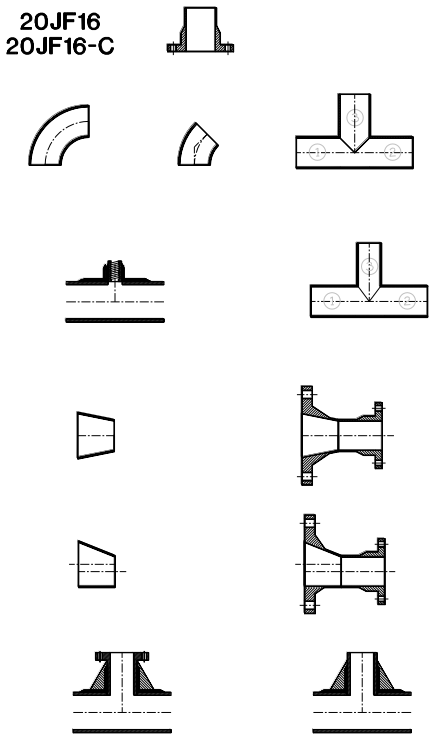
FIBERBOND®

ENGINEERED COMPOSITE PIPING SYSTEMS

SERIES 20JF16
FITTINGS GUIDE



FIBERBOND® SERIES

- **20JF16**
- **20JF16-C**

TIGER WRAP™

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April 2016 Edition

FIBERBOND® Fittings Guide - Series 20JF16 and 20JF16-C

PIPE SERIES:

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

20JF16	16bar rated product for dry deluge systems and for systems requiring jet-fire resistance.
20JF16-C	Identical to 20JF16, 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 torqueing these flanges. Over-torqueing 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 20JF16	Pending from USCG and ABS
Series 20JF16-C	Pending from USCG and ABS

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:

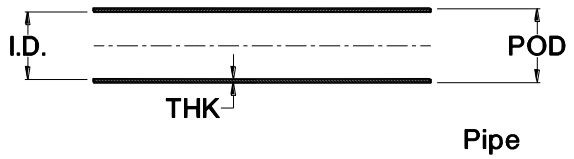
A catalog for Aveva Inc.'s 3D modeling software VPDMS is available by contacting Specialty Plastics (www.fiberbond.com). A 2-D catalog is also available for Autodesk's AutoCAD. A general catalog is also available for Intergraph's PDS, but there are some minor deviations in pipe O.D.s.

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	20JF16 and 20JF16-C									
	Rating		I.D.		NOM. THK		POD		Weight	
	(psig)	(bar)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(lb/ft)	(kg/m)
1"	232	16.0	1.00"	25.4	0.63"	16.0	2.26"	57.4	3.2	4.7
1.5"	232	16.0	1.50"	38.1	0.63"	16.0	2.76"	70.1	3.9	5.8
2"	232	16.0	2.00"	50.8	0.63"	16.0	3.26"	82.8	4.3	6.3
2.5"	232	16.0	2.50"	63.5	0.63"	16.0	3.76"	95.5	5.1	7.5
3"	232	16.0	3.00"	76.2	0.63"	16.0	4.26"	108.2	6.0	8.9
4"	232	16.0	4.00"	101.6	0.63"	16.0	5.26"	133.6	7.6	11.3
5"	232	16.0	5.00"	127.0	0.63"	16.0	6.26"	159.0	9.1	13.6
6"	232	16.0	6.00"	152.4	0.63"	16.0	7.26"	184.4	10.9	16.2
8"	232	16.0	8.00"	203.2	0.63"	16.0	9.26"	235.2	14.2	21.2
10"	232	16.0	10.00"	254.0	0.63"	16.0	11.26"	286.0	17.5	26.1
12"	232	16.0	12.00"	304.8	0.63"	16.0	13.26"	336.8	20.8	31.0
14"	232	16.0	14.25"	362.0	0.67"	17.0	15.59"	396.0	27.6	41.1
16"	232	16.0	16.25"	412.8	0.75"	19.1	17.75"	450.9	33.4	49.7
18"	232	16.0	18.25"	463.6	0.82"	20.8	19.89"	505.2	41.8	62.3
20"	232	16.0	20.25"	514.4	0.89"	22.6	22.03"	559.6	48.7	72.5
24"	232	16.0	24.25"	616.0	1.04"	26.4	26.33"	668.8	66.9	99.6
30"										
36"										
42"										
48"										
54"										
60"										

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

CHANGES FROM THE PREVIOUS EDITION

April 2016: Revised statement about <=2” gaskets at 435psig (30 bar) hydrotests in the Gaskets section to match the Gasket Selection document. No other changes made.

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).

June 2012: Updated weights for most items.

January 2012: Updated the drawing for Fig.47JF MNPT; added note on gaskets.

April 2010: Updated available reducing tee sizes.

January 2010: This is the first release of this document. A draft version was started in October 2008.

FLANGES & BLINDS

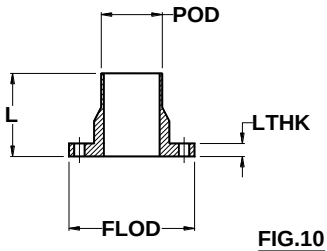


FIG.10

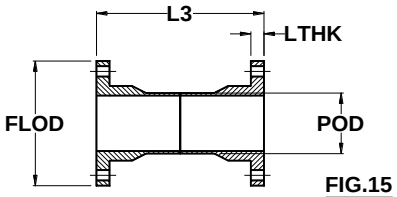


FIG.15

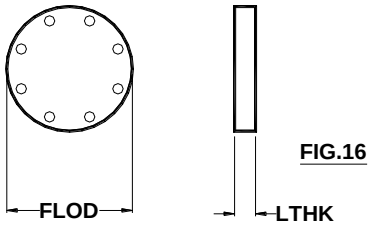


FIG.16

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	8"	203.2		
4"	6"	152.4	12"	304.8	12"	304.8	10"	254.0		
5"	6"	152.4	12"	304.8	12"	304.8	10"	254.0		
6"	8"	203.2	12"	304.8	16"	406.4	12"	304.8		
8"	10"	254.0	12"	304.8	20"	508.0	14"	355.6		
10"	12"	304.8	18"	457.2	24"	609.6	16"	406.4		
12"	14"	355.6	18"	457.2	28"	711.2	18"	457.2		
14"	15"	381.0	18"	457.2	30"	762.0	18"	457.2		
16"	17"	431.8	18"	457.2	34"	863.6	20"	508.0		
18"	18"	457.2	18"	457.2	36"	914.4	20"	508.0		
20"	20"	508.0	24"	609.6	40"	1016.0	22"	558.8		
24"	24"	609.6	24"	609.6	48"	1219.2	24"	609.6		
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, 16							
	(in.)	(mm)	(in.)	(mm)				
1"	0.50"	12.7	4.25"	108.0				
1.5"	0.52"	13.2	5.00"	127.0				
2"	0.64"	16.3	6.00"	152.4				
2.5"	0.72"	18.3	7.00"	177.8				
3"	0.77"	19.6	7.50"	190.5				
4"	1.01"	25.7	9.00"	228.6				
5"	1.10"	27.9	10.00"	254.0				
6"	1.19"	30.2	11.00"	279.4				
8"	1.36"	34.5	13.50"	342.9				
10"	1.69"	42.9	16.00"	406.4				
12"	1.95"	49.5	19.00"	482.6				
14"	2.03"	51.6	21.00"	533.4				
16"	2.34"	59.4	23.50"	596.9				
18"	2.32"	58.9	25.00"	635.0				
20"	2.57"	65.3	27.50"	698.5				
24"	2.88"	73.2	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"	2.5	1.1	5.0	2.3	0.9	0.4		
1.5"	2.9	1.3	5.8	2.6	1.0	0.4		
2"	3.5	1.6	7.0	3.2	1.4	0.6		
2.5"	4.4	2.0	8.9	4.0	1.9	0.9		
3"	5.2	2.4	10.4	4.7	2.2	1.0		
4"	7.4	3.4	14.8	6.7	3.6	1.6		
5"	8.8	4.0	17.5	8.0	4.2	1.9		
6"	13.3	6.0	26.6	12.1	5.9	2.7		
8"	18.7	8.5	37.4	17.0	9.1	4.1		
10"	29.7	13.5	59.4	27.0	15.2	6.9		
12"	39.2	17.8	78.5	35.6	21.9	9.9		
14"	55.5	25.2	111.0	50.4	27.9	12.7		
16"	72.5	32.9	145.0	65.8	39.1	17.8		
18"	87.7	39.8	175.4	79.6	45.9	20.8		
20"	108.0	49.0	216.0	98.1	59.3	26.9		
24"	154.8	70.3	309.6	140.6	87.9	39.9		
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"	4.50"	114	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"	6.50"	165	5.75"	146				
14"	(12) 1"	6.75"	171	6.25"	159				
16"	(16) 1"	7.50"	191	6.50"	165				
18"	(16) 1 1/8"								
20"	(20) 1 1/8"								
24"	(20) 1 1/4"								
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 * (Flange Thickness + PTOL + Nut Thickness) + 1/8" + (2 * 1/8").

