):
- IP 65, bronze traveling nut gearbox, ductile iron housing

Actuator, 8–12 Inch (DN200–DN300):
- IP 65, brass segmented gearbox, ductile iron housing

Silicone Free Model Availability
Silicone free models are available. Contact Tyco sales for information.

Tapping Bosses
Two factory-plugged NPT threaded tapping bosses in the valve body are located on the up- and downstream sides of the disc for connection to valve trim. Tapping boss sizes:

2–3 inch (DN50–DN80) . . . . . .3/8 NPT
4–12 inch (DN100–DN300) . . . . . .1/2 NPT

Control Valve Seat Leakage Class IEC 60534-4
CLASS VI (Type C) Control Valve Seat Leakage according to ANSI/FCI 70-2-2006 (ASME B16.104)

MODEL BFV-300 WITH OPEN SUPERVISORY SWITCHES

MODEL BFV-300C WITH CLOSED SUPERVISORY SWITCHES

Nominal Valve Size Inches (DN)	Pipe OD Inches (mm)	Nominal Dimensions Inches (mm)									Weight Lbs. (kg)
		A	B	C	D	E	F	G	H	J	
2 (DN50)	2.37 (60,3)	3.8 (96,4)	10.63 (270)	2.85 (72,5)	4.90 (124,5)	4.92 (125)	4.28 (108,6)	1.99 (50,5)	0	0	10.8 (4,9)
2-1/2 (DN65)	2.88 (73,0)	3.8 (96,4)	11.72 (297,8)	3.35 (85)	5.5 (139,8)	4.92 (125)	4.28 (108,6)	1.99 (50,5)	0	0	13.0 (5,9)
— (DN65)	3 76,1	3.8 (96,4)	11.72 (297,8)	3.35 (85)	5.5 (139,8)	4.92 (125)	4.28 (108,6	1.99 (50,5)	0	0	13.0 (5,9)
3 (DN80)	3.5 (88,9)	3.8 (96,4)	12.22 (310,3)	3.58 (91)	5.76 (146,3)	4.92 (125)	4.28 (108,6)	1.99 (50,5)	0	0	13.9 (6,3)
4 (DN100)	4.5 (114,3)	4.54 (115,4)	13.92 (353,5)	4.29 (109)	6.75 (171,5)	4.92 (125)	4.28 (108,6)	1.99 (50,5)	0	0	17.64 (8,0)
— (DN125)	5.5 (139,7)	5.83 (148)	16 (406,6)	5.16 (131)	7.93 (201,5)	5.91 (150)	5.79 (147)	2.32 (58,9)	0	0	26.4 (11,9)
5 (DN125)	5.56 (141,3)	5.83 (148)	16 (406,6)	5.16 (131)	7.93 (201,5)	5.91 (150)	5.79 (147)	2.32 (58,9)	0	0	26.4 (11,9)
— DN150	6.5 165,1	5.83 (148)	17.07 (433,6)	5.71 (145)	8.44 (214,5)	5.91 (150)	5.79 (147)	2.32 (58,9)	0	0	30,42 (13,8)
6 (DN150)	6.63 (168,3)	5.83 (148)	17.07 (433,6)	5.71 (145)	8.44 (214,5)	5.91 (150)	5.79 (147)	2.32 (58,9)	0	0	30,42 (13,8)
8 (DN200)	8.63 (219,1)	5.24 (133)	19.67 (499,5)	6.69 (170)	9.29 (236)	8.86 (225)	8.19 (208)	2.76 (70)	5.66 (143,7)	1.24 (31,4)	47.18 (21,4)
10 (DN250)	10.75 (273)	6.26 (159)	22.46 (570,5)	7.68 (195)	11.1 (282)	11.14 (283)	8.19 (208)	2.91 (74)	7.21 (183,1)	1.65 (41,8)	73.41 (33,3)
12 (DN300)	12.75 (323,9)	6.5 (165)	25.39 (645)	9.5 (241,5)	12.2 (310)	11.14 (283)	8.19 (208)	2.91 (74)	9.96 (252,9)	2.7 (68,5)	89.29 (40,5)

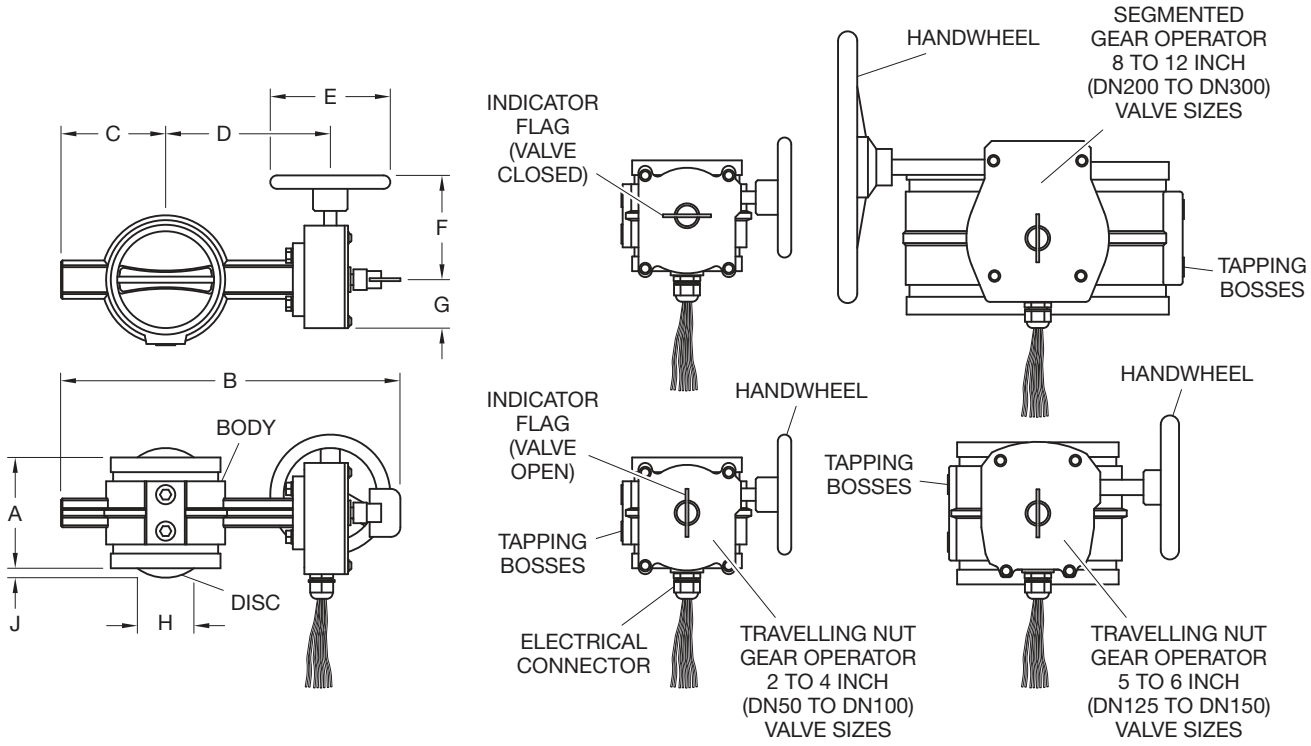
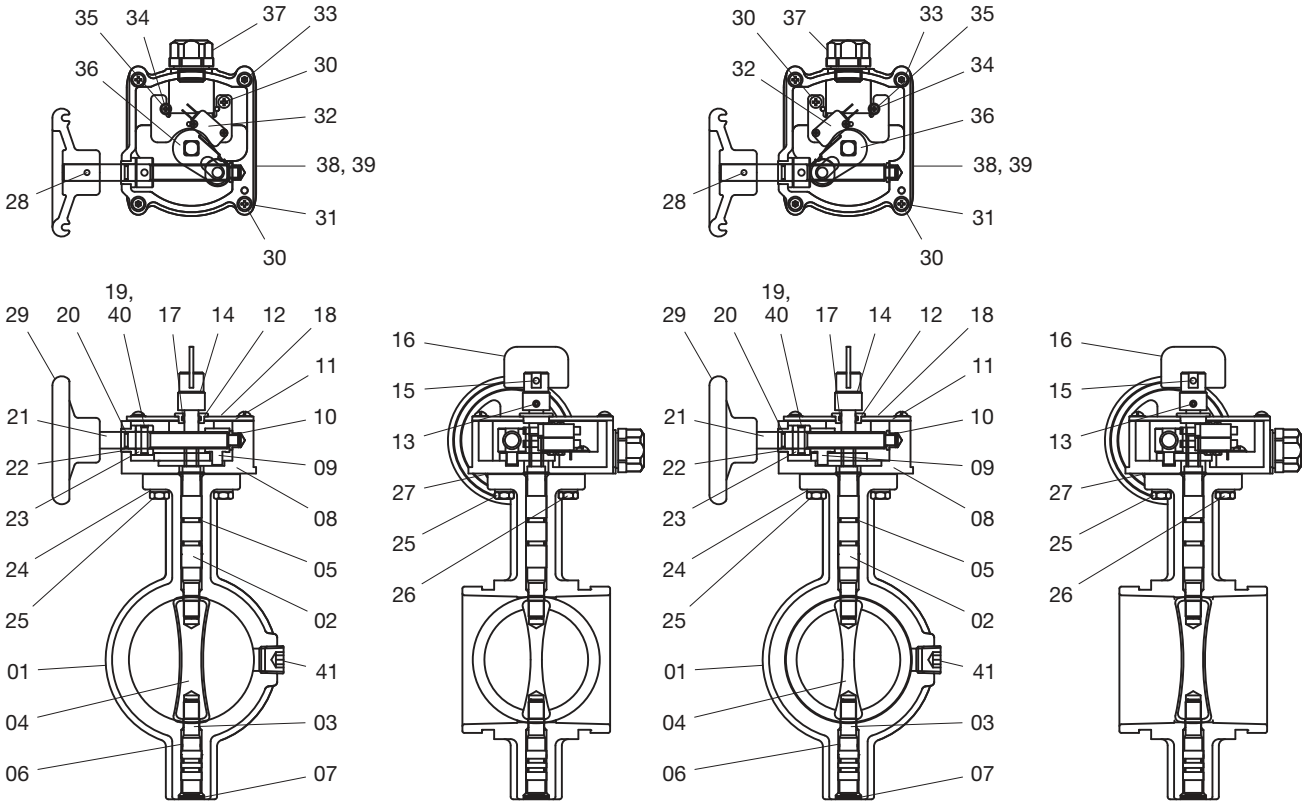


FIGURE 1
MODEL BFV-300/BFV-300C GROOVED END BUTTERFLY VALVE
NOMINAL DIMENSIONS

No.	Part	Material	Qty.
01	Body	ASTM A-536	1
02	Upper Stem	AISI 410	1
03	Lower Stem	AISI 410	1
04	Disc	EPDM	1
05	O-Ring (P12)	EPDM	4
06	Oiless B/R (MB1410)	—	4
07	End Cap 2-1/2–4 Inch	EPDM	1
08	Gear Box	ASTM A-536	1
09	Traveling Nut 2–6 Inch	Bronze	1
	Segment Gear 8–12 Inch	C3604BD	1
10	Bushing (2)	FD-0205-45	1
11	Cover	ASTM A-619	1
12	Bushing	Fe	1
13	Headless Wrench Bolt M5 x 7L	ASTM A-307	1
14	Stem Housing	Fe	1

No.	Part	Material	Qty.
15	Spring Pin	ASTM A-228	1
16	Indicator	ASTM A-619	1
17	O-Ring	NBR	1
18	Cover Gasket	Paper	1
19	Spring Pin Ø5x1Tx25	ASTM A-228	1
20	O-Ring (P10)	EPDM	1
21	Worm Shaft	AISI 410	1
22	Bushing (1)	FD-0205-45	1
23	Collar	FD-0205-45	1
24	Spring Washer	ASTM A-167	4
25	Hex Bolt M8 x 20L	ASTM A-167	2
26	Hex Bolt M8 x 25L	ASTM A-167	2
27	Gasket	Paper	1
28	Spring Pin Ø4x0.8tx25	ASTM A-228	1
29	Handwheel	ASTM A-536	1

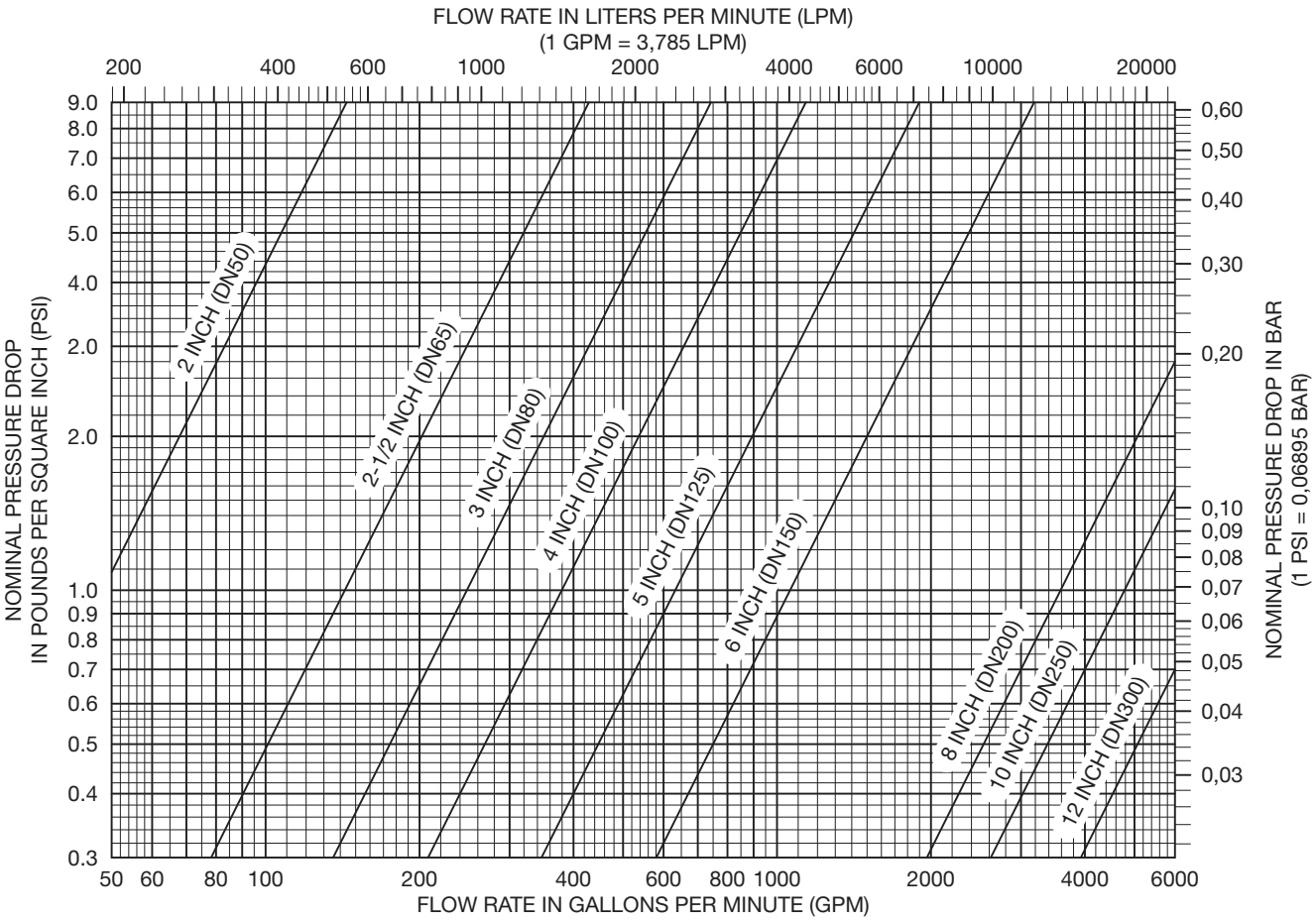
No.	Part	Material	Qty.
30	Bolt (Round)	ASTM A-167	3
31	Plate Washer	ASTM A-167	4
32	Switch Assembly	—	1
33	T/R Bolt	ASTM A-307	2
34	Tapping Screw ST3.5 x 7.5	S10C	1
35	Tooth Washer 4#	S10C	1
36	Lever	ASTM A-619	1
37	Connector	—	1
38	Sticker	—	1
39	Sticker	—	1
40	Spring Pin Ø3x0.6Tx25	ASTM A-228	1
41	Headless Plug 3/8 NPT 2–3 Inch	ASTM A-307	2
	Headless Plug 1/2 NPT 4–12 Inch		



BFV-300 Normally Open Valve Supervisory Switch Arrangement

BFV-300C Normally Closed Valve Supervisory Switch Arrangement

FIGURE 2
MODEL BFV-300/BFV-300C GROOVED END BUTTERFLY VALVE ASSEMBLY



GRAPH A
MODEL BFV-300/BFV-300C GROOVED END BUTTERFLY VALVE
NOMINAL PRESSURE DROP VERSUS FLOW

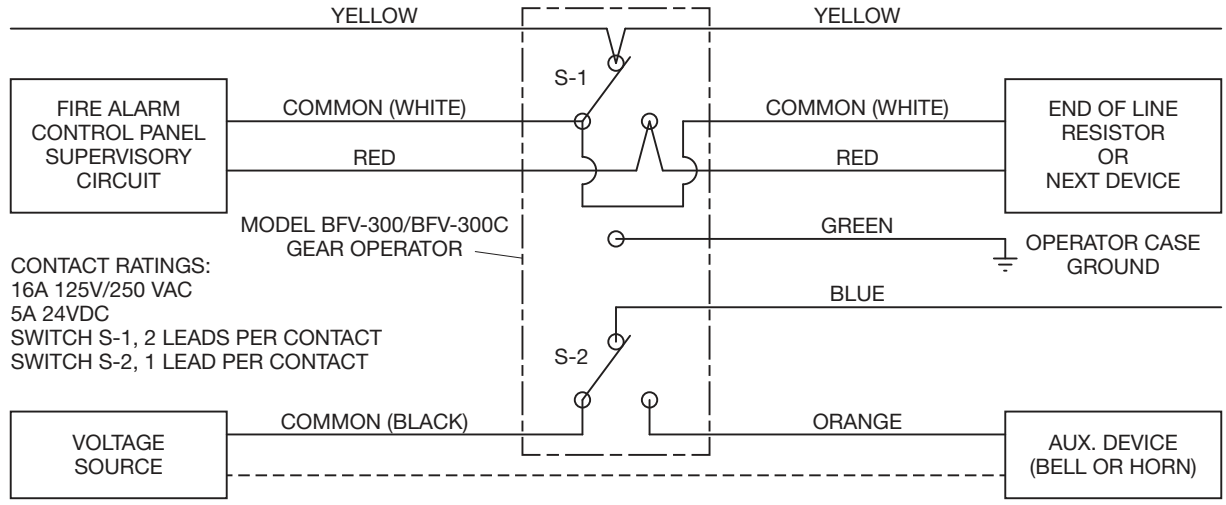


FIGURE 3
MODEL BFV-300 BUTTERFLY VALVE OPEN POSITION — SUPERVISORY SWITCH OPEN POSITION
MODEL BFV-300C BUTTERFLY VALVE CLOSED POSITION — SUPERVISORY SWITCH CLOSED POSITION
INTERNAL SWITCH WIRING DIAGRAM

Nominal Valve Size Inches (DN)	Pipe O.D. Inches (mm)	Max. PSI (bar)	Part Number		Agency Listing/Approval							
			BFV-300 Supv. Switch OPEN	BFV-300C Supv. Switch CLOSED	CE	UL	FM	VdS	CA Fire Marshall	CNPP	PAVUS	Russian Fire Cert.
2 (DN50)	2.38 (60,3)	300 (20,7)	59300G020WS	59300G020WSC	✓	✓		✓			✓	✓
2-1/2 (DN65)	2.88 (73,0)	300 (20,7)	59300G025WS	59300G025WSC	✓	✓	✓	✓	✓		✓	✓
— DN65	3 76,1	300 (20,7)	59300G026WS	59300G026WSC	✓	✓	✓	✓			✓	✓
3 (DN80)	3,5 (88,9)	300 (20,7)	59300G030WS	59300G030WSC	✓	✓	✓	✓	✓		✓	✓
4 (DN100)	4.5 (114,3)	300 (20,7)	59300G040WS	59300G040WSC	✓	✓	✓	✓	✓		✓	✓
— DN125	5.5 (139,7)	300 (20,7)	59300G056WS	59300G056WSC	✓	✓	✓	✓			✓	✓
5 (DN125)	5.56 (141,3)	300 (20,7)	59300G050WS	59300G050WSC	✓	✓	✓	✓	✓		✓	✓
— DN150	6.5 (165,1)	300 (20,7)	59300G066WS	59300G066WSC	✓	✓	✓	✓			✓	✓
6 (DN150)	6.63 (168,3)	300 (20,7)	59300G060WS	59300G060WSC	✓	✓	✓	✓	✓		✓	✓
8 (DN200)	8.63 (219,1)	300 (20,7)	59300G080WS	59300G080WSC	✓	✓	✓	✓	✓		✓	✓
10 (DN250)	10.75 (273)	175 (12,1)	59300G100WS	59300G100WSC	✓	✓	✓	✓	✓		✓	✓
12 (DN300)	12.75 323,9	175 (12,1)	59300G120WS	59300G120WSC	✓	✓		✓			✓	✓

TABLE A
MODEL BFV-300/BFV-300C GROOVED END BUTTERFLY VALVE
WITH INTERNAL SUPERVISORY SWITCHES
PART NUMBER SELECTION AND AGENCY LISTINGS/APPROVALS

Nominal Valve Size Inches (DN)	Pipe O.D. Inches (mm)	Max. PSI (bar)	Part Number		Agency Listing/Approval		
			BFV-300 Supv. Switch OPEN	BFV-300C Supv. Switch CLOSED	CE	VdS	CNPP
2 (DN50)	2.38 (60,3)	300 (20,7)	59300G020AWS	59300G020AWSC	✓	✓	✓
2-1/2 (DN65)	2.88 (73,0)	300 (20,7)	59300G025AWS	59300G025AWSC	✓	✓	✓
— DN65	3 76,1	300 (20,7)	59300G026AWS	59300G026AWSC	✓	✓	✓
3 (DN80)	3,5 (88,9)	300 (20,7)	59300G030AWS	59300G030AWSC	✓	✓	✓
4 (DN100)	4.5 (114,3)	300 (20,7)	59300G040AWS	59300G040AWSC	✓	✓	✓
— DN125	5.5 (139,7)	300 (20,7)	59300G056AWS	59300G056AWSC	✓	✓	✓
5 (DN125)	5.56 (141,3)	300 (20,7)	59300G050AWS	59300G050AWSC	✓	✓	✓
— DN150	6.5 (165,1)	300 (20,7)	59300G066AWS	59300G066AWSC	✓	✓	✓
6 (DN150)	6.63 (168,3)	300 (20,7)	59300G060AWS	59300G060AWSC	✓	✓	✓
8 (DN200)	8.63 (219,1)	300 (20,7)	59300G080AWS	59300G080AWSC	✓	✓	✓
10 (DN250)	10.75 (273)	175 (12,1)	59300G100AWS	59300G100AWSC	✓	✓	✓
12 (DN300)	12.75 323,9	175 (12,1)	59300G120AWS	59300G120AWSC	✓	✓	✓

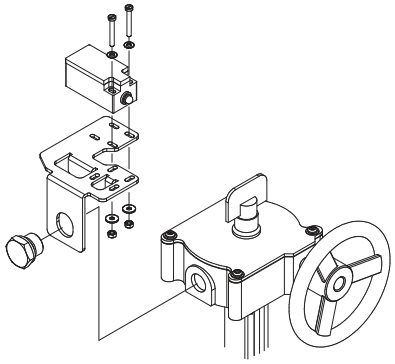
TABLE B
MODEL BFV-300/BFV-300C GROOVED END BUTTERFLY VALVE
WITH CNPP-APSAD LARGE 100 X 100 MM FLAG AND INTERNAL SUPERVISORY SWITCHES
PART NUMBER SELECTION AND AGENCY LISTINGS/APPROVALS

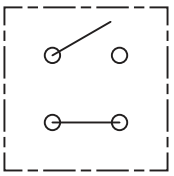
Nominal Valve Size Inches (DN)	Pipe O.D. Inches (mm)	Max. PSI (bar)	Part Number	Agency Listing/Approval							
				CE	UL	FM	VdS	CA Fire Marshall	CNPP	PAVUS	Russian Fire Cert.
2 (DN50)	2.38 (60,3)	300 (20,7)	59300G020NS	✓	✓		✓			✓	✓
2-1/2 (DN65)	2.88 (73,0)	300 (20,7)	59300G025NS	✓	✓	✓	✓	✓		✓	✓
— DN65	3 76,1	300 (20,7)	59300G026NS	✓	✓	✓	✓			✓	✓
3 (DN80)	3,5 (88,9)	300 (20,7)	59300G030NS	✓	✓	✓	✓	✓		✓	✓
4 (DN100)	4.5 (114,3)	300 (20,7)	59300G040NS	✓	✓	✓	✓	✓		✓	✓
— DN125	5.5 (139,7)	300 (20,7)	59300G056NS	✓	✓	✓	✓			✓	✓
5 (DN125)	5.56 (141,3)	300 (20,7)	59300G050NS	✓	✓	✓	✓	✓		✓	✓
— DN150	6.5 (165,1)	300 (20,7)	59300G066NS	✓	✓	✓	✓			✓	✓
6 (DN150)	6.63 (168,3)	300 (20,7)	59300G060NS	✓	✓	✓	✓	✓		✓	✓
8 (DN200)	8.63 (219,1)	300 (20,7)	59300G080NS	✓	✓	✓	✓	✓		✓	✓
10 (DN250)	10.75 (273)	175 (12,1)	59300G100NS	✓	✓	✓	✓	✓		✓	✓
12 (DN300)	12.75 323,9	175 (12,1)	59300G120NS	✓	✓		✓			✓	✓

TABLE C
MODEL BFV-300 GROOVED END BUTTERFLY VALVE
WITHOUT INTERNAL SUPERVISORY SWITCHES
PART NUMBER SELECTION AND AGENCY LISTINGS/APPROVALS

Nominal Valve Size Inches (DN)	Gear Operator Type	Part Number			
		Mounting Bracket with Mounting Bolts	Bernstein i88-IP65 Regular Switch	Bernstein i88-IP65 LED Switch 24V	Bernstein GC-SU1Z Ex IP-66/67 ATEX (Ex II2G Ex dIIC T6 Gb) Switch
2–4 (DN50–DN100)	Travelling Nut	59300SPBRACKET10	59300SPSW	59300SPSWLED	59300SPSWATEX
5–6 (DN125–DN200)		59300SPBRACKET20			
8 (DN200)	Segmented Gear	59300SPBRACKET25			
10–12 (DN250–DN300)		59300SPBRACKET30			

Notes:
1. Install a single switch in either bracket mounting position to monitor Open or Closed valve condition





Bernstein Switch Wiring Diagram

TABLE D
MODEL BFV-300 GROOVED END BUTTERFLY VALVE WITHOUT INTERNAL SUPERVISORY SWITCHES
ACCESSORY EXTERNAL SUPERVISORY SWITCHES AND MOUNTING BRACKETS
PART NUMBER SELECTION

Installation

The Model BFV-300/BFV-300C Grooved End Butterfly Valves may be installed with flow in either direction and can be positioned either horizontally or vertically.

The grooved end pipe couplings used with the Model BFV-300/BFV-300C must be listed or approved for fire protection service and installed in accordance with the manufacturers instructions.

The Model BFV-300/BFV-300C Butterfly Valve may be installed with any schedule of pressure class of pipe or tubing that is listed or approved for fire protection.

Conduit and electrical connections are to be made in accordance with the authority having jurisdiction and/or the National Electrical Code. With reference to Figure 3, the supervisory switch is intended for connection to the supervisory circuit of a fire alarm control panel in accordance with NFPA 72. The auxiliary switch is intended for the unsupervised connection to auxiliary equipment in accordance with NFPA 70, National Electric Code.

NOTE: *For outdoor applications with internal supervisory switches, it is recommended that wiring connections be made at a temperature above 15°F (-9°C), in order to insure sufficient flexibility of the wire lead insulation.*

Care and Maintenance

Before closing a fire protection system control valve for maintenance or inspection work on either the valve or fire protection system which it controls, permission to shut down the affected fire protection systems must be obtained from the proper authorities and all personnel who may be affected by this decision must be notified.

The owner is responsible for the inspection, testing, and maintenance of their fire protection system and devices in accordance 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 impairment must be immediately corrected.

It is recommended that automatic sprinkler systems be inspected, tested, and maintained by a qualified inspection service.

Nominal Valve Size Inches (DN)	Part Number	
	BFV-300, Red Painted	BFV-300C, Black Painted
2–4 (DN50–DN100)	59300SPHWHEEL10	59300SPHWHEEL10B
5–8 (DN125–DN200)	59300SPHWHEEL20	59300SPHWHEEL20B
10–12 (DN250–DN300)	59300SPHWHEEL30	59300SPHWHEEL30B

TABLE E
BFV-300/BFV-300C GROOVED END BUTTERFLY VALVE REPLACEMENT HANDWHEEL 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).

Butterfly Valves

Model BFV-300 with Internal Open Supervisory Switches
Specify: (specify size) Model BFV-300 Grooved End Butterfly Valve, Internal Open Supervisory Switches, P/N (specify per Table A)

Model BFV-300C with Internal Closed Supervisory Switches
Specify: (specify size) Model BFV-300C Grooved End Butterfly Valve, Internal Closed Supervisory Switches, P/N (specify per Table A)

Model BFV-300 with Internal Open Supervisory Switches, APSAD Approved
Specify: (specify size) Model BFV-300 Grooved End Butterfly Valve, Internal Open Supervisory Switches, APSAD Approved, P/N (specify per Table B)

Model BFV-300C with Internal Closed Supervisory Switches, APSAD Approved
Specify: (specify size) Model BFV-300C Grooved End Butterfly Valve, Internal Closed Supervisory Switches, APSAD Approved, P/N (specify per Table B)

Model BFV-300 without Internal Supervisory Switches
Specify: (specify size) Model BFV-300 Grooved End Butterfly Valve, P/N (specify per Table C)

Accessories

External Supervisory Switch and Mounting Bracket

Note: *Accessory external supervisory switches and mounting brackets are applicable only to valves without factory-installed internal supervisory switches.*

Refer to Table D for switch models and part numbers.

Specify: (specify size) Model BFV-300 Grooved End Butterfly Valve External Switch Mounting Bracket, P/N (specify), with (specify quantity) Bernstein External Switch (specify model), P/N (specify)

Replacement Parts

Note: *Only items described in this section are offered as replacement parts.*

Handwheel
Replacement handwheel includes pin. Refer to Table E for part numbers.

Model BFV-300, Red Painted
Specify: Handwheel, (specify size) Model BFV-300 Grooved End Butterfly Valve, P/N (specify)

Model BFV-300C, Black Painted
Specify: Handwheel, (specify size) Model BFV-300C Grooved End Butterfly Valve, P/N (specify)

tyco Fire Protection Products

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 (Ref. 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.

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 to 12 Inch (DN50 to DN300): UL and C-UL Listed, FM Approved, Bureau Veritas
- 2-1/2 to 10 Inch (DN65 to DN250): VdS Approved
  Certificate No. G4060018

Sizes
2 to 12 Inch (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 (Ref. 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 Inch (mm)							Cover Bolt Torque Lbs.-ft. (Nm)	Approx. Weight Lbs. (kg)
Valve Size Inch (DN)	Pipe O.D. Inch (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)	18 (25)	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)	39 (54)	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)	39 (54)	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)	39 (54)	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)	50 (69)	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)	39 (54)	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)	39 (54)	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)	60 (82)	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)	60 (82)	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)	120 (164)	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)	130 (178)	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)	130 (178)	151.0 (68,0)

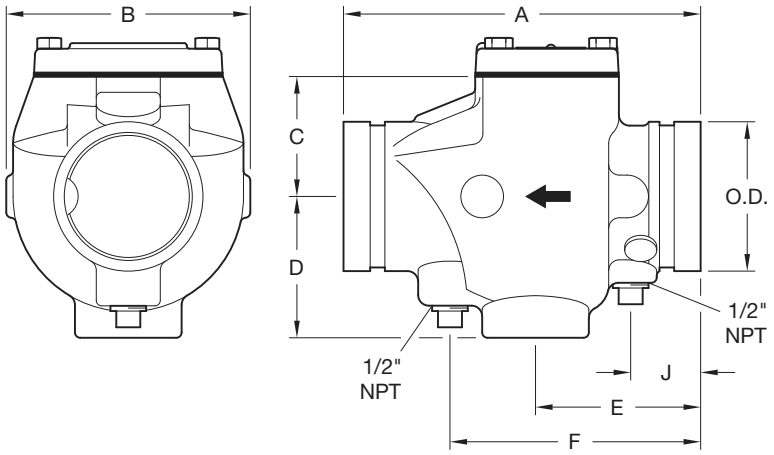


FIGURE 1
MODEL CV-1F GROOVED END SWING CHECK VALVES
NOMINAL DIMENSIONS

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 (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.

