

Quality People. Building Solutions.

Comfort Systems USA (Arkansas), Inc.
P.O. Box 16620
Little Rock, AR 72231
Phone 501-834-3320
Fax 501-834-5416

Date: 10/10/2023

Return Request: 10/16/2023

Project: ASU Mid-South RC & UC Chiller Replacement

Supplier: Comfort Systems USA (Arkansas), Inc.

Manufacturer: Various

Submittal: Hydronic Piping

Submittal Number: 23 21 13-01

Drawing # and Installation: Mechanical Drawings

ARCHITECT

Witsell Evans Rasco
901 W. Third Street
Little Rock, AR 72201
501-374-5300

ENGINEER

Pettit & Pettit
201 E. Markham St. #400
Little Rock, AR 72201
501-374-3731

GENERAL CONTRACTOR

Baldwin & Shell
3725 Champion Hills Driver, Suite 1300
Memphis, TN 38125
901-755-2952

MECHANICAL SUBCONTRACTOR

Comfort Systems USA (Arkansas), Inc.
9924 Landers Rd.
N. Little Rock, AR 72117
501-834-3320

Notes:

CSUSA PROJECT NO.

23-1024

jon@comfortar.com

23 21 13, 2.01A Heating Water Piping
23 21 13, 2.01B Chilled Water Piping

ASTM A53 Type E Grade B

ASTM A53 Grade B Type E pipe is produced at our Nucor Tubular Products (NTP) Trinity, Alabama division. NTP pipe is always made, melted, and rolled in the U.S.A. – so it's steel you can trust!

All Nucor Tubular Products ASTM A53 Grade B Type E Pipe is:

- UL Listed (US and Canada) 1" NPS – 8" NPS
- FM Approved 1" NPS – 8" NPS
- Produced from 100% domestically sourced steel
- NDT Weld Tested
- Hydrotested
- MIC Guard coated

In addition:

- Stock Lengths Available in 21' (1" through 8") and 42' (3" through 8")
- Custom Lengths Available
- Plain End or Roll Grooved
- Black proprietary coating, or bare
- Complies with NFPA 13 and 14
- NYC SCA Approved

A53 Type E Grade B - Schedule 40							
NPS	Nom OD	Nom ID	Nom Wall	Nom Weight	PCS/BDL	21' Lift Weight	CRR (Threaded)
1"	1.315"	1.049"	0.133"	1.68	70	2,470	1.00
1 1/4"	1.660"	1.380"	0.140"	2.27	51	2,431	1.00
1 1/2"	1.900"	1.610"	0.145"	2.72	44	2,513	1.00
2"	2.375"	2.067"	0.154"	3.65	30	2,300	1.00
2 1/2"	2.875"	2.469"	0.203"	5.57	19	2,310	1.00
3"	3.500"	3.068"	0.216"	7.34	13	2,069	1.00
4"	4.500"	4.026"	0.237"	10.78	10	2,266	1.00
6"	6.625"	6.065"	0.280"	18.99	7	2,792	1.00
8"	8.625"	7.981"	0.322"	28.58	5	3,001	1.00

www.nucortubular.com

2000 Cooperage Way, Trinity, AL 35673

(256) 301-5560

NUCOR[®]
TUBULAR PRODUCTS



1503 NORTH POST OAK ROAD, P.O. BOX 55710, HOUSTON, TX 77255-5710
(713) 686-4351 PHONE • (713) 685-3222 FAX

Schedule 40

Electric Resistance Welded Standard Pipe

Rev. 0-2003

Schedule 40 standard pipe is available in the listed diameter, wall thicknesses and foot weights to meet the requirements of a broad range of pressure, mechanical, and specialized piping applications. Tex-Tube's standard pipe is supplied in 21-foot lengths and end finishes include beveled, square cut, or Victaulic grooved. Standard pipe products are supplied bare or are coated with a durable, paintable, environmentally approved acrylic or water-based coating.

Specification: ASTM A53, Grade B, Type E

NPS (inches)	OUTSIDE DIAMETER (inches)	WALL THICKNESS (inches)	WEIGHT (lb/ft)	NUMBER LENGTHS PER BUNDLE	LENGTH ⁽²⁾ (ft)
2	2-3/8	.154 ⁽¹⁾	3.66	26	21
2-1/2	2-7/8	.203	5.80	37	21
3	3-1/2	.216	7.58	24	21
4	4-1/2	.237	10.80	19	21
5	5-9/16	.258 ⁽¹⁾	14.63	10	21
6	6-5/8	.280	18.99	10	21
8	8-5/8	.322	28.58	7	21
10	10-3/4	.365 ⁽¹⁾	40.52	1	21

Notes: (1) Pipe manufactured by Lone Star Steel, purchased and stocked by Tex-Tube under an alliance.

(2) Other lengths are available upon request.

Chemical Requirements

Composition, max %								
C	Mn	P	S	Cu	Ni	Cr	Mo	V
.30	1.20	.050	.045	.40	.40	.40	.15	.08

Tensile Requirements

Yield strength, min (psi)	35,000
Tensile Strength, min (psi)	60,000



EXPECT THE BEST FROM
WHEATLAND
GRADE B

ASTM A53, Type E, Grade B
ERW Standard Pipe

AMERICAN
METAL



Wheatland *Tube*
A DIVISION OF ZEKELMAN INDUSTRIES

IT DOESN'T GET BETTER THAN OUR **SEAM ANNEALED** GRADE B STANDARD PIPE

Wheatland Tube is a worldwide leader in pipe and tube manufacturing, always working to provide customers with the highest-performing products on the market. Our ASTM A53, Type E, Grade B ERW standard pipe is seam annealed in sizes 2-6 for superior martensite tempering, making it ideal for bending, threading and grooving.

Product Highlights (2-6 NPS)



Made in America
(read more on the back page)



Seam annealed to
eliminate untempered
martensite



UL® and cUL® Listed



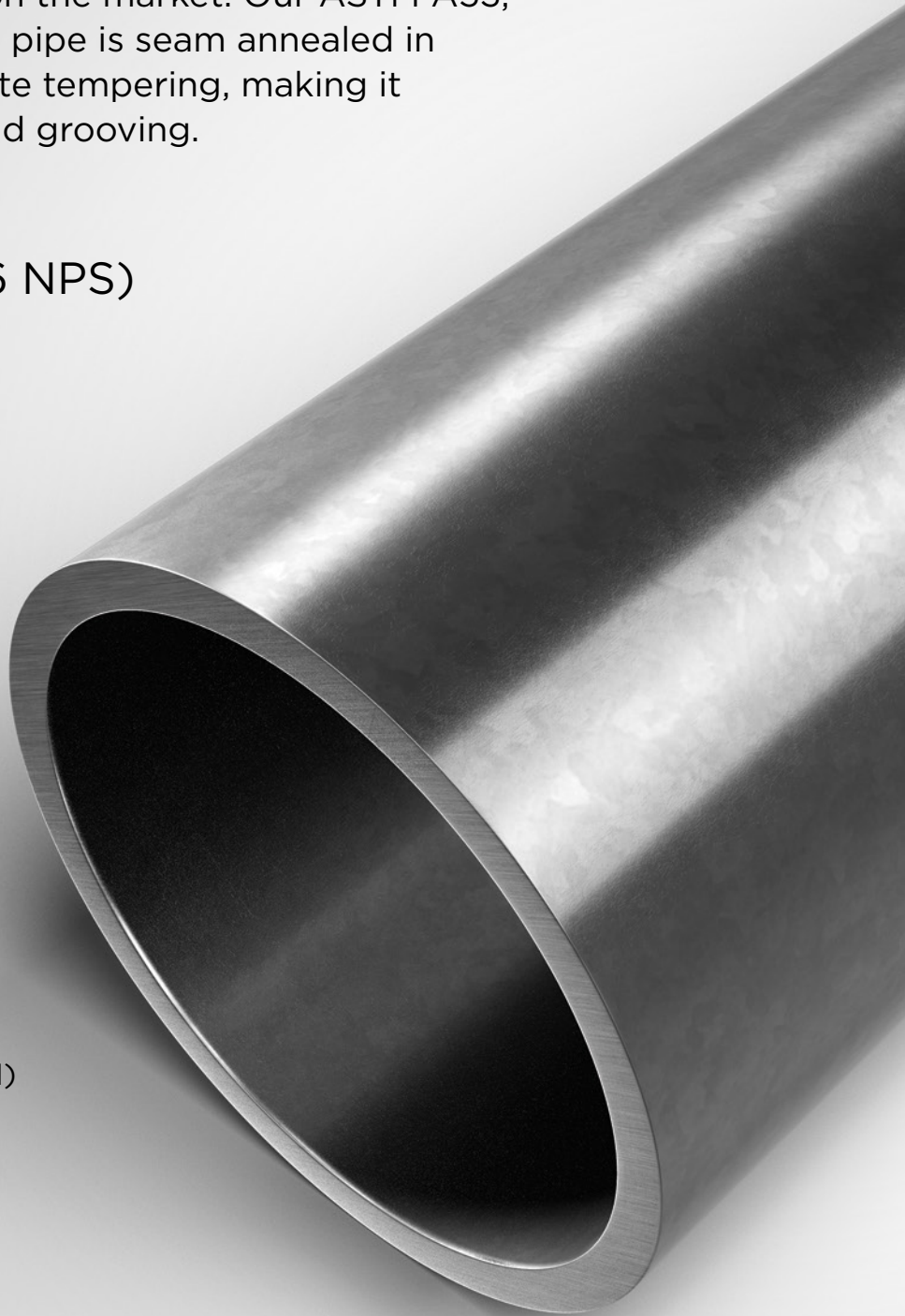
FM Approved for use
in fire sprinkler pipe
applications

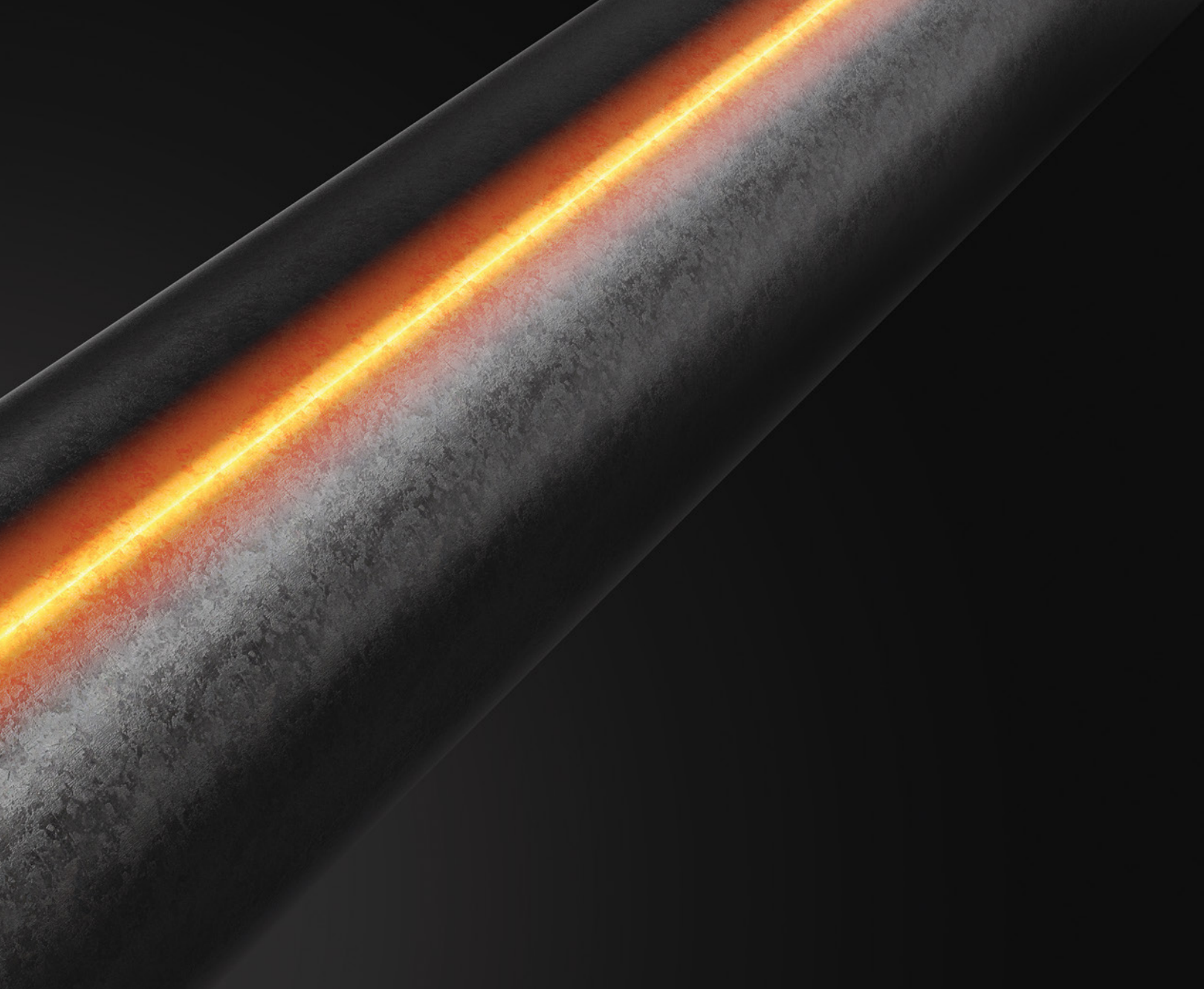


Approved for drinking
water use (NSF / ANSI® 61)



Fully complies with the
Uniform Plumbing Code





Why Choose Seam Annealed?

Better Process

After our pipe is formed and welded, our in-line seam annealing process reheats the pipe at the weld seam to eliminate untempered martensite. While other steel mills reduce martensite through chemistry, seam annealing is a more reliable process that delivers a superior product.

Better Results

Seam annealing creates a stronger, more ductile pipe with no untempered martensite remaining at the weld seam. The improved internal structure of the pipe results in a product that is less susceptible to corrosion and easier to bend, thread and groove.



The Best Pipe for the Job

Engineered for mechanical and pressure applications, our Grade B ERW pipe is intended for ordinary uses in steam, water, gas and air lines.



Steam



Water



Gas



Air

The Best Finishes

Wheatland is an industry leader in hot-dip galvanization technology. Our seam-annealed Grade B ERW pipe is available in both hot-dip galvanized and black finishes.



Make it even better with our antimicrobial coating, available on our black pipe.



Product Specifications

ASTM A53, TYPE E, GRADE B ERW WEIGHTS AND DIMENSIONS

TRADE SIZE	OD	NOMINAL WALL THICKNESS	WEIGHT
	in.	in.	lbs./ft.
2	2.375	0.154	3.66
2½	2.875	0.203	5.80
3	3.500	0.216	7.58
4	4.500	0.237	10.80
5	5.563	0.258	14.63
6	6.625	0.280	18.99

Other wall thicknesses are available.

HYDROSTATIC AND NON-DESTRUCTIVE ELECTRIC TESTING

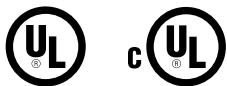
Hydrostatic inspection test pressures for plain-end pipe are listed in Table X 2.2 of the ASTM A53/A53M industry specification. Test pressures are maintained for a minimum of five seconds. Non-destructive electric testing of the weld seam is required on each length of ERW pipe NPS 2 and larger.

TENSILE REQUIREMENTS

TENSILE STRENGTH, MIN.	YIELD STRENGTH, MIN.
60,000 psi	35,000 psi

BENDING TEST (COLD)

DEGREE OF BEND	DIAMETER OF MANDREL
90°	12x pipe OD



Larger sizes available
(8-18 NPS)

Expect the Best Quality

We take great pride in the quality of our products. All our facilities have ISO-certified quality management systems in place so you receive the best possible products.



1 Council Avenue
P.O. Box 608
Wheatland, PA 16161
800.257.8182
info@wheatland.com
wheatland.com



Corporate Office
227 West Monroe Street
Suite 2600
Chicago, IL 60606
312.275.1600
info@zekelman.com
zekelman.com



Proudly made in the USA

All Wheatland Tube products are made right here in the USA and support American steelworkers. Wheatland is proud to be a champion for American Metal—a national grass-roots initiative that supports the domestic steel industry and all the hard workers whose livelihoods depend on it.

To learn more about American Metal, visit chooseamericanmetal.com

About Wheatland Tube Standard Pipe

Wheatland produces a full line of standard pipe—SureThread™ and ERW pipe—in a broad range of sizes. We're the industry leader in hot-dip galvanized pipe, and we offer more than 350 different combinations of finish, end treatments and lengths on our standard pipe.

All Wheatland manufacturing locations' quality management systems are certified to ISO requirements.

For more information, contact Wheatland Tube at:

800.257.8182 or **info@wheatland.com**

Or, visit our website at wheatland.com

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CARBON FITTINGS & FLANGES SPECIFICATION GUIDE

CARBON FITTINGS & FLANGES

CHEMICAL

SPECIFICATION AND GRADE	A/SA350LF2 CL1/CL2	A/SA350LF3 CL1	A105	SA105	A234-WPB	SA234-WPB	A234-WPC	SA234-WPC	A/SA450-WPL6
ADDENDUM	2011	2011	2013	2013	2013		2013		2013
PRODUCTS ALLOWED	seamless/forgings	seamless/forgings	seamless/forgings	seamless/forgings	Welded pipe fittings	Welded pipe fittings	Welded pipe fittings	Welded pipe fittings	Welded & SMLS pipe fittings Low Temp

Ladle/Product Analysis

CHEMISTRY	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
Carbon (C)		0.300		0.200		0.350		0.350		0.30**		0.30**		0.350		0.350		0.300
Manganese (MN)	0.600	1.350		0.900	0.600	1.05 *	0.600	1.05 *	0.290	1.06*	0.290	1.06*	0.290	1.06*	0.290	1.06*	0.290	1.350
Phosphorus (P)		0.035		0.035		0.035		0.035		0.050		0.050		0.050		0.050		0.035
Sulfur (S)		0.040		0.040		0.040		0.040		0.058		0.058		0.058		0.058		0.040
Silicon (SI)	0.150	0.300	0.200	0.350	0.100	0.350	0.100	0.350	0.100	0.350	0.100	0.350	0.100	0.350	0.100	0.350	0.150	0.400
Copper (CU)		0.400		0.400		0.400		0.400		0.400		0.400		0.400		0.400		0.400
Nickel (NI)		0.400	3.300	3.700		0.400		0.400		0.400		0.400		0.400		0.400		0.400
Chrome (CR)		0.300		0.300		0.300		0.300		0.400		0.400		0.400		0.400		0.300
Molybdenum (MO)		0.120		0.120		0.120		0.120		0.150		0.150		0.150		0.150		0.120
Vanadium (V)		0.080		0.030		0.080		0.080		0.080		0.080		0.080		0.080		0.080
Columbium (CB)		0.02*		0.020														0.02*
Titanium (Ti)																		
Boron (B)																		
Aluminum (AL)																		
Calcium (CA)																		
Nitrogen (N)																		
Tin (Sn)																		
Zirconium(Zi)																		
Cu+ Cr+Ni+Mo+V		1.000		1.000		1.000		1.000		1.000		1.000		1.000		1.000		1.000
Cu+ Cr+Ni+Mo										1.000		1.000		1.000		1.000		1.000
CB+V+TI																		
CB+V																		
V+TI																		
Cr+Mo		0.320		0.320		0.320		0.320										
Notes *	* by agreement .05 max				* For each reduction of .01% C below the max(.35),an increase of .06% Mn above the specified max(1.05%) will br permitted up to max of 1.65%.		* For each reduction of .01% C below the max(.35),an increase of .06% Mn above the specified max(1.05%) will br permitted up to max of 1.35%.		* For each reduction of .01% C below the max(.35),an increase of .06% Mn above the specified max(1.05%) will br permitted up to max of 1.65%. Note** Fittings made from plate mat have .35% C		* For each reduction of .01% C below the max(.35),an increase of .06% Mn above the specified max(1.05%) will br permitted up to max of 1.35%. Note** Fittings made from plate mat have .35% C		* For each reduction of .01% C below the max(.35),an increase of .06% Mn above the specified max(1.05%) will br permitted up to max of 1.65%.		* For each reduction of .01% C below the max(.35),an increase of .06% Mn above the specified max(1.05%) will br permitted up to max of 1.35%.		* by agreement .05 max	
Melt, BOP, OH, VDG, EF, VARM	ALL		ALL		ALL		ALL		ALL		ALL		ALL		ALL		ALL	
Fully Killed, Fine Grain	Yes		Yes		Yes		Yes											

CARBON FITTINGS & FLANGES

SPECIAL TOLERANCES

Specification and Grade	A/SA350LF2 CL1/CL2		A/SA350LF3 CL1		A105		SA105		A234-WPB		SA234-WPB		A234-WPC		SA234-WPC		A/SA450-WPL6		
Addendum	2011		2011		2013		2013		2013				2013				2013		
Carbon Equivalent (CE)*	0.47				0.47		0.47		0.5		0.5		0.5		0.5		0.5		
	MIN	AVG.	MIN	AVG.	MIN	AVG.	MIN	AVG.	MIN	AVG.	MIN	AVG.	MIN	AVG.	MIN	AVG.	MIN	AVG.	
CHARPY 10x10 mm	Class 1		Class 1																
Temperature °F (°C)	-50° (-46)		-150° (-101)																-50° (-46)
FT/#'S-Long	12	15	12	15															10 13
FT/#'S-Trn																			
LAT/EXP (min.MLS)	report	S3.1	report	S3.1															
Sheer %																			
CHARPY 10x10 mm	Class 2		Class 2																
Temperature °F (°C)	-0° (-18)		-150° (-101)																
FT/#'S-Long	12	15	15	20															
FT/#'S-Trn																			
LAT/EXP (min.MLS)	report	S3.1	report	S3.1															
Sheer %																			
Hydro Test	Capable		Capable																
NDE																			
No repair by welding	Yes																		
No mercury contamination	Yes																		
Flattening Test																			
Heat Treat Options																			
As Rolled	No		No		Yes		Yes												No
Normalizing	Yes		Yes		Yes	Depends on product	Yes	Depends on product	1150°F	1800°F	1150°F	1800°F	1150°F	1800°F	1150°F	1800°F	Yes	T1100°F-1200°F	
Normalized and Tempered	Yes		Yes		Yes		Yes		Yes	1100°F	1275°F	1100°F	1275°F	1100°F	1275°F	1100°F	1275°F	Yes	
Isothermal-annealed																			No
Full-annealed																			Yes
Quenched & Tempering	Yes		Yes		Yes		Yes												Yes
Tempering Temp restriction	1100°F		1100°F						1150°F		1150°F		1150°F		1150°F				

* Carbon Equivalent: $CE = C + Mn/6 + (Cr + Mo + V)/5 + (Ni + Cu)/15$

Carbon under .12: $CE_{Pcm} = C + (Si/30) + (Mn/20) + (Cu/20) + (Ni/60) + (Cr/20) + (Mo/15) + (V/10) + 5B$

CARBON FITTINGS & FLANGES

MECHANICAL

SPECIFICATION AND GRADE	A/SA350LF2 CL1/CL2		A/SA350LF3 CL1		A105		SA105		A234-WPB		SA234-WPB		A234-WPC		SA234-WPC		A/SA450-WPL6	
ADDENDUM	2011		2011		2013		2013		2013				2013				2013	
Product Test	Buyer option		Buyer option		Buyer option		Buyer option		Buyer option		Buyer option		Buyer option		Buyer option		Buyer option	
Number of samples																		
TENSILE psi	70,000	95,000	70,000	95,000	70,000		70,000		60,000		60,000		70,000		70,000		60,000	
YIELD psi	36,000		37,500		36,000		36,000		35,000		35,000		40,000		40,000		35,000	
Y/T Ratio																		
ELOG. (2"std. round) Long.	22%		22%		22%		22%		22%		22%		22%		22%		22%	
ELOG. (2"std. round)Trans.									14%		14%		14%		14%		12%	
ELOG. (2"std. Strip 5/16">) Long.	30%		30%		30%		30%		30%		30%		30%		30%		30%	
ELOG. (2"std. Strip 5/16">) Trans.									20%		20%		20%		20%		17%	
Reduction of Area	30%		35%		30%		30%											
Hardness(BHN)		197		197		187		187		197		197		197		197		197
Hardness # of test	2		2															

MTR INFORMATION

Specification, Grade, Addendum	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Type heat treatment	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Chemical analysis results	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Additional Product analysis results	Yes	Yes	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option
Tensile property results	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Impact test results	Yes	Yes	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Purchaser Option	Yes
Hardness results	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Any supplementary testing required by the purchase order	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No repaired by welding	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes



Even with all the advances in technology today, the wholly welded piping system has for decades remained the best choice for use in high pressure and high temperature application. Many piping jobs in schools, industrial plants, refineries and factories have benefited from the inherent advantages of a completely welded system. It becomes a closed container joining pipes, valves, fittings, and flanges. A welded joint actually becomes part of the pipe, minimizing leak potential. This provides greater margins of safety, especially under conditions of high internal pressures. Additionally, welding fittings form a continuous metal structure with the pipe, adding forged-in strength to any piping system. Furthermore, smooth forged fittings simplify insulation and take up less space.