3. For FRP to 150# alloy flange connections, LSSB = Flange Thickness + PTOL + 150# Flange Thickness + PTOL + (2 * 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.20

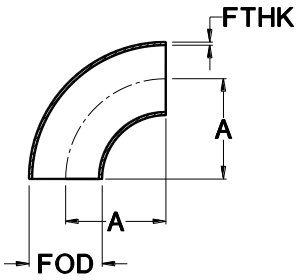
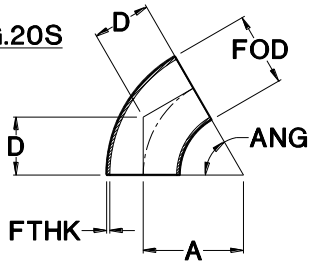


FIG.20S



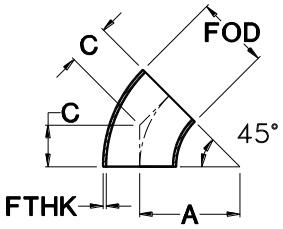


FIG.30

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.				0.63"	16	2.26"	57
1.5"	2.25"	57					0.63"	16	2.76"	70
2"	3.00"	76	D = 1.5 * Size * TAN (ANG/2).		1.25"	32	0.63"	16	3.26"	83
2.5"	3.75"	95			2.56"	65	0.63"	16	3.76"	96
3"	4.50"	114			1.88"	48	0.63"	16	4.26"	108
4"	6.00"	152	Smaller angles can be mitered.		2.50"	64	0.63"	16	5.26"	134
5"	7.50"	191			3.13"	79	0.63"	16	6.26"	159
6"	9.00"	229			3.75"	95	0.63"	16	7.26"	184
8"	12.00"	305			5.00"	127	0.63"	16	9.26"	235
10"	15.00"	381			6.25"	159	0.63"	16	11.26"	286
12"	18.00"	457			7.50"	191	0.70"	18	13.40"	340
14"	21.00"	533			8.75"	222	0.79"	20	15.83"	402
16"	24.00"	610			10.00"	254	0.87"	22	17.99"	457
18"	27.00"	686			11.25"	286	0.95"	24	20.15"	512
20"	30.00"	762			12.50"	318	1.03"	26	22.31"	567
24"	36.00"	914			15.00"	381	1.19"	30	26.63"	676
30"										
36"										
42"										
48"										
54"										
60"										

ELBOWS (cont'd)

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

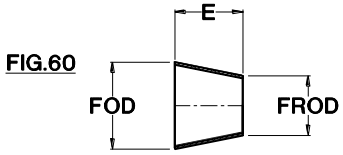
Elbow Ratings and Weights

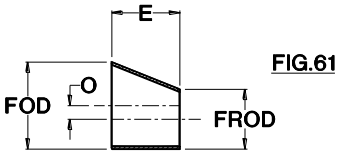
Size	Rating		Fig.20 Weight		Fig.30 Weight	
	(psig)	(bar)	(lb)	(kg)	(lb)	(kg)
1"	232	16.0	0.5	0.2	0.3	0.1
1.5"	232	16.0	1.1	0.5	0.5	0.2
2"	232	16.0	1.8	0.8	0.9	0.4
2.5"	232	16.0	2.1	1.0	1.1	0.5
3"	232	16.0	3.6	1.6	1.8	0.8
4"	232	16.0	6.2	2.8	3.1	1.4
5"	232	16.0	7.6	3.5	3.8	1.7
6"	232	16.0	13.3	6.0	6.6	3.0
8"	232	16.0	23.1	10.5	11.5	5.2
10"	232	16.0	35.5	16.1	17.8	8.1
12"	232	16.0	57.0	25.9	28.5	12.9
14"	232	16.0	85.8	39.0	42.9	19.5
16"	232	16.0	122.6	55.7	61.3	27.8
18"	232	16.0	168.5	76.5	84.3	38.3
20"	232	16.0	224.9	102.1	112.4	51.0
24"	232	16.0	371.4	168.6	85.7	38.9
30"						
36"						
42"						
48"						
54"						
60"						

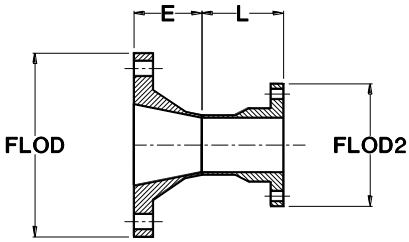
1. These ratings are also valid for flanges (Fig.10, Fig.10O, Fig.11, & Fig.15), blind flanges (Fig.16, Fig.19MC, Fig.19MH), bleed rings (Fig.17), tees (Fig.40, Fig.40PPF, & Fig.40F3), saddles (Fig.46 & Fig.48), reducers (Fig.60 & Fig.61), caps (Fig.96), MNPT saddles (Fig.47JF), and "dummy legs" (Fig.90 & 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".

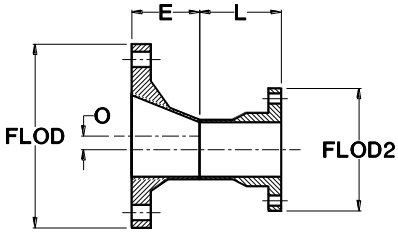
2. Fittings and flanges that are shipped loose for site installation are typically shipped without any pigmented gelcoat. This is due to the fact that the gelcoat would have to be removed during the bonding process.

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	2.76"	70	2.26"	57	0.25"	6
2"x1.5"	1.25"	32	7.25"	184	3.26"	83	2.76"	70	0.25"	6
2"x1"	2.50"	64	8.50"	216	3.26"	83	2.26"	57	0.50"	13
2.5"x2"	1.25"	32	7.25"	184	3.76"	96	3.26"	83	0.25"	6
3"x2.5"	1.25"	32	7.25"	184	4.26"	108	3.76"	96	0.25"	6
3"x2"	2.50"	64	8.50"	216	4.26"	108	3.26"	83	0.50"	13
3"x1.5"	3.75"	95	9.75"	248	4.26"	108	2.76"	70	0.75"	19
3"x1"	5"	127	11"	279	4.26"	108	2.26"	57	1.00"	25
4"x3"	2.50"	64	8.50"	216	5.26"	134	4.26"	108	0.50"	13
4"x2.5"	3.75"	95	9.75"	248	5.26"	134	3.76"	96	0.75"	19
4"x2"	5"	127	11"	279	5.26"	134	3.26"	83	1.00"	25
4"x1.5"	6.25"	159	12.25"	311	5.26"	134	2.76"	70	1.25"	32
4"x1"	7.50"	191	13.50"	343	5.26"	134	2.26"	57	1.50"	38
5"x4"	2.50"	64	8.50"	216	6.26"	159	5.26"	134	0.50"	13
6"x5"	2.50"	64	8.50"	216	7.26"	184	6.26"	159	0.50"	13
6"x4"	5"	127	11"	279	7.26"	184	5.26"	134	1.00"	25
6"x3"	7.50"	191	13.50"	343	7.26"	184	4.26"	108	1.50"	38
6"x2.5"	8.75"	222	14.75"	375	7.26"	184	3.76"	96	1.75"	44
6"x2"	10"	254	16"	406	7.26"	184	3.26"	83	2.00"	51
8"x6"	5"	127	13"	330	9.26"	235	7.26"	184	1.00"	25
8"x5"	7.50"	191	13.50"	343	9.26"	235	6.26"	159	1.50"	38
8"x4"	10"	254	16"	406	9.26"	235	5.26"	134	2.00"	51
8"x3"	12.50"	318	18.50"	470	9.26"	235	4.26"	108	2.50"	64

