

FIBERBOND®

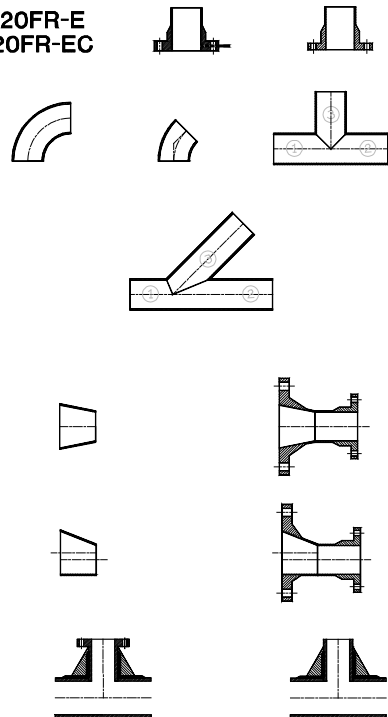
ENGINEERED COMPOSITE PIPING SYSTEMS

SERIES 20FR-E FITTINGS GUIDE

FIBERBOND® SERIES

- 20FR-E
- 20FR-EC

20FR-E
20FR-EC



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April 2018 Edition

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FIBERBOND® Fittings Guide - Series 20FR-E and 20FR-EC

PIPE SERIES:

The fittings contained in this book are available in the following series (unless otherwise noted):

- | | |
|---------|---|
| 20FR-E | 13.8bar (up to 12", 10.3bar up to 24") rated product for firewater, seawater, cooling water, and other high pressure lines, with fire endurance properties. |
| 20FR-EC | Identical to 20FR-E, except it has an electrically conductive exterior for use where grounding is required. |

GASKETS:

1. In systems hydrotesting above 225psig (15.5bar), gaskets with better sealing properties, such as Garlock's "Stress Saver" gasket (www.garlock.com), CTG's "ET Energizer" gasket (www.ctgasket.com) or Asahi's "Low Torque" gasket (www.asahi-america.com), are recommended for sizes 2" (50NB) and larger.
2. O-ring gaskets may also be used, but they do require a special o-ring groove to be machined in one face (and only one face) of the mating pair of flanges. O-ring gaskets have no takeout. Shore "A" hardness values are typically between 55 and 75. A typical material is Buna-N (NBR). For higher temperatures and resistance to certain acids and solvents, Viton® is also available. Viton® is a fluoroelastomer manufactured by DuPont Dow.
3. In systems hydrotesting between 150psig (10.3bar) and 225psig (15.5bar), either full-face 1/8" thick flat rubber gaskets (neoprene, red rubber, etc.) or gaskets with better sealing properties may be used in sizes 2" (50NB) and larger.
4. In systems hydrotesting only up to 150psig (10.3bar), full-face 1/8" thick rubber gaskets are recommended. Shore "A" hardness values can range from 60 to 80, although values down to 50 may be suitable as well as higher values.
5. These gasket recommendations do not take into account the required corrosion resistance of the systems. Make sure that gasket materials are suitable for the intended services. CR (neoprene) is normally good for water and seawater and has excellent weathering resistance. SBR (red rubber) is normally good for water, seawater, alcohol, glycol, and weak acids. NBR (Buna-N) is normally good for water, seawater, dilute acids, and aliphatic hydrocarbons (propane, butane, petroleum oil, mineral oil, grease, diesel fuel). EPDM (ethylene-propylene-diene rubber) is a good choice for hot water service, many solvents and many acid services.

RULES FOR O-RING GASKETS:

1. Takeout of the gasket is essentially zero inches. The gasket is 3/16" (0.1875", 4.8mm) nominal diameter and the groove is 0.15" (3.8mm). With compression of the gasket, the takeout is zero.
2. A groove is only provided in one face of each mating pair of flanges. The #1 situation to avoid with the o-ring gasket is a grooved flange mated directly to another grooved flange. The only solution to this situation is 1) remove one of the grooved

flanges and replace with a flat-face flange, 2) fill one of the grooved flanges with a putty material to obtain a flat-face, or 3) insert a rubber gasket or harder material between the two grooved flanges along with an o-ring gasket in each groove to provide a suitable seal.

3. Other general rules that are usually followed with o-ring gaskets:

A. For FRP to FRP flange connection, the groove is placed in one of the FIBERBOND® flanges at the discretion of the fabricator. For convenience during installation, if the flange is in the vertical, the groove is normally placed in the lower flange.

B. For connections to alloy flanges, the groove is applied to the FIBERBOND® flange. There is only one exception to this rule and that is when the alloy flange is a drilled-and-tapped blind flange supplied by the fabricator. In this case, the groove is applied to the alloy blind flange.

C. For connections to full-face flanged valves, lug type valves, or wafer valves that do not have an integral seal, a groove is applied to the FIBERBOND® flange.

D. For connections to valves with integral seals (not seats), as is typical with many butterfly valves, no groove is applied to the FIBERBOND® flange as no gasket is used.

E. For connections to raised face flanges, an o-ring groove is not needed. A full-face 1/8" (3mm) thick rubber gasket, such as red rubber "SBR" can be used. The takeout for the gasket is 1/8" (3mm).

F. O-ring grooves are not applied to FIBERBOND® flanges smaller than 2" (50mm) diameter. If the connection is not to an alloy blind flange that can be "grooved" by the fabricator, then a full-face 1/8" (3mm) thick rubber gasket can be used.

G. For flange to blind flange connections, normally the groove is placed in the blind flange. Blind flanges are usually slightly less expensive to "groove" than flanges.

FLANGES:

1. All flanges are flat face and should be bolted to flat face flanges. FIBERBOND® flanges can be bolted to raised-face flanges, however, care should be taken when torquing these flanges. Over-torquing can cause cracking in the flange.
2. The flange thickness will differ from ANSI B16.5 150#.
3. The outside diameter and bolt pattern will match 150#. Other bolt patterns, such as 300# and BS4504 PN10 & PN16, can be provided. The flange will still be limited to its standard pressure and temperature rating.
4. Reducing flanges are also available.

NUTS, BOLTS, & WASHERS:

1. There are no special requirements for bolting materials except that ANSI B18.22.1 Type A Narrow "SAE" series washers must be used. ANSI B18.22.1 Type A Wide "USS" washers will not fit on FRP flanges.

LATERAL WELDS AND FITTINGS:

1. Lateral welds are currently only rated for design pressures up to 100psig (6.9bar) up to 16in. (400mm) diameter and 50psig (3.4bar) for larger sizes. If higher pressures are required, please consult with Specialty Plastics.

CERTIFICATIONS AND APPROVALS:

Series 20FR-E ABS 00 NO 32171-X, USCG 164.141/2/0 Sizes 2" - 24"
Series 20FR-EC ABS 00 NO 32171-X, USCG 164.141/3/0 Sizes 2" - 24"

ANSI DIMENSION FITTINGS:

ANSI dimension flanged fittings are available upon request, but are rated only to 150psig (10.3bar). Please consult Specialty Plastics for information on these fittings.

VICTAULIC CONNECTIONS:

For most pipes up to 12in. nominal diameter, ends can be machined to fit a victaulic coupling. Please consult Specialty Plastics for information on these fittings.

VPDMS, PDS, and AutoCAD CATALOGS:

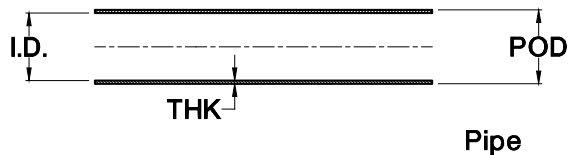
A catalog for Aveva Inc.'s 3D modeling software VPDMS is available by contacting Specialty Plastics (www.fiberbond.com). A 2-D catalog is also available for Autodesk's AutoCAD. A general catalog is also available for Intergraph's PDS.

SPECIAL NOTES ON DRAIN SYSTEMS:

Slopes can be fabricated in FIBERBOND® systems at any angle. When shop prefabrication work is performed by Specialty Plastics, laterals can be fabricated at special angles, such as 45.9 degrees (for a 3/16" sloped header). This eliminates the need for any special dimensioning. The same is true for tees and reducing tees. In sloped systems, elbows are normally kept at their full sweep for 45 or 90 degrees and the pipe is mitered to maintain the slope in the header.

WALL THICKNESSES & OUTSIDE DIAMETERS:

All FIBERBOND® Fiberglass Piping Series are manufactured with a fixed inside diameter. As the pressure rating of the pipe series increases, the wall thickness and outer diameter also increase.



Ratings, Wall Thicknesses, and Outside Diameters

Size	20FR-E and 20FR-EC									
	Rating		I.D.		THK		P.O.D.		Weight	
	(psig)	(bar)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(lb/ft)	(kg/m)
1"	200	13.8	1.00"	25.4	0.25"	6.4	1.50"	38.1	1.0	1.5
1.5"	200	13.8	1.50"	38.1	0.25"	6.4	2.00"	50.8	1.3	2.0
2"	200	13.8	2.00"	50.8	0.31"	7.9	2.62"	66.5	1.5	2.3
2.5"	200	13.8	2.50"	63.5	0.25"	6.4	3.00"	76.2	1.9	2.8
3"	200	13.8	3.00"	76.2	0.25"	6.4	3.50"	88.9	2.2	3.3
4"	200	13.8	4.00"	101.6	0.25"	6.4	4.50"	114.3	2.9	4.4
5"	200	13.8	5.00"	127.0	0.25"	6.4	5.50"	139.7	3.6	5.4
6"	200	13.8	6.00"	152.4	0.31"	7.9	6.63"	168.3	5.9	8.8
8"	200	13.8	8.00"	203.2	0.38"	9.5	8.75"	222.3	8.9	13.2
10"	200	13.8	10.00"	254.0	0.44"	11.1	10.88"	276.2	12.4	18.4
12"	200	13.8	12.00"	304.8	0.50"	12.7	13.00"	330.2	16.4	24.4
14"	150	10.3	14.25"	362.0	0.44"	11.1	15.13"	384.2	17.1	25.5
16"	150	10.3	16.25"	412.8	0.50"	12.7	17.25"	438.2	21.6	32.2
18"	150	10.3	18.25"	463.6	0.56"	14.3	19.38"	492.1	28.9	43.0
20"	150	10.3	20.25"	514.4	0.63"	15.9	21.50"	546.1	34.7	51.7
22"	150	10.3	22.25"	565.2	0.69"	17.5	23.63"	600.2	41.0	61.1
24"	150	10.3	24.25"	616.0	0.75"	19.1	25.75"	654.1	47.8	71.2
30"										
36"										
42"										
48"										
54"										
60"										

1. Sizes 2.5", 5", 22" and 54" are non-standard and are not as readily available as the standard sizes.

CHANGES FROM THE PREVIOUS EDITION

April 2018: Clarified note on when it is acceptable to use 1" as the minimum pup length.

April 2016: Revised statement about ≤ 2 " gaskets at 435psig (30 bar) hydrotests in the Gaskets section to match the Gasket Selection document. Wall thickness and OD for the 2" size corrected to match our other documents.

January 2015: Combined flanges and blinds into one section. Moved bleed rings, vanstone flanges and Fig.19MH/MC blinds to the Special Fittings Guide. Removed Fig.80F3.

January 2013: Added note on flange neck lengths. Added note on the pigmented exterior of fittings and flanges (in the Elbows section). Updated FOD for the 2" size.

January 2012: Updated the drawing for Fig.47JF MNPT olet and changed the layout of information; added note on gaskets.