ASTM A 234

Scope

This standard covers wrought carbon steel fittings of seamless and welded construction which are manufactured to the dimensional specifications of ASME B16.9 and B16.28. These fittings are primarily for use in pressure piping and in pressure vessel fabrication for service at moderate and elevated temperatures.

Materials

The starting material for fittings shall consist of killed steel, forgings, bars, plates, seamless or fusion-welded tubular products with filler metal added and shall conform to the the chemical requirements of ASTM A 234. Unless otherwise specified, carbon steel plates may be either coarse grain or fine grain practice.

Manufacture

Forging or shaping operations are performed by hammering, pressing, piercing, extruding, upsetting, rolling, bending, machining, or by a combination of two or more of these operations. The forming process shall be applied so that it will not produce injurious imperfections in the fittings.

Heat Treatment

Hot-formed WPB fittings, upon which the final forming operation is completed at a temperature above 1150°F and below 1800°F, need not be heat treated.

Cold-Formed WPB fittings, upon which the final forming operation is completed at a temperature below 1150°F, shall be normalized, or shall be stress relieved at 1100°F to 1275°F.

Fitting Summary Data Sheet

Chemical requirements (in %):

Carbon	Manganese	Phosphorus (max)	Sulfur (max)
.30 max	.29-1.06	.050	.058

Silicon	Chromium	Molybdenum	Nickel	Copper
.10 min	.40 max	.15 max	.40 max	.40 max

Vanadium	Columbium
.08 max	.02 max

Mechanical requirements:

Tensile Strength	60,000-85,000 psi
Yield Strength (min)	35,000 psi
Elongation - Longitudinal:	22%
- Transverse:	14%

Dimensions

Butt-welding fittings and butt-welding short radius elbows and returns purchased in accordance with this specification shall conform to the dimensions and tolerances given in the latest revision of ANSI B16.9 and B16.28, respectively.

Certification

When requested by the purchaser, the manufacturer shall provide a certificate of compliance to this specification.

If requested to provide test reports, the manufacturer shall also provide the following where applicable:

- * Chemical analysis results. When the amount of an element is less than .02%, the analysis for that element is reported as "<0.02%."
- * Tensile property results, report the yield strength and ultimate strength in ksi [or MPa] and elongation in percent,
- * Hardness acceptable in accordance with Section 10 of ASTM A-234,
- * Seamless or Welded,
- * Type of Heat Treatment, if any,
- * Starting material, specifically pipe, plate, etc.,
- * Statement regarding radiographic or ultrasonic examination.
- * Any supplemental testing required by the purchase order.

Product Marking

All fittings shall have the prescribed information stamped or otherwise suitable marked on each fitting in accordance with ASTM A 234/MSS SP-25. A Weldbend fitting is marked as follows: Weldbend's Name, Nominal Pipe Size, Pipe Wall Thickness Designation, Material Grade (WPB/WPC) and Heat Identification Number.

Note: All information contained in this document, and for a complete description of all requirements, refer to ASTM A 105. Sheets are subject to change without notice.



Even with all the advances in technology today, the wholly welded piping system has for decades remained the best choice for use in high pressure and high temperature application. Many piping jobs in schools, industrial plants, refineries, and factories have benefited from the inherent advantages of a completely welded system. It becomes a closed container joining pipes, valves, fittings, and flanges. A welded joint actually becomes part of the pipe, minimizing leak potential. This provides greater margins of safety, especially under conditions of high internal pressures. Additionally, welding fittings form a continuous metal structure with the pipe, adding forged-in strength to any piping system. Furthermore, smooth forged flanges simplify insulation and take up less space.

ASTM A 105

Scope

This standard covers forged carbon steel piping components for ambient- and higher-temperature service in pressure systems. Flanges are ordered either to dimensions specified by the purchaser or to dimensional specifications such as ASME 16.5 and API 6A. Forgings made to ASTM A 105 are normally limited to a maximum weight of 10,000 lb.

Materials

Weldbend flanges are made by hammering, pressing, rolling and/or machining cast or forged bars, billets or slabs. These adhere to the extent described in the following sections.

Manufacture

ASTM A 105 covers the requirements for forged steel components as finished products only.

The requirements for raw materials are covered by the standards specified in Section 2: Referenced Documents of ASTM A 105.

Heat Treatment

Heat treatment is not a mandatory requirement of this specification except for the following piping components:

- * Flanges above Class 300,
- * Flanges of special design where the design pressure at the design temperature exceeds the pressure-temperature ratings of Class 300, Group 1.1,
- * Flanges of special design where the design pressure or design temperature is not known.

Heat treatment, when required by the above, shall be annealing, normalizing, normalizing and tempering, or quenching and tempering in accordance with ASTM A 961.

Flange Summary Data Sheet

Chemical requirements (in %):

Carbon	Manganese	Phosphorus (max)	Sulfur (max)
.35 max	.60-1.05	.035	.040

Silicon	Copper	Nickel	Chromium
.10-.35	.40 max	.40 max	.30 max

Molybdenum	Vanadium	Columbium
.12 max	.08 max	.02 max

Mechanical requirements:

Tensile Strength (min)	70,000 psi
Yield Strength (min)	36,000 psi
Basic minimum elongation for walls 5/16 in. and over in thickness, strip tests.	30%
Reduction of area (min)	30%
Hardness, HB (max)	187

Dimensions

Weldbend flanges are manufactured in accordance with ASME B 16.5 (24" NPS and smaller) and ASME B 16.47 (26" - 60" NPS).

Certification

For forgings made to specified dimensions agreed upon by the purchaser, and for forgings made to dimensional standards, the application of identification marks, as required by ASTM A 961, shall be the certification that the forgings have been furnished in accordance with the requirements of this standard. The specification designation included on test reports shall include the year of issue and revision letter, if any.

Test Reports: When test reports are required, Weldbend will also provide the following, if applicable:

- *Type of heat treatment,
- *Tensile property results, i.e., yield strength and ultimate strength in ksi, elongation and reduction in area, in percent,
- *Chemical analysis results,
- *Hardness results, and,
- *Any supplementary testing required by the purchase order.

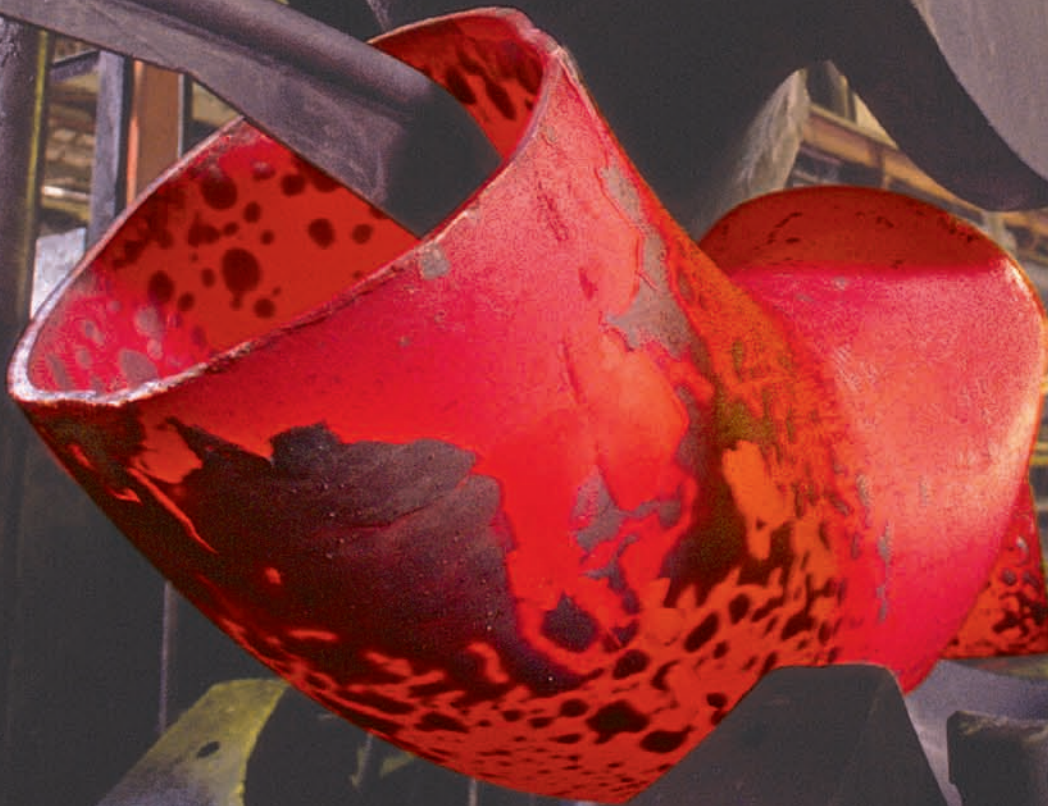
Product Marking

All flanges shall have the prescribed information stamped or otherwise suitable marked on each flange in accordance with the Standard/MSS SP-25. A Weldbend flange is marked as follows:

Weldbend's Name, Nominal Pipe Size, A105/SA105, Bore Designation, Heat Identification Number and manufacture date.

Note: All information contained in this document, and for a complete description of all requirements, refer to ASTM A 105. Sheets are subject to change without notice.

TUBE FORGINGS *of* AMERICA INC.



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Tube Forgings of America, Inc.**
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MISSION STATEMENT

Tube Forgings of America, Inc. is dedicated to be the premier weld fitting manufacturer through the continual training of personnel and improvement of processes to ensure unquestioned dependability to its customers.

T

ube Forgings of America, Inc. (TFA) has been a manufacturer of welding fittings since 1955. We work primarily in carbon steel. But over the years, in order to meet customer

specifications, we have also manufactured weld fittings out of chrome alloys, stainless steels, copper-nickel and other exotic materials. Our product line is so varied because our customers are so varied—they range from oil refining to chemical and petro-chemical processing, from gas transmission to power generation (including nuclear), and from shipbuilding to a broad assortment of commercial construction applications. While our major market is here in the United States, you'll also find TFA fittings in service all around the world.

In early 1990, the management of TFA made a commitment to Continuous Process Improvement. We aggressively launched a program of progressive practices which we continue to vigorously support today. We continue to maintain our ISO Quality Systems certification which we first received in September of 1993 when TFA became the first U.S.-based manufacturer to receive ISO 9001 certification.

TFA is consumed with the desire to be our industry's absolute leader in customer service. Our mission at TFA is to make such quality and service the standard...and then raise the standard still higher. You can count on Tube Forgings' fittings to be manufactured to the highest quality and delivered with superior service by employees who take pride in their attention to detail and their absolute desire to be the best.



Jay N. Zidell,
President

The Quality Program at Tube Forgings of America is directed by the Quality Assurance Manual, Procedures Manual and all employees of our facility. We emphasize continuous improvement through investment in training and equipment to assure that the latest methods and technologies are in use. This provides a more cost effective, consistent end product from lot to lot and, ultimately, to our customers.

Quality begins with our suppliers which are audited regularly by Tube Forgings. Material is received, inspected and approved before use. All stages of production are checked using traditional methods of inspection such as first article, in process and final.

However, our continuous improvement and product quality is also monitored using our Statistical Process Control program. Real time information is provided for use to correct and improve processes during the lot production. This technique means a more consistent product with less and less variation from lot to lot. Key processes are monitored at each work center using SPC and the data is stored and available from our computer network.

Tube Forgings' Quality Program is designed and meets ASME SEC. III Subsection NCA 3800, MIL-Q-9858, and ISO 9001.

As proof of our commitment to quality, Tube Forgings is an ISO 9001 registered supplier.

Seamless Carbon Steel Welding Fittings

Manufacturing Standards

Tube Forgings of America, Inc. produces a wide range of welding fittings in carbon steel and in other materials. Each product manufactured conforms to one or more of the specifications established by leading authorities who govern manufacturing methods, design dimensions, pressure ratings, markings and quality control requirements. Catalog pages relating to specific types and sizes of welding fittings will note the individual standards.

**MATERIAL SPECIFICATIONS FOR CARBON STEEL BUTT WELDING FITTINGS
ASTM SPECIFICATIONS A234**

Grade Symbol	WPB (Grade B)	WPB (Grade C)
Type of Steel	Carbon	Carbon
Chemical Composition	C=.30 max.	C=.35 max.
Minimum Physical Requirements	psi TS-60,000-85,000 YS-35,000	psi TS-70,000-95,000 YS-40,000
Heat Treatment	Cooled Still Air	Per ASTM A960

Marking Standards

All Tube Forgings welding fittings are permanently and conspicuously identified. Identity includes TFA, nominal pipe size, wall thickness, material grade and heat code per MSS SP-25 standards.

MSS SP-25



Tube Forgings Materials

The seamless carbon steel pipe or tubing utilized by Tube Forgings of America, Inc. conforms to the requirements for melting process, chemical composition and is capable of conforming to the mechanical property requirements of the ASTM, MSS-SP-75, CSA or applicable specification for the particular grades referred to in the table above.

Weight Conversion: Pound to Kilograms (1 pound=0.453592 Kilogram)

Lb.	Kg.	Lb.	Kg.	Lb.	Kg.	Lb.	Kg.
0.1	0.05	4.0	1.81	70.0	31.75	1,000.0	453.59
0.2	0.09	5.0	2.27	80.0	36.29	2,000.0	907.18
0.3	0.14	6.0	2.72	90.0	40.82	3,000.0	1,360.78
0.4	0.18	7.0	3.18	100.0	45.36	4,000.0	1,814.37
0.5	0.23	8.0	3.63	200.0	90.72	5,000.0	2,267.96
0.6	0.27	9.0	4.08	300.0	136.08	6,000.0	2,721.55
0.7	0.32	10.0	4.54	400.0	181.44	7,000.0	3,175.14
0.8	0.36	20.0	9.07	500.0	226.80	8,000.0	3,628.74
0.9	0.41	30.0	13.61	600.0	272.16	9,000.0	4,082.33
1.0	0.45	40.0	18.14	700.0	317.51	10,000.0	4,535.92
2.0	0.91	50.0	22.68	800.0	362.87		
3.0	1.36	60.0	27.22	900.0	408.23		

TFA Materials Available—Normal Delivery

	ASTM Designation	Material Grade	Normal Composition
Carbon	A234	WPB	Carbon Steel
	A234	WPC	Carbon Steel
Low Temp/High Yield	A860	A860/WPHY	Fine Grain Carbon Steel, Low Sulphur
Low Temp. Steel	A420	WPL6	Fine Grain Carbon Steel
Low Temp/High Strength Steel	A858	A858	Fine Grain Carbon Steel, Low Sulphur
High Yield Steel	None	MSS-SP-75/WPHY CSA-Z-245.11	Carbon/Low Alloy Steel
Fittings for sour gas service NACE MR0175/ISO 15156-1, 2 and 3	None	Various	With restricted chemistry

Tube Forgings Welding Fittings available in a Wide Range of Schedules and Wall Thicknesses

90° Long Radius Elbows – Light wall gas distribution through double extra strong.

90° Long Radius Reducing Elbows – Standard and extra strong.

90°, 45° 3-R Elbows

90° Short Radius Elbows – Schedule 20 through extra strong.

45° Long Radius Elbows – Light wall gas distribution through double extra strong.

180° Short Radius Returns - Standard weight and extra strong.

180° Long Radius Returns – Light wall gas distribution through double extra strong.

Straight and Reducing Tees – Light wall gas distribution through double extra strong.

Straight and Reducing Crosses – Light wall gas distribution through double extra strong.

Concentric and Eccentric Reducers – Light wall gas distribution through double extra strong.

Caps – Standard and extra strong.

Above information denotes extreme range. Sizes and wall thicknesses available will vary from product to product.

Basic Specifications Covering TFA Products

ASME B16.9 Pressure ratings, dimensions, tolerances, marking and beveling of fittings 1" through 24".

ASTM/ASME A234/SA234 Materials, manufacturing, heat treating for material grades - carbon and alloy steels.

ASTM/ASME A420/SA420 Carbon and alloy grades for low temperature service.

MSS-SP-75 High yield, carbon and alloy steel for higher strength requirements.

CSA-Z-245.11 High yield, carbon and alloy steel for higher strength requirements.

Dimensional Tolerances

Tolerances shown below are those established by the American Standards ASME B16.9 for Steel Butt Welding Fittings. Included are all types and sizes through 48" covered by these standards.

Wall Thickness

The wall thickness shall not be less than 87 1/2% of nominal thickness at any point.

Outside Diameter

Outside diameter to the beginning of the bevel shall not vary from nominal more than:

Sizes up to and incl. 2 1/2" ± 1/16" - 1/32"
 Sizes 3" through 4" ± 1/16" - 1/16"
 Sizes 5" through 8" ± 3/32" - 1/16"
 Sizes 10" through 18" ± 5/32" - 1/8"
 Sizes 20" through 30" ± 1/4" - 3/16"

Inside Diameter

Inside diameter of welding ends shall not vary from nominal more than:

Sizes up to and incl. 2 1/2" ± 1/32"
 Sizes 3" through 8" ± 1/16"
 Sizes 10" through 18" ± 1/8"
 Sizes 20" through 30" ± 3/16"

Length of Caps

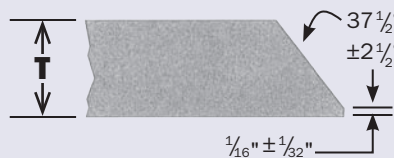
Sizes up to and incl. 4" ± 1/8"
 Sizes 5" through 24" ± 1/4"
 Sizes 26" through 30" ± 3/8"

Welding Bevels

Welding bevel dimensions shall not vary from nominal more than:

Standard Bevels

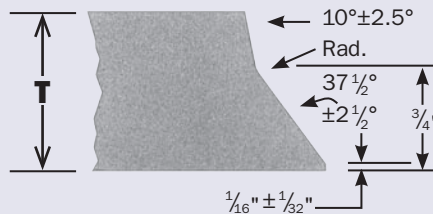
ASME B16.25



Plain Bevel

Bevel for wall thickness (T) at end of fitting, 7/8" or less.

* Max slope 1:3 for I.D. taper bore (30° max)



Compound Bevel

Bevel for wall thickness (T) at end of fitting, greater than 7/8".

* Max slope 1:3 for I.D. taper bore (30° max)

Center-to-End of 90° Elbows, 45° Elbows, Tees, Crosses

Center-to-end dimension shall not vary from nominal more than:

Sizes up to and incl. 8" ± 1/16"
 Sizes 10" through 24" ± 3/32"
 Sizes 26" through 30" ± 1/8"

Center-to-Center of 180° Returns

Center-to-center dimension shall not vary from nominal more than:

Sizes up to and incl. 8" ± 1/4"
 Sizes 10" and larger ± 3/8"

Back-to-Face of 180° Returns

Back-to-face shall not vary from nominal more than:

All sizes ± 1/4"

Alignment of Ends of 180° Returns

Sizes up to and incl. 8" ± 1/32"
 Sizes 10" through 24" ± 1/16"

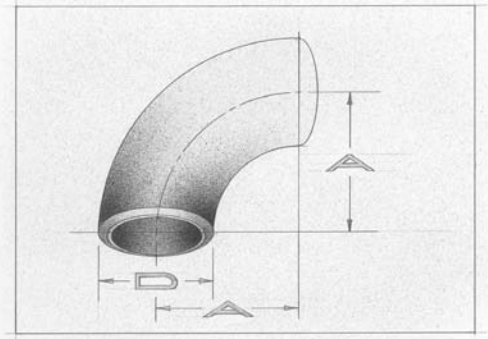
End-to-End of Reducers

End-to-end dimension shall not vary from nominal more than:

Sizes up to and incl. 8" ± 1/16"
 Sizes 10" through 24" ± 3/32"
 Sizes 26" through 30" ± 3/16"

* Special dimensional tolerances are maintained when specifications other than ASME B16.9 are required by the customer, eg. MSS-SP-75 or CSA-Z-245.11.