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	11.26"	286	9.26"	235	1.00"	25
10"x6"	10"	254	18"	457	11.38"	289	7.26"	184	2.06"	52
10"x5"	12.50"	318	18.50"	470	11.38"	289	6.26"	159	2.56"	65
10"x4"	15"	381	21"	533	11.38"	289	5.26"	134	3.06"	78
12"x10"	5"	127	15"	381	13.40"	340	11.26"	286	1.07"	27
12"x8"	10"	254	18"	457	13.40"	340	9.26"	235	2.07"	53
12"x6"	15"	381	23"	584	13.40"	340	7.26"	184	3.07"	78
14"x12"	5"	127	15"	381	15.83"	402	13.40"	340	1.22"	31
14"x10"	10"	254	20"	508	15.83"	402	11.26"	286	2.29"	58
14"x8"	15"	381	23"	584	15.83"	402	9.26"	235	3.29"	83
16"x14"	5"	127	17"	432	17.99"	457	15.83"	402	1.08"	27
16"x12"	10"	254	20"	508	17.99"	457	13.40"	340	2.30"	58
16"x10"	15"	381	25"	635	17.99"	457	11.26"	286	3.37"	85
18"x16"	5"	127	17"	432	20.15"	512	17.99"	457	1.08"	27
18"x14"	10"	254	15"	381	20.15"	512	15.83"	402	2.16"	55
18"x12"	15"	381	14"	356	20.15"	512	13.40"	340	3.38"	86
20"x18"	5"	127	18"	457	22.31"	567	20.15"	512	1.08"	27
20"x16"	10"	254	17"	432	22.31"	567	17.99"	457	2.16"	55
20"x14"	15"	381	15"	381	22.31"	567	15.83"	402	3.24"	82
24"x20"	10"	254	20"	508	26.63"	676	22.31"	567	2.16"	55
24"x18"	15"	381	18"	457	26.63"	676	20.15"	512	3.24"	82
30"x24"										
36"x30"										
42"x36"										
48"x42"										
54"x48"										
60"x54"										

REDUCERS (cont'd)

Reducer Weights

Size	Fig.60, 61		Fig.60FF, 61FF		Size	Fig.60, 61		Fig.60FF, 61FF	
	(lb)	(kg)	(lb)	(kg)		(lb)	(kg)	(lb)	(kg)
1.5"x1"	0.3	0.1	2.3	1.1	12"x10"	7.6	3.5	69.3	31.5
2"x1.5"	0.7	0.3	3.7	1.7	12"x8"	15.1	6.9	76.1	34.5
2"x1"	0.7	0.3	3.7	1.7	12"x6"	22.7	10.3	82.9	37.6
2.5"x2"	0.4	0.2	4.5	2.0					
					14"x12"	9.8	4.4	90.5	41.1
3"x2.5"	1.0	0.4	5.7	2.6	14"x10"	19.5	8.9	99.4	45.1
3"x2"	1.0	0.4	5.7	2.6	14"x8"	29.3	13.3	108.2	49.1
3"x1.5"	1.9	0.9	6.6	3.0					
3"x1"	1.9	0.9	6.6	3.0	16"x14"	12.2	5.5	128.4	58.3
					16"x12"	24.4	11.1	139.6	63.4
4"x3"	1.2	0.6	9.4	4.3	16"x10"	36.6	16.6	150.9	68.5
4"x2.5"	2.5	1.1	10.6	4.8					
4"x2"	2.5	1.1	10.6	4.8	18"x16"	14.9	6.8	151.8	68.9
4"x1.5"	3.7	1.7	11.9	5.4	18"x14"	29.8	13.5	165.7	75.2
4"x1"	3.7	1.7	11.9	5.4	18"x12"	44.7	20.3	179.5	81.5
5"x4"	1.5	0.7	11.3	5.1	20"x18"	17.9	8.1	201.2	91.3
					20"x16"	35.8	16.3	217.9	98.9
6"x5"	1.8	0.8	16.7	7.6	20"x14"	53.7	24.4	234.6	106.5
6"x4"	3.5	1.6	18.5	8.4					
6"x3"	5.3	2.4	20.3	9.2	24"x20"	49.3	22.4	328.0	148.9
6"x2.5"	7.0	3.2	22.0	10.0	24"x18"	73.9	33.6	351.3	159.5
6"x2"	7.0	3.2	22.0	10.0					
					30"x24"				
8"x6"	4.6	2.1	28.8	13.1	36"x30"				
8"x5"	7.0	3.2	31.1	14.1	42"x36"				
8"x4"	9.2	4.2	33.4	15.2	48"x42"				
8"x3"	1.5	0.7	35.7	16.2	54"x48"				
					60"x54"				
10"x8"	5.7	2.6	47.6	21.6					
10"x6"	11.3	5.1	53.3	24.2					
10"x5"	14.3	6.5	56.2	25.5					
10"x4"	17.0	7.7	59.0	26.8					

EQUAL SIZE & REDUCING TEES

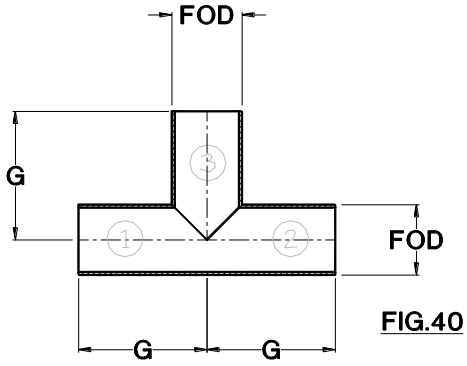


FIG.40

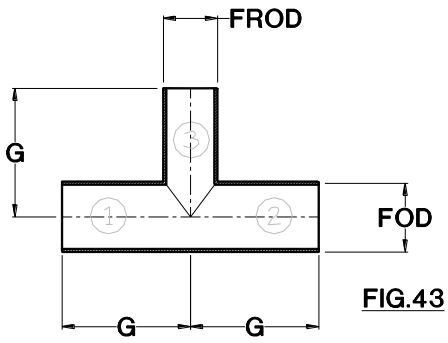


FIG.43

Size	Fig.40					
	G		FOD		Weight	
	(in.)	(mm)	(lb)	(kg)	(lb)	(kg)
1"	5"	127	2.26"	57	2.6	1.2
1.5"	5.5"	140	2.76"	70	3.7	1.7
2"	6"	152	3.26"	83	5.0	2.3
2.5"	6.5"	165	3.76"	96	6.6	3.0
3"	7"	178	4.26"	108	8.1	3.7
4"	8"	203	5.26"	134	11.8	5.4
5"	9"	229	6.26"	159	16.7	7.6
6"	10"	254	7.26"	184	21.1	9.6
8"	12"	305	9.26"	235	33.0	15.0
10"	14"	356	11.26"	286	47.5	21.6
12"	16"	406	13.40"	340	72.5	32.9
14"	18"	457	15.83"	402	105.4	47.9
16"	20"	508	17.99"	457	146.4	66.5
18"	21"	533	20.15"	512	196.7	89.3
20"	22"	559	22.31"	567	471.7	214.2
24"	24"	610	26.63"	676	738.4	335.2
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	9.26"	235	7.26"	184	29.1	13.2
10"x8"	14"	356	11.26"	286	9.26"	235	42.7	19.4
10"x6"	14"	356	11.26"	286	7.26"	184	38.7	17.6
12"x10"	16"	406	13.40"	340	11.26"	286	64.2	29.1
12"x8"	16"	406	13.40"	340	9.26"	235	59.4	27.0
14"x12"	18"	457	15.83"	402	13.40"	340	94.4	42.9
14"x10"	18"	457	15.83"	402	11.26"	286	86.1	39.1
16"x14"	20"	508	17.99"	457	15.83"	402	132.7	60.2
16"x12"	20"	508	17.99"	457	13.40"	340	121.8	55.3
16"x10"	20"	508	17.99"	457	11.26"	286	113.4	51.5
18"x16"	21"	533	20.15"	512	17.99"	457	179.9	81.7
18"x14"	21"	533	20.15"	512	15.83"	402	166.3	75.5
18"x12"	21"	533	20.15"	512	13.40"	340	155.3	70.5
20"x18"	22"	559	22.31"	567	20.15"	512	380.0	172.5
20"x16"	22"	559	22.31"	567	17.99"	457	363.2	164.9
20"x14"	22"	559	22.31"	567	15.83"	402	349.6	158.7
24"x20"	24"	610	26.63"	676	22.31"	567	649.5	294.9
24"x18"	24"	610	26.63"	676	20.15"	512	557.8	253.2
24"x16"	24"	610	26.63"	676	17.99"	457	541.1	245.7

