

FIBERBOND®

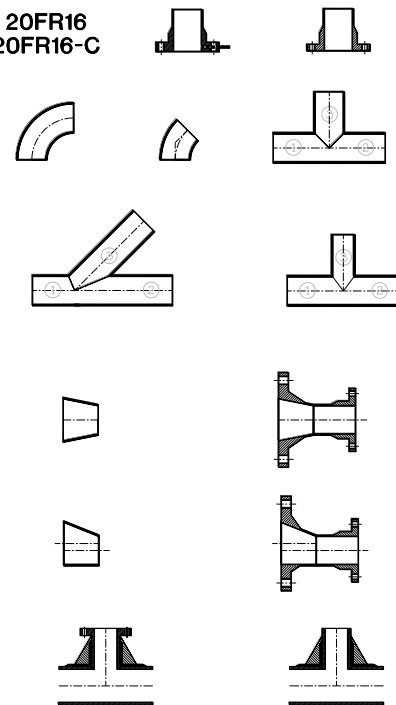
ENGINEERED COMPOSITE PIPING SYSTEMS

SERIES 20FR16 FITTINGS GUIDE

FIBERBOND® SERIES

- 20FR16
- 20FR16-C

20FR16
20FR16-C



April 2018 Edition

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FIBERBOND® Fittings Guide - Series 20FR16 and 20FR16-C

PIPE SERIES:

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

- | | |
|----------|---|
| 20FR16 | 16bar rated product for seawater, cooling water, and other high pressure lines, with fire endurance properties. |
| 20FR16-C | Identical to 20FR16, 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 B18.21.1 Narrow "SAE" series washers must be used. ANSI B18.21.1 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 20FR16 ABS 00 NO 32171-X, USCG 164.141/22/0
Series 20FR16-C ABS 00 NO 32171-X, USCG 164.141/23/0

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:

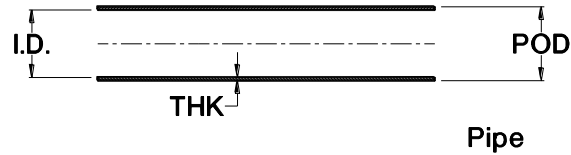
A catalog for Aveva Inc.'s 3D modeling software VPDMS is available by contacting Specialty Plastics (www.fiberbond.com). A 2-D catalog is also available for Autodesk's AutoCAD. A general catalog is also available for Intergraph's PDS, but there are some minor deviations in pipe O.D.s and flange neck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

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	20FR16 and 20FR16-C									
	Rating		I.D.		THK		P.O.D.		Weight	
	(psig)	(bar)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(lb/ft)	(kg/m)
1"	232	16.0	1.00"	25.4	0.25"	6.4	1.50"	38.1	1.0	1.5
1.5"	232	16.0	1.50"	38.1	0.25"	6.4	2.00"	50.8	1.3	1.9
2"	232	16.0	2.00"	50.8	0.31"	7.9	2.62"	66.5	1.5	2.2
2.5"	232	16.0	2.50"	63.5	0.25"	6.4	3.00"	76.2	1.9	2.8
3"	232	16.0	3.00"	76.2	0.25"	6.4	3.50"	88.9	2.2	3.3
4"	232	16.0	4.00"	101.6	0.25"	6.4	4.50"	114.3	2.9	4.3
5"	232	16.0	5.00"	127.0	0.25"	6.4	5.50"	139.7	3.9	5.7
6"	232	16.0	6.00"	152.4	0.25"	6.4	6.50"	165.1	4.3	6.4
8"	232	16.0	8.00"	203.2	0.32"	8.1	8.64"	219.5	7.8	11.6
10"	232	16.0	10.00"	254.0	0.39"	9.9	10.78"	273.8	11.0	16.4
12"	232	16.0	12.00"	304.8	0.46"	11.7	12.92"	328.2	16.3	24.3
14"	232	16.0	14.25"	362.0	0.54"	13.7	15.33"	389.4	20.8	31.0
16"	232	16.0	16.25"	412.8	0.62"	15.7	17.49"	444.2	27.9	41.6
18"	232	16.0	18.25"	463.6	0.69"	17.5	19.63"	498.6	33.7	50.2
20"	232	16.0	20.25"	514.4	0.76"	19.3	21.77"	553.0	40.0	59.6
24"	232	16.0	24.25"	616.0	0.91"	23.1	26.07"	662.2	57.3	85.4
30"	150	10.3	30.25"	768.4	0.73"	18.5	31.71"	805.4	59.3	88.3
36"	150	10.3	36.25"	920.8	0.87"	22.1	37.99"	964.9	84.9	126.4
42"	100	6.9	42.25"	1073.2	0.67"	17.0	43.59"	1107.2	77.0	114.7
48"	100	6.9	48.25"	1225.6	0.77"	19.6	49.79"	1264.7	100.1	149.2
54"	50	3.4	54.25"	1378.0	0.44"	11.2	55.13"	1400.3	64.5	96.0
60"	50	3.4	60.25"	1530.4	0.48"	12.2	61.21"	1554.7	79.1	117.8

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 2018: Clarified note on when it is acceptable to use 1" as the minimum pup length. Corrected units error for the POD of Fig.1 pups. Added note about weight of dummy legs.

September 2017: No dimensional changes. Added notes to clarify manufacturing methods for tees, reducing tees, laterals and reducing laterals.

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.

November 2014: 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.

June 2012: Updated weights for the 14x12 and larger reducing laterals (Fig.88).

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

April 2010: Updated the 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.

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.

May 2008: Corrected POD, PROD, PBOD, FOD, and FROD dimensions for all items in sizes 16" thru 48". Corrected POD and PBOD dimensions for Fig.48 and 80 in all sizes.

June 2005: Added weights and SI units to all the tables. Corrected the E+L dimensions for the following reducers: 6"x4" (13 to 11"), 6"x3" (15.5 to 13.5"), 8"x4" (18 to 16"), 8"x3" (20.5 to 18.5"), 14"x12" (20 to 19"), 16"x12" (25 to 24"), 18"x16" (20 to 22"), 18"x12" (30 to 29"), 20"x18" (20 to 23"), 20"x16" (25 to 27"), 24"x20" (28 to 30"), and 24"x18" (30 to 33"). 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 more reducing tee sizes. Changed the 8" on 60" Fig.46 'LS' dimension from 41" to 43".

February 2005: Added reducing tee sizes. Added information on Fig.47JF fittings. Split guide into two: one for 20FR16 and one for 20FR20. Added 2" and 3" Fig.96 hemicaps. Added information on bleed rings and other blind flanges. Added table on elbow thicknesses. Added Fig.1 "Pipe Pup Lengths". Added laterals and reducing laterals.

February 2004: Updated gasket recommendations and information on o-ring gaskets. Added information on VPDMS catalogs.

August 2003: Added section on Blind Flanges.

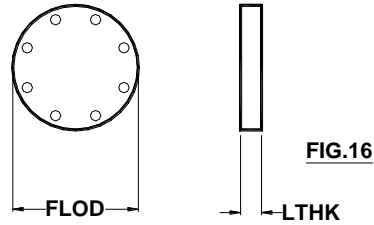
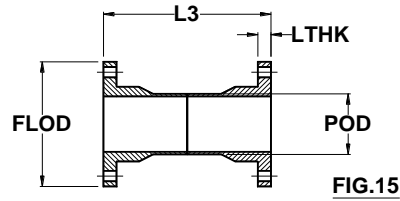
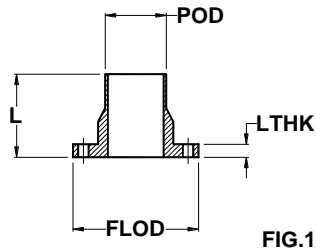
April 2003: Information regarding threaded connections was clarified to reflect the Figure 94 flanged saddle with drilled-and-tapped alloy blind flange as the only option. Figure 47JF and 97 NPT saddles are currently not available in Series 20FR16 nor 20FR20. The LS dimension for the Figure 46 Flanged Saddle was increased for sizes 4" and larger. Changed dummy leg size for Figure 90 for elbow sizes 6", 14", 16", and 18". Revised neck lengths for the Figure 10, 11, and 15 flanges for sizes 12" and larger in Series 20FR16 and sizes 4" and larger for Series 20FR20. Revised neck lengths for the Figure 10-O flange for sizes 10" and larger.

March 2002: In the March 2002 edition, 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 from 3 3/8" to 3 3/4" for 6" diameter.

January 2002: Only minor text changes were made in the January 2002 edition.

June 2001: The June 2001 Edition is the first release of our Fittings Guide for our 16bar and 20bar products.