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"-8" (DN50-200)	Stainless Steel	1
	Clapper, 10"-12" (DN250-300)	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" NPT	Cast Iron	2
16	Adhesive	Thread Sealer	AR
17	Nameplate	Aluminum	1
18	Rivet	Steel	2
19	Spacer	Stainless Steel	1

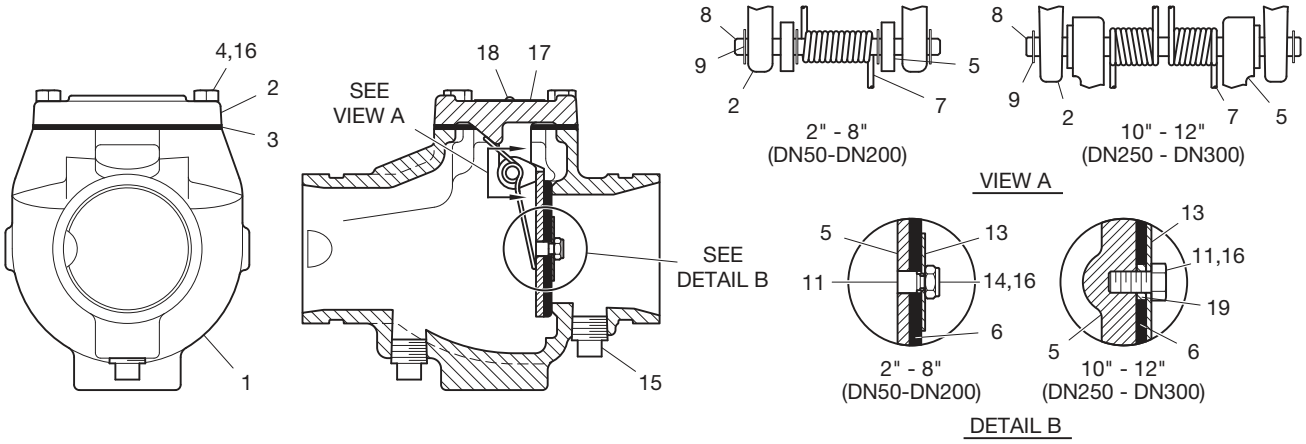
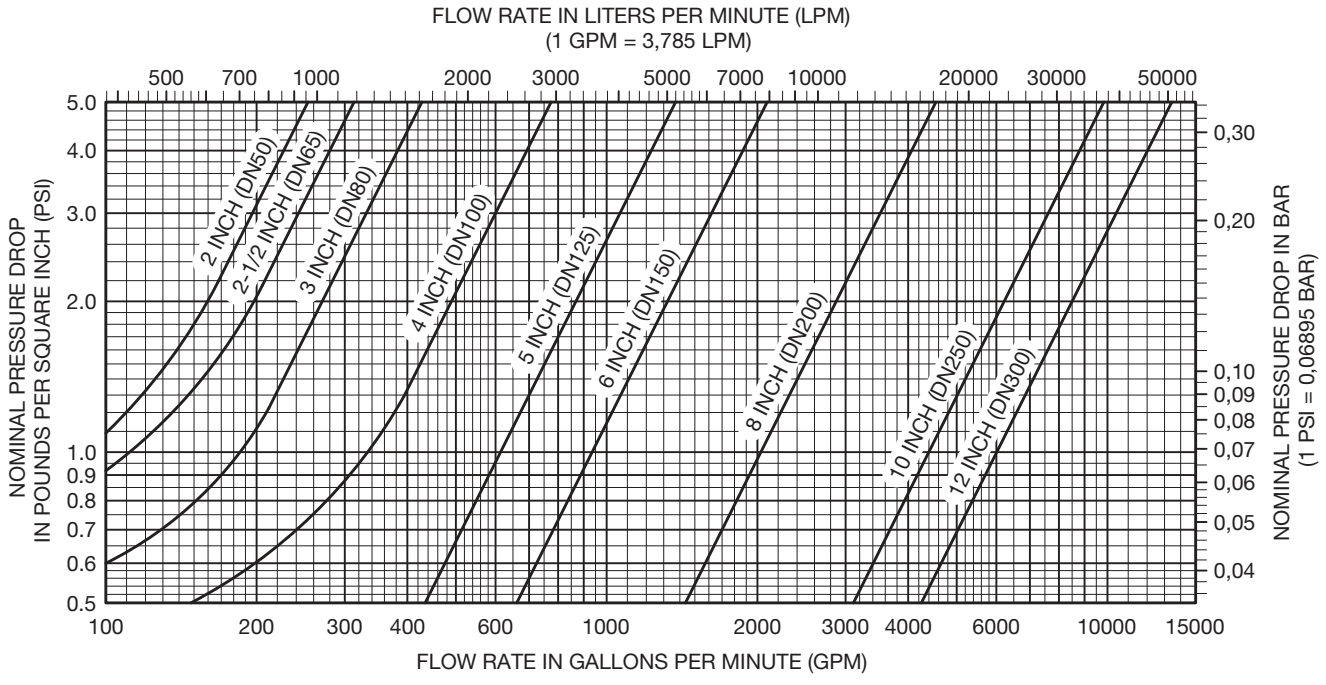


FIGURE 2
MODEL CV-1F GROOVED END SWING CHECK VALVES
ASSEMBLY



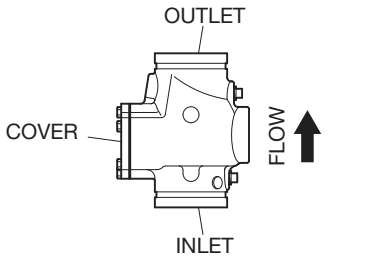
GRAPH A
MODEL CV-1F GROOVED END SWING CHECK VALVES
NOMINAL PRESSURE LOSS VS. FLOW

Valve Size Inch (DN)	Pipe O.D. Inch (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

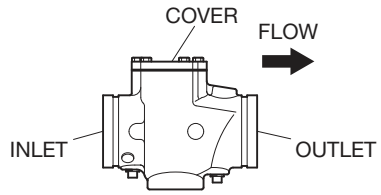
TABLE A
MODEL CV-1F GROOVED END SWING CHECK VALVES
PART NUMBER SELECTION

Valve Size Inch (DN)	Pipe O.D. Inch (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

Refer to 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, 5-14, and 17-19.

Specify: Model CV-1F Grooved End Swing Check Valve, Clapper Assembly, size (specify), P/N (specify per Table B)

tyco Fire Protection Products

tyco Fire Protection Products

Worldwide Contacts | www.tyco-fire.com

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.

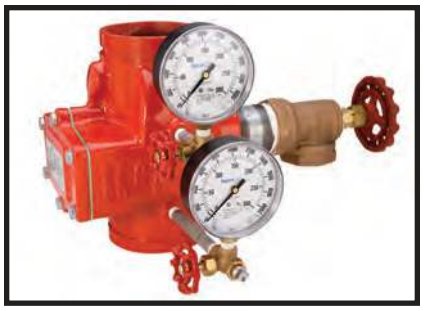
Technical Data

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

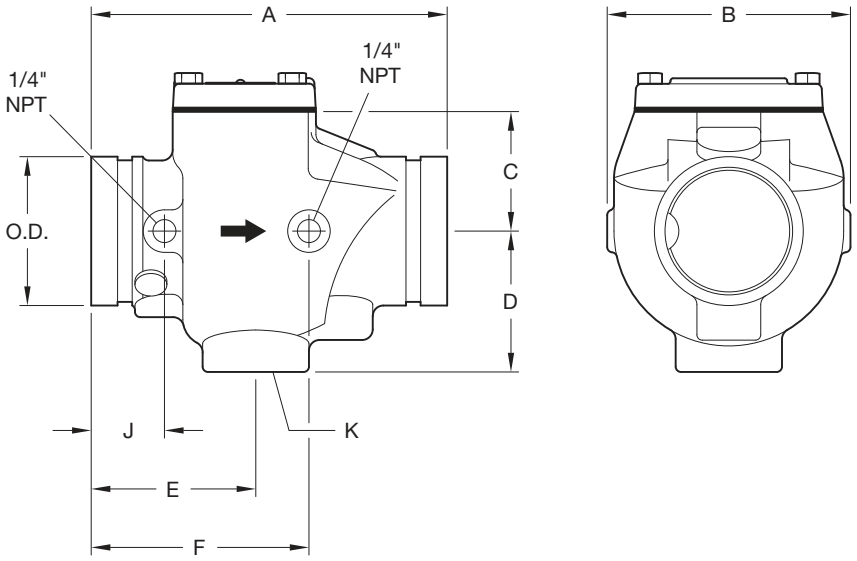


Installation

The Model CV-1FR Riser Check Valves are to be installed in accordance with this section:

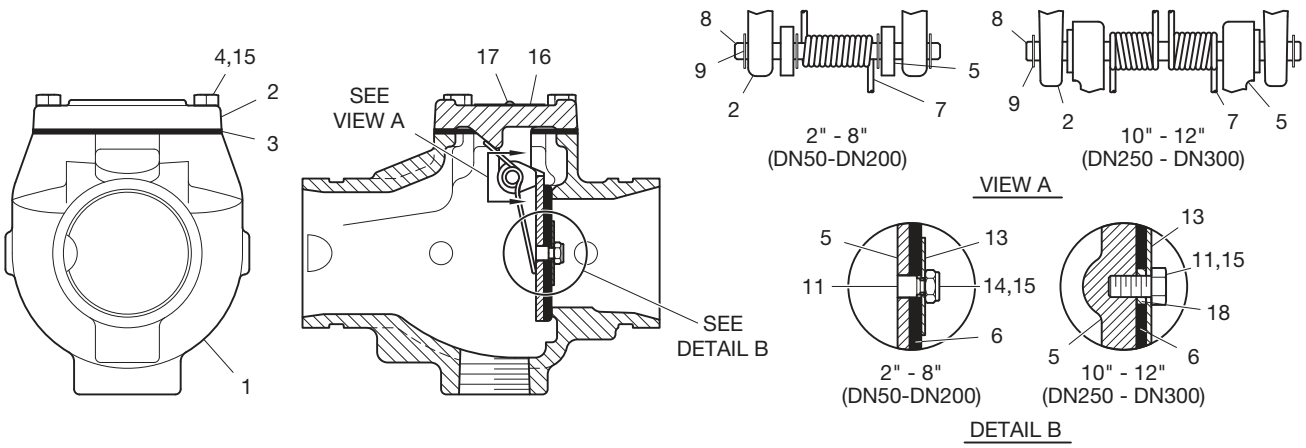
1. The arrow cast on the Body must point in the direction of the flow.
2. Valves installed vertically must be positioned with the flow in the upward direction.
3. Valves installed horizontally must be positioned with the Cover facing up. Refer to Figure 6.
4. Grooved-end pipe couplings used with the 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

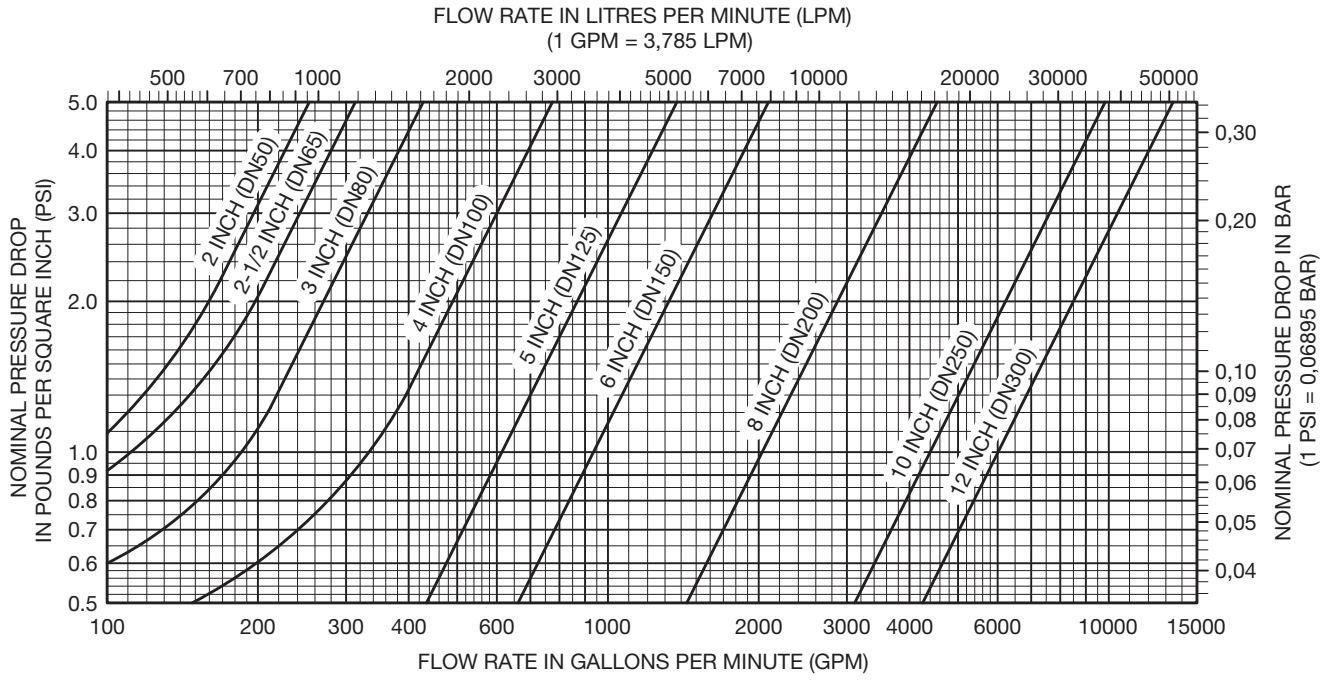
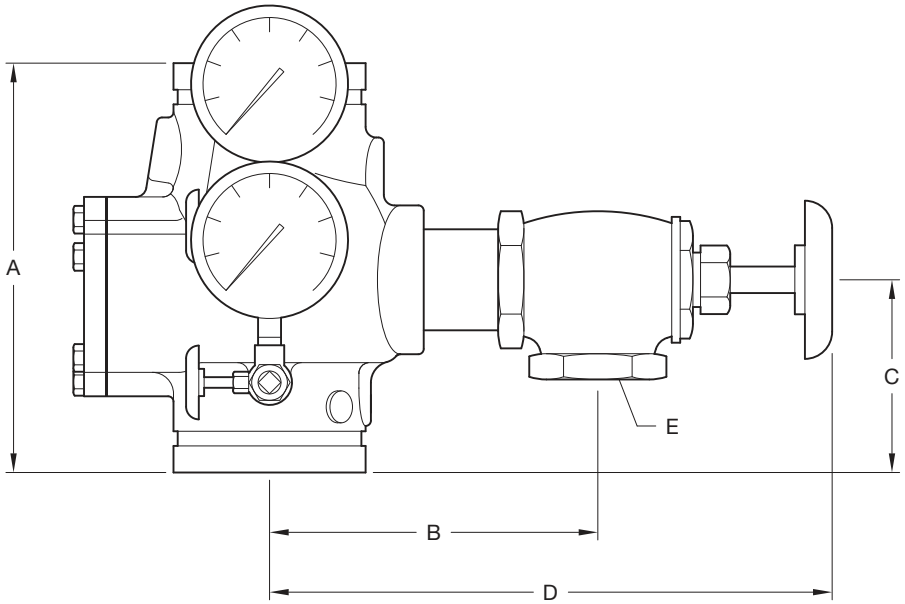


FIGURE 3
MODEL CV-1FR RISER CHECK VALVES
PRESSURE LOSS DATA



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.

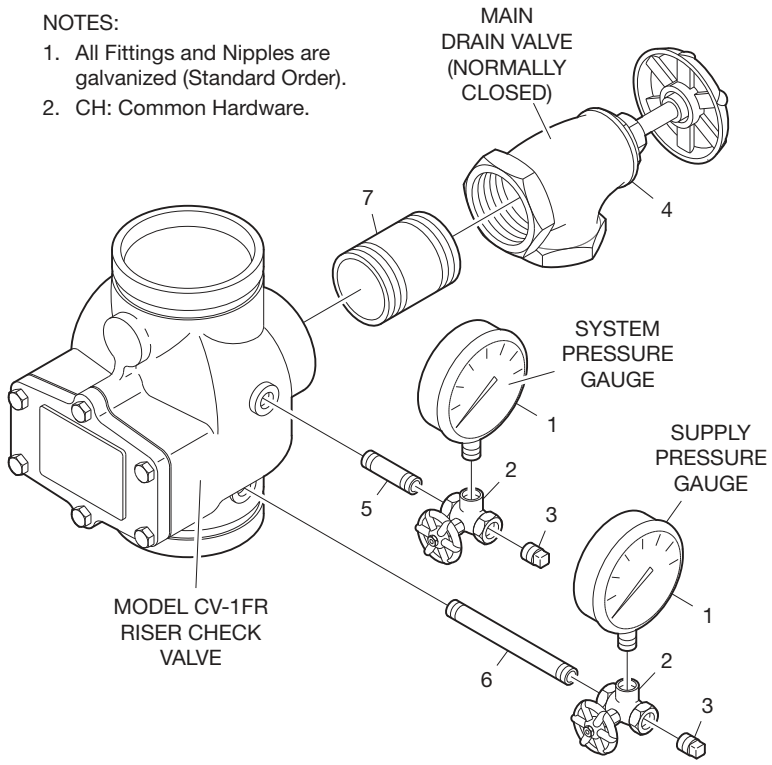
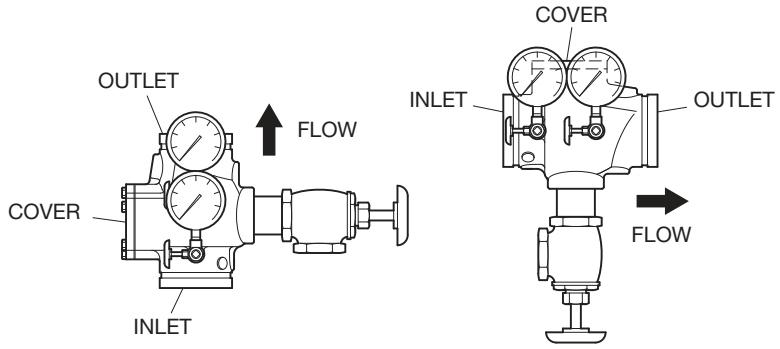


FIGURE 5
MODEL CV-1FR RISER CHECK VALVES
TRIM PARTS LIST



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

tyco Fire Protection Products

Model RM-1 Riser Manifold Commercial and Residential

General Description

The TYCO commercial and residential Model RM-1 Riser Manifold provide the necessary waterflow alarm, pressure gauge, alarm test orifice, drain, and sight glass equipment in a single assembly for use in NFPA 13 commercial sprinkler systems and in NFPA 13D/13R residential sprinkler systems as follows:

NFPA 13*
- 1-1/2 Inch (DN40)
  Male Thread x Female Thread
- 2–6 Inch (DN50–DN150)
  Groove x Groove

NFPA 13D
- 1 Inch (DN25)
  Female Thread x Female Thread

NFPA 13R
- 1-1/2 Inch (DN40)
  Male Thread x Female Thread
- 2 Inch (DN50)
  Groove x Groove

* Although the Riser Manifold described in this technical 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 2.8K or 4.2K 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 Model RM-1 Riser Manifolds may be installed either horizontally (flow switch on top) or vertically (flow going up) orientation, for both single sprinkler rises and floor control in high-rises.

Optional Pressure Relief Kits feature a 175 psi pressure relief valve and trim components for convenient integration into commercial and residential riser manifold assemblies.

The pressure relief valve, installed in manifold assemblies above the normally closed test and drain or drain valve, automatically bleeds system pressure exceeding 175 psi through a flexible hose connected to the manifold drain outlet (Ref. Figure 5), reducing system pressure to 175 psi.

NOTICE

The Model RM-1 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 (NFPA), in addition to the standards of any other authorities having jurisdiction. Failure to do so may impair the performance of these devices.

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

Technical Data

Approvals
UL and ULC Listed
FM Approved
Listed by California State Fire Marshall

Maximum Working Pressure
300 psi (20,7 bar)

Test Orifice
1–3 Inch (DN25–DN80) Manifolds: 2.8K
4–6 Inch (DN100–DN150) Manifolds: 4.2K

Finish
Red Painted

Nominal Riser Size Inches (DN)	End Connections		Nominal Dimensions Inches (mm)							Nominal Drain Size Inches (DN)
	Inlet	Outlet	A	B	C	D	E	F	G	H
1-1/2 (40)	Thread MNPT	Thread FNPT	10 (254)	15-1/2 (394)	2-1/4 (57)	5-5/8 (143)	8-3/8 (213)	15 (381)	4-3/8 (111)	1-1/4 (32)
2 (50)	Groove	Groove	13 (330)	18 (457)	2-1/16 (53)	5-5/8 (143)	8-3/8 (213)	15-1/4 (388)	4-3/8 (111)	1-1/4 (32)
2-1/2 (65)	Groove	Groove	13 (330)	18-1/16 (460)	2-1/16 (53)	5-5/8 (143)	8-3/8 (213)	15-1/4 (388)	4-3/8 (111)	1-1/4 (32)
3 (80)	Groove	Groove	13 (330)	18-1/16 (460)	2-1/16 (53)	5-7/8 (150)	8-5/8 (219)	15-3/4 (400)	4-3/8 (111)	1-1/4 (32)
4 (100)	Groove	Groove	13 (330)	20-1/4 (514)	4-1/4 (108)	6-3/4 (172)	10-3/4 (273)	18-3/8 (467)	5-3/16 (132)	2 (50)
6 (150)	Groove	Groove	13 (330)	20-1/4 (514)	4-1/4 (108)	7-3/4 (197)	11-3/4 (300)	21 (533)	6-3/4 (172)	2 (50)

NO	DESCRIPTION	P/N
1	300 psi/2000 kPa Water Pressure Gauge	90050001
2	Test and Drain Valve, Model TD-1: 1-1/2–3 Inch (DN40–DN80) Size Manifolds, 1-1/4", 2.8K Orifice	A61G0420
	4–6 Inch (DN100–DN150) Size Manifolds, 2", 4.2K Orifice	A61G0601
3	Flow Switch, VSR-M:	
	1-1/2" (DN40)	91144815
	2" (DN50)	91144802
	2-1/2" (DN65)	91144825
	3" (DN80)	91144803
	4" (DN100)	91144804
	6" (DN150)	91144806
4	Field Replaceable Retard/Switch	91144800

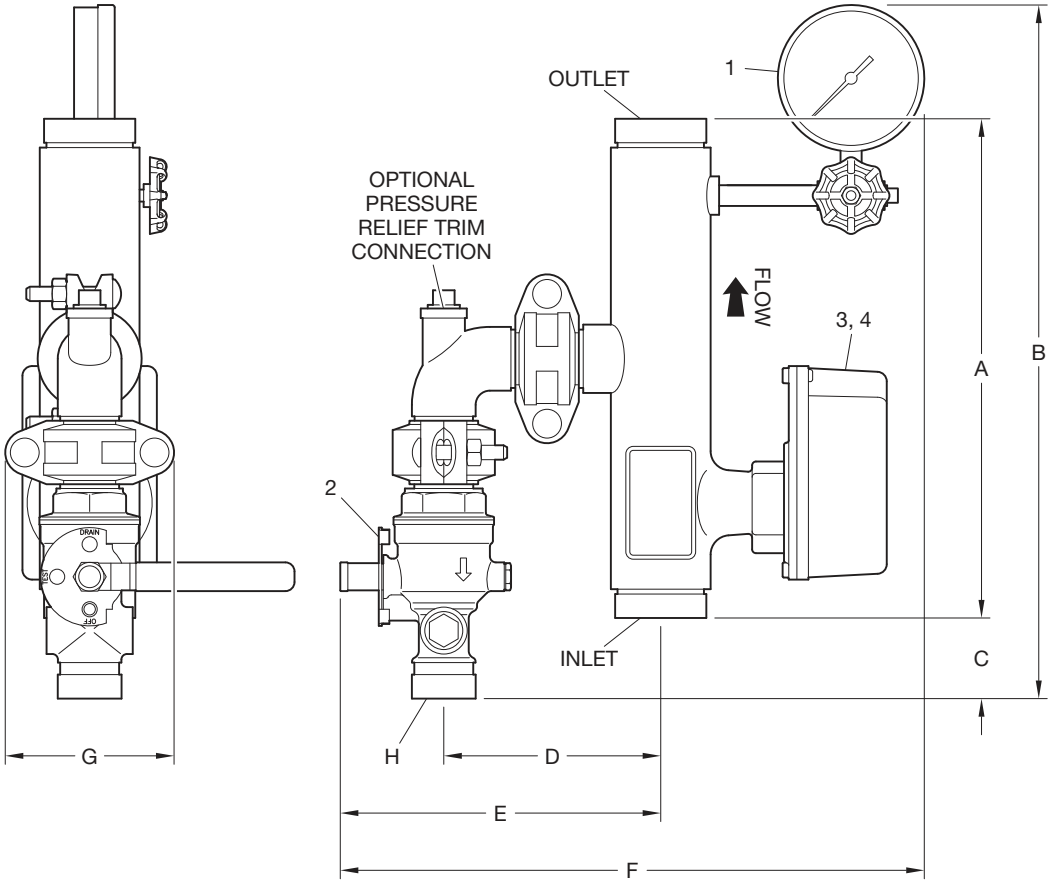
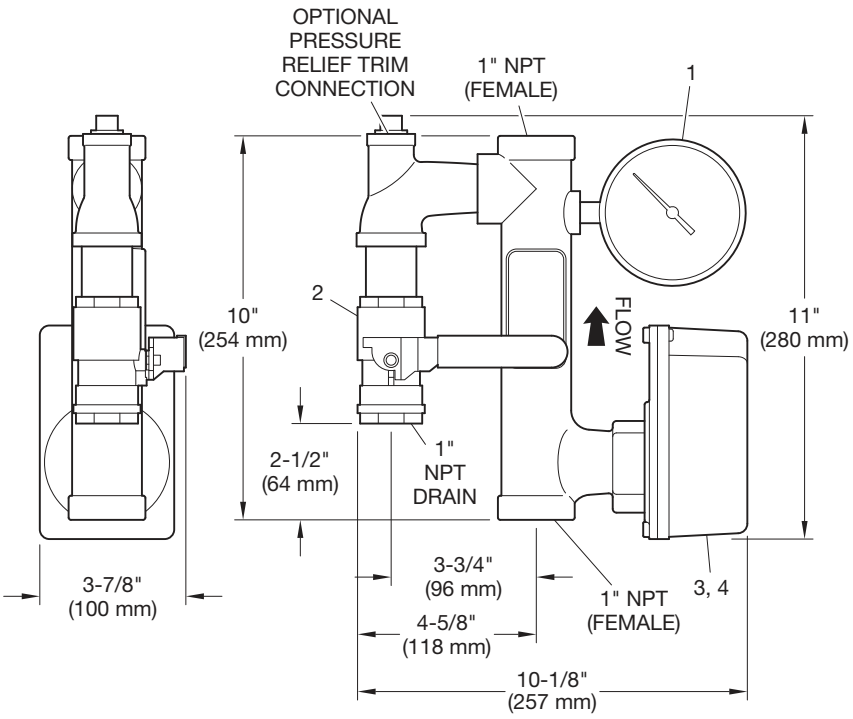
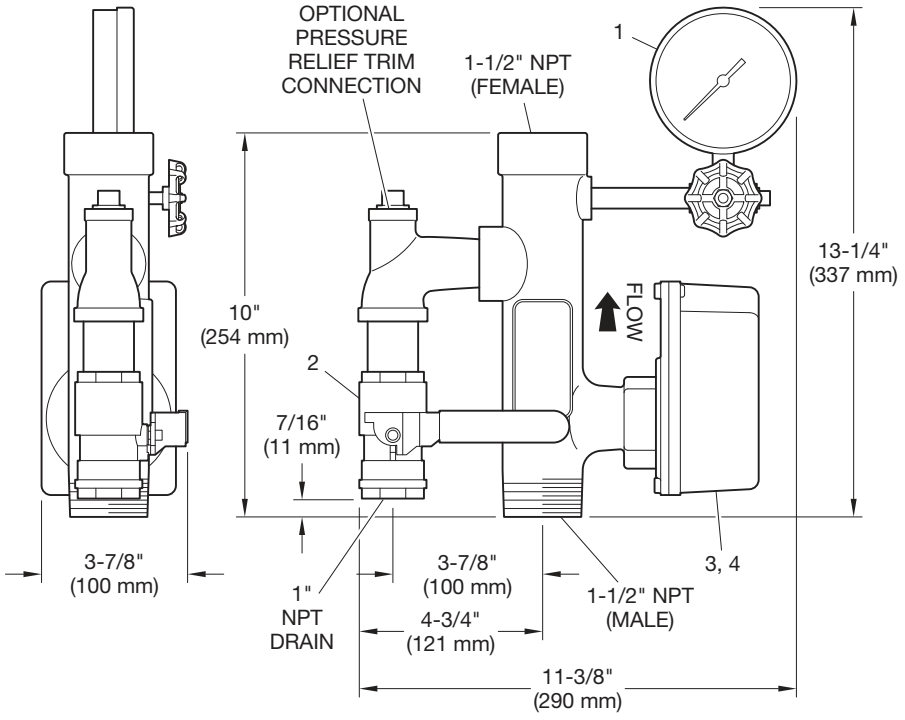


FIGURE 1
MODEL RM-1 COMMERCIAL RISER MANIFOLDS
1-1/2–6 INCH (DN40–DN150)



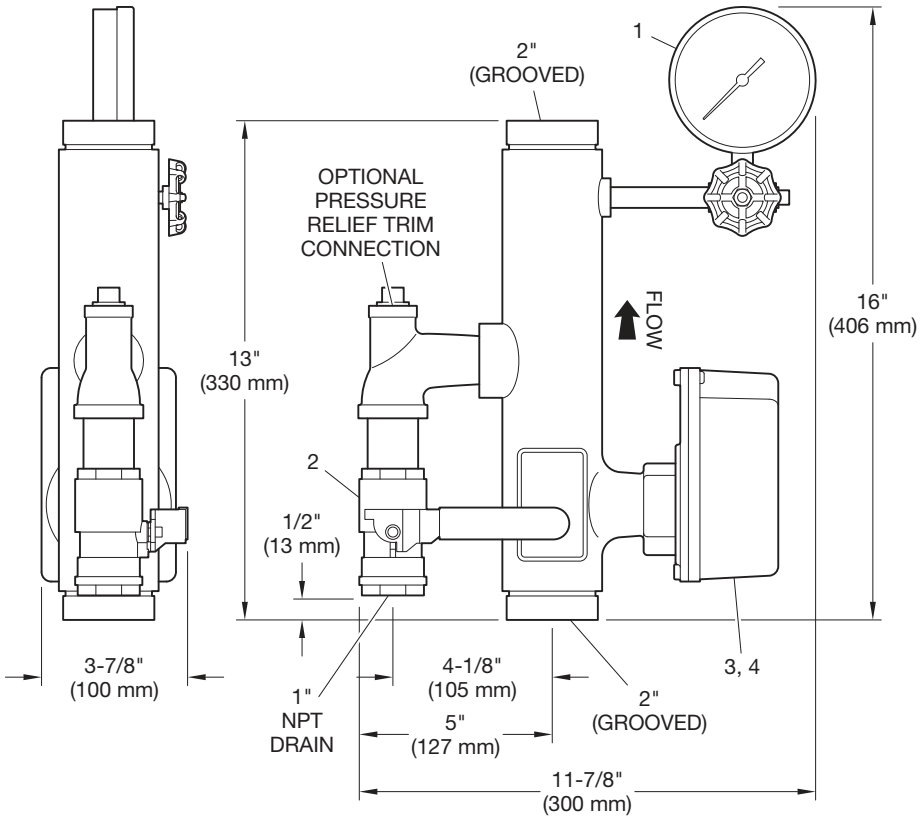
NO	DESCRIPTION	P/N
1	300 psi/2000 kPa Water Pressure Gauge	90050001
2	Ball Valve, 1" (DN25)	97111603
3	Flow Switch, VSR-M, 1" (DN25)	91144801
4	Field Replaceable Retard/Switch	91144800

FIGURE 2
MODEL RM-1 RESIDENTIAL RISER MANIFOLD
1 INCH (DN25)



NO	DESCRIPTION	P/N
1	300 psi/2000 kPa Water Pressure Gauge	90050001
2	Ball Valve, 1" (DN25)	97111603
3	Flow Switch, VSR-M, 1-1/2" (DN40)	91144815
4	Field Replaceable Retard/Switch	91144800

FIGURE 3
MODEL RM-1 RESIDENTIAL RISER MANIFOLD
1-1/2 INCH (DN40)



NO	DESCRIPTION	P/N
1	300 psi/2000 kPa Water Pressure Gauge	90050001
2	Ball Valve, 1" (DN25)	97111603
3	Flow Switch, VSR-M, 2" (DN50)	91144802
4	Field Replaceable Retard/Switch	91144800

FIGURE 4
MODEL RM-1 RESIDENTIAL RISER MANIFOLD
2 INCH (DN50)

Manifold Installation

TYCO Model RM-1 Riser Manifold must be installed in accordance with this section.

The Model RM-1 Riser Manifold may be installed either horizontally (flow switch on top) or vertically (flow going up). The inlet of the Riser Manifold may be connected directly 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.

Provisions for an alarm test flow on Residential Models must be made. The alarm test flow is to be through an orifice having a flow capacity equal to or smaller than the smallest orifice sprinkler in the system. One of two options can be considered. The first option is to temporarily install a test orifice in the outlet of the drain line prior to performing the alarm test. The second option is to install an Inspector's Test Connection downstream of the Waterflow Alarm Switch.

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 on commercial manifolds set the Model TD-1 Test and Drain Valve to the OFF position or on residential manifolds close the drain valve.

Step 3. Refer to Figure 6 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 5 for Optional Pressure Relief Trim installation.

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.

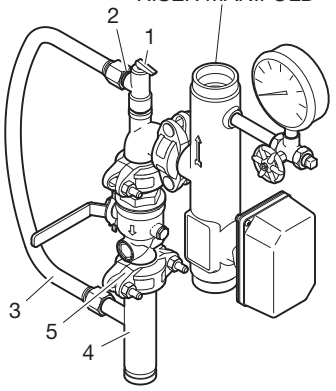
After the system is fully pressurized, completely open the control valve.

Step 6. Secure all supply valves open.

Commercial Riser Manifolds

NO	DESCRIPTION	P/N
1	Pressure Relief Valve, 175 psi, 1/2" NPT	1001184-01
2	1/2" x Close Nipple	1001023-01
3	Flexible Hose: 1-1/2–3 Inch (DN40–DN80) Size Manifolds, 1/2" x 24"	1001266-02
	4–6 Inch (DN100–DN150) Size Manifolds, 1/2" x 30"	1001266-01
4	Figure 323 Reducing Tee, Grooved x NPT Threaded: 1-1/2–3 Inch (DN40–DN80) Size Manifolds, 1-1/4" x 1-1/4" x 1/2"	3231305GS
	4–6 Inch (DN100–DN150) Size Manifolds, 2" x 2" x 1/2"	3232005GS
5	Figure 577 Rigid Grooved Coupling: 1-1/2–3 Inch (DN40–DN80) Size Manifolds, 1-1/4"	57713AGCP
	4–6 Inch (DN100–DN150) Size Manifolds, 2"	57720AGCP

MODEL RM-1
COMMERCIAL
RISER MANIFOLD



Residential Riser Manifolds

NO	DESCRIPTION	P/N
1	Pressure Relief Valve, 175 psi, 1/2" NPT	1001184-01
2	1/2" x Close Nipple, Qty 2	1001023-01
3	Flexible Hose, 1/2" x 16"	1001266-03
4	Figure 815 Threaded Reducing Tee, 1" x 1" x 1/2" NPT	1001259-07
5	1" x Close Nipple	1001025-01

MODEL RM-1
RESIDENTIAL
RISER MANIFOLD

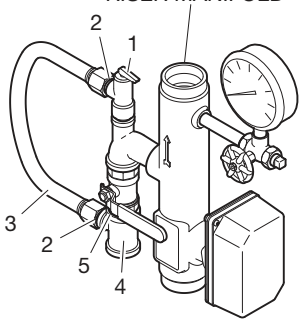


FIGURE 5
MODEL RM-1 COMMERCIAL AND RESIDENTIAL RISER MANIFOLDS
OPTIONAL PRESSURE RELIEF TRIM INSTALLATION

Optional Pressure Relief Trim Installation

Model RM-1 commercial and residential riser manifold assemblies are designed to accommodate an optional pressure relief valve and trim components (Ref. Figure 5).

Optional pressure relief trim must be installed in accordance with the following procedures.