OLETS, PLAIN AND FLANGED

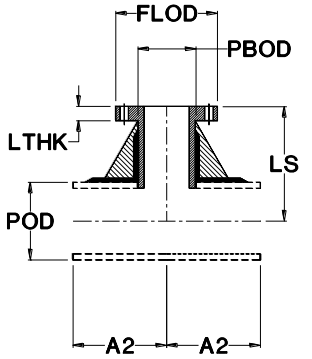


FIG.46

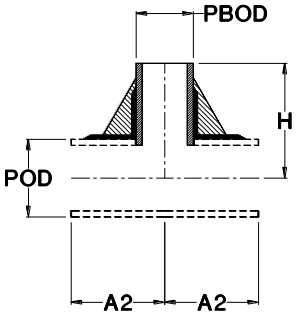


FIG.48

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	LS							
6"	1"								
6"	1.5"	7"							
6"	2"	7"							
6"	2.5"	7.5"							
7"	3"	7.5"	7.5"						
8"	4"	8"	8"						
10"	5"	9"	9"	10"					
10"	6"	9"	9"	10"	13"				
12"	8"	10"	10"	11"	14"				
14"	10"	11"	11"	12"	15"	18"			
16"	12"	12"	12"	13"	16"	19"			
18"	14"	13"	13"	14"	17"	20"			
20"	16"	14"	14"	15"	18"	21"			
21"	18"	15"	15"	16"	19"	22"			
22"	20"	16"	16"	17"	20"	23"			
24"	24"	18"	18"	19"	22"	25"			
30"	30"								
33"	36"								
36"	42"								
45"	48"								
54"	54"								
54"	60"								

1. 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”
2. An olet 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	6.8	3.1
2"x1.5"	7.00"	178	6.00"	152	0.52"	13	5.00"	127	8.6	3.9
2"x1"	7.00"	178	6.00"	152	0.50"	13	4.25"	108	6.8	3.1
2.5"x2"	7.50"	191	6.00"	152	0.64"	16	6.00"	152	10.6	4.8
3"x2.5"	7.50"	191	7.00"	178	0.72"	18	7.00"	178	12.7	5.8
3"x2"	7.50"	191	6.00"	152	0.64"	16	6.00"	152	10.6	4.8
3"x1.5"	7.50"	191	6.00"	152	0.52"	13	5.00"	127	8.6	3.9
3"x1"	7.50"	191	6.00"	152	0.50"	13	4.25"	108	6.8	3.1
4"x3"	8.00"	203	7.00"	178	0.77"	20	7.50"	191	14.8	6.7
4"x2.5"	8.00"	203	7.00"	178	0.72"	18	7.00"	178	12.7	5.8
4"x2"	8.00"	203	6.00"	152	0.64"	16	6.00"	152	10.6	4.8
4"x1.5"	8.00"	203	6.00"	152	0.52"	13	5.00"	127	8.6	3.9
4"x1"	8.00"	203	6.00"	152	0.50"	13	4.25"	108	6.8	3.1
5"x4"	10.00"	254	8.00"	203	1.01"	26	9.00"	229	19.8	9.0
6"x5"	13.00"	330	10.00"	254	1.10"	28	10.00"	254	24.7	11.2
6"x4"	10.00"	254	8.00"	203	1.01"	26	9.00"	229	19.8	9.0
6"x3"	9.00"	229	7.00"	178	0.77"	20	7.50"	191	14.8	6.7
6"x2.5"	9.00"	229	7.00"	178	0.72"	18	7.00"	178	12.7	5.8
6"x2"	9.00"	229	6.00"	152	0.64"	16	6.00"	152	10.6	4.8
6"x1.5"	9.00"	229	6.00"	152	0.52"	13	5.00"	127	8.6	3.9
6"x1"	9.00"	229	6.00"	152	0.50"	13	4.25"	108	6.8	3.1
8"x6"	14.00"	356	10.00"	254	1.36"	35	11.00"	279	30.9	14.0
8"x5"	14.00"	356	10.00"	254	1.19"	30	10.00"	254	24.7	11.2
8"x4"	11.00"	279	8.00"	203	1.01"	26	9.00"	229	19.8	9.0
8"x3"	10.00"	254	7.00"	178	0.77"	20	7.50"	191	14.8	6.7
8"x2.5"	10.00"	254	7.00"	178	0.72"	18	7.00"	178	12.7	5.8
8"x2"	10.00"	254	6.00"	152	0.64"	16	6.00"	152	10.6	4.8
8"x1.5"	10.00"	254	6.00"	152	0.52"	13	5.00"	127	8.6	3.9
8"x1"	10.00"	254	6.00"	152	0.50"	13	4.25"	108	6.8	3.1
10"x8"	18.00"	457	12.00"	305	1.36"	35	13.50"	343	48.5	22.0
10"x6"	15.00"	381	10.00"	254	1.19"	30	11.00"	279	30.9	14.0
10"x5"	15.00"	381	10.00"	254	1.10"	28	10.00"	254	24.7	11.2
10"x4"	12.00"	305	8.00"	203	1.01"	26	9.00"	229	19.8	9.0
10"x3"	11.00"	279	7.00"	178	0.77"	20	7.50"	191	14.8	6.7
10"x2.5"	11.00"	279	7.00"	178	0.72"	18	7.00"	178	12.7	5.8
10"x2"	11.00"	279	6.00"	152	0.64"	16	6.00"	152	10.6	4.8
10"x1.5"	11.00"	279	6.00"	152	0.52"	13	5.00"	127	8.6	3.9
10"x1"	11.00"	279	6.00"	152	0.50"	13	4.25"	108	6.8	3.1

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"										
12"x8"	19.00"	483	12.00"	305	1.36"	35	13.50"	343	48.5	22.0
12"x6"	16.00"	406	10.00"	254	1.19"	30	11.00"	279	30.9	14.0
12"x5"	16.00"	406	10.00"	254	1.10"	28	10.00"	254	24.7	11.2
12"x4"	13.00"	330	8.00"	203	1.01"	26	9.00"	229	19.8	9.0
12"x3"	12.00"	305	7.00"	178	0.77"	20	7.50"	191	14.8	6.7
12"x2.5"	12.00"	305	7.00"	178	0.72"	18	7.00"	178	12.7	5.8
12"x2"	12.00"	305	6.00"	152	0.64"	16	6.00"	152	10.6	4.8
12"x1.5"	12.00"	305	6.00"	152	0.52"	13	5.00"	127	8.6	3.9
12"x1"	12.00"	305	6.00"	152	0.50"	13	4.25"	108	6.8	3.1
14"x12"										
14"x10"										
14"x8"	20.00"	508	12.00"	305	1.36"	35	13.50"	343	48.5	22.0
14"x6"	17.00"	432	10.00"	254	1.19"	30	11.00"	279	30.9	14.0
14"x5"	17.00"	432	10.00"	254	1.10"	28	10.00"	254	24.7	11.2
14"x4"	14.00"	356	8.00"	203	1.01"	26	9.00"	229	19.8	9.0
14"x3"	13.00"	330	7.00"	178	0.77"	20	7.50"	191	14.8	6.7
14"x2.5"	13.00"	330	7.00"	178	0.72"	18	7.00"	178	12.7	5.8
14"x2"	13.00"	330	6.00"	152	0.64"	16	6.00"	152	10.6	4.8
14"x1.5"	13.00"	330	6.00"	152	0.52"	13	5.00"	127	8.6	3.9
14"x1"	13.00"	330	6.00"	152	0.50"	13	4.25"	108	6.8	3.1
16"x14"										
16"x12"										
16"x10"										
16"x8"	21.00"	533	12.00"	305	1.36"	35	13.50"	343	48.5	22.0
16"x6"	18.00"	457	10.00"	254	1.19"	30	11.00"	279	30.9	14.0
16"x5"	18.00"	457	10.00"	254	1.10"	28	10.00"	254	24.7	11.2
16"x4"	15.00"	381	8.00"	203	1.01"	26	9.00"	229	19.8	9.0
16"x3"	14.00"	356	7.00"	178	0.77"	20	7.50"	191	14.8	6.7
16"x2.5"	14.00"	356	7.00"	178	0.72"	18	7.00"	178	12.7	5.8
16"x2"	14.00"	356	6.00"	152	0.64"	16	6.00"	152	10.6	4.8
16"x1.5"	14.00"	356	6.00"	152	0.52"	13	5.00"	127	8.6	3.9
16"x1"	14.00"	356	6.00"	152	0.50"	13	4.25"	108	6.8	3.1
18"x16"										
18"x14"										
18"x12"										