September 2010: Increased "LS" dimension for 14" and larger Fig.46 branch sizes (e.g. 16"x14", 18"x14", 18"x16", 24"x20") by 2" to 5".

April 2010: Updated available reducing tee sizes.

March 2010: Clarified that the Fig.46 and Fig.48 olets consist of the branch fitting only.

February 2010: Corrected the LTHK2 and L2 lengths for the Fig.10-O orifice flanges.

July 2009: Added data on the non-standard 22" size. Removed Fig.95F and Fig.97.

April 2009: Changed wording on gasket recommendations.

August 2008: Changed wording on material choices for the Fig.47JF MNPT olet and Fig.94 threaded blind flange. Changed "metallic" to "alloy" throughout the document.

February 2007: Corrected the L, L2, and L3 flange neck lengths in sizes 14" and larger. Corrected the hydrotest pressure in the gasket section.

January 2006: Corrected the LS dimension from 8" to 9" for the 6"x3", x2.5", x2", x1.5", and x1" FE olets and from 10" to 9" for the 5"x4" (only the detailed table was corrected).

June 2005: This is the first release of this stand-alone guide for 20FR-E and 20FR-EC. Information was previously contained in our general Fittings Guide. Added weights and SI units to all the tables. Updated letter designations in the figures so that all are unique (e.g. changed "A" to "G" for Fig.40, Fig.43 tees and changed "A" to "H" for Fig.48 olets). Changed hemicap to cap. Added reducing tees.

February 2005: Corrected lateral pressure ratings. Updated ratings (to 150psig) and thicknesses for 20FR-E in the 20" and 24" sizes.

December 2004: Added new note on gaskets. Added thicknesses and O.D.s for fittings. Added note for Fig.47JF MNPT olets.

August 2003: No dimensional changes were made. Additional information was added about the threaded connections, rules for o-rings, and selection of gaskets in the preceding pages.

April 2003: Details of the Figure 47 FNPT metallic saddle have been removed from the Fittings Guide. Details of the Figure 47JF MNPT metallic saddle have been added. The "C" dimension of the Figure 88 Reducing Lateral was corrected. The thicknesses of the Figure 17 Bleed Ring were changed to 1.5" for sizes up to 12". Changed dummy leg size for Figure 90 for elbow sizes 6", 14", 16", and 18".

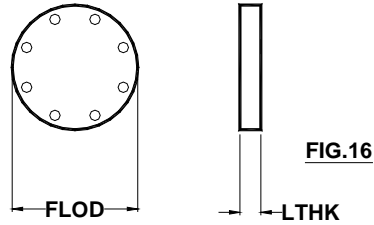
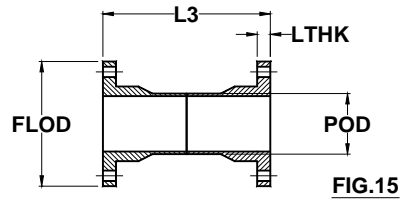
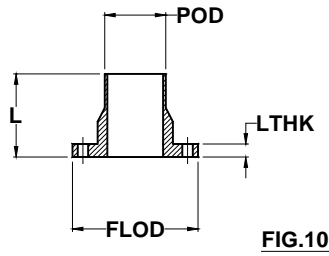
May 2002: Quantity and size of bolts and capscrew data was added to the Bolt Lengths table. Added a "Blinds & Bleed Rings" section with Figures 16, 17, 19H, and 19C. Information on "pup" lengths was added to the Dummy Legs & Hemicaps section. Information on the availability of reducing flanges was added to the Flanges section.

March 2002: The "C" and "C+L" dimensions for the 3" and 6" Figure 30 elbows were corrected. The "C" dimension was changed from 1 5/8" to 1 7/8" for 3" diameter and 3 3/8" to 3 3/4" for 6" diameter. Other minor text changes were made.

January 2002: Only minor changes have been made. The lettering terminology for the Figure 20, 20PF, and 20FF elbows were corrected so that the table matched the figure. No values changed. The pipe outside diameter of various series was listed incorrectly for the 18" size only. The outside diameters that were 18.38" should have been listed as 19.38".

April 2001: The "B" dimension in the table for Figures 46 and 48 was changed to "LS" to match the figure. The "E" and "E+L" dimensions for a 6" x 2" reducer (Fig.60 & 61) were changed to 10" and 16", respectively. The previous dimensions were incorrect. A great deal of new information is included in this edition of the Fittings Guide. The only change from our previous edition is the 'L' dimension of our Fig.10 Flange in sizes 20" and larger. These dimensions have increased by 3" for sizes 20", and 24". These changes have also affected the dimensions of Fig.20PF, 20FF, 30PF, 30FF, 60PF, 60FF, 61PF, and 61FF.

FLANGES & BLINDS



Size	Fig.10 and Fig.11				Fig. 15					
	L		Max.L		L3		Min. L3			
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)		
1"	6"	152.4	6"	152.4	12"	304.8	6"	152.4		
1.5"	6"	152.4	6"	152.4	12"	304.8	6"	152.4		
2"	6"	152.4	12"	304.8	12"	304.8	7"	177.8		
2.5"	6"	152.4	12"	304.8	12"	304.8	7"	177.8		
3"	6"	152.4	12"	304.8	12"	304.8	7"	177.8		
4"	6"	152.4	12"	304.8	12"	304.8	7"	177.8		
5"	6"	152.4	12"	304.8	12"	304.8	8"	203.2		
6"	8"	203.2	12"	304.8	16"	406.4	8"	203.2		
8"	8"	203.2	12"	304.8	16"	406.4	8"	203.2		
10"	10"	254.0	18"	457.2	20"	508.0	9"	228.6		
12"	10"	254.0	18"	457.2	20"	508.0	10"	254.0		
14"	14"	355.6	18"	457.2	28"	711.2	10"	254.0		
16"	14"	355.6	18"	457.2	28"	711.2	11"	279.4		
18"	15"	381.0	18"	457.2	30"	762.0	11"	279.4		
20"	16"	406.4	18"	457.2	32"	812.8	12"	304.8		
22"	20"	508.0	24"	609.6	40"	1016.0	15"	381.0		
24"	20"	508.0	24"	609.6	40"	1016.0	15"	381.0		
30"										
36"										
42"										
48"										
54"										
60"										

FLANGES & BLINDS (cont'd)

1. Flanges that are shipped loose for site installation are normally manufactured with a neck length up to 3" longer than the "L" and "L2" values specified in this table.

2. For Fig.15, the minimum L length for the Fig.15 flange requires special fabrication techniques and normally requires additional time for delivery.

Flange Thicknesses and Flange O.D.s

Size	LTHK		FLOD					
	Fig.10, 15							
	(in.)	(mm)	(in.)	(mm)				
1"	0.50"	12.7	4.25"	108.0				
1.5"	0.50"	12.7	5.00"	127.0				
2"	0.69"	17.5	6.00"	152.4				
2.5"	0.75"	19.1	7.00"	177.8				
3"	0.81"	20.6	7.50"	190.5				
4"	1.00"	25.4	9.00"	228.6				
5"	1.06"	27.0	10.00"	254.0				
6"	1.19"	30.2	11.00"	279.4				
8"	1.38"	34.9	13.50"	342.9				
10"	1.63"	41.3	16.00"	406.4				
12"	1.88"	47.6	19.00"	482.6				
14"	1.75"	44.5	21.00"	533.4				
16"	1.94"	49.2	23.50"	596.9				
18"	2.00"	50.8	25.00"	635.0				
20"	2.13"	54.0	27.50"	698.5				
22"	2.25"	57.2	29.50"	749.3				
24"	2.38"	60.3	32.00"	812.8				
30"								
36"								
42"								
48"								
54"								
60"								

FLANGES & BLINDS (cont'd)

Flange Weights

Size	Fig.10		Fig.15		Fig.16			
	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)		
	1"	1.4	0.6	2.8	1.3	0.9		
1.5"	1.6	0.7	3.3	1.5	1.0	0.4		
2"	2.4	1.1	4.7	2.1	1.6	0.7		
2.5"	3.0	1.4	6.0	2.7	2.0	0.9		
3"	3.5	1.6	6.9	3.1	2.3	1.1		
4"	5.0	2.3	9.9	4.5	3.5	1.6		
5"	6.0	2.7	12.0	5.5	4.2	1.9		
6"	10.0	4.5	20.0	9.1	6.0	2.7		
8"	15.5	7.0	31.0	14.1	9.6	4.3		
10"	24.9	11.3	49.8	22.6	14.6	6.7		
12"	35.3	16.0	70.6	32.0	21.7	9.9		
14"	41.1	18.7	82.3	37.3	24.0	10.9		
16"	53.9	24.5	107.8	48.9	32.3	14.7		
18"	68.6	31.2	137.2	62.3	39.7	18.0		
20"	83.8	38.1	167.7	76.1	49.2	22.3		
22"	97.8	44.4	195.6	88.8	56.8	25.8		
24"	120.0	54.5	239.9	108.9	72.2	32.8		
30"								
36"								
42"								
48"								
54"								
60"								

FLANGES & BLINDS (cont'd)

Recommended Stud Bolt Length (LSSB)

Size	No./Size	Fig.10, 15			
		F/F		F/S	
1"	(4) 1/2"	2.75"	70	2.75"	70
1.5"	(4) 1/2"	2.75"	70	3.00"	76
2"	(4) 5/8"	3.25"	83	3.50"	89
2.5"	(4) 5/8"	3.50"	89	3.50"	89
3"	(4) 5/8"	3.50"	89	3.75"	95
4"	(8) 5/8"	4.00"	102	4.00"	102
5"	(8) 3/4"	4.25"	108	4.25"	108
6"	(8) 3/4"	4.50"	114	4.50"	114
8"	(8) 3/4"	5.00"	127	4.75"	121
10"	(12) 7/8"	5.75"	146	5.25"	133
12"	(12) 7/8"	6.25"	159	5.50"	140
14"	(12) 1"	6.25"	159	5.75"	146
16"	(16) 1"	6.50"	165	6.00"	152
18"	(16) 1 1/8"	7.00"	178	6.50"	165
20"	(20) 1 1/8"	7.50"	191	6.75"	171
22"	(20) 1 1/4"	8.00"	203		
24"	(20) 1 1/4"	8.25"	210	7.50"	191
30"	(28) 1 1/4"				
36"	(32) 1 1/2"				
42"	(36) 1 1/2"				
48"	(44) 1 1/2"				
54"	(44) 1 3/4"				
60"	(52) 1 3/4"				

1. The F/F column is for FRP to FRP flange connections. The F/S column is for FRP to 150# alloy flange connections.

2. For FRP to FRP flange connections, $LSSB = 2 * (\text{Flange Thickness} + \text{PTOL} + \text{Nut Thickness}) + 1/8" + (2 * 1/8")$.

3. For FRP to 150# alloy flange connections, $LSSB = \text{Flange Thickness} + \text{PTOL} + 150\# \text{ Flange Thickness} + \text{PTOL} + (2 * \text{Nut Thickness}) + 1/8" + (2 * 1/8")$.

4. PTOL = 1/8" up to 18" nominal size and 3/16" above 18" nominal size. 1/8" accounts for the gasket. (2 * 1/8") accounts for two washers.