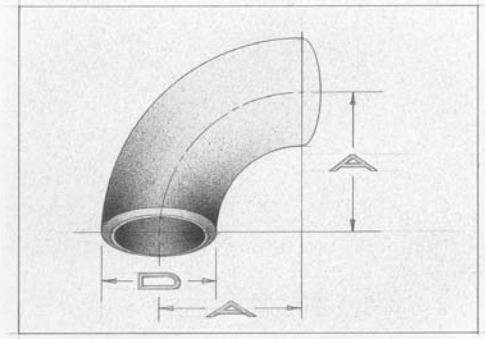
Long Radius 90° ELBOWS



Key			Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)													
			Schedule													
Nominal Pipe Size	"D" Outside Diameter at Bevel	"A" Center-to-End	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
inches mm	inches mm	inches mm														
½"	.84	1.50	-	-	-	-	.109	.109	-	.147	.147	-	-	-	.188	.294
			-	-	-	-	2.769	2.769	-	3.734	3.734	-	-	-	4.775	7.468
			-	-	-	-	.622	.622	-	.546	.546	-	-	-	.464	.252
			-	-	-	-	15.799	15.799	-	13.868	13.868	-	-	-	11.786	6.401
			-	-	-	-	0.1	0.1	-	0.3	0.3	-	-	-	0.6	0.3
¾"	1.05	1.50	-	-	-	-	.113	.113	-	.154	.154	-	-	-	.219	.308
			-	-	-	-	2.870	2.870	-	3.912	3.912	-	-	-	5.563	7.823
			-	-	-	-	.824	.824	-	.742	.742	-	-	-	.612	.434
			-	-	-	-	20.930	20.930	-	18.847	18.847	-	-	-	15.545	11.024
			-	-	-	-	0.2	0.2	-	0.3	0.3	-	-	-	0.6	0.3
1"	1.32	1.50	-	-	-	-	.133	.133	-	.179	.179	-	-	-	.250	.358
			-	-	-	-	3.378	3.378	-	4.547	4.547	-	-	-	6.350	9.093
			-	-	-	-	1.049	1.049	-	.957	.957	-	-	-	.815	.599
			-	-	-	-	26.645	26.645	-	24.308	24.308	-	-	-	20.701	15.215
			-	-	-	-	0.4	0.4	-	0.5	0.5	-	-	-	0.6	0.8
1¼"	1.66	1.88	-	-	-	-	.140	.140	-	.191	.191	-	-	-	.250	.382
			-	-	-	-	3.556	3.556	-	4.851	4.851	-	-	-	6.350	9.703
			-	-	-	-	1.380	1.380	-	1.278	1.278	-	-	-	1.160	.896
			-	-	-	-	35.052	35.052	-	32.461	32.461	-	-	-	29.464	22.758
			-	-	-	-	0.6	0.6	-	0.8	0.8	-	-	-	1.0	1.4
1½"	1.90	2.25	-	-	-	-	.145	.145	-	.200	.200	-	-	-	.281	.400
			-	-	-	-	3.683	3.683	-	5.080	5.080	-	-	-	7.137	10.160
			-	-	-	-	1.610	1.610	-	1.500	1.500	-	-	-	1.338	1.100
			-	-	-	-	40.894	40.894	-	38.100	38.100	-	-	-	33.985	27.940
			-	-	-	-	0.8	0.8	-	1.0	1.0	-	-	-	1.8	2.0
2"	2.38	3.00	-	-	-	-	.154	.154	-	.218	.218	-	-	-	.344	.436
			-	-	-	-	3.912	3.912	-	5.537	5.537	-	-	-	7.738	11.074
			-	-	-	-	2.067	2.067	-	1.939	1.939	-	-	-	1.687	1.503
			-	-	-	-	52.502	52.502	-	49.251	49.251	-	-	-	42.850	38.176
			-	-	-	-	1.6	1.6	-	2.0	2.0	-	-	-	3.2	3.9
2½"	2.88	3.75	-	-	-	-	.203	.203	-	.276	.276	-	-	-	.375	.552
			-	-	-	-	5.156	5.156	-	7.010	7.010	-	-	-	9.525	14.021
			-	-	-	-	2.469	2.469	-	2.323	2.323	-	-	-	2.125	1.771
			-	-	-	-	62.713	62.713	-	59.004	59.004	-	-	-	53.975	44.983
			-	-	-	-	2.9	2.9	-	4.0	4.0	-	-	-	6.0	6.8
3"	3.50	4.50	-	-	-	-	.216	.216	-	.300	.300	-	-	-	.438	.600
			-	-	-	-	5.486	5.486	-	7.620	7.620	-	-	-	11.125	15.240
			-	-	-	-	3.068	3.068	-	2.900	2.900	-	-	-	2.624	2.300
			-	-	-	-	77.927	77.927	-	73.660	73.660	-	-	-	66.650	58.420
			-	-	-	-	4.6	4.6	-	6.3	6.3	-	-	-	10.0	11.3
3½"	4.00	5.25	-	-	-	-	.226	.226	-	.318	.318	-	-	-	-	.636*
			-	-	-	-	5.740	5.740	-	8.077	8.077	-	-	-	-	16.154
			-	-	-	-	3.548	3.548	-	3.364	3.364	-	-	-	-	2.728
			-	-	-	-	90.119	90.119	-	85.446	85.446	-	-	-	-	69.291
			-	-	-	-	6.3	6.3	-	8.5	8.5	-	-	-	-	16.2
4"	4.50	6.00	.188	-	-	-	.237	.237	-	.337	.337	-	.438	-	.531	.674
			4.775	-	-	-	6.020	6.020	-	8.560	8.560	-	11.125	-	13.487	17.120
			4.124	-	-	-	4.026	4.026	-	3.826	3.826	-	3.624	-	3.438	3.152
			104.749	-	-	-	102.260	102.260	-	97.180	97.180	-	92.050	-	87.325	80.061
			7.8	-	-	-	8.7	8.7	-	12.2	12.2	-	15.0	-	22.0	23.0
5"	5.56	7.50	-	-	-	-	.258	.258	-	.375	.375	-	.500	-	.625	.750
			-	-	-	-	6.553	6.553	-	9.525	9.525	-	12.700	-	15.875	19.050
			-	-	-	-	5.047	5.047	-	4.813	4.813	-	4.563	-	4.313	4.063
			-	-	-	-	128.194	128.194	-	122.250	122.250	-	115.900	-	109.550	103.200
			-	-	-	-	14.4	14.4	-	19.8	19.8	-	27.5	-	33.0	38.0

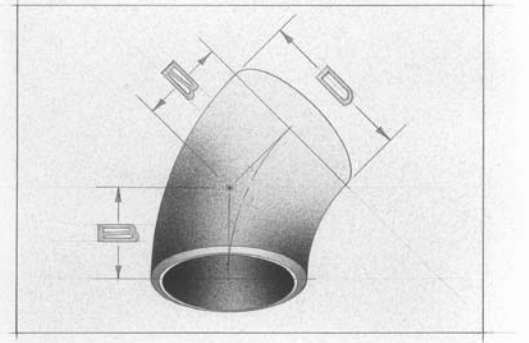
*Not given in ASME B36.10

Long Radius 90° ELBOWS



Key			Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)														
			Schedule														
Nominal Pipe Size	"D" Outside Diameter at Bevel	"A" Center-to-End	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS	
inches mm	inches mm	inches mm															
6"	6.63	9.00	.219	-	-	-	.280	.280	-	.432	.432	-	.562	-	.719	.864	
			5.563	-	-	-	7.112	7.112	-	10.973	10.973	-	14.275	-	18.263	21.946	
			6.187	-	-	-	6.065	6.065	-	5.761	5.761	-	5.501	-	5.187	4.897	
			157.150	-	-	-	154.051	154.051	-	146.329	146.329	-	139.725	-	131.750	124.384	
152.40	168.40	228.60	19.5	-	-	-	23.7	23.7	-	33.5	33.5	-	44.0	-	62.0	69.0	
8"	8.63	12.00	.219	-	.250	.277	.322	.322	.406	.500	.500	.594	.719	.812	.906	.875	
			5.563	-	6.350	7.036	8.179	8.179	10.312	12.700	12.700	15.088	18.263	20.625	23.012	22.225	
			8.187	-	8.125	8.071	7.981	7.981	7.813	7.625	7.437	7.187	7.001	6.813	6.875		
			203.20	-	206.375	205.003	202.717	202.717	198.450	193.675	193.675	188.900	182.550	177.825	173.050	174.625	
203.20	219.20	304.80	30.3	-	38.3	41.8	45.8	45.8	58.0	70.0	70.0	85.5	103.0	116.0	122.0	120.0	
10"	10.75	15.00	.219	-	.250	.307	.365	.365	.500	.500	.594	.719	.844	1.000	1.125	1.000	
			5.563	-	6.350	7.798	9.271	9.271	12.700	12.700	15.088	18.263	21.438	25.400	28.575	25.400	
			10.312	-	10.250	10.136	10.020	10.020	9.750	9.750	9.562	9.312	9.062	8.750	8.500	8.750	
			254.00	-	260.350	257.454	254.508	254.508	247.650	247.650	242.875	236.525	230.175	222.250	215.900	222.250	
254.00	273.05	381.00	261.925	-	59.0	68.4	86.0	86.0	107.0	130.0	164.0	201.0	232.0	270.0	270.0	232.0	
12"	12.75	18.00	.250	-	.250	.330	.406	.375	.562	.500	.688	.844	1.000	1.125	1.312	1.000	
			6.350	-	6.350	8.382	10.312	9.525	14.275	12.700	17.475	21.438	25.400	28.575	33.325	25.400	
			12.250	-	12.250	12.090	11.938	12.000	11.626	11.750	11.374	11.062	10.750	10.500	10.126	10.750	
			304.80	-	311.150	307.086	303.225	304.800	295.300	298.450	288.900	280.975	273.050	266.700	257.200	273.050	
304.80	323.85	457.20	311.150	-	96.0	105.0	129.0	120.0	180.0	210.0	269.0	315.0	365.0	460.0	315.0		
14"	14.00	21.00	.250	.250	.312	.375	.438	.375	.594	.500	.750	.938	1.094	1.250	1.406	-	
			6.350	6.350	7.925	9.525	11.125	9.525	15.088	12.700	19.050	23.825	27.788	31.750	35.712	-	
			13.500	13.500	13.376	13.250	13.124	13.250	12.812	13.000	12.500	12.124	11.812	11.500	11.188	-	
			355.60	355.60	533.40	342.900	342.900	339.750	336.550	333.350	336.550	325.425	330.200	317.500	307.950	300.025	292.100
355.60	355.60	533.40	98.0	98.0	126.0	-	170.0	156.0	270.0	191.0	310.0	371.0	415.0	490.0	563.0	-	
16"	16.00	24.00	.250	.250	.312	.375	.500	.375	.656	.500	.844	1.031	1.219	1.438	1.594	-	
			6.350	6.350	7.925	9.525	12.700	9.525	16.662	12.700	21.438	26.187	30.963	36.525	40.488	-	
			15.500	15.500	15.376	15.250	15.000	15.250	14.688	15.000	14.312	13.938	13.562	13.124	12.812	-	
			406.40	406.40	609.60	393.700	393.700	390.550	387.350	381.000	373.075	373.075	381.000	363.525	354.025	344.475	333.350
406.40	406.40	609.60	135.0	135.0	169.0	-	262.0	206.0	302.0	268.0	420.0	518.0	622.0	735.0	825.0	-	
18"	18.00	27.00	.250	.250	.312	.438	.562	.375	.750	.500	.938	1.156	1.375	1.562	1.781	-	
			6.350	6.350	7.925	11.125	14.275	9.525	19.050	12.700	23.825	29.362	34.925	39.675	45.237	-	
			17.500	17.500	17.376	17.124	16.876	17.250	16.500	16.124	15.688	15.250	14.876	14.438	-		
			457.20	457.20	685.80	444.500	444.500	441.350	434.950	428.650	438.150	419.100	431.800	409.550	398.475	387.350	377.850
457.20	457.20	685.80	165.0	165.0	215.0	287.0	369.0	256.0	512.0	318.0	620.0	747.0	872.0	1005.0	-	-	
20"	20.00	30.00	.250	.250	.375	.500	.594	.375	.812	.500	1.031	1.281	1.500	1.750	1.969	-	
			6.350	6.350	9.525	12.700	15.088	9.525	20.625	12.700	26.187	32.537	38.100	44.450	50.013	-	
			19.500	19.500	19.250	19.000	18.812	19.250	18.376	19.000	17.938	17.438	17.000	16.500	16.062	-	
			508.00	508.00	762.00	495.300	495.300	488.950	482.600	477.825	488.950	466.750	482.600	455.625	442.925	431.800	419.100
508.00	508.00	762.00	194.0	194.0	310.0	409.0	498.0	344.0	675.0	407.0	840.0	997.0	1178.0	-	-		
22"	22.00	33.00	-	.250	.375	.500	-	.375	.875	.500	1.125	1.375	1.625	1.875	2.125	-	
			-	6.350	9.525	12.700	-	9.525	22.225	12.700	28.575	34.925	41.275	47.625	53.975	-	
			-	21.500	21.250	21.000	-	21.250	20.250	21.000	19.750	19.250	18.750	18.250	17.750	-	
			558.80	558.80	838.20	-	546.100	539.750	533.400	-	539.750	514.350	533.400	501.650	488.950	476.250	463.550
558.80	558.80	838.20	-	394.0	394.0	520.0	-	474.0	-	474.0	-	-	-	-	-	-	
24"	24.00	36.00	.250	.250	.375	.562	.688	.375	.969	.500	1.219	1.531	1.812	2.062	2.344	-	
			6.350	6.350	9.525	14.275	17.475	9.525	24.613	12.700	30.963	38.887	46.025	52.375	59.538	-	
			23.500	23.500	23.250	22.876	22.624	23.250	22.062	23.000	21.562	20.938	20.376	19.876	19.312	-	
			609.60	609.60	914.40	596.900	596.900	590.550	581.050	574.650	590.550	560.375	584.200	547.675	531.825	517.550	504.850
609.60	609.60	914.40	304.0	304.0	-	691.0	844.0	483.3	1170.0	632.0	1465.0	1730.0	2050.0	2310.0	-	-	
30"	30.00	45.00	-	.312	.500	.625	-	.375	-	.500	-	-	-	-	-	-	
			-	7.925	12.700	15.875	-	9.525	-	12.700	-	-	-	-	-	-	-
			-	29.376	29.000	28.750	-	29.250	-	29.000	-	-	-	-	-	-	-
			762.00	762.00	1143.00	-	746.150	736.600	730.250	-	742.950	-	736.600	-	-	-	-
762.00	762.00	1143.00	-	620.0	-	1235.0	-	778.0	-	953.0	-	-	-	-	-	-	

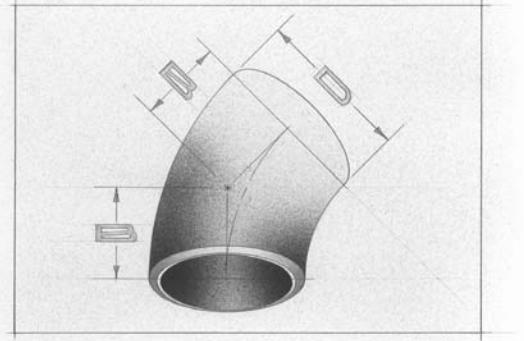
Long Radius 45° ELBOWS



Key			Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)													
			Schedule													
Nominal Pipe Size	"D" Outside Diameter at Bevel	"B" Center-to-End	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
inches mm	inches mm	inches mm														
½"	.84	.63	-	-	-	-	.109	.109	-	.147	.147	-	-	-	.188	.294
			-	-	-	-	2.769	2.769	-	3.734	3.734	-	-	-	4.775	7.468
			-	-	-	-	.622	.622	-	.546	.546	-	-	-	.464	.252
			-	-	-	-	15.799	15.799	-	13.868	13.868	-	-	-	11.786	6.401
			-	-	-	-	0.1	0.1	-	0.2	-	-	-	-	-	0.2
¾"	1.05	.75	-	-	-	-	.113	.113	-	.154	.154	-	-	-	.219	.308
			-	-	-	-	2.870	2.870	-	3.912	3.912	-	-	-	5.563	7.823
			-	-	-	-	.824	.824	-	.742	.742	-	-	-	.612	.434
			-	-	-	-	20.930	20.930	-	18.847	18.847	-	-	-	15.545	11.024
			-	-	-	-	0.1	0.1	-	0.2	-	-	-	-	-	0.3
1"	1.32	.88	-	-	-	-	.133	.133	-	.179	.179	-	-	-	.250	.358
			-	-	-	-	3.378	3.378	-	4.547	4.547	-	-	-	6.350	9.093
			-	-	-	-	1.049	1.049	-	.957	.957	-	-	-	.815	.599
			-	-	-	-	26.645	26.645	-	24.308	24.308	-	-	-	20.701	15.215
			-	-	-	-	0.3	0.3	-	0.3	-	-	-	-	-	0.4
1¼"	1.66	1.00	-	-	-	-	.140	.140	-	.191	.191	-	-	-	.250	.382
			-	-	-	-	3.556	3.556	-	4.851	4.851	-	-	-	6.350	9.703
			-	-	-	-	1.380	1.380	-	1.278	1.278	-	-	-	1.160	.896
			-	-	-	-	35.052	35.052	-	32.461	32.461	-	-	-	29.464	22.758
			-	-	-	-	0.3	0.3	-	0.4	-	-	-	-	-	0.5
1½"	1.90	1.12	-	-	-	-	.145	.145	-	.200	.200	-	-	-	.281	.400
			-	-	-	-	3.683	3.683	-	5.080	5.080	-	-	-	7.137	10.160
			-	-	-	-	1.610	1.610	-	1.500	1.500	-	-	-	1.338	1.100
			-	-	-	-	40.894	40.894	-	38.100	38.100	-	-	-	33.985	27.940
			-	-	-	-	0.5	0.5	-	0.6	-	-	-	-	-	1.0
2"	2.38	1.38	-	-	-	-	.154	.154	-	.218	.218	-	-	-	.344	.436
			-	-	-	-	3.912	3.912	-	5.537	5.537	-	-	-	7.738	11.074
			-	-	-	-	2.067	2.067	-	1.939	1.939	-	-	-	1.687	1.503
			-	-	-	-	52.502	52.502	-	49.251	49.251	-	-	-	42.850	38.176
			-	-	-	-	0.8	0.8	-	1.0	-	-	-	-	-	1.8
2½"	2.88	1.75	-	-	-	-	.203	.203	-	.276	.276	-	-	-	.375	.552
			-	-	-	-	5.156	5.156	-	7.010	7.010	-	-	-	9.525	14.021
			-	-	-	-	2.469	2.469	-	2.323	2.323	-	-	-	2.125	1.771
			-	-	-	-	62.713	62.713	-	59.004	59.004	-	-	-	53.975	44.983
			-	-	-	-	1.7	1.6	-	1.9	-	-	-	-	-	3.0
3"	3.50	2.00	-	-	-	-	.216	.216	-	.300	.300	-	-	-	.438	.600
			-	-	-	-	5.486	5.486	-	7.620	7.620	-	-	-	11.125	15.240
			-	-	-	-	3.068	3.068	-	2.900	2.900	-	-	-	2.624	2.300
			-	-	-	-	77.927	77.927	-	73.660	73.660	-	-	-	66.650	58.420
			-	-	-	-	2.3	2.4	-	3.1	-	-	-	-	-	5.0
3½"	4.00	2.25	-	-	-	-	.226	.226	-	.318	.318	-	-	-	-	.636*
			-	-	-	-	5.740	5.740	-	8.077	8.077	-	-	-	-	16.154
			-	-	-	-	3.548	3.548	-	3.364	3.364	-	-	-	-	2.728
			-	-	-	-	90.119	90.119	-	85.446	85.446	-	-	-	-	69.291
			-	-	-	-	3.2	3.2	-	4.8	-	-	-	-	-	-
4"	4.50	2.50	.188	-	-	-	.237	.237	-	.337	.337	-	.438	-	.531	.674
			4.775	-	-	-	6.020	6.020	-	8.560	8.560	-	11.125	-	13.487	17.120
			4.124	-	-	-	4.026	4.026	-	3.826	3.826	-	3.624	-	3.438	3.152
			104.749	-	-	-	102.260	102.260	-	97.180	97.180	-	92.050	-	87.325	80.061
			3.9	-	-	-	4.3	4.3	-	6.2	-	-	-	-	10.8	10.7
5"	5.56	3.13	-	-	-	-	.258	.258	-	.375	.375	-	.500	-	.625	.750
			-	-	-	-	6.553	6.553	-	9.525	9.525	-	12.700	-	15.875	19.050
			-	-	-	-	5.047	5.047	-	4.813	4.813	-	4.563	-	4.313	4.063
			-	-	-	-	128.194	128.194	-	122.250	122.250	-	115.900	-	109.550	103.200
			-	-	-	-	7.3	7.4	-	11.8	-	-	-	-	-	17.0