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"										
18"x8"	22.00"	559	12.00"	305	1.36"	35	13.50"	343	48.5	22.0
18"x6"	19.00"	483	10.00"	254	1.19"	30	11.00"	279	30.9	14.0
18"x5"	19.00"	483	10.00"	254	1.10"	28	10.00"	254	24.7	11.2
18"x4"	16.00"	406	8.00"	203	1.01"	26	9.00"	229	19.8	9.0
18"x3"	15.00"	381	7.00"	178	0.77"	20	7.50"	191	14.8	6.7
18"x2.5"	15.00"	381	7.00"	178	0.72"	18	7.00"	178	12.7	5.8
18"x2"	15.00"	381	6.00"	152	0.64"	16	6.00"	152	10.6	4.8
18"x1.5"	15.00"	381	6.00"	152	0.52"	13	5.00"	127	8.6	3.9
18"x1"	15.00"	381	6.00"	152	0.50"	13	4.25"	108	6.8	3.1
20"x18"										
20"x16"										
20"x14"										
20"x12"										
20"x10"										
20"x8"	23.00"	584	12.00"	305	1.36"	35	13.50"	343	48.5	22.0
20"x6"	20.00"	508	10.00"	254	1.19"	30	11.00"	279	30.9	14.0
20"x5"	20.00"	508	10.00"	254	1.10"	28	10.00"	254	24.7	11.2
20"x4"	17.00"	432	8.00"	203	1.01"	26	9.00"	229	19.8	9.0
20"x3"	16.00"	406	7.00"	178	0.77"	20	7.50"	191	14.8	6.7
20"x2.5"	16.00"	406	7.00"	178	0.72"	18	7.00"	178	12.7	5.8
20"x2"	16.00"	406	6.00"	152	0.64"	16	6.00"	152	10.6	4.8
20"x1.5"	16.00"	406	6.00"	152	0.52"	13	5.00"	127	8.6	3.9
20"x1"	16.00"	406	6.00"	152	0.50"	13	4.25"	108	6.8	3.1
24"x20"										
24"x18"										
24"x16"										
24"x14"										
24"x12"										
24"x10"										
24"x8"	25.00"	635	12.00"	305	1.36"	35	13.50"	343	48.5	22.0
24"x6"	22.00"	559	10.00"	254	1.19"	30	11.00"	279	30.9	14.0
24"x5"	22.00"	559	10.00"	254	1.10"	28	10.00"	254	24.7	11.2
24"x4"	19.00"	483	8.00"	203	1.01"	26	9.00"	229	19.8	9.0
24"x3"	18.00"	457	7.00"	178	0.77"	20	7.50"	191	14.8	6.7
24"x2.5"	18.00"	457	7.00"	178	0.72"	18	7.00"	178	12.7	5.8
24"x2"	18.00"	457	6.00"	152	0.64"	16	6.00"	152	10.6	4.8
24"x1.5"	18.00"	457	6.00"	152	0.52"	13	5.00"	127	8.6	3.9
24"x1"	18.00"	457	6.00"	152	0.50"	13	4.25"	108	6.8	3.1

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	2.76"	70	2.26"	57	4.5	2.0
2"x1.5"	6.00"	152	6.00"	152	3.26"	83	2.76"	70	5.9	2.7
2"x1"	6.00"	152	6.00"	152	3.26"	83	2.26"	57	4.5	2.0
2.5"x2"	7.00"	178	6.00"	152	3.76"	96	3.26"	83	7.0	3.2
3"x2.5"	7.00"	178	7.00"	178	4.26"	108	3.76"	96	8.3	3.8
3"x2"	7.00"	178	6.00"	152	4.26"	108	3.26"	83	7.0	3.2
3"x1.5"	7.00"	178	6.00"	152	4.26"	108	2.76"	70	5.9	2.7
3"x1"	7.00"	178	6.00"	152	4.26"	108	2.26"	57	4.5	2.0
4"x3"	8.00"	203	7.00"	178	5.26"	134	4.26"	108	9.6	4.4
4"x2.5"	8.00"	203	7.00"	178	5.26"	134	3.76"	96	8.3	3.8
4"x2"	8.00"	203	6.00"	152	5.26"	134	3.26"	83	7.0	3.2
4"x1.5"	8.00"	203	6.00"	152	5.26"	134	2.76"	70	5.9	2.7
4"x1"	8.00"	203	6.00"	152	5.26"	134	2.26"	57	4.5	2.0
5"x4"	10.00"	254	8.00"	203	6.26"	159	5.26"	134	12.3	5.6
6"x5"	10.00"	254	10.00"	254	7.26"	184	6.26"	159	15.8	7.2
6"x4"	10.00"	254	8.00"	203	7.26"	184	5.26"	134	12.3	5.6
6"x3"	10.00"	254	7.00"	178	7.26"	184	4.26"	108	9.6	4.4
6"x2.5"	10.00"	254	7.00"	178	7.26"	184	3.76"	96	8.3	3.8
6"x2"	10.00"	254	6.00"	152	7.26"	184	3.26"	83	7.0	3.2
6"x1.5"	10.00"	254	6.00"	152	7.26"	184	2.76"	70	5.9	2.7
6"x1"	10.00"	254	6.00"	152	7.26"	184	2.26"	57	4.5	2.0
8"x6"	12.00"	305	10.00"	254	9.26"	235	7.26"	184	19.5	8.9
8"x5"	12.00"	305	10.00"	254	9.26"	235	6.26"	159	15.8	7.2
8"x4"	12.00"	305	8.00"	203	9.26"	235	5.26"	134	12.3	5.6
8"x3"	12.00"	305	7.00"	178	9.26"	235	4.26"	108	9.6	4.4
8"x2.5"	12.00"	305	7.00"	178	9.26"	235	3.76"	96	8.3	3.8
8"x2"	12.00"	305	6.00"	152	9.26"	235	3.26"	83	7.0	3.2
8"x1.5"	12.00"	305	6.00"	152	9.26"	235	2.76"	70	5.9	2.7
8"x1"	12.00"	305	6.00"	152	9.26"	235	2.26"	57	4.5	2.0
10"x8"	14.00"	356	12.00"	305	11.26"	286	9.26"	235	30.0	13.6
10"x6"	14.00"	356	10.00"	254	11.26"	286	7.26"	184	19.5	8.9
10"x5"	14.00"	356	10.00"	254	11.26"	286	6.26"	159	15.8	7.2
10"x4"	14.00"	356	8.00"	203	11.26"	286	5.26"	134	12.3	5.6
10"x3"	14.00"	356	7.00"	178	11.26"	286	4.26"	108	9.6	4.4
10"x2.5"	14.00"	356	7.00"	178	11.26"	286	3.76"	96	8.3	3.8
10"x2"	14.00"	356	6.00"	152	11.26"	286	3.26"	83	7.0	3.2
10"x1.5"	14.00"	356	6.00"	152	11.26"	286	2.76"	70	5.9	2.7
10"x1"	14.00"	356	6.00"	152	11.26"	286	2.26"	57	4.5	2.0