ELBOWS

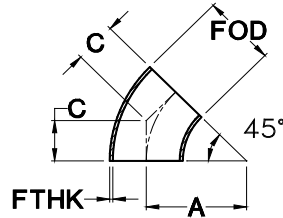
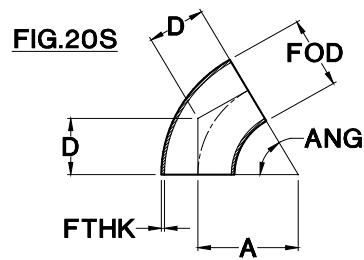
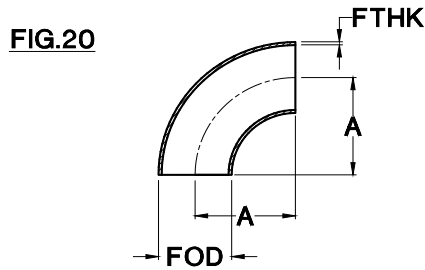


FIG.30

Size	Fig.20,20S,30		Fig.20S		Fig.30		Fig.20, 20S, 30			
	A		D	ANG	C		FTHK		FOD	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)
1"	1.50"	38	ANG can be from 20 to 89degrees.				0.25"	6	1.50"	38
1.5"	2.25"	57	D = 1.5 * Size * TAN (ANG/2).		1.25"	32	0.31"	8	2.00"	51
2"	3.00"	76			2.56"	65	0.25"	6	3.00"	76
2.5"	3.75"	95	Smaller angles can be mitered.		1.88"	48	0.25"	6	3.50"	89
3"	4.50"	114			2.50"	64	0.25"	6	4.50"	114
4"	6.00"	152			3.13"	79	0.25"	6	5.50"	140
5"	7.50"	191			3.75"	95	0.31"	8	6.63"	168
6"	9.00"	229			5.00"	127	0.44"	11	8.88"	225
8"	12.00"	305			6.25"	159	0.50"	13	11.00"	279
10"	15.00"	381			7.50"	191	0.63"	16	13.25"	337
12"	18.00"	457								
14"	21.00"	533			8.75"	222	0.56"	14	15.38"	391
16"	24.00"	610			10.00"	254	0.63"	16	17.50"	445
18"	27.00"	686			11.25"	286	0.69"	17	19.63"	498
20"	30.00"	762			12.50"	318	0.75"	19	21.75"	552
22"	Not Available				Not Available					
24"	36.00"	914			15.00"	381	0.88"	22	26.00"	660
30"										
36"										
42"										
48"										
54"										
60"										

ELBOWS (cont'd)

1. 42" and larger elbows are mitered, all other sizes are full sweep.

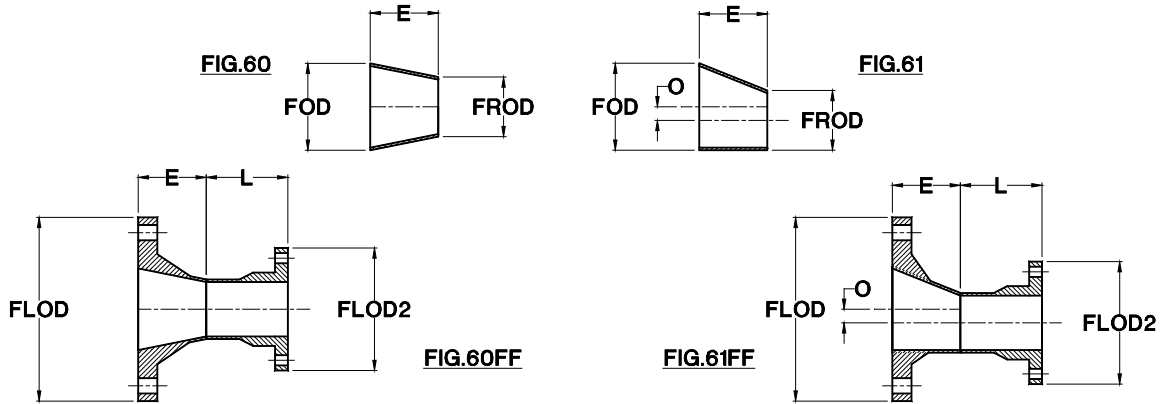
Elbow Ratings and Weights

Size	Rating		Fig.20		Fig.30	
	(psig)	(bar)	Weight		Weight	
			(lb)	(kg)	(lb)	(kg)
1"	200	13.8	0.2	0.1		
1.5"	200	13.8	0.4	0.2		
2"	200	13.8	0.7	0.3	0.3	0.2
2.5"	200	13.8	0.9	0.4	0.4	0.2
3"	200	13.8	1.5	0.7	0.8	0.3
4"	200	13.8	2.6	1.2	1.3	0.6
5"	200	13.8	3.2	1.5	1.6	0.7
6"	200	13.8	6.6	3.0	3.3	1.5
8"	200	13.8	15.9	7.2	8.0	3.6
10"	200	13.8	29.1	13.2	14.5	6.6
12"	200	13.8	51.2	23.3	25.6	11.6
14"	150	10.3	64.8	29.4	32.4	14.7
16"	150	10.3	90.0	40.8	45.0	20.4
18"	150	10.3	127.5	57.9	63.8	28.9
20"	150	10.3	165.7	75.2	82.9	37.6
22"	150	10.3				
24"	150	10.3	274.9	124.8	137.5	62.4
30"	100	6.9				
36"	100	6.9				
42"	50	3.4				
48"	50	3.4				
54"	50	3.4				
60"	50	3.4				

1. These ratings are also valid for flanges (Fig.10, Fig.10O, Fig.11, & Fig.15), blind flanges (Fig.16, Fig.19MC, Fig.19MH), bleed rings (Fig.17), tees (Fig.40, Fig.40PPF, & Fig.40F3), saddles (Fig.46 & Fig.48), reducers (Fig.60 & Fig.61), caps (Fig.96), MNPT saddles (Fig.47JF), and "dummy legs" (Fig.90 & Fig.91). Laterals (Fig.80 & Fig.80F3) and reducing laterals (Fig.88) are only rated to 100psig up to 16" and 50psig up to 60".

2. Fittings and flanges that are shipped loose for site installation are typically shipped without any pigmented gelcoat. This is due to the fact that the gelcoat would have to be removed during the bonding process.

REDUCERS



Size	E		E+L		FOD		FROD		O	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)
1.5"x1"	1.25"	32	7.25"	184	2.00"	51	1.50"	38	0.25"	6
2"x1.5"	1.25"	32	7.25"	184	2.62"	67	2.00"	51	0.31"	8
2"x1"	2.50"	64	8.50"	216	2.62"	67	1.50"	38	0.56"	14
2.5"x2"	1.25"	32	7.25"	184	3.00"	76	2.62"	67	0.19"	5
3"x2.5"	1.25"	32	7.25"	184	3.50"	89	3.00"	76	0.25"	6
3"x2"	2.50"	64	8.50"	216	3.50"	89	2.62"	67	0.44"	11
3"x1.5"	3.75"	95	9.75"	248	3.50"	89	2.00"	51	0.75"	19
3"x1"	5"	127	11"	279	3.50"	89	1.50"	38	1.00"	25
4"x3"	2.50"	64	8.50"	216	4.50"	114	3.50"	89	0.50"	13
4"x2.5"	3.75"	95	9.75"	248	4.50"	114	3.00"	76	0.75"	19
4"x2"	5"	127	11"	279	4.50"	114	2.62"	67	0.94"	24
4"x1.5"	6.25"	159	12.25"	311	4.50"	114	2.00"	51	1.25"	32
4"x1"	7.50"	191	13.50"	343	4.50"	114	1.50"	38	1.50"	38
5"x4"	2.50"	64	8.50"	216	5.50"	140	4.50"	114	0.50"	13
6"x5"	2.50"	64	8.50"	216	6.63"	168	5.50"	140	0.56"	14
6"x4"	5"	127	11"	279	6.63"	168	4.50"	114	1.06"	27
6"x3"	7.50"	191	13.50"	343	6.63"	168	3.50"	89	1.56"	40
6"x2.5"	8.75"	222	14.75"	375	6.63"	168	3.00"	76	1.81"	46
6"x2"	10"	254	16"	406	6.63"	168	2.62"	67	2.00"	51
8"x6"	5"	127	13"	330	8.88"	225	6.63"	168	1.13"	29
8"x5"	7.50"	191	13.50"	343	8.88"	225	5.50"	140	1.69"	43
8"x4"	10"	254	16"	406	8.88"	225	4.50"	114	2.19"	56
8"x3"	12.50"	318	18.50"	470	8.88"	225	3.50"	89	2.69"	68

REDUCERS (cont'd)

1. Offset dimension for eccentric reducers is 0.5" x (FOD - FROD).
2. Reducers may be available in other sizes than those shown above. Min. E+L dimensions are also available.
3. The FLOD and FLOD2 dimensions match ASME B16.5 150# and B16.1 125# O.D.s.

Reducer Dimensions (cont'd)

Size	E		E+L		FOD		FROD		O	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)
10"x8"	5"	127	13"	330	11.00"	279	8.88"	225	1.06"	27
10"x6"	10"	254	18"	457	11.00"	279	6.63"	168	2.19"	56
10"x5"	12.50"	318	18.50"	470	11.00"	279	5.50"	140	2.75"	70
10"x4"	15"	381	21"	533	11.00"	279	4.50"	114	3.25"	83
12"x10"	5"	127	15"	381	13.25"	337	11.00"	279	1.13"	29
12"x8"	10"	254	18"	457	13.25"	337	8.88"	225	2.19"	56
12"x6"	15"	381	23"	584	13.25"	337	6.63"	168	3.31"	84
14"x12"	5"	127	15"	381	15.38"	391	13.25"	337	1.06"	27
14"x10"	10"	254	20"	508	15.38"	391	11.00"	279	2.19"	56
14"x8"	15"	381	23"	584	15.38"	391	8.88"	225	3.25"	83
16"x14"	5"	127	17"	432	17.50"	445	15.38"	391	1.06"	27
16"x12"	10"	254	20"	508	17.50"	445	13.25"	337	2.13"	54
16"x10"	15"	381	25"	635	17.50"	445	11.00"	279	3.25"	83
18"x16"	5"	127	17"	432	19.63"	498	17.50"	445	1.06"	27
18"x14"	10"	254	22"	559	19.63"	498	15.38"	391	2.13"	54
18"x12"	15"	381	25"	635	19.63"	498	13.25"	337	3.19"	81
20"x18"	5"	127	17"	432	21.75"	552	19.63"	498	1.06"	27
20"x16"	10"	254	22"	559	21.75"	552	17.50"	445	2.13"	54
20"x14"	15"	381	27"	686	21.75"	552	15.38"	391	3.19"	81
22"x20"	5"	127	20"	508	23.88"	606	21.75"	552	1.06"	27
24"x22"	5"	127	25"	635	26.00"	660	23.88"	606	1.06"	27
24"x20"	10"	254	25"	635	26.00"	660	21.75"	552	2.13"	54
24"x18"	15"	381	27"	686	26.00"	660	19.63"	498	3.19"	81
30"x24"										
36"x30"										
42"x36"										
48"x42"										
54"x48"										
60"x54"										