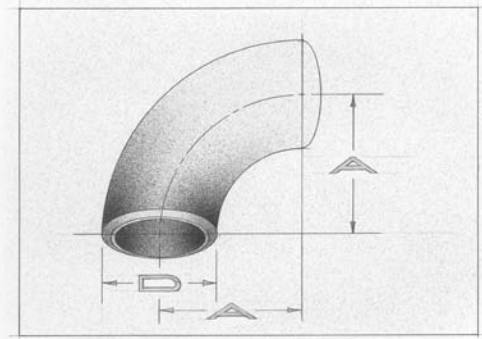
*Not given in ASME B36.10

Long Radius 45° ELBOWS



Key			Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)														
			Schedule														
Nominal Pipe Size	"D" Outside Diameter at Bevel	"B" Center-to-End	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS	
inches mm	inches mm	inches mm															
6"	6.63	3.75	.219	-	-	-	.280	.280	-	.432	.432	-	.562	-	.719	.864	
			5.563	-	-	-	7.112	7.112	-	10.973	10.973	-	14.275	-	18.263	21.946	
			6.187	-	-	-	6.065	6.065	-	5.761	5.761	-	5.501	-	5.187	4.897	
			157.150	-	-	-	154.051	154.051	-	146.329	146.329	-	139.725	-	131.750	124.384	
			12.0	-	-	-	11.5	12.7	-	16.3	16.7	-	21.6	-	30.0	32.0	
8"	8.63	5.00	.219	-	.250	.277	.322	.322	.406	.500	.500	.594	.719	.812	.906	.875	
			5.563	-	6.350	7.036	8.179	8.179	10.312	12.700	12.700	15.088	18.263	20.625	23.012	22.225	
			8.187	-	8.125	8.071	7.981	7.981	7.813	7.625	7.437	7.187	7.001	6.813	6.875		
			203.20	-	206.375	205.003	202.717	202.717	198.450	193.675	193.675	188.900	182.550	177.825	173.050	174.625	
			19.8	-	19.8	20.5	22.5	23.3	30.6	34.0	34.0	43.5	52.7	58.5	75.0	60.0	
10"	10.75	6.25	.219	-	.250	.307	.365	.365	.500	.500	.594	.719	.844	1.000	1.125	1.000	
			5.563	-	6.350	7.798	9.271	9.271	12.700	12.700	15.088	18.263	21.438	25.400	28.575	25.400	
			10.312	-	10.250	10.136	10.020	10.020	9.750	9.750	9.562	9.312	9.062	8.750	8.500	8.750	
			254.00	-	260.350	257.454	254.508	254.508	247.650	247.650	242.875	236.525	230.175	222.250	215.900	222.250	
			20.5	-	21.6	28.5	39.0	53.0	53.0	68.0	78.0	97.0	122.0	135.0	-		
12"	12.75	7.50	.250	-	.250	.330	.406	.375	.562	.500	.688	.844	1.000	1.125	1.312	1.000	
			6.350	-	6.350	8.382	10.312	9.525	14.275	12.700	17.475	21.438	25.400	28.575	33.325	25.400	
			12.250	-	12.250	12.090	11.938	12.000	11.626	11.750	11.374	11.062	10.750	10.500	10.126	10.750	
			304.80	-	311.150	307.086	303.225	304.800	295.300	298.450	288.900	280.975	273.050	266.700	257.200	273.050	
			39.7	-	39.7	52.1	64.5	60.0	89.0	78.0	106.0	134.0	167.0	189.0	230.0	-	
14"	14.00	8.75	.250	.250	.312	.375	.438	.375	.594	.500	.750	.938	1.094	1.250	1.406	-	
			6.350	6.350	7.925	9.525	11.125	9.525	15.088	12.700	19.050	23.825	27.788	31.750	35.712	-	
			13.500	13.500	13.376	13.250	13.124	13.250	12.812	13.000	12.500	12.124	11.812	11.500	11.188	-	
			355.60	355.60	342.900	342.900	339.750	336.550	333.350	336.550	325.425	330.200	317.500	307.950	300.025	292.100	284.175
			49.5	49.5	64.2	74.0	87.0	78.0	113.0	95.0	159.0	186.0	209.0	241.0	278.0	-	
16"	16.00	10.00	.250	.250	.312	.375	.500	.375	.656	.500	.844	1.031	1.219	1.438	1.594	-	
			6.350	6.350	7.925	9.525	12.700	9.525	16.662	12.700	21.438	26.187	30.963	36.525	40.488	-	
			15.500	15.500	15.376	15.250	15.000	15.250	14.688	15.000	14.312	13.938	13.562	13.124	12.812	-	
			406.40	406.40	393.700	393.700	390.550	387.350	381.000	387.350	373.075	381.000	363.525	354.025	344.475	333.350	325.425
			68.5	68.5	84.3	101.0	131.0	100.0	169.0	131.0	228.0	269.0	318.0	362.0	415.0	-	
18"	18.00	11.25	.250	.250	.312	.438	.562	.375	.750	.500	.938	1.156	1.375	1.562	1.781	-	
			6.350	6.350	7.925	11.125	14.275	9.525	19.050	12.700	23.825	29.362	34.925	39.675	45.237	-	
			17.500	17.500	17.376	17.124	16.876	17.250	16.500	17.000	16.124	15.688	15.250	14.876	14.438	-	
			457.20	457.20	444.500	444.500	441.350	434.950	428.650	438.150	419.100	431.800	409.550	398.475	387.350	377.850	366.725
			85.0	85.0	114.0	151.0	187.0	128.0	245.0	170.0	309.0	376.0	439.0	509.0	609.0	-	
20"	20.00	12.50	.250	.250	.375	.500	.594	.375	.812	.500	1.031	1.281	1.500	1.750	1.969	-	
			6.350	6.350	9.525	12.700	15.088	9.525	20.625	12.700	26.187	32.537	38.100	44.450	50.013	-	
			19.500	19.500	19.250	19.000	18.812	19.250	18.376	19.000	17.938	17.438	17.000	16.500	16.062	-	
			508.00	508.00	495.300	495.300	488.950	482.600	477.825	488.950	466.750	482.600	455.625	442.925	431.800	419.100	407.975
			105.0	105.0	155.0	205.0	245.0	155.0	330.0	205.0	424.0	502.0	597.0	684.0	-		
22"	22.00	13.50	-	.250	.375	.500	-	.375	.875	.500	1.125	1.375	1.625	1.875	2.125	-	
			-	6.350	9.525	12.700	-	9.525	22.225	12.700	28.575	34.925	41.275	47.625	53.975	-	
			-	21.500	21.250	21.000	-	21.250	20.250	21.000	19.750	19.250	18.750	18.250	17.750	-	
			558.80	558.80	546.100	539.750	533.400	-	539.750	514.350	533.400	501.650	488.950	476.250	463.550	450.850	-
			-	-	-	-	-	197.0	-	262.0	-	-	-	-	-		
24"	24.00	15.00	.250	.250	.375	.562	.688	.375	.969	.500	1.219	1.531	1.812	2.062	2.344	-	
			6.350	6.350	9.525	14.275	17.475	9.525	24.613	12.700	30.963	38.887	46.025	52.375	59.538	-	
			23.500	23.500	23.250	22.876	22.624	23.250	22.062	23.000	21.562	20.938	20.376	19.876	19.312	-	
			609.60	609.60	596.900	596.900	590.550	581.050	574.650	590.550	560.375	584.200	547.675	531.825	517.550	504.850	490.525
			146.0	146.0	223.0	342.0	418.0	223.0	575.0	295.0	726.0	875.0	1032.0	1179.0	-		
30"	30.00	18.50	-	.312	.500	.625	-	.375	-	.500	-	-	-	-	-	-	
			-	7.925	12.700	15.875	-	9.525	-	12.700	-	-	-	-	-	-	-
			-	29.376	29.000	28.750	-	29.250	-	29.000	-	-	-	-	-	-	-
			762.00	762.00	746.150	736.600	730.250	-	742.950	-	736.600	-	-	-	-	-	-
			365.0	475.0	680.0	-	367.0	-	475.0	-	-	-	-	-	-		

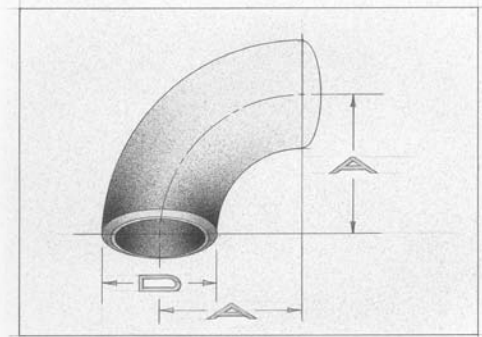
3-R 90° ELBOWS



Key			Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)													
			Schedule													
Nominal Pipe Size	"D" Outside Diameter at Bevel	"B" Center-to-End	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
inches mm	inches mm	inches mm														
¾"	1.05	2.25	-	-	-	-	.113	.113	-	.154	.154	-	-	-	.219	.308
			-	-	-	-	2.870	2.870	-	3.912	3.912	-	-	-	5.563	7.823
			-	-	-	-	.824	.824	-	.742	.742	-	-	-	.612	.434
			-	-	-	-	20.930	20.930	-	18.847	18.847	-	-	-	15.545	11.024
1"	1.32	3.0	-	-	-	-	.133	.133	-	.179	.179	-	-	-	.250	.358
			-	-	-	-	3.378	3.378	-	4.547	4.547	-	-	-	6.350	9.093
			-	-	-	-	1.049	1.049	-	.957	.957	-	-	-	.815	.599
			-	-	-	-	26.645	26.645	-	24.308	24.308	-	-	-	20.701	15.215
1½"	1.66	3.75	-	-	-	-	.140	.140	-	.191	.191	-	-	-	.250	.382
			-	-	-	-	3.556	3.556	-	4.851	4.851	-	-	-	6.350	9.703
			-	-	-	-	1.380	1.380	-	1.278	1.278	-	-	-	1.160	.896
			-	-	-	-	35.052	35.052	-	32.461	32.461	-	-	-	29.464	22.758
2"	2.38	6.00	-	-	-	-	.154	.154	-	.218	.218	-	-	-	.344	.436
			-	-	-	-	3.912	3.912	-	5.537	5.537	-	-	-	8.738	11.074
			-	-	-	-	2.067	2.067	-	1.939	1.939	-	-	-	1.687	1.503
			-	-	-	-	52.502	52.502	-	49.251	49.251	-	-	-	42.850	38.176
2½"	2.88	7.50	-	-	-	-	.203	.203	-	.276	.276	-	-	-	.375	.552
			-	-	-	-	5.156	5.156	-	7.010	7.010	-	-	-	9.525	14.021
			-	-	-	-	2.469	2.469	-	2.323	2.323	-	-	-	2.125	1.771
			-	-	-	-	62.713	62.713	-	59.004	59.004	-	-	-	53.975	44.983
3"	3.50	9.0	-	-	-	-	.216	.216	-	.300	.300	-	-	-	.438	.600
			-	-	-	-	5.486	5.486	-	7.620	7.620	-	-	-	11.125	15.240
			-	-	-	-	3.068	3.068	-	2.900	2.900	-	-	-	2.624	2.300
			-	-	-	-	77.927	77.927	-	73.660	73.660	-	-	-	66.650	58.420
4"	4.50	12.00	-	-	-	-	.237	.237	-	.337	.337	-	-	-	.531	.674
			-	-	-	-	6.020	6.020	-	8.560	8.560	-	.438	-	13.487	17.120
			-	-	-	-	4.026	4.026	-	3.826	3.826	-	3.624	-	3.438	3.152
			-	-	-	-	102.260	102.260	-	97.180	97.180	-	92.050	-	87.325	80.061

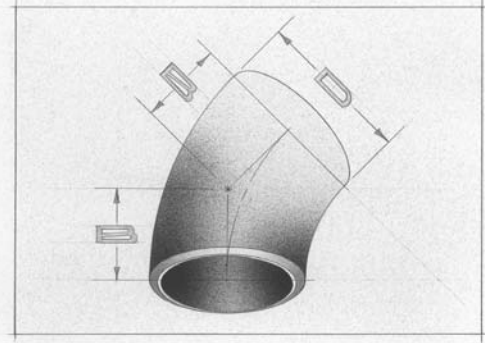
*Not given in ASME B36.10

3-R 90° ELBOWS



Key			Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)													
			Schedule													
Nominal Pipe Size	"D" Outside Diameter at Bevel	"B" Center-to-End	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
inches mm	inches mm	inches mm														
6"	6.63	18.0	.219	-	-	-	.280	.280	-	.432	.432	-	.562	-	.719	.864
			5.563	-	-	-	7.112	7.112	-	10.973	10.973	-	14.275	-	18.263	21.946
			6.187	-	-	-	6.065	6.065	-	5.761	5.761	-	5.501	-	5.187	4.897
152.40	168.28	457.2	157.150	-	-	-	154.051	154.051	-	146.329	146.329	-	139.725	-	131.750	124.384
			19.5	-	-	-	23.7	23.7	-	33.5	33.5	-	44.0	-	62.0	69.0
8"	8.63	24.0	.219	-	.250	.277	.322	.322	.406	.500	.500	.594	.719	.812	.906	.875
			5.563	-	6.350	7.036	8.179	8.179	10.312	12.700	12.700	15.088	18.263	20.625	23.012	22.225
			8.187	-	8.125	8.071	7.981	7.981	7.813	7.625	7.437	7.187	7.001	6.813	6.875	
203.20	219.08	609.6	207.949	-	206.375	205.003	202.717	202.717	198.450	193.675	193.675	188.900	182.550	177.825	173.050	174.625
			30.3	-	38.3	41.8	45.8	45.8	58.0	70.0	70.0	85.5	103.0	116.0	122.0	120.0
10"	10.75	30.0	.219	-	.250	.307	.365	.365	.500	.500	.594	.719	.844	1.000	1.125	1.000
			5.563	-	6.350	7.798	9.271	9.271	12.700	12.700	15.088	18.263	21.438	25.400	28.575	25.400
			10.312	-	10.250	10.136	10.020	10.020	9.750	9.750	9.562	9.312	9.062	8.750	8.500	8.750
254.00	273.05	762.0	261.925	-	260.350	257.454	254.508	254.508	247.650	247.650	242.875	236.525	230.175	222.250	215.900	222.250
			-	-	59.0	68.4	86.0	86.0	107.0	109.0	130.0	164.0	201.0	232.0	270.0	232.0
12"	12.75	36.0	.250	-	.250	.330	.406	.375	.562	.500	.688	.844	1.000	1.125	1.312	1.000
			6.350	-	6.350	8.382	10.312	9.525	14.275	12.700	17.475	21.438	25.400	28.575	33.325	25.400
			12.250	-	12.250	12.090	11.938	12.000	11.626	11.750	11.374	11.062	10.750	10.500	10.126	10.750
304.80	323.85	914.40	311.150	-	311.150	307.086	303.225	304.800	295.300	298.450	288.900	280.975	273.050	266.700	257.200	273.050
			-	-	96.0	105.0	129.0	120.0	180.0	160.0	210.0	269.0	315.0	365.0	460.0	315.0
16"	16.00	48.0	.250	.250	.312	.375	.500	.375	.656	.500	.844	1.031	1.219	1.438	1.594	-
			6.350	6.350	7.925	9.525	12.700	9.525	16.662	12.700	21.438	26.187	30.963	36.525	40.488	-
			15.500	15.500	15.376	15.250	15.000	15.250	14.688	15.000	14.312	13.938	13.562	13.124	12.812	-
406.40	406.40	1219.2	393.700	393.700	390.550	387.350	381.000	387.350	373.075	381.000	363.525	354.025	344.475	333.350	325.425	-
			135.0	135.0	169.0	-	262.0	206.0	302.0	268.0	420.0	518.0	622.0	735.0	825.0	-
18"	18.00	154.0	.250	.250	.312	.438	.562	.375	.750	.500	.938	1.156	1.375	1.562	1.781	-
			6.350	6.350	7.925	11.125	14.275	9.525	19.050	12.700	23.825	29.362	34.925	39.675	45.237	-
			17.500	17.500	17.376	17.124	16.876	17.250	16.500	17.000	16.124	15.688	15.250	14.876	14.438	-
457.20	457.20	1371.6	444.500	444.500	441.350	434.950	428.650	438.150	419.100	431.800	409.550	398.475	387.350	377.850	366.725	-
			165.0	165.0	215.0	287.0	369.0	256.0	512.0	318.0	620.0	747.0	872.0	1005.0	-	
20"	20.00	60.0	.250	.250	.375	.500	.594	.375	.812	.500	1.031	1.281	1.500	1.750	1.969	-
			6.350	6.350	9.525	12.700	15.088	9.525	20.625	12.700	26.187	32.537	38.100	44.450	50.013	-
			19.500	19.500	19.250	19.000	18.812	19.250	18.376	19.000	17.938	17.438	17.000	16.500	16.062	-
508.00	508.00	1524.0	495.300	495.300	488.950	482.600	477.825	488.950	466.750	482.600	455.625	442.925	431.800	419.100	407.975	-
			194.0	194.0	310.0	409.0	498.0	344.0	675.0	407.0	840.0	997.0	1178.0	1419.0	-	
24"	24.00	72.0	.250	.250	.375	.562	.688	.375	.969	.500	1.219	1.531	1.812	2.062	2.344	-
			6.350	6.350	9.525	14.275	17.475	9.525	24.613	12.700	30.963	38.887	46.025	52.375	59.538	-
			23.500	23.500	23.250	22.876	22.624	23.250	22.062	23.000	21.562	20.938	20.376	19.876	19.312	-
609.60	609.60	1828.8	596.900	596.900	590.550	581.050	574.650	590.550	560.375	584.200	547.675	531.825	517.550	504.850	490.525	-
			304.0	304.0	-	691.0	844.0	483.3	1170.0	632.0	1465.0	1730.0	2050.0	2310.0	-	

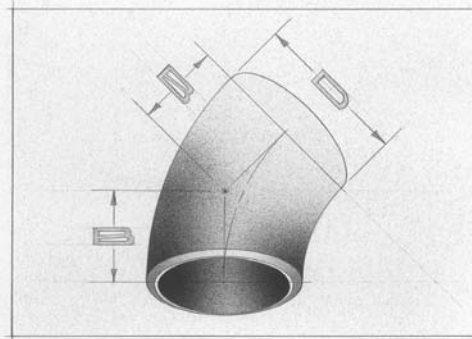
3-R 45° ELBOWS



Key			Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)													
			Schedule													
Nominal Pipe Size	"D" Outside Diameter at Bevel	"B" Center-to-End	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
inches mm	inches mm	inches mm														
¾"	1.05	.94	-	-	-	-	.113	.113	-	.154	.154	-	-	-	.219	.308
			-	-	-	-	2.870	2.870	-	3.912	3.912	-	-	-	5.563	7.823
19.05	26.67	23.8	-	-	-	-	.824	.824	-	.742	.742	-	-	-	.612	.434
			-	-	-	-	20.930	20.930	-	18.847	18.847	-	-	-	15.545	11.024
			-	-	-	-	0.1	0.1	-	0.2	0.2	-	-	-	0.3	0.2
1"	1.32	1.25	-	-	-	-	.133	.133	-	.179	.179	-	-	-	.250	.358
			-	-	-	-	3.378	3.378	-	4.547	4.547	-	-	-	6.350	9.093
25.40	33.40	31.7	-	-	-	-	1.049	1.049	-	.957	.957	-	-	-	.815	.599
			-	-	-	-	26.645	26.645	-	24.308	24.308	-	-	-	20.701	15.215
			-	-	-	-	0.3	0.3	-	0.3	0.3	-	-	-	0.4	0.4
1½"	1.66	1.56	-	-	-	-	.140	.140	-	.191	.191	-	-	-	.250	.382
			-	-	-	-	3.556	3.556	-	4.851	4.851	-	-	-	6.350	9.703
31.75	42.16	39.6	-	-	-	-	1.380	1.380	-	1.278	1.278	-	-	-	1.160	.896
			-	-	-	-	35.052	35.052	-	32.461	32.461	-	-	-	29.464	22.758
			-	-	-	-	0.3	0.3	-	0.4	0.4	-	-	-	0.5	0.5
1½"	1.90	1.88	-	-	-	-	.145	.145	-	.200	.200	-	-	-	.281	.400
			-	-	-	-	3.683	3.683	-	5.080	5.080	-	-	-	7.137	10.160
38.10	48.26	47.8	-	-	-	-	1.610	1.610	-	1.500	1.500	-	-	-	1.338	1.100
			-	-	-	-	40.894	40.894	-	38.100	38.100	-	-	-	33.985	27.940
			-	-	-	-	0.5	0.5	-	0.6	0.6	-	-	-	1.0	1.2
2"	2.38	2.50	-	-	-	-	.154	.154	-	.218	.218	-	-	-	.344	.436
			-	-	-	-	3.912	3.912	-	5.537	5.537	-	-	-	8.738	11.074
50.80	60.33	63.5	-	-	-	-	2.067	2.067	-	1.939	1.939	-	-	-	1.687	1.503
			-	-	-	-	52.502	52.502	-	49.251	49.251	-	-	-	42.850	38.176
			-	-	-	-	0.8	0.8	-	1.0	1.1	-	-	-	1.8	2.0
2½"	2.88	3.12	-	-	-	-	.203	.203	-	.276	.276	-	-	-	.375	.552
			-	-	-	-	5.156	5.156	-	7.010	7.010	-	-	-	9.525	14.021
63.50	73.03	79.2	-	-	-	-	2.469	2.469	-	2.323	2.323	-	-	-	2.125	1.771
			-	-	-	-	62.713	62.713	-	59.004	59.004	-	-	-	53.975	44.983
			-	-	-	-	1.7	1.6	-	1.9	1.9	-	-	-	3.0	3.8
3"	3.50	3.75	-	-	-	-	.216	.216	-	.300	.300	-	-	-	.438	.600
			-	-	-	-	5.486	5.486	-	7.620	7.620	-	-	-	11.125	15.240
76.20	88.90	95.2	-	-	-	-	3.068	3.068	-	2.900	2.900	-	-	-	2.624	2.300
			-	-	-	-	77.927	77.927	-	73.660	73.660	-	-	-	66.650	58.420
			-	-	-	-	2.3	2.4	-	3.1	3.1	-	-	-	5.0	6.0
4"	4.50	5.0	.188	-	-	-	.237	.237	-	.337	.337	-	.438	-	.531	.674
			4.775	-	-	-	6.020	6.020	-	8.560	8.560	-	11.125	-	13.487	17.120
101.60	114.30	127.0	4.124	-	-	-	4.026	4.026	-	3.826	3.826	-	3.624	-	3.438	3.152
			104.749	-	-	-	102.260	102.260	-	97.180	97.180	-	92.050	-	87.325	80.061
			3.9	-	-	-	4.3	4.3	-	6.2	5.9	-	7.3	-	10.8	10.7