Notes:

For assembly in Riser Manifolds installed and in service, verify the fire protection system is de-pressurized and drained. Close the system supply control valve, set commercial manifold test and drain valve to DRAIN or open residential drain valve to relieve residual pressure and drain system. Make certain that drainage water will not cause any damage or injury.

Refer to Care and Maintenance section for other requirements when closing a fire protection system control valve and placing system in service.

Apply thread sealant or TEFLON tape on all threaded connections, with the exception of internally sealed flexible hose connections.

Commercial Manifolds

Refer to Figure 1 for commercial riser manifold features and Figure 5 for pressure relief trim components described in this procedure.

Step 1. Remove 1/2 inch pipe plug from manifold tee. Inspect exposed female tee threads, remove thread sealant remnants or debris as necessary.

Step 2. Install Pressure Relief Valve (1) in manifold tee, orienting valve outlet port perpendicular to and facing away from manifold body.

Step 3. Install 1/2 inch x Close Nipple (2) in pressure relief valve outlet port.

Step 4. Disconnect drain piping from grooved outlet of manifold TD-1 test and drain valve as applicable and install Figure 323 Grooved Reducing Tee (4) on valve outlet by securing with Figure 577 Grooved Coupling (5), aligning tee threaded branch outlet parallel with pressure relief valve outlet port. Reconnect drain piping to Figure 323 tee drain outlet as necessary.

Note: *Refer to Technical Data Sheet G901 for Figure 577 Grooved Coupling installation and assembly instructions.*

Step 5. Install Flexible Hose (3) by threading female ends onto 1/2 inch x close nipple installed on relief valve outlet port and onto Figure 323 reducing tee branch outlet.

Note: *Assure Flexible Hose is not susceptible to being caught or snagged by other moving equipment.*

Residential Manifolds

Refer to Figures 2, 3 or 4 for residential riser manifold features and Figure 5 for pressure relief trim components described in this procedure.

Step 1. Remove 1/2 inch pipe plug from manifold tee. Inspect exposed female tee threads, remove thread sealant remnants or debris as necessary.

Step 2. Install Pressure Relief Valve (1) in manifold tee, orienting valve outlet port perpendicular to and facing away from manifold body.

Step 3. Disconnect drain piping from threaded outlet of manifold drain valve as applicable and install 1 inch x Close Nipple (5) in valve outlet.

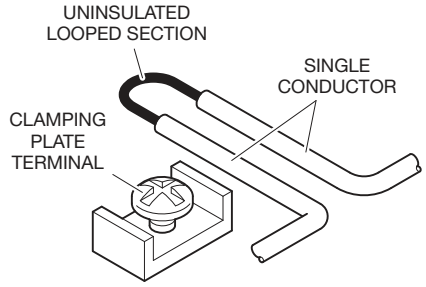
Step 4. Install Figure 815 Reducing Tee (4) onto 1 inch x close nipple, aligning tee branch outlet parallel with pressure relief valve outlet port. Reconnect drain piping to Figure 815 tee drain outlet as necessary.

Step 5. Install 1/2 inch x Close Nipples (2) in pressure relief valve outlet port and in Figure 815 reducing tee branch outlet.

Step 6. Install Flexible Hose (3) by threading female ends onto 1/2 inch x close nipples installed on relief valve outlet port and Figure 815 reducing tee branch outlet.

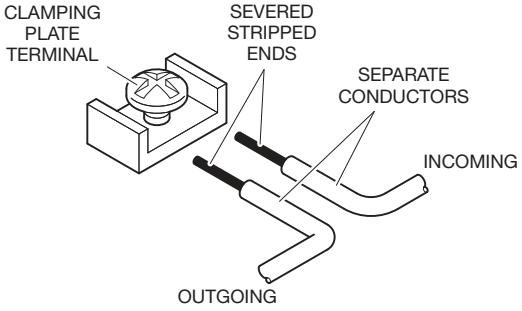
Note: *Assure Flexible Hose is not susceptible to being caught or snagged by other moving equipment.*

SWITCH TERMINAL CONNECTIONS

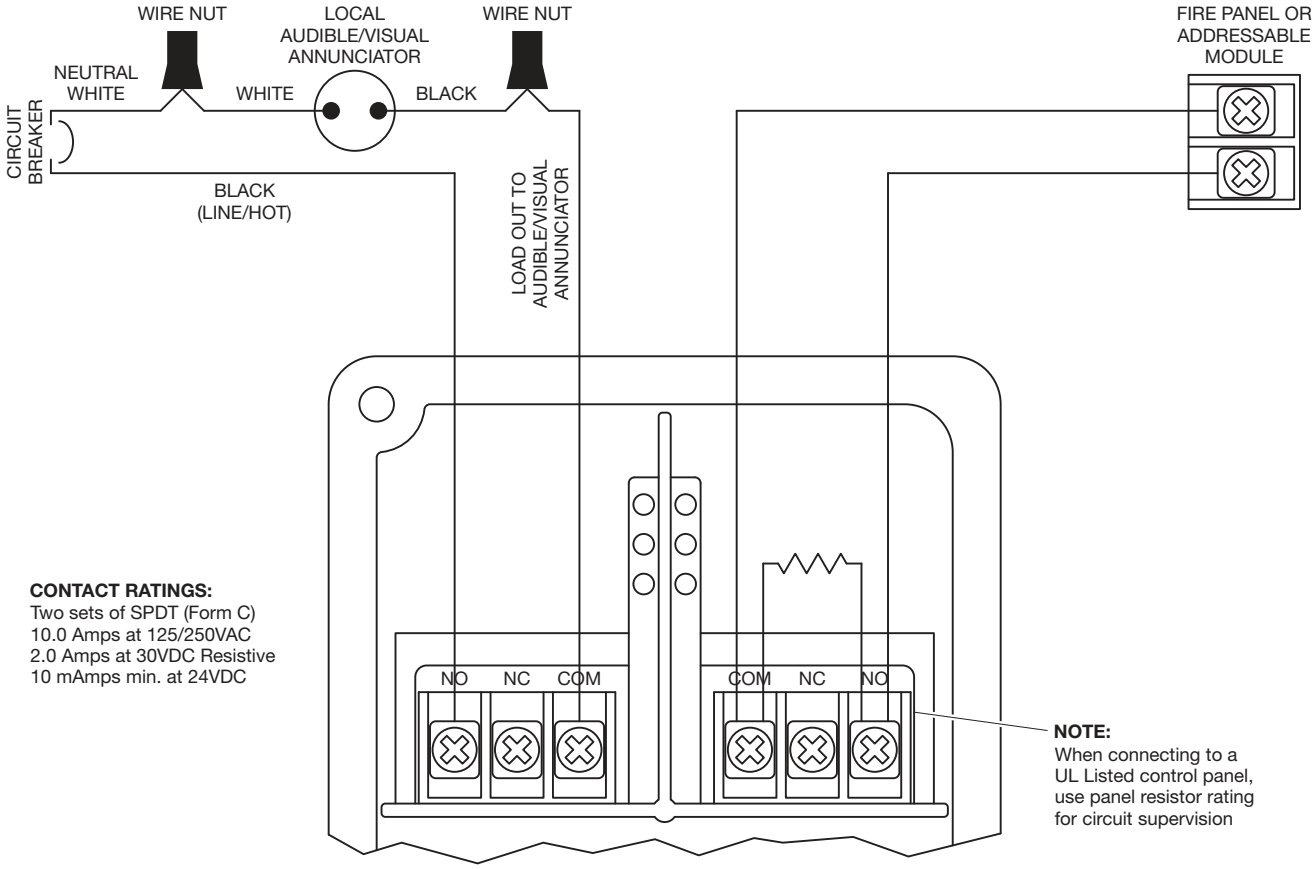


IMPROPER CONNECTION METHOD

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



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

NOTE:
When connecting to a UL Listed control panel, use panel resistor rating for circuit supervision

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 remote signaling unit, while the other contact is used to operate a local audible or visual annunciator.

FIGURE 6
MODEL RM-1 COMMERCIAL AND RESIDENTIAL RISER MANIFOLD WIRING GUIDANCE

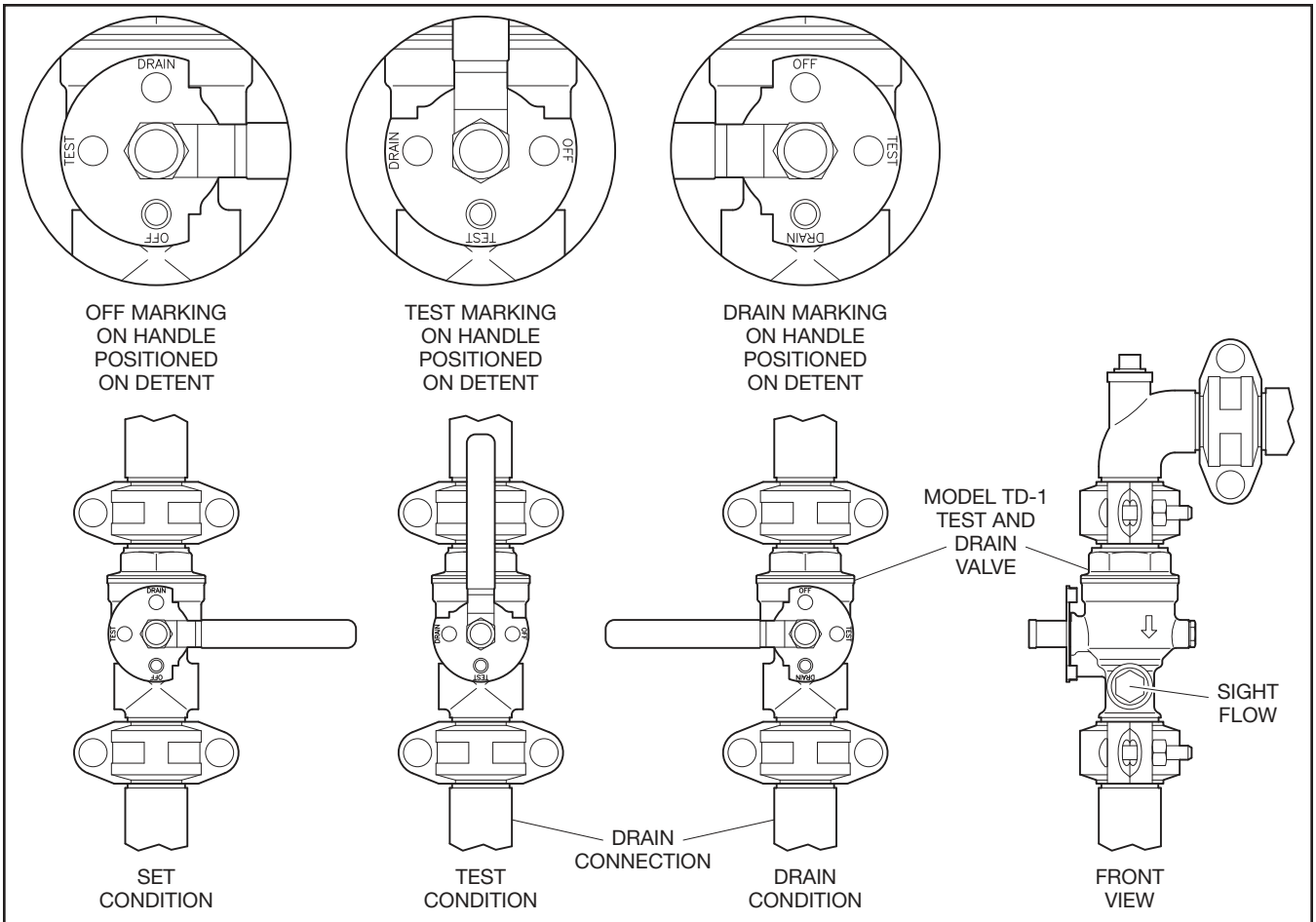


FIGURE 7
MODEL RM-1 COMMERCIAL RISER MANIFOLD
TD-1 TEST AND DRAIN VALVE OPERATION

Care and Maintenance

TYCO Riser Manifolds RM-1 must be serviced and maintained in accordance with this section.

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.

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.

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.

Note: *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.

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:

Alarm/Flow Test Procedure

Step 1. Place the Model TD-1 Test and Drain Valve in the TEST position (Ref. Figure 7). On residential assemblies without a test orifice, temporarily install a test orifice in the drain outlet and fully open the Drain Valve. Make certain that drainage water will not cause any damage or injury.

Step 2. Verify operation of associated alarms.

Step 3. Verify that the residual (i.e., flowing) pressure indicated by the pressure gauge is no less that originally recorded for the system when it was first installed.

Step 4. Close the Drain Valve on the Residential models and the Test and Drain valve on commercial models.

Step 5. Verify that the static (i.e., not flowing) pressure indicated by the pressure gauge is no less that originally recorded for the system when it was first installed.

Limited Warranty

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

Ordering Procedure

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

Riser Manifolds
Specify: Size (specify) Connection Type (specify inlet x outlet) Model RM-1 Riser Manifold, P/N (specify):

Commercial
1-1/2 Inch (DN40) MT x FT 40551
2 Inch (DN50) G x G 40601
2-1/2 Inch (DN65) G x G 40611
3 Inch (DN80) G x G 40621
4 Inch (DN100) G x G 40651
6 Inch (DN150) G x G 40661

Residential
1 Inch (DN25) FT x FT 40671
1-1/2 Inch (DN40) MT x FT 40571
2 Inch (DN50) G x G 40591

Optional 175 psi Pressure Relief Kit
Specify: Pressure Relief Kit, Model RM-1 Riser Manifold, (specify Commercial or Residential application), (specify size range), P/N (specify):

Commercial
1-1/2–3 Inch (DN40–DN80) 40721
4–6 Inch (DN100–DN150) 40731

Residential
1–2 Inch (DN25–DN50) 40711

Replacement Parts
Specify: Model RM-1 Riser Manifold (specify part description), P/N (specify from Figures 1, 2, 3, 4 or 5)

tyco Fire Protection Products

FIRE PROTECTION EQUIPMENT SUBMITTAL

PRECISION FIRE SYSTEMS, INC.

790 Monroe Road
Sanford, Florida 32771
321-363-1560

Pipe & Fittings

Precision Fire System, Inc.
Steel Pipe Submittal

All of the steel pipe to be used on this project meets or exceeds the requirements of one or more of the following standards as required by paragraph 6.3 NFPA 13-2010:

ASTM A795 **Specification for Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless Steel Pipe for Fire Protection Use**

ANSI/ASTM A 53 **Specification for Black and Hot-Dipped Zinc Coated (Galvanized) Welded and Seamless Steel Pipe**

ASTM A 135 **Specification for Electric – Resistance Welded Steel Pipe**

Manufacturers may vary. As per paragraph 6.3.8.1, NFPA 13-2010, all pipe shall be marked along its length to properly identify its type, schedule and manufacturing standard.

Additional approvals or listings are not required when:

1. Steel pipe meeting the above referenced ASTM specifications is used and joined by welding or roll-grooved pipe and fittings, the minimum nominal wall thickness for pressures up to 300 psi shall be in accordance with Schedule 10 for sizes up to 6 inches and .188 inches for 8" – 10" pipe.
2. Steel pipe meeting the above referenced ASTM specifications is used and joined by threaded fittings, the minimum wall thickness shall be in accordance with Schedule 40 in sizes less than 8 inches for pressures up to 300 psi.

Exception: Pipe meeting the above referenced ASTM specifications with wall thickness and pressure limitations less than Schedule 40 for threading or Schedule 10 for welding and roll-grooving, which have been investigated for suitability in automatic sprinkler installations and listed for this service, shall be permitted when installed in accordance with their UL or FM listing limitations.

All steel pipe is to be installed in strict accordance with the guidelines of NFPA 13 and therefore requires no special submittal of specific manufacture's installation instructions as noted in NFPA 13-2010.

~~NOTE:~~
~~All piping 2" and less shall be Schedule 40.~~
~~All piping 2~~

BlazeMaster® Fire Sprinkler Systems
Submittal Specification – North America

SCOPE:
This specification covers the material requirements for BlazeMaster® CPVC SDR 13.5 pipe and socket fittings. Both the pipe and fittings are manufactured in North America and meet or exceed the requirements set forth by the appropriate ASTM standard (F437, F438, F439, F442), and NSF/ANSI Standards 14 and 61.

CPVC MATERIALS:
BlazeMaster CPVC pipe and fittings are extruded/molded from Lubrizol CPVC compounds. The pipe compound meets cell class 23547 and the fitting compound meets cell class 24447 as defined by ASTM D1784. Both the pipe and the fitting compounds are certified by NSF International for use with potable water.

As manufactured by Tyco Fire Protection Products, The Viking Corporation, Georg Fischer Harvel LLC., Nibco Inc. and IPEX Inc.

DIMENSIONS AND PROPERTIES:
Dimensions, tolerances and physical properties meet or exceed the requirements of the appropriate ASTM standard (F437, F438, F439, F442).

COMPATIBILITY:
Ancillary products (including, but not limited to fire stops, thread sealants, leak detectors, etc.) coming into contact with pipe and fittings must be chemically compatible with BlazeMaster CPVC pipe and fittings (reference the Lubrizol FBC™ System Compatible Program).

SOLVENT WELDING:
All socket type joints shall be assembled employing solvent cements that meet or exceed the requirements of ASTM F493. The standard practice for safe handling of solvent cements shall be in accordance with ASTM F402. Solvent cement shall be certified by NSF International for use with potable water, and approved by the BlazeMaster pipe and fittings manufacturers.

BASIC USE:
BlazeMaster Pipe and fittings are Listed by UL for use in Light Hazard Occupancies as defined by NFPA 13, 13R and 13D.
BlazeMaster is permitted to protect ordinary hazard rooms of otherwise light hazard occupancies where the room does not exceed 400 square feet (i.e. Laundry room) as defined in NFPA 13 and NFPA 13R.

MARKING:
The marking on the CPVC pipe and fittings shall meet the requirements of UL 1821 and the appropriate ASTM standard (F437, F438, F439, F442), and state the pipe/fitting manufacture's name or trademark, the material designation, the size, the NSF mark for potable water and the ASTM designation ASTM (F437, F438, F439, F442).

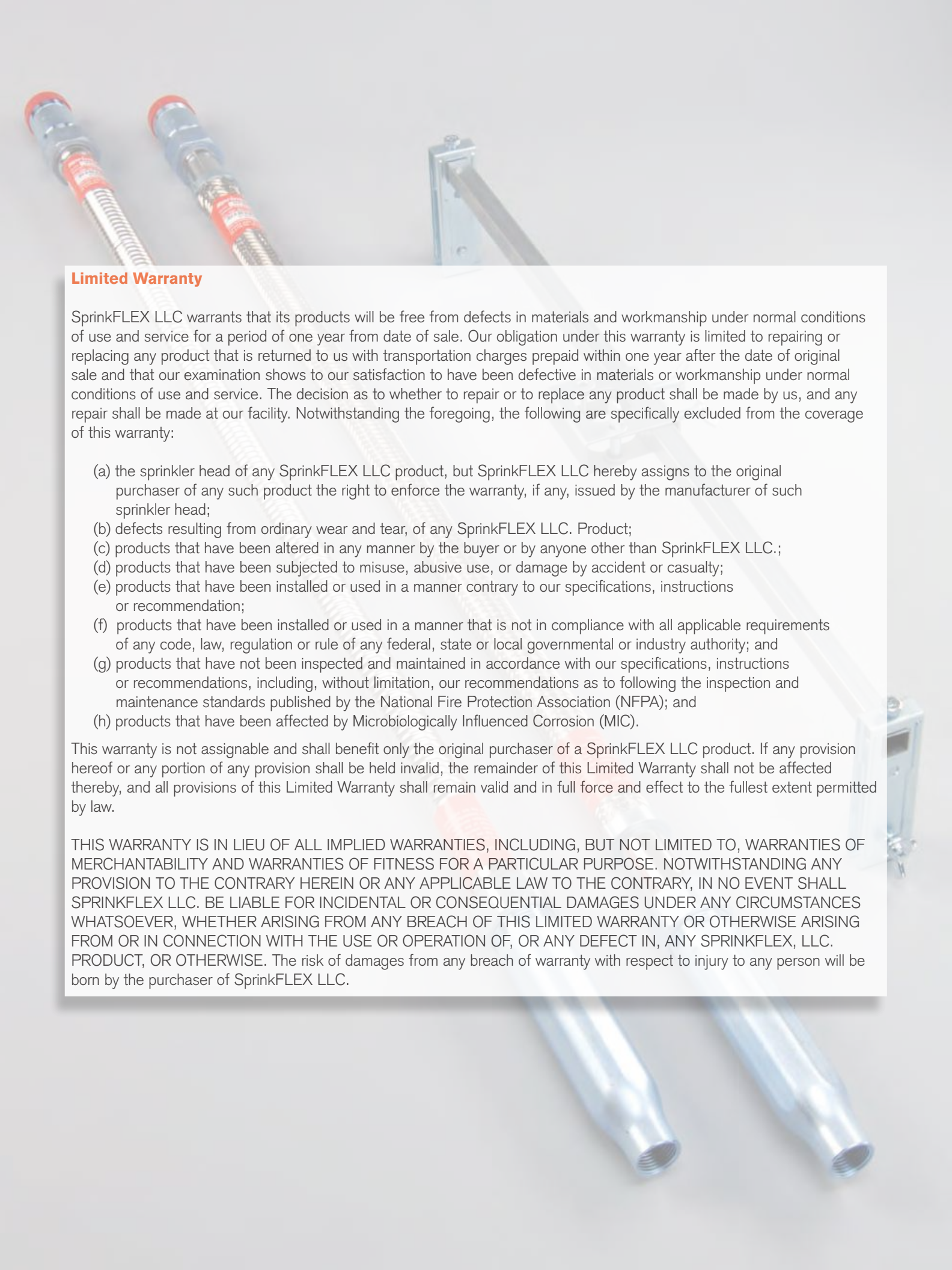
BROCHURE

SprinkFLEX®

COMMERCIAL FIRE SPRINKLER CONNECTIONS
Product Submittal

A PART OF

atkore INTERNATIONAL



Limited Warranty

SprinkFLEX LLC warrants that its products will be free from defects in materials and workmanship under normal conditions of use and service for a period of one year from date of sale. Our obligation under this warranty is limited to repairing or replacing any product that is returned to us with transportation charges prepaid within one year after the date of original sale and that our examination shows to our satisfaction to have been defective in materials or workmanship under normal conditions of use and service. The decision as to whether to repair or to replace any product shall be made by us, and any repair shall be made at our facility. Notwithstanding the foregoing, the following are specifically excluded from the coverage of this warranty:

(a) the sprinkler head of any SprinkFLEX LLC product, but SprinkFLEX LLC hereby assigns to the original purchaser of any such product the right to enforce the warranty, if any, issued by the manufacturer of such sprinkler head;
(b) defects resulting from ordinary wear and tear, of any SprinkFLEX LLC. Product;
(c) products that have been altered in any manner by the buyer or by anyone other than SprinkFLEX LLC.;
(d) products that have been subjected to misuse, abusive use, or damage by accident or casualty;
(e) products that have been installed or used in a manner contrary to our specifications, instructions or recommendation;
(f) products that have been installed or used in a manner that is not in compliance with all applicable requirements of any code, law, regulation or rule of any federal, state or local governmental or industry authority; and
(g) products that have not been inspected and maintained in accordance with our specifications, instructions or recommendations, including, without limitation, our recommendations as to following the inspection and maintenance standards published by the National Fire Protection Association (NFPA); and
(h) products that have been affected by Microbiologically Influenced Corrosion (MIC).

This warranty is not assignable and shall benefit only the original purchaser of a SprinkFLEX LLC product. If any provision hereof or any portion of any provision shall be held invalid, the remainder of this Limited Warranty shall not be affected thereby, and all provisions of this Limited Warranty shall remain valid and in full force and effect to the fullest extent permitted by law.

THIS WARRANTY IS IN LIEU OF ALL IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, WARRANTIES OF MERCHANTABILITY AND WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE. NOTWITHSTANDING ANY PROVISION TO THE CONTRARY HEREIN OR ANY APPLICABLE LAW TO THE CONTRARY, IN NO EVENT SHALL SPRINKFLEX LLC. BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES UNDER ANY CIRCUMSTANCES WHATSOEVER, WHETHER ARISING FROM ANY BREACH OF THIS LIMITED WARRANTY OR OTHERWISE ARISING FROM OR IN CONNECTION WITH THE USE OR OPERATION OF, OR ANY DEFECT IN, ANY SPRINKFLEX, LLC. PRODUCT, OR OTHERWISE. The risk of damages from any breach of warranty with respect to injury to any person will be born by the purchaser of SprinkFLEX LLC.

Series SFN Unbraided Flexible Hose Assemblies c UL us LISTED

Series SFB Braided Flexible Hose Assemblies FM APPROVED c UL us LISTED

SprinkFLEX Stainless Steel Sprinkler Fittings connect the branch line to the sprinkler using a flexible stainless steel hose and reducer. The flexible stainless steel hose and fittings are intended for direct connection to the sprinkler and are particularly suited for use in suspended and hard ceiling applications. Each drop assembly comes with one stainless steel flexible hose, one branch line connection nipple, one sprinkler reducing nipple and bracket system.

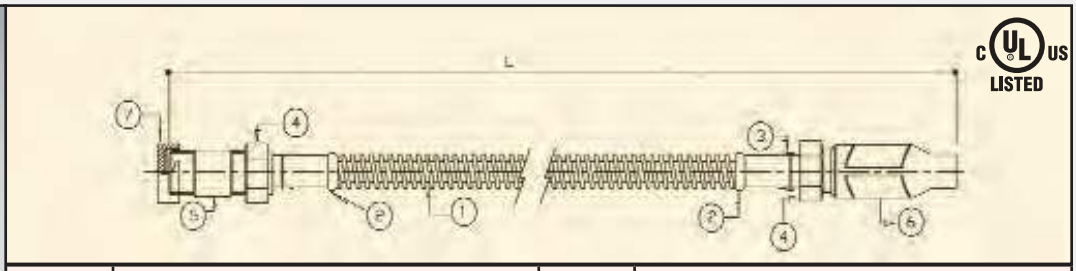
SYSTEM OPTIONS

- Pre-assembled, ready to install, unbraided and braided flexible stainless steel hose lengths:
  28" (700mm), 40" (1000mm), 48" (1200mm), 59" (1500mm), 71" (1800mm)
- 1⁄2" and 3⁄4" outlet fittings for connecting sprinkler
- Pre-assembled, ready to install mounting bracket available in 24" and 48" long
- Mounting bracket allows the sprinkler to be locate anywhere within the ceiling with reference marks in the center for ease of installation without the need for measuring.
- Optional factory installed sprinkler head.

TECHNICAL DATA

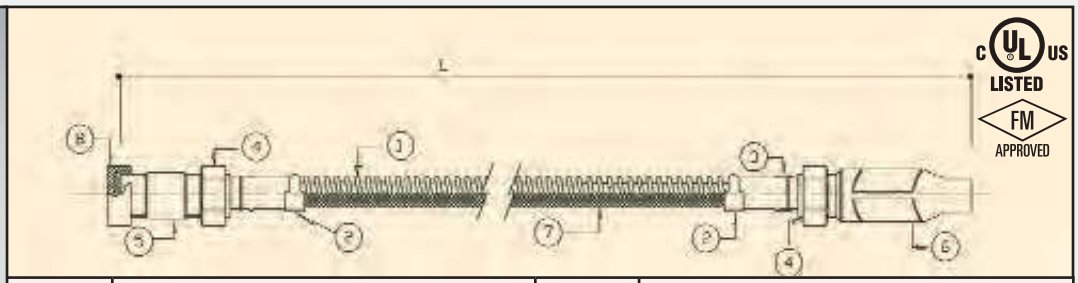
- Maximum Working Pressure: 200 psi (1375 kPa)
- Maximum Ambient Temperature: 300˚ F (149˚C)
- Connection to Branch Line: 1-inch NPT
- Minimum Bend Radius of Flexible Stainless Steel Hose:
  3 inches (76.2 mm) per UL Listing
  8 inches (203.2 mm) per FM Approval
- Maximum Number of 90˚ Bends Per Flexible Stainless Steel Hose:
  2 - 90 degree bends for 28" length
  3 - 90 degree bends for 40", 48", 59"and 71" lengths
  The flexible stainless steel hose should not be bent within 21⁄2 inches (64 mm) of the connection nut at both ends.
- Maximum K-Factor of Sprinkler to be connected to Sprinkler Reducing Nipple:
  1⁄2 inch outlets: 8.0
  3⁄4 inch outlets: 11.2
- Listings and Approvals:
  Unbraided models are UL Listed
  Braided models are FM Approved and UL Listed

FLEXIBLE HOSE - NON BRAIDED



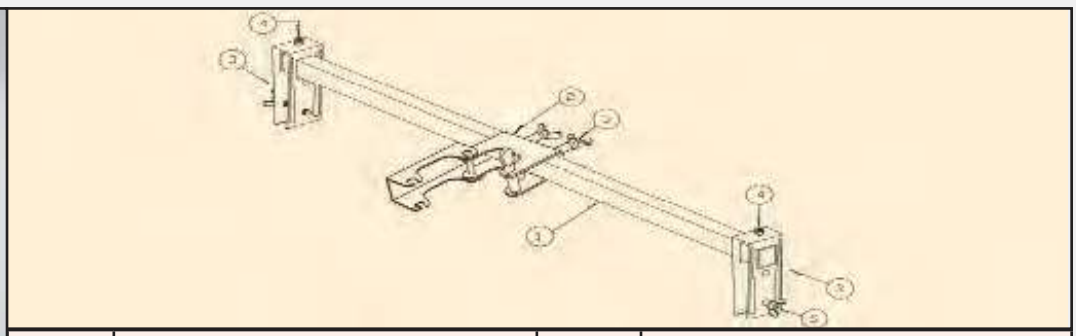
NO.	DESCRIPTION	NO.	DESCRIPTION
1	Flexible Hose 7/8" Nominal Diameter	5	Nipple
2	Ring	6	Reducer 1/2" or 3/4"
3	Washer	7	Plastic Cap
4	Slip Nut		

FLEXIBLE HOSE - BRAIDED



NO.	DESCRIPTION	NO.	DESCRIPTION
1	Flexible Hose 7/8" Nominal Diameter	5	Nipple
2	Ring	6	Reducer 1/2" or 3/4"
3	Washer	7	Braid
4	Slip Nut	8	Plastic Cap

BRACKET ASSEMBLY



NO.	DESCRIPTION	NO.	DESCRIPTION
1	24" or 48" Support Bar	4	Hex Screw
2	Center Bracket Assembly	5	Wing Bolt
3	Clamp		

MATERIAL SPECIFICATIONS

Corrugated Flexible Hose: SS304	Support Bar: G90 Galvanized Steel
SEAL: EPDM	Clamp and Center Bracket Assembly: G90 Galvanized Steel
SLIP NUT AND NIPPLE: Zinc-Plated Carbon Steel	Hex Screw and Wing Bolts: Zinc-Plated Carbon Steel
Slip Nut and Nipple: Zinc-Plated Carbon Steel	Optional Tamper-Resistant Screw: Zinc-Plated Carbon Steel
BRAID AND BRAID RING: SS304	

FRICTION LOSS DATA

UNBRAIDED HOSE UL LISTED

MODEL	INLET & OUTLET SIZE NPT INCH	LENGTH INCH (mm)	NUMBER OF 90 DEGREE BENDS	UL LISTED – UNBRAIDED HOSE MAXIMUM EQUIVALENT LENGTH OF SCH 40 1 INCH DIAMETER PIPE (C=120), FT
SFN28H	1 x 1/2	28" (700mm)	2	22
SFN28T	1 x 3/4	28" (700mm)	2	28
SFN40H	1 x 1/2	40" (1000mm)	3	39
SFN40T	1 x 3/4	40" (1000mm)	3	54
SFN48H	1 x 1/2	48" (1200mm)	3	56
SFN48T	1 x 3/4	48" (1200mm)	3	63
SFN59H	1 x 1/2	59" (1500mm)	3	59
SFN59T	1 x 3/4	59" (1500mm)	3	74
SFN71H	1 x 1/2	71" (1800mm)	3	67
SFN71T	1 x 3/4	71" (1800mm)	3	74

*Series SFN models are unbraided/Series SFB models are braided
*Unbraided hoses are UL Listed
*Braided hoses are FM Approved

BRAIDED HOSE FM APPROVED AND UL LISTED

MODEL	INLET & OUTLET SIZE NPT INCH	LENGTH INCH (mm)	NUMBER OF 90 DEGREE BENDS	UL–BRAIDED HOSE MAXIMUM EQUIVALENT LENGTH OF SCH 40 1 INCH DIAMETER PIPE (C=120), FT	FM–BRAIDED HOSE MAXIMUM EQUIVALENT LENGTH OF SCH 40 1 INCH DIAMETER PIPE (C=100), FT
SFB28H	1 x 1/2	28" (700mm)	2	22	18.6
SFB28T	1 x 3/4	28" (700mm)	2	28	18.8
SFB40H	1 x 1/2	40" (1000mm)	3	39	24.6
SFB40T	1 x 3/4	40" (1000mm)	3	54	24.8
SFB48H	1 x 1/2	48" (1200mm)	3	56	28.5
SFB48T	1 x 3/4	48" (1200mm)	3	63	28.7
SFB59H	1 x 1/2	59" (1500mm)	3	59	34.4
SFB59T	1 x 3/4	59" (1500mm)	3	74	34.6
SFB71H	1 x 1/2	71" (1800mm)	3	67	40.4
SFB71T	1 x 3/4	71" (1800mm)	3	74	40.6

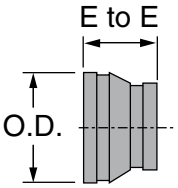
BRAIDED HOSE WITH ELBOW - FM APPROVED

MODEL	INLET & OUTLET SIZE NPT INCH	LENGTH INCH (mm)	NUMBER OF 90 DEGREE BENDS	FM–BRAIDED HOSE MAXIMUM EQUIVALENT LENGTH OF SCH 40 1 INCH DIAMETER PIPE (C=120), FT
SFB28H – E	1 x 1/2	28" (700mm)	2	20.6
SFB28T – E	1 x 3/4	28" (700mm)	2	20.8
SFB40H – E	1 x 1/2	40" (1000mm)	3	26.6
SFB40T – E	1 x 3/4	40" (1000mm)	3	26.8
SFB48H – E	1 x 1/2	48" (1200mm)	3	30.5
SFB48T – E	1 x 3/4	48" (1200mm)	3	30.7
SFB59H – E	1 x 1/2	59" (1500mm)	3	36.4
SFB59T – E	1 x 3/4	59" (1500mm)	3	36.6
SFB71H – E	1 x 1/2	71" (1800mm)	3	42.4
SFB71T – E	1 x 3/4	71" (1800mm)	3	42.6