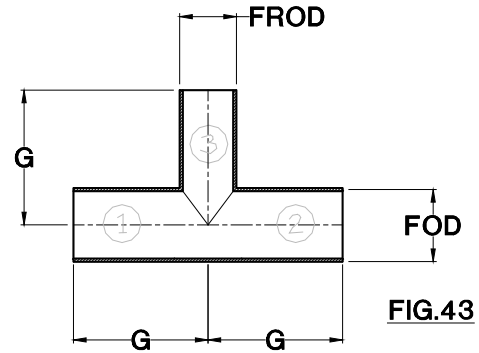
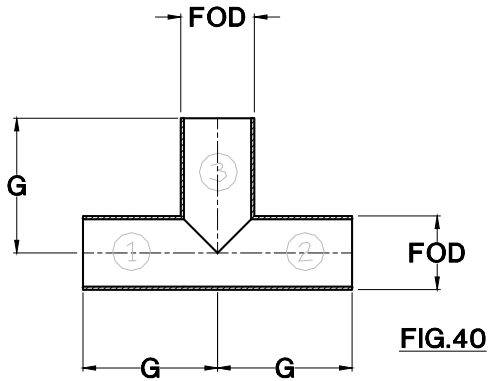
REDUCERS (cont'd)

Reducer Weights

Size	Fig.60, 61		Fig.60FF, 61FF	
	(lb)	(kg)	(lb)	(kg)
1.5"x1"	0.1	0.0	2.5	1.1
2"x1.5"	0.3	0.1	3.5	1.6
2"x1"	0.3	0.1	3.3	1.5
2.5"x2"	0.2	0.1	4.6	2.1
3"x2.5"	0.4	0.2	5.7	2.6
3"x2"	0.4	0.2	5.1	2.3
3"x1.5"	0.8	0.4	4.8	2.2
3"x1"	0.8	0.4	4.6	2.1
4"x3"	0.5	0.2	7.5	3.4
4"x2.5"	1.0	0.5	7.5	3.4
4"x2"	1.0	0.5	6.9	3.1
4"x1.5"	1.6	0.7	6.7	3.0
4"x1"	1.6	0.7	6.5	2.9
5"x4"	0.6	0.3	9.8	4.4
6"x5"	0.9	0.4	12.9	5.9
6"x4"	1.8	0.8	12.8	5.8
6"x3"	2.6	1.2	12.1	5.5
6"x2.5"	3.5	1.6	12.5	5.7
6"x2"	3.5	1.6	11.9	5.4
8"x6"	3.2	1.4	22.7	10.3
8"x5"	4.8	2.2	20.3	9.2
8"x4"	6.3	2.9	20.9	9.5
8"x3"	7.9	3.6	20.9	9.5
10"x8"	4.6	2.1	34.8	15.8
10"x6"	9.3	4.2	33.9	15.4
10"x5"	11.6	5.3	32.2	14.6
10"x4"	13.9	6.3	33.5	15.2

Size	Fig.60, 61		Fig.60FF, 61FF	
	(lb)	(kg)	(lb)	(kg)
12"x10"	6.8	3.1	53.4	24.2
12"x8"	13.6	6.2	50.8	23.1
12"x6"	20.4	9.3	52.1	23.6
14"x12"	7.4	3.3	66.7	30.3
14"x10"	14.7	6.7	63.7	28.9
14"x8"	22.1	10.0	61.6	28.0
16"x14"	8.9	4.1	82.4	37.4
16"x12"	17.9	8.1	85.5	38.8
16"x10"	26.8	12.2	83.5	37.9
18"x16"	11.3	5.1	123.1	55.9
18"x14"	22.5	10.2	122.5	55.6
18"x12"	33.8	15.4	111.9	50.8
20"x18"	13.2	6.0	131.0	59.5
20"x16"	26.4	12.0	129.4	58.8
20"x14"	39.6	18.0	129.9	59.0
22"x20"	16.0	7.3		
24"x22"	18.2	8.3		
24"x20"	36.5	16.6	192.5	87.4
24"x18"	54.7	24.8	195.5	88.8
30"x24"				
36"x30"				
42"x36"				
48"x42"				
54"x48"				
60"x54"				

EQUAL SIZE & REDUCING TEES



Size	Fig.40					
	G		FOD		Weight	
	(in.)	(mm)	(lb)	(kg)	(lb)	(kg)
1"	5"	127	1.50"	38	2.4	1.1
1.5"	5.5"	140	2.00"	51	3.4	1.6
2"	6"	152	2.62"	67	2.0	0.9
2.5"	6.5"	165	3.00"	76	2.4	1.1
3"	7"	178	3.50"	89	3.4	1.5
4"	8"	203	4.50"	114	5.0	2.3
5"	9"	229	5.50"	140	6.2	2.8
6"	10"	254	6.63"	168	10.5	4.8
8"	12"	305	8.88"	225	22.8	10.4
10"	14"	356	11.00"	279	38.9	17.7
12"	16"	406	13.25"	337	65.2	29.6
14"	18"	457	15.38"	391	79.6	36.1
16"	20"	508	17.50"	445	107.4	48.8
18"	21"	533	19.63"	498	228.4	103.7
20"	22"	559	21.75"	552	284.8	129.3
22"	23"	584	23.63"	600	359.5	163.2
24"	24"	610	26.00"	660	445.8	202.4
30"						
36"						
42"						
48"						
54"						
60"						

EQUAL SIZE & REDUCING TEES (cont'd)

Size	Fig.43							
	G		FOD		FROD		Weight	
	(in.)	(mm)	(lb)	(kg)	(lb)	(kg)	(lb)	(kg)
8"x6"	12"	305	8.88"	225	6.63"	168	19.9	9.0
10"x8"	14"	356	11.00"	279	8.88"	225	35.5	16.1
10"x6"	14"	356	11.00"	279	6.63"	168	31.4	14.3
12"x10"	16"	406	25.00"	635	11.00"	279	59.2	26.9
12"x8"	16"	406	13.25"	337	8.88"	225	54.5	24.7
14"x12"	18"	457	15.38"	391	13.25"	337	78.7	35.7
14"x10"	18"	457	15.38"	391	11.00"	279	70.8	32.2
16"x14"	20"	508	17.50"	445	15.38"	391	102.6	46.6
16"x12"	20"	508	17.50"	445	13.25"	337	100.2	45.5

OLETS, PLAIN AND FLANGED

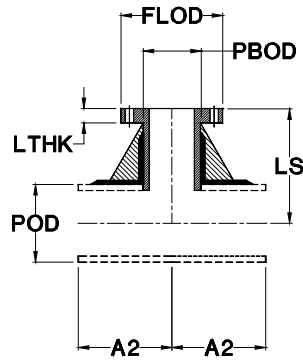


FIG.46

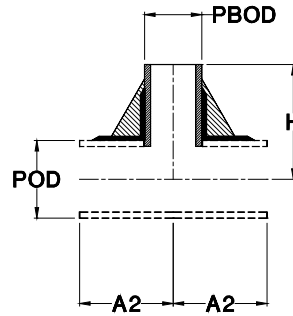


FIG.48

A2							
6"	7"	8"	10"	12"	14"	16"	18"

Branch Diameter							
1", 1.5", 2"	2.5", 3"	4"	5", 6"	8"	10"	12"	14"

H	Header Diameter
6"	1"
6"	1.5"
6"	2"
6"	2.5"
7"	3"
8"	4"
10"	5"
10"	6"
12"	8"
14"	10"
16"	12"
18"	14"
20"	16"
21"	18"
22"	20"
23"	22"
24"	24"
30"	30"
33"	36"
36"	42"
45"	48"
54"	54"
54"	60"

Header Diameter	Header Diameter
1"	1"
1.5"	1.5"
2"	2"
2.5"	2.5"
3"	3"
4"	4"
5"	5"
6"	6"
8"	8"
10"	10"
12"	12"
14"	14"
16"	16"
18"	18"
20"	20"
22"	22"
24"	24"
30"	30"
36"	36"
42"	42"
48"	48"
54"	54"
60"	60"

LS								
7"								
7"								
7.5"								
7.5"	7.5"							
8"	8"							
9"	9"	9"						
9"	9"	9"	11"					
10"	10"	10"	12"					
11"	11"	11"	13"	13"				
12"	12"	12"	14"	14"	16"			
13"	13"	13"	15"	15"	17"	17"		
14"	14"	14"	16"	16"	18"	18"	22"	
15"	15"	15"	17"	17"	19"	19"	23"	
16"	16"	16"	18"	18"	20"	20"	24"	
17"	17"	17"	19"	19"	21"	21"	26"	
18"	18"	18"	20"	20"	22"	22"	29"	

- The 'H' dimension is based on header size. The 'A2' dimension is based on branch size. The 'LS' dimension is based on both header and branch size; e.g. 3" on 6" Fig. 46 has LS = 9", A2 = 7"
- An outlet fitting includes only the branch components. Unless purchased as part of a pre-fabricated (pre-assembled) system, it does require some assembly and bonding work.

OLETS, PLAIN AND FLANGED (cont'd)

Flanged End Olet Dimensions

Size	LS		A2		LTHK		FLOD		Weight	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(lb)	(kg)
1.5"x1"	7.00"	178	6.00"	152	0.50"	13	4.25"	108	2.8	1.3
2"x1.5"	7.00"	178	6.00"	152	0.50"	13	5.00"	127	3.6	1.6
2"x1"	7.00"	178	6.00"	152	0.50"	13	4.25"	108	2.8	1.3
2.5"x2"	7.50"	191	6.00"	152	0.69"	17	6.00"	152	4.9	2.2
3"x2.5"	7.50"	191	7.00"	178	0.75"	19	7.00"	178	6.0	2.7
3"x2"	7.50"	191	6.00"	152	0.69"	17	6.00"	152	4.9	2.2
3"x1.5"	7.50"	191	6.00"	152	0.50"	13	5.00"	127	3.6	1.6
3"x1"	7.50"	191	6.00"	152	0.50"	13	4.25"	108	2.8	1.3
4"x3"	8.00"	203	7.00"	178	0.81"	21	7.50"	191	7.0	3.2
4"x2.5"	8.00"	203	7.00"	178	0.75"	19	7.00"	178	6.0	2.7
4"x2"	8.00"	203	6.00"	152	0.69"	17	6.00"	152	4.9	2.2
4"x1.5"	8.00"	203	6.00"	152	0.50"	13	5.00"	127	3.6	1.6
4"x1"	8.00"	203	6.00"	152	0.50"	13	4.25"	108	2.8	1.3
5"x4"	9.00"	229	8.00"	203	1.00"	25	9.00"	229	9.6	4.3
6"x5"	11.00"	279	10.00"	254	1.06"	27	10.00"	254	11.7	5.3
6"x4"	9.00"	229	8.00"	203	1.00"	25	9.00"	229	9.6	4.3
6"x3"	9.00"	229	7.00"	178	0.81"	21	7.50"	191	7.0	3.2
6"x2.5"	9.00"	229	7.00"	178	0.75"	19	7.00"	178	6.0	2.7
6"x2"	9.00"	229	6.00"	152	0.69"	17	6.00"	152	4.9	2.2
6"x1.5"	9.00"	229	6.00"	152	0.50"	13	5.00"	127	3.6	1.6
6"x1"	9.00"	229	6.00"	152	0.50"	13	4.25"	108	2.8	1.3
8"x6"	12.00"	305	10.00"	254	1.19"	30	11.00"	279	18.6	8.4
8"x5"	12.00"	305	10.00"	254	1.06"	27	10.00"	254	11.7	5.3
8"x4"	10.00"	254	8.00"	203	1.00"	25	9.00"	229	9.6	4.3
8"x3"	10.00"	254	7.00"	178	0.81"	21	7.50"	191	7.0	3.2
8"x2.5"	10.00"	254	7.00"	178	0.75"	19	7.00"	178	6.0	2.7
8"x2"	10.00"	254	6.00"	152	0.69"	17	6.00"	152	4.9	2.2
8"x1.5"	10.00"	254	6.00"	152	0.50"	13	5.00"	127	3.6	1.6
8"x1"	10.00"	254	6.00"	152	0.50"	13	4.25"	108	2.8	1.3
10"x8"	13.00"	330	12.00"	305	1.38"	35	13.50"	343	38.8	17.6
10"x6"	13.00"	330	10.00"	254	1.19"	30	11.00"	279	18.6	8.4
10"x5"	13.00"	330	10.00"	254	1.06"	27	10.00"	254	11.7	5.3
10"x4"	11.00"	279	8.00"	203	1.00"	25	9.00"	229	9.6	4.3
10"x3"	11.00"	279	7.00"	178	0.81"	21	7.50"	191	7.0	3.2
10"x2.5"	11.00"	279	7.00"	178	0.75"	19	7.00"	178	6.0	2.7
10"x2"	11.00"	279	6.00"	152	0.69"	17	6.00"	152	4.9	2.2
10"x1.5"	11.00"	279	6.00"	152	0.50"	13	5.00"	127	3.6	1.6
10"x1"	11.00"	279	6.00"	152	0.50"	13	4.25"	108	2.8	1.3