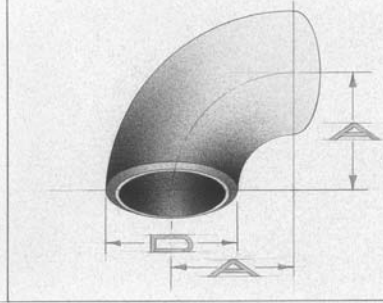
*Not given in ASME B36.10

3-R 45° ELBOWS



Key			Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)													
			Schedule													
Nominal Pipe Size	"D" Outside Diameter at Bevel	"B" Center-to-End	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
inches mm	inches mm	inches mm														
6"	6.63	7.44	.219	-	-	-	.280	.280	-	.432	.432	-	.562	-	.719	.864
			5.563	-	-	-	7.112	7.112	-	10.973	10.973	-	14.275	-	18.263	21.946
			6.187	-	-	-	6.065	6.065	-	5.761	5.761	-	5.501	-	5.187	4.897
			157.150	-	-	-	154.051	154.051	-	146.329	146.329	-	139.725	-	131.750	124.384
			12.0	-	-	-	11.5	12.7	-	16.3	16.7	-	21.6	-	30.0	32.0
8"	8.63	9.94	.219	-	.250	.277	.322	.322	.406	.500	.500	.594	.719	.812	.906	.875
			5.563	-	6.350	7.036	8.179	8.179	10.312	12.700	12.700	15.088	18.263	20.625	23.012	22.225
			8.187	-	8.125	8.071	7.981	7.981	7.813	7.625	7.625	7.437	7.187	7.001	6.813	6.875
			203.20	-	206.375	205.003	202.717	202.717	198.450	193.675	193.675	188.900	182.550	177.825	173.050	174.625
			19.8	-	19.8	20.5	22.5	23.3	30.6	34.0	34.0	43.5	52.7	58.5	75.0	60.0
10"	10.75	12.44	.219	-	.250	.307	.365	.365	.500	.500	.594	.719	.844	1.000	1.125	1.000
			5.563	-	6.350	7.798	9.271	9.271	12.700	12.700	15.088	18.263	21.438	25.400	28.575	22.250
			10.312	-	10.250	10.136	10.020	10.020	9.750	9.750	9.562	9.312	9.062	8.750	8.500	8.750
			254.00	-	260.350	257.454	254.508	254.508	247.650	247.650	242.875	236.525	230.175	222.250	215.900	222.250
			20.5	-	21.6	28.5	39.0	39.0	53.0	53.0	68.0	78.0	97.0	135.0	-	
12"	12.75	14.88	.250	-	.250	.330	.406	.375	.562	.500	.688	.844	1.000	1.125	1.312	1.000
			6.350	-	6.350	8.382	10.312	9.525	14.275	12.700	17.475	21.438	25.400	28.575	33.325	25.400
			12.250	-	12.250	12.090	11.938	12.000	11.626	11.750	11.374	11.062	10.750	10.500	10.126	10.750
			304.80	-	311.150	307.086	303.225	304.800	295.300	298.450	288.900	280.975	273.050	266.700	257.200	273.050
			39.7	-	39.7	52.1	64.5	60.0	89.0	78.0	106.0	134.0	167.0	189.0	230.0	-
16"	16.00	19.88	.250	.250	.312	.375	.500	.375	.656	.500	.844	1.031	1.219	1.438	1.594	-
			6.350	6.350	7.925	9.525	12.700	9.525	16.662	12.700	21.438	26.187	30.963	36.525	40.488	-
			15.500	15.500	15.376	15.250	15.000	15.250	14.688	15.000	14.312	13.938	13.562	13.124	12.812	-
			406.40	406.40	393.700	393.700	390.550	387.350	381.000	387.350	373.075	381.000	363.525	354.025	344.475	333.350
			68.5	68.5	84.3	101.0	131.0	100.0	169.0	131.0	228.0	269.0	318.0	362.0	415.0	-
18"	18.00	22.38	.250	.250	.312	.438	.562	.375	.750	.500	.938	1.156	1.375	1.562	1.781	-
			6.350	6.350	7.925	11.125	14.275	9.525	19.050	12.700	23.825	29.362	34.925	39.675	45.237	-
			17.500	17.500	17.376	17.124	16.876	17.250	16.500	17.000	16.124	15.688	15.250	14.876	14.438	-
			457.20	457.20	444.500	444.500	441.350	434.950	428.650	438.150	419.100	431.800	409.550	398.475	387.350	377.850
			85.0	85.0	114.0	151.0	187.0	128.0	245.0	170.0	309.0	376.0	439.0	509.0	609.0	-
20"	20.00	24.88	.250	.250	.375	.500	.594	.375	.812	.500	1.031	1.281	1.500	1.750	1.969	-
			6.350	6.350	9.525	12.700	15.088	9.525	20.625	12.700	26.187	32.537	38.100	44.450	50.013	-
			19.500	19.500	19.250	19.000	18.812	19.250	18.376	19.000	17.938	17.438	17.000	16.500	16.062	-
			508.00	508.00	495.300	495.300	488.950	482.600	477.825	488.950	466.750	482.600	455.625	442.925	431.800	419.100
			105.0	105.0	155.0	205.0	245.0	155.0	330.0	205.0	424.0	502.0	597.0	684.0	992.1	-
24"	24.00	29.81	.250	.250	.375	.562	.688	.375	.969	.500	1.219	1.531	1.812	2.062	2.344	-
			6.350	6.350	9.525	14.275	17.475	9.525	24.613	12.700	30.963	38.887	46.025	52.375	59.538	-
			23.500	23.500	23.250	22.876	22.624	23.250	22.062	23.000	21.562	20.938	20.376	19.876	19.312	-
			609.60	609.60	596.900	596.900	590.550	581.050	574.650	590.550	560.375	584.200	547.675	531.825	517.550	504.850
			146.0	146.0	223.0	342.0	418.0	223.0	575.0	295.0	726.0	875.0	1032.0	1179.0	-	

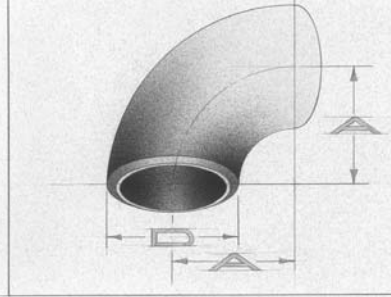
Short Radius 90° ELBOWS



Key			Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)													
			Schedule													
Nominal Pipe Size	"D" Outside Diameter at Bevel	"A" Center-to-End	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
inches mm	inches mm	inches mm														
½"	.84	-	-	-	-	-	.109	.109	-	.147	.147	-	-	-	.188	.294
			12.70	21.34	-	-	-	-	2.769	2.769	-	3.734	3.734	-	-	-
			-	-	-	-	.622	.622	-	.546	.546	-	-	-	.464	.252
			-	-	-	-	15.799	15.799	-	13.868	13.868	-	-	-	11.786	6.401
			-	-	-	-	-	-	-	-	-	-	-	-	-	-
¾"	1.05	-	-	-	-	-	.113	.113	-	.154	.154	-	-	-	.219	.308
			19.05	26.67	-	-	-	-	2.870	2.870	-	3.912	3.912	-	-	-
			-	-	-	-	.824	.824	-	.742	.742	-	-	-	.612	.434
			-	-	-	-	20.930	20.930	-	18.847	18.847	-	-	-	15.545	11.024
			-	-	-	-	-	-	-	-	-	-	-	-	-	-
1"	1.32	1.00	-	-	-	-	.133	.133	-	.179	.179	-	-	-	.250	.358
			25.40	33.53	25.40	-	-	-	3.378	3.378	-	4.547	4.547	-	-	-
			-	-	-	-	1.049	1.049	-	.957	.957	-	-	-	.815	.599
			-	-	-	-	26.645	26.645	-	24.308	24.308	-	-	-	20.701	15.215
			-	-	-	-	0.3	0.3	-	0.5	0.5	-	-	-	-	-
1½"	1.66	1.25	-	-	-	-	.140	.140	-	.191	.191	-	-	-	.250	.382
			31.75	42.16	31.75	-	-	-	3.556	3.556	-	4.851	4.851	-	-	-
			-	-	-	-	1.380	1.380	-	1.278	1.278	-	-	-	1.160	.896
			-	-	-	-	35.052	35.052	-	32.461	32.461	-	-	-	29.464	22.758
			-	-	-	-	0.4	0.4	-	0.7	0.7	-	-	-	-	-
1½"	1.90	1.50	-	-	-	-	.145	.145	-	.200	.200	-	-	-	.281	.400
			38.10	48.26	38.10	-	-	-	3.683	3.683	-	5.080	5.080	-	-	-
			-	-	-	-	1.610	1.610	-	1.500	1.500	-	-	-	1.338	1.100
			-	-	-	-	40.894	40.894	-	38.100	38.100	-	-	-	33.985	27.940
			-	-	-	-	0.5	0.5	-	0.8	0.8	-	-	-	-	1.5
2"	2.38	2.00	-	-	-	-	.154	.154	-	.218	.218	-	-	-	.344	.436
			50.80	60.45	50.80	-	-	-	3.912	3.912	-	5.537	5.537	-	-	-
			-	-	-	-	2.067	2.067	-	1.939	1.939	-	-	-	1.687	1.503
			-	-	-	-	52.502	52.502	-	49.251	49.251	-	-	-	42.850	38.176
			-	-	-	-	0.9	0.9	-	1.5	1.5	-	-	-	2.4	2.8
2½"	2.88	2.50	-	-	-	-	.203	.203	-	.276	.276	-	-	-	.375	.552
			63.50	73.15	63.50	-	-	-	5.156	5.156	-	7.010	7.010	-	-	-
			-	-	-	-	2.469	2.469	-	2.323	2.323	-	-	-	2.125	1.771
			-	-	-	-	62.713	62.713	-	59.004	59.004	-	-	-	53.975	44.983
			-	-	-	-	1.8	1.8	-	2.3	2.3	-	-	-	-	4.9
3"	3.50	3.00	-	-	-	-	.216	.216	-	.300	.300	-	-	-	.438	.600
			76.20	88.90	76.20	-	-	-	5.486	5.486	-	7.620	7.620	-	-	-
			-	-	-	-	3.068	3.068	-	2.900	2.900	-	-	-	2.624	2.300
			-	-	-	-	77.927	77.927	-	73.660	73.660	-	-	-	66.650	58.420
			-	-	-	-	3.0	3.0	-	3.8	3.8	-	-	-	5.6	7.0
3½"	4.00	3.50	-	-	-	-	.226	.226	-	.318	.318	-	-	-	-	.636*
			88.90	101.60	88.90	-	-	-	5.740	5.740	-	8.077	8.077	-	-	-
			-	-	-	-	3.548	3.548	-	3.364	3.364	-	-	-	-	2.728
			-	-	-	-	90.119	90.119	-	85.446	85.446	-	-	-	-	69.291
			-	-	-	-	4.0	4.0	-	5.5	5.5	-	-	-	-	10.5
4"	4.50	4.00	.188	-	-	-	.237	.237	-	.337	.337	-	.438	-	.531	.674
			101.60	114.30	101.60	4.775	-	-	6.020	6.020	-	8.560	8.560	-	11.125	-
			4.124	-	-	-	4.026	4.026	-	3.826	3.826	-	3.624	-	3.438	3.152
			104.749	-	-	-	102.260	102.260	-	97.180	97.180	-	92.050	-	87.325	80.061
			-	-	-	-	6.0	6.0	-	7.8	7.8	-	10.2	-	12.5	14.1
5"	5.56	5.00	-	-	-	-	.258	.258	-	.375	.375	-	.500	-	.625	.750
			127.00	141.22	127.00	-	-	-	6.553	6.553	-	9.525	9.525	-	12.700	-
			-	-	-	-	5.047	5.047	-	4.813	4.813	-	4.563	-	4.313	4.063
			-	-	-	-	128.194	128.194	-	122.250	122.250	-	115.900	-	109.550	103.200
			-	-	-	-	9.5	9.5	-	13.5	13.5	-	17.7	-	-	26.0

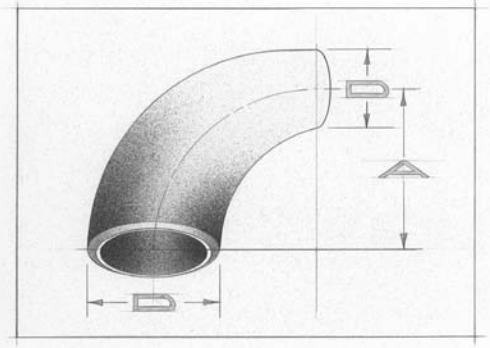
*Not given in ASME B36.10

Short Radius 90° ELBOWS



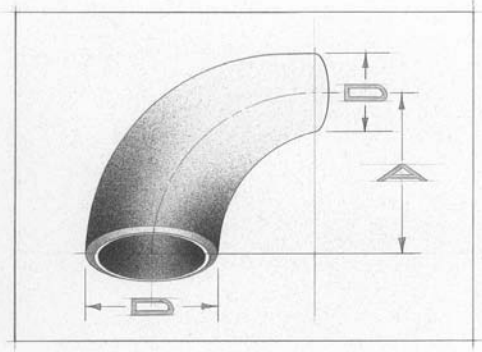
Key			Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)																	
			Schedule																	
Nominal Pipe Size	"D" Outside Diameter at Bevel	"A" Center-to-End	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS				
inches mm	inches mm	inches mm																		
6"	6.63	6.00	.219	-	-	-	.280	.280	-	.432	.432	-	.562	-	.719	.864				
			5.563	-	-	-	7.112	7.112	-	10.973	10.973	-	14.275	-	18.263	21.946				
			6.187	-	-	-	6.065	6.065	-	5.761	5.761	-	5.501	-	5.187	4.897				
			152.40	168.40	152.40	157.150	-	-	-	154.051	154.051	-	146.329	-	139.725	-	131.750	124.384		
			-	-	-	-	-	-	-	15.5	15.5	-	22.5	-	29.6	-	-	57.0		
8"	8.63	8.00	.219	-	.250	.277	.322	.322	.406	.500	.500	.594	.719	.812	.906	.875				
			5.563	-	6.350	7.036	8.179	8.179	10.312	12.700	12.700	15.088	18.263	20.625	23.012	22.225				
			8.187	-	8.125	8.071	7.981	7.981	7.813	7.625	7.437	7.187	7.001	6.813	6.875					
			203.20	219.20	203.20	207.949	-	206.375	205.003	202.717	202.717	198.450	193.675	188.900	182.550	177.825	173.050	174.625		
			-	-	-	-	-	23.5	27.5	31.0	31.0	41.0	46.0	46.0	57.5	68.7	77.0	127.0	80.0	
10"	10.75	10.00	.219	-	.250	.307	.365	.365	.500	.500	.594	.719	.844	1.000	1.125	1.000				
			5.563	-	6.350	7.798	9.271	9.271	12.700	12.700	15.088	18.263	21.438	25.400	28.575	25.400				
			10.312	-	10.250	10.136	10.020	10.020	9.750	9.750	9.562	9.312	9.062	8.750	8.500	8.750				
			254.00	273.05	254.00	261.925	-	260.350	257.454	254.508	254.508	247.650	247.650	242.875	236.525	230.175	222.250	215.900	222.250	
			-	-	-	-	-	36.4	45.2	55.0	55.0	71.0	71.0	86.0	109.0	126.0	151.0	-	-	
12"	12.75	12.00	.250	-	.250	.330	.406	.375	.562	.500	.688	.844	1.000	1.125	1.312	1.000				
			6.350	-	6.350	8.382	10.312	9.525	14.275	12.700	17.475	21.438	25.400	28.575	33.325	25.400				
			12.250	-	12.250	12.090	11.938	12.000	11.626	11.750	11.374	11.062	10.750	10.500	10.126	10.750				
			304.80	323.85	304.80	311.150	-	311.150	307.086	303.225	304.800	295.300	298.450	288.900	280.975	273.050	266.700	257.200	273.050	
			-	-	-	-	-	53.5	71.5	86.0	78.0	118.0	100.0	145.0	179.0	210.0	235.0	-	-	
14"	14.00	14.00	.250	.250	.312	.375	.438	.375	.594	.500	.750	.938	1.094	1.250	1.406	-				
			6.350	6.350	7.925	9.525	11.125	9.525	15.088	12.700	19.050	23.825	27.788	31.750	35.712	-				
			13.500	13.500	13.376	13.250	13.124	13.250	12.812	13.000	12.500	12.124	11.812	11.500	11.188	-				
			355.60	355.60	355.60	342.900	-	339.750	336.550	333.350	336.550	325.425	330.200	317.500	307.950	300.025	292.100	284.175	-	
			-	-	-	-	-	84.5	104.0	113.0	104.0	159.0	132.0	210.0	247.0	295.0	-	-	-	
16"	16.00	16.00	.250	.250	.312	.375	.500	.375	.656	.500	.844	1.031	1.219	1.438	1.594	-				
			6.350	6.350	7.925	9.525	12.700	9.525	16.662	12.700	21.438	26.187	30.963	36.525	40.488	-				
			15.500	15.500	15.376	15.250	15.000	15.250	14.688	15.000	14.312	13.938	13.562	13.124	12.812	-				
			406.40	406.40	406.40	393.700	-	390.550	387.350	381.000	387.350	373.075	381.000	363.525	354.025	344.475	333.350	325.425	-	
			-	-	-	-	-	112.0	118.0	160.0	118.0	225.0	160.0	312.0	325.0	431.0	431.0	-	-	
18"	18.00	18.00	.250	.250	.312	.438	.562	.375	.750	.500	.938	1.156	1.375	1.562	1.781	-				
			6.350	6.350	7.925	11.125	14.275	9.525	19.050	12.700	23.825	29.362	34.925	39.675	45.237	-				
			17.500	17.500	17.376	17.124	16.876	17.250	16.500	17.000	16.124	15.688	15.250	14.876	14.438	-				
			457.20	457.20	457.20	444.500	-	444.500	441.350	434.950	428.650	438.150	419.100	431.800	409.550	398.475	387.350	377.850	366.725	-
			-	-	-	-	-	120.0	184.0	227.0	148.0	310.0	194.0	397.0	507.0	610.0	-	-	-	
20"	20.00	20.00	.250	.250	.375	.500	.594	.375	.812	.500	1.031	1.281	1.500	1.750	1.969	-				
			6.350	6.350	9.525	12.700	15.088	9.525	20.625	12.700	26.187	32.537	38.100	44.450	50.013	-				
			19.500	19.500	19.250	19.000	18.812	19.250	18.376	19.000	17.938	17.438	17.000	16.500	16.062	-				
			508.00	508.00	508.00	495.300	-	495.300	488.950	482.600	477.825	488.950	466.750	455.625	442.925	431.800	419.100	407.975	-	
			-	-	-	-	-	210.0	280.0	332.0	210.0	449.0	280.0	575.0	672.0	795.0	-	-	-	
22"	22.00	22.00	-	.250	.375	.500	-	.375	.875	.500	1.125	1.375	1.625	1.875	2.125	-				
			-	6.350	9.525	12.700	-	9.525	22.225	12.700	28.575	34.925	41.275	47.625	53.975	-				
			-	21.500	21.250	21.000	-	21.250	20.250	20.000	19.750	19.250	18.750	18.250	17.750	-				
			558.80	558.80	558.80	546.100	-	539.750	533.400	-	539.750	514.350	533.400	501.650	488.950	476.250	463.550	450.850	-	
			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
24"	24.00	24.00	.250	.250	.375	.562	.688	.375	.969	.500	1.219	1.531	1.812	2.062	2.344	-				
			6.350	6.350	9.525	14.275	17.475	9.525	24.613	12.700	30.963	38.887	46.025	52.375	59.538	-				
			23.500	23.500	23.250	22.876	22.624	23.250	22.062	23.000	21.562	20.938	20.376	19.876	19.312	-				
			609.60	609.60	609.60	596.900	-	596.900	590.550	581.050	574.650	590.550	560.375	547.675	531.825	517.550	504.850	490.525	-	
			-	-	-	-	-	288.0	453.0	558.0	288.0	775.0	370.0	961.0	1147.0	1465.0	-	-	-	

Long Radius Reducing **ELBOWS**



Key									
Reducing Sizes		Nominal Pipe Size		"D" Outside Diameter at Bevel				"A" Center-to-End	
				Large End		Small End			
inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
-	-	1	25.40	-	-	-	-	-	-
-	-	1¼	31.75	-	-	-	-	-	-
-	-	1½	38.10	-	-	-	-	-	-
2 x 1½ 2 x 1¼ 2 x 1	50.80 x 38.10 50.80 x 31.75 50.80 x 25.40	2	50.80	2.38 2.38 2.38	60.45 60.45 60.45	1.90 1.66 1.32	48.26 42.16 33.53	3.00 3.00 3.00	76.20 76.20 76.20
2½ x 2 2½ x 1½ 2½ x 1¼	63.50 x 50.80 63.50 x 38.10 63.50 x 31.75	2½	63.50	2.88 2.88 2.88	73.15 73.15 73.15	2.38 1.90 1.66	60.45 48.26 42.16	3.75 3.75 3.75	95.25 95.25 95.25
3 x 2½ 3 x 2 3 x 1½	76.20 x 63.50 76.20 x 50.80 76.20 x 38.10	3	76.20	3.50 3.50 3.50	88.90 88.90 88.90	2.88 2.38 1.90	73.15 60.45 48.26	4.50 4.50 4.50	114.30 114.30 114.30
3½ x 3 3½ x 2½ 3½ x 2	88.90 x 76.20 88.90 x 63.50 88.90 x 50.80	3½	88.90	4.00 4.00 4.00	101.60 101.60 101.60	3.50 2.88 2.38	88.90 73.15 60.45	5.25 5.25 5.25	133.35 133.35 133.35
4 x 3½ 4 x 3 4 x 2½ 4 x 2	101.60 x 88.90 101.60 x 76.20 101.60 x 63.50 101.60 x 50.80	4	101.60	4.50 4.50 4.50 4.50	114.30 114.30 114.30 114.30	4.00 3.50 2.88 2.38	101.60 88.90 73.15 60.45	6.00 6.00 6.00 6.00	152.40 152.40 152.40 152.40
5 x 4 5 x 3½ 5 x 3 5 x 2½	127.00 x 101.60 127.00 x 88.90 127.00 x 76.20 127.00 x 63.50	5	127.00	5.56 5.56 5.56 5.56	141.22 141.22 141.22 141.22	4.50 4.00 3.50 2.88	114.30 101.60 88.90 73.15	7.50 7.50 7.50 7.50	190.50 190.50 190.50 190.50
6 x 5 6 x 4 6 x 3½ 6 x 3	152.40 x 127.00 152.40 x 101.60 152.40 x 88.90 152.40 x 76.20	6	152.40	6.63 6.63 6.63 6.63	168.40 168.40 168.40 168.40	5.56 4.50 4.00 3.50	141.22 114.30 101.60 88.90	9.00 9.00 9.00 9.00	228.60 228.60 228.60 228.60