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	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"	24"	609.6	24"	609.6	48"	1219.2				
36"	24"	609.6	24"	609.6	48"	1219.2				
42"	24"	609.6	24"	609.6	48"	1219.2				
48"	24"	609.6	24"	609.6	48"	1219.2				
54"	24"	609.6	24"	609.6	48"	1219.2				
60"	30"	762.0	30"	762.0	60"	1524.0				

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					
	(in.)	(mm)	(in.)	(mm)				
	Fig.10, 15, 16							
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"	2.86"	72.6	38.75"	984.3				
36"	3.43"	87.1	46.00"	1168.4				
42"	3.23"	82.0	53.00"	1346.2				
48"	3.65"	92.7	59.50"	1511.3				
54"	2.97"	75.4	66.25"	1682.8				
60"	3.30"	83.8	73.00"	1854.2				

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	0.4		
1.5"	1.6	0.7	3.2	1.5	1.0	0.4		
2"	2.2	1.0	4.4	2.0	1.4	0.6		
2.5"	2.9	1.3	5.8	2.6	1.9	0.9		
3"	3.3	1.5	6.6	3.0	2.2	1.0		
4"	5.1	2.3	10.2	4.6	3.6	1.7		
5"	7.0	3.2	14.0	6.4	4.8	2.2		
6"	8.9	4.0	17.8	8.1	6.0	2.7		
8"	14.5	6.6	29.0	13.2	9.3	4.2		
10"	24.6	11.2	49.2	22.3	15.4	7.0		
12"	35.8	16.3	71.6	32.5	22.3	10.1		
14"	49.1	22.3	98.2	44.6	28.3	12.9		
16"	67.6	30.7	135.2	61.4	39.7	18.0		
18"	80.3	36.5	160.6	72.9	46.6	21.2		
20"	100.3	45.5	200.6	91.1	60.2	27.4		
24"	146.7	66.6	293.4	133.2	89.4	40.6		
30"	198.2	90.0	396.4	180.0	124.1	56.3		
36"	309.6	140.6	619.2	281.1	203.5	92.4		
42"	342.4	155.4	684.8	310.9	246.1	111.7		
48"	498.6	226.4	997.2	452.7	348.4	158.2		
54"	440.6	200.0	881.2	400.1	343.9	156.1		
60"	623.5	283.1	1247.0	566.1	465.2	211.2		

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"	7.75"	197	6.75"	171
20"	(20) 1 1/8"	8.25"	210	7.25"	184
24"	(20) 1 1/4"	9.25"	235	8.00"	203
30"	(28) 1 1/4"	9.00"	229	8.25"	210
36"	(32) 1 1/2"	10.75"	273	9.50"	241
42"	(36) 1 1/2"	10.25"	260	9.50"	241
48"	(44) 1 1/2"	11.25"	286	10.25"	260
54"	(44) 1 3/4"	10.25"	260	10.25"	260
60"	(52) 1 3/4"	11.00"	279	10.75"	273

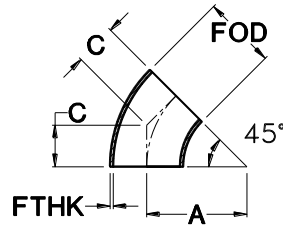
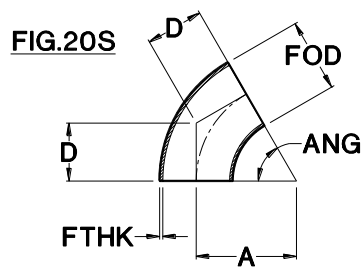
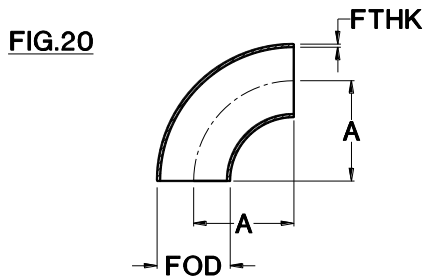
1. The F/F column is for FRP to FRP flange connections. The F/S column is for FRP to 150# alloy flange connections.

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



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. $D = 1.5 * \text{Size} * \text{TAN} (\text{ANG}/2)$. Smaller angles can be mitered.				0.25"	6	1.50"	38
1.5"	2.25"	57					0.25"	6	2.00"	51
2"	3.00"	76			1.25"	32	0.31"	8	2.62"	67
2.5"	3.75"	95			2.56"	65	0.25"	6	3.00"	76
3"	4.50"	114			1.88"	48	0.25"	6	3.50"	89
4"	6.00"	152			2.50"	64	0.25"	6	4.50"	114
5"	7.50"	191			3.13"	79	0.25"	6	5.50"	140
6"	9.00"	229			3.75"	95	0.27"	7	6.54"	166
8"	12.00"	305			5.00"	127	0.35"	9	8.70"	221
10"	15.00"	381			6.25"	159	0.43"	11	10.86"	276
12"	18.00"	457			7.50"	191	0.51"	13	13.02"	331
14"	21.00"	533					8.75"	222	0.60"	15
16"	24.00"	610			10.00"	254	0.68"	17	17.61"	447
18"	27.00"	686			11.25"	286	0.76"	19	19.77"	502
20"	30.00"	762			12.50"	318	0.84"	21	21.93"	557
24"	36.00"	914			15.00"	381	1.00"	25	26.25"	667
30"	45.00"	1143			18.75"	476	0.80"	20	31.85"	809
36"	54.00"	1372			22.50"	572	0.95"	24	38.15"	969
42"							0.74"	19	43.73"	1111
48"							0.84"	21	49.93"	1268
54"							0.48"	12	55.21"	1402
60"							0.53"	13	61.31"	1557

ELBOWS (cont'd)

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

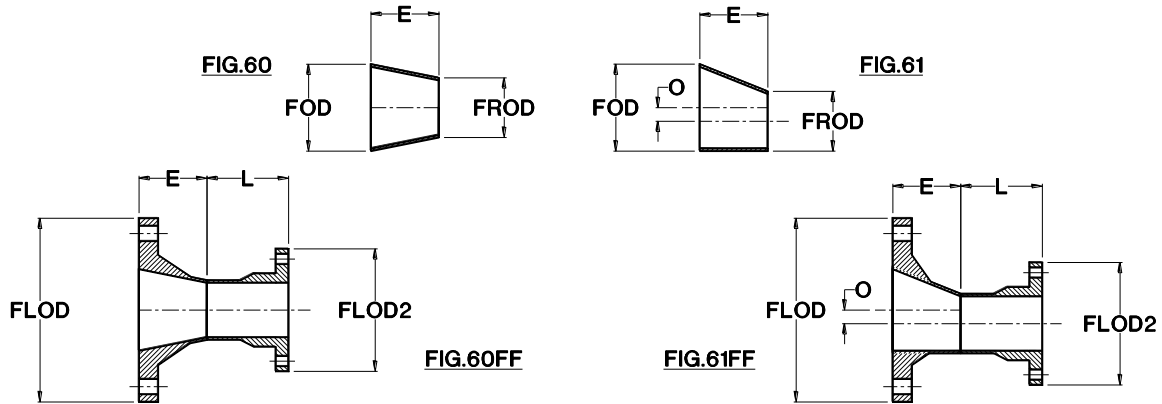
Elbow Ratings and Weights

Size	Rating		Fig.20		Fig.30	
	(psig)	(bar)	Weight		Weight	
			(lb)	(kg)	(lb)	(kg)
1"	232	16.0	0.2	0.1		
1.5"	232	16.0	0.4	0.2		
2"	232	16.0	0.7	0.3	0.3	0.2
2.5"	232	16.0	0.9	0.4	0.4	0.2
3"	232	16.0	1.5	0.7	0.8	0.3
4"	232	16.0	2.6	1.2	1.3	0.6
5"	232	16.0	4.2	1.9	2.1	1.0
6"	232	16.0	5.8	2.6	2.9	1.3
8"	232	16.0	13.1	5.9	6.5	3.0
10"	232	16.0	24.6	11.2	12.3	5.6
12"	232	16.0	41.6	18.9	20.8	9.4
14"	232	16.0	64.9	29.5	32.5	14.7
16"	232	16.0	95.6	43.4	47.8	21.7
18"	232	16.0	134.8	61.2	67.4	30.6
20"	232	16.0	183.4	83.3	91.7	41.6
24"	232	16.0	312.9	142.1	156.4	71.0
30"	150	10.3	387.6	176.0	193.8	88.0
36"	150	10.3	666.9	302.8	333.5	151.4
42"	100	6.9	716.9	325.5	358.4	162.7
48"	100	6.9	1032.0	468.5	516.0	234.3
54"	50	3.4	755.3	342.9	377.7	171.5
60"	50	3.4	1079.9	490.3	539.9	245.1

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	6.54"	166	5.50"	140	0.52"	13
6"x4"	5"	127	11"	279	6.54"	166	4.50"	114	1.02"	26
6"x3"	7.50"	191	13.50"	343	6.54"	166	3.50"	89	1.52"	39
6"x2.5"	8.75"	222	14.75"	375	6.54"	166	3.00"	76	1.77"	45
6"x2"	10"	254	16"	406	6.54"	166	2.62"	67	1.96"	50
8"x6"	5"	127	13"	330	8.70"	221	6.54"	166	1.08"	27
8"x5"	7.50"	191	13.50"	343	8.70"	221	5.50"	140	1.60"	41
8"x4"	10"	254	16"	406	8.70"	221	4.50"	114	2.10"	53
8"x3"	12.50"	318	18.50"	470	8.70"	221	3.50"	89	2.60"	66

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)