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"										
12"x8"	16.00"	406	12.00"	305	13.30"	338	9.25"	235	30.0	13.6
12"x6"	16.00"	406	10.00"	254	13.30"	338	7.00"	178	19.5	8.9
12"x5"	16.00"	406	10.00"	254	13.30"	338	5.88"	149	15.8	7.2
12"x4"	16.00"	406	8.00"	203	13.30"	338	4.88"	124	12.3	5.6
12"x3"	16.00"	406	7.00"	178	13.30"	338	3.88"	98	9.6	4.4
12"x2.5"	16.00"	406	7.00"	178	13.30"	338	3.38"	86	8.3	3.8
12"x2"	16.00"	406	6.00"	152	13.30"	338	2.88"	73	7.0	3.2
12"x1.5"	16.00"	406	6.00"	152	13.30"	338	2.38"	60	5.9	2.7
12"x1"	16.00"	406	6.00"	152	13.30"	338	1.88"	48	4.5	2.0
14"x12"										
14"x10"										
14"x8"	18.00"	457	12.00"	305	15.71"	399	9.25"	235	30.0	13.6
14"x6"	18.00"	457	10.00"	254	15.71"	399	7.00"	178	19.5	8.9
14"x5"	18.00"	457	10.00"	254	15.71"	399	5.88"	149	15.8	7.2
14"x4"	18.00"	457	8.00"	203	15.71"	399	4.88"	124	12.3	5.6
14"x3"	18.00"	457	7.00"	178	15.71"	399	3.88"	98	9.6	4.4
14"x2.5"	18.00"	457	7.00"	178	15.71"	399	3.38"	86	8.3	3.8
14"x2"	18.00"	457	6.00"	152	15.71"	399	2.88"	73	7.0	3.2
14"x1.5"	18.00"	457	6.00"	152	15.71"	399	2.38"	60	5.9	2.7
14"x1"	18.00"	457	6.00"	152	15.71"	399	1.88"	48	4.5	2.0
16"x14"										
16"x12"										
16"x10"										
16"x8"	20.00"	508	12.00"	305	17.87"	454	9.25"	235	30.0	13.6
16"x6"	20.00"	508	10.00"	254	17.87"	454	7.00"	178	19.5	8.9
16"x5"	20.00"	508	10.00"	254	17.87"	454	5.88"	149	15.8	7.2
16"x4"	20.00"	508	8.00"	203	17.87"	454	4.88"	124	12.3	5.6
16"x3"	20.00"	508	7.00"	178	17.87"	454	3.88"	98	9.6	4.4
16"x2.5"	20.00"	508	7.00"	178	17.87"	454	3.38"	86	8.3	3.8
16"x2"	20.00"	508	6.00"	152	17.87"	454	2.88"	73	7.0	3.2
16"x1.5"	20.00"	508	6.00"	152	17.87"	454	2.38"	60	5.9	2.7
16"x1"	20.00"	508	6.00"	152	17.87"	454	1.88"	48	4.5	2.0
18"x16"										
18"x14"										
18"x12"										

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"										
18"x8"	21.00"	533	12.00"	305	20.01"	508	9.26"	235	30.0	13.6
18"x6"	21.00"	533	10.00"	254	20.01"	508	7.26"	184	19.5	8.9
18"x5"	21.00"	533	10.00"	254	20.01"	508	6.26"	159	15.8	7.2
18"x4"	21.00"	533	8.00"	203	20.01"	508	5.26"	134	12.3	5.6
18"x3"	21.00"	533	7.00"	178	20.01"	508	4.26"	108	9.6	4.4
18"x2.5"	21.00"	533	7.00"	178	20.01"	508	3.76"	96	8.3	3.8
18"x2"	21.00"	533	6.00"	152	20.01"	508	3.26"	83	7.0	3.2
18"x1.5"	21.00"	533	6.00"	152	20.01"	508	2.76"	70	5.9	2.7
18"x1"	21.00"	533	6.00"	152	20.01"	508	2.26"	57	4.5	2.0
20"x18"										
20"x16"										
20"x14"										
20"x12"										
20"x10"										
20"x8"	22.00"	559	12.00"	305	22.15"	563	9.26"	235	30.0	13.6
20"x6"	22.00"	559	10.00"	254	22.15"	563	7.26"	184	19.5	8.9
20"x5"	22.00"	559	10.00"	254	22.15"	563	6.26"	159	15.8	7.2
20"x4"	22.00"	559	8.00"	203	22.15"	563	5.26"	134	12.3	5.6
20"x3"	22.00"	559	7.00"	178	22.15"	563	4.26"	108	9.6	4.4
20"x2.5"	22.00"	559	7.00"	178	22.15"	563	3.76"	96	8.3	3.8
20"x2"	22.00"	559	6.00"	152	22.15"	563	3.26"	83	7.0	3.2
20"x1.5"	22.00"	559	6.00"	152	22.15"	563	2.76"	70	5.9	2.7
20"x1"	22.00"	559	6.00"	152	22.15"	563	2.26"	57	4.5	2.0
24"x20"										
24"x18"										
24"x16"										
24"x14"										
24"x12"										
24"x10"										
24"x8"	24.00"	610	12.00"	305	26.45"	672	9.26"	235	30.0	13.6
24"x6"	24.00"	610	10.00"	254	26.45"	672	7.26"	184	19.5	8.9
24"x5"	24.00"	610	10.00"	254	26.45"	672	6.26"	159	15.8	7.2
24"x4"	24.00"	610	8.00"	203	26.45"	672	5.26"	134	12.3	5.6
24"x3"	24.00"	610	7.00"	178	26.45"	672	4.26"	108	9.6	4.4
24"x2.5"	24.00"	610	7.00"	178	26.45"	672	3.76"	96	8.3	3.8
24"x2"	24.00"	610	6.00"	152	26.45"	672	3.26"	83	7.0	3.2
24"x1.5"	24.00"	610	6.00"	152	26.45"	672	2.76"	70	5.9	2.7
24"x1"	24.00"	610	6.00"	152	26.45"	672	2.26"	57	4.5	2.0

LATERALS

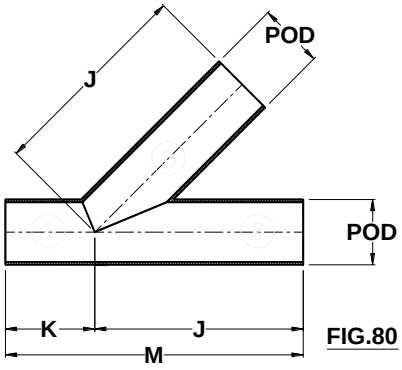


FIG.80

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	3.26"	83	14.2	6.4
2.5"	12"	305	6"	152	18"	457	3.76"	96	17.5	7.9
3"	12"	305	6"	152	18"	457	4.26"	108	21.6	9.8
4"	14"	356	6"	152	20"	508	5.26"	134	30.1	13.7
5"	16"	406	8"	203	24"	610	6.26"	159	39.0	17.7
6"	16"	406	8"	203	24"	610	7.26"	184	38.6	17.5
8"	20"	508	10"	254	30"	762	9.26"	235	79.7	36.2
10"	24"	610	10"	254	34"	864	11.26"	286	118.8	53.9
12"	26"	660	12"	305	38"	965	13.30"	338	166.8	75.7
14"	30"	762	12"	305	42"	1067	15.71"	399	248.1	112.6
16"	32"	813	14"	356	46"	1168	17.87"	454	331.8	150.6
18"	36"	914	14"	356	50"	1270	20.01"	508	455.0	206.6
20"	38"	965	16"	406	54"	1372	22.15"	563	577.3	262.1
24"	42"	1067	18"	457	60"	1524	26.45"	672	905.6	411.1
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