OLETS, PLAIN AND FLANGED (cont'd)

Flanged End Olet Dimensions (cont'd)

Size	LS		A2		LTHK		FLOD		Weight	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(lb)	(kg)
12"x10"	16.00"	406	14.00"	356	1.63"	41	16.00"	406	60.4	27.4
12"x8"	14.00"	356	12.00"	305	1.38"	35	13.50"	343	38.8	17.6
12"x6"	14.00"	356	10.00"	254	1.19"	30	11.00"	279	18.6	8.4
12"x5"	14.00"	356	10.00"	254	1.06"	27	10.00"	254	11.7	5.3
12"x4"	12.00"	305	8.00"	203	1.00"	25	9.00"	229	9.6	4.3
12"x3"	12.00"	305	7.00"	178	0.81"	21	7.50"	191	7.0	3.2
12"x2.5"	12.00"	305	7.00"	178	0.75"	19	7.00"	178	6.0	2.7
12"x2"	12.00"	305	6.00"	152	0.69"	17	6.00"	152	4.9	2.2
12"x1.5"	12.00"	305	6.00"	152	0.50"	13	5.00"	127	3.6	1.6
12"x1"	12.00"	305	6.00"	152	0.50"	13	4.25"	108	2.8	1.3
14"x12"	17.00"	432	16.00"	406	1.88"	48	19.00"	483	84.3	38.3
14"x10"	17.00"	432	14.00"	356	1.63"	41	16.00"	406	60.4	27.4
14"x8"	15.00"	381	12.00"	305	1.38"	35	13.50"	343	38.8	17.6
14"x6"	15.00"	381	10.00"	254	1.19"	30	11.00"	279	18.6	8.4
14"x5"	15.00"	381	10.00"	254	1.06"	27	10.00"	254	11.7	5.3
14"x4"	13.00"	330	8.00"	203	1.00"	25	9.00"	229	9.6	4.3
14"x3"	13.00"	330	7.00"	178	0.81"	21	7.50"	191	7.0	3.2
14"x2.5"	13.00"	330	7.00"	178	0.75"	19	7.00"	178	6.0	2.7
14"x2"	13.00"	330	6.00"	152	0.69"	17	6.00"	152	4.9	2.2
14"x1.5"	13.00"	330	6.00"	152	0.50"	13	5.00"	127	3.6	1.6
14"x1"	13.00"	330	6.00"	152	0.50"	13	4.25"	108	2.8	1.3
16"x14"	22.00"	559	18.00"	457	1.75"	44	21.00"	533	83.1	37.7
16"x12"	18.00"	457	16.00"	406	1.88"	48	19.00"	483	84.3	38.3
16"x10"	18.00"	457	14.00"	356	1.63"	41	16.00"	406	60.4	27.4
16"x8"	16.00"	406	12.00"	305	1.38"	35	13.50"	343	38.8	17.6
16"x6"	16.00"	406	10.00"	254	1.19"	30	11.00"	279	18.6	8.4
16"x5"	16.00"	406	10.00"	254	1.06"	27	10.00"	254	11.7	5.3
16"x4"	14.00"	356	8.00"	203	1.00"	25	9.00"	229	9.6	4.3
16"x3"	14.00"	356	7.00"	178	0.81"	21	7.50"	191	7.0	3.2
16"x2.5"	14.00"	356	7.00"	178	0.75"	19	7.00"	178	6.0	2.7
16"x2"	14.00"	356	6.00"	152	0.69"	17	6.00"	152	4.9	2.2
16"x1.5"	14.00"	356	6.00"	152	0.50"	13	5.00"	127	3.6	1.6
16"x1"	14.00"	356	6.00"	152	0.50"	13	4.25"	108	2.8	1.3
18"x16"	23.00"	584	20.00"	508	1.94"	49	23.50"	597	118.1	53.6
18"x14"	23.00"	584	18.00"	457	1.75"	44	21.00"	533	83.1	37.7
18"x12"	19.00"	483	16.00"	406	1.88"	48	19.00"	483	84.3	38.3

OLETS, PLAIN AND FLANGED (cont'd)

Flanged End Olet Dimensions (cont'd)

Size	LS		A2		LTHK		FLOD		Weight	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(lb)	(kg)
18"x10"	19.00"	483	14.00"	356	1.63"	41	16.00"	406	60.4	27.4
18"x8"	17.00"	432	12.00"	305	1.38"	35	13.50"	343	38.8	17.6
18"x6"	17.00"	432	10.00"	254	1.19"	30	11.00"	279	18.6	8.4
18"x5"	17.00"	432	10.00"	254	1.06"	27	10.00"	254	11.7	5.3
18"x4"	15.00"	381	8.00"	203	1.00"	25	9.00"	229	9.6	4.3
18"x3"	15.00"	381	7.00"	178	0.81"	21	7.50"	191	7.0	3.2
18"x2.5"	15.00"	381	7.00"	178	0.75"	19	7.00"	178	6.0	2.7
18"x2"	15.00"	381	6.00"	152	0.69"	17	6.00"	152	4.9	2.2
18"x1.5"	15.00"	381	6.00"	152	0.50"	13	5.00"	127	3.6	1.6
18"x1"	15.00"	381	6.00"	152	0.50"	13	4.25"	108	2.8	1.3
20"x18"	25.00"	635	21.00"	533	2.00"	51	25.00"	635	152.5	69.2
20"x16"	24.00"	610	20.00"	508	1.94"	49	23.50"	597	118.1	53.6
20"x14"	24.00"	610	18.00"	457	1.75"	44	21.00"	533	83.1	37.7
20"x12"	20.00"	508	16.00"	406	1.88"	48	19.00"	483	84.3	38.3
20"x10"	20.00"	508	14.00"	356	1.63"	41	16.00"	406	60.4	27.4
20"x8"	18.00"	457	12.00"	305	1.38"	35	13.50"	343	38.8	17.6
20"x6"	18.00"	457	10.00"	254	1.19"	30	11.00"	279	18.6	8.4
20"x5"	18.00"	457	10.00"	254	1.06"	27	10.00"	254	11.7	5.3
20"x4"	16.00"	406	8.00"	203	1.00"	25	9.00"	229	9.6	4.3
20"x3"	16.00"	406	7.00"	178	0.81"	21	7.50"	191	7.0	3.2
20"x2.5"	16.00"	406	7.00"	178	0.75"	19	7.00"	178	6.0	2.7
20"x2"	16.00"	406	6.00"	152	0.69"	17	6.00"	152	4.9	2.2
20"x1.5"	16.00"	406	6.00"	152	0.50"	13	5.00"	127	3.6	1.6
20"x1"	16.00"	406	6.00"	152	0.50"	13	4.25"	108	2.8	1.3
24"x20"	28.00"	711	22.00"	559	2.13"	54	27.50"	699	186.8	84.8
24"x18"	27.00"	686	21.00"	533	2.00"	51	25.00"	635	152.5	69.2
24"x16"	26.00"	660	20.00"	508	1.94"	49	23.50"	597	118.1	53.6
24"x14"	26.00"	660	18.00"	457	1.75"	44	21.00"	533	83.1	37.7
24"x12"	22.00"	559	16.00"	406	1.88"	48	19.00"	483	84.3	38.3
24"x10"	22.00"	559	14.00"	356	1.63"	41	16.00"	406	60.4	27.4
24"x8"	20.00"	508	12.00"	305	1.38"	35	13.50"	343	38.8	17.6
24"x6"	20.00"	508	10.00"	254	1.19"	30	11.00"	279	18.6	8.4
24"x5"	20.00"	508	10.00"	254	1.06"	27	10.00"	254	11.7	5.3
24"x4"	18.00"	457	8.00"	203	1.00"	25	9.00"	229	9.6	4.3
24"x3"	18.00"	457	7.00"	178	0.81"	21	7.50"	191	7.0	3.2
24"x2.5"	18.00"	457	7.00"	178	0.75"	19	7.00"	178	6.0	2.7
24"x2"	18.00"	457	6.00"	152	0.69"	17	6.00"	152	4.9	2.2
24"x1.5"	18.00"	457	6.00"	152	0.50"	13	5.00"	127	3.6	1.6
24"x1"	18.00"	457	6.00"	152	0.50"	13	4.25"	108	2.8	1.3

OLETS, PLAIN AND FLANGED (cont'd)