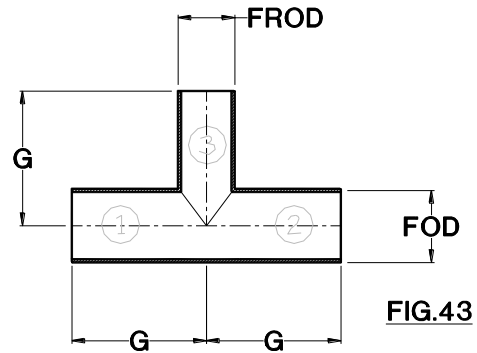
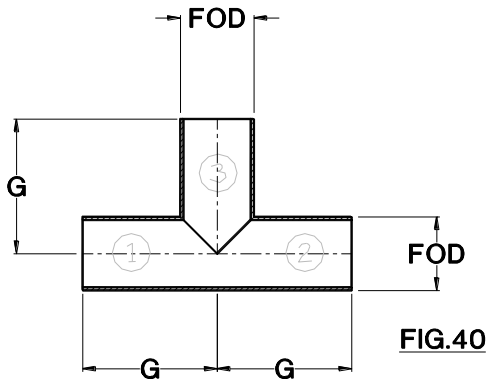
Size	E		E+L		FOD		FROD		O	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)
10"x8"	5"	127	15"	381	10.86"	276	8.70"	221	1.08"	27
10"x6"	10"	254	18"	457	10.86"	276	6.54"	166	2.16"	55
10"x5"	12.50"	318	18.50"	470	10.86"	276	5.50"	140	2.68"	68
10"x4"	15"	381	21"	533	10.86"	276	4.50"	114	3.18"	81
12"x10"	5"	127	17"	432	13.02"	331	10.86"	276	1.08"	27
12"x8"	10"	254	20"	508	13.02"	331	8.70"	221	2.16"	55
12"x6"	15"	381	23"	584	13.02"	331	6.54"	166	3.24"	82
14"x12"	5"	127	19"	483	15.45"	392	13.02"	331	1.22"	31
14"x10"	10"	254	22"	559	15.45"	392	10.86"	276	2.30"	58
14"x8"	15"	381	25"	635	15.45"	392	8.70"	221	3.38"	86
16"x14"	5"	127	20"	508	17.61"	447	15.45"	392	1.08"	27
16"x12"	10"	254	24"	610	17.61"	447	13.02"	331	2.30"	58
16"x10"	15"	381	27"	686	17.61"	447	10.86"	276	3.38"	86
18"x16"	5"	127	22"	559	19.77"	502	17.61"	447	1.08"	27
18"x14"	10"	254	25"	635	19.77"	502	15.45"	392	2.16"	55
18"x12"	15"	381	29"	737	19.77"	502	13.02"	331	3.38"	86
20"x18"	5"	127	23"	584	21.93"	557	19.77"	502	1.08"	27
20"x16"	10"	254	27"	686	21.93"	557	17.61"	447	2.16"	55
20"x14"	15"	381	30"	762	21.93"	557	15.45"	392	3.24"	82
24"x20"	10"	254	30"	762	26.25"	667	21.93"	557	2.16"	55
24"x18"	15"	381	33"	838	26.25"	667	19.77"	502	3.24"	82
30"x24"	15"	381	39"	991	31.85"	809	26.25"	667	2.80"	71
36"x30"	15"	381	39"	991	38.15"	969	31.85"	809	3.15"	80
42"x36"	15"	381	39"	991	43.73"	1111	38.15"	969	2.79"	71
48"x42"	15"	381	39"	991	49.93"	1268	43.73"	1111	3.10"	79
54"x48"	15"	381	39"	991	55.21"	1402	49.93"	1268	2.64"	67
60"x54"	30"	762	54"	1372	61.31"	1557	55.21"	1402	3.05"	77

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"	0.1	0.0	2.5	1.1	12"x10"	5.5	2.5	52.4	23.8
2"x1.5"	0.3	0.1	3.3	1.5	12"x8"	11.0	5.0	47.8	21.7
2"x1"	0.3	0.1	3.1	1.4	12"x6"	16.5	7.5	63.4	28.8
2.5"x2"	0.2	0.1	4.2	1.9					
					14"x12"	7.4	3.4	71.5	32.5
3"x2.5"	0.4	0.2	5.5	2.5	14"x10"	14.8	6.7	67.7	30.7
3"x2"	0.4	0.2	4.8	2.2	14"x8"	22.1	10.1	64.9	29.5
3"x1.5"	0.8	0.4	4.7	2.1					
3"x1"	0.8	0.4	4.4	2.0	16"x14"	9.5	4.3	98.4	44.7
					16"x12"	19.0	8.6	94.5	42.9
4"x3"	0.5	0.2	7.5	3.4	16"x10"	28.5	13.0	92.8	42.1
4"x2.5"	1.0	0.5	7.5	3.4					
4"x2"	1.0	0.5	6.9	3.1	18"x16"	11.9	5.4	126.2	57.3
4"x1.5"	1.6	0.7	6.9	3.1	18"x14"	23.8	10.8	119.6	54.3
4"x1"	1.6	0.7	6.6	3.0	18"x12"	47.7	21.6	118.2	53.6
5"x4"	0.6	0.3	10.1	4.6	20"x18"	14.6	6.6	155.2	70.4
					20"x16"	29.2	13.3	157.1	71.3
6"x5"	0.8	0.4	13.0	5.9	20"x14"	43.8	19.9	153.2	69.5
6"x4"	1.5	0.7	12.7	5.8					
6"x3"	2.3	1.1	11.7	5.3	24"x20"	41.5	18.8	231.1	104.9
6"x2.5"	3.1	1.4	12.0	5.4	24"x18"	62.2	28.3	231.9	105.3
6"x2"	3.1	1.4	11.3	5.1					
					30"x24"	61.7	28.0	332.5	150.9
8"x6"	2.6	1.2	20.8	9.4	36"x30"	88.5	40.2	490.1	222.5
8"x5"	3.9	1.8	19.3	8.8	42"x36"	81.5	37.0	637.2	289.3
8"x4"	5.2	2.4	19.6	8.9	48"x42"	102.7	46.6	793.5	360.2
8"x3"	6.5	3.0	19.1	8.7	54"x48"	66.8	30.3	909.4	412.9
					60"x54"	85.9	39.0	991.8	450.3
10"x8"	3.9	1.8	33.8	15.4					
10"x6"	7.8	3.6	32.2	14.6					
10"x5"	9.8	4.4	31.4	14.3					
10"x4"	11.8	5.3	33.8	15.3					

EQUAL SIZE & REDUCING TEES



Size	Fig.40					
	G		FOD		Weight	
	(in.)	(mm)	(lb)	(kg)	(lb)	(kg)
1"	5"	127	1.50"	38	1.8	0.8
1.5"	5.5"	140	2.00"	51	2.7	1.2
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	7.2	3.3
6"	10"	254	6.54"	166	9.3	4.2
8"	12"	305	8.70"	221	18.7	8.5
10"	14"	356	10.86"	276	32.9	15.0
12"	16"	406	13.02"	331	53.0	24.0
14"	18"	457	15.45"	392	79.7	36.2
16"	20"	508	17.61"	447	114.1	51.8
18"	21"	533	19.77"	502	295.5	134.2
20"	22"	559	1.68"	43	379.1	172.1
24"	24"	610	26.25"	667	611.3	277.5
30"	30"	762	31.85"	809	653.8	296.8
36"	33"	838	38.15"	969	1053.4	478.3
42"	36"	914	43.73"	1111	1002.4	455.1
48"	45"	1143	49.93"	1268	1497.5	679.9
54"	54"	1372	55.21"	1402	960.8	436.2
60"	54"	1372	61.31"	1557	1256.1	570.3

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	8.70"	221	6.54"	166	16.6	7.5
10"x8"	14"	356	10.86"	276	8.70"	221	29.9	13.6
10"x6"	14"	356	10.86"	276	6.54"	166	26.9	12.2
12"x10"	16"	406	13.02"	331	10.86"	276	48.7	22.1
12"x8"	16"	406	13.02"	331	8.70"	221	44.5	20.2
14"x12"	18"	457	15.45"	392	13.02"	331	74.2	33.7
14"x10"	18"	457	15.45"	392	10.86"	276	68.4	31.0
16"x14"	20"	508	17.61"	447	15.45"	392	107.1	48.6
16"x12"	20"	508	17.61"	447	13.02"	331	99.6	45.2
16"x10"	20"	508	17.61"	447	10.86"	276	93.1	42.3
18"x16"	21"	533	19.77"	502	17.61"	447	270.4	122.8
18"x14"	21"	533	19.77"	502	15.45"	392	246.7	112.0
18"x12"	21"	533	19.77"	502	13.02"	331	230.8	104.8
20"x18"	22"	559	21.93"	557	19.77"	502	351.3	159.5
20"x16"	22"	559	21.93"	557	17.61"	447	326.1	148.1
20"x14"	22"	559	21.93"	557	15.45"	392	302.5	137.3
24"x20"	24"	610	26.25"	667	21.93"	557	533.9	242.4
24"x18"	24"	610	26.25"	667	19.77"	502	506.0	229.7
24"x16"	24"	610	26.25"	667	17.61"	447	480.9	218.3
30"x24"	30"	762	31.85"	809	26.25"	667	640.1	290.6
36"x30"	33"	838	38.15"	969	31.85"	809	920.4	417.9
42"x36"	36"	914	43.73"	1111	38.15"	969	1019.5	462.8
48"x42"	45"	1143	49.93"	1268	43.73"	1111	1332.5	605.0
54"x48"	54"	1372	55.21"	1402	49.93"	1268	1139.9	517.5
60"x54"	54"	1372	61.31"	1557	55.21"	1402	1157.9	525.7
60"x48"	54"	1372	61.31"	1557	49.93"	1268	1336.8	606.9

1. Some tees and reducing tees are offer as a molded fitting and others as a fabricated fitting. Temperature and pressure ratings are the same amongst the two construction methods.
2. A Fig.48 plain end olet may be more economical than a reducing tee.
3. For sizes not listed above, a Fig.48 plain end olet may be used.