139A Charles Street #313
Boston, MA 02114
TOLL FREE / 800-463-1276
FAX / 888-502-3775
sprinkflex@gmail.com

www.sprinkflex.com

FIG. R-1 Concentric Reducer



R-1 CONCENTRIC REDUCER

Nominal Size	End to End	Approx. Wt. Ea.	Nominal Size	End to End	Approx. Wt. Ea.	Nominal Size	End to End	Approx. Wt. Ea.
In./DN(mm)	*In./mm*	*Lbs./Kg*	*In./DN(mm)*	*In./mm*	*Lbs./Kg*	*In./DN(mm)*	*In./mm*	*Lbs./Kg*
1¼ x 1 *32 x 25*	3⁵⁄₁₆ *84*	0.85 *0.4*	5 x 1 *125 x 25*	– –	4.8 *2.2*	10 x 2 *250 x 50*	– –	16.4 *7.4*
1½ x 1 *40 x 25*	3⁵⁄₁₆ *84*	0.73 *0.3*	5 x 1¼ *125 x 32*	– –	4.8 *2.2*	10 x 2½ *250 x 65*	– –	16.4 *7.4*
1½ x 1¼ *40 x 32*	3⁵⁄₁₆ *84*	1.0 *0.4*	5 x 1½ *125 x 40*	3½ *89*	4.8 *2.2*	10 x 3 *250 x 80*	– –	16.4 *7.4*
2 x 1 (d) *50 x 25*	3⁵⁄₁₆ *84*	0.7 *0.3*	5 x 2 *125 x 50*	3½ *89*	4.8 *2.2*	10 x 4 *250 x 100*	6 *152*	16.4 *7.4*
2 x 1¼ (d) *50 x 32*	3⁵⁄₁₆ *84*	0.8 *0.4*	5 x 2½ *125 x 65*	3½ *89*	4.8 *2.2*	10 x 5 *250 x 125*	6 *152*	16.4 *7.4*
2 x 1½ (d) *50 x 40*	3⁵⁄₁₆ *84*	0.8 *0.4*	5 x 3 *125 x 80*	3½ *89*	4.8 *2.2*	10 x 6 *250 x 150*	6 *152*	16.4 *7.4*
2½ x 1 *65 x 25*	3⁵⁄₁₆ *84*	1.5 *0.7*	5 x 4 *125 x 100*	3½ *89*	4.8 *2.2*	10 x 8 (d) *250 x 200*	6 *152*	23.1 *10.5*
2½ x 1¼ *65 x 32*	3⁵⁄₁₆ *84*	1.5 *0.7*	6 x 1 *150 x 25*	– –	7.5 *3.4*	10 x 4 *250 x 100*	6 *152*	16.4 *7.4*
2½ x 1½ *65 x 40*	3⁵⁄₁₆ *84*	1.5 *0.7*	6 x 1½ *150 x 40*	– –	7.5 *3.4*	10 x 5 *250 x 125*	6 *152*	16.4 *7.4*
2½ x 2 *65 x 50*	3⁵⁄₁₆ *84*	1.9 *0.9*	6 x 2 (d) *150 x 50*	4 *102*	6.3 *2.9*	10 x 6 *250 x 150*	6 *152*	16.4 *7.4*
3 x 1 *80 x 25*	3⁵⁄₁₆ *84*	2.4 *1.1*	6 x 2½ *150 x 65*	4 *102*	5.1 *2.3*	10 x 8 (d) *250 x 200*	6 *152*	23.1 *10.5*
3 x 1¼ *80 x 32*	3⁵⁄₁₆ *84*	2.4 *1.1*	6 x 3 (d) *150 x 80*	4 *102*	4.3 *1.9*	12 x 1 *300 x 25*	– –	19.0 *8.6*
3 x 1½ *80 x 40*	3⁵⁄₁₆ *84*	2.4 *1.1*	6 x 4 (d) *150 x 100*	4 *102*	6.3 *2.9*	12 x 2 *300 x 50*	– –	19.0 *8.6*
3 x 2 (d) *80 x 50*	3⁵⁄₁₆ *84*	1.4 *0.6*	6 x 5 *150 x 125*	4 *102*	7.5 *3.4*	12 x 2½ *300 x 65*	– –	19.0 *8.6*
3 x 2½ (d) *80 x 65*	3⁵⁄₁₆ *84*	1.5 *0.7*	8 x 1½ *200 x 40*	– –	9.1 *4.1*	12 x 3 *300 x 80*	– –	19.0 *8.6*
4 x 1 *100 x 25*	3⁄₈ *86*	3.2 *1.5*	8 x 2 *200 x 50*	5 *127*	9.1 *4.1*	12 x 4 *300 x 100*	7 *178*	19.0 *8.6*
4 x 1¼ *100 x 32*	3⁄₈ *86*	3.2 *1.5*	8 x 2½ *200 x 65*	5 *127*	9.1 *4.1*	12 x 5 *300 x 125*	7 *178*	19.0 *8.6*
4 x 1½ (d) *100 x 40*	3⁄₈ *86*	2.7 *1.2*	8 x 3 (d) *200 x 80*	5 *127*	9.2 *4.2*	12 x 6 *300 x 150*	7 *178*	19.0 *8.6*
4 x 2 (d) *100 x 50*	3⁄₈ *86*	2.5 *1.1*	8 x 4 (d) *200 x 100*	5 *127*	9.8 *4.4*	12 x 8 *300 x 200*	7 *178*	19.0 *8.6*
4 x 2½ (d) *100 x 65*	3⁄₈ *86*	3.2 *1.5*	8 x 5 *200 x 125*	5 *127*	9.1 *4.1*	12 x 10 *300 x 250*	7 *178*	19.0 *8.6*
4 x 3 (d) *100 x 80*	3 *76*	2.6 *1.2*	8 x 6 (d) *200 x 150*	5 *127*	12.0 *5.4*			
4 x 3½ *100 x 90*	– –	1.0 *0.4*	10 x 1½ *250 x 40*	– –	16.4 *7.4*			

(d)=Ductile Iron all others are fabricated.

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

LPS 1219: Issue 3.1
Cert/LPCB ref. 519a/26

MATERIAL SPECIFICATIONS

CAST FITTINGS:
Ductile Iron conforming to ASTM-A536, Grade 65-45-12

FABRICATED FITTINGS:
1"- 10" Carbon Steel, Schedule 40, conforming to ASTM A-53, Grade B

12" Carbon Steel, Standard Wall, conforming to ASTM A-53, Grade B

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

O.D. CHART

Nominal Size	O.D.	Nominal Size	O.D.	Nominal Size	O.D.
In./DN(mm)	*In./mm*	*In./DN(mm)*	*In./mm*	*In./DN(mm)*	*In./mm*
1 *25*	1.315 *33.4*	3 *80*	3.500 *88.9*	6 *150*	6.625 *168.3*
1¼ *32*	1.660 *42.2*	3½ *90*	4.000 *101.6*	8 *200*	8.625 *219.1*
1½ *40*	1.900 *48.3*	4 *100*	4.500 *114.3*	10 *250*	10.750 *273.1*
2 *50*	2.375 *60.3*	5 *125*	5.563 *141.3*	12 *300*	12.750 *323.9*
2½ *65*	2.875 *73.0*				

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

Grinnell®

Worldwide Contacts | www.tyco-fire.com

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

General Description

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

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

NOTICE

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

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

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

The owner is responsible for maintaining their mechanical system and devices in proper operating condition.

IMPORTANT

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

The installing contractor or device manufacturer should be contacted with any questions.

Technical Data

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

Refer to Table A for details.

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

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

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

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

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

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

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

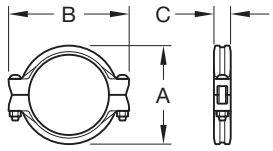
LPS 1219 Cert/LPCB ref. 921a/02

For Fire Protection pressure rating, listing, and approval information, contact your TYCO Representative.

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

  For dry and freezer systems, lubrication is required. Refer to Installation Manual IH-1000FP for details.
- Tri-Seal Grade "E" EPDM, Green color code, -30°F to 230°F (-34°C to 110°C)

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



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

a. Maximum available gap between pipe ends. Minimum gap = 0.
b. Maximum Pressure and End Load are total from all loads based on standard weight steel pipe. Pressure ratings and end loads may differ for other pipe materials and/or wall thickness. Contact your TYCO Representative.
c. Gold color coded metric bolts and nuts are available upon request.
d. Max End Gap is for cut grooved standard weight pipe.
e. For 10 in. and 12 in. sizes where VdS Approval is required, refer to Figure 772, Technical Data Sheet G140.

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

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

Pipe O.D. mm	Pipe Specification[c]	Pressure Rating psi (bar)	
		UL	FM
76,1	ISO 4200 Type F	300 (20,7)	350 (24,1)
	ISO 4200 Type D and E	300 (20,7)	300 (20,7)
	EN 10255 Heavy	300 (20,7)	300 (20,7)
	EN 10255 Medium	300 (20,7)	300 (20,7)
139,7	ISO 4200 Type D, E, and F	300 (20,7)	300 (20,7)
	EN 10255 Heavy	300 (20,7)	300 (20,7)
	EN 10255 Medium	300 (20,7)	300 (20,7)
165,1	EN 10255 Heavy	300 (20,7)	300 (20,7)
	EN 10255 Medium	300 (20,7)	300 (20,7)

Pipe Sizes Nominal ANSI Inches (O.D. mm)	Pipe Specification[d]	Pressure Rating psi (bar)	
		LPCB	VdS
1 (33,7); 1-1/4 (42,4); 1-1/2 (48,3); 2 (60,3); — (76,1); 3 (88,9); 4 (114,3); — (165,1)	ISO 65 Medium	290 (20)	—
6 (168,3); 8 (219,1); 10 (273,0); 12 (323,9)	ISO 4200 Wall Thickness 5,4 mm	290 (20)	—
1 (33,7); 1-1/4 (42,4); 1-1/2 (48,3); 2 (60,3); — (76,1); 3 (88,9); 4 (114,3); — (139,7); 6 (168,3); 8 (219,1)	DIN 2448 or 2548	—	232 (16)

a. For 8 in. and 10 in. sizes, minimum allowed pipe wall thickness is 0.188 in.
b. For 12 in., Schedule 30 is minimum allowed pipe wall thickness by UL and ULC. 0.250 inch wall thickness is the minimum allowed by FM
c. See Agency website for Listing/Approvals of other pipe specifications:
UL website - see Online Certificate Directory, www.ul.com
FM Global website - www.approvalguide.com
d. See Agency website for Listing/Approvals of other pipe specifications:
LPCB website - see Search Our Listings - Automatic Sprinklers, Water Spray and Deluge Systems, www.redbooklive.com
VdS website - see certifications, www.vds.de

TABLE A
LISTED/APPROVED PRESSURE RATINGS

Care and Maintenance

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

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

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

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

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

Limited Warranty

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

Ordering Procedure

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

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

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

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

Johnson Controls

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

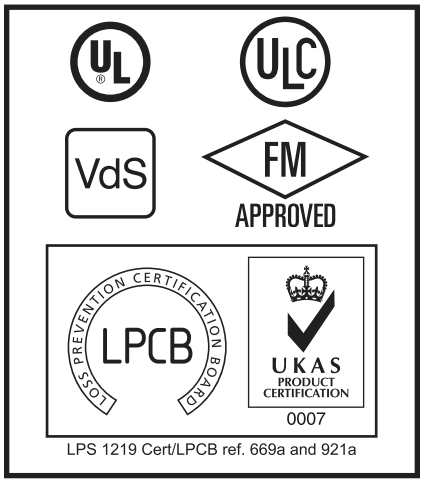
Protective Coatings
- Non-lead orange paint (USA)
- RAL red or non-lead paint (EMEA and APAC)
- Hot dipped galvanized conforming to ASTM A153

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.

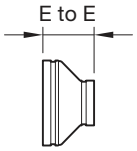


FIGURE 250
CAST CONCENTRIC
REDUCER

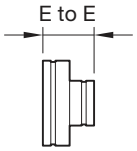


FIGURE 350
FABRICATED CONCENTRIC
REDUCER

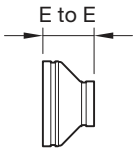


FIGURE 550(1)
CAST CONCENTRIC
REDUCER

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.

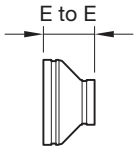


FIGURE 250
CAST CONCENTRIC REDUCER

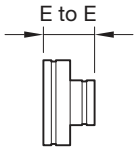


FIGURE 350
FABRICATED CONCENTRIC REDUCER

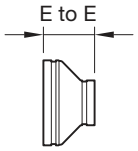


FIGURE 550 (1)
CAST CONCENTRIC REDUCER

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

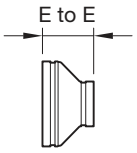


FIGURE 250
CAST CONCENTRIC
REDUCER

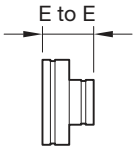


FIGURE 350
FABRICATED CONCENTRIC
REDUCER

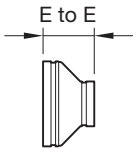


FIGURE 550 (1)
CAST CONCENTRIC
REDUCER

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)

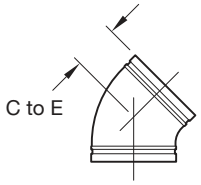


FIGURE 501
CAST 45° ELBOW

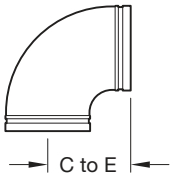


FIGURE 510
CAST 90° ELBOW

FIGURE 2
FIGURES 501 AND 510 ELBOWS
NOMINAL DIMENSIONS

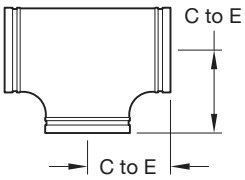


FIGURE 519
CAST TEE

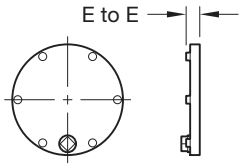


FIGURE 260[1]
CAST END CAP

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)

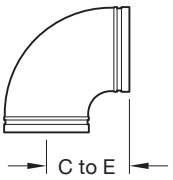


FIGURE 510S
90° ELBOW
SHORT PATTERN

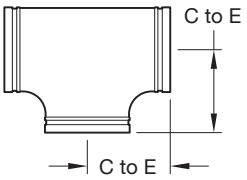
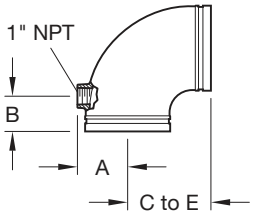


FIGURE 519S
TEE
SHORT PATTERN

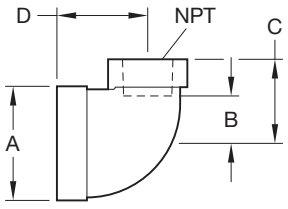
FIGURE 4
FIGURES 510S ELBOW AND FIGURE 519S TEE
NOMINAL DIMENSIONS



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.

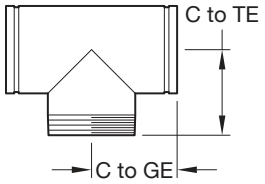


FIGURE 7
FIGURE 320 FABRICATED GROOVE X GROOVE X MALE THREAD TEES (SEGMENT WELDED) NOMINAL DIMENSIONS

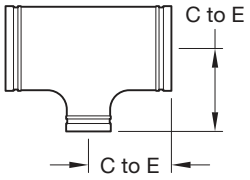


FIGURE 221
CAST TEE REDUCING
GROOVED
(SEGMENT WELDED)

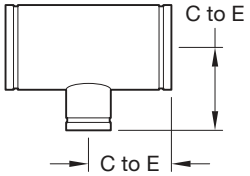


FIGURE 321
FABRICATED TEE REDUCING
GROOVED
(SEGMENT WELDED)

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

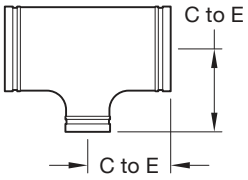


FIGURE 221
CAST TEE REDUCING
GROOVED
(SEGMENT WELDED)

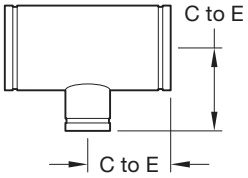


FIGURE 321
FABRICATED TEE REDUCING
GROOVED
(SEGMENT WELDED)

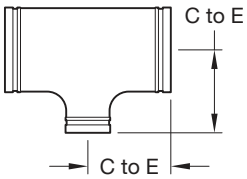


FIGURE 221
CAST TEE REDUCING
GROOVED
(SEGMENT WELDED)

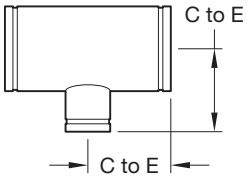


FIGURE 321
FABRICATED TEE REDUCING
GROOVED
(SEGMENT WELDED)

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.

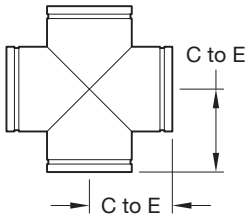


FIGURE 327[1] FABRICATED CROSS GROOVED (SEGMENT WELDED)

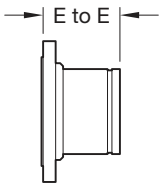
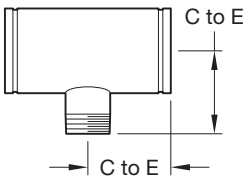


FIGURE 341[1] FABRICATED FLANGE ADAPTER ANSI CLASS 150 LBS. GROOVED

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

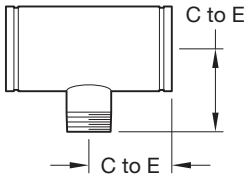


Nominal Pipe Size		Nominal C to E Inches (mm)	Approx. Weight Lbs. (kg)
ANSI Inches (DN)	O.D. Inches (mm)		
2 x 2 x 3/4 (50 x 50 x 20)	2.37 x 2.37 x 1.05 (60,3 x 60,3 x 26,7)	3.25 (82,6)	2.0 (0,9)
2 x 2 x 1 (50 x 50 x 25)	2.37 x 2.37 x 1.31 (60,3 x 60,3 x 33,4)	3.25 (82,6)	2.2 (1,0)
2 x 2 x 1-1/4 (50 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.

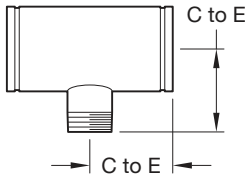
FIGURE 10 (1 OF 3)
FIGURE 323 FABRICATED GROOVE X GROOVE X MALE THREAD REDUCING TEES (SEGMENT WELDED) NOMINAL DIMENSIONS

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.

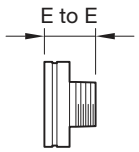
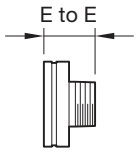


FIGURE 11 (1 OF 2)
FIGURE 372 FABRICATED CONCENTRIC REDUCER GROOVE X MALE THREAD (MPT)
NOMINAL DIMENSIONS

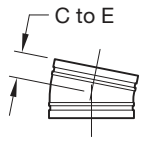


Nominal Pipe Size		E to E Inches (mm)	Approx. Weight Lbs. (kg)
ANSI Inches (DN)	Pipe O.D. Inches (mm)		
4 x 3 (100 x 80)	4.50 x 3.50 (114,3 x 88,9)	3.00 (76,2)	2.6 (1,2)
5 x 4 (125 x 100)	5.56 x 4.50 (141,3 x 114,3)	3.50 (88,9)	4.5 (2,0)
165mm x 1 (150 x 25)	6.50 x 1.31 (165,1 x 33,4)	4.00 (101,6)	1.2 (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)

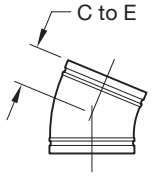
a. Figure 372 not available for the EMEA market.

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

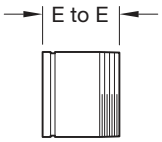


FIGURE 391[1]
FABRICATED
ADAPTER NIPPLE
GROOVE X MALE THREAD
(MA)

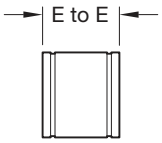


FIGURE 392[1]
FABRICATED
ADAPTER NIPPLE
GROOVE X GROOVE

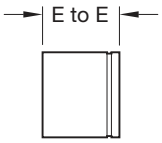


FIGURE 393[1]
FABRICATED
ADAPTER NIPPLE
GROOVE X PLAIN

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.

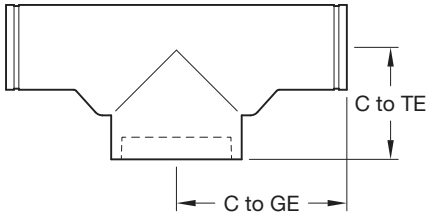


FIGURE 14
FIGURE 507/50L FABRICATED BULLHEAD TEE
NOMINAL DIMENSIONS

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.

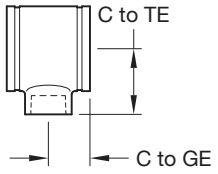


FIGURE 15
FIGURE 328 FABRICATED STANDPIPE TEE
NOMINAL DIMENSIONS

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

Johnson Controls

FIRE PROTECTION EQUIPMENT SUBMITTAL

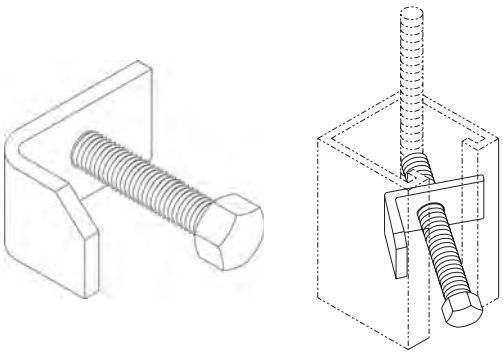
PRECISION FIRE SYSTEMS, INC.

790 Monroe Road
Sanford, Florida 32771
321-363-1560

Hangers

Fig. 98 - Rod Stiffener

Component of State of California OSHPD Approved Seismic Restraints System



Size Range — Secures 3/8" thru 7/8" hanger rod

Material — Carbon Steel

Function — Secures channel to hanger rod for vertical seismic bracing.

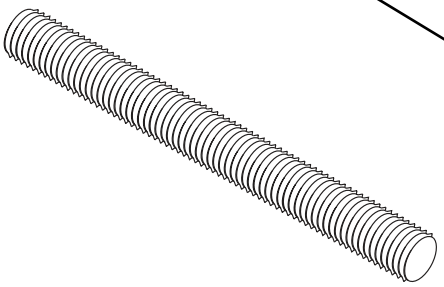
Approvals — Included in our Seismic Restraints Catalog approved by the State of California Office of Statewide Health Planning and Development (**OSHPD**). For additional load, spacing and placement information relating to OSHPD projects, please refer to the TOLCO Seismic Restraint Systems Guidelines

Finish — Electro Galvanized

Note — Available in HDG finish or Stainless Steel materials.

Order By — Figure number

Fig. 99 - All Thread Rod Cut to Length



Size Range — Secures 3/8" thru 7/8" rod in 1" increments

Material — Carbon Steel

Maximum Temperature — 750°F

Finish — Plain

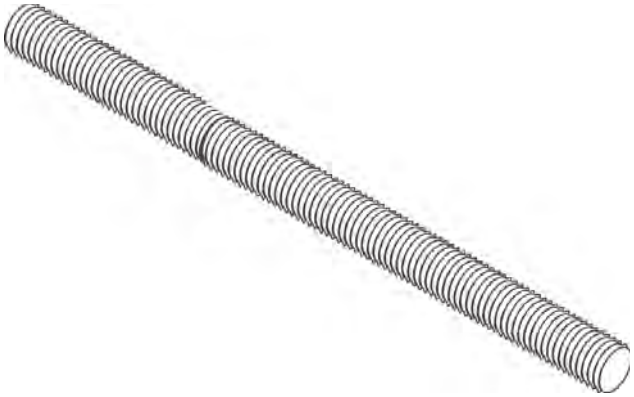
Note — Available in Electro-Galvanized and HDG finish or Stainless Steel materials.

Order By — Figure number, rod diameter, rod length and finish

Dimensions

Rod Size	Max. Rec. Load Lbs. For Service Temps 650°F	750°F
3/8	610	540
1/2	1130	1010
5/8	1810	1610
3/4	2710	2420
7/8	3770	3360

Fig. 100 - All Thread Rod Full Lengths



Size Range — Secures 3/8" thru 1½" rod in 10' lengths

Material — Carbon Steel

Maximum Temperature — 750°F

Finish — Plain

Note — Available in Electro-Galvanized and HDG finish or Stainless Steel materials.

Order By — Figure number, rod diameter and finish

Dimensions • Weights

Rod Size	Max Rec. Load Lbs. For Service Temps 650°F	750°F	Approx. Wt./100
1/4	240	215	12
3/8	730	540	29
1/2	1350	1010	53
5/8	2160	1610	84
3/4	3230	2420	123
7/8	4480	3360	169
1	5900	4420	222
1¼	9500	7140	360
1½	13800	10370	510

OFFICE/MANUFACTURING FACILITY • 1375 SAMPSON AVE. • CORONA, CA 92879 • PH: 951.737.5599 • FAX: 951.737.0330
CUSTOMER SERVICE • 800.786.5266
www.tolco.com

CADDY®

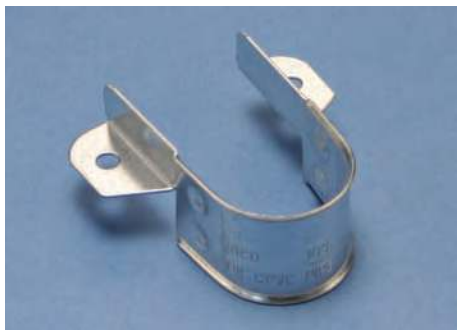
STRAP HANGERS For CPVC Piping

Features

- Available for 3/4" – 2" CPVC Pipe
- Dimples secure hanger to pipe during installation (#108 and #109)
- #10 x 1 hex head cap screws included
- Flared edges help protect the CPVC pipe
- UL® Listed
- Comply with the static load requirements of NFPA® 13
- Suitable for fire protection installations
- SO type eliminates spacers or backup blocks
- Easy installation

CPVC Fixing 107

CPVC Fixing 108

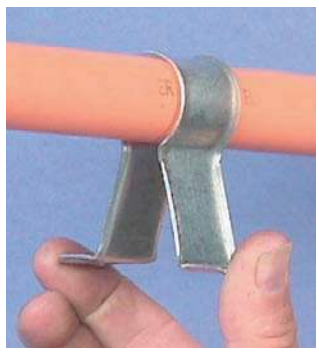


CPVC Fixing 109

CPVC Fixing SO

CADDY® Strap Hangers from ERICO® provide a time saving and safer application method to mount CPVC pipes. There are different models for applications – beside, below or on top of beams or when mounting from the side of the beam is required. A stand-off version provides a 1-1/2" offset from the vertical face of structural wood or composite wood joists with a minimum 3/8" web thickness.

1. Snap strap over CPVC pipe.



2. Squeeze strap back around pipe. (NOTE: Pipe must be allowed to move freely.)

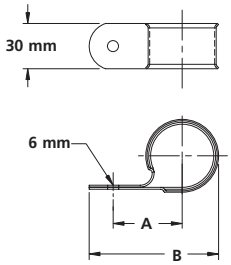
3. Fasten the strap to the vertical face of the wood surface using the two screws provided (#10 x 1" long, with 5/16" hex cap screws).

ERICO®

CADDY®

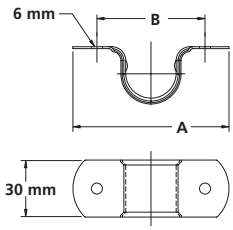
STRAP HANGERS For CPVC Piping

CPVC Fixing 107



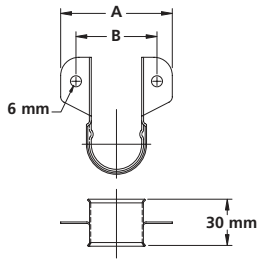
One-hole Wrap Around Strap for CPVC Pipe

CPVC Fixing 108



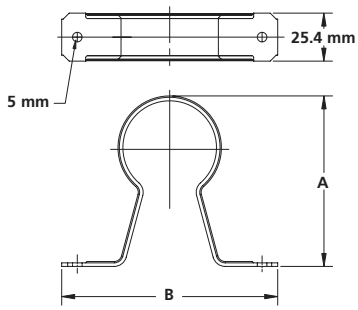
Two-hole Strap for CPVC Pipe

CPVC Fixing 109



Side Mount Strap for CPVC Pipe

CPVC Fixing SO



Stand-off Two-hole Strap for CPVC Pipe

Part Number	Description	Finish	Box Quantity	A	B	Max. Hanger Spacing
597811	Stand-Off 2-Hole Strap for 3/4" CPVC Pipe	P1	100	68,3 mm	82,6 mm	1,7 m
597812	Stand-Off 2-Hole Strap for 1" CPVC Pipe	P1	100	74,6 mm	82,6 mm	1,8 m
597813	Stand-Off 2-Hole Strap for 1-1/4" CPVC Pipe	P1	100	84,1 mm	82,6 mm	2,0 m
597814	Stand-Off 2-Hole Strap for 1-1/2" CPVC Pipe	P1	100	90,5 mm	114,3 mm	2,1 m
597815	Stand-Off 2-Hole Strap for 2" CPVC Pipe	P1	100	103,2 mm	127 mm	2,4 m
597816	#107 Wrap Around Strap CPVC 3/4"	P1	100	31,8 mm	60,3 mm	1,7 m
597817	#107 Wrap Around Strap CPVC 1"	P1	100	36,5 mm	68,3 mm	1,8 m
597818	#107 Wrap Around Strap CPVC 1-1/4"	P1	100	41,3 mm	77,8 mm	2,0 m
597819	#107 Wrap Around Strap CPVC 1-1/2"	P1	100	44,5 mm	84,1 mm	2,1 m
597821	#107 Wrap Around Strap CPVC 2"	P1	100	47,6 mm	93,7 mm	2,4 m
597822	#108 Two-Hole Strap CPVC 3/4"	P1	100	82,6 mm	57,2 mm	1,7 m
597823	#108 Two-Hole Strap CPVC 1"	P1	100	88,9 mm	63,5 mm	1,8 m
597824	#108 Two-Hole Strap CPVC 1-1/4"	P1	100	108,0 mm	82,6 mm	2,0 m
597825	#108 Two-Hole Strap CPVC 1-1/2"	P1	100	123,8 mm	87,3 mm	2,1 m
597826	#108 Two-Hole Strap CPVC 2"	P1	100	125,4 mm	100,0 mm	2,4 m
597827	#109 Side Mount Strap CPVC 3/4"	P1	100	58,7 mm	42,9 mm	1,7 m
597828	#109 Side Mount Strap CPVC 1"	P1	100	66,7 mm	49,2 mm	1,8 m
597829	#109 Side Mount Strap CPVC 1-1/4"	P1	100	74,4 mm	58,7 mm	2,0 m
597831	#109 Side Mount Strap CPVC 1-1/2"	P1	100	81,0 mm	63,5 mm	2,1 m
597832	#109 Side Mount Strap CPVC 2"	P1	100	92,1 mm	76,2 mm	2,4 m

Phone: 00 800 5000 1090
www.erico.com

ERICO®

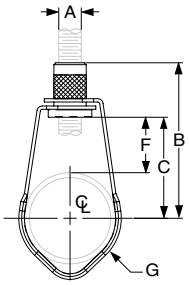
Fig. 69 Adjustable Swivel Ring, Tapped Per NFPA Standards

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: 450° F
Approvals: Complies with Federal Specification A-A-1192A (Type 10), *WW-H-171-E (Type 10)*, and ANSI/MSS SP-58 (Type 10). UL Listed and FM Approved (Sizes 3/4" - 8").
Features:

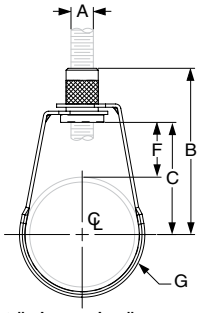
- 1/2" - 2" sizes designed for use with steel and CPVC piping and manufactured with FBC System Compatible oil.
- Threads are countersunk so that they cannot become burred or damaged.
- Knurled swivel nut provides vertical adjustment after piping is in place.
- Captured swivel nut in the 1/2" through 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.
Non-captured nut also available upon request.

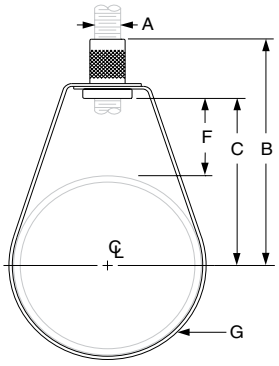
1/2" through 2" Size
Rounded Edge Design



1/2" through 1" pipe



1 1/4" through 2" pipe



2 1/2" through 8" pipe

c UL us LISTED FM APPROVED

2 1/2" through 8" Size

FIG. 69: LOADS (LBS) • WEIGHT (LBS) • DIMENSIONS (IN)

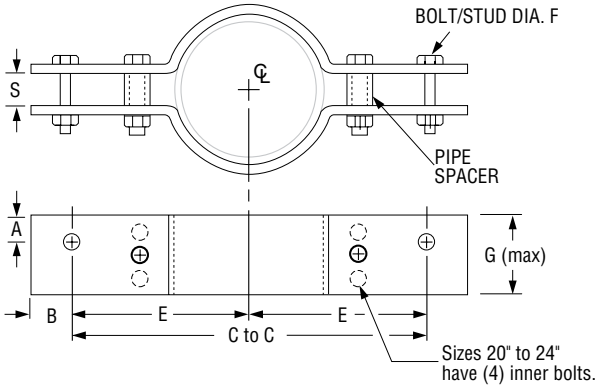
Pipe Size	Max Load	Weight	Rod Size A	B	C	F	G Width
1/2	300	0.10	3/8	2 7/8	2	1 9/16	5/8
3/4		0.10		2 3/4	1 7/8	1 5/16	
1		0.10		2 9/16	1 11/16	1	
1 1/4		0.10		2 5/8	1 3/4	7/8	
1 1/2		0.10		2 3/4	1 7/8		
2		0.11		3 1/4	2 3/8	1 1/8	
2 1/2	525	0.20		4	2 3/4	1 5/16	3/4
3		0.20		3 13/16	2 15/16	1 3/16	
4	650	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 9/16	7 9/16	3 1/4	

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

Fig. 40

Riser Clamp – Standard

Size Range: 2" through 24"
Material: Carbon steel (CS), Alloy (A), or Stainless Steel (SS)
Finish: ☐ Plain or ☐ Hot-Dip Galvanized with Zinc Plated Fasteners
Maximum Temperature: Galvanized 450° F, 650° F (CS), 950° F (A) and 1,000° F (SS)
Service: Riser clamps are used for the support of vertical piping. Load is carried by shear lugs which are welded to the pipe. Shear lugs provided upon request. Local pipe wall stress evaluation available upon request.
Approvals: Complies with Federal Specification A-A-1192A (Type 42), ANSI/MSS SP-69 and MSS SP-58 (Type 42).
Ordering: Specify pipe size, material, figure number, name and finish.
Note: If different loads or dimensions are required, refer to Fig. 40 SD special design riser clamp.