Plain End Olet Dimensions

Size	H		A2		POD		PBOD		Weight	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(lb)	(kg)
1.5"x1"	6.00"	152	6.00"	152	2.00"	51	1.50"	38	1.5	0.7
2"x1.5"	6.00"	152	6.00"	152	2.62"	67	2.00"	51	2.0	0.9
2"x1"	6.00"	152	6.00"	152	2.62"	67	1.50"	38	1.5	0.7
2.5"x2"	7.00"	178	6.00"	152	3.00"	76	2.62"	67	2.5	1.1
3"x2.5"	7.00"	178	7.00"	178	3.50"	89	3.00"	76	3.1	1.4
3"x2"	7.00"	178	6.00"	152	3.50"	89	2.62"	67	2.5	1.1
3"x1.5"	7.00"	178	6.00"	152	3.50"	89	2.00"	51	2.0	0.9
3"x1"	7.00"	178	6.00"	152	3.50"	89	1.50"	38	1.5	0.7
4"x3"	8.00"	203	7.00"	178	4.50"	114	3.50"	89	3.6	1.6
4"x2.5"	8.00"	203	7.00"	178	4.50"	114	3.00"	76	3.1	1.4
4"x2"	8.00"	203	6.00"	152	4.50"	114	2.62"	67	2.5	1.1
4"x1.5"	8.00"	203	6.00"	152	4.50"	114	2.00"	51	2.0	0.9
4"x1"	8.00"	203	6.00"	152	4.50"	114	1.50"	38	1.5	0.7
5"x4"	10.00"	254	8.00"	203	5.50"	140	4.50"	114	4.7	2.1
6"x5"	10.00"	254	10.00"	254	6.63"	168	5.50"	140	5.8	2.6
6"x4"	10.00"	254	8.00"	203	6.63"	168	4.50"	114	4.7	2.1
6"x3"	10.00"	254	7.00"	178	6.63"	168	3.50"	89	3.6	1.6
6"x2.5"	10.00"	254	7.00"	178	6.63"	168	3.00"	76	3.1	1.4
6"x2"	10.00"	254	6.00"	152	6.63"	168	2.62"	67	2.5	1.1
6"x1.5"	10.00"	254	6.00"	152	6.63"	168	2.00"	51	2.0	0.9
6"x1"	10.00"	254	6.00"	152	6.63"	168	1.50"	38	1.5	0.7
8"x6"	12.00"	305	10.00"	254	8.75"	222	6.63"	168	9.9	4.5
8"x5"	12.00"	305	10.00"	254	8.75"	222	5.50"	140	5.8	2.6
8"x4"	12.00"	305	8.00"	203	8.75"	222	4.50"	114	4.7	2.1
8"x3"	12.00"	305	7.00"	178	8.75"	222	3.50"	89	3.6	1.6
8"x2.5"	12.00"	305	7.00"	178	8.75"	222	3.00"	76	3.1	1.4
8"x2"	12.00"	305	6.00"	152	8.75"	222	2.62"	67	2.5	1.1
8"x1.5"	12.00"	305	6.00"	152	8.75"	222	2.00"	51	2.0	0.9
8"x1"	12.00"	305	6.00"	152	8.75"	222	1.50"	38	1.5	0.7
10"x8"	14.00"	356	12.00"	305	10.88"	276	8.75"	222	21.9	10.0
10"x6"	14.00"	356	10.00"	254	10.88"	276	6.63"	168	9.9	4.5
10"x5"	14.00"	356	10.00"	254	10.88"	276	5.50"	140	5.8	2.6
10"x4"	14.00"	356	8.00"	203	10.88"	276	4.50"	114	4.7	2.1
10"x3"	14.00"	356	7.00"	178	10.88"	276	3.50"	89	3.6	1.6
10"x2.5"	14.00"	356	7.00"	178	10.88"	276	3.00"	76	3.1	1.4
10"x2"	14.00"	356	6.00"	152	10.88"	276	2.62"	67	2.5	1.1
10"x1.5"	14.00"	356	6.00"	152	10.88"	276	2.00"	51	2.0	0.9
10"x1"	14.00"	356	6.00"	152	10.88"	276	1.50"	38	1.5	0.7

OLETS, PLAIN AND FLANGED (cont'd)

Plain End Olet Dimensions (cont'd)

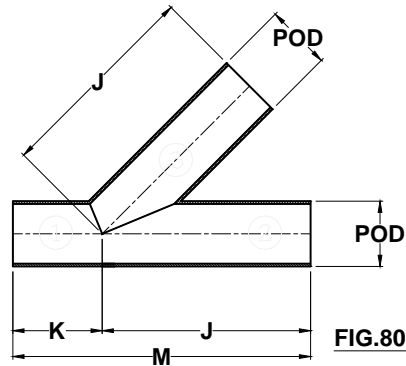
Size	H		A2		POD		PBOD		Weight	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(lb)	(kg)
12"x10"	16.00"	406	14.00"	356	13.00"	330	10.88"	276	34.6	15.7
12"x8"	16.00"	406	12.00"	305	13.00"	330	8.75"	222	21.9	10.0
12"x6"	16.00"	406	10.00"	254	13.00"	330	6.63"	168	9.9	4.5
12"x5"	16.00"	406	10.00"	254	13.00"	330	5.50"	140	5.8	2.6
12"x4"	16.00"	406	8.00"	203	13.00"	330	4.50"	114	4.7	2.1
12"x3"	16.00"	406	7.00"	178	13.00"	330	3.50"	89	3.6	1.6
12"x2.5"	16.00"	406	7.00"	178	13.00"	330	3.00"	76	3.1	1.4
12"x2"	16.00"	406	6.00"	152	13.00"	330	2.62"	67	2.5	1.1
12"x1.5"	16.00"	406	6.00"	152	13.00"	330	2.00"	51	2.0	0.9
12"x1"	16.00"	406	6.00"	152	13.00"	330	1.50"	38	1.5	0.7
14"x12"	18.00"	457	16.00"	406	15.13"	384	13.00"	330	58.4	26.5
14"x10"	18.00"	457	14.00"	356	15.13"	384	10.88"	276	34.6	15.7
14"x8"	18.00"	457	12.00"	305	15.13"	384	8.75"	222	21.9	10.0
14"x6"	18.00"	457	10.00"	254	15.13"	384	6.63"	168	9.9	4.5
14"x5"	18.00"	457	10.00"	254	15.13"	384	5.50"	140	5.8	2.6
14"x4"	18.00"	457	8.00"	203	15.13"	384	4.50"	114	4.7	2.1
14"x3"	18.00"	457	7.00"	178	15.13"	384	3.50"	89	3.6	1.6
14"x2.5"	18.00"	457	7.00"	178	15.13"	384	3.00"	76	3.1	1.4
14"x2"	18.00"	457	6.00"	152	15.13"	384	2.62"	67	2.5	1.1
14"x1.5"	18.00"	457	6.00"	152	15.13"	384	2.00"	51	2.0	0.9
14"x1"	18.00"	457	6.00"	152	15.13"	384	1.50"	38	1.5	0.7
16"x14"	20.00"	508	18.00"	457	17.25"	438	15.13"	384	55.5	25.2
16"x12"	20.00"	508	16.00"	406	17.25"	438	13.00"	330	58.4	26.5
16"x10"	20.00"	508	14.00"	356	17.25"	438	10.88"	276	34.6	15.7
16"x8"	20.00"	508	12.00"	305	17.25"	438	8.75"	222	21.9	10.0
16"x6"	20.00"	508	10.00"	254	17.25"	438	6.63"	168	9.9	4.5
16"x5"	20.00"	508	10.00"	254	17.25"	438	5.50"	140	5.8	2.6
16"x4"	20.00"	508	8.00"	203	17.25"	438	4.50"	114	4.7	2.1
16"x3"	20.00"	508	7.00"	178	17.25"	438	3.50"	89	3.6	1.6
16"x2.5"	20.00"	508	7.00"	178	17.25"	438	3.00"	76	3.1	1.4
16"x2"	20.00"	508	6.00"	152	17.25"	438	2.62"	67	2.5	1.1
16"x1.5"	20.00"	508	6.00"	152	17.25"	438	2.00"	51	2.0	0.9
16"x1"	20.00"	508	6.00"	152	17.25"	438	1.50"	38	1.5	0.7
18"x16"	21.00"	533	20.00"	508	19.38"	492	17.25"	438	80.3	36.5
18"x14"	21.00"	533	18.00"	457	19.38"	492	15.13"	384	55.5	25.2
18"x12"	21.00"	533	16.00"	406	19.38"	492	13.00"	330	58.4	26.5

OLETS, PLAIN AND FLANGED (cont'd)

Plain End Olet Dimensions (cont'd)

Size	H		A2		POD		PBOD		Weight	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(lb)	(kg)
18"x10"	21.00"	533	14.00"	356	19.38"	492	10.88"	276	34.6	15.7
18"x8"	21.00"	533	12.00"	305	19.38"	492	8.75"	222	21.9	10.0
18"x6"	21.00"	533	10.00"	254	19.38"	492	6.63"	168	9.9	4.5
18"x5"	21.00"	533	10.00"	254	19.38"	492	5.50"	140	5.8	2.6
18"x4"	21.00"	533	8.00"	203	19.38"	492	4.50"	114	4.7	2.1
18"x3"	21.00"	533	7.00"	178	19.38"	492	3.50"	89	3.6	1.6
18"x2.5"	21.00"	533	7.00"	178	19.38"	492	3.00"	76	3.1	1.4
18"x2"	21.00"	533	6.00"	152	19.38"	492	2.62"	67	2.5	1.1
18"x1.5"	21.00"	533	6.00"	152	19.38"	492	2.00"	51	2.0	0.9
18"x1"	21.00"	533	6.00"	152	19.38"	492	1.50"	38	1.5	0.7
20"x18"	22.00"	559	21.00"	533	21.50"	546	19.38"	492	105.5	47.9
20"x16"	22.00"	559	20.00"	508	21.50"	546	17.25"	438	80.3	36.5
20"x14"	22.00"	559	18.00"	457	21.50"	546	15.13"	384	55.5	25.2
20"x12"	22.00"	559	16.00"	406	21.50"	546	13.00"	330	58.4	26.5
20"x10"	22.00"	559	14.00"	356	21.50"	546	10.88"	276	34.6	15.7
20"x8"	22.00"	559	12.00"	305	21.50"	546	8.75"	222	21.9	10.0
20"x6"	22.00"	559	10.00"	254	21.50"	546	6.63"	168	9.9	4.5
20"x5"	22.00"	559	10.00"	254	21.50"	546	5.50"	140	5.8	2.6
20"x4"	22.00"	559	8.00"	203	21.50"	546	4.50"	114	4.7	2.1
20"x3"	22.00"	559	7.00"	178	21.50"	546	3.50"	89	3.6	1.6
20"x2.5"	22.00"	559	7.00"	178	21.50"	546	3.00"	76	3.1	1.4
20"x2"	22.00"	559	6.00"	152	21.50"	546	2.62"	67	2.5	1.1
20"x1.5"	22.00"	559	6.00"	152	21.50"	546	2.00"	51	2.0	0.9
20"x1"	22.00"	559	6.00"	152	21.50"	546	1.50"	38	1.5	0.7
24"x20"	24.00"	610	22.00"	559	25.75"	654	21.50"	546	128.8	58.5
24"x18"	24.00"	610	21.00"	533	25.75"	654	19.38"	492	105.5	47.9
24"x16"	24.00"	610	20.00"	508	25.75"	654	17.25"	438	80.3	36.5
24"x14"	24.00"	610	18.00"	457	25.75"	654	15.13"	384	55.5	25.2
24"x12"	24.00"	610	16.00"	406	25.75"	654	13.00"	330	58.4	26.5
24"x10"	24.00"	610	14.00"	356	25.75"	654	10.88"	276	34.6	15.7
24"x8"	24.00"	610	12.00"	305	25.75"	654	8.75"	222	21.9	10.0
24"x6"	24.00"	610	10.00"	254	25.75"	654	6.63"	168	9.9	4.5
24"x5"	24.00"	610	10.00"	254	25.75"	654	5.50"	140	5.8	2.6
24"x4"	24.00"	610	8.00"	203	25.75"	654	4.50"	114	4.7	2.1
24"x3"	24.00"	610	7.00"	178	25.75"	654	3.50"	89	3.6	1.6
24"x2.5"	24.00"	610	7.00"	178	25.75"	654	3.00"	76	3.1	1.4
24"x2"	24.00"	610	6.00"	152	25.75"	654	2.62"	67	2.5	1.1
24"x1.5"	24.00"	610	6.00"	152	25.75"	654	2.00"	51	2.0	0.9
24"x1"	24.00"	610	6.00"	152	25.75"	654	1.50"	38	1.5	0.7