OLETS, PLAIN AND FLANGED

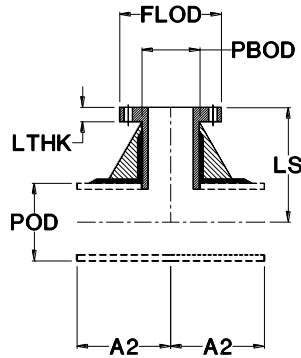


FIG.46

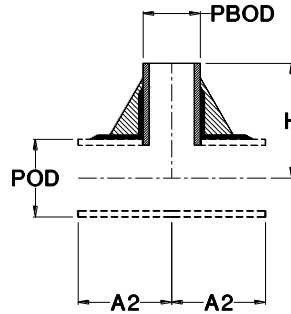


FIG.48

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"

		LS																		
H	6"	Header Diameter	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"																	
	24"		24"																	
	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 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	2.0	0.9
2"x1.5"	7.00"	178	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
2"x1"	7.00"	178	6.00"	152	0.50"	13	4.25"	108	2.0	0.9
2.5"x2"	7.50"	191	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
3"x2.5"	7.50"	191	7.00"	178	0.72"	18	7.00"	178	4.3	2.0
3"x2"	7.50"	191	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
3"x1.5"	7.50"	191	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
3"x1"	7.50"	191	6.00"	152	0.50"	13	4.25"	108	2.0	0.9
4"x3"	8.00"	203	7.00"	178	0.77"	20	7.50"	191	5.0	2.3
4"x2.5"	8.00"	203	7.00"	178	0.72"	18	7.00"	178	4.3	2.0
4"x2"	8.00"	203	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
4"x1.5"	8.00"	203	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
4"x1"	8.00"	203	6.00"	152	0.50"	13	4.25"	108	2.0	0.9
5"x4"	10.00"	254	8.00"	203	1.01"	26	9.00"	229	7.6	3.5
6"x5"	13.00"	330	10.00"	254	1.10"	28	10.00"	254	12.0	5.4
6"x4"	10.00"	254	8.00"	203	1.01"	26	9.00"	229	7.6	3.5
6"x3"	9.00"	229	7.00"	178	0.77"	20	7.50"	191	5.0	2.3
6"x2.5"	9.00"	229	7.00"	178	0.72"	18	7.00"	178	4.3	2.0
6"x2"	9.00"	229	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
6"x1.5"	9.00"	229	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
6"x1"	9.00"	229	6.00"	152	0.50"	13	4.25"	108	2.0	0.9
8"x6"	14.00"	356	10.00"	254	1.19"	30	11.00"	279	16.3	7.4
8"x5"	14.00"	356	10.00"	254	1.10"	28	10.00"	254	12.0	5.4
8"x4"	11.00"	279	8.00"	203	1.01"	26	9.00"	229	7.6	3.5
8"x3"	10.00"	254	7.00"	178	0.77"	20	7.50"	191	5.0	2.3
8"x2.5"	10.00"	254	7.00"	178	0.72"	18	7.00"	178	4.3	2.0
8"x2"	10.00"	254	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
8"x1.5"	10.00"	254	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
8"x1"	10.00"	254	6.00"	152	0.50"	13	4.25"	108	2.0	0.9
10"x8"	18.00"	457	12.00"	305	1.36"	35	13.50"	343	30.4	13.8
10"x6"	15.00"	381	10.00"	254	1.19"	30	11.00"	279	16.3	7.4
10"x5"	15.00"	381	10.00"	254	1.10"	28	10.00"	254	12.0	5.4
10"x4"	12.00"	305	8.00"	203	1.01"	26	9.00"	229	7.6	3.5
10"x3"	11.00"	279	7.00"	178	0.77"	20	7.50"	191	5.0	2.3
10"x2.5"	11.00"	279	7.00"	178	0.72"	18	7.00"	178	4.3	2.0
10"x2"	11.00"	279	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
10"x1.5"	11.00"	279	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
10"x1"	11.00"	279	6.00"	152	0.50"	13	4.25"	108	2.0	0.9

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	30.4	13.8
12"x6"	16.00"	406	10.00"	254	1.19"	30	11.00"	279	16.3	7.4
12"x5"	16.00"	406	10.00"	254	1.10"	28	10.00"	254	12.0	5.4
12"x4"	13.00"	330	8.00"	203	1.01"	26	9.00"	229	7.6	3.5
12"x3"	12.00"	305	7.00"	178	0.77"	20	7.50"	191	5.0	2.3
12"x2.5"	12.00"	305	7.00"	178	0.72"	18	7.00"	178	4.3	2.0
12"x2"	12.00"	305	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
12"x1.5"	12.00"	305	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
12"x1"	12.00"	305	6.00"	152	0.50"	13	4.25"	108	2.0	0.9
14"x12"										
14"x10"										
14"x8"	20.00"	508	12.00"	305	1.36"	35	13.50"	343	30.4	13.8
14"x6"	17.00"	432	10.00"	254	1.19"	30	11.00"	279	16.3	7.4
14"x5"	17.00"	432	10.00"	254	1.10"	28	10.00"	254	12.0	5.4
14"x4"	14.00"	356	8.00"	203	1.01"	26	9.00"	229	7.6	3.5
14"x3"	13.00"	330	7.00"	178	0.77"	20	7.50"	191	5.0	2.3
14"x2.5"	13.00"	330	7.00"	178	0.72"	18	7.00"	178	4.3	2.0
14"x2"	13.00"	330	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
14"x1.5"	13.00"	330	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
14"x1"	13.00"	330	6.00"	152	0.50"	13	4.25"	108	2.0	0.9
16"x14"										
16"x12"										
16"x10"										
16"x8"	21.00"	533	12.00"	305	1.36"	35	13.50"	343	30.4	13.8
16"x6"	18.00"	457	10.00"	254	1.19"	30	11.00"	279	16.3	7.4
16"x5"	18.00"	457	10.00"	254	1.10"	28	10.00"	254	12.0	5.4
16"x4"	15.00"	381	8.00"	203	1.01"	26	9.00"	229	7.6	3.5
16"x3"	14.00"	356	7.00"	178	0.77"	20	7.50"	191	5.0	2.3
16"x2.5"	14.00"	356	7.00"	178	0.72"	18	7.00"	178	4.3	2.0
16"x2"	14.00"	356	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
16"x1.5"	14.00"	356	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
16"x1"	14.00"	356	6.00"	152	0.50"	13	4.25"	108	2.0	0.9
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	30.4	13.8
18"x6"	19.00"	483	10.00"	254	1.19"	30	11.00"	279	16.3	7.4
18"x5"	19.00"	483	10.00"	254	1.10"	28	10.00"	254	12.0	5.4
18"x4"	16.00"	406	8.00"	203	1.01"	26	9.00"	229	7.6	3.5
18"x3"	15.00"	381	7.00"	178	0.77"	20	7.50"	191	5.0	2.3
18"x2.5"	15.00"	381	7.00"	178	0.72"	18	7.00"	178	4.3	2.0
18"x2"	15.00"	381	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
18"x1.5"	15.00"	381	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
18"x1"	15.00"	381	6.00"	152	0.50"	13	4.25"	108	2.0	0.9
20"x18"										
20"x16"										
20"x14"										
20"x12"										
20"x10"										
20"x8"	23.00"	584	12.00"	305	1.36"	35	13.50"	343	30.4	13.8
20"x6"	20.00"	508	10.00"	254	1.19"	30	11.00"	279	16.3	7.4
20"x5"	20.00"	508	10.00"	254	1.10"	28	10.00"	254	12.0	5.4
20"x4"	17.00"	432	8.00"	203	1.01"	26	9.00"	229	7.6	3.5
20"x3"	16.00"	406	7.00"	178	0.77"	20	7.50"	191	5.0	2.3
20"x2.5"	16.00"	406	7.00"	178	0.72"	18	7.00"	178	4.3	2.0
20"x2"	16.00"	406	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
20"x1.5"	16.00"	406	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
20"x1"	16.00"	406	6.00"	152	0.50"	13	4.25"	108	2.0	0.9
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	30.4	13.8
24"x6"	22.00"	559	10.00"	254	1.19"	30	11.00"	279	16.3	7.4
24"x5"	22.00"	559	10.00"	254	1.10"	28	10.00"	254	12.0	5.4
24"x4"	19.00"	483	8.00"	203	1.01"	26	9.00"	229	7.6	3.5
24"x3"	18.00"	457	7.00"	178	0.77"	20	7.50"	191	5.0	2.3
24"x2.5"	18.00"	457	7.00"	178	0.72"	18	7.00"	178	4.3	2.0
24"x2"	18.00"	457	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
24"x1.5"	18.00"	457	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
24"x1"	18.00"	457	6.00"	152	0.50"	13	4.25"	108	2.0	0.9