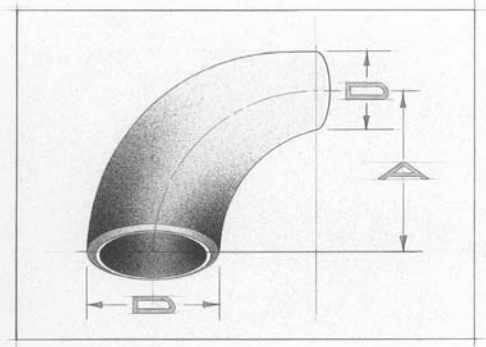
Long Radius Reducing ELBOWS



Key		Nominal Wall Thickness: inches mm Inside Diameter: inches mm Weight: Call factory for weights													
		Reducing Sizes		Schedule											
inches	mm	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
-	-	-	-	-	-	.133 3.378 1.049 26.645	.133 3.378 1.049 26.645	-	.179 4.547 .957 24.308	.179 4.547 .957 24.308	-	-	-	.250 6.350 .815 20.701	.358 9.093 .599 15.215
-	-	-	-	-	-	.140 3.556 1.380 35.052	.140 3.556 1.380 35.052	-	.191 4.851 1.278 32.461	.191 4.851 1.278 32.461	-	-	-	.250 6.350 1.160 29.464	.382 9.703 .896 22.758
-	-	-	-	-	-	.145 3.683 1.610 40.894	.145 3.683 1.610 40.894	-	.200 5.080 1.500 38.100	.200 5.080 1.500 38.100	-	-	-	.281 7.137 1.338 33.985	.400 10.160 1.100 27.940
2 x 1½ 2 x 1¼ 2 x 1	50.80 x 38.10 50.80 x 31.75 50.80 x 25.40	-	-	-	-	.154 3.912 2.067 52.502	.154 3.912 2.067 52.502	-	.218 5.537 1.939 49.251	.218 5.537 1.939 49.251	-	-	-	.344 8.738 1.687 42.850	.436 11.074 1.503 38.176
2½ x 2 2½ x 1½ 2½ x 1¼	63.50 x 50.80 63.50 x 38.10 63.50 x 31.75	-	-	-	-	.203 5.156 2.469 62.713	.203 5.156 2.469 62.713	-	.276 7.010 2.323 59.004	.276 7.010 2.323 59.004	-	-	-	.375 9.525 2.125 53.975	.552 14.021 1.771 44.983
3 x 2½ 3 x 2 3 x 1½	76.20 x 63.50 76.20 x 50.80 76.20 x 38.10	-	-	-	-	.216 5.486 3.068 77.927	.216 5.486 3.068 77.927	-	.300 7.620 2.900 73.660	.300 7.620 2.900 73.660	-	-	-	.438 11.125 2.624 66.650	.600 15.240 2.300 58.420
3½ x 3 3½ x 2½ 3½ x 2	88.90 x 76.20 88.90 x 63.50 88.90 x 50.80	-	-	-	-	.226 5.740 3.548 90.119	.226 5.740 3.548 90.119	-	.318 8.077 3.364 85.446	.318 8.077 3.364 85.446	-	-	-	-	.636* 16.154 2.728 69.291
4 x 3½ 4 x 3 4 x 2½ 4 x 2	101.60 x 88.90 101.60 x 76.20 101.60 x 63.50 101.60 x 50.80	.188 4.775 4.124 104.749	-	-	-	.237 6.020 4.026 102.260	.237 6.020 4.026 102.260	-	.337 8.560 3.826 97.180	.337 8.560 3.826 97.180	-	.438 11.125 3.624 92.050	-	.531 13.487 3.438 87.325	.674 17.120 3.152 80.061
5 x 4 5 x 3½ 5 x 3 5 x 2½	127.00 x 101.60 127.00 x 88.90 127.00 x 76.20 127.00 x 63.50	-	-	-	-	.258 6.553 5.047 128.194	.258 6.553 5.047 128.194	-	.375 9.525 4.813 122.250	.375 9.525 4.813 122.250	-	.500 12.700 4.563 115.900	-	.625 15.875 4.313 109.550	.750 19.050 4.063 103.200
6 x 5 6 x 4 6 x 3½ 6 x 3	152.40 x 127.00 152.40 x 101.60 152.40 x 88.90 152.40 x 76.20	.219 5.563 6.187 157.150	-	-	-	.280 7.112 6.065 154.051	.280 7.112 6.065 154.051	-	.432 10.973 5.761 146.329	.432 10.973 5.761 146.329	-	.562 14.275 5.501 139.725	-	.719 18.263 5.187 131.750	.864 21.946 4.897 124.384

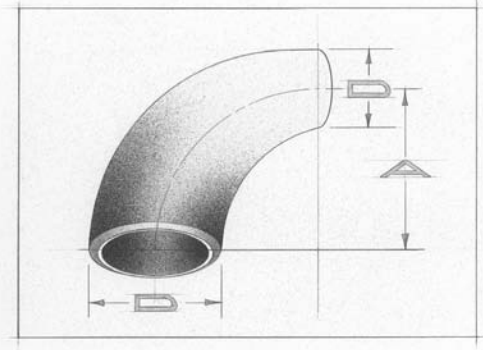
*Not given in ASME B36.10

Long Radius Reducing ELBOWS



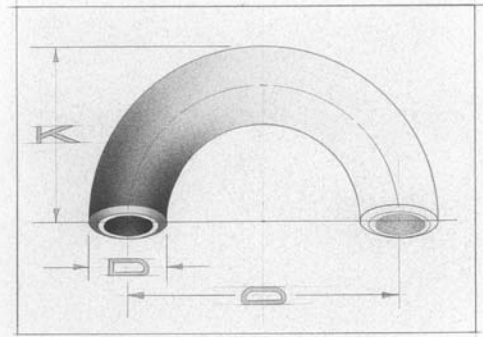
Key									
Reducing Sizes		Nominal Pipe Size		"D" Outside Diameter at Bevel				"A" Center-to-End	
				Large End		Small End			
inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
8 x 6 8 x 5 8 x 4	203.20 x 152.40 203.20 x 127.00 203.20 x 101.60	8	203.20	8.63 8.63 8.63	219.20 219.20 219.20	6.63 5.56 4.50	168.40 141.22 114.30	12.00 12.00 12.00	304.80 304.80 304.80
10 x 8 10 x 6 10 x 5	254.00 x 203.20 254.00 x 152.40 254.00 x 127.00	10	254.00	10.75 10.75 10.75	273.05 273.05 273.05	8.63 6.63 5.56	219.20 168.40 141.22	15.00 15.00 15.00	381.00 381.00 381.00
12 x 10 12 x 8 12 x 6	304.80 x 254.00 304.80 x 203.20 304.80 x 152.40	12	304.80	12.75 12.75 12.75	323.85 323.85 323.85	10.75 8.63 6.63	273.05 219.20 168.40	18.00 18.00 18.00	457.20 457.20 457.20
14 x 12 14 x 10 14 x 8	355.60 x 304.80 355.60 x 254.00 355.60 x 203.20	14	355.60	14.00 14.00 14.00	355.60 355.60 355.60	12.75 10.75 8.63	323.85 273.05 219.20	21.00 21.00 21.00	533.40 533.40 533.40
16 x 14 16 x 12 16 x 10	406.40 x 355.60 406.40 x 304.80 406.40 x 254.00	16	406.40	16.00 16.00 16.00	406.40 406.40 406.40	14.00 12.75 10.75	355.60 323.85 273.05	24.00 24.00 24.00	609.60 609.60 609.60
18 x 16 18 x 14 18 x 12 18 x 10	457.20 x 406.40 457.20 x 355.60 457.20 x 304.80 457.20 x 254.00	18	457.20	18.00 18.00 18.00 18.00	457.20 457.20 457.20 457.20	16.00 14.00 12.75 10.75	406.40 355.60 323.85 273.05	27.00 27.00 27.00 27.00	685.80 685.80 685.80 685.80
20 x 18 20 x 16 20 x 14 20 x 12 20 x 10	508.00 x 457.20 508.00 x 406.40 508.00 x 355.60 508.00 x 304.80 508.00 x 254.00	20	508.00	20.00 20.00 20.00 20.00 20.00	508.00 508.00 508.00 508.00 508.00	18.00 16.00 14.00 12.75 10.75	457.20 406.40 355.60 323.85 273.05	30.00 30.00 30.00 30.00 30.00	762.00 762.00 762.00 762.00 762.00
-	-	22	558.80	-	-	-	-	-	-
24 x 22 24 x 20 24 x 18 24 x 16 24 x 14 24 x 12	609.60 x 558.80 609.60 x 508.00 609.60 x 457.20 609.60 x 406.40 609.60 x 355.60 609.60 x 304.80	24	609.60	24.00 24.00 24.00 24.00 24.00 24.00	609.60 609.60 509.60 609.60 609.60 609.60	22.00 20.00 18.00 16.00 14.00 12.75	558.80 508.00 457.20 406.40 355.60 323.85	36.00 36.00 36.00 36.00 36.00 36.00	914.40 914.40 914.40 914.40 914.40 914.40

Long Radius Reducing ELBOWS



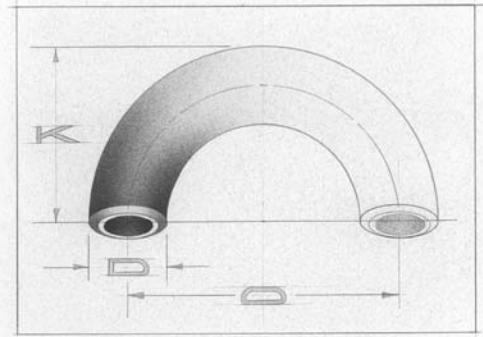
Key		Nominal Wall Thickness: inches mm Inside Diameter: inches mm Weight: Call factory for weights													
		Reducing Sizes		Schedule											
inches	mm	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
8 x 6	203.20 x 152.40	.219	-	.250	.277	.322	.322	.406	.500	.500	.594	.719	.812	.906	.875
8 x 5	203.20 x 127.00	5.563	-	6.350	7.036	8.179	8.179	10.312	12.700	12.700	15.088	18.263	20.625	23.012	22.225
8 x 4	203.20 x 101.60	8.187	-	8.125	8.071	7.981	7.981	7.813	7.625	7.625	7.437	7.187	7.001	6.813	6.875
		207.949	-	206.375	205.003	202.717	202.717	198.450	193.675	193.675	188.900	182.550	177.825	173.050	174.625
10 x 8	254.00 x 203.20	.219	-	.250	.307	.365	.365	.500	.500	.594	.719	.844	1.000	1.125	1.000
10 x 6	254.00 x 152.40	5.563	-	6.350	7.798	9.271	9.271	12.700	12.700	15.088	18.263	21.438	25.400	28.575	25.400
10 x 5	254.00 x 127.00	10.312	-	10.250	10.136	10.020	10.020	9.750	9.750	9.562	9.312	9.062	8.750	8.500	8.750
		261.925	-	260.350	257.454	254.508	254.508	247.650	247.650	242.875	236.525	230.175	222.250	215.900	222.250
12 x 10	304.80 x 254.00	.250	-	.250	.330	.406	.375	.562	.500	.688	.844	1.000	1.125	1.312	1.000
12 x 8	304.80 x 203.20	6.350	-	6.350	8.382	10.312	9.525	14.275	12.700	17.475	21.438	25.400	28.575	33.325	25.400
12 x 6	304.80 x 152.40	12.250	-	12.250	12.090	11.938	12.000	11.626	11.750	11.374	11.062	10.750	10.500	10.126	10.750
		311.150	-	311.150	307.086	303.225	304.800	295.300	298.450	288.900	280.975	273.050	266.700	257.200	273.050
14 x 12	355.60 x 304.80	.250	.250	.312	.375	.438	.375	.594	.500	.750	.938	1.094	1.250	1.406	-
14 x 10	355.60 x 254.00	6.350	6.350	7.925	9.525	11.125	9.525	15.088	12.700	19.050	23.825	27.788	31.750	35.712	-
14 x 8	355.60 x 203.20	13.500	13.500	13.376	13.250	13.124	13.250	12.812	13.000	12.500	12.124	11.812	11.500	11.188	-
		342.900	342.900	339.750	336.550	333.350	336.550	325.425	330.200	317.500	307.950	300.025	292.100	284.175	-
16 x 14	406.40 x 355.60	.250	.250	.312	.375	.500	.375	.656	.500	.844	1.031	1.219	1.438	1.594	-
16 x 12	406.40 x 304.80	6.350	6.350	7.925	9.525	12.700	9.525	16.662	12.700	21.438	26.187	30.963	36.525	40.488	-
16 x 10	406.40 x 254.00	15.500	15.500	15.376	15.250	15.000	15.250	14.688	15.000	14.312	13.938	13.562	13.124	12.812	-
		393.700	393.700	390.550	387.350	381.000	387.350	373.075	381.000	363.525	354.025	344.475	333.350	325.425	-
18 x 16	457.20 x 406.40	.250	.250	.312	.438	.562	.375	.750	.500	.938	1.156	1.375	1.562	1.781	-
18 x 14	457.20 x 355.60	6.350	6.350	7.925	11.125	14.275	9.525	19.050	12.700	23.825	29.362	34.925	39.675	45.237	-
18 x 12	457.20 x 304.80	17.500	17.500	17.376	17.124	16.876	17.250	16.500	17.000	16.124	15.688	15.250	14.876	14.438	-
18 x 10	457.20 x 254.00	444.500	444.500	441.350	434.950	428.650	438.150	419.100	431.800	409.550	398.475	387.350	377.850	366.725	-
20 x 18	508.00 x 457.20	.250	.250	.375	.500	.594	.375	.812	.500	1.031	1.281	1.500	1.750	1.969	-
20 x 16	508.00 x 406.40	6.350	6.350	9.525	12.700	15.088	9.525	20.625	12.700	26.187	32.537	38.100	44.450	50.013	-
20 x 14	508.00 x 355.60	19.500	19.500	19.250	19.000	18.812	19.250	18.376	19.000	17.938	17.438	17.000	16.500	16.062	-
20 x 12	508.00 x 304.80	495.300	495.300	488.950	482.600	477.825	488.950	466.750	482.600	455.625	442.925	431.800	419.100	407.975	-
20 x 10	508.00 x 254.00														-
-	-	-	.250	.375	.500	-	.375	.875	.500	1.125	1.375	1.625	1.875	2.125	-
		-	6.350	9.525	12.700	-	9.525	22.225	12.700	28.575	34.925	41.275	47.625	53.975	-
		-	21.500	21.250	21.000	-	21.250	20.250	21.000	19.750	19.250	18.750	18.250	17.750	-
		-	546.100	539.750	533.400	-	539.750	514.350	533.400	501.650	488.950	476.250	463.550	450.850	-
24 x 22	609.60 x 558.80	.250	.250	.375	.562	.688	.375	.969	.500	1.219	1.531	1.812	2.062	2.344	-
24 x 20	609.60 x 508.00	6.350	6.350	9.525	14.275	17.475	9.525	24.613	12.700	30.963	38.887	46.025	52.375	59.538	-
24 x 18	609.60 x 457.20	23.500	23.500	23.250	22.876	22.624	23.250	22.062	23.000	21.562	20.938	20.376	19.876	19.312	-
24 x 16	609.60 x 406.40	596.900	596.900	590.550	581.050	574.650	590.550	560.375	584.200	547.675	531.825	517.550	504.850	490.525	-
24 x 14	609.60 x 355.60														-
24 x 12	609.60 x 304.80														-

Long Radius 180° ELBOWS



Key				Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)													
				Schedule													
Nominal Pipe Size	"D" Outside Diameter at Bevel	"O" Center-to-Center	"K" Back-to-Face	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
inches mm	inches mm	inches mm	inches mm														
½"	.84	3.00	1.88	-	-	-	-	.109	.109	-	.147	.147	-	-	-	.188	.294
				-	-	-	-	2.769	2.769	-	3.734	3.734	-	-	-	4.775	7.468
				-	-	-	-	.622	.622	-	.546	.546	-	-	-	.464	.252
				-	-	-	-	15.799	15.799	-	13.868	13.868	-	-	-	11.786	6.401
				-	-	-	-	0.3	0.3	-	0.5	0.5	-	-	-	-	-
¾"	1.05	3.00	2.00	-	-	-	-	.113	.113	-	.154	.154	-	-	-	.219	.308
				-	-	-	-	2.870	2.870	-	3.912	3.912	-	-	-	5.563	7.823
				-	-	-	-	.824	.824	-	.742	.742	-	-	-	.612	.434
				-	-	-	-	20.930	20.930	-	18.847	18.847	-	-	-	15.545	11.024
				-	-	-	-	0.3	0.4	-	0.5	0.5	-	-	-	-	-
1"	1.32	3.00	2.19	-	-	-	-	.133	.133	-	.179	.179	-	-	-	.250	.358
				-	-	-	-	3.378	3.378	-	4.547	4.547	-	-	-	6.350	9.093
				-	-	-	-	1.049	1.049	-	.957	.957	-	-	-	.815	.599
				-	-	-	-	26.645	26.645	-	24.308	24.308	-	-	-	20.701	15.215
				-	-	-	-	0.8	0.8	-	1.0	1.0	-	-	-	1.3	-
1½"	1.66	3.75	2.75	-	-	-	-	.140	.140	-	.191	.191	-	-	-	.250	.382
				-	-	-	-	3.556	3.556	-	4.851	4.851	-	-	-	6.350	9.703
				-	-	-	-	1.380	1.380	-	1.278	1.278	-	-	-	1.160	.896
				-	-	-	-	35.052	35.052	-	32.461	32.461	-	-	-	29.464	22.758
				-	-	-	-	1.0	1.0	-	1.5	1.5	-	-	-	2.0	-
1¾"	1.90	4.50	3.25	-	-	-	-	.145	.145	-	.200	.200	-	-	-	.281	.400
				-	-	-	-	3.683	3.683	-	5.080	5.080	-	-	-	7.137	10.160
				-	-	-	-	1.610	1.610	-	1.500	1.500	-	-	-	1.338	1.100
				-	-	-	-	40.894	40.894	-	38.100	38.100	-	-	-	33.985	27.940
				-	-	-	-	1.5	1.5	-	2.0	2.0	-	-	-	3.5	-
2"	2.38	6.00	4.19	-	-	-	-	.154	.154	-	.218	.218	-	-	-	.344	.436
				-	-	-	-	3.912	3.912	-	5.537	5.537	-	-	-	8.738	11.074
				-	-	-	-	2.067	2.067	-	1.939	1.939	-	-	-	1.687	1.503
				-	-	-	-	52.502	52.502	-	49.251	49.251	-	-	-	42.850	38.176
				-	-	-	-	3.0	3.0	-	4.0	4.0	-	-	-	6.5	9.7
2½"	2.88	7.50	5.19	-	-	-	-	.203	.203	-	.276	.276	-	-	-	.375	.552
				-	-	-	-	5.156	5.156	-	7.010	7.010	-	-	-	9.525	14.021
				-	-	-	-	2.469	2.469	-	2.323	2.323	-	-	-	2.125	1.771
				-	-	-	-	62.713	62.713	-	59.004	59.004	-	-	-	53.975	44.983
				-	-	-	-	6.0	6.0	-	7.5	7.5	-	-	-	12.0	13.4
3"	3.50	9.00	6.25	-	-	-	-	.216	.216	-	.300	.300	-	-	-	.438	.600
				-	-	-	-	5.486	5.486	-	7.620	7.620	-	-	-	11.125	15.240
				-	-	-	-	3.068	3.068	-	2.900	2.900	-	-	-	2.624	2.300
				-	-	-	-	77.927	77.927	-	73.660	73.660	-	-	-	66.650	58.420
				-	-	-	-	9.0	9.0	-	12.0	12.0	-	-	-	18.0	22.5