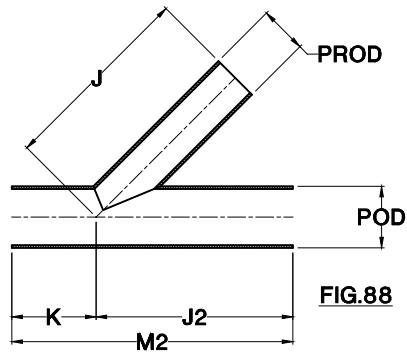
LATERALS



Size	Fig.80									
	J		K		M (J+K)		POD		Weight	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(lb)	(kg)
1"										
1.5"										
2"	10"	254	6"	152	16"	406	2.62"	67	5.1	2.3
2.5"	12"	305	6"	152	18"	457	3.00"	76	6.2	2.8
3"	12"	305	6"	152	18"	457	3.50"	89	8.1	3.7
4"	14"	356	6"	152	20"	508	4.50"	114	11.5	5.2
5"	16"	406	8"	203	24"	610	5.50"	140	14.2	6.4
6"	16"	406	8"	203	24"	610	6.63"	168	25.7	11.7
8"	20"	508	10"	254	30"	762	8.75"	222	53.0	24.1
10"	24"	610	10"	254	34"	864	10.88"	276	84.1	38.2
12"	26"	660	12"	305	38"	965	13.00"	330	132.0	59.9
14"	30"	762	12"	305	42"	1067	15.13"	384	141.0	64.0
16"	32"	813	14"	356	46"	1168	17.25"	438	199.0	90.4
18"	36"	914	14"	356	50"	1270	19.38"	492	283.7	128.8
20"	38"	965	16"	406	54"	1372	21.50"	546	359.9	163.4
22"	40"	1016	18"	457	58"	1473	23.63"	600	448.2	203.5
24"	42"	1067	18"	457	60"	1524	25.75"	654	565.2	256.6
30"										
36"										
42"										
48"										
54"										
60"										

1. Standard laterals are limited to a 100psig design pressure up to 16" and 50psig up to 60".

REDUCING LATERAL OLETS



K							
6"	6"	6"	8"	10"	10"	12"	12"
Branch Diameter							
1", 1.5", 2"	2.5", 3"	4"	5", 6"	8"	10"	12"	14"

10"
12"
12"
14"
16"
16"
20"
24"
26"
30"
32"
36"
38"
40"
42"
52"
62"
72"

Header Diameter	1"
	1.5"
	2"
	2.5"
	3"
	4"
	5"
	6"
	8"
	10"
	12"
	14"
	16"
	18"
	20"
	22"
	24"
	30"
36"	
42"	
48"	
54"	
60"	

J2							
10"	12"						
10"	12"						
10"	12"	14"					
10"	12"	14"	15"				
10"	12"	14"	16"				
12"	13"	14"	16"	20"			
14"	15"	16"	18"	20"	24"		
16"	17"	18"	20"	22"	24"	26"	
18"	19"	20"	22"	24"	26"	28"	30"
20"	21"	22"	24"	26"	28"	30"	32"
22"	23"	24"	26"	28"	30"	32"	34"
24"	25"	26"	28"	30"	32"	34"	36"
26"	27"	28"	30"	32"	34"	36"	38"

REDUCING LATERAL OLETS (cont'd)

1. The 'J' dimension is based on header size. The 'K' dimension is based on branch size. The 'J2' dimension is based on header and branch size; e.g. 3" on 6" Fig. 88 has J=16", K=12", J2=12".
2. Standard reducing laterals are limited to a 100psig design pressure up to 16" and 50psig up to 60".

Reducing Lateral Olet Dimensions

Size	Fig.88									
	J		K		J2		POD		PROD	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)
1.5"x1"										
2"x1.5"	10"	254	6"	152	10"	254	2.62"	67	2.00"	51
2"x1"	10"	254	6"	152	10"	254	2.62"	67	1.50"	38
2.5"x2"	12"	305	6"	152	10"	254	3.00"	76	2.50"	64
3"x2.5"	12"	305	6"	152	12"	305	3.50"	89	3.00"	76
3"x2"	12"	305	6"	152	10"	254	3.50"	89	2.62"	67
3"x1.5"	12"	305	6"	152	10"	254	3.50"	89	2.00"	51
3"x1"	12"	305	6"	152	10"	254	3.50"	89	1.50"	38
4"x3"	14"	356	6"	152	12"	305	4.50"	114	3.50"	89
4"x2.5"	14"	356	6"	152	12"	305	4.50"	114	3.00"	76
4"x2"	14"	356	6"	152	10"	254	4.50"	114	2.62"	67
4"x1.5"	14"	356	6"	152	10"	254	4.50"	114	2.00"	51
4"x1"	14"	356	6"	152	10"	254	4.50"	114	1.50"	38
5"x4"	16"	406	6"	152	14"	356	5.50"	140	4.50"	114
6"x5"	16"	406	8"	203	15"	381	6.63"	168	5.50"	140
6"x4"	16"	406	6"	152	14"	356	6.63"	168	4.50"	114
6"x3"	16"	406	6"	152	12"	305	6.63"	168	3.50"	89
6"x2.5"	16"	406	6"	152	12"	305	6.63"	168	3.00"	76
6"x2"	16"	406	6"	152	10"	254	6.63"	168	2.62"	67
6"x1.5"	16"	406	6"	152	10"	254	6.63"	168	2.00"	51
6"x1"	16"	406	6"	152	10"	254	6.63"	168	1.50"	38
8"x6"	20"	508	8"	203	16"	406	8.75"	222	6.63"	168
8"x5"	20"	508	8"	203	16"	406	8.75"	222	5.50"	140
8"x4"	20"	508	6"	152	14"	356	8.75"	222	4.50"	114
8"x3"	20"	508	6"	152	12"	305	8.75"	222	3.50"	89
8"x2.5"	20"	508	6"	152	12"	305	8.75"	222	3.00"	76
8"x2"	20"	508	6"	152	10"	254	8.75"	222	2.62"	67
8"x1.5"	20"	508	6"	152	10"	254	8.75"	222	2.00"	51
8"x1"	20"	508	6"	152	10"	254	8.75"	222	1.50"	38

REDUCING LATERAL OLETS (cont'd)

Reducing Lateral Olet Dimensions

Size	Fig.88									
	J		K		J2		POD		PROD	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)
10"x8"	24"	610	10"	254	20"	508	10.88"	276	8.75"	222
10"x6"	24"	610	8"	203	16"	406	10.88"	276	6.63"	168
10"x5"	24"	610	8"	203	16"	406	10.88"	276	5.50"	140
10"x4"	24"	610	6"	152	14"	356	10.88"	276	4.50"	114
10"x3"	24"	610	6"	152	13"	330	10.88"	276	3.50"	89
10"x2.5"	24"	610	6"	152	13"	330	10.88"	276	3.00"	76
10"x2"	24"	610	6"	152	12"	305	10.88"	276	2.62"	67
10"x1.5"	24"	610	6"	152	12"	305	10.88"	276	2.00"	51
10"x1"	24"	610	6"	152	12"	305	10.88"	276	1.50"	38
12"x10"	26"	660	10"	254	24"	610	13.00"	330	10.88"	276
12"x8"	26"	660	10"	254	20"	508	13.00"	330	8.75"	222
12"x6"	26"	660	8"	203	18"	457	13.00"	330	6.63"	168
12"x5"	26"	660	8"	203	18"	457	13.00"	330	5.50"	140
12"x4"	26"	660	6"	152	16"	406	13.00"	330	4.50"	114
12"x3"	26"	660	6"	152	15"	381	13.00"	330	3.50"	89
12"x2.5"	26"	660	6"	152	15"	381	13.00"	330	3.00"	76
12"x2"	26"	660	6"	152	14"	356	13.00"	330	2.62"	67
12"x1.5"	26"	660	6"	152	14"	356	13.00"	330	2.00"	51
12"x1"	26"	660	6"	152	14"	356	13.00"	330	1.50"	38
14"x12"	30"	762	12"	305	26"	660	15.13"	384	13.00"	330
16"x14"	32"	813	12"	305	30"	762	17.25"	438	15.13"	384
18"x16"	36"	914	14"	356	34"	864	19.38"	492	17.25"	438
20"x18"	38"	965	14"	356	38"	965	21.50"	546	19.38"	492
22"x20"	40"	1016	16"	406	42"	1067	23.63"	600	21.50"	546
24"x20"	42"	1067	16"	406	44"	1118	25.75"	654	21.50"	546
30"x24"										
36"x30"										
42"x36"										
48"x42"										
54"x48"										
60"x54"										

REDUCING LATERAL OLETS (cont'd)

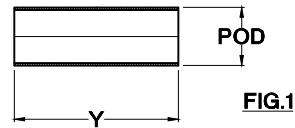
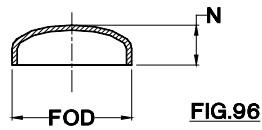
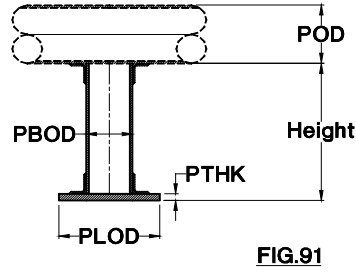
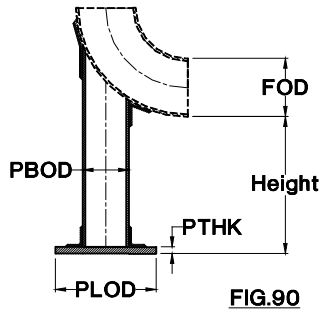
Reducing Lateral Olet Weights

Size	Fig.88	
	(lb)	(kg)
1.5" x 1"		
2" x 1.5"	3.3	1.5
2" x 1"	2.5	1.1
2.5" x 2"	4.1	1.8
3" x 2.5"	4.9	2.2
3" x 2"	4.1	1.8
3" x 1.5"	3.3	1.5
3" x 1"	2.5	1.1
4" x 3"	6.2	2.8
4" x 2.5"	5.2	2.4
4" x 2"	4.3	2.0
4" x 1.5"	3.5	1.6
4" x 1"	2.7	1.2
5" x 4"	8.5	3.9
6" x 5"	10.5	4.8
6" x 4"	8.5	3.9
6" x 3"	6.5	3.0
6" x 2.5"	5.6	2.5
6" x 2"	4.6	2.1
6" x 1.5"	3.7	1.7
6" x 1"	2.8	1.3

Size	Fig.88	
	(lb)	(kg)
8" x 6"	18.5	8.4
8" x 5"	11.7	5.3
8" x 4"	9.5	4.3
8" x 3"	7.3	3.3
8" x 2.5"	6.2	2.8
8" x 2"	5.1	2.3
8" x 1.5"	4.2	1.9
8" x 1"	3.2	1.4
10" x 8"	41.1	18.6
10" x 6"	20.4	9.3
10" x 5"	12.9	5.8
10" x 4"	10.5	4.7
10" x 3"	8.0	3.6
10" x 2.5"	6.8	3.1
10" x 2"	5.6	2.5
10" x 1.5"	4.6	2.1
10" x 1"	3.5	1.6
12" x 10"	62.3	28.3
12" x 8"	42.5	19.3
12" x 6"	21.4	9.7
12" x 5"	13.5	6.1
12" x 4"	10.9	5.0
12" x 3"	8.4	3.8
12" x 2.5"	7.1	3.2
12" x 2"	5.9	2.7
12" x 1.5"	4.8	2.2
12" x 1"	3.7	1.7

Size	Fig.88	
	(lb)	(kg)
14" x 12"	89.9	40.8
16" x 14"	87.5	39.7
18" x 16"	129.0	58.6
20" x 18"	175.4	79.6
22" x 20"	199.5	90.6
24" x 20"	224.3	101.8
30" x 24"		
36" x 30"		
42" x 36"		
48" x 42"		
54" x 48"		
60" x 54"		