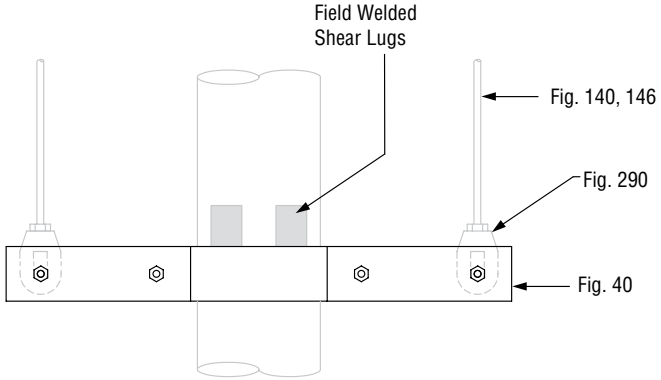


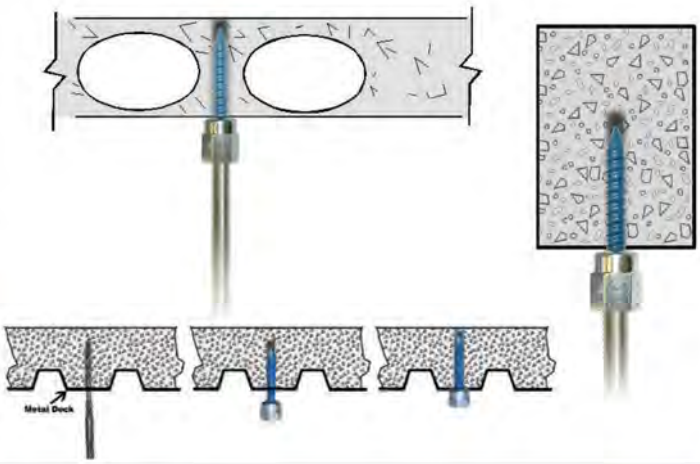
FIG. 40: LOADS (LBS) • WEIGHT (LBS) • DIMENSIONS (IN)

Pipe Size	Max Load		C-C	E	F (max)	G (max)	S	A (CS)	A (alloy) (SS)	B (max)	Maximum Weight Each		
	Rigid Assembly	Spring Assembly									CS	SS	Alloy
2	900	1,800	18	9	½	2½	¾	1¼	⅞	2	18	15	18
2½			20	10							20	20	20
3	1,500	3,000			⅝	3		1½			30	25	30
4	2,200	4,400	22	11	¾				1⅛		40	40	44
5						4		2			45	40	45
6	3,000	6,000	24	12	⅞		1	⅞	1¼		60	60	73
8			27	13½		5					82	82	82
10	5,500	11,000	30	15	1¼	6	1½	1¼	1⅝	3	157	157	157
12	7,800	15,600	32	16	1½	7	1¾	1⅜	1⅞		216	202	250
14			34	17					1⅜		228	228	263
16	9,000	18,000	36	18		8	2	1½	2		314	277	315
18			39	19½		9					338	338	377
20	13,500	27,000	42	21	2	10	2½	2⅝	2⅝	4¼	525	525	580
24			45	22½		11					621	565	681

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

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.
- Manufactured 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.
- Manufactured 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

MANUFACTURED 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.

FIRE PROTECTION EQUIPMENT SUBMITTAL

PRECISION FIRE SYSTEMS, INC.

790 Monroe Road
Sanford, Florida 32771
321-363-1560

Fire Stopping

3M™ Fire Barrier Sealant IC 15WB+

Product Data Sheet

FIRE BARRIER
UP TO 3 HOUR Fire Protection

SMOKE SEAL
L RATED Meets Optional L Requirements

SOUND BARRIER
STC 54 In STC 54-rated wall assembly

CLASSIFIED UL

FILL, VOID, OR CAVITY
FOR USE IN JOINT SYSTEMS,
THROUGH-PENETRATION FIRESTOP SYSTEMS
AND PERIMETER CONTAINMENT SYSTEMS
SEE UL FIRE RESISTANCE DIRECTORY
90G9

LISTED
ULC LISTED
FILL, VOID OR CAVITY
MATERIALS
90G9

LISTED
C Intertek US
FIRESTOP SYSTEMS
SEE INTERTEK DIRECTORY

1. Product Description

3M™ Fire Barrier Sealant IC 15WB+ is a cost-effective, one-part, gun-grade, latex-based, intumescent firestop sealant that dries to form a monolithic firestop seal that also acts as a barrier to airborne sound transmission. 3M™ Fire Barrier Sealant IC 15WB+ firestops through penetrations passing through fire-rated floor, floor/ceiling or wall assemblies, as well as other fire-rated interior building partitions and assemblies (e.g. static construction joints or blank openings). In addition, the unique intumescent property of this material allows 3M™ Fire Barrier Sealant IC 15WB+ to expand and help maintain a firestop penetration seal for up to 3 hours as penetrants are exposed to fire. 3M™ Fire Barrier Sealant IC 15WB+ bonds to most construction substrates, including: gypsum wallboard, concrete, metals, wood, plastic and cable jacketing. No mixing is required.

FBC SYSTEM COMPATIBLE

Cost-effective firestop sealant available in tube, pail or sausage.

Product Color: Yellow.

Product Features

- Firestop tested up to 3 hours in accordance with ASTM E 814 (UL 1479), ASTM E 1966 (UL 2079) & CAN/ULC-S115
- Expanded fire protection systems
- Helps minimize sound transfer*
- Sag-resistant
- Halogen-free
- Excellent adhesion
- Re-enterable/repairable
- Excellent caulk rate
- Paintable
- Water clean up

Complies with the intent of LEED® NC-EQ Credit 4.1 for Low-Emitting Materials: Adhesives and Sealants, contains <250 g/L VOC contents (less H_2O and exempt solvents per SCAQMD Rule 1168).

**Minimizes noise transfer—STC-Rating of 54 when tested in STC 54-rated wall assembly.*

2. Applications

3M™ Fire Barrier Sealant IC 15WB+ is a general-purpose intumescent firestop ideal for sealing single or multiple through penetrations in fire-rated construction. 3M™ Fire Barrier Sealant IC 15WB+ is typically used in mechanical, electrical and plumbing applications to firestop openings created by the following penetrations in fire-rated floors, floor/ceilings or walls: metallic pipe, plastic pipe, conduit, power and communication cable, cable trays, busways, combos, insulated pipe and HVAC duct penetrations. 3M™ Fire Barrier Sealant IC 15WB+ is also used to firestop blank openings and static construction joints.

3. Specifications

3M™ Fire Barrier Sealant IC 15WB+ shall be a one component, ready-to-use, gun-grade, latex-based, intumescent firestop sealant capable of expanding a minimum of 3 times at 1000°F. The material shall be thixotropic and be applicable to overhead, vertical and horizontal firestops. The sealant shall be listed by independent test agencies such as UL, ULC, Intertek or FM. 3M™ Fire Barrier Sealant IC 15WB+ shall be tested to and pass the criteria of ASTM E 814 (UL 1479) Standard Test Method for Fire Tests of Penetration Firestop Systems, ASTM E 1966 (UL 2079) Standard Test Method for Fire Resistive Joint Systems and CAN/ULC-S115 Standard Method of Fire Tests of Firestop Systems. 3M™ Fire Barrier Sealant IC 15WB+ meets the requirements of the IBC, IRC, NBCC, IFC, IPC, IMC, NFPA 5000, NEC (NFPA 70) and NFPA 101.

Typically Specified MasterFormat (2004)
Section 07 84 00 – Firestopping

Related Sections
Section 07 27 00 – Air Barriers
Section 07 84 16 – Annular Space Protection
Section 07 84 43 – Fire-Resistant Joint Sealants
Section 07 86 00 – Smoke Seals
Section 07 87 00 – Smoke Containment Barriers
Section 07 92 13 – Elastomeric Joint Sealants
Section 07 92 19 – Acoustical Joint Sealants
Section 21 00 00 – Fire Suppression
Section 22 00 00 – Plumbing
Section 23 00 00 – Heating, Ventilating, and Air Conditioning (HVAC)
Section 26 00 00 – Electrical

4. Performance & Typical Physical Properties

Color:	Yellow
Application Temperature Range: (ASTM C 1299)	40° to 122°F (4° to 50°C)
Service Temperature Range:	-20° to 180°F (-28° to 82°C)
STC Acoustic Barrier: (ASTM E 90 and ASTM E 413)	54 when tested in STC 54 rated wall assembly

Surface Burning (ASTM E 84)**:** Flame Spread 5, Smoke Development 50

Hardness (ASTM D 2240 Shore A)**:**	70
Tensile Strength:	85 psi (0.59 MPa)
Volume Shrinkage (ASTM C 1241)**:**	28%
VOC Less H_2O and Exempt Solvents:	<2 g/L

Dry: Under typical conditions of 75°F (23°C) and 50% R.H., sealant becomes tack-free in about ten minutes and dry-to-touch in 30 to 60 minutes. Full dry depends upon ambient conditions and volume of sealant. Typical dry rate is approximately 1/8 inch (3 mm) per day.

Unit Volume: 10.1 fl. oz tube (298.7 ml, 18.2 $in.^3$), 20 fl. oz. sausage (591.5 ml, 36.1 $in.^3$), 27 fl. oz tube (798.5 ml, 48.7 $in.^3$), 4.5 gal. pail (17.03 L, 1039.5 $in.^3$)

5. Packaging, Storage, Shelf Life

Packaging Product packaged in cartridge or pail is enclosed in HDPE plastic containers, sausage is packaged in aluminum foil wrap.

Storage 3M™ Fire Barrier Sealant IC 15WB+ should be stored indoors in dry conditions between 40°F and 90°F (4°C and 32°C) in the original unopened package. Avoid repeated freeze / thaw exposures of the 3M™ Fire Barrier Sealant IC 15WB+ prior to installation.

Shelf Life 3M™ Fire Barrier Sealant IC 15WB+ shelf life is 12 months in original unopened containers from date of packaging when stored above 68°F (2°C).

Lot numbering (e.g. 8183AS): First digit = Last digit of year manufactured, Second to fourth digit = Julian Date, Letters = Random to distinguish between lot numbers

6. Installation Techniques

Consult a 3M Authorized Fire Protection Products Distributor / Dealer or Sales Representative for applicable UL, cUL, ULC, Intertek, FM or other third-party drawings and system details.

Preparatory Work The surface of the opening and any penetrating items should be cleaned to allow for the proper adhesion of the 3M™ Fire Barrier Sealant IC 15WB+. Ensure that the surface of the substrates are not wet and are frost free. Sealant can be installed with a standard caulking gun, pneumatic pumping equipment or it can be easily applied with a putty knife or trowel.

Installation Details Install the applicable depth of backing material, if required, as detailed within the applicable UL, cUL, ULC, Intertek, FM or other third-party listed system. Cut the end of the 3M™ Fire Barrier Sealant IC 15WB+ tube spout to achieve the desired bead width when applying. Install the applicable depth of 3M™ Fire Barrier Sealant IC 15WB+ into the opening flush with the surface of the substrate, or as detailed within the applicable listed system, at the depth for the assembly and rating that is required. Tool within 5 minutes. Clean all tools immediately after use with water.

Limitations Do not apply 3M™ Fire Barrier Sealant IC 15WB+ when surrounding temperature is than less 40°F (4°C) and in conditions where seals may be exposed to rain or water spray within 18 hours of application. Do not apply 3M™ Fire Barrier Sealant IC 15WB+ to building materials that bleed oil, plasticizers or solvent (e.g. impregnated wood, oil-based sealants, or green or partially vulcanized rubber). Do not apply 3M™ Fire Barrier Sealant IC 15WB+ to wet or frost-coated surfaces or to areas that are continuously damp or immersed in water.

7. Maintenance

No maintenance is expected to be required when installed in accordance with the applicable UL, cUL, ULC, Intertek, FM or other third-party listed system. Once installed, if any section of the 3M™ Fire Barrier Sealant IC 15WB+ is damaged, the following procedure will apply: remove and reinstall the damaged section in accordance with the applicable listed system, with a minimum 1/2 in. (12.7 mm) overlap onto the adjacent material.

8. Availability

3M™ Fire Barrier Sealant IC 15WB+ is available from 3M Authorized Fire Protection Products Distributors and Dealers. 3M™ Fire Barrier Sealant IC 15WB+ is available in 10.1 fl. oz. cartridges (3M ID 98-0400-5509-1, 12/case), 20.0 fl. oz. sausages (3M ID 98-0400-5512-5, 10/case), and 4.5 gallon pails (3M ID 98-0400-5510-9, 1/case). For additional technical and purchasing information regarding this and other 3M Fire Protection Products, please call: 1-800-328-1687 or visit www.3m.com/firestop.

9. Safe Handling Information

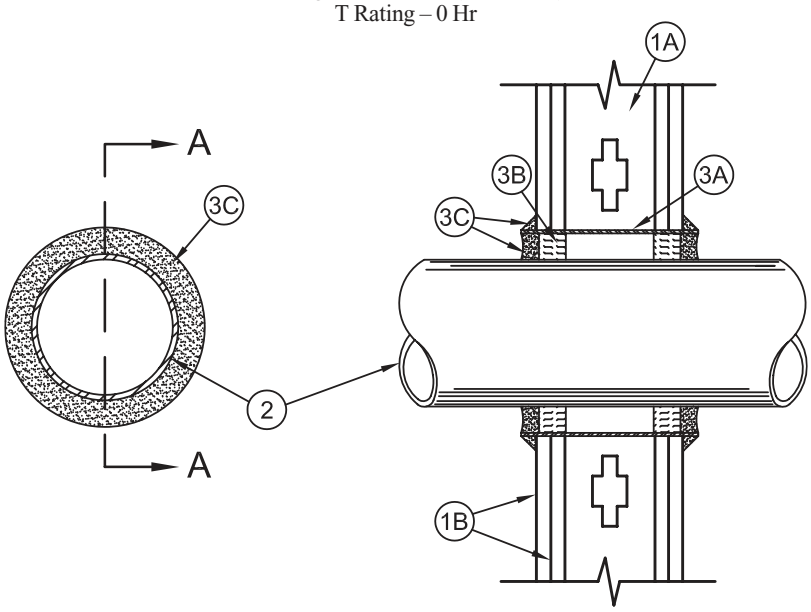
Consult country-of-use Material Safety Data Sheet (MSDS) prior to handling and disposal.

3M

Industrial Adhesives and Tapes Division
3M Center, Building 223-2N-21
St. Paul, MN 55144-1000 USA
1-800-328-1687
www.3M.com/firestop

System No. W-L-1003

February 14, 2008
F Ratings – 1 and 2 Hr (See Item 1)
T Rating – 0 Hr



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 described in the individual U300, U400 or V400 Series Wall and 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 with nom 2 by 4 in. (51 by 102 mm) lumber end plates and cross braces. Steel studs to be min 3-1/2 in. (89 mm) wide by 1-3/8 in. (35 mm) deep channels spaced max 24 in. (610 mm) OC.

   B. **Gypsum Board*** – Nom 5/8 in. (16 mm) thick, 4 ft (1.2 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, U400 or V400 Series Design in the UL Fire Resistance Directory. Max diam of opening is 15 in. (381 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 tubing to be installed either concentrically or eccentrically within the firestop system. The space between pipes, conduits or tubing and the steel sleeve (Item 3A) shall be min of 0 in. (point contact) to max 2-3/8 in. (60 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 12 in. (305 mm) diam (or smaller) Schedule 10 (or heavier) steel pipe.

   B. **Iron Pipe** – Nom 12 in. (305 mm) diam (or smaller) service weight (or heavier) cast iron soil pipe, nom 12 in. (305 mm) diam (or smaller) or Class 50 (or heavier) ductile iron pressure pipe.

   C. **Conduit** – Nom 6 in. (152 mm) diam (or smaller) steel conduit or nom 4 in. (102 mm) diam (or smaller) steel electrical metallic tubing.

   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. **Firestop System** – Installed symmetrically on both sides of wall assembly. The details of the firestop system shall be as follows.

   A. **Steel Sleeve** – Cylindrical sleeve fabricated from min 0.019 in. thick (0.48 mm) galv sheet steel and having a min 2 in. (51 mm) lap along the longitudinal seam. Length of steel sleeve to be equal to thickness of wall plus 1 to 4 in. (25 to 102 mm) such that, when installed, the ends of the sleeve will project approx 1/2 to 2 in. (13 to 51 mm) beyond the surface of the wall on both sides of the wall assembly.

   Sleeve installed by coiling the sheet steel to a diam smaller than the through opening, inserting the coil through the openings and releasing the coil to let it uncoil against the circular cutouts in the gypsum board layers.

   B. **Packing Material** – Min 1 in. (25 mm) thickness of mineral wool batt insulation firmly packed into steel sleeve on both sides of the wall assembly as permanent forms. Packing material to be recessed min 1/2 in. (13 mm) from end of steel sleeve (flush with or recessed into gypsum board surface) on both sides of wall assembly.

   B1. **Packing Material** – (Not shown) – As an alternate to Item B, nom 1 in. (25 mm) thick polyethylene backer rod may be used. The backer rod is to be recessed within the steel sleeve a min of 1 in. (25 mm) from each surface of wall.

   C. **Fill, Void or Cavity Materials*** – **Caulk or Sealant** – When mineral wool batt insulation is used, caulk or sealant applied to fill the steel sleeve to a min depth of 1/2 in. (13 mm) on both sides of wall assembly. When backer rod is used, a min thickness of 1 in. (25 mm) of caulk or sealant is required flush with both sides of wall. A nom 1/4 in. (6 mm) diam continuous bead of caulk or sealant shall be applied around the circumference of the steel sleeve at its egress from the gypsum board layers on both sides of the wall assembly.

   3M COMPANY – CP 25WB+, IC 15WB+ or FB-3000 WT

*Bearing the UL Classification Mark

FIRE PROTECTION EQUIPMENT SUBMITTAL

PRECISION FIRE SYSTEMS, INC.

790 Monroe Road
Sanford, Florida 32771
321-363-1560

Misc.

Alarm Bell

INSIST ON FPPI®

Description

The 6” and 10” Alarm Bells provide an audible notification of a sprinkler system event. Can be used to signal flow with in the sprinkler system or tampering with a monitored valve. Each bell is complete and provides 4 wire connectivity for “through” wiring to additional devices. UL Listed. Available in 120VAC or 24VDC.

Installation

Installation of the alarm bell should be performed by a qualified electrician only. Improper installation may cause electrical shock, damage or failure of one or more connected devices.

1. Remove gong.
2. Wire the bell in the circuit according to attached instructions.
3. Mount bell mechanism on 4” square standard outlet box with the striker facing down.
4. Replace gong.
5. The bell must be mounted a minimum of 8ft., above the floor, or, as close to the ceiling as possible.

MAKE SURE SOURCE POWER HAS BEEN DISCONNECTED AND “LOCKED OUT” PRIOR TO INSTALLATION AND CONNECTION OF THE ALARM BELL TO ANY DEVICE.

Use with:

Bell Back Box
02-454-00

Bell Guard
02-457-00

Bell Sign
02-057-00

Specifications

Size:	Item No:
6” 120VAC	02-452-00
10” 120VAC	02-450-00
6” 24VDC	02-452-50
10” 24VDC	02-450-50

Finish:
Red

Additional Accessories:
ABS Back Box
Wire Bell Cage
911 Bell Sign

3198 LIONSHEAD AVE
CARLSBAD, CA 92010
+ 1 (760) 599-1168
+ 1 (800) 344-1822
+ 1 (800) 344-3775 FAX

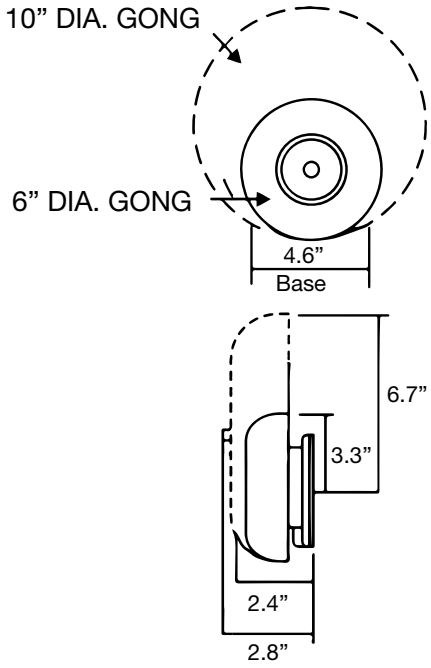
UL LISTED

Alarm Bell

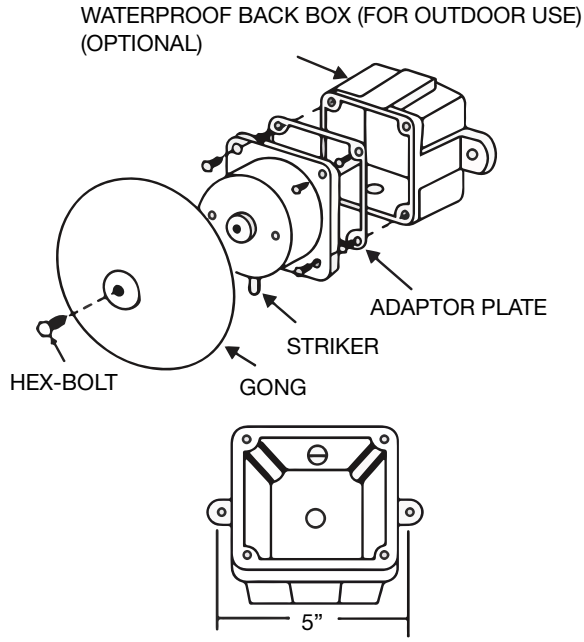
Installation Instructions

INSIST ON FPPI®

BASIC MECHANISM AND GONGS



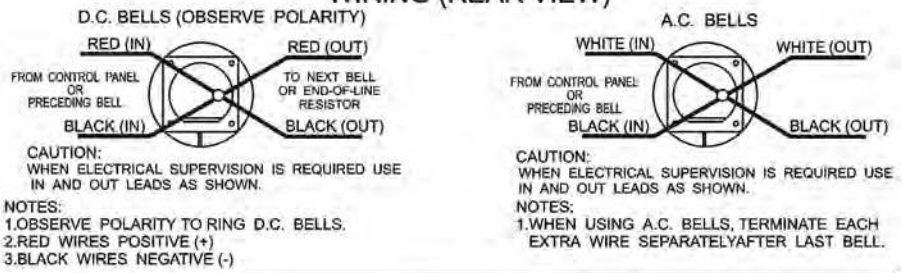
SEMI-FLUSH INSTALLATION



AUDIBLITY RATING (dB at 10FT)

MODEL	RATING	6"GONG SIZE		10"GONG SIZE	
	VOLTAGE	RATED CURRENT	SOUND LEVEL AT 10 FT dB	RATED CURRENT	SOUND LEVEL AT 10 FT dB
COIL	6VDC	250mA	95	250mA	95
	12VDC	200mA	96	200mA	96
	24VDC	100mA	96	100mA	96
	120VAC	46mA	98	46mA	98
	220VAC	20mA	97	20mA	97

WIRING (REAR VIEW)



INSTALLATION NOTE

1. Remove a gong
2. Wire the bell in the circuit.
3. Mount bell mechanism on 4" square standard outlet box with the striker facing down.
4. Replace a gong
5. The bell must be mounted a minimum of 8ft., above the floor, or, as close to the ceiling as possible.
6. Polarized bell provides Red(+) and Black(-) lead wires. When you install the bell, observe the polarity.

3198 LIONSHEAD AVE
CARLSBAD, CA 92010
+ 1 (760) 599-1168
+ 1 (800) 344-1822
+ 1 (800) 344-3775 FAX

Alarm Bell Back Box

INSIST ON FPPI®

For Fire Alarm Bell, ABS

Description

FPPI's Back Box for Fire Alarm Bells is made from high impact ABS thermoplastic. ABS is known for its strength and rigidity and has superior electrical insulation properties as compared to PVC, Styrene or other plastics. ABS can also be used in a wide range of temperatures from -13 °F (-25° C) and 140 °F (60°). ABS is resistant to the elements that would normally cause corrosion in a similar back box made from cast aluminum with a painted finish. The back box design includes two tabs for easy surface mounting with two ½" NPT threaded inlets/outlets for through wiring. Each back box is supplied with four screws for mounting a compatible bell and an extra ½" NPT plug for plugging an unused NPT inlet or outlet.

Installation

Install in accordance with usual and customary installation techniques for electrical apparatus. The ABS Back Box can be attached to most flat even surfaces in either horizontal or vertical positioning. Mounting to an uneven surface may cause the back box to become deformed, compromise weather resistance and prevent proper installation of the alarm bell. In order to maintain its' weather resistant properties install the supplied 1/2" NPT plug when not "through" wiring the bell to another appliance. Prolonged exposure to direct sunlight may cause the surface of the back box to appear slightly discolored. This appearance does not change the performance characteristics of the product. Do not mount any electrical appliance in areas that are expected to be exposed to direct streams of water or directly exposed to inclimate weather. The back box weather resistant properties are dependent on all installed components (NPT plugs, conduit connections, alarm bells, etc.) being installed in a weather resistant fashion and having weather resistant properties of their own. When installed correctly, the final assembly of all components should provide a reasonable amount of resistance to moisture.

Specifications

Materials:
Acrylonitrile Butadiene Styrene (ABS)

Sizes:
4" Back box with two ½" NPT threaded outlets/ inlets. Includes for bell mounting screws and one ½" NPT plug.

Color:
Red

Maintenance

No regular maintenance is required. As with all fire sprinkler system components, regularly inspect the back box for damage to insure expected performance.

Related Products

6" Alarm Bell
10" Alarm Bell
Alarm Bell Cage (Guard)
Alarm Bell Signs

3198 LIONSHEAD AVE
CARLSBAD, CA 92010
TEL + 1 760 599-1168
+ 1 800 344-1822
FAX + 1 800 344-3775

US Patent No. Des D563,896

VSR

VANE TYPE WATERFLOW ALARM SWITCH WITH RETARD

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

Service Pressure: 450 PSI (31 BAR) - UL

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

Maximum Surge: 18 FPS (5.5 m/s)

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

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

Environmental Specifications:

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

Service Use:

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

Specifications subject to change without notice.

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

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

⚠ WARNING

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

CAUTION

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

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

General Information

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

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

Enclosure

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

VSR
VANE TYPE WATERFLOW ALARM SWITCH WITH RETARD

Installation (see Fig. 1)

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

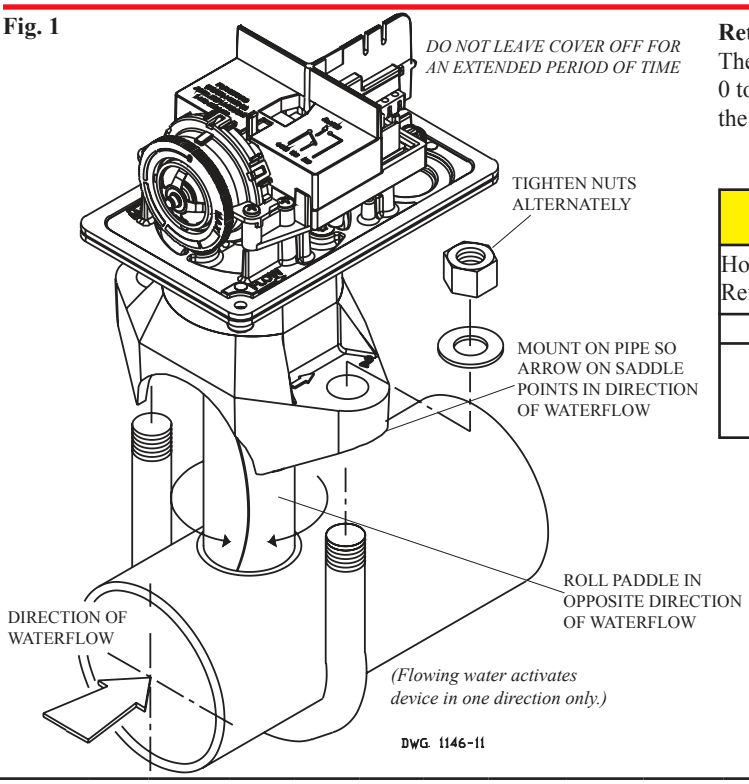
NOTE: Do not leave cover off for an extended period of time.

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

⚠ CAUTION

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

Fig. 1

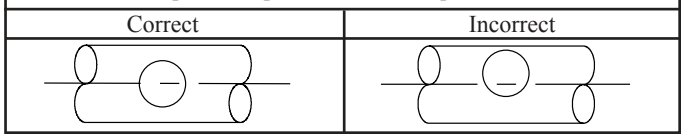


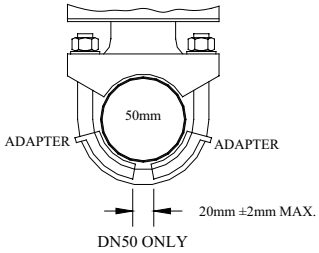
Retard Adjustment

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

CAUTION

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





USE (2) 5180162 ADAPTERS AS SHOWN ABOVE

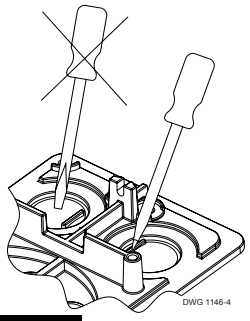
DWG# 1146-1F

Compatible Pipe/ Installation Requirements

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

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

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



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

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

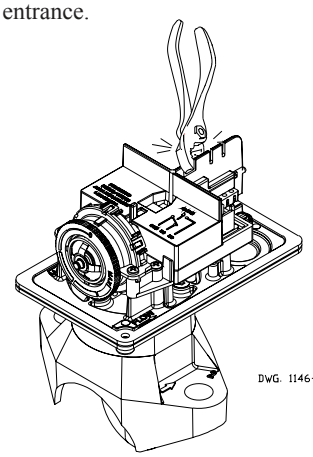
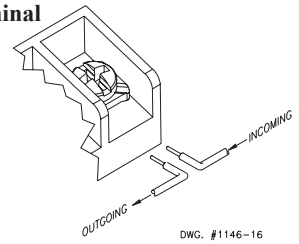


Fig. 4 Switch Terminal Connections Clamping Plate Terminal

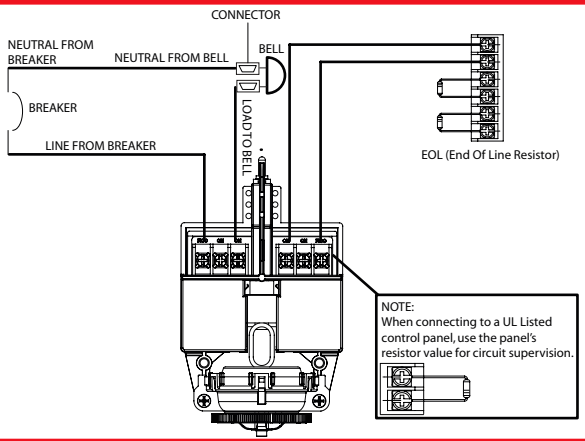


⚠ WARNING

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

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

Fig. 5 Typical Electrical Connections



Notes:

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

Testing

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

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

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

Fig. 6 Mounting Dimensions

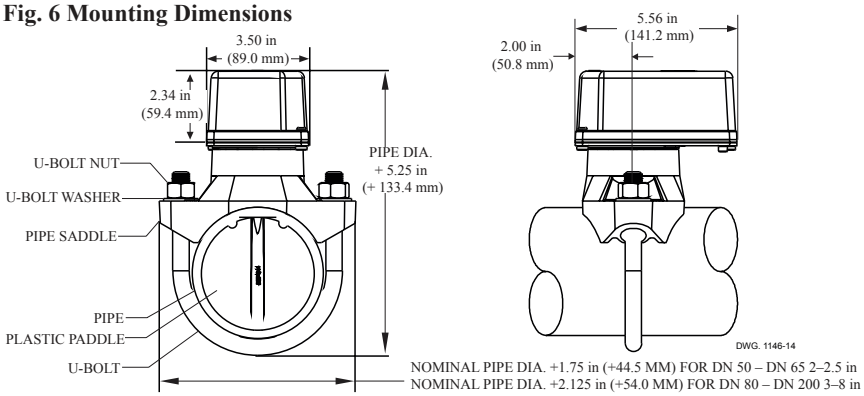
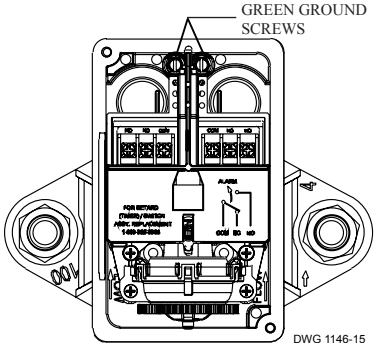


Fig. 7



Maintenance

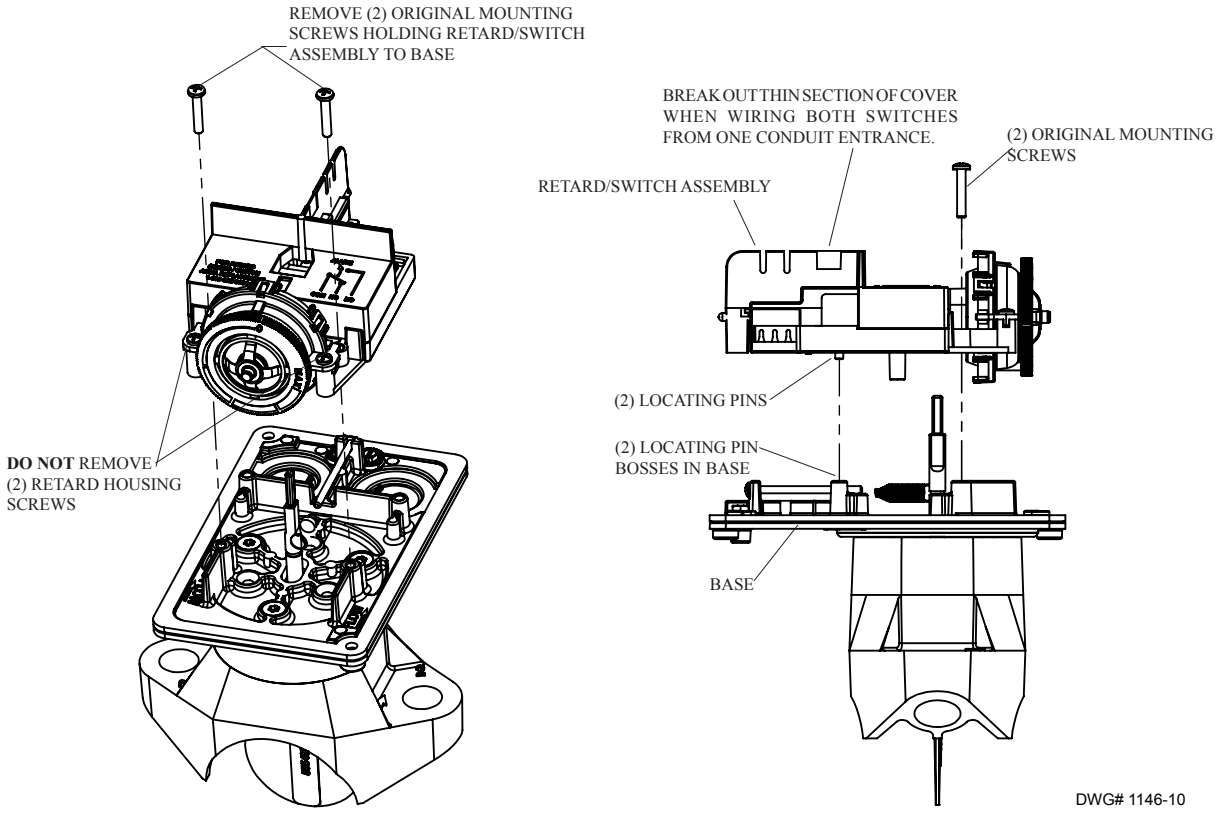
Inspect detectors monthly. If leaks are found, replace the detector. The VSR waterflow switch should provide years of trouble-free service. The retard and switch assembly are easily field replaceable. In the unlikely event that either component does not perform properly, please order replacement retard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

Retard/Switch Assembly Replacement (See Fig. 8)

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

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

Fig. 8



Removal of Waterflow Switch

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

FIRE PROTECTION EQUIPMENT SUBMITTAL

PRECISION FIRE SYSTEMS, INC.