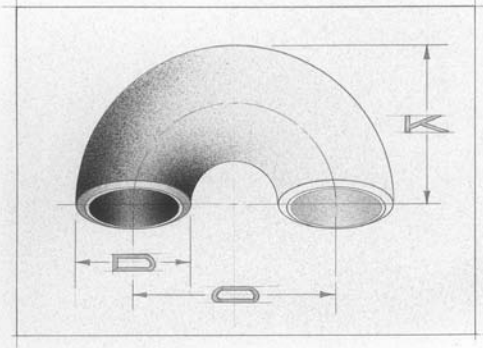
Long Radius 180° ELBOWS



Key				Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)														
				Schedule														
Nominal Pipe Size	"D" Outside Diameter at Bevel	"O" Center-to-Center	"K" Back-to-Face	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS	
inches mm	inches mm	inches mm	inches mm															
3½"	4.00	10.50	7.25	-	-	-	-	.226	.226	-	.318	.318	-	-	-	-	.636*	
				-	-	-	-	5.740	5.740	-	8.077	8.077	-	-	-	-	16.154	
				-	-	-	-	3.548	3.548	-	3.364	3.364	-	-	-	-	-	2.728
				88.90	101.60	266.70	184.15	-	-	-	-	90.119	90.119	-	85.446	85.446	-	-
								12.5	12.5	-	17.0	17.0	-	-	-	32.5		
4"	4.50	12.00	8.25	.188	-	-	-	.237	.237	-	.337	.337	-	.438	-	.531	.674	
				4.775	-	-	-	6.020	6.020	-	8.560	8.560	-	11.125	-	13.487	17.120	
				4.124	-	-	-	4.026	4.026	-	3.826	3.826	-	3.624	-	3.438	3.152	
				101.60	114.30	304.80	209.55	104.749	-	-	-	102.260	102.260	-	97.180	97.180	-	92.050
								17.0	17.0	-	23.5	23.5	-	30.0	-	38.0		
																	40.5	
5"	5.56	15.00	10.31	-	-	-	-	.258	.258	-	.375	.375	-	.500	-	.625	.750	
				-	-	-	-	6.553	6.553	-	9.525	9.525	-	12.700	-	15.875	19.050	
				-	-	-	-	5.047	5.047	-	4.813	4.813	-	4.563	-	4.313	4.063	
				127.00	141.22	381.00	261.87	-	-	-	-	128.194	128.194	-	122.250	122.250	-	115.900
								28.5	28.5	-	40.0	40.0	-	55.0	-	66.0		
																	76.0	
6"	6.63	18.00	12.31	.219	-	-	-	.280	.280	-	.432	.432	-	.562	-	.719	.864	
				5.563	-	-	-	7.112	7.112	-	10.973	10.973	-	14.275	-	18.263	21.946	
				6.187	-	-	-	6.065	6.065	-	5.761	5.761	-	5.501	-	5.187	4.897	
				152.40	168.40	457.20	312.67	157.150	-	-	-	154.051	154.051	-	146.329	146.329	-	139.725
								46.0	46.0	-	67.0	67.0	-	86.4	-	118.0		
																	126.0	
8"	8.63	24.00	16.31	.219	-	.250	.277	.322	.322	.406	.500	.500	.594	.719	.812	.906	.875	
				5.563	-	6.350	7.036	8.179	8.179	10.312	12.700	12.700	15.088	18.263	20.625	23.012	22.225	
				8.187	-	8.125	8.071	7.981	7.981	7.813	7.625	7.625	7.437	7.187	7.001	6.813	6.875	
				203.20	219.20	609.60	414.27	207.949	-	206.375	205.003	202.717	202.717	198.450	193.675	193.675	188.900	182.550
								90.0	90.0	115.0	138.0	138.0	175.0	212.0	226.0	254.0		
																	240.0	
10"	10.75	30.00	20.38	.219	-	.250	.307	.365	.365	.500	.500	.594	.719	.844	1.000	1.125	1.000	
				5.563	-	6.350	7.798	9.271	9.271	12.700	12.700	15.088	18.263	21.438	25.400	28.575	25.400	
				10.312	-	10.250	10.136	10.020	10.020	9.750	9.750	9.562	9.312	9.062	8.750	8.500	8.750	
				254.00	273.05	762.00	517.65	261.925	-	260.350	257.454	254.508	254.508	247.650	247.650	242.875	236.525	230.175
								156.0	156.0	215.0	215.0	267.0	324.0	375.0	456.0	540.0		
																	-	
12"	12.75	36.00	24.38	.250	-	.250	.330	.406	.375	.562	.500	.688	.844	1.000	1.125	1.312	1.000	
				6.350	-	6.350	8.382	10.312	9.525	14.275	12.700	17.475	21.438	25.400	28.575	33.325	25.400	
				12.250	-	12.250	12.090	11.938	12.000	11.626	11.750	11.374	11.062	10.750	10.500	10.126	10.750	
				304.80	323.85	914.40	619.25	311.150	-	311.150	307.086	303.225	304.800	295.300	298.450	288.900	280.975	273.050
								248.0	236.0	349.0	300.0	397.0	490.0	610.0	740.0	920.0		
																	-	

*Not given in ASME B36.10

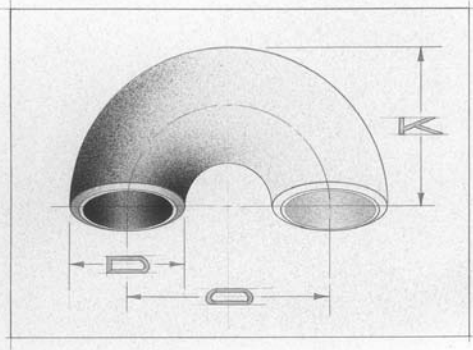
Short Radius 180° ELBOWS



Key				Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)													
				Schedule													
Nominal Pipe Size	"D" Outside Diameter at Bevel	"O" Center-to-Center	"K" Back-to-Face	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
inches mm	inches mm	inches mm	inches mm														
1"	1.32	2.00	1.62	-	-	-	-	.133	.133	-	.179	.179	-	-	-	.250	.358
				-	-	-	-	3.378	3.378	-	4.547	4.547	-	-	-	6.350	9.093
				-	-	-	-	1.049	1.049	-	.957	.957	-	-	-	.815	.599
				-	-	-	-	26.645	26.645	-	24.308	24.308	-	-	-	20.701	15.215
				-	-	-	-	0.5	0.5	-	-	-	-	-	-	-	-
1 1/4"	1.66	2.50	2.06	-	-	-	-	.140	.140	-	.191	.191	-	-	-	.250	.382
				-	-	-	-	3.556	3.556	-	4.851	4.851	-	-	-	6.350	9.703
				-	-	-	-	1.380	1.380	-	1.278	1.278	-	-	-	1.160	.896
				-	-	-	-	35.052	35.052	-	32.461	32.461	-	-	-	29.464	22.758
				-	-	-	-	0.8	0.8	-	1.3	1.3	-	-	-	-	-
1 1/2"	1.90	3.00	2.44	-	-	-	-	.145	.145	-	.200	.200	-	-	-	.281	.400
				-	-	-	-	3.683	3.683	-	5.080	5.080	-	-	-	7.137	10.160
				-	-	-	-	1.610	1.610	-	1.500	1.500	-	-	-	1.338	1.100
				-	-	-	-	40.894	40.894	-	38.100	38.100	-	-	-	33.985	27.940
				-	-	-	-	1.0	1.0	-	1.5	1.5	-	-	-	-	-
2"	2.38	4.00	3.19	-	-	-	-	.154	.154	-	.218	.218	-	-	-	.344	.436
				-	-	-	-	3.912	3.912	-	5.537	5.537	-	-	-	8.738	11.074
				-	-	-	-	2.067	2.067	-	1.939	1.939	-	-	-	1.687	1.503
				-	-	-	-	52.502	52.502	-	49.251	49.251	-	-	-	42.850	38.176
				-	-	-	-	1.8	1.8	-	3.0	3.0	-	-	-	2.4	6.0
2 1/2"	2.88	5.00	3.94	-	-	-	-	.203	.203	-	.276	.276	-	-	-	.375	.552
				-	-	-	-	5.156	5.156	-	7.010	7.010	-	-	-	9.525	14.021
				-	-	-	-	2.469	2.469	-	2.323	2.323	-	-	-	2.125	1.771
				-	-	-	-	62.713	62.713	-	59.004	59.004	-	-	-	53.975	44.983
				-	-	-	-	3.5	3.5	-	4.5	4.5	-	-	-	-	-
3"	3.50	6.00	4.75	-	-	-	-	.216	.216	-	.300	.300	-	-	-	.438	.600
				-	-	-	-	5.486	5.486	-	7.620	7.620	-	-	-	11.125	15.240
				-	-	-	-	3.068	3.068	-	2.900	2.900	-	-	-	2.624	2.300
				-	-	-	-	77.927	77.927	-	73.660	73.660	-	-	-	66.650	58.420
				-	-	-	-	6.0	6.0	-	7.5	7.5	-	-	-	5.6	14.5
3 1/2"	4.00	7.00	5.50	-	-	-	-	.226	.226	-	.318	.318	-	-	-	-	.636*
				-	-	-	-	5.740	5.740	-	8.077	8.077	-	-	-	-	16.154
				-	-	-	-	3.548	3.548	-	3.364	3.364	-	-	-	-	2.728
				-	-	-	-	90.119	90.119	-	85.446	85.446	-	-	-	-	69.291
				-	-	-	-	8.0	8.0	-	11.0	11.0	-	-	-	-	22.0

*Not given in ASME B36.10

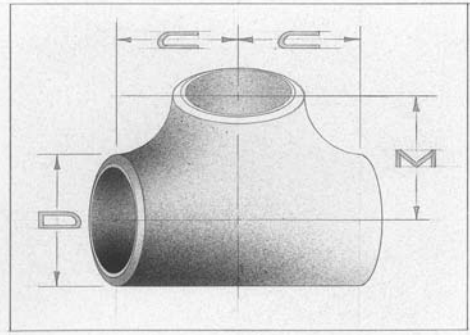
Short Radius 180° ELBOWS



Key				Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)																	
				Schedule																	
Nominal Pipe Size	"D" Outside Diameter at Bevel	"O" Center-to-Center	"K" Back-to-Face	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS				
inches mm	inches mm	inches mm	inches mm																		
4"	4.50	8.00	6.25	-	-	-	-	.237	.237	-	.337	.337	-	.438	-	.531	.674				
				-	-	-	-	6.020	6.020	-	8.560	8.560	-	11.125	-	13.487	17.120				
				-	-	-	-	4.026	4.026	-	3.826	3.826	-	3.624	-	3.438	3.152				
				101.60	114.30	203.20	158.75	-	-	-	-	102.260	102.260	-	97.180	-	92.050	-	87.325	80.061	
				-	-	-	-	-	-	-	-	12.0	12.0	-	15.5	-	18.9	-	-	28.9	
5"	5.56	10.00	7.75	-	-	-	-	.258	.258	-	.375	.375	-	.500	-	.625	.750				
				-	-	-	-	6.553	6.553	-	9.525	9.525	-	12.700	-	15.875	19.050				
				-	-	-	-	5.047	5.047	-	4.813	4.813	-	4.563	-	4.313	4.063				
				127.00	141.22	254.00	196.85	-	-	-	-	128.194	128.194	-	122.250	-	115.900	-	109.550	103.200	
				-	-	-	-	-	-	-	-	19.0	19.0	-	27.0	-	36.8	-	-	52.0	
6"	6.63	12.00	9.31	.219	-	-	-	.280	.280	-	.432	.432	-	.562	-	.719	.864				
				5.563	-	-	-	7.112	7.112	-	10.973	10.973	-	14.275	-	18.263	21.946				
				6.187	-	-	-	6.065	6.065	-	5.761	5.761	-	5.501	-	4.187	4.897				
				152.40	168.40	304.80	236.47	157.150	-	-	-	154.051	154.051	-	146.329	-	139.725	-	131.750	124.384	
				-	-	-	-	-	-	-	-	31.0	31.0	-	45.0	-	58.7	-	-	86.0	
8"	8.63	16.00	12.31	.219	-	.250	.277	.322	.322	.406	.500	.500	.594	.719	.812	.906	.875				
				5.563	-	6.350	7.036	8.179	8.179	10.312	12.700	12.700	15.088	18.263	20.625	23.012	22.225				
				8.187	-	8.125	8.071	7.981	7.981	7.813	7.625	7.625	7.437	7.187	7.001	6.813	6.875				
				203.20	219.20	406.40	312.67	207.949	-	206.375	205.003	202.717	202.717	198.450	193.675	193.675	188.900	182.550	177.825	173.050	174.625
				-	-	-	-	-	-	46.4	53.6	62.0	62.0	78.5	92.0	92.0	114.0	137.0	159.0	-	160.0
10"	10.75	20.00	15.38	.219	-	.250	.307	.365	.365	.500	.500	.594	.719	.844	1.000	1.125	1.000				
				5.563	-	6.350	7.798	9.271	9.271	12.700	12.700	15.088	18.263	21.438	25.400	28.575	25.400				
				10.312	-	10.250	10.136	10.020	10.020	9.750	9.750	9.562	9.312	9.062	8.750	8.500	8.750				
				254.00	273.05	508.00	390.65	261.925	-	260.350	257.454	254.508	254.508	247.650	247.650	242.875	236.525	230.175	222.250	215.900	222.250
				-	-	-	-	-	-	74.6	92.8	110.0	110.0	142.0	142.0	183.0	218.0	261.0	299.0	-	299.0
12"	12.75	24.00	18.38	.250	-	.250	.330	.406	.375	.562	.500	.688	.844	1.000	1.125	1.312	1.000				
				6.350	-	6.350	8.382	10.312	9.525	14.275	12.700	17.475	21.438	25.400	28.575	33.325	25.400				
				12.250	-	12.250	12.090	11.938	12.000	11.626	11.750	11.374	11.062	10.750	10.500	10.126	10.750				
				304.80	323.85	609.60	466.85	311.150	-	311.150	307.086	303.225	304.800	295.300	298.450	288.900	280.975	273.050	266.700	257.200	273.050
				-	-	-	-	-	-	104.0	141.0	164.0	156.0	237.0	200.0	289.0	360.0	430.0	480.0	-	430.0

*Not given in ASME B36.10

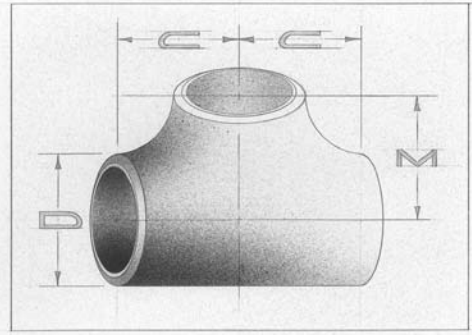
Straight TEES



Key				Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)													
				Center-to-End				Schedule									
Nominal Pipe Size	"D" Outside Diameter at Bevel	Center-to-End															
		"C" Run	"M" Outlet	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
inches mm	inches mm	inches mm	inches mm														
½"	.84	1.00	1.00	-	-	-	-	.109	.109	-	.147	.147	-	-	-	.188	.294
				-	-	-	-	2.769	2.769	-	3.734	3.734	-	-	-	4.775	7.468
				-	-	-	-	.622	.622	-	.546	.546	-	-	-	.464	.252
				-	-	-	-	15.799	15.799	-	13.868	13.868	-	-	-	11.786	6.401
				-	-	-	-	0.3	0.3	-	0.3	0.3	-	-	-	-	-
¾"	1.05	1.13	1.13	-	-	-	-	.113	.113	-	.154	.154	-	-	-	.219	.308
				-	-	-	-	2.870	2.870	-	3.912	3.912	-	-	-	5.563	7.823
				-	-	-	-	.824	.824	-	.742	.742	-	-	-	.612	.434
				-	-	-	-	20.930	20.930	-	18.847	18.847	-	-	-	15.545	11.024
				-	-	-	-	0.4	0.4	-	0.5	0.5	-	-	-	0.7	1.2
1"	1.32	1.50	1.50	-	-	-	-	.133	.133	-	.179	.179	-	-	-	.250	.358
				-	-	-	-	3.378	3.378	-	4.547	4.547	-	-	-	6.350	9.093
				-	-	-	-	1.049	1.049	-	.957	.957	-	-	-	.815	.599
				-	-	-	-	26.645	26.645	-	24.308	24.308	-	-	-	20.701	15.215
				-	-	-	-	0.9	0.9	-	1.0	1.0	-	-	-	1.1	1.3
1½"	1.66	1.88	1.88	-	-	-	-	.140	.140	-	.191	.191	-	-	-	.250	.382
				-	-	-	-	3.556	3.556	-	4.851	4.851	-	-	-	6.350	9.703
				-	-	-	-	1.380	1.380	-	1.278	1.278	-	-	-	1.160	.896
				-	-	-	-	35.052	35.052	-	32.461	32.461	-	-	-	29.464	22.758
				-	-	-	-	1.6	1.6	-	2.0	2.0	-	-	-	2.1	2.3
1¾"	1.90	2.25	2.25	-	-	-	-	.145	.145	-	.200	.200	-	-	-	.281	.400
				-	-	-	-	3.683	3.683	-	5.080	5.080	-	-	-	7.137	10.160
				-	-	-	-	1.610	1.610	-	1.500	1.500	-	-	-	1.338	1.100
				-	-	-	-	40.894	40.894	-	38.100	38.100	-	-	-	33.985	27.940
				-	-	-	-	2.1	2.1	-	2.8	2.8	-	-	-	3.0	3.4
2"	2.38	2.50	2.50	-	-	-	-	.154	.154	-	.218	.218	-	-	-	.344	.436
				-	-	-	-	3.912	3.912	-	5.537	5.537	-	-	-	8.738	11.074
				-	-	-	-	2.067	2.067	-	1.939	1.939	-	-	-	1.687	1.503
				-	-	-	-	52.502	52.502	-	49.251	49.251	-	-	-	42.850	38.176
				-	-	-	-	3.3	3.3	-	3.9	3.9	-	-	-	4.5	5.2
2½"	2.88	3.00	3.00	-	-	-	-	.203	.203	-	.276	.276	-	-	-	.375	.552
				-	-	-	-	5.156	5.156	-	7.010	7.010	-	-	-	9.525	14.021
				-	-	-	-	2.469	2.469	-	2.323	2.323	-	-	-	2.125	1.771
				-	-	-	-	62.713	62.713	-	59.004	59.004	-	-	-	53.975	44.983
				-	-	-	-	5.9	5.9	-	6.7	6.7	-	-	-	7.0	9.6
3"	3.50	3.38	3.38	-	-	-	-	.216	.216	-	.300	.300	-	-	-	.438	.600
				-	-	-	-	5.486	5.486	-	7.620	7.620	-	-	-	11.125	15.240
				-	-	-	-	3.068	3.068	-	2.900	2.900	-	-	-	2.624	2.300
				-	-	-	-	77.927	77.927	-	73.660	73.660	-	-	-	66.650	58.420
				-	-	-	-	7.6	7.6	-	9.0	9.0	-	-	-	11.5	13.5
3½"	4.00	3.75	3.75	-	-	-	-	.226	.226	-	.318	.318	-	-	-	-	.636*
				-	-	-	-	5.740	5.740	-	8.077	8.077	-	-	-	-	16.154
				-	-	-	-	3.548	3.548	-	3.364	3.364	-	-	-	-	2.728
				-	-	-	-	90.119	90.119	-	85.446	85.446	-	-	-	-	69.291
				-	-	-	-	10.5	10.5	-	13.0	13.0	-	-	-	-	23.0
4"	4.50	4.13	4.13	.188	-	-	-	.237	.237	-	.337	.337	-	.438	-	.531	.674
				4.775	-	-	-	6.020	6.020	-	8.560	8.560	-	11.125	-	13.487	17.120
				4.124	-	-	-	4.026	4.026	-	3.826	3.826	-	3.624	-	3.438	3.152
				104.749	-	-	-	102.260	102.260	-	97.180	97.180	-	92.050	-	87.325	80.061
				8.95	-	-	-	12.2	12.2	-	15.7	15.7	-	20.3	-	21.5	25.0
5"	5.56	4.88	4.88	-	-	-	-	.258	.258	-	.375	.375	-	.500	-	.625	.750
				-	-	-	-	6.553	6.553	-	9.525	9.525	-	12.700	-	15.875	19.050
				-	-	-	-	5.047	5.047	-	4.813	4.813	-	4.563	-	4.313	4.063
				-	-	-	-	128.194	128.194	-	122.250	122.250	-	115.900	-	109.550	103.200
				-	-	-	-	21.5	21.5	-	26.0	26.0	-	33.4	-	37.0	39.5