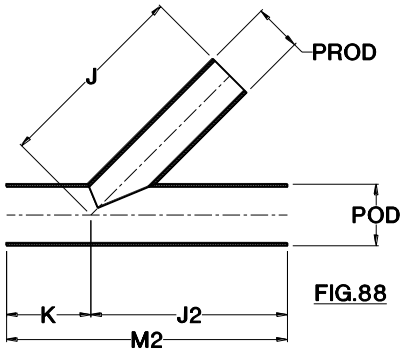


FIG.88

			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"
J		Header Diameter	J2							
		1"								
		1.5"								
	10"	2"								
	12"	2.5"								
	12"	3"	10"	12"						
	14"	4"	10"	12"						
	16"	5"	10"	12"	14"					
	16"	6"	10"	12"	14"	15"				
	20"	8"	10"	12"	14"	16"				
	24"	10"	12"	13"	14"	16"	20"			
	26"	12"	14"	15"	16"	18"	20"	24"		
	30"	14"	16"	17"	18"	20"	22"	24"	26"	
	32"	16"	18"	19"	20"	22"	24"	26"	28"	30"
	36"	18"	20"	21"	22"	24"	26"	28"	30"	32"
	38"	20"	22"	23"	24"	26"	28"	30"	32"	34"
	42"	24"	26"	27"	28"	30"	32"	34"	36"	38"
	52"	30"								
	62"	36"								
	72"	42"								
		48"								
		54"								
		60"								

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	3.26"	83	2.76"	70
2"x1"	10"	254	6"	152	10"	254	3.26"	83	2.26"	57
2.5"x2"	12"	305	6"	152	10"	254	3.76"	96	3.26"	83
3"x2.5"	12"	305	6"	152	12"	305	3.26"	83	3.76"	96
3"x2"	12"	305	6"	152	10"	254	3.26"	83	3.26"	83
3"x1.5"	12"	305	6"	152	10"	254	3.26"	83	2.76"	70
3"x1"	12"	305	6"	152	10"	254	3.26"	83	2.26"	57
4"x3"	14"	356	6"	152	12"	305	5.26"	134	4.26"	108
4"x2.5"	14"	356	6"	152	12"	305	5.26"	134	3.76"	96
4"x2"	14"	356	6"	152	10"	254	5.26"	134	3.26"	83
4"x1.5"	14"	356	6"	152	10"	254	5.26"	134	2.76"	70
4"x1"	14"	356	6"	152	10"	254	5.26"	134	2.26"	57
5"x4"	16"	406	6"	152	14"	356	6.26"	159	5.26"	134
6"x5"	16"	406	8"	203	15"	381	7.26"	184	6.26"	159
6"x4"	16"	406	6"	152	14"	356	7.26"	184	5.26"	134
6"x3"	16"	406	6"	152	12"	305	7.26"	184	4.26"	108
6"x2.5"	16"	406	6"	152	12"	305	7.26"	184	3.76"	96
6"x2"	16"	406	6"	152	10"	254	7.26"	184	3.26"	83
6"x1.5"	16"	406	6"	152	10"	254	7.26"	184	2.76"	70
6"x1"	16"	406	6"	152	10"	254	7.26"	184	2.26"	57
8"x6"	20"	508	8"	203	16"	406	9.26"	235	7.26"	184
8"x5"	20"	508	8"	203	16"	406	9.26"	235	6.26"	159
8"x4"	20"	508	6"	152	14"	356	9.26"	235	5.26"	134
8"x3"	20"	508	6"	152	12"	305	9.26"	235	4.26"	108
8"x2.5"	20"	508	6"	152	12"	305	9.26"	235	3.76"	96
8"x2"	20"	508	6"	152	10"	254	9.26"	235	3.26"	83
8"x1.5"	20"	508	6"	152	10"	254	9.26"	235	2.76"	70
8"x1"	20"	508	6"	152	10"	254	9.26"	235	2.26"	57

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	11.26"	286	9.26"	235
10"x6"	24"	610	8"	203	16"	406	11.26"	286	7.26"	184
10"x5"	24"	610	8"	203	16"	406	11.26"	286	6.26"	159
10"x4"	24"	610	6"	152	14"	356	11.26"	286	5.26"	134
10"x3"	24"	610	6"	152	13"	330	11.26"	286	4.26"	108
10"x2.5"	24"	610	6"	152	13"	330	11.26"	286	3.76"	96
10"x2"	24"	610	6"	152	12"	305	11.26"	286	3.26"	83
10"x1.5"	24"	610	6"	152	12"	305	11.26"	286	2.76"	70
10"x1"	24"	610	6"	152	12"	305	11.26"	286	2.26"	57
12"x10"	26"	660	10"	254	24"	610	13.30"	338	11.26"	286
12"x8"	26"	660	10"	254	20"	508	13.30"	338	9.26"	235
12"x6"	26"	660	8"	203	18"	457	13.30"	338	7.26"	184
12"x5"	26"	660	8"	203	18"	457	13.30"	338	6.26"	159
12"x4"	26"	660	6"	152	16"	406	13.30"	338	5.26"	134
12"x3"	26"	660	6"	152	15"	381	13.30"	338	4.26"	108
12"x2.5"	26"	660	6"	152	15"	381	13.30"	338	3.76"	96
12"x2"	26"	660	6"	152	14"	356	13.30"	338	3.26"	83
12"x1.5"	26"	660	6"	152	14"	356	13.30"	338	2.76"	70
12"x1"	26"	660	6"	152	14"	356	13.30"	338	2.26"	57
14"x12"	30"	762	12"	305	26"	660	15.71"	399	13.30"	338
16"x14"	32"	813	12"	305	30"	762	17.87"	454	15.71"	399
18"x16"	36"	914	14"	356	34"	864	20.01"	508	17.87"	454
20"x18"	38"	965	14"	356	38"	965	22.15"	563	20.01"	508
24"x20"	42"	1067	16"	406	44"	1118	26.45"	672	22.15"	563
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"	8.9	4.0
2" x 1"	7.1	3.2
2.5" x 2"	10.6	4.8
3" x 2.5"	12.5	5.7
3" x 2"	10.6	4.8
3" x 1.5"	8.9	4.0
3" x 1"	7.1	3.2
4" x 3"	14.7	6.7
4" x 2.5"	12.5	5.7
4" x 2"	10.6	4.8
4" x 1.5"	8.9	4.0
4" x 1"	7.1	3.2
5" x 4"	18.7	8.5
6" x 5"	22.2	10.1
6" x 4"	18.7	8.5
6" x 3"	14.7	6.7
6" x 2.5"	12.5	5.7
6" x 2"	10.6	4.8
6" x 1.5"	8.9	4.0
6" x 1"	7.1	3.2

Size	Fig.88	
	(lb)	(kg)
8" x 6"	26.8	12.2
8" x 5"	22.2	10.1
8" x 4"	18.7	8.5
8" x 3"	14.7	6.7
8" x 2.5"	12.5	5.7
8" x 2"	10.6	4.8
8" x 1.5"	8.9	4.0
8" x 1"	7.1	3.2
10" x 8"	41.7	18.9
10" x 6"	26.8	12.2
10" x 5"	22.2	10.1
10" x 4"	18.7	8.5
10" x 3"	14.7	6.7
10" x 2.5"	12.5	5.7
10" x 2"	10.6	4.8
10" x 1.5"	8.9	4.0
10" x 1"	7.1	3.2
12" x 10"	67.7	30.7
12" x 8"	41.7	18.9
12" x 6"	26.8	12.2
12" x 5"	22.2	10.1
12" x 4"	18.7	8.5
12" x 3"	14.7	6.7
12" x 2.5"	12.5	5.7
12" x 2"	10.6	4.8
12" x 1.5"	8.9	4.0
12" x 1"	7.1	3.2

Size	Fig.88	
	(lb)	(kg)
14" x 12"	85.2	38.7
16" x 14"	127.1	57.7
18" x 16"	175.8	79.8
20" x 18"	240.1	109.0
24" x 20"	312.6	141.9
30" x 24"		
36" x 30"		
42" x 36"		
48" x 42"		
54" x 48"		
60" x 54"		