790 Monroe Road
Sanford, Florida 32771
321-363-1560

Underground

Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

Approval _____ Representative _____

LEAD FREE*

Series 2000SS

Double Check Valve Assemblies

Sizes: 2½" – 12" (65 – 300mm)

2000SS

Features

- Cam-Check Assembly provides low head loss
- Short lay length is ideally suited for retrofit installations
- Stainless Steel body is half the weight of competitive designs reducing installation and shipping cost
- Stainless steel construction provides long term corrosion protection and maximum strength
- Single top access cover with two-bolt grooved style coupling for ease of maintenance
- No special tools required for servicing
- Compact construction allows for smaller vaults and enclosures
- May be installed in horizontal or vertical "flow up" position (ASSE Only)

Available Models

Suffix:

NRS –	non-rising stem resilient seated gate valves
OSY –	UL/FM outside stem and yoke resilient seated gate valves
****OSY FxG –**	flanged inlet gate connection and grooved outlet gate connection
****OSY GxF –**	grooved inlet gate connection and flanged outlet gate connection
****OSY GxG –**	grooved inlet gate connection and grooved outlet gate connection
LG –	less gates

Available with grooved NRS gate valves – consult factory**

Post indicator plate and operating nut available – consult factory**

**Consult factory for dimensions

NOTICE

Inquire with governing authorities for local installation requirements

***The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.**

Series 2000SS Double Check Valve Assemblies are designed to prevent the reverse flow of polluted water from entering into the potable water system. This series can be applied, where approved by the local authority having jurisdiction, on non-health hazard installations. Features short end-to-end dimensions, lightweight stainless steel body, and low head loss.

Specifications

A Double Check Valve Assembly shall be installed at each noted location to prevent the unwanted reversal of polluted water into the potable water supply. The main valve body shall be manufactured from 300 series stainless steel to provide corrosion resistance, 100% lead free through the waterway. The double check shall consist of two independently operated spring loaded cam-check valves, required test cocks, and optional inlet and outlet resilient seated shutoff valves. Each cam-check shall be internally loaded and provide a positive drip tight closure against the reverse flow of liquid caused by backsiphonage or backpressure. The modular cam-check includes a stainless steel spring and cam-arm, rubber faced disc and a replaceable seat. There shall be no brass or bronze parts used within the cam-check valve assembly. The valve cover shall be held in place through the use of a single grooved style two-bolt coupling. The main assembly shall consist of two independently operating torsion spring check assemblies, two resilient seated isolation valves, and four ball valve type test cocks. The assembly shall be an Ames Company Series 2000SS.

Materials

All internal metal parts: 300 Series stainless steel

Main valve body: 300 Series stainless steel

Check assembly: Noryl®

Flange dimension in accordance with AWWA Class D

Noryl® is a registered trademark of General Electric Company.

Pressure — Temperature

Temperature Range: 33°F – 110°F (5°C – 43°C)

Maximum Working Pressure: 175psi (12.06 bar)

Standards

AWWA C510-92, CSA B64.5

Approvals

ASSE 1015

CLASSIFIED C UL US (OSY ONLY)

FM Approved

For 12" approvals consult factory

NOTICE

The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product.

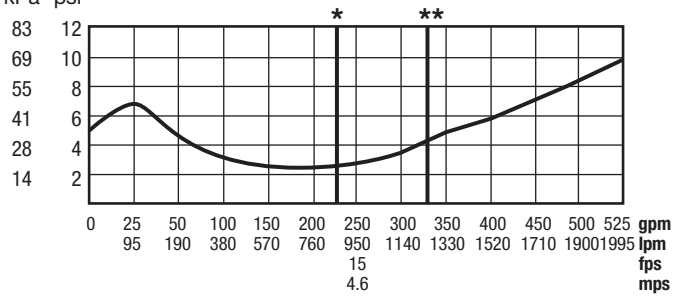
AMES FIRE & WATERWORKS

A WATTS Brand

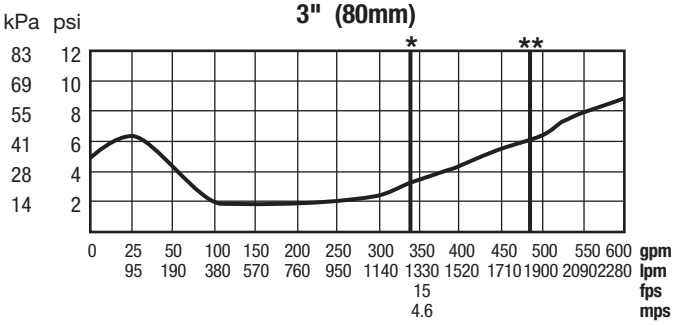
Capacities

Rated working pressure 175psi (12.06 bar) * Rated flow **UL Tested

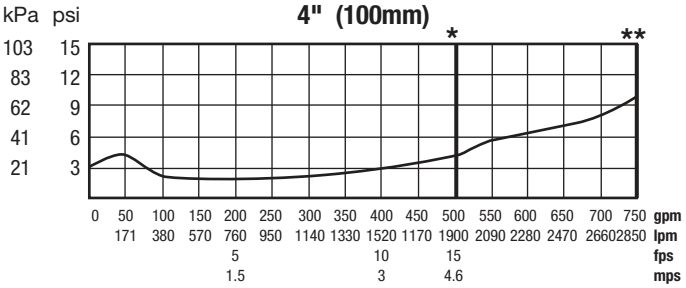
2½" (65mm)



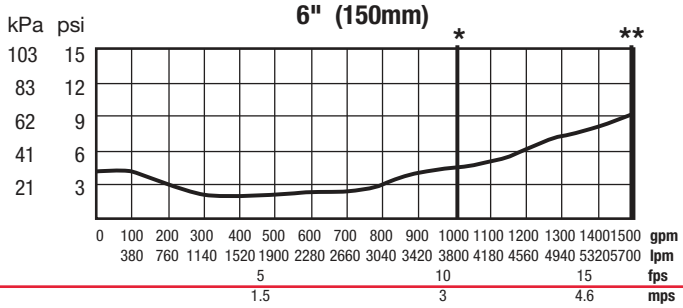
3" (80mm)



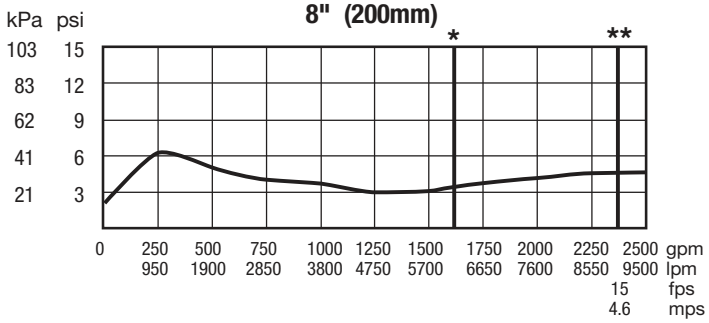
4" (100mm)



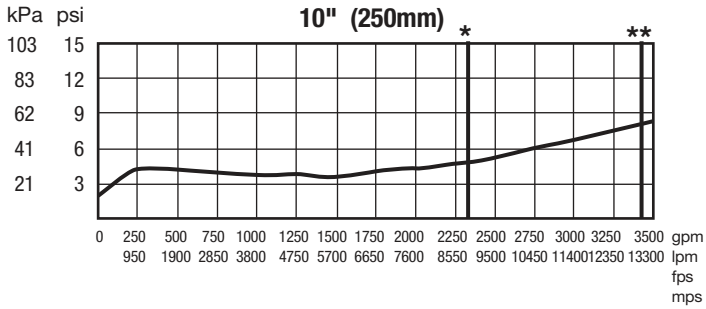
6" (150mm)



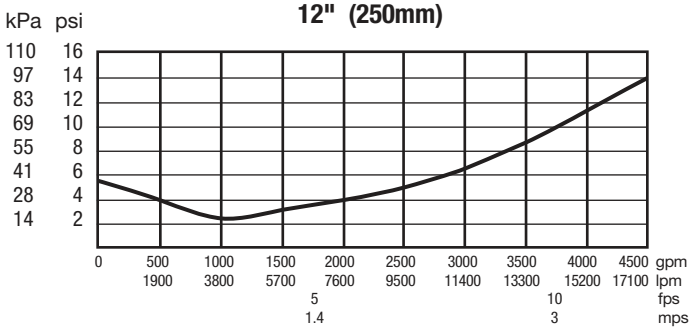
8" (200mm)



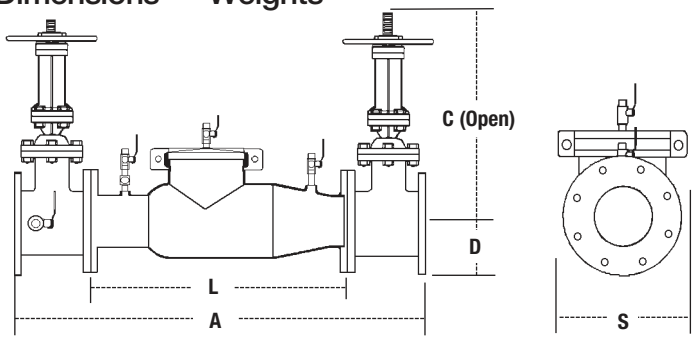
10" (250mm)



12" (250mm)



Dimensions — Weights



SIZE (DN)		DIMENSIONS												WEIGHT			
		A		C (OSY)		C(NRS)		D		L		S		w/Gates		w/o Gates	
in.	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*in.*	*mm*	*lb.*	*kg.*	*lb.*	*kg.*
2½	65	37	965	16⅜	416	9⅜	238	3½	89	22	559	7	178	140	64	53	24
3	80	38	965	18⅞	479	10¼	260	3¾	95	22	559	7½	191	215	98	55	25
4	100	40	1016	22¾	578	12 3/16	310	4½	114	22	559	9	229	225	102	58	26
6	150	48½	1232	30⅛	765	16	406	5½	140	27½	699	11	279	375	170	105	48
8	200	52½	1334	37¾	959	19 15/16	506	6¾	171	29½	749	13½	343	561	254	169	77
10	250	55½	1410	45¾	1162	23 13/16	605	8	200	29½	749	16	406	763	346	179	81
12	300	57½	1461	53⅛	1349	26¾	679	9½	241	29½	749	19	483	1033	469	209	95

AMES
FIRE & WATERWORKS

A **WATTS** *Brand*

USA: Backflow T: (978) 689-6066 • F: (978) 975-8350 • AmesFireWater.com
USA: Control Valves T: (713) 943-0688 • F: (713) 944-9445 • AmesFireWater.com
Canada: T: (905) 332-4090 • F: (905) 332-7068 • AmesFireWater.ca
Latin America: T: (52) 81-1001-8600 • AmesFireWater.com

Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

Approval _____ Representative _____

LEAD FREE*

Series IBR

In-Building Risers Customizable

Sizes: 4" – 10"

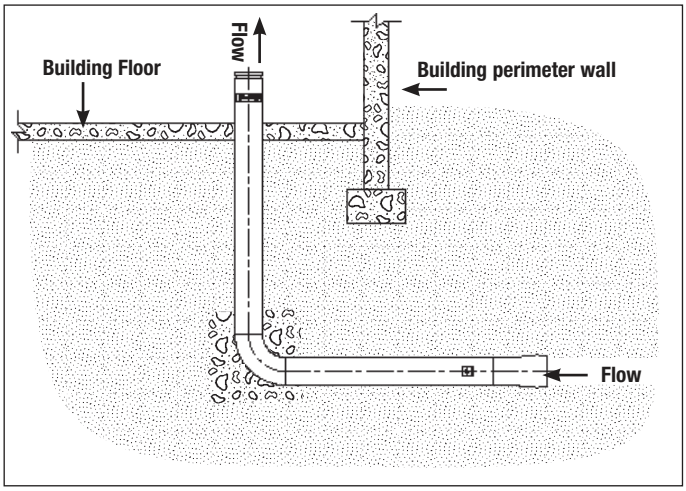
Series IBR In-Building Risers are used to connect the main fire supply to the building overhead fire system. The fitting passes under the foundation without joints and extends up through the floor. Provided with installation tabs, the unit has a CIPS (Cast Iron Pipe Size) coupler for easy connection to the underground supply (AWWA C900 PVC and Ductile Iron Pipe) and industry standard grooved-end connection (AWWA C606) on the building side for easy connection to the overhead fire sprinkler system. The IBR features Lead Free* construction to comply with Lead Free* installation requirements.

Ames In-Building Risers are precision engineered and manufactured to provide exceptional reliability and reduce installation time & labor costs associated with field assembly. In accordance with NFPA 24, the UL/FM approved In-Building Risers replace numerous fittings, elbows & spools and reduces the possibility of leaks or failure in comparison to traditional installation methods and materials. Factory tested integrity ensures the highest quality installation. The use of stainless steel significantly increases the reliability and life of the riser.

Features

- Cost savings
- Corrosion resistant stainless steel construction, type 304
- Ease of installation and light weight allows one person to position and handle the riser
- Minimal site preparation; joint restraint one-piece construction reduces time and labor; no missing parts, no leaks; easily identifiable for approvals
- Includes Test Cap and Coupler
- UL/FM approved
- Sizes: available in 4" – 10" with various lengths to meet local requirements
- Designed to meet NFPA 24
- AWWA C900 Inlet/DIP
- AWWA C606 Outlet

6'x6' standard length
(custom lengths from 3' – 20' available)



***The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.**

AMES
FIRE & WATERWORKS
A WATTS Brand

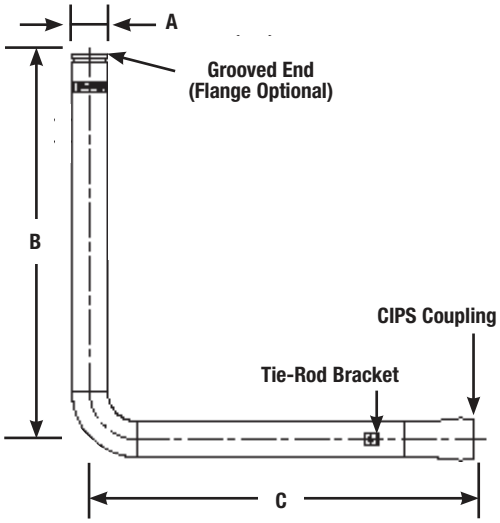
Specifications

In-Building Riser shall be installed as indicated on the plans. Riser shall be composed of a single extended 90 degree fitting of fabricated 304 stainless steel tubing, maximum working pressure 200psi (14 bar). The fitting shall have a grooved-end connection on the outlet (building) side and a CIPS coupler on the inlet (underground) side. The grooved end shall include a coupler and cap to facilitate testing of the underground piping. The In-Building Riser shall be an Ames Fire & Waterworks Series IBR.

Approvals

Fittings FM class 1920
UL HKQA (4"-10")

Dimensions – Weights



SIZE							WEIGHT	
	A (OD)		B		C			
in.	*in.*	*mm*	*ft.*	*cm*	*ft.*	*cm*	*lbs.*	*kg*
4	4½	114	6	183	6	183	71	32
4	4½	114	8'-6"	183	6	183	85	39
6	6⅝	168	6	183	6	183	98	44
6	6⅝	168	8'-6"	259	6	183	122	56
8	8⅝	219	6	183	6	183	129	59
8	8⅝	219	8'-6"	259	6	183	163	74
10	10¾	273	6	183	6	183	202	92

**Each B (vertical) and C (horizontal) leg is customizable from 3' to 20' with UL/FM approvals. Consult with your factory representative for details.

Standards

NFPA — Designed to allow the contractor to conform to NFPA 24

Where a riser is close to building foundations, underground fittings of proper design and type shall be used to avoid pipe joints being located under the foundations.

End Connections

Horizontal End: Mates with Ductile Iron Pipe and AWWA C900 Pipe (PVC Pipe with Ductile Iron Pipe Equivalent OD's)

Utilizes Gasket conforming to UL 157 with "Lock in" gasket configuration

SIZE	MATING PIPE OD	
in.	*in.*	*mm*
4	4.8	122
6	6.9	175
8	9.1	230
10	11.1	282

Vertical End:

Meets AWWA C-606 dimensions for roll grooved pipe
Meets AWWA C-207 class D for flanges

Ratings

Meets AWWA C-900 pressure class 200, DR 14 Pipe

Testing

Welds are 100% leak tested at the factory

NOTICE

Inquire with governing authorities for local installation requirements

NOTICE

The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product.

AMES
FIRE & WATERWORKS

A **WATTS** *Brand*

USA: Backflow Tel: (978) 689-6066 • Fax: (978) 975-8350 • AmesFireWater.com
USA: Control Valves Tel: (713) 943-0688 • Fax: (713) 944-9445 • AmesFireWater.com
Canada: Tel: (905) 332-4090 • Fax: (905) 332-7068 • AmesFireWater.ca
Latin America: Tel: (52) 81-1001-8600 • AmesFireWater.com

For Commercial Applications

Job Name _____ Contractor _____

Job Location _____ Approval _____

Engineer _____ Contractor's P.O. No. _____

Approval _____ Representative _____

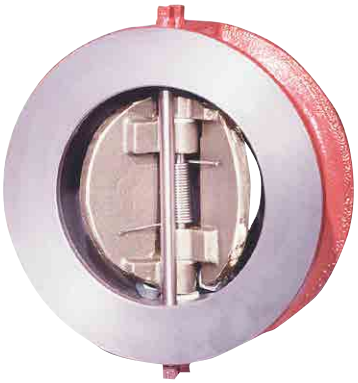
LEAD FREE*

Series ICV-125-2-2-T

Cast Iron Wafer Check Valves

Sizes: 2" - 12" (50-300mm)**

Series ICV-125-2-2-T Cast Iron Wafer Check Valves are designed for HVAC and general service applications. They are lighter, more compact, utilize half the number of studs for installation and in some sizes offer more flow capacity than conventional swing check valves. The two spring-loaded plates close when the flow decreases, without the necessity of reverse flow. The Series ICV-125-2-2-T is designed and tested according to API 594 for use between ANSI Class 125 or 150 flanges. The ICV-125-2-2-T features Lead Free* construction to comply with Lead Free* installation requirements.



ICV-125-2-2-T

Features

- Lightweight & compact design
- Aluminum bronze disc plates
- EPDM seat bonded to body for leak tight sealing
- Silent check valve
- Complies with API 594

NOTICE

When installed in vertical pipe, flow direction in normal operation should open discs, and inlet pressure should be greater than head pressure.

Specifications

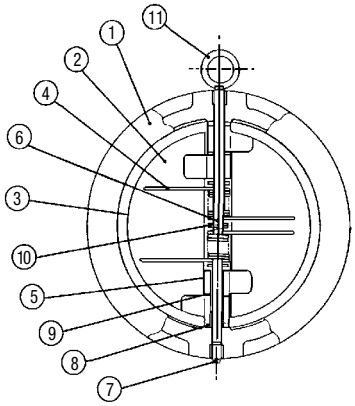
Check valve shall be manufactured out of ASTM A126 Class B cast iron and comply with API 594. Valve shall be pressure rated to 200psi (13.8 bar) for sizes 2" – 12" (50mm – 300mm). Check valve constructed with aluminum bronze disc plate, EPDM seat, 316 stainless steel spring, and PTFE bearings. Lead Free* cast iron wafer check valve shall be constructed using Lead Free* materials. Lead Free ICV-125-2-2-T shall comply with state codes and standards, where applicable, requiring reduced lead content. Valve shall be Watts Series ICV-125-2-2-T.

Pressure — Temperature

Temperature Range: -40°F – 250°F (-40°C – 121°C)

Pressure Rating: 2" – 12" (50 – 300mm):
200psi (13.8 bar) CWP @ 150°F (66°C)

Materials



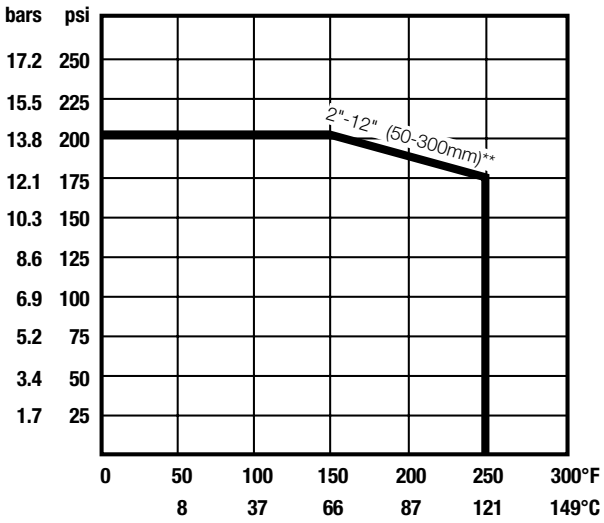
1.	**Body**	Cast Iron	ASTM A126 Class B
2.	**Disc plates (2)**	Aluminum Bronze	ASTM B-148
3.	**Seat**	EPDM	Commercial
4.	**Spring**	Stainless Steel	ASTM A-276 316SS
5.	**Hinge Pin**	Stainless Steel	ASTM A-167 304SS
6.	**Stop pin**	Stainless Steel	ASTM A-167 304SS
7.	**Plug**	Carbon Steel	ASTM A-105
8.	**Body bearings**	PTFE	Commercial
9.	**Plate bearings**	PTFE	Commercial
10.	**Spring bearings**	PTFE	Commercial

***The wetted surface of this product contacted by consumable water contains less than 0.25% of lead by weight.**

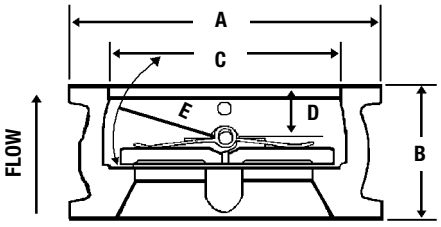
**** Metric Dimensions are nominal pipe diameter. This product is produced with ASME/ANSI flanged end connections.**

WATTS®

Pressure – Temperature Ratings

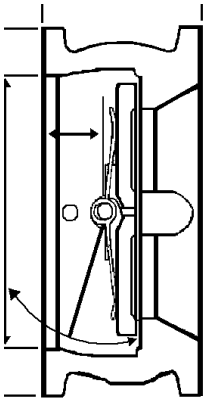


Note: Indicated Pressures are WOG.

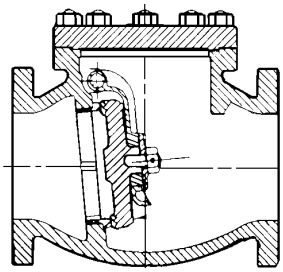


Flanges not included. Designed to mount between user supplied flanges.

ICV-125-2-2-T vs. Conventional Swing Check



Watts ICV-125-2-2-T
- Lightweight
- Higher flow capacity
- Only one set of studs and nuts required



Conventional Swing Check
- Heavy
- Lower flow capacity
- Twice as many studs and nuts required

Dimensions — Weights

SIZE (DN)**		A		B		C		D		E		CV	NO.	STUD DIAMETER		LENGTH		WEIGHT	
In.	*mm.*	*In.*	*mm.*	*In.*	*mm.*	*In.*	*mm.*	*In.*	*mm.*	*In.*	*mm.*			*mm*	*in.*	*in.*	*mm.*	*lbs.*	*kg.*
2	50	4⅛	105	2⅛	54	2 9/16	65	1	25	1⅜	35	72	4	⅝	16	5¼	133	7	3
2½	65	4⅞	124	2⅜	60	3 1/16	78	1	25	1½	38	132	4	⅝	16	5½	140	9	4
3	80	5⅜	137	2⅝	67	3 11/16	94	1⅛	29	1⅞	48	180	4	⅝	16	5¾	146	11	5
4	100	6⅞	175	2⅝	67	4⅝	117	1⅜	35	2	50	380	8	⅝	16	6¼	159	13	6
5	125	7⅜	187	3¼	82	5 11/16	145	1⅜	35	2⅝	67	635	8	¾	19	6¾	171	20	9
6	150	8¾	222	3¾	95	6¾	171	1 7/16	36	3⅛	79	864	8	¾	19	7	178	22	10
8	200	11	279	5	127	8¾	222	1¾	44	4⅛	105	1650	8	¾	19	8	200	42	19
10	250	13⅜	340	5½	140	10⅞	276	1¾	44	5	127	3017	12	⅞	22	9	229	68	31
12	300	16⅛	409	7⅛	181	12⅞	327	2⅜	60	6⅛	156	4280	12	⅞	22	10½	267	123	56

C_V = flow in GPM through a valve at 1psi pressure drop when the media is water at 68°F.

** Metric Dimensions are nominal pipe diameter. This product is produced with ASME/ANSI flanged end connections.

GUARDIAN
FIRE EQUIPMENT, INC.
MIAMI, FL
Ph. 800.327.6584 • Fax 800.827.3869

DETAIL AND SUBMITTAL SHEET

6300 Series - Fire Dept. Inlet Connections - Bodies

Project/Location: _____ **Date:** _____

Architect/Engineer: _____ **Qty:** _____

Contractor: _____

☑ *Appropriate Selection*

Used as auxiliary connections through which the fire department can pump water to supplement existing water supplies. Provides 250 GPM flow (minimum), per 2½" inlet.

Two and three-way - inlet connections feature clappered brass bodies (straight or angle pattern), with female hose thread swivel inlets and female outlets. Cast brass construction, standard.

Two and Three-Way Connections

Model No.	Outlet	Size	Clappers	A	B
☐ 6314*	Back	4" x 2½" x 2½"	1	5½"	8⅛"
☐ 6315*	Angle	4" x 2½" x 2½"	1	8⅛"	8¾"
☐ 6324	Back	4" x 2½" x 2½"	2	7 9/32"	11 21/32"
☐ 6325	Angle	4" x 2½" x 2½"	2	8 31/64"	11 21/32"
☐ 6326	Back	6" x 2½" x 2½"	2	7¼"	10½"
☐ 6327	Angle	6" x 2½" x 2½"	2	10"	10½"
☐ 6336**	Back	6" x 2½" x 2½" x 2½"	3	10½"	13¾"
☐ 6337**	Angle	6" x 2½" x 2½" x 2½"	3	11½"	14½"

Body Lettering

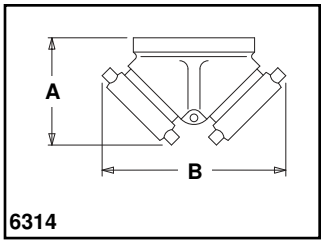
☐ **AUTO SPKR** ☐ **STANDPIPE**

☐ ***Blank (unlettered)***

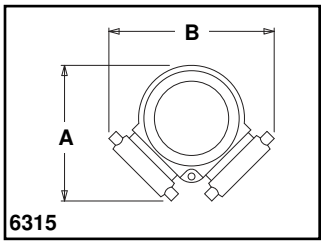
**Auto Spkr lettering only ** Blank (Unlettered) only*

Optional Finish: ☐ **-B** Polished Brass ☐ **-C** Rough Chrome Plated ☐ **-D** Polished Chrome Plated

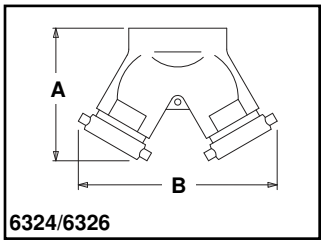
Threads: ☐ NST ☐ Other _____



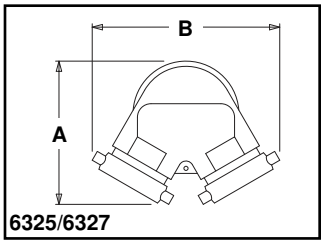
6314



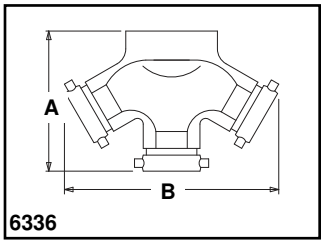
6315



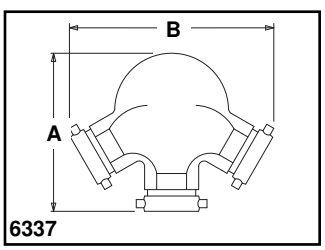
6324/6326



6325/6327



6336



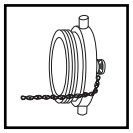
6337

Plugs with Chains and Break Caps - Used to keep fire dept. inlet connections free of debris and protect female threads.

Plugs with Chains

Model No.	Size	Type
☐ 6404	2½"	Brass

Optional Finish:
☐ **-B** Polished
☐ **-C** Rough Chrome Plated
☐ **-D** Polished Chrome Plated



Threads: ☐ NST ☐ Other _____

Break Caps

Model No.	Size	Type
☐ 6406	2½"	Aluminum
☐ 6407	2½"	Plastic

Adjustable Plugs

Model No.	Size	Type
☐ 6408	2½"	Aluminum
☐ 6409	2½"	Plastic

Contact factory for current listings and approvals

VINYLTECH AWWA
C900 BLUE
TECHNICAL DATA SUBMITTAL (4" – 12")

VINYLTECH VT PVC • PIPE

CONFORMANCE
These specifications designate the requirements for manufacturing and installing Vinyltech AWWA C900 PVC Pressure Pipe for potable water (4"-12").
ANSI/AWWA C900 - Polyvinyl Chloride (PVC) Pressure Pipe and Fabricated Fittings, 4" Through 60" (100mm Through 1,500mm)
AWWA C605 - Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water
ASTM D1784 - Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds
ASTM D3139 - Standard Specification for Joints for Plastic Pressure Pipes Using Flexible Elastomeric Seals
ASTM F477 - Standard Specification for Elastomeric Seals (Gaskets) for Joining Plastic Pipe
NSF/ANSI 61, Annex G - Drinking Water Systems Components-Health Effects
FM 1612 - Approval Standard for Polyvinyl Chloride (PVC) Pipe and Fittings for Underground Fire Protection
UL 1285 - Standard for Pipe and Couplings, Polyvinyl Chloride (PVC), and Oriented Polyvinyl Chloride (PVCO) for Underground Fire Service

PIPE COMPOUND
The pipe shall be extruded from compounds meeting (PVC 1120) the requirements of Cell Classification 12454, as defined in ASTM D1784, Standard Specification for Rigid Poly (Vinyl Chloride) (PVC) Compounds and Chlorinated Poly (Vinyl Chloride) (CPVC) Compounds. The PVC shall also be listed by the National Sanitation Foundation (NSF) for use in potable water.

PIPE
Vinyltech pipe shall be manufactured in accordance with AWWA C900.

GASKET JOINT
The gasket shall be reinforced with a steel band and meet the requirements of ASTM F477. Vinyltech pipe shall have an integral bell end with a locked-in factory installed gasket and shall meet the joint requirements of ASTM D3139.

MARKING
The pipe shall be marked in accordance with AWWA C900.

QUALITY CONTROL
Each length of the pipe including the bell shall be hydrostatically tested in accordance with AWWA C900. The pipe shall meet all additional test requirements as described in AWWA C900. Our full-time quality assurance staff continually administers a rigid program of tests to maintain the production of the best pipe products available.

INSTALLATION
Recommended installation procedures of Vinyltech Corporation are outlined in AWWA C605, Underground Installation of Polyvinyl Chloride (PVC) Pressure Pipe and Fittings for Water. The AWWA Manual M23, PVC Pipe Design and Installation, is also an invaluable resource guide for design and installation.

TAPPING
The consistent success of tapping PVC pressure pipe is contingent upon the use of proper procedures and equipment. Vinyltech recommends strict compliance with the requirements as specified in AWWA C605.

ASSEMBLING THE PIPE
Assembly of Vinyltech PVC water pipe is easily accomplished. A depth of entry mark is on each spigot end to serve as a visual check for rapid, accurate joint inspection. **Do not over insert.**

1) Remove any mud, sand, or other foreign matter from the belled and spigot ends of the pipe. Carefully clean the gasket area.
2) With a clean applicator (a brush or hand) lubricate the entire surface of the pipe from the spigot end to the depth of entry mark and the contact surface of the gasket with **Vinyltech Brand Lubricant**.
3) Brace the bell to avoid disturbing the already installed joints. Align the pipe, insert the spigot into the bell and push.
4) **Do not insert past the entry mark line.**

ASTM INTERNATIONAL · FM APPROVED · NSF · UL Underwriters Laboratories Inc.® LISTED

VINYLTECH • 201 S. 61st Avenue • Phoenix, AZ 85043 • 602 233-0071 • Fax: 602 272-4847 • www.vtpipe.com

VINYLTECH AWWA

C900 BLUE

TECHNICAL DATA SUBMITTAL (4" – 12")

VINYLTECH VT PVC • PIPE

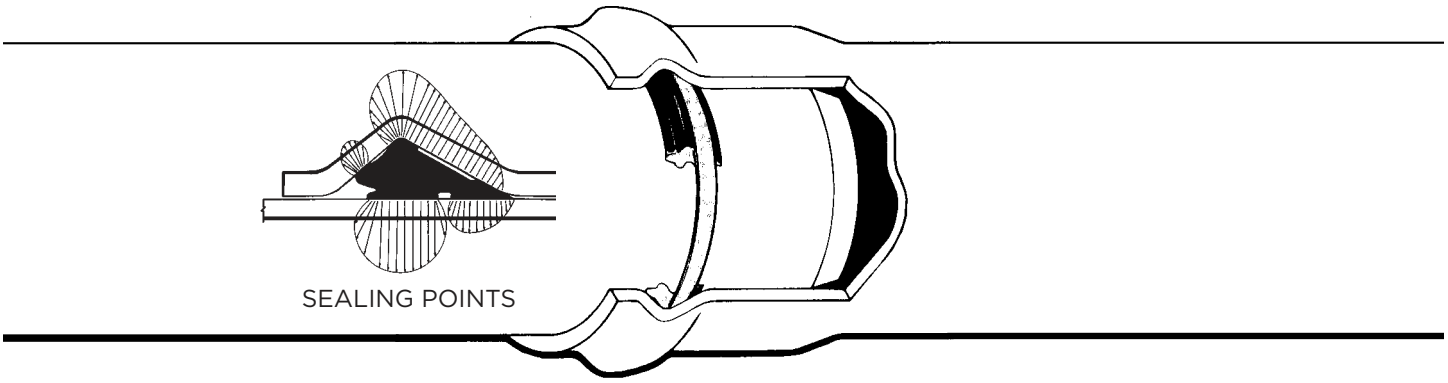
Effective 11/17

C900 DR 18 Pressure Class 235

NOMINAL SIZE		OUTER DIAMETER (IN)	MINIMUM WALL (IN)	FEET PER LIFT	LIFTS PER TRUCK	APPROX WEIGHT (LB/100')
(IN)	(mm)					
4	100	4.800	0.267	1020	16	251.6
6	150	6.900	0.383	440	16	521.2
8	200	9.050	0.503	200	20	903.0
10	250	11.100	0.617	240	12	1364.4
12	300	13.200	0.733	60-80	28	1935.8

C900 DR 14 Pressure Class 305

NOMINAL SIZE		OUTER DIAMETER (IN)	MINIMUM WALL (IN)	FEET PER LIFT	LIFTS PER TRUCK	APPROX WEIGHT (LB/100')
(IN)	(mm)					
4	100	4.800	0.343	1020	16	317.5
6	150	6.900	0.493	440	16	658.7
8	200	9.050	0.646	200	20	1139.7
10	250	11.100	0.793	240	12	1722.3
12	300	13.200	0.943	60-80	28	2445.5



The Rieber Sealing System

The Rieber system provides a proven pipe joint with an excellent track record in the field. It is the fastest growing system in the world because of its many advantages.