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)
42"x36"										
42"x30"										
42"x24"										
42"x20"										
42"x18"										
42"x16"										
42"x14"										
42"x12"										
42"x10"										
42"x8"	34.00"	864	12.00"	305	1.36"	35	13.50"	343	30.4	13.8
42"x6"	31.00"	787	10.00"	254	1.19"	30	11.00"	279	16.3	7.4
42"x5"	31.00"	787	10.00"	254	1.10"	28	10.00"	254	12.0	5.4
42"x4"	28.00"	711	8.00"	203	1.01"	26	9.00"	229	7.6	3.5
42"x3"	27.00"	686	7.00"	178	0.77"	20	7.50"	191	5.0	2.3
42"x2.5"	27.00"	686	7.00"	178	0.72"	18	7.00"	178	4.3	2.0
42"x2"	27.00"	686	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
42"x1.5"	27.00"	686	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
42"x1"	27.00"	686	6.00"	152	0.50"	13	4.25"	108	2.0	0.9
48"x42"										
48"x36"										
48"x30"										
48"x24"										
48"x20"										
48"x18"										
48"x16"										
48"x14"										
48"x12"										
48"x10"										
48"x8"	37.00"	940	12.00"	305	1.36"	35	13.50"	343	30.4	13.8
48"x6"	34.00"	864	10.00"	254	1.19"	30	11.00"	279	16.3	7.4
48"x5"	34.00"	864	10.00"	254	1.10"	28	10.00"	254	12.0	5.4
48"x4"	31.00"	787	8.00"	203	1.01"	26	9.00"	229	7.6	3.5
48"x3"	30.00"	762	7.00"	178	0.77"	20	7.50"	191	5.0	2.3
48"x2.5"	30.00"	762	7.00"	178	0.72"	18	7.00"	178	4.3	2.0
48"x2"	30.00"	762	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
48"x1.5"	30.00"	762	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
48"x1"	30.00"	762	6.00"	152	0.50"	13	4.25"	108	2.0	0.9

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)
54"x48"										
54"x42"										
54"x36"										
54"x30"										
54"x24"										
54"x20"										
54"x18"										
54"x16"										
54"x14"										
54"x12"										
54"x10"										
54"x8"	40.00"	1016	12.00"	305	1.36"	35	13.50"	343	30.4	13.8
54"x6"	37.00"	940	10.00"	254	1.19"	30	11.00"	279	16.3	7.4
54"x5"	37.00"	940	10.00"	254	1.10"	28	10.00"	254	12.0	5.4
54"x4"	34.00"	864	8.00"	203	1.01"	26	9.00"	229	7.6	3.5
54"x3"	33.00"	838	7.00"	178	0.77"	20	7.50"	191	5.0	2.3
54"x2.5"	33.00"	838	7.00"	178	0.72"	18	7.00"	178	4.3	2.0
54"x2"	33.00"	838	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
54"x1.5"	33.00"	838	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
54"x1"	33.00"	838	6.00"	152	0.50"	13	4.25"	108	2.0	0.9
60"x54"										
60"x48"										
60"x42"										
60"x36"										
60"x30"										
60"x24"										
60"x20"										
60"x18"										
60"x16"										
60"x14"										
60"x12"										
60"x10"										
60"x8"	43.00"	1092	12.00"	305	1.36"	35	13.50"	343	30.4	13.8
60"x6"	40.00"	1016	10.00"	254	1.19"	30	11.00"	279	16.3	7.4
60"x5"	40.00"	1016	10.00"	254	1.10"	28	10.00"	254	12.0	5.4
60"x4"	37.00"	940	8.00"	203	1.01"	26	9.00"	229	7.6	3.5
60"x3"	36.00"	914	7.00"	178	0.77"	20	7.50"	191	5.0	2.3
60"x2.5"	36.00"	914	7.00"	178	0.72"	18	7.00"	178	4.3	2.0
60"x2"	36.00"	914	6.00"	152	0.64"	16	6.00"	152	3.3	1.5
60"x1.5"	36.00"	914	6.00"	152	0.52"	13	5.00"	127	2.5	1.1
60"x1"	36.00"	914	6.00"	152	0.50"	13	4.25"	108	2.0	0.9

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	0.9	0.4
2"x1.5"	6.00"	152	6.00"	152	2.62"	67	2.00"	51	1.3	0.6
2"x1"	6.00"	152	6.00"	152	2.62"	67	1.50"	38	0.9	0.4
2.5"x2"	7.00"	178	6.00"	152	3.00"	76	2.62"	67	1.6	0.7
3"x2.5"	7.00"	178	7.00"	178	3.50"	89	3.00"	76	2.0	0.9
3"x2"	7.00"	178	6.00"	152	3.50"	89	2.62"	67	1.6	0.7
3"x1.5"	7.00"	178	6.00"	152	3.50"	89	2.00"	51	1.3	0.6
3"x1"	7.00"	178	6.00"	152	3.50"	89	1.50"	38	0.9	0.4
4"x3"	8.00"	203	7.00"	178	4.50"	114	3.50"	89	2.3	1.0
4"x2.5"	8.00"	203	7.00"	178	4.50"	114	3.00"	76	2.0	0.9
4"x2"	8.00"	203	6.00"	152	4.50"	114	2.62"	67	1.6	0.7
4"x1.5"	8.00"	203	6.00"	152	4.50"	114	2.00"	51	1.3	0.6
4"x1"	8.00"	203	6.00"	152	4.50"	114	1.50"	38	0.9	0.4
5"x4"	10.00"	254	8.00"	203	5.50"	140	4.50"	114	3.2	1.5
6"x5"	10.00"	254	10.00"	254	6.50"	165	5.50"	140	5.6	2.5
6"x4"	10.00"	254	8.00"	203	6.50"	165	4.50"	114	3.2	1.5
6"x3"	10.00"	254	7.00"	178	6.50"	165	3.50"	89	2.3	1.0
6"x2.5"	10.00"	254	7.00"	178	6.50"	165	3.00"	76	2.0	0.9
6"x2"	10.00"	254	6.00"	152	6.50"	165	2.62"	67	1.6	0.7
6"x1.5"	10.00"	254	6.00"	152	6.50"	165	2.00"	51	1.3	0.6
6"x1"	10.00"	254	6.00"	152	6.50"	165	1.50"	38	0.9	0.4
8"x6"	12.00"	305	10.00"	254	8.64"	219	6.50"	165	8.0	3.6
8"x5"	12.00"	305	10.00"	254	8.64"	219	5.50"	140	5.6	2.5
8"x4"	12.00"	305	8.00"	203	8.64"	219	4.50"	114	3.2	1.5
8"x3"	12.00"	305	7.00"	178	8.64"	219	3.50"	89	2.3	1.0
8"x2.5"	12.00"	305	7.00"	178	8.64"	219	3.00"	76	2.0	0.9
8"x2"	12.00"	305	6.00"	152	8.64"	219	2.62"	67	1.6	0.7
8"x1.5"	12.00"	305	6.00"	152	8.64"	219	2.00"	51	1.3	0.6
8"x1"	12.00"	305	6.00"	152	8.64"	219	1.50"	38	0.9	0.4
10"x8"	14.00"	356	12.00"	305	10.78"	274	8.64"	219	16.2	7.4
10"x6"	14.00"	356	10.00"	254	10.78"	274	6.50"	165	8.0	3.6
10"x5"	14.00"	356	10.00"	254	10.78"	274	5.50"	140	5.6	2.5
10"x4"	14.00"	356	8.00"	203	10.78"	274	4.50"	114	3.2	1.5
10"x3"	14.00"	356	7.00"	178	10.78"	274	3.50"	89	2.3	1.0
10"x2.5"	14.00"	356	7.00"	178	10.78"	274	3.00"	76	2.0	0.9
10"x2"	14.00"	356	6.00"	152	10.78"	274	2.62"	67	1.6	0.7
10"x1.5"	14.00"	356	6.00"	152	10.78"	274	2.00"	51	1.3	0.6
10"x1"	14.00"	356	6.00"	152	10.78"	274	1.50"	38	0.9	0.4