DUMMY LEGS, CAPS, PUP PIECES

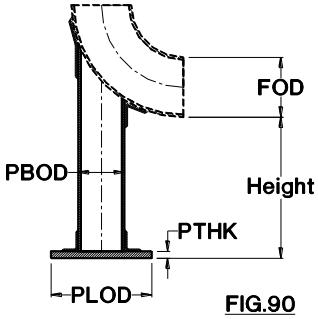


FIG.90

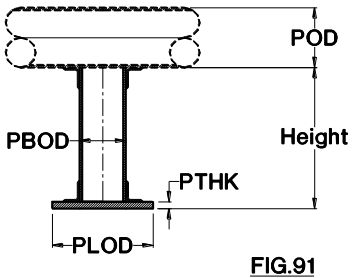


FIG.91

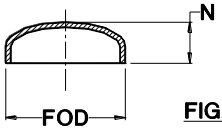


FIG.96

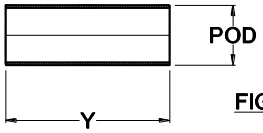


FIG.1

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	3.26"	83	16.4	7.4
2.5"	2"	51	5"	127	0.50"	13	3.26"	83	16.4	7.4
3"	2"	51	5"	127	0.50"	13	3.26"	83	16.4	7.4
4"	3"	76	6"	152	0.50"	13	4.26"	108	22.6	10.3
5"	3"	76	6"	152	0.50"	13	4.26"	108	22.6	10.3
6"	4"	102	7"	178	0.50"	13	5.26"	134	28.8	13.1
8"	6"	152	9"	229	0.50"	13	7.26"	184	41.3	18.8
10"	6"	152	9"	229	0.50"	13	7.26"	184	41.3	18.8
12"	8"	203	12"	305	0.50"	13	9.26"	235	57.9	26.3
14"	10"	254	14"	356	0.50"	13	11.26"	286	79.4	36.0
16"	12"	305	16"	406	0.50"	13	13.30"	338	106.3	48.3
18"										
20"										
24"										
30"										
36"										
42"										
48"										
54"										
60"										

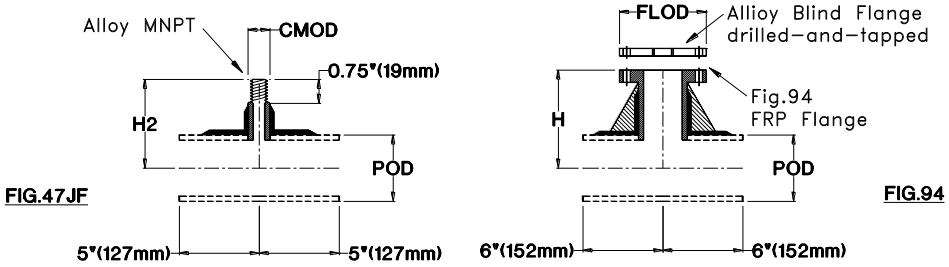
DUMMY LEGS, CAPS, PUP PIECES (cont'd)

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 shop 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	2.26"	57
1.5"							4"	1.8	2.76"	70
2"	1.5"	38	3.26"	83	0.3	0.1	4"	102	3.26"	83
2.5"	1.5"	38	3.76"	96	0.3	0.2	4"	102	3.76"	96
3"	2.0"	51	4.26"	108	0.6	0.3	4"	102	4.26"	108
4"	2.5"	64	5.26"	134	1.0	0.5	6"	152	5.26"	134
5"	3.0"	76	6.26"	159	1.2	0.5	6"	152	6.26"	159
6"	3.5"	89	7.26"	184	2.1	1.0	6"	152	7.26"	184
8"	4.0"	102	9.26"	235	3.7	1.7	9"	229	9.26"	235
10"	5.0"	127	11.26"	286	5.7	2.6	12"	305	11.26"	286
12"	6.0"	152	13.40"	340	9.1	4.1	14"	356	13.30"	338
14"	6.5"	165	15.83"	402	13.7	6.2	17"	432	15.71"	399
16"	7.0"	178	17.99"	457	19.5	8.9	19"	483	17.87"	454
18"	8.0"	203	20.15"	512	26.8	12.2	21"	533	20.01"	508
20"	9.0"	229	22.31"	567	35.8	16.3	24"	610	22.15"	563
24"	10.5"	267	26.63"	676	59.1	26.8	28"	711	26.45"	672
30"										
36"										
42"										
48"										
54"										
60"										

THREADED CONNECTIONS



For Series 20JF16 and 20JF16-C, 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.

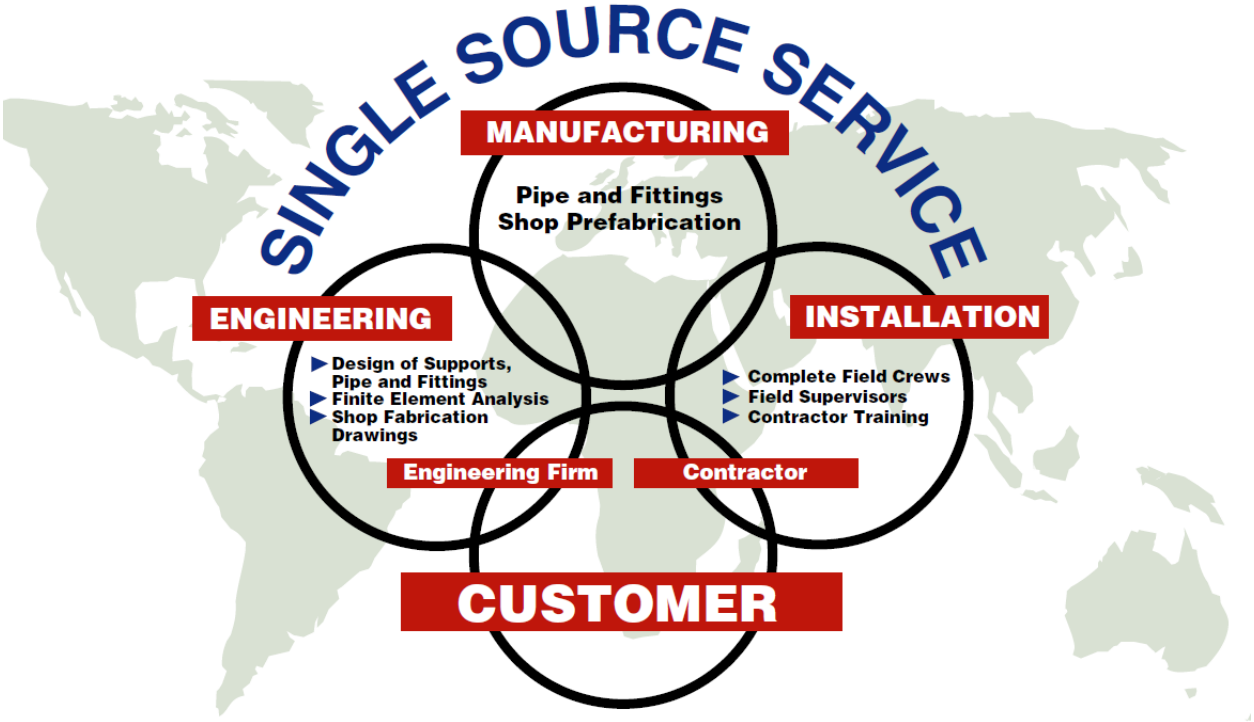
1. Fig.94: The most reliable and heavy-duty solution for threaded connections is to use an FRP flange and bolt an alloy (316SS, 90/10 Cu-Ni, Gr. 2 Ti, etc.) blind flange that is drilled-and-tapped for the NPT size. This type of connection has been used for many years and is the most durable and toughest 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 olet 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.

Size	Fig.47JF,94		Fig.47JF		Fig.94	
	POD		H2		H	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)
0.5"						
0.75"						
1.0"	2.26"	57	4.75"	121		
1.5"	2.76"	70	5.00"	127		
2"	3.26"	83	5.25"	133	7.00"	178
2.5"	3.76"	96	5.50"	140	7.25"	184
3"	4.26"	108	5.75"	146	7.50"	191
4"	5.26"	134	6.25"	159	8.00"	203
5"	6.26"	159	6.75"	171	8.50"	216
6"	7.26"	184	7.31"	186	9.00"	229
8"	9.26"	235	8.38"	213	10.00"	254
10"	11.26"	286	9.44"	240	11.00"	279
12"	13.40"	340	10.50"	267	12.00"	305
14"	15.71"	399	11.56"	294	13.00"	330
16"	17.87"	454	12.63"	321	14.00"	356
18"	20.01"	508	13.69"	348	15.00"	381
20"	22.15"	563	14.56"	370	16.00"	406
24"	26.45"	672	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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