- Factory installed, locked-in gasket
- The pipe bell forms over the gasket, making a perfect fit
- Avoids the possibility of installing the wrong gasket
- Reduces installation problems
- The locked-in gasket eliminates gasket roll-out during joining
- The gasket is molded vs. extruded and spliced
- Works equally well under pressure or vacuum
- Three sealing points achieved vs. two
- **LEAK-PROOF JOINTS**
- **"THE WORLDS BEST JOINT"**

Ductile Iron MJ Compact Fittings

ANSI/AWWA C153/A21.53

GENERAL SPECIFICATIONS

MATERIAL: Ductile Iron per ASTM A536

PRESSURE: 350 PSI rating for 2" - 24" sizes, 250 PSI rating for 30" - 48" sizes and 150 PSI rating for 54" - 64" sizes

TESTING: In accordance with ANSI/AWWA C153/A21.53, ANSI/AWWA C111/A21.11, UL and FM requirements

LAYING LENGTH: In accordance with ANSI/AWWA C153/A21.53 (fittings not listed in ANSI/AWWA have dimensions per Star design as noted in the catalog)

DEFLECTION: 2"- 4"=8° | 6"=7° | 8"-12"=5° | 14"-16"=3 ½° | 18"-24"=3° | 30"-64"=2°

WEIGHTS: Are in pounds, unless noted otherwise and do not include accessories, cement lining and coating

FLANGES: Flanged ends on fittings match ANSI/AWWA C115/A21.15 and ANSI B16.1 class 125 flanges

CEMENT LINING: In accordance with ANSI/AWWA C104/A21.4 -- size 2" - 3" single thickness and sizes 4" - 64" double thickness

COATING: Asphaltic seal coat inside and out in accordance with ANSI/AWWA C104/A21.4 and referenced in ANSI/AWWA C153/A21.53

GASKETS: SBR in accordance with ANSI/AWWA C111/A21.11

T-BOLTS/NUTS: Low alloy steel in accordance with ANSI/AWWA C111/A21.11

APPROVALS: 3" - 12" UL/ULC Listed | 2" and greater are UL/ANSI/NSF Standards 61 and 372 | 3" - 16" FM APPROVED. Please consult factory for detail listing and approvals.

DIMENSIONS: All dimensions are in inches unless noted otherwise.

INSTALLATION: Per ANSI/AWWA C600 and C111 using DIP conforming to C150/C151 and PVC pipe conforming to C900/C905

AWWA MEMBER

WATER QUALITY

FM APPROVED

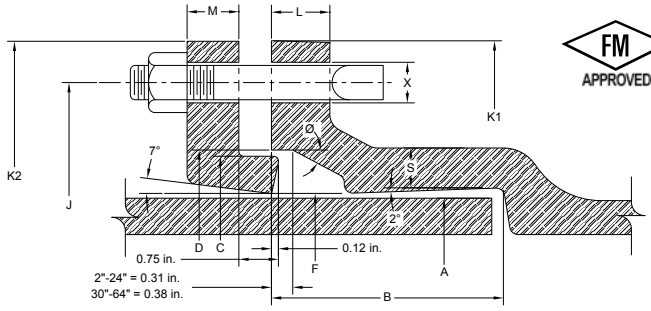
SUBMITTAL INFORMATION

PROJECT NAME:

ENGINEER:

CONTRACTOR:

SPEC. SECTION:



MECHANICALJOINT DIMENSIONS

NOM. SIZE	A DIA.	B	C DIA.	D DIA.	F DIA.	J DIA.	K1 DIA.	K2 DIA.	L	M	S	Ø	X DIA.	BOLTS	
														SIZE	NO.
2	2.50	2.50	3.39	3.50	2.61	4.75	6.19	6.25	0.58	0.62	0.36	28°	¾	⅝ x 3	2
3	3.96	2.50	4.84	4.94	4.06	6.19	7.62	7.69	0.58	0.62	0.39	28°	¾	⅝ x 3	4
4	4.80	2.50	5.92	6.02	4.90	7.50	9.06	9.12	0.60	0.75	0.39	28°	⅞	¾ x 3 ½	4
6	6.90	2.50	8.02	8.12	7.00	9.50	11.06	11.12	0.63	0.88	0.43	28°	⅞	¾ x 3 ½	6
8	9.05	2.50	10.17	10.27	9.15	11.75	13.31	13.37	0.66	1.00	0.45	28°	⅞	¾ x 3 ½	6
10	11.10	2.50	12.22	12.34	11.20	14.00	15.62	15.62	0.70	1.00	0.47	28°	⅞	¾ x 3 ½	8
12	13.20	2.50	14.32	14.44	13.30	16.25	17.88	17.88	0.73	1.00	0.49	28°	⅞	¾ x 3 ½	8
14	15.30	3.50	16.40	16.54	15.44	18.75	20.25	20.25	0.79	1.25	0.55	28°	⅞	¾ x 4	10
16	17.40	3.50	18.50	18.64	17.54	21.00	22.50	22.50	0.85	1.31	0.58	28°	⅞	¾ x 4	12
18	19.50	3.50	20.60	20.74	19.64	23.25	24.83	24.75	1.00	1.38	0.68	28°	⅞	¾ x 4	12
20	21.60	3.50	22.70	22.84	21.74	25.50	27.08	27.00	1.02	1.44	0.69	28°	⅞	¾ x 4	14
24	25.80	3.50	26.90	27.04	25.94	30.00	31.58	31.50	1.02	1.56	0.75	28°	⅞	¾ x 4 ½	16
30	32.00	4.00	33.29	33.46	32.17	36.88	39.12	39.12	1.31	2.00	0.82	20°	1 ⅛	1 x 5 ½	20
36	38.30	4.00	39.59	39.76	38.47	43.75	46.00	46.00	1.45	2.00	1.00	20°	1 ⅛	1 x 5 ½	24
42	44.50	4.00	45.79	45.96	44.67	50.62	53.12	53.12	1.45	2.00	1.25	20°	1 ⅜	1 ¼ x 6	28
48	50.80	4.00	52.09	52.26	50.97	57.50	60.00	60.00	1.45	2.00	1.35	20°	1 ⅜	1 ¼ x 6	32
54	57.56	4.00	58.82	59.02	57.73	63.20	65.70	65.70	1.88	2.00	1.50	20°	1 ⅜	1 ¼ x 6 ½	36
60	61.61	4.00	62.87	63.07	61.78	67.72	70.22	70.22	1.88	2.00	1.55	20°	1 ⅜	1 ¼ x 6 ½	36
64	65.67	4.00	66.96	67.13	65.84	71.86	74.36	74.36	1.88	2.00	1.62	20°	1 ⅜	1 ¼ x 6 ½	38

SIZE RANGE (Please specify):

Size Range _____

LINING OPTIONS (Please check one):

- [x] Standard: Cement-lined and asphalt seal coat per ANSI/AWWA C104/A21.4 and UL/NSF-61
- [ ] Optional: FBE (Fusion Bonded Epoxy) per ANSI/AWWA C116/A21.15 and UL/NSF-61 - ID & OD Only
- [ ] Optional: P401 (Protecto 401) Ceramic Epoxy - sewer applications only. Not NSF-61
- [ ] Optional: Other (specify) _____

COATING OPTIONS (Please check one):

- [x] Standard: Asphaltic seal coat per ANSI/AWWA C104/A21.4
- [ ] Optional: FBE (Fusion Bonded Epoxy) per ANSI/AWWA C116/A21.15 and UL/NSF-61 - ID & OD Only
- [ ] Optional: Other (specify) _____

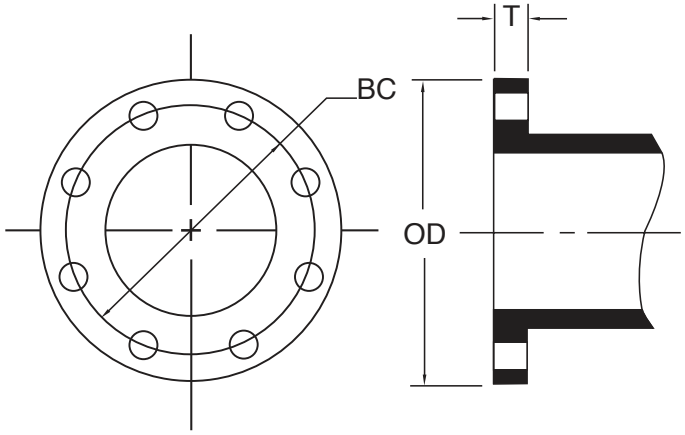
STAR PIPE PRODUCTS
HOUSTON **CORPORATE** TOLL FREE 1-800-999-3009 FAX 281-558-9000
www.starpipeproducts.com

TÜVRheinland® Certified to ISO 9001:2008

Ductile and Cast Iron Flanged Fittings 2″ – 48″

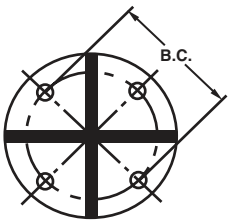
Metalfit

Flanged Joint Dimensions
ANSI/AWWA C110/A21.10



Size	OD	BC	T	Hole Dia.	Bolt Size	No. Bolts
2	6.00	4.75	0.62	0.75	5/8 x 2-1/4	4
2-1/2	7.00	5.50	0.69	0.75	5/8 x 2-1/2	4
3	7.50	6.00	0.75	0.75	5/8 x 2-1/2	4
4	9.00	7.50	0.94	0.75	5/8 x 3	8
5	10.00	8.50	0.94	0.88	3/4 x 3	8
6	11.00	9.50	1.00	0.88	3/4 x 3-1/2	8
8	13.50	11.75	1.12	0.88	3/4 x 3-1/2	8
10	16.00	14.25	1.19	1.00	7/8 x 4	12
12	19.00	17.00	1.25	1.00	7/8 x 4	12
14	21.00	18.75	1.38	1.12	1 x 4-1/2	12
16	23.50	21.25	1.44	1.12	1 x 4-1/2	16
18	25.00	22.75	1.56	1.25	1-1/8 x 5	16
20	27.50	25.00	1.69	1.25	1-1/8 x 5	20
24	32.00	29.50	1.88	1.37	1-1/4 x 5-1/2	20
30	38.75	36.00	2.12	1.37	1-1/4 x 6-1/2	28
36	46.00	42.75	2.38	1.62	1-1/2 x 7	32
42	53.00	49.50	2.62	1.62	1-1/2 x 7-1/2	36
48	59.50	56.00	2.75	1.62	1-1/2 x 8	44

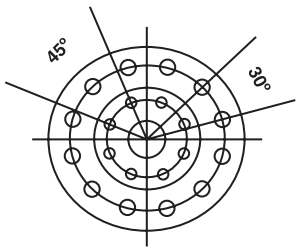
BASE DIMENSIONS



Size	B.C.	Hole Dia.	No. Bolts
3	3.88	0.62	4
4	4.75	0.75	4
6	5.50	0.75	4
8	7.50	0.75	4
10	7.50	0.75	4
12	9.50	0.88	4
14	9.50	0.88	4
16	9.50	0.88	4
18	11.75	0.88	4
20	11.75	0.88	4
24	11.75	0.88	4
30	14.25	1.00	4
36	17.00	1.00	4
42	21.25	1.12	4
48	22.75	1.25	4

INSTALLATION NOTE

Drilling Templates are furnished in multiples of four. Standard flanged reducers, with a different number of holes in each flange, will have only two centerlines which are common to the drilling templates of both flanges.



ANSI/AWWA C110/A21.10

Dimensions in inches.
Weights in pounds.

ENGINEERING SUBMITTAL DATA

Metalfit manufactures Ductile Iron and Gray Cast Iron Flanged Fittings for both Waterworks and Industrial applications and conforms fully to the required industry standards. Flanged Fittings are manufactured in accordance with ANSI/AWWA C110/A21.10 and ANSI B16.1, Class 125. Metalfit 2″ through 12″ Flanged Fittings are also listed by Underwriters Laboratories for fire protection service. Additionally, **Metalfit hydrostatically tests every fitting** to ensure quality casting integrity. These tests are performed at 1.5 times the rated working pressure.

Mechanical Properties

Cast Iron to ASTM A48
Minimum Tensile Strength 31,000 psi

Ductile Iron to ASTM A 536
Minimum Tensile Strength 70,000 psi
Yield Strength 50,000 psi
Elongation 5%

Water Working Pressure

Gray Cast Iron
2″ - 12″ CI Fittings rated 250 psi
14″ - 42″ CI Fittings rated 150 psi

Ductile Iron
All DI Fittings Rated 250 psi
As noted in ANSI/AWWA C111/A21/11, ductile iron flanged joints in the 24″ and smaller sizes may be rated to 350 psi with the use of “special” gaskets.

COATINGS & LININGS

Interior Linings

Flanged fittings are furnished cement lined and seal coated per ANSI/AWWA C104/A21.4. Fittings are also available unlined for air service or with other special linings for particular service conditions.

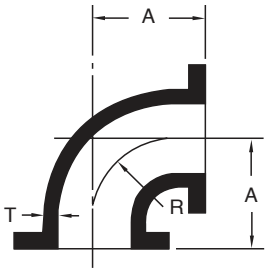
Exterior Coatings

Flanged fittings are furnished standard with a red epoxy primer or tar coated at the customer’s discretion. Special primer coatings are also available for particular service conditions.

All standard coatings and linings are provided in full accordance with ANSI/NSF 61.

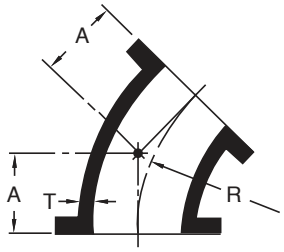
COMMITMENT TO QUALITY

Metalfit takes pride in producing the finest quality Flanged Fittings available in today’s market. Our manufacturing standards and a strict adherence to the quality control procedures, developed over many years, make certain that we abide by our commitment to be the best.



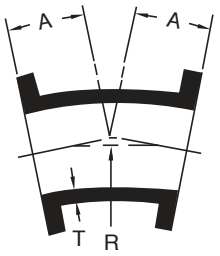
BENDS, 1/4 (90 DEG)

Size	Wt.	A	R	T
2	14	4.5	3.0	0.31
2½	22	5.0	3.5	0.31
3	25	5.5	4.0	0.48
4	45	6.5	4.5	0.52
5	52	7.5	5.5	0.52
6	65	8.0	6.0	0.55
8	105	9.0	7.0	0.60
10	165	11.0	9.0	0.68
12	235	12.0	10.0	0.75
14	290	14.0	11.5	0.66
16	370	15.0	12.5	0.70
18	450	16.5	14.0	0.75
20	580	18.0	15.5	0.80
24	900	22.0	18.5	0.89
30	1430	25.0	21.5	1.03
36	2135	28.0	24.5	1.15
42	3055	31.0	27.5	1.28
48	4095	34.0	30.5	1.42



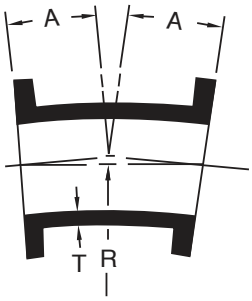
BENDS, 1/8 (45 DEG)

Size	Wt.	A	R	T
2	12	2.5	2.41	0.31
2½	18	3.0	3.02	0.31
3	20	3.0	3.62	0.48
4	40	4.0	4.81	0.52
5	45	4.5	6.04	0.52
6	55	5.0	7.25	0.55
8	90	5.5	8.44	0.60
10	130	6.5	10.88	0.68
12	195	7.5	13.25	0.75
14	220	7.5	12.06	0.66
16	280	8.0	13.25	0.70
18	325	8.5	14.50	0.75
20	430	9.5	16.88	0.80
24	630	11.0	18.12	0.89
30	1120	15.0	27.75	1.03
36	1755	18.0	35.00	1.15
42	2600	21.0	42.25	1.28
48	3580	24.0	49.5	1.42



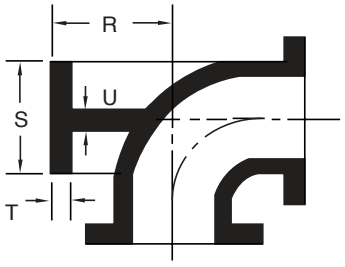
BENDS, 1/16 (22-1/2 DEG)

Size	Wt.	A	R	T
2	12	2.5	6.04	0.31
2½	18	3.0	6.80	0.31
3	20	3.0	7.56	0.48
4	40	4.0	10.06	0.52
5	45	4.5	10.86	0.52
6	55	5.0	15.06	0.55
8	90	5.5	17.62	0.60
10	135	6.5	22.62	0.68
12	205	7.5	27.62	0.75
14	225	7.5	25.12	0.66
16	285	8.0	27.62	0.70
18	335	8.5	30.19	0.75
20	435	9.5	35.19	0.80
24	640	11.0	37.69	0.89
30	1135	15.0	57.81	1.03
36	1790	18.0	72.88	1.15
42	2665	21.0	88.00	1.28
48	3665	24.0	103.06	1.42



BENDS, 1/32 (11-1/4 DEG)

Size	Wt.	A	R	T
2	12	2.5	12.69	0.31
3	20	3.0	15.25	0.48
4	40	4.0	20.31	0.52
5	45	4.5	22.85	0.52
6	55	5.0	30.50	0.55
8	90	5.5	35.50	0.60
10	135	6.5	45.69	0.68
12	205	7.5	55.81	0.75
14	225	7.5	50.75	0.66
16	285	8.0	55.81	0.70
18	335	8.5	60.94	0.75
20	435	9.5	71.06	0.80
24	645	11.0	76.12	0.89
30	1150	15.0	116.75	1.03
36	1805	18.0	147.25	1.15
42	2680	21.0	177.69	1.28
48	3695	24.0	208.12	1.42

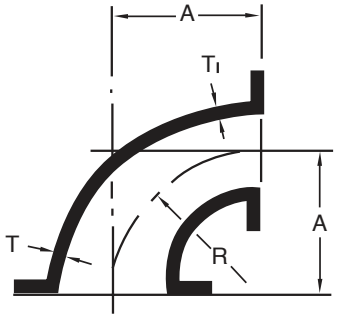


BASE BENDS

Size	Weight Base Bend	Weight Base Only	R	S	T	U	BC
3	35	10	4.88	5.00	0.56	0.50	3.88
4	55	10	5.50	6.00	0.62	0.50	4.75
6	85	20	7.00	7.00	0.69	0.62	5.50
8	145	40	8.38	9.00	0.94	0.88	7.50
10	210	45	9.75	9.00	0.94	0.88	7.50
12	300	65	11.25	11.00	1.00	1.00	9.50
14	360	70	12.50	11.00	1.00	1.00	9.50
16	445	75	13.75	11.00	1.00	1.00	9.50
18	565	115	15.00	13.50	1.12	1.12	11.75
20	700	120	16.00	13.50	1.12	1.12	11.75
24	1030	130	18.50	13.50	1.12	1.12	11.75
30	1625	190	23.00	16.00	1.19	1.15	14.25
36	2385	250	26.00	19.00	1.25	1.15	17.00
42	3465	410	30.00	23.50	1.44	1.28	21.25
48	4610	515	34.00	25.00	1.56	1.42	22.75

ANSI/AWWA C110/A21.10

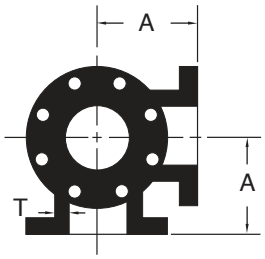
Dimensions in inches.
Weights in pounds.



REDUCING 90 DEG. BENDS

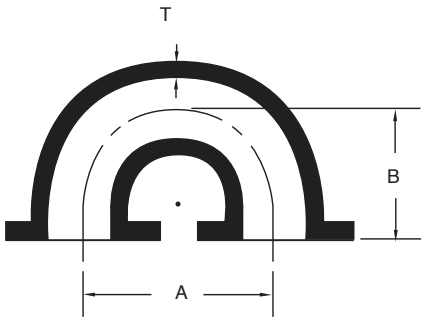
Size	Wt.	A	R	T	T1
2½x2	18	5.0	3.5	0.31	0.31
3x2	22	5.5	4.0	0.48	0.31
3x2½	23	5.5	4.0	0.48	0.31
4x2	27	6.6	4.5	0.52	0.31
4x2½	29	6.6	4.5	0.52	0.31
4x3	29	6.6	4.5	0.52	0.48
5x4	51	7.5	5.5	0.52	0.52
6x3	45	8.0	6.0	0.55	0.48
6x4	55	8.0	6.0	0.55	0.52
6x5	65	8.0	6.0	0.55	0.52
8x4	75	9.0	7.0	0.60	0.52
8x5	80	9.0	7.0	0.60	0.52
8x6	85	9.0	7.0	0.60	0.55
10x4	110	11.0	9.0	0.68	0.52
10x6	135	11.0	9.0	0.68	0.55
10x8	150	11.0	9.0	0.68	0.60
12x4	140	12.0	10.0	0.75	0.52
12x6	160	12.0	10.0	0.75	0.55
12x8	180	12.0	10.0	0.75	0.60
12x10	210	12.0	10.0	0.75	0.68
14x6	144	14.0	11.5	0.66	0.55
14x8	200	14.0	11.5	0.66	0.60
14x10	240	14.0	11.5	0.66	0.68
14x12	270	14.0	11.5	0.66	0.75
16x6	220	15.0	12.5	0.70	0.55
16x8	240	15.0	12.5	0.70	0.60
16x10	280	15.0	12.5	0.70	0.68
16x12	310	15.0	12.5	0.70	0.75
16x14	330	15.0	12.5	0.70	0.66
18x6	260	16.5	14.0	0.75	0.55
18x8	280	16.5	14.0	0.75	0.60
18x10	320	16.5	14.0	0.75	0.68
18x12	350	16.5	14.0	0.75	0.75
18x14	370	16.5	14.0	0.75	0.66
18x16	410	16.5	14.0	0.75	0.70
20x6	320	18.0	15.5	0.80	0.55
20x8	345	18.0	15.5	0.80	0.60

Size	Wt.	A	R	T	T1
20x10	385	18.0	15.5	0.80	0.68
20x12	415	18.0	15.5	0.80	0.75
20x14	435	18.0	15.5	0.80	0.66
20x16	475	18.0	15.5	0.80	0.70
20x18	515	18.0	15.5	0.80	0.75
24x6	480	22.0	18.5	0.89	0.55
24x8	505	22.0	18.5	0.89	0.60
24x10	545	22.0	18.5	0.89	0.68
24x12	575	22.0	18.5	0.89	0.75
24x14	595	22.0	18.5	0.89	0.66
24x16	635	22.0	18.5	0.89	0.70
24x18	675	22.0	18.5	0.89	0.75
24x20	740	22.0	18.5	0.89	0.80
30x12	840	25.0	21.5	1.03	0.75
30x14	860	25.0	21.5	1.03	0.66
30x16	900	25.0	21.5	1.03	0.70
30x18	940	25.0	21.5	1.03	0.75
30x20	1005	25.0	21.5	1.03	0.80
30x24	1165	25.0	21.5	1.03	0.89
36x12	1195	28.0	24.5	1.15	0.75
36x14	1215	28.0	24.5	1.15	0.66
36x16	1255	28.0	24.5	1.15	0.70
36x18	1295	28.0	24.5	1.15	0.75
36x20	1360	28.0	24.5	1.15	0.80
36x24	1520	28.0	24.5	1.15	0.89
36x30	1785	28.0	24.5	1.15	1.03
42x14	1675	31.0	27.5	1.28	0.66
42x16	1715	31.0	27.5	1.28	0.70
42x18	1755	31.0	27.5	1.28	0.75
42x20	1820	31.0	27.5	1.28	0.80
42x24	1980	31.0	27.5	1.28	0.89
42x30	2245	31.0	27.5	1.28	1.03
42x36	2600	31.0	27.5	1.28	1.15
48x24	3240	34.0	30.5	1.42	0.89
48x30	3600	34.0	30.5	1.42	1.03
48x36	3255	34.0	30.5	1.42	1.15
48x42	4685	34.0	30.5	1.42	1.28



SIDE OUTLET BENDS

Size	Wt.	A	T
3	36	5.5	0.48
4	60	6.5	0.50
6	96	8.0	0.55
8	150	9.0	0.60
10	235	11.0	0.68
12	335	12.0	0.80
14	405	14.0	0.66
16	490	15.0	0.70
18	580	16.5	0.75
20	740	18.0	0.80
24	1145	22.0	0.89

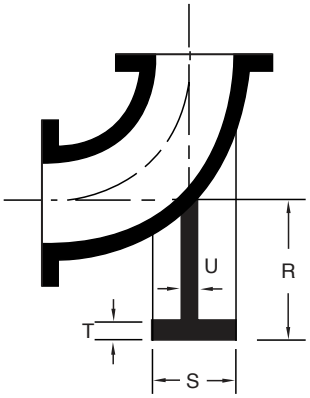


RETURN BENDS

Size	Wt.	A	B	T
4	60	10	6.5	0.52
6	95	12	8.0	0.55
8	165	18	9.0	0.60
10	260	20	11.0	0.68
12	395	24	12.0	0.75

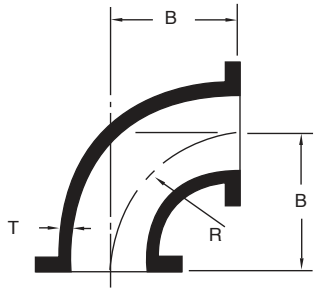
ANSI/AWWA C110/A21.10

Dimensions in inches.
Weights in pounds.



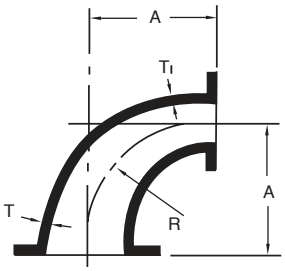
LONG RADIUS BASE BENDS

Size	Weight		R	S	T	U	BC
	Base Bend	Base Only					
3	48	18	4.88	5.0	0.56	0.50	3.88
4	73	23	5.50	6.0	0.62	0.50	4.75
6	120	40	7.00	7.0	0.69	0.62	5.50
8	205	65	8.38	9.0	0.94	0.88	7.50
10	295	80	9.75	9.0	0.94	0.88	7.50
12	435	95	11.25	11.0	1.00	1.00	9.50
14	490	105	12.50	11.0	1.00	1.00	9.50
16	615	110	13.75	11.0	1.00	1.00	9.50
18	800	170	15.00	13.5	1.12	1.12	11.75
20	985	175	16.00	13.5	1.12	1.12	11.75
24	1430	190	18.50	13.5	1.12	1.12	11.75
30	2400	295	23.00	16.0	1.19	1.15	14.25
36	3680	395	26.00	19.0	1.25	1.15	17.00



LONG RADIUS BENDS

Size	Wt.	B	T	R
2	20	6.50	0.31	5.0
2½	22	7.00	0.31	6.0
3	30	7.75	0.48	6.0
4	50	9.00	0.52	7.0
6	80	11.50	0.55	9.5
8	140	14.00	0.60	12.0
10	215	16.50	0.68	14.5
12	325	19.00	0.75	17.0
14	385	21.50	0.66	19.0
16	505	24.00	0.70	21.0
18	630	26.50	0.75	24.0
20	810	29.00	0.80	26.5
24	1240	34.00	0.89	30.5
30	2105	41.50	1.03	38.0
36	3285	49.00	1.15	45.5
45	4865	56.50	1.28	53.0



LONG RADIUS REDUCING BENDS

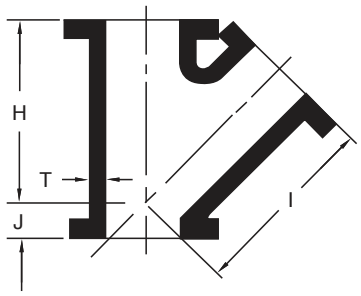
Size	Wt.	H	J	T	T1
4x3	32	9.0	0.52	0.48	7.0
6x4	61	11.5	0.55	0.52	9.5
8x4	100	14.0	0.60	0.52	12.0
8x6	110	14.0	0.60	0.55	12.0
10x4	195	16.5	0.68	0.52	14.5
10x6	180	16.5	0.68	0.55	14.5
10x8	215	16.5	0.68	0.60	14.5
12x6	235	19.0	0.75	0.55	17.0
12x8	285	19.0	0.75	0.60	17.0
12x10	325	19.0	0.75	0.68	17.0
14x8	285	21.5	0.66	0.60	19.0
14x10	325	21.5	0.66	0.68	19.0
14x12	370	21.5	0.66	0.75	19.0
16x8	395	24.0	0.70	0.60	21.5
16x10	395	24.0	0.70	0.68	21.5
16x12	415	24.0	0.70	0.75	21.5
16x14	460	24.0	0.70	0.66	21.5
18x10	465	26.5	0.75	0.68	24.0
18x12	585	26.5	0.96	0.75	24.0
18x14	535	26.5	0.75	0.66	24.0
18x16	585	26.5	0.75	0.70	24.0
20x10	640	29.0	0.80	0.68	26.5
20x12	630	29.0	0.80	0.75	26.5
20x14	770	29.0	0.80	0.66	26.5
20x16	695	29.0	0.80	0.70	26.5
20x18	905	29.0	0.80	0.75	26.5
24x12	855	34.0	0.89	0.75	30.5
24x14	875	34.0	0.89	0.66	30.5
24x16	940	34.0	0.89	0.70	30.5
24x20	1080	34.0	0.89	0.80	30.5
30x16	1400	41.5	1.03	0.70	38.0
30x20	1575	41.5	1.03	0.80	38.0
30x24	1675	41.5	1.37	1.16	38.0
36x20	2835	49.0	1.15	0.80	45.5
36x24	3140	49.0	1.15	0.89	45.5
36x30	3675	49.0	1.58	1.37	45.5
42x30	4905	56.5	1.28	1.03	53.0
42x36	4270	56.5	1.28	1.15	53.0

ANSI/AWWA C110/A21.10

Dimensions in inches.
Weights in pounds.

45º LATERAL WYES

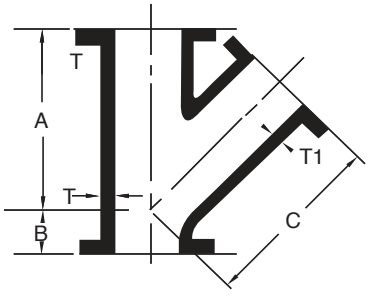
Size	Wt	H	J	I	T
3	45	10.0	3.0	10.0	0.48
4	75	12.0	3.0	12.0	0.52
6	120	14.5	3.5	14.5	0.55
8	200	17.5	4.5	17.5	0.60
10	335	20.5	5.0	20.5	0.80
12	515	24.5	5.5	24.5	0.87
14	605	27.0	6.0	27.0	0.66
16	805	30.0	6.5	30.0	0.70
18	980	32.0	7.0	32.0	0.75
20	1265	35.0	8.0	35.0	0.80
24	1905	40.5	9.0	40.5	0.89
30	3225	49.0	10.0	49.0	1.03
36	5740	60.0	19.5	60.0	1.15



45º REDUCING LATERAL WYES

Size	Wt.	A	B	C	T	T1
4x3	65	12.0	3.0	12.0	0.52	0.48
6x4	105	14.5	3.5	14.5	0.55	0.52
8x4	165	17.5	4.5	17.5	0.60	0.52
8x6	175	17.5	4.5	17.5	0.60	0.55
10x4	235	20.5	5.0	20.5	0.68	0.52
10x6	250	20.5	5.0	20.5	0.68	0.55
10x8	270	20.5	5.0	20.5	0.68	0.60
12x4	350	24.5	5.5	24.5	0.75	0.52
12x6	365	24.5	5.5	24.5	0.75	0.55
12x8	390	24.5	5.5	24.5	0.75	0.60
12x10	470	24.5	5.5	24.5	0.75	0.68
14x6	475	27.0	6.0	27.0	0.66	0.55
14x8	500	27.0	6.0	27.0	0.66	0.60
14x10	525	27.0	6.0	27.0	0.66	0.68
14x12	570	27.0	6.0	27.0	0.66	0.75
16x6	620	30.0	6.5	30.0	0.70	0.55
16x8	645	30.0	6.5	30.0	0.70	0.60
16x10	675	30.0	6.5	30.0	0.70	0.68
16x12	715	30.0	6.5	30.0	0.70	0.75
16x14	755	30.0	6.5	30.0	0.70	0.66
18x8	780	32.0	7.0	32.0	0.75	0.60
18x10	810	32.0	7.0	32.0	0.75	0.68
18x12	850	32.0	7.0	32.0	0.75	0.75
18x14	885	32.0	7.0	32.0	0.75	0.66

Size	Wt.	A	B	C	T	T1
18x16	935	32.0	7.0	32.0	0.75	0.70
20x8	995	35.0	8.0	35.0	0.80	0.60
20x10	1025	35.0	8.0	35.0	0.80	0.68
20x12	1065	35.0	8.0	35.0	0.80	0.75
20x14	1110	35.0	8.0	35.0	0.80	0.66
20x16	1155	35.0	8.0	35.0	0.80	0.70
20x18	1315	35.0	8.0	35.0	0.80	0.75
24x8	1470	40.5	9.0	40.5	0.89	0.60
24x10	1505	40.5	9.0	40.5	0.89	0.68
24x12	1550	40.5	9.0	40.5	0.89	0.75
24x14	1590	40.5	9.0	40.5	0.89	0.66
24x16	1640	40.5	9.0	40.5	0.89	0.70
24x18	1685	40.5	9.0	40.5	0.89	0.75
24x20	1750	40.5	9.0	40.5	0.89	0.80
30x12	2795	49.0	10.0	49.0	1.03	0.75
30x14	2850	49.0	10.0	49.0	1.03	0.66
30x16	2905	49.0	10.0	49.0	1.03	0.70
30x18	2960	49.0	10.0	49.0	1.03	0.75
30x20	3040	49.0	10.0	49.0	1.03	0.80
30x24	3205	49.0	10.0	49.0	1.03	0.89
36x16	4455	54.0	15.3	54.0	1.15	0.70
36x18	4505	54.0	15.3	54.0	1.15	0.75
36x20	4575	54.0	15.3	54.0	1.15	0.80
36x24	4725	54.0	15.3	54.0	1.15	0.89



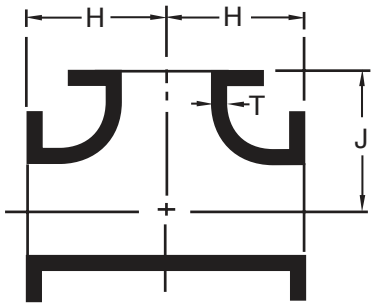
ANSI/AWWA C110/A21.10

Dimensions in inches.
Weights in pounds.