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	12.92"	328	8.64"	219	16.2	7.4
12"x6"	16.00"	406	10.00"	254	12.92"	328	6.50"	165	8.0	3.6
12"x5"	16.00"	406	10.00"	254	12.92"	328	5.50"	140	5.6	2.5
12"x4"	16.00"	406	8.00"	203	12.92"	328	4.50"	114	3.2	1.5
12"x3"	16.00"	406	7.00"	178	12.92"	328	3.50"	89	2.3	1.0
12"x2.5"	16.00"	406	7.00"	178	12.92"	328	3.00"	76	2.0	0.9
12"x2"	16.00"	406	6.00"	152	12.92"	328	2.62"	67	1.6	0.7
12"x1.5"	16.00"	406	6.00"	152	12.92"	328	2.00"	51	1.3	0.6
12"x1"	16.00"	406	6.00"	152	12.92"	328	1.50"	38	0.9	0.4
14"x12"										
14"x10"										
14"x8"	18.00"	457	12.00"	305	15.33"	389	8.64"	219	16.2	7.4
14"x6"	18.00"	457	10.00"	254	15.33"	389	6.50"	165	8.0	3.6
14"x5"	18.00"	457	10.00"	254	15.33"	389	5.50"	140	5.6	2.5
14"x4"	18.00"	457	8.00"	203	15.33"	389	4.50"	114	3.2	1.5
14"x3"	18.00"	457	7.00"	178	15.33"	389	3.50"	89	2.3	1.0
14"x2.5"	18.00"	457	7.00"	178	15.33"	389	3.00"	76	2.0	0.9
14"x2"	18.00"	457	6.00"	152	15.33"	389	2.62"	67	1.6	0.7
14"x1.5"	18.00"	457	6.00"	152	15.33"	389	2.00"	51	1.3	0.6
14"x1"	18.00"	457	6.00"	152	15.33"	389	1.50"	38	0.9	0.4
16"x14"										
16"x12"										
16"x10"										
16"x8"	20.00"	508	12.00"	305	17.49"	444	8.64"	219	16.2	7.4
16"x6"	20.00"	508	10.00"	254	17.49"	444	6.50"	165	8.0	3.6
16"x5"	20.00"	508	10.00"	254	17.49"	444	5.50"	140	5.6	2.5
16"x4"	20.00"	508	8.00"	203	17.49"	444	4.50"	114	3.2	1.5
16"x3"	20.00"	508	7.00"	178	17.49"	444	3.50"	89	2.3	1.0
16"x2.5"	20.00"	508	7.00"	178	17.49"	444	3.00"	76	2.0	0.9
16"x2"	20.00"	508	6.00"	152	17.49"	444	2.62"	67	1.6	0.7
16"x1.5"	20.00"	508	6.00"	152	17.49"	444	2.00"	51	1.3	0.6
16"x1"	20.00"	508	6.00"	152	17.49"	444	1.50"	38	0.9	0.4
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	19.63"	499	8.64"	219	16.2	7.4
18"x6"	21.00"	533	10.00"	254	19.63"	499	6.50"	165	8.0	3.6
18"x5"	21.00"	533	10.00"	254	19.63"	499	5.50"	140	5.6	2.5
18"x4"	21.00"	533	8.00"	203	19.63"	499	4.50"	114	3.2	1.5
18"x3"	21.00"	533	7.00"	178	19.63"	499	3.50"	89	2.3	1.0
18"x2.5"	21.00"	533	7.00"	178	19.63"	499	3.00"	76	2.0	0.9
18"x2"	21.00"	533	6.00"	152	19.63"	499	2.62"	67	1.6	0.7
18"x1.5"	21.00"	533	6.00"	152	19.63"	499	2.00"	51	1.3	0.6
18"x1"	21.00"	533	6.00"	152	19.63"	499	1.50"	38	0.9	0.4
20"x18"										
20"x16"										
20"x14"										
20"x12"										
20"x10"										
20"x8"	22.00"	559	12.00"	305	21.77"	553	8.64"	219	16.2	7.4
20"x6"	22.00"	559	10.00"	254	21.77"	553	6.50"	165	8.0	3.6
20"x5"	22.00"	559	10.00"	254	21.77"	553	5.50"	140	5.6	2.5
20"x4"	22.00"	559	8.00"	203	21.77"	553	4.50"	114	3.2	1.5
20"x3"	22.00"	559	7.00"	178	21.77"	553	3.50"	89	2.3	1.0
20"x2.5"	22.00"	559	7.00"	178	21.77"	553	3.00"	76	2.0	0.9
20"x2"	22.00"	559	6.00"	152	21.77"	553	2.62"	67	1.6	0.7
20"x1.5"	22.00"	559	6.00"	152	21.77"	553	2.00"	51	1.3	0.6
20"x1"	22.00"	559	6.00"	152	21.77"	553	1.50"	38	0.9	0.4
24"x20"										
24"x18"										
24"x16"										
24"x14"										
24"x12"										
24"x10"										
24"x8"	24.00"	610	12.00"	305	26.07"	662	8.64"	219	16.2	7.4
24"x6"	24.00"	610	10.00"	254	26.07"	662	6.50"	165	8.0	3.6
24"x5"	24.00"	610	10.00"	254	26.07"	662	5.50"	140	5.6	2.5
24"x4"	24.00"	610	8.00"	203	26.07"	662	4.50"	114	3.2	1.5
24"x3"	24.00"	610	7.00"	178	26.07"	662	3.50"	89	2.3	1.0
24"x2.5"	24.00"	610	7.00"	178	26.07"	662	3.00"	76	2.0	0.9
24"x2"	24.00"	610	6.00"	152	26.07"	662	2.62"	67	1.6	0.7
24"x1.5"	24.00"	610	6.00"	152	26.07"	662	2.00"	51	1.3	0.6
24"x1"	24.00"	610	6.00"	152	26.07"	662	1.50"	38	0.9	0.4

OLETS, PLAIN AND FLANGED (cont'd)

Plain End Olet Dimensions (cont'd)

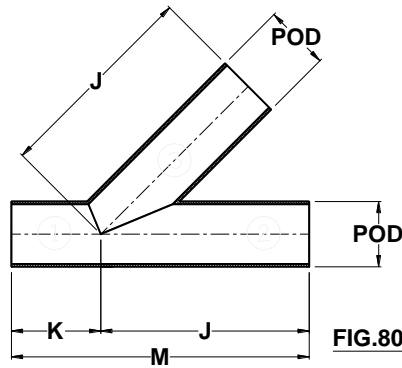
Size	H		A2		POD		PBOD		Weight	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(lb)	(kg)
42"x36"										
42"x30"										
42"x24"										
42"x20"										
42"x18"										
42"x16"										
42"x14"										
42"x12"										
42"x10"										
42"x8"	36.00"	914	12.00"	305	43.59"	1107	8.64"	219	16.2	7.4
42"x6"	36.00"	914	10.00"	254	43.59"	1107	6.50"	165	8.0	3.6
42"x5"	36.00"	914	10.00"	254	43.59"	1107	5.50"	140	5.6	2.5
42"x4"	36.00"	914	8.00"	203	43.59"	1107	4.50"	114	3.2	1.5
42"x3"	36.00"	914	7.00"	178	43.59"	1107	3.50"	89	2.3	1.0
42"x2.5"	36.00"	914	7.00"	178	43.59"	1107	3.00"	76	2.0	0.9
42"x2"	36.00"	914	6.00"	152	43.59"	1107	2.62"	67	1.6	0.7
42"x1.5"	36.00"	914	6.00"	152	43.59"	1107	2.00"	51	1.3	0.6
42"x1"	36.00"	914	6.00"	152	43.59"	1107	2.00"	51	0.9	0.4
48"x42"										
48"x36"										
48"x30"										
48"x24"										
48"x20"										
48"x18"										
48"x16"										
48"x14"										
48"x12"										
48"x10"										
48"x8"	45.00"	1143	12.00"	305	49.79"	1265	8.64"	219	16.2	7.4
48"x6"	45.00"	1143	10.00"	254	49.79"	1265	6.50"	165	8.0	3.6
48"x5"	45.00"	1143	10.00"	254	49.79"	1265	5.50"	140	5.6	2.5
48"x4"	45.00"	1143	8.00"	203	49.79"	1265	4.50"	114	3.2	1.5
48"x3"	45.00"	1143	7.00"	178	49.79"	1265	3.50"	89	2.3	1.0
48"x2.5"	45.00"	1143	7.00"	178	49.79"	1265	3.00"	76	2.0	0.9
48"x2"	45.00"	1143	6.00"	152	49.79"	1265	2.62"	67	1.6	0.7
48"x1.5"	45.00"	1143	6.00"	152	49.79"	1265	2.00"	51	1.3	0.6
48"x1"	45.00"	1143	6.00"	152	49.79"	1265	1.50"	38	0.9	0.4

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)
54"x48"										
54"x42"										
54"x36"										
54"x30"										
54"x24"										
54"x20"										
54"x18"										
54"x16"										
54"x14"										
54"x12"										
54"x10"										
54"x8"	54.00"	1372	12.00"	305	55.13"	1400	8.64"	219	16.2	7.4
54"x6"	54.00"	1372	10.00"	254	55.13"	1400	6.50"	165	8.0	3.6
54"x5"	54.00"	1372	10.00"	254	55.13"	1400	5.50"	140	5.6	2.5
54"x4"	54.00"	1372	8.00"	203	55.13"	1400	4.50"	114	3.2	1.5
54"x3"	54.00"	1372	7.00"	178	55.13"	1400	3.50"	89	2.3	1.0
54"x2.5"	54.00"	1372	7.00"	178	55.13"	1400	3.00"	76	2.0	0.9
54"x2"	54.00"	1372	6.00"	152	55.13"	1400	2.62"	67	1.6	0.7
54"x1.5"	54.00"	1372	6.00"	152	55.13"	1400	2.00"	51	1.3	0.6
54"x1"	54.00"	1372	6.00"	152	55.13"	1400	1.50"	38	0.9	0.4
60"x54"										
60"x48"										
60"x42"										
60"x36"										
60"x30"										
60"x24"										
60"x20"										
60"x18"										
60"x16"										
60"x14"										
60"x12"										
60"x10"										
60"x8"	54.00"	1372	12.00"	305	61.21"	1555	8.64"	219	16.2	7.4
60"x6"	54.00"	1372	10.00"	254	61.21"	1555	6.50"	165	8.0	3.6
60"x5"	54.00"	1372	10.00"	254	61.21"	1555	5.50"	140	5.6	2.5
60"x4"	54.00"	1372	8.00"	203	61.21"	1555	4.50"	114	3.2	1.5
60"x3"	54.00"	1372	7.00"	178	61.21"	1555	3.50"	89	2.3	1.0
60"x2.5"	54.00"	1372	7.00"	178	61.21"	1555	3.00"	76	2.0	0.9
60"x2"	54.00"	1372	6.00"	152	61.21"	1555	2.62"	67	1.6	0.7
60"x1.5"	54.00"	1372	6.00"	152	61.21"	1555	2.00"	51	1.3	0.6
60"x1"	54.00"	1372	6.00"	152	61.21"	1555	1.50"	38	0.9	0.4