DUMMY LEGS, CAPS, PUP PIECES



Size	Fig.90, 91									
	Dummy Leg Size		PLOD		PTHK		PBOD		Weight	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(lb)	(kg)
1"										
1.5"										
2"	2"	51	5"	127	0.50"	13	2.62"	67	5.3	2.4
2.5"	2"	51	5"	127	0.50"	13	2.62"	67	5.3	2.4
3"	2"	51	5"	127	0.50"	13	2.62"	67	5.3	2.4
4"	3"	76	6"	152	0.50"	13	3.50"	89	7.8	3.5
5"	3"	76	6"	152	0.50"	13	3.50"	89	7.8	3.5
6"	4"	102	7"	178	0.50"	13	4.50"	114	10.3	4.7
8"	6"	152	9"	229	0.50"	13	6.63"	168	15.5	7.0
10"	6"	152	9"	229	0.50"	13	6.63"	168	15.5	7.0
12"	8"	203	12"	305	0.50"	13	8.75"	222	28.1	12.8
14"	10"	254	14"	356	0.50"	13	10.88"	276	39.4	17.9
16"	12"	305	16"	406	0.50"	13	13.00"	330	57.2	26.0
18"	14"	356	18"	457	0.50"	13	15.13"	384	72.9	33.1
20"	18"	457	22"	559	0.50"	13	19.38"	492	116.8	53.0
22"	18"	457	22"	559	0.50"	13	19.38"	492	116.8	53.0
24"	18"	457	22"	559	0.50"	13	19.38"	492	116.8	53.0
30"										
36"										
42"										
48"										
54"										
60"										

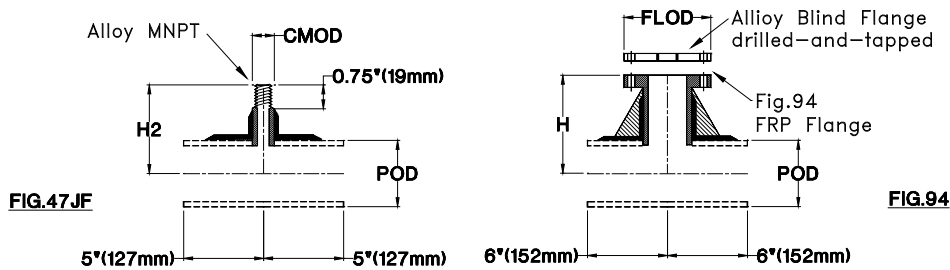
DUMMY LEGS, CAPS, PUP PIECES (cont'd)

1. Fig. 90 and Fig. 91 include the dummy leg only, not the elbow nor pipe. Dummy legs can also be placed under tees and reducers.
2. Maximum dummy leg length is 3'-0". Specify the required leg length with the figure number.
3. Plate to be shipped loose and field installed. 6" of trim to be provided on dummy leg.
4. In prefabricated systems, the Fig.1 'Y' dimension can be as short as 1".

Caps and Pup Pieces

Size	Fig.96						Fig.1			
	N		FOD		Weight		Y		POD	
	(in.)	(mm)	(in.)	(mm)	(lb)	(kg)	(in.)	(mm)	(lb)	(kg)
1"							4"	1.8	1.50"	38
1.5"							4"	1.8	2.00"	51
2"	1.5"	38	2.62"	67	0.1	0.1	4"	102	2.62"	67
2.5"	1.5"	38	3.00"	76	0.1	0.1	4"	102	3.00"	76
3"	2.0"	51	3.50"	89	0.2	0.1	4"	102	3.50"	89
4"	2.5"	64	4.50"	114	0.4	0.2	6"	152	4.50"	114
5"	3.0"	76	5.50"	140	0.5	0.2	6"	152	5.50"	140
6"	3.5"	89	6.63"	168	1.1	0.5	6"	152	6.63"	168
8"	4.0"	102	8.88"	225	2.5	1.2	8"	203	8.75"	222
10"	5.0"	127	11.00"	279	4.6	2.1	10"	254	10.88"	276
12"	6.0"	152	13.25"	337	8.2	3.7	12"	305	13.00"	330
14"	6.5"	165	15.38"	391	10.3	4.7	14"	356	15.13"	384
16"	7.0"	178	17.50"	445	14.3	6.5	16"	406	17.25"	438
18"	8.0"	203	19.63"	498	20.3	9.2	18"	457	19.38"	492
20"	9.0"	229	21.75"	552	26.4	12.0	19"	483	21.50"	546
22"	Not Available						20"	508	22.63"	575
24"	10.5"	267	26.00"	660	43.8	19.9	22"	559	25.75"	654
30"										
36"										
42"										
48"										
54"										
60"										

THREADED CONNECTIONS



For Series 20FR-E and 20FR-EC, the threaded options are: 1) the Figure 94 Flanged Saddle with drilled-and-tapped alloy blind flange and 2) the Figure 47JF threaded alloy MNPT. The Figure 97 threaded FRP FNPT is no longer a standard product.

1. Fig.94: The most reliable and heavy-duty solution for threaded connections is to use an FRP flange and bolt an alloy (316SS, 90/10 Cu-Ni, Gr. 2 Ti, etc.) blind flange that is drilled-and-tapped for the NPT size. This type of connection has been used for many years and is the most durable and toughest solution.
2. Fig.47JF: To eliminate the need for a bolted connection, the Figure 47JF MNPT alloy saddle is available. Alloy material choices include 316SS, 90/10 Cu-Ni, Titanium, and Monel. Other alloy materials may be available. This alloy MNPT is designed for connections to spray nozzles in deluge systems and can also be used for connecting to vents, drains, and instruments. Due to the large bending moment that could be applied, it is not recommended that the Fig.47JF MNPT be used to connect directly to long runs of threaded alloy piping. Note: the alloy MNPT is permanently bonded to the FRP piping.

Notes:

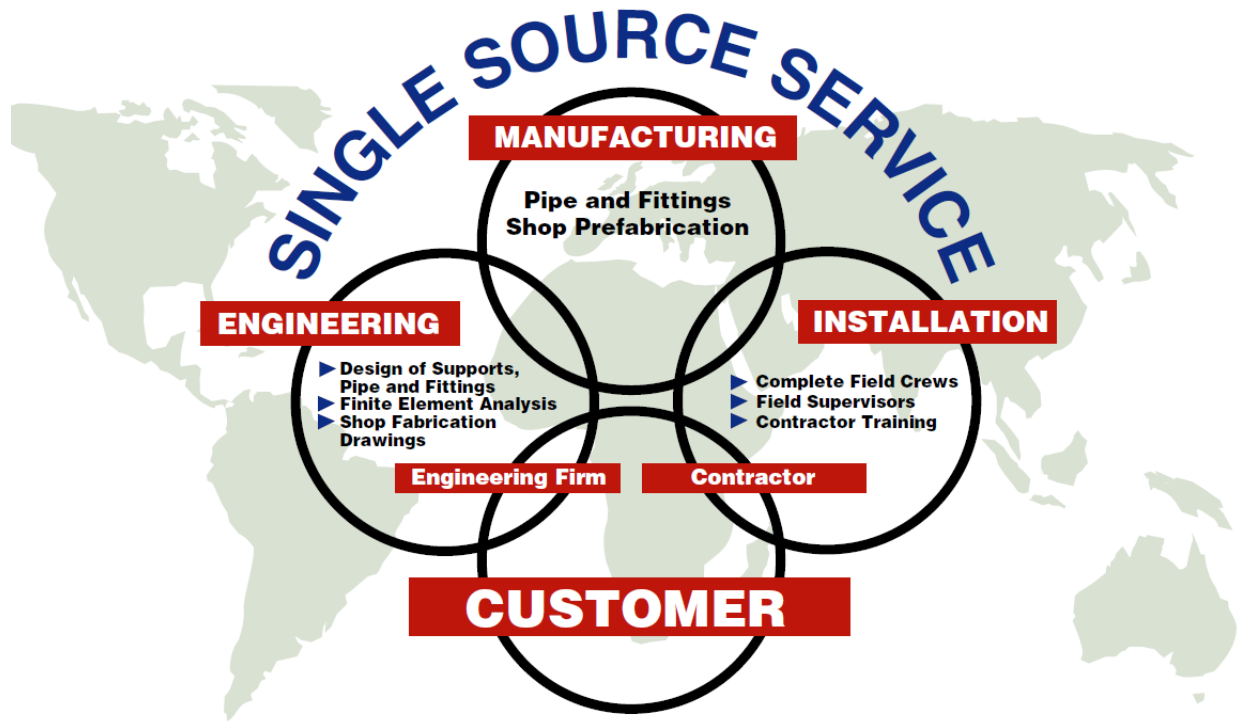
1. The Fig.47JF sizes are 0.50", 0.75", 1.0", 1.25", and 1.5" MNPT. The 'H2' dimension is approximate and will vary based on the pipe wall thickness. Material choices include 316SS, 90/10 Cu-Ni, Titanium, Monel, and others.
2. The Fig.47JF outlet fitting includes only the branch components. Unless purchased as part of a pre-fabricated (pre-assembled) system, it does require some assembly and bonding work.
3. The Fig.94 threaded alloy blind includes the drilled-and-tapped alloy blind flange only. The branch size is 2" diameter, standard. Other branch sizes are available upon request. Material choices for the alloy blind flange include 316SS, 90/10 Cu-Ni and others.
4. For Fig.47JF, CMODs are: 0.56" (14.3mm) for 1/2", 0.81" (20.6mm) for 3/4", 1.06" (27.0mm) for 1", 1.31" (33.3mm) for 1 1/4", and 1.56" (39.7mm) for 1 1/2" MNPTs.

THREADED CONNECTIONS (cont'd)

Size	Fig.47JF,94,97		Fig.47JF		Fig.94	
	POD		H2		H	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)
0.5"						
0.75"						
1.0"	1.50"	38	4.75"	121		
1.5"	2.00"	51	5.00"	127		
2"	2.62"	67	5.25"	133	7.00"	178
2.5"	3.00"	76	5.50"	140	7.25"	184
3"	3.50"	89	5.75"	146	7.50"	191
4"	4.50"	114	6.25"	159	8.00"	203
5"	5.50"	140	6.75"	171	8.50"	216
6"	6.63"	168	7.31"	186	9.00"	229
8"	8.75"	222	8.38"	213	10.00"	254
10"	10.88"	276	9.44"	240	11.00"	279
12"	13.00"	330	10.50"	267	12.00"	305
14"	15.13"	384	11.56"	294	13.00"	330
16"	17.25"	438	12.63"	321	14.00"	356
18"	19.38"	492	13.69"	348	15.00"	381
20"	21.50"	546	14.56"	370	16.00"	406
22"	23.63"	600	15.63"	397	17.00"	432
24"	25.75"	654	16.63"	422	18.00"	457
30"						
36"						
42"						
48"						
54"						
60"						

Threaded Connection Weights

Size	Fig.47JF		Fig.94	
	(lb)	(kg)	(lb)	(kg)
1"x1/2", 1.5"x1/2", ..., 24"x1/2"	1.6	0.7		
1"x3/4", 1.5"x3/4", ..., 24"x3/4"	1.7	0.8		
1.5"x1", 2"x1", ..., 24"x1"	2.5	1.2		
1.5"x1.25", 2"x1.25", ..., 24"x1.25"	2.6	1.2		
2"x1.5", 2.5"x1.5", ..., 24"x1.5"	2.7	1.2		
2.5"x2", 3"x2", ..., 24"x2"			6.1	2.8



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15915 Perkins Road
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