Ductile and Cast Iron Flanged Fittings

TEES

Size	Wt.	H	J	T
2	20	4.5	4.5	0.31
2½	27	5.0	5.0	0.31
3	40	5.5	5.5	0.48
4	65	6.5	6.5	0.52
5	85	7.5	7.5	0.52
6	95	8.0	8.0	0.55
8	155	9.0	9.0	0.60
10	270	11.0	11.0	0.80
12	385	12.0	12.0	0.87
14	435	14.0	14.0	0.66
16	550	15.0	15.0	0.70
18	665	16.5	16.5	0.75
20	855	18.0	18.0	0.80
24	1330	22.0	22.0	0.89
30	2150	25.0	25.0	1.03
36	3160	28.0	28.0	1.15
42	5580	31.0	31.0	1.78
42 (150 psi)	4470	31.0	31.0	1.28

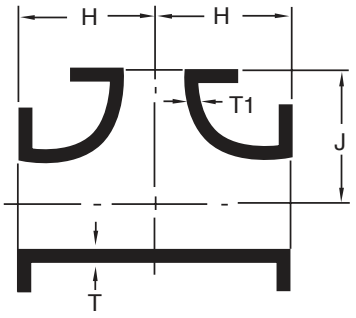


REDUCING TEES

Size	Wt.	H	J	T	T1
3x2	35	5.5	5.5	0.48	0.31
3x2½	37	5.5	5.5	0.48	0.31
4x2	50	6.5	6.5	0.52	0.31
4x2½	55	6.5	6.5	0.52	0.31
4x3	60	6.5	6.5	0.52	0.48
5x4	80	7.5	7.5	0.52	0.52
6x2	85	8.0	8.0	0.55	0.31
6x2½	85	8.0	8.0	0.55	0.31
6x3	85	8.0	8.0	0.55	0.48
6x4	90	8.0	8.0	0.55	0.52
6x5	95	8.0	8.0	0.55	0.52
8x3	135	9.0	9.0	0.60	0.48
8x4	140	9.0	9.0	0.60	0.52
8x6	145	9.0	9.0	0.60	0.55
10x3	200	11.0	11.0	0.68	0.48
10x4	205	11.0	11.0	0.68	0.52
10x6	215	11.0	11.0	0.68	0.55
10x8	225	11.0	11.0	0.68	0.60
12x3	280	12.0	12.0	0.75	0.48
12x4	290	12.0	12.0	0.75	0.52
12x6	295	12.0	12.0	0.75	0.55
12x8	310	12.0	12.0	0.75	0.60
12x10	360	12.0	12.0	0.87	0.80
14x4	365	14.0	14.0	0.66	0.52
14x6	375	14.0	14.0	0.66	0.55
14x8	390	14.0	14.0	0.66	0.60
14x10	400	14.0	14.0	0.66	0.68
14x12	425	14.0	14.0	0.66	0.75
16x4	440	15.0	15.0	0.70	0.52
16x6	465	15.0	15.0	0.70	0.55
16x8	475	15.0	15.0	0.70	0.60
16x10	495	15.0	15.0	0.70	0.68

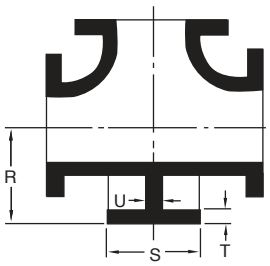
Size	Wt.	H	J	T	T1
16x12	520	15.0	15.0	0.70	0.75
16x14	530	15.0	15.0	0.70	0.66
18x6	480	13.0	15.5	0.75	0.55
18x8	495	13.0	15.5	0.75	0.60
18x10	510	13.0	15.5	0.75	0.68
18x12	535	13.0	15.5	0.75	0.75
18x14	630	16.5	16.5	0.75	0.66
18x16	650	16.5	16.5	0.75	0.70
20x6	610	14.0	17.0	0.80	0.55
20x8	620	14.0	17.0	0.80	0.60
20x10	635	14.0	17.0	0.80	0.68
20x12	660	14.0	17.0	0.80	0.75
20x14	665	14.0	17.0	0.80	0.66
20x16	810	18.0	18.0	0.80	0.70
20x18	820	18.0	18.0	0.80	0.75
24x6	845	15.0	19.0	0.89	0.55
24x8	860	15.0	19.0	0.89	0.60
24x10	880	15.0	19.0	0.89	0.68
24x12	890	15.0	19.0	0.89	0.75
24x14	900	15.0	19.0	0.89	0.66
24x16	915	15.0	19.0	0.89	0.70
24x18	1220	22.0	22.0	0.89	0.75
24x20	1255	22.0	22.0	0.89	0.80
30x6	1460	18.0	23.0	1.03	0.55
30x8	1470	18.0	23.0	1.03	0.60
30x10	1480	18.0	23.0	1.03	0.68
30x12	1490	18.0	23.0	1.03	0.75
30x14	1490	18.0	23.0	1.03	0.66
30x16	1505	18.0	23.0	1.03	0.70
30x18	1515	18.0	23.0	1.03	0.75
30x20	1540	18.0	23.0	1.03	0.80
30x24	2025	25.0	25.0	1.03	0.89

Size	Wt.	H	J	T	T1
36x12	2170	20.0	26.0	1.15	0.75
36x14	2175	20.0	26.0	1.15	0.66
36x16	2185	20.0	26.0	1.15	0.70
36x18	2190	20.0	26.0	1.15	0.75
36x20	2210	20.0	26.0	1.15	0.80
36x24	2255	20.0	26.0	1.15	0.89
36x30	3000	28.0	28.0	1.15	1.03
42x12	3165	23.0	30.0	1.28	0.75
42x14	3170	23.0	30.0	1.28	0.66
42x16	3180	23.0	30.0	1.28	0.70
42x18	3185	23.0	30.0	1.28	0.75
42x20	3205	23.0	30.0	1.28	0.80
42x24	3245	23.0	30.0	1.28	0.89
42x30	4125	31.0	31.0	1.28	1.03
42x36	5360	31.0	31.0	1.78	1.58
48x12	4315	26.0	34.0	1.42	0.75
48x14	4315	26.0	34.0	1.42	0.66
48x16	4330	26.0	34.0	1.42	0.70
48x18	4330	26.0	34.0	1.42	0.75
48x20	4350	26.0	34.0	1.42	0.80
48x24	4385	26.0	34.0	1.42	0.89
48x30	4455	26.0	34.0	1.42	1.03



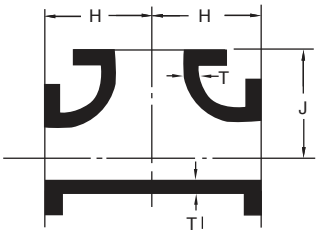
ANSI/AWWA C110/A21.10

Dimensions in inches.
Weights in pounds.



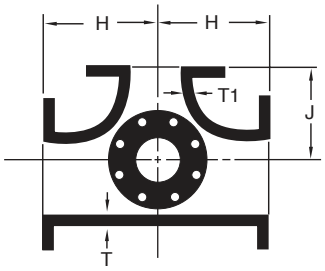
BASE TEES

Size	Weight Base Tee	Weight Base Only	R	S	T	U	BC
3	45	5	4.88	5.00	0.56	0.50	3.88
4	75	10	5.50	6.00	0.62	0.50	4.75
6	110	15	7.00	7.00	0.69	0.62	5.50
8	185	30	8.38	9.00	0.94	0.88	7.50
10	300	30	9.75	9.00	0.94	0.88	7.50
12	430	45	11.25	11.00	1.00	1.00	9.50
14	485	50	12.50	11.00	1.00	1.00	9.50
16	600	50	13.75	11.00	1.00	1.00	9.50
18	740	75	15.00	13.50	1.12	1.12	11.75
20	930	75	16.00	13.50	1.12	1.12	11.75
24	1410	80	18.50	13.50	1.12	1.12	11.75
30	2270	120	23.00	16.00	1.19	1.15	14.25
36	3320	160	26.00	19.00	1.25	1.15	17.00
42	5850	270	30.00	23.50	1.44	1.28	21.25



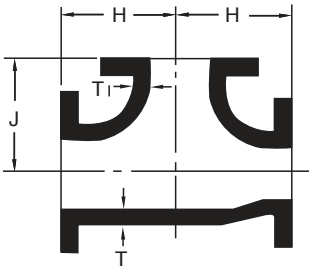
BULLHEAD TEES

Size	Wt.	H	J	T_1	T
2½x2½x3	36	5.5	5.5	0.31	0.48
3x3x4	49	6.5	6.5	0.48	0.52
4x4x6	88	8.0	8.0	0.52	0.55
6x6x8	142	9.0	9.0	0.55	0.60
8x8x10	240	11.0	11.0	0.60	0.68
10x10x12	340	12.0	12.0	0.80	0.87
12x12x16	425	15.0	15.0	0.75	0.75
12x12x24	845	22.0	22.0	0.75	0.89
16x16x24	993	22.0	22.0	0.70	0.89



SIDE OUTLET TEES

Size	Wt.	H	J	T_1	T
4	82	6.5	6.5	0.52	0.52
6	135	8.0	8.0	0.55	0.55
8	210	9.0	9.0	0.60	0.60
10	330	11.0	11.0	0.68	0.80
12	470	12.0	12.0	0.75	0.87
14	650	14.0	14.0	0.66	0.66
16	850	15.0	15.0	0.70	0.70
18	1040	16.5	16.5	0.75	0.75
20	1330	18.0	18.0	0.80	0.80
24	2080	22.0	22.0	0.89	0.89

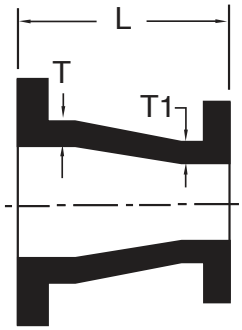


REDUCING TEES ON RUN

Size	Wt.	H	J	T	T_1
4x2x4	50	6.5	6.5	0.52	0.48
4x3x3	53	6.5	6.5	0.52	0.48
4x3x4	55	6.5	6.5	0.52	0.52
6x3x4	85	8.0	8.0	0.55	0.52
6x3x6	91	8.0	8.0	0.55	0.55
6x4x3	86	8.0	8.0	0.55	0.48
6x4x4	90	8.0	8.0	0.55	0.52
6x4x6	95	8.0	8.0	0.55	0.52
8x4x6	140	9.0	9.0	0.60	0.55
8x4x8	135	9.0	9.0	0.60	0.60
8x6x4	125	9.0	9.0	0.60	0.55
8x6x6	145	9.0	9.0	0.60	0.55
8x6x8	160	9.0	9.0	0.60	0.55
10x6x10	234	11.0	11.0	0.80	0.80
10x8x6	210	11.0	11.0	0.80	0.55
10x8x8	227	11.0	11.0	0.80	0.60
10x8x10	248	11.0	11.0	0.80	0.80
12x6x12	300	12.0	12.0	0.87	0.80
12x8x8	275	12.0	12.0	0.87	0.80
12x8x12	310	12.0	12.0	0.75	0.60
12x10x10	325	12.0	12.0	0.87	0.80
12x10x12	350	12.0	12.0	0.87	0.87
14x10x10	380	14.0	14.0	0.66	0.68
14x10x12	400	14.0	14.0	0.66	0.68
14x10x14	425	14.0	14.0	0.66	0.68
16x10x10	490	15.0	15.0	0.70	0.68
16x12x12	525	14.0	14.0	0.70	0.66
16x12x16	600	15.0	15.0	0.70	0.75
16x14x16	630	14.0	14.0	0.70	0.66
20x12x20	660	18.0	18.0	0.80	0.75
20x14x20	680	18.0	18.0	0.80	0.66
24x16x24	915	22.0	22.0	0.89	0.70
36x24x36	2255	28.0	28.0	1.15	0.89

ANSI/AWWA C110/A21.10

Dimensions in inches.
Weights in pounds.



CONCENTRIC REDUCERS

Size	Wt.	L	T	T_1
2½x2	14	5.5	0.31	0.31
3x2	16	6.0	0.48	0.31
3x2½	20	6.0	0.48	0.31
4x2	25	7.0	0.52	0.31
4x2½	28	7.0	0.52	0.31
4x3	30	7.0	0.52	0.48
5x3	38	8.0	0.52	0.48
5x4	40	8.0	0.52	0.52
6x2	35	9.0	0.55	0.31
6x2½	38	9.0	0.55	0.31
6x3	40	9.0	0.55	0.48
6x4	45	9.0	0.55	0.52
6x5	50	9.0	0.55	0.52
8x3	60	11.0	0.60	0.48
8x4	65	11.0	0.60	0.52
8x5	70	11.0	0.60	0.52
8x6	75	11.0	0.60	0.55
10x4	85	12.0	0.68	0.52
10x5	88	12.0	0.68	0.52
10x6	90	12.0	0.68	0.55
10x8	110	12.0	0.68	0.60
12x4	120	14.0	0.75	0.52
12x6	130	14.0	0.75	0.55
12x8	145	14.0	0.75	0.60
12x10	170	14.0	0.75	0.68
14x4	150	16.0	0.66	0.52
14x6	155	16.0	0.66	0.55
14x8	175	16.0	0.66	0.60
14x10	190	16.0	0.66	0.68
14x12	220	16.0	0.66	0.75
16x4	180	18.0	0.70	0.52
16x6	190	18.0	0.70	0.55
16x8	210	18.0	0.70	0.60
16x10	235	18.0	0.70	0.68

Size	Wt.	L	T	T_1
16x12	265	18.0	0.70	0.75
16x14	280	18.0	0.70	0.66
18x6	230	19.0	0.75	0.55
18x8	240	19.0	0.75	0.60
18x10	265	19.0	0.75	0.68
18x12	295	19.0	0.75	0.75
18x14	310	19.0	0.75	0.66
18x16	340	19.0	0.75	0.70
20x6	300	20.0	0.80	0.55
20x8	305	20.0	0.80	0.60
20x10	310	20.0	0.80	0.68
20x12	345	20.0	0.80	0.75
20x14	355	20.0	0.80	0.66
20x16	390	20.0	0.80	0.70
20x18	410	20.0	0.80	0.75
24x8	460	24.0	0.89	0.60
24x10	470	24.0	0.89	0.68
24x12	480	24.0	0.89	0.75
24x14	490	24.0	0.89	0.66
24x16	525	24.0	0.89	0.70
24x18	550	24.0	0.89	0.75
24x20	590	24.0	0.89	0.80
30x18	810	30.0	1.03	0.75
30x20	870	30.0	1.03	0.80
30x24	970	30.0	1.03	0.89
36x20	1230	36.0	1.15	0.80
36x24	1345	36.0	1.15	0.89
36x30	1555	36.0	1.15	1.03
42x24	1820	42.0	1.28	0.89
42x30	2060	42.0	1.28	1.03
42x36	2345	42.0	1.28	1.15
48x30	2625	48.0	1.42	1.03
48x36	2950	48.0	1.42	1.15
48x42	3320	48.0	1.42	1.28

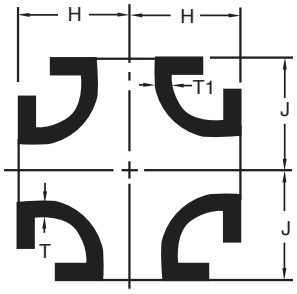
ANSI/AWWA C110/A21.10

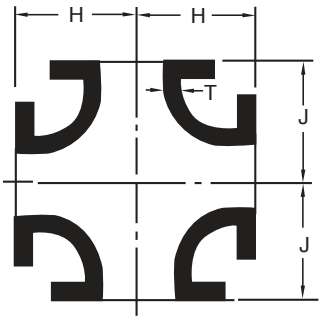
Dimensions in inches.
Weights in pounds.

REDUCING CROSSES

Size	Wt.	H	J	T	T_1
3x2	45	5.5	5.5	0.48	0.31
4x2	60	6.5	6.5	0.52	0.31
4x2 1/2	65	6.5	6.5	0.52	0.31
4x3	70	6.5	6.5	0.52	0.48
6x2	90	8.0	8.0	0.55	0.31
6x3	95	8.0	8.0	0.55	0.48
6x4	110	8.0	8.0	0.55	0.52
8x4	155	9.0	9.0	0.60	0.52
8x6	165	9.0	9.0	0.60	0.55
10x4	220	11.0	11.0	0.68	0.52
10x6	240	11.0	11.0	0.68	0.55
10x8	265	11.0	11.0	0.68	0.60
12x4	310	12.0	12.0	0.75	0.52
12x6	320	12.0	12.0	0.75	0.55
12x8	345	12.0	12.0	0.75	0.60
12x10	415	12.0	12.0	0.87	0.80
14x6	400	14.0	14.0	0.66	0.55
14x8	425	14.0	14.0	0.66	0.60
14x10	460	14.0	14.0	0.66	0.68
14x12	505	14.0	14.0	0.66	0.75
16x6	490	15.0	15.0	0.70	0.55
16x8	520	15.0	15.0	0.70	0.60
16x10	555	15.0	15.0	0.70	0.68
16x12	605	15.0	15.0	0.70	0.75
16x14	620	15.0	15.0	0.70	0.66
18x6	505	13.0	15.5	0.75	0.55
18x8	535	13.0	15.5	0.75	0.60
18x10	560	13.0	15.5	0.75	0.68
18x12	610	13.0	15.5	0.75	0.75
18x14	720	16.5	16.5	0.75	0.66
18x16	765	16.5	16.5	0.75	0.70
20x6	635	14.0	17.0	0.80	0.55
20x8	665	14.0	17.0	0.80	0.60
20x10	685	14.0	17.0	0.80	0.68
20x12	735	14.0	17.0	0.80	0.75
20x14	745	14.0	17.0	0.80	0.66
20x16	915	18.0	18.0	0.80	0.70
20x18	945	18.0	18.0	0.80	0.75
24x6	875	15.0	19.0	0.89	0.55
24x8	895	15.0	19.0	0.89	0.60
24x10	930	15.0	19.0	0.89	0.68
24x12	960	15.0	19.0	0.89	0.75
24x14	975	15.0	19.0	0.89	0.66
24x16	1010	15.0	19.0	0.89	0.70
24x18	1365	22.0	22.0	0.89	0.75
24x20	1430	22.0	22.0	0.89	0.80
30x12	1565	18.0	23.0	1.03	0.75
30x14	1570	18.0	23.0	1.03	0.66
30x16	1605	18.0	23.0	1.03	0.70
30x18	1615	18.0	23.0	1.03	0.75
30x20	1670	18.0	23.0	1.03	0.80
30x24	2245	25.0	25.0	1.03	0.89
36x12	2240	20.0	26.0	1.15	0.75
36x14	2240	20.0	26.0	1.15	0.66
36x16	2270	20.0	26.0	1.15	0.70
36x18	2280	20.0	26.0	1.15	0.75
36x20	2325	20.0	26.0	1.15	0.80
36x24	2405	20.0	26.0	1.15	0.89
36x30	3300	28.0	28.0	1.15	1.03
42x12	3240	23.0	30.0	1.28	0.75
42x16	3270	23.0	30.0	1.28	0.70
42x18	3275	23.0	30.0	1.28	0.75
42x20	3320	23.0	30.0	1.28	0.80

Size	Wt.	H	J	T	T_1
42x24	3395	23.0	30.0	1.28	0.89
42x30	4375	31.0	31.0	1.28	1.03
42x36	5720	31.0	31.0	1.78	1.58
48x10	4350	34.0	26.0	1.42	0.68
48x12	4390	34.0	26.0	1.42	0.75
48x14	4385	34.0	26.0	1.42	0.66
48x16	4415	34.0	26.0	1.42	0.70
48x18	4420	34.0	26.0	1.42	0.75
48x20	4460	34.0	26.0	1.42	0.80
48x24	4535	34.0	26.0	1.42	0.89
48x30	4670	34.0	26.0	1.42	1.03





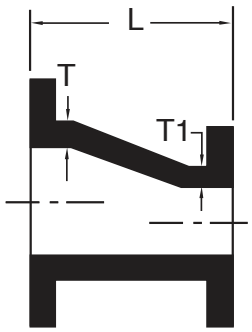
CROSSES

Size	Wt.	H	J	T
2	30	4.5	4.5	0.31
2 1/2	41	5.0	5.0	0.31
3	50	5.5	5.5	0.48
4	80	6.5	6.5	0.52
6	120	8.0	8.0	0.55
8	195	9.0	9.0	0.60
10	330	11.0	11.0	0.80
12	460	12.0	12.0	0.87
14	530	14.0	14.0	0.66
16	665	15.0	15.0	0.70
18	795	16.5	16.5	0.75
20	1015	18.0	18.0	0.80
24	1570	22.0	22.0	0.89
30	2500	25.0	25.0	1.03
36	3620	28.0	28.0	1.15
42 (150 psi)	5060	31.0	31.0	1.28

ANSI/AWWA C110/A21.10

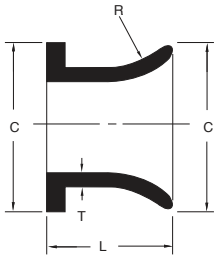
Dimensions in inches.
Weights in pounds.

ECCENTRIC REDUCERS



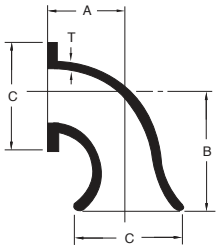
Size	Wt.	L	T	T_1
3x2	16	6	0.48	0.31
3x2 1/2	20	6	0.48	0.31
4x2	26	7	0.52	0.31
4x2 1/2	28	7	0.52	0.31
4x3	30	7	0.52	0.48
6x2	35	9	0.55	0.31
6x2 1/2	38	9	0.55	0.31
6x3	40	9	0.55	0.48
6x4	45	9	0.55	0.52
6x5	50	9	0.55	0.52
8x4	65	11	0.60	0.52
8x5	70	11	0.60	0.52
8x6	75	11	0.60	0.55
10x4	85	12	0.68	0.52
10x6	90	12	0.68	0.55
10x8	110	12	0.68	0.60
12x4	120	14	0.75	0.52
12x6	130	14	0.75	0.55
12x8	145	14	0.75	0.60
12x10	170	14	0.75	0.68
14x6	155	16	0.66	0.55
14x8	175	16	0.66	0.60
14x10	190	16	0.66	0.68
14x12	220	16	0.66	0.75
16x6	190	18	0.70	0.55
16x8	210	18	0.70	0.60
16x10	235	18	0.70	0.68
16x12	265	18	0.70	0.75
16x14	280	18	0.70	0.86

Size	Wt.	L	T	T_1
18x8	240	19	0.75	0.60
18x10	265	19	0.75	0.68
18x12	295	19	0.75	0.75
18x14	310	19	0.75	0.66
18x16	340	19	0.75	0.70
20x10	310	20	0.80	0.68
20x12	345	20	0.80	0.75
20x14	355	20	0.80	0.66
20x16	390	20	0.80	0.70
20x18	410	20	0.80	0.75
24x12	480	24	0.89	0.75
24x14	490	24	0.89	0.66
24x16	525	24	0.89	0.70
24x18	550	24	0.89	0.75
24x20	590	24	0.89	0.80
30x18	810	30	1.03	0.75
30x20	870	30	1.03	0.80
30x24	970	30	1.03	0.89
36x18	1200	36	1.15	0.75
36x20	1230	36	1.15	0.80
36x24	1345	36	1.15	0.89
36x30	1555	36	1.15	1.03
42x24	1820	42	1.28	0.89
42x30	2060	42	1.28	1.03
42x36	2345	42	1.28	1.15
48x30	2625	48	1.42	1.03
48x36	2950	48	1.42	1.15
48x42	3320	48	1.42	1.28



STRAIGHT FLARE PIECES

Size	Wt.	T	C	L	R
3	20	0.40	7.50	8	6
4	30	0.40	9.00	8	6
6	40	0.45	11.00	8	6
8	70	0.53	13.50	10	8
10	95	0.55	16.00	10	10
12	155	0.60	19.00	12	12
14	165	0.65	21.00	12	14
16	240	0.70	23.50	16	16
18	275	0.75	25.00	16	18
20	355	0.80	27.50	18	20
24	480	0.90	32.00	18	24
30	1100	1.07	38.75	24	30
36	1460	1.19	46.00	24	36
42	1900	1.28	53.00	30	42
48	2375	1.42	59.50	18	48

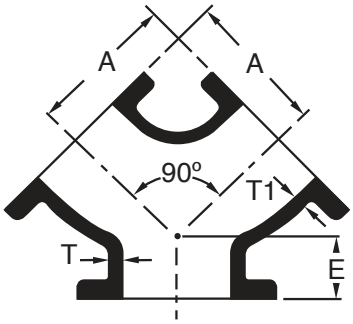


90º FLARE BENDS

Size	Wt	T	C	A	B
3	25	0.40	7.5	5.5	11
4	40	0.40	9.00	6.5	12
6	70	0.45	11.00	8.0	12
8	110	0.53	13.50	9.0	14
10	175	0.55	16.00	11.0	17
12	245	0.60	19.00	12.0	18
14	340	0.65	21.00	14.0	20
16	460	0.70	23.50	15.0	21
18	560	0.75	25.00	16.5	22.5
20	700	0.80	27.50	18.0	24
24	1100	0.90	32.00	22.0	28
30	1840	1.07	38.75	25.0	32
36	2700	1.19	46.00	28.0	35
42	3250	1.28	53.00	31.0	38
48	4425	1.42	59.50	34.0	41

ANSI/AWWA C110/A21.10

Dimensions in inches.
Weights in pounds.



TRUE WYES

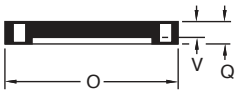
Size	Wt.	T	T_1	A	E
4	55	0.52	0.52	6.5	3.0
6	85	0.55	0.55	8.0	3.5
8	140	0.60	0.60	9.0	4.5
10	205	0.68	0.68	11.0	5.0
12	300	0.75	0.75	12.0	5.5
14	435	0.66	0.66	14.0	6.0

12” and Larger

BLIND FLANGES*

Size	Wt.	O	Q	V
3	9	7.50	0.75	0.69
4	16	9.00	0.94	0.88
6	25	11.00	1.00	0.94
8	42	13.50	1.12	1.06
10	63	16.00	1.19	1.12
12	85	19.00	1.25	0.81
14	120	21.00	1.38	0.88
16	145	23.50	1.44	1.00
18	185	25.00	1.56	1.06
20	245	27.50	1.69	1.12
24	370	32.00	1.88	1.25
30	500	38.75	2.12	1.44
36	790	46.00	2.38	1.62
42	1175	53.00	2.62	1.81

* Blind Flanges can be provided tapped according to customer’s requirement.



10” and Smaller

FLAT BLIND FLANGES

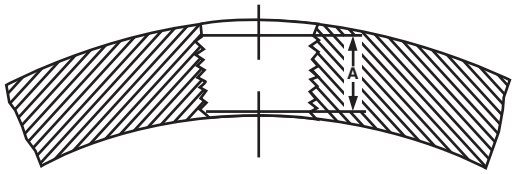
Size	Wt.	O	Q	V
12	85	19.0	1.25	1.25
14	120	21.0	1.38	1.38
16	155	23.5	1.44	1.44
18	190	25.0	1.56	1.56
20	250	27.5	1.69	1.69
24	380	32.0	1.88	1.88

BLIND FLANGES W/2” TAP

Size	Wt	O	Q	V
3	9	7.50	0.75	0.69
4	16	9.00	0.94	0.88
6	25	11.00	1.00	0.94
8	42	13.50	1.12	1.06
10	63	16.00	1.19	1.12
12	85	19.00	1.25	0.81
14	120	21.00	1.38	0.88
16	145	23.50	1.44	1.00
18	185	25.00	1.56	1.06
20	245	27.50	1.69	1.12
24	370	32.00	1.88	1.25
30	500	38.75	2.12	1.44
36	790	46.00	2.38	1.62
42	1175	53.00	2.62	1.81

TAPS AND BOSSES

Flanged Fittings may be drilled and tapped if the fitting wall thickness will provide the effective thread length as shown in the following table.



DRAIN TAPPINGS

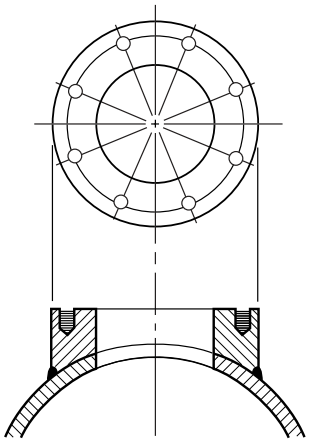
Tap Size	3/8″	1/2″	3/4″	1″	1-1/4″	1-1/2″	2″
Length of Thread "A"	0.41″	0.53″	0.55″	0.68″	0.71″	0.72″	0.76″

These lengths are in accordance with the effective thread length as required in ANSI B2.1. If the tap size is too large to be accommodated by the standard fitting wall thickness, an integrally cast boss may be required to provide the necessary thickness for tapping.

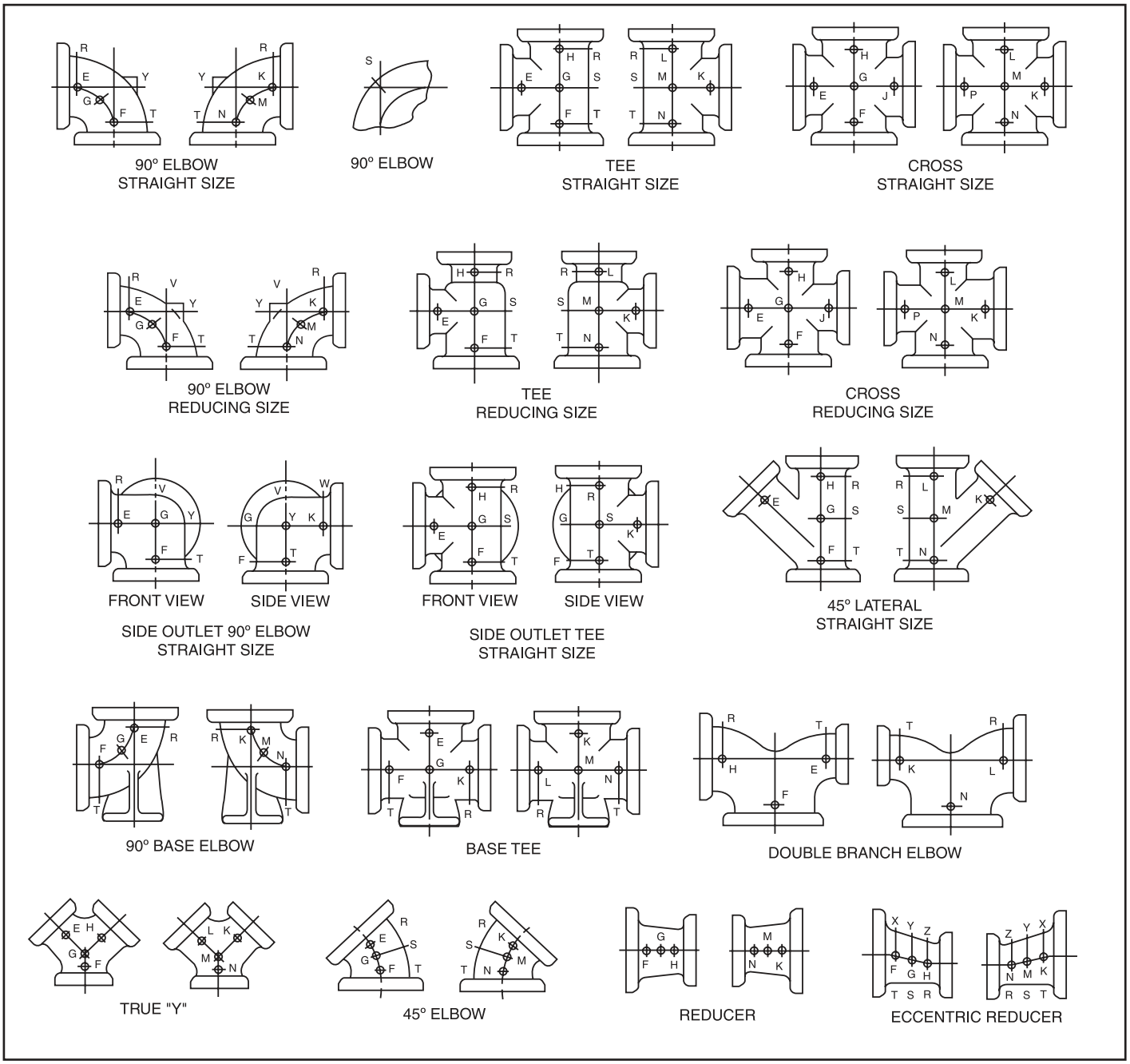
The following will serve as a guideline for maximum tap sizes into standard fitting wall thicknesses for ANSI/AWWA C110/A21.10 Flanged Fittings:

Fitting Size	Maximum Tap Size Without Boss
3"	1/2"
4"-6"	3/4"
8"	1-1/4"
10"-16"	1-1/2"
18"-42"	2"

To accommodate larger size holes that are impractical to thread, it may be necessary to integrally cast a flanged boss to the fitting. In this case, a boss the size of a flange shall be integrally cast. The hole shall be cored or drilled at our option. The flange boss shall be faced and the bolt holes drilled and blind tapped so as not to interfere with the fitting wall thickness.



Methods of Designating Location of Tapped Holes for Drains When Specified



Metalfit

5583 Snowflake Way
Parker, CO 80134

Phone: 303-840-2183
Fax: 303-840-2193
metalfit1@aol.com