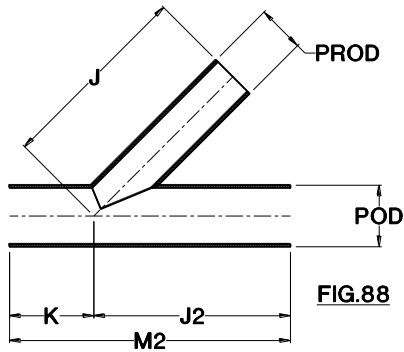
LATERALS



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	4.2	1.9
2.5"	12"	305	6"	152	18"	457	3.00"	76	5.1	2.3
3"	12"	305	6"	152	18"	457	3.50"	89	6.8	3.1
4"	14"	356	6"	152	20"	508	4.50"	114	10.0	4.5
5"	16"	406	8"	203	24"	610	5.50"	140	14.7	6.7
6"	16"	406	8"	203	24"	610	6.54"	166	19.4	8.8
8"	20"	508	10"	254	30"	762	8.70"	221	43.4	19.7
10"	24"	610	10"	254	34"	864	10.86"	276	73.6	33.4
12"	26"	660	12"	305	38"	965	13.02"	331	123.2	55.9
14"	30"	762	12"	305	42"	1067	15.33"	389	180.4	81.9
16"	32"	813	14"	356	46"	1168	17.49"	444	262.0	119.0
18"	36"	914	14"	356	50"	1270	19.63"	499	360.1	163.5
20"	38"	965	16"	406	54"	1372	21.77"	553	465.9	211.5
24"	42"	1067	18"	457	60"	1524	26.07"	662	754.6	342.6
30"	52"	1321	20"	508	72"	1829	31.71"	805	821.8	373.1
36"	62"	1575	22"	559	84"	2134	37.99"	965	1385.8	629.2
42"	72"	1829	24"	610	96"	2438	43.59"	1107	1329.8	603.7
48"										
54"										
60"										

1. Standard laterals are limited to a 100psig design pressure up to 16" and 50psig up to 60".
2. A lateral is a fabricated fitting. It is most economically supplied as part of a shop-fabricated system.

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"

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

Header Diameter
1"
1.5"
2"
2.5"
3"
4"
5"
6"
8"
10"
12"
14"
16"
18"
20"
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"
26"	27"	28"	30"	32"	34"	36"	38"
32"	33"	34"	36"	38"	40"	42"	44"
38"	39"	40"	42"	44"	46"	48"	50"
44"	45"	46"	48"	50"	52"	54"	56"

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".
3. A reducing lateral includes only the branch components. They are normally only provided as part of a pre-fabricated (pre-assembled) system.

Reducing Lateral Olet Dimensions

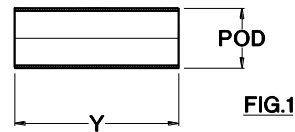
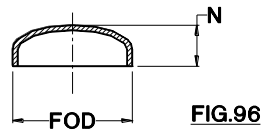
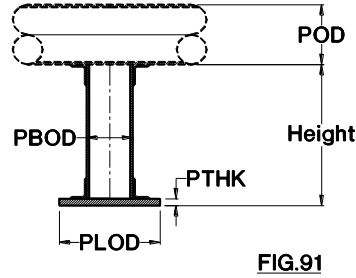
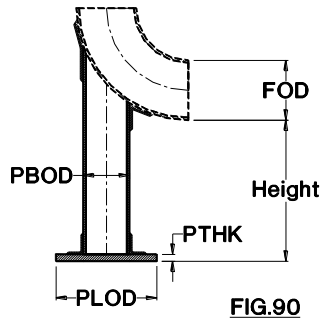
Size	Fig.88									
	J		K		J2		POD		PROD	
	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)
1.5"x1"										
2"x1.5"	10"	254	6"	152	10"	254	2.62"	67	2.00"	51
2"x1"	10"	254	6"	152	10"	254	2.62"	67	1.50"	38
2.5"x2"	12"	305	6"	152	10"	254	3.00"	76	2.50"	64
3"x2.5"	12"	305	6"	152	12"	305	3.50"	89	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	6.50"	165	5.50"	140
6"x4"	16"	406	6"	152	14"	356	6.50"	165	4.50"	114
6"x3"	16"	406	6"	152	12"	305	6.50"	165	3.50"	89
6"x2.5"	16"	406	6"	152	12"	305	6.50"	165	3.00"	76
6"x2"	16"	406	6"	152	10"	254	6.50"	165	2.62"	67
6"x1.5"	16"	406	6"	152	10"	254	6.50"	165	2.00"	51
6"x1"	16"	406	6"	152	10"	254	8.64"	219	1.50"	38
8"x6"	20"	508	8"	203	16"	406	8.64"	219	6.50"	165
8"x5"	20"	508	8"	203	16"	406	8.64"	219	5.50"	140
8"x4"	20"	508	6"	152	14"	356	8.64"	219	4.50"	114
8"x3"	20"	508	6"	152	12"	305	8.64"	219	3.50"	89
8"x2.5"	20"	508	6"	152	12"	305	8.64"	219	3.00"	76
8"x2"	20"	508	6"	152	10"	254	8.64"	219	2.62"	67
8"x1.5"	20"	508	6"	152	10"	254	8.64"	219	2.00"	51
8"x1"	20"	508	6"	152	10"	254	8.64"	219	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	10.78"	274	8.64"	219
10"x6"	24"	610	8"	203	16"	406	10.78"	274	6.50"	165
10"x5"	24"	610	8"	203	16"	406	10.78"	274	5.50"	140
10"x4"	24"	610	6"	152	14"	356	10.78"	274	4.50"	114
10"x3"	24"	610	6"	152	13"	330	10.78"	274	3.50"	89
10"x2.5"	24"	610	6"	152	13"	330	10.78"	274	3.00"	76
10"x2"	24"	610	6"	152	12"	305	10.78"	274	2.62"	67
10"x1.5"	24"	610	6"	152	12"	305	10.78"	274	2.00"	51
10"x1"	24"	610	6"	152	12"	305	10.78"	274	1.50"	38
12"x10"	26"	660	10"	254	24"	610	12.92"	328	10.78"	274
12"x8"	26"	660	10"	254	20"	508	12.92"	328	8.64"	219
12"x6"	26"	660	8"	203	18"	457	12.92"	328	6.50"	165
12"x5"	26"	660	8"	203	18"	457	12.92"	328	5.50"	140
12"x4"	26"	660	6"	152	16"	406	12.92"	328	4.50"	114
12"x3"	26"	660	6"	152	15"	381	12.92"	328	3.50"	89
12"x2.5"	26"	660	6"	152	15"	381	12.92"	328	3.00"	76
12"x2"	26"	660	6"	152	14"	356	12.92"	328	2.62"	67
12"x1.5"	26"	660	6"	152	14"	356	12.92"	328	2.00"	51
12"x1"	26"	660	6"	152	14"	356	12.92"	328	1.50"	38
14"x12"	30"	762	12"	305	26"	660	15.33"	389	12.92"	328
16"x14"	32"	813	12"	305	30"	762	17.49"	444	15.33"	389
18"x16"	36"	914	14"	356	34"	864	19.63"	499	17.49"	444
20"x18"	38"	965	14"	356	38"	965	21.77"	553	19.63"	499
24"x20"	42"	1067	16"	406	44"	1118	26.07"	662	21.77"	553
30"x24"	52"	1321	18"	457	54"	1372	31.71"	805	26.07"	662
36"x30"	62"	1575	20"	508	66"	1676	37.99"	965	31.71"	805
42"x36"	72"	1829	22"	559	78"	1981	43.59"	1107	37.99"	965
48"x42"										
54"x48"										
60"x54"										

DUMMY LEGS, CAPS, PUP PIECES



Size	Fig.90, 91									
	Dummy Leg Size		PLOD		PTHK		PBOD		Weight	
	(in.)	DN	(in.)	(mm)	(in.)	(mm)	(in.)	(mm)	(lb)	(kg)
1"										
1.5"										
2"	2"	DN50	5"	127	0.50"	13	2.62"	67	5.3	2.4
2.5"	2"	DN50	5"	127	0.50"	13	2.62"	67	5.3	2.4
3"	2"	DN50	5"	127	0.50"	13	2.62"	67	5.3	2.4
4"	3"	DN80	6"	152	0.50"	13	3.50"	89	7.8	3.5
5"	3"	DN80	6"	152	0.50"	13	3.50"	89	7.8	3.5
6"	4"	DN100	7"	178	0.50"	13	4.50"	114	10.3	4.7
8"	6"	DN150	9"	229	0.50"	13	6.50"	165	15.5	7.0
10"	6"	DN150	9"	229	0.50"	13	6.50"	165	15.5	7.0
12"	8"	DN200	12"	305	0.50"	13	8.64"	219	28.1	12.8
14"	10"	DN250	14"	356	0.50"	13	10.78"	274	39.4	17.9
16"	12"	DN300	16"	406	0.50"	13	12.92"	328	57.2	26.0
18"	14"	DN350	18"	457	0.50"	13	15.33"	389	72.9	33.1
20"	18"	ND450	22"	559	0.50"	13	19.63"	499	116.8	53.0
24"	18"	DN450	22"	559	0.50"	13	19.63"	499	116.8	53.0
30"	24"	DN600	28"	711	0.75"	19	26.07"	662	210.1	95.4
36"	24"	DN600	28"	711	0.75"	19	26.07"	662	210.1	95.4
42"	36"	DN900	40"	1016	0.75"	19	37.99"	965	332.7	151.0
48"	36"	DN900	40"	1016	0.75"	19	37.99"	965	332.7	151.0
54"	48"	DN1200	52"	1321	0.75"	19	49.79"	1265	432.1	196.2
60"	48"	DN1200	52"	1321	0.75"	19	49.79"	1265	432.1	196.2

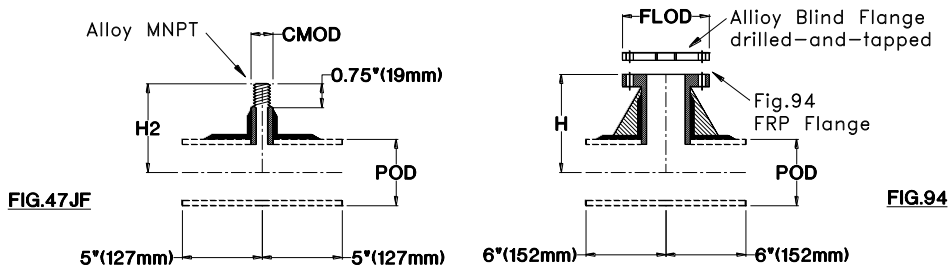
DUMMY LEGS, CAPS, PUP PIECES (cont'd)

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".
5. Fig.90, 91 weight is based on a nominal 3ft (0.9m) height and includes the base plate.

Caps and Pup Pieces

Size	Fig.96						Fig.1			
	N		FOD		Weight		Y		POD	
	(in.)	(mm)	(in.)	(mm)	(lb)	(kg)	(in.)	(mm)	(in.)	(mm)
1"							4"	1.8	1.50"	38
1.5"							4"	1.8	2.00"	51
2"	1.5"	38	2.62"	67	0.1	0.0	4"	102	2.62"	67
2.5"	1.5"	38	3.00"	76	0.2	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	0.7	0.3	6"	152	5.50"	140
6"	3.5"	89	6.54"	166	0.9	0.4	6"	152	6.54"	166
8"	4.0"	102	8.70"	221	2.1	0.9	9"	229	8.70"	221
10"	5.0"	127	10.86"	276	3.9	1.8	12"	305	10.86"	276
12"	6.0"	152	13.02"	331	6.6	3.0	14"	356	13.02"	331
14"	6.5"	165	15.45"	392	10.3	4.7	17"	432	15.43"	392
16"	7.0"	178	17.61"	447	15.2	6.9	19"	483	17.59"	447
18"	8.0"	203	19.77"	502	21.5	9.7	21"	533	19.75"	502
20"	9.0"	229	21.93"	557	29.2	13.3	24"	610	21.91"	557
24"	10.5"	267	26.25"	667	49.8	22.6	28"	711	26.23"	666
30"	10.5"	267	31.85"	809	61.7	28.0	19"	483	31.83"	808
36"	10.5"	267	38.15"	969	106.1	48.2	22"	559	38.15"	969
42"	12.0"	305	43.73"	1111	114.1	51.8	15"	381	43.73"	1111
48"	13.5"	343	49.93"	1268	164.3	74.6	15"	381	49.93"	1268
54"							20"	508	55.21"	1402
60"	16.5"	419	61.31"	1557	171.9	78.0	20"	508	61.31"	1557

THREADED CONNECTIONS



For Series 20FR16 and 20FR16-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 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.

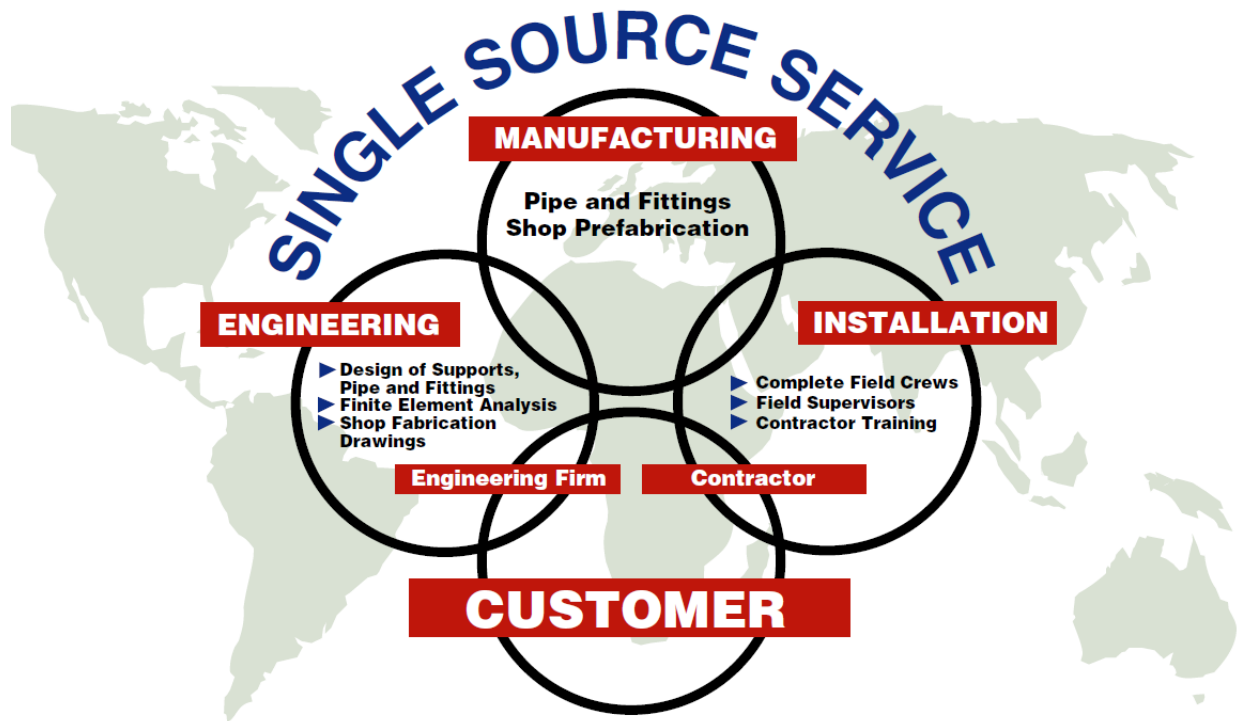
THREADED CONNECTIONS (cont'd)

Size	Fig.47JF,94		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"	6.50"	165	7.31"	186	9.00"	229
8"	8.64"	219	8.38"	213	10.00"	254
10"	10.78"	274	9.44"	240	11.00"	279
12"	12.92"	328	10.50"	267	12.00"	305
14"	15.33"	389	11.56"	294	13.00"	330
16"	17.49"	444	12.63"	321	14.00"	356
18"	19.63"	499	13.69"	348	15.00"	381
20"	21.77"	553	14.56"	370	16.00"	406
24"	26.07"	662	16.63"	422	18.00"	457
30"	31.71"	805	19.75"	502	21.00"	533
36"	37.99"	965	22.88"	581	24.00"	610
42"	43.59"	1107	25.56"	649	27.00"	686
48"	49.79"	1265	28.63"	727	30.00"	762
54"	55.13"	1400	31.69"	805	33.00"	838
60"	61.21"	1555	34.63"	879	36.00"	914

Threaded Connection Weights

Size
1"x1/2", 1.5"x1/2", ..., 60"x1/2"
1"x3/4", 1.5"x3/4", ..., 60"x3/4"
1.5"x1", 2"x1", ..., 60"x1"
1.5"x1.25", 2"x1.25", ..., 60"x1.25"
2"x1.5", 2.5"x1.5", ..., 60"x1.5"
2.5"x2", 3"x2", ..., 60"x2"

Fig.47JF		Fig.94	
(lb)	(kg)	(lb)	(kg)
1.6	0.7		
1.7	0.8		
2.5	1.2		
2.6	1.2		
2.7	1.2		
		6.1	2.8



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