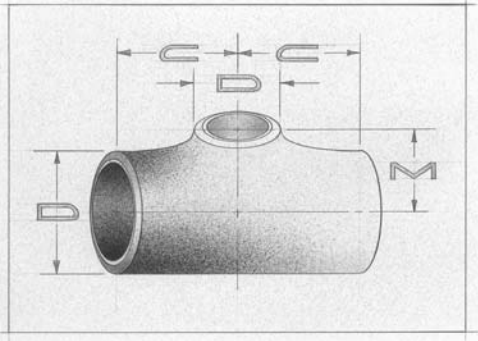
*Not given in ASME B36.10

Straight TEES



Key				Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)																	
				Schedule																	
Nominal Pipe Size	"D" Outside Diameter at Bevel	Center-to-End																			
		"C" Run	"M" Outlet	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS				
inches mm	inches mm	inches mm	inches mm																		
6"	6.63	5.63	5.63	.219	-	-	-	.280	.280	-	.432	.432	-	.562	-	.719	.864				
				5.563	-	-	-	7.112	7.112	-	10.973	10.973	-	14.275	-	18.263	21.946				
				6.187	-	-	-	6.065	6.065	-	5.761	5.761	-	5.501	-	5.187	4.897				
				157.150	-	-	-	154.051	154.051	-	146.329	146.329	-	139.725	-	131.750	124.384				
152.40	168.40	143.00	143.00	24.5	-	-	-	33.9	33.9	-	44.0	44.0	-	53.4	-	63.0	66.0				
8"	8.63	7.00	7.00	.219	-	.250	.277	.322	.322	.406	.500	.500	.594	.719	.812	.906	.875				
				5.563	-	6.350	7.036	8.179	8.179	10.312	12.700	12.700	15.088	18.263	20.625	23.012	22.225				
				8.187	-	8.125	8.071	7.981	7.981	7.981	7.981	7.813	7.625	7.437	7.187	7.001	6.813	6.875			
				203.20	219.20	177.80	177.80	207.949	-	206.375	205.003	202.717	202.717	198.450	193.675	193.675	188.900	182.550	177.825	173.050	174.625
30.0	-	36.0	49.1	54.2	54.2	64.6	75.5	75.5	81.5	89.0	89.0	97.5	97.5	114.0	114.0	110.0	110.0				
10"	10.75	8.50	8.50	.219	-	.250	.307	.365	.365	.500	.500	.594	.719	.844	1.000	1.125	1.000				
				5.563	-	6.350	7.798	9.271	9.271	12.700	12.700	15.088	18.263	21.438	25.400	28.575	25.400				
				10.312	-	10.250	10.136	10.020	10.020	9.750	9.750	9.562	9.312	9.062	8.750	8.500	8.750				
				254.00	273.05	215.90	215.90	261.925	-	260.350	257.454	254.508	254.508	247.650	247.650	242.875	236.525	230.175	222.250	215.900	222.250
26.0	-	64.5	76.2	87.5	87.5	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0	110.0				
12"	12.75	10.00	10.00	.250	-	.250	.330	.406	.375	.562	.500	.688	.844	1.000	1.125	1.312	1.000				
				6.350	-	6.350	8.382	10.312	9.525	14.275	12.700	17.475	21.438	25.400	28.575	33.325	25.400				
				12.250	-	12.250	11.938	11.938	12.000	11.626	11.750	11.374	11.062	10.750	10.500	10.126	10.126				
				304.80	323.85	254.00	254.00	311.150	-	311.150	307.086	303.225	304.800	295.300	298.450	288.900	280.975	273.050	266.700	257.200	273.050
99.5	-	99.5	118.0	139.0	126.0	187.0	165.0	165.0	210.0	210.0	210.0	210.0	210.0	210.0	210.0	210.0	210.0				
14"	14.00	11.00	11.00	.250	.250	.312	.375	.438	.375	.594	.500	.750	.938	1.094	1.250	1.406	-				
				6.350	6.350	7.925	9.525	11.125	9.525	15.088	12.700	19.050	23.825	27.788	31.750	35.712	25.400				
				13.500	13.500	13.376	13.250	13.124	13.250	12.812	13.000	12.500	12.124	11.812	11.500	11.188	-				
				355.60	355.60	279.40	279.40	342.900	342.900	339.750	336.550	333.350	336.550	325.425	330.200	317.500	307.950	300.025	292.100	284.175	-
126.0	126.0	141.0	159.0	195.0	159.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0	225.0	-				
16"	16.00	12.00	12.00	.250	.250	.312	.375	.500	.375	.656	.500	.844	1.031	1.219	1.438	1.594	-				
				6.350	6.350	7.925	9.525	12.700	9.525	16.662	12.700	21.438	26.187	30.963	36.525	40.488	-				
				15.500	15.500	15.376	15.250	15.000	15.250	14.688	15.000	14.312	13.938	13.562	13.124	12.812	-				
				406.40	406.40	304.80	304.80	393.700	393.700	390.550	387.350	381.000	387.350	373.075	381.000	363.525	354.025	344.475	333.350	325.425	-
147.0	147.0	186.0	220.0	265.0	265.0	312.0	312.0	312.0	312.0	312.0	312.0	312.0	312.0	312.0	312.0	312.0	-				
18"	18.00	13.50	13.50	.250	.250	.312	.438	.562	.375	.750	.500	.938	1.156	1.375	1.562	1.781	-				
				6.350	6.350	7.925	11.125	14.275	9.525	19.050	12.700	23.825	29.362	34.925	39.675	45.237	-				
				17.500	17.500	17.376	17.124	16.876	17.250	16.500	17.000	16.124	15.688	15.250	14.876	14.438	-				
				457.20	457.20	342.90	342.90	444.500	444.500	441.350	434.950	428.650	438.150	419.100	431.800	409.550	398.475	387.350	377.850	366.725	-
197.0	197.0	230.0	310.0	360.0	360.0	490.0	490.0	490.0	490.0	490.0	490.0	490.0	490.0	490.0	490.0	490.0	-				
20"	20.00	15.00	15.00	.250	.250	.375	.500	.594	.375	.812	.500	1.031	1.281	1.500	1.750	1.969	-				
				6.350	6.350	9.525	12.700	15.088	9.525	20.625	12.700	26.187	32.537	38.100	44.450	50.013	-				
				19.500	19.500	19.250	19.000	18.812	19.250	18.376	19.000	17.938	17.438	17.000	16.500	16.062	-				
				508.00	508.00	381.00	381.00	495.300	495.300	488.950	482.600	477.825	488.950	466.750	482.600	455.625	442.925	431.800	419.100	407.975	-
246.0	246.0	363.0	450.0	478.0	478.0	657.0	657.0	657.0	657.0	657.0	657.0	657.0	657.0	657.0	657.0	657.0	-				
22"	22.00	16.50	16.50	-	.250	.375	.500	-	.375	.875	.500	1.125	1.375	1.625	1.875	2.125	-				
				-	6.350	9.525	12.700	-	9.525	22.225	12.700	28.575	34.925	41.275	47.625	53.975	-				
				-	21.500	21.250	21.000	-	21.250	20.250	21.000	19.750	19.750	18.750	18.250	17.750	-				
				558.80	558.80	419.10	419.10	-	546.100	539.750	533.400	-	539.750	514.350	533.400	501.650	488.950	476.250	463.550	450.850	-
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-				
24"	24.00	17.00	17.00	.250	.250	.375	.562	.688	.375	.969	.500	1.219	1.531	1.812	2.062	2.344	-				
				6.350	6.350	9.525	14.275	17.475	9.525	24.613	12.700	30.963	38.887	46.025	52.375	59.538	-				
				23.500	23.500	23.250	22.876	22.624	23.250	22.062	23.000	21.562	20.938	20.376	19.876	19.312	-				
				609.60	609.60	431.80	431.80	596.900	596.900	590.550	581.050	574.650	590.550	560.375	584.200	547.675	531.825	517.550	504.850	490.525	-
392.0	392.0	515.0	740.0	1080.0	1080.0	1390.0	1390.0	1390.0	1390.0	1390.0	1390.0	1390.0	1390.0	1390.0	1390.0	1390.0	-				
30"	30.00	22.00	22.00	-	.312	.500	.625	-	.375	-	.500	-	-	-	-	-	-				
				-	7.925	12.700	15.875	-	9.525	-	12.700	-	-	-	-	-	-	-	-	-	
				-	29.376	29.000	28.750	-	29.250	-	29.250	-	-	-	-	-	-	-	-	-	-
				762.00	762.00	558.80	558.80	-	746.150	736.600	730.250	-	742.950	-	736.600	-	-	-	-	-	-
-	-	-	-	-	930.0	1175.0	1490.0	-	1010.0	-	1175.0	-	-	-	-	-	-	-			

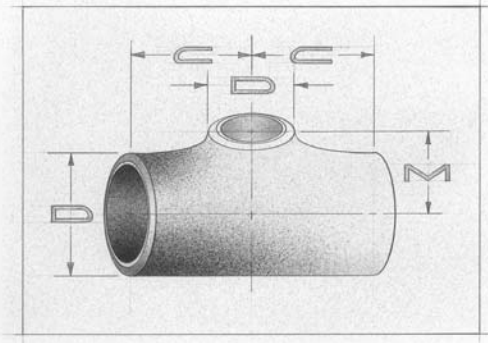
Reducing TEES



Key											
Reducing Sizes		Nominal Pipe Size		"D" Outside Diameter at Bevel				Center-to-End			
				Run		Outlet		"C" Run		"M" Outlet	
inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
½ x ½ x ¼	12.70 x 12.70 x 6.35	½	12.70	0.84	21.34	0.54	13.72	1.00	25.40	1.00	25.40
¾ x ¾ x ½	19.05 x 19.05 x 12.70	¾	19.05	1.05	26.67	0.84	21.34	1.12	28.45	1.12	28.45
1 x 1 x ¾ 1 x 1 x ½	25.40 x 25.40 x 19.05 25.40 x 25.40 x 12.70	1	25.40	1.32 1.32	33.53 33.53	1.05 0.84	26.67 21.34	1.50 1.50	38.10 38.10	1.50 1.50	38.10 38.10
1¼ x 1¼ x 1 1¼ x 1¼ x ¾ 1¼ x 1¼ x ½	31.75 x 31.75 x 25.40 31.75 x 31.75 x 19.05 31.75 x 31.75 x 12.70	1¼	31.75	1.66 1.66 1.66	42.17 42.17 42.17	1.32 1.05 0.84	33.53 26.67 21.34	1.88 1.88 1.88	47.75 47.75 47.75	1.88 1.88 1.88	47.75 47.75 47.75
1½ x 1½ x 1¼ 1½ x 1½ x 1 1½ x 1½ x ¾ 1½ x 1½ x ½	38.10 x 38.10 x 31.75 38.10 x 38.10 x 25.40 38.10 x 38.10 x 19.05 38.10 x 38.10 x 12.70	1½	38.10	1.90 1.90 1.90 1.90	48.26 48.26 48.26 48.26	1.66 1.32 1.05 0.84	42.17 33.53 26.67 21.34	2.25 2.25 2.25 2.25	57.15 57.15 57.15 57.15	2.25 2.25 2.25 2.25	57.15 57.15 57.15 57.15
2 x 2 x 1½ 2 x 2 x 1¼ 2 x 2 x 1 2 x 2 x ¾	50.80 x 50.80 x 38.10 50.80 x 50.80 x 31.75 50.80 x 50.80 x 25.40 50.80 x 50.80 x 19.05	2	50.80	2.38 2.38 2.38 2.38	60.45 60.45 60.45 60.45	1.90 1.66 1.32 1.05	48.26 42.17 33.53 26.67	2.50 2.50 2.50 2.50	63.50 63.50 63.50 63.50	2.38 2.25 2.00 1.75	60.45 57.15 50.80 44.45
2½ x 2½ x 2 2½ x 2½ x 1½ 2½ x 2½ x 1¼ 2½ x 2½ x 1	63.50 x 63.50 x 50.80 63.50 x 63.50 x 38.10 63.50 x 63.50 x 31.75 63.50 x 63.50 x 25.40	2½	63.50	2.88 2.88 2.88 2.88	73.15 73.15 73.15 73.15	2.38 1.90 1.66 1.32	60.45 48.26 42.17 33.53	3.00 3.00 3.00 3.00	76.20 76.20 76.20 76.20	2.75 2.62 2.50 2.25	69.85 66.55 63.50 57.15
3 x 3 x 2½ 3 x 3 x 2 3 x 3 x 1½ 3 x 3 x 1¼	76.20 x 76.20 x 63.50 76.20 x 76.20 x 50.80 76.20 x 76.20 x 38.10 76.20 x 76.20 x 31.75	3	76.20	3.50 3.50 3.50 3.50	88.90 88.90 88.90 88.90	2.88 2.38 1.90 1.66	73.15 60.45 48.26 42.17	3.38 3.38 3.38 3.38	85.85 85.85 85.85 85.85	3.25 3.00 2.88 2.75	82.55 76.20 73.15 69.85
3½ x 3½ x 3 3½ x 3½ x 2½ 3½ x 3½ x 2 3½ x 3½ x 1½	88.90 x 88.90 x 76.20 88.90 x 88.90 x 63.50 88.90 x 88.90 x 50.80 88.90 x 88.90 x 38.10	3½	88.90	4.00 4.00 4.00 4.00	101.60 101.60 101.60 101.60	3.50 2.88 2.38 1.90	88.90 73.15 60.45 48.26	3.75 3.75 3.75 3.75	95.25 95.25 95.25 95.25	3.62 3.50 3.25 3.12	91.95 88.90 82.55 79.25
4 x 4 x 3½ 4 x 4 x 3 4 x 4 x 2½ 4 x 4 x 2 4 x 4 x 1½	101.60 x 101.60 x 88.90 101.60 x 101.60 x 76.20 101.60 x 101.60 x 63.50 101.60 x 101.60 x 50.80 101.60 x 101.60 x 38.10	4	101.60	4.50 4.50 4.50 4.50 4.50	114.30 114.30 114.30 114.30 114.30	4.00 3.50 2.88 2.38 1.90	101.60 88.90 73.15 60.45 48.26	4.12 4.12 4.12 4.12 4.12	104.65 104.65 104.65 104.65 104.65	4.00 3.88 3.75 3.50 3.38	101.60 98.55 95.25 88.90 85.85
5 x 5 x 4 5 x 5 x 3½ 5 x 5 x 3 5 x 5 x 2½ 5 x 5 x 2	127.00 x 127.00 x 101.60 127.00 x 127.00 x 88.90 127.00 x 127.00 x 76.20 127.00 x 127.00 x 63.50 127.00 x 127.00 x 50.80	5	127.00	5.56 5.56 5.56 5.56 5.56	141.22 141.22 141.22 141.22 141.22	4.50 4.00 3.50 2.88 2.38	114.30 101.60 88.90 73.15 60.45	4.88 4.88 4.88 4.88 4.88	123.95 123.95 123.95 123.95 123.95	4.62 4.50 4.38 4.25 4.12	117.35 114.30 111.25 107.95 104.65
6 x 6 x 5 6 x 6 x 4 6 x 6 x 3½ 6 x 6 x 3 6 x 6 x 2½ 6 x 6 x 2	152.40 x 152.40 x 127.00 152.40 x 152.40 x 101.60 152.40 x 152.40 x 88.90 152.40 x 152.40 x 76.20 152.40 x 152.40 x 63.50 152.40 x 152.40 x 50.80	6	152.40	6.62 6.62 6.62 6.62 6.62 6.62	168.15 168.15 168.15 168.15 168.15 168.15	5.56 4.50 4.00 3.50 2.88 2.38	141.22 114.30 101.60 88.90 73.15 60.45	5.62 5.62 5.62 5.62 5.62 5.62	142.75 142.75 142.75 142.75 142.75 142.75	5.38 5.12 5.00 4.88 4.75 ***	136.65 130.05 127.00 123.95 120.65 ***

**Call factory for Nominal Wall Thickness and Inside Diameter measurements on ¼"
***Call factory for dimensions.

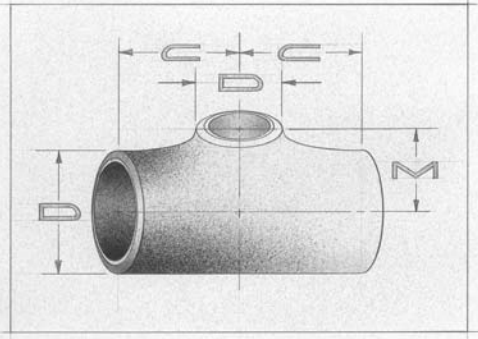
Reducing TEES



Key		Nominal Wall Thickness: inches mm Inside Diameter: inches mm Weight: Call factory for weights														
		Reducing Sizes		Schedule												
inches	mm	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS	
½ x ½ x ¾	12.70 x 12.70 x 6.35	-	-	-	-	.109	.109	-	.147	.147	-	-	-	.188	.294	
		-	-	-	-	2.769	2.769	-	3.734	3.734	-	-	-	4.775	7.468	
		-	-	-	-	.622	.622	-	.546	.546	-	-	-	.464	.252	
		-	-	-	-	15.799	15.799	-	13.868	13.868	-	-	-	11.786	6.401	
¾ x ¾ x 1½	19.05 x 19.05 x 12.70	-	-	-	-	.113	.113	-	.154	.154	-	-	-	.219	.308	
		-	-	-	-	2.870	2.870	-	3.912	3.912	-	-	-	5.563	7.823	
		-	-	-	-	.824	.824	-	.742	.742	-	-	-	.612	.434	
		-	-	-	-	20.930	20.930	-	18.847	18.847	-	-	-	15.545	11.024	
1 x 1 x ¾ 1 x 1 x ½	25.40 x 25.40 x 19.05 25.40 x 25.40 x 12.70	-	-	-	-	.133	.133	-	.179	.179	-	-	-	.250	.358	
		-	-	-	-	3.378	3.378	-	4.547	4.547	-	-	-	6.350	9.093	
		-	-	-	-	1.049	1.049	-	.957	.957	-	-	-	.815	.599	
		-	-	-	-	26.645	26.645	-	24.308	24.308	-	-	-	20.701	15.215	
1¼ x 1¼ x 1 1¼ x 1¼ x ¾ 1¼ x 1¼ x ½	31.75 x 31.75 x 25.40 31.75 x 31.75 x 19.05 31.75 x 31.75 x 12.70	-	-	-	-	.140	.140	-	.191	.191	-	-	-	.250	.382	
		-	-	-	-	3.556	3.556	-	4.851	4.851	-	-	-	6.350	9.703	
		-	-	-	-	1.380	1.380	-	1.278	1.278	-	-	-	1.160	.896	
		-	-	-	-	35.052	35.052	-	32.461	32.461	-	-	-	29.464	22.758	
1½ x 1½ x 1¼ 1½ x 1½ x 1 1½ x 1½ x ¾ 1½ x 1½ x ½	38.10 x 38.10 x 31.75 38.10 x 38.10 x 25.40 38.10 x 38.10 x 19.05 38.10 x 38.10 x 12.70	-	-	-	-	.145	.145	-	.200	.200	-	-	-	.281	.400	
		-	-	-	-	3.683	3.683	-	5.080	5.080	-	-	-	7.137	10.160	
		-	-	-	-	1.610	1.610	-	1.500	1.500	-	-	-	1.338	1.100	
		-	-	-	-	40.894	40.894	-	38.100	38.100	-	-	-	33.985	27.940	
2 x 2 x 1½ 2 x 2 x 1¼ 2 x 2 x 1 2 x 2 x ¾	50.80 x 50.80 x 38.10 50.80 x 50.80 x 31.75 50.80 x 50.80 x 25.40 50.80 x 50.80 x 19.05	-	-	-	-	.154	.154	-	.218	.218	-	-	-	.344	.436	
		-	-	-	-	3.912	3.912	-	5.537	5.537	-	-	-	8.738	11.074	
		-	-	-	-	2.067	2.067	-	1.939	1.939	-	-	-	1.687	1.503	
		-	-	-	-	52.502	52.502	-	49.251	49.251	-	-	-	42.850	38.176	
2½ x 2½ x 2 2½ x 2½ x 1½ 2½ x 2½ x 1¼ 2½ x 2½ x 1	63.50 x 63.50 x 50.80 63.50 x 63.50 x 38.10 63.50 x 63.50 x 31.75 63.50 x 63.50 x 25.40	-	-	-	-	.203	.203	-	.276	.276	-	-	-	.375	.552	
		-	-	-	-	5.156	5.156	-	7.010	7.010	-	-	-	9.525	14.021	
		-	-	-	-	2.469	2.469	-	2.323	2.323	-	-	-	2.125	1.771	
		-	-	-	-	62.713	62.713	-	59.004	59.004	-	-	-	53.975	44.983	
3 x 3 x 2½ 3 x 3 x 2 3 x 3 x 1½ 3 x 3 x 1¼	76.20 x 76.20 x 63.50 76.20 x 76.20 x 50.80 76.20 x 76.20 x 38.10 76.20 x 76.20 x 31.75	-	-	-	-	.216	.216	-	.300	.300	-	-	-	.438	.600	
		-	-	-	-	5.486	5.486	-	7.620	7.620	-	-	-	11.125	15.240	
		-	-	-	-	3.068	3.068	-	2.900	2.900	-	-	-	2.624	2.300	
		-	-	-	-	77.927	77.927	-	73.660	73.660	-	-	-	66.650	58.420	
3½ x 3½ x 3 3½ x 3½ x 2½ 3½ x 3½ x 2 3½ x 3½ x 1½	88.90 x 88.90 x 76.20 88.90 x 88.90 x 63.50 88.90 x 88.90 x 50.80 88.90 x 88.90 x 38.10	-	-	-	-	.226	.226	-	.318	.318	-	-	-	-	.636*	
		-	-	-	-	5.740	5.740	-	8.077	8.077	-	-	-	-	16.154	
		-	-	-	-	3.548	3.548	-	3.364	3.364	-	-	-	-	2.728	
		-	-	-	-	90.119	90.119	-	85.446	85.446	-	-	-	-	69.291	
4 x 4 x 3½ 4 x 4 x 3 4 x 4 x 2½ 4 x 4 x 2 4 x 4 x 1½	101.60 x 101.60 x 88.90 101.60 x 101.60 x 76.20 101.60 x 101.60 x 63.50 101.60 x 101.60 x 50.80 101.60 x 101.60 x 38.10	.188	-	-	-	.237	.237	-	.337	.337	-	.438	-	.531	.674	
		4.775	-	-	-	6.020	6.020	-	8.560	8.560	-	11.125	-	13.487	17.120	
		4.124	-	-	-	4.026	4.026	-	3.826	3.826	-	3.624	-	3.438	3.152	
		104.749	-	-	-	102.260	102.260	-	97.180	97.180	-	92.050	-	87.325	80.061	
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5 x 5 x 4 5 x 5 x 3½ 5 x 5 x 3 5 x 5 x 2½ 5 x 5 x 2	127.00 x 127.00 x 101.60 127.00 x 127.00 x 88.90 127.00 x 127.00 x 76.20 127.00 x 127.00 x 63.50 127.00 x 127.00 x 50.80	-	-	-	-	.258	.258	-	.375	.375	-	.500	-	.625	.750	
		-	-	-	-	6.553	6.553	-	9.525	9.525	-	12.700	-	15.875	19.050	
		-	-	-	-	5.047	5.047	-	4.813	4.813	-	4.563	-	4.313	4.063	
		-	-	-	-	128.194	128.194	-	122.250	122.250	-	115.900	-	109.550	103.200	
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
6 x 6 x 5 6 x 6 x 4 6 x 6 x 3½ 6 x 6 x 3 6 x 6 x 2½ 6 x 6 x 2	152.40 x 152.40 x 127.00 152.40 x 152.40 x 101.60 152.40 x 152.40 x 88.90 152.40 x 152.40 x 76.20 152.40 x 152.40 x 63.50 152.40 x 152.40 x 50.80	.219	-	-	-	.280	.280	-	.432	.432	-	.562	-	.719	.864	
		5.563	-	-	-	7.112	7.112	-	10.973	10.973	-	14.275	-	18.263	21.946	
		6.187	-	-	-	6.065	6.065	-	5.761	5.761	-	5.501	-	5.187	4.897	
		157.150	-	-	-	154.051	154.051	-	146.329	146.329	-	139.725	-	131.750	124.384	
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

*Not given in ASME B36.10

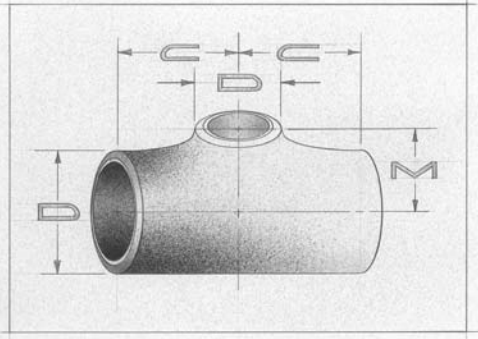
Reducing TEES



Key											
Reducing Sizes		Nominal Pipe Size		"D" Outside Diameter at Bevel				Center-to-End			
				Run		Outlet		"C" Run		"M" Outlet	
inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
8 x 8 x 6	203.20 x 203.20 x 152.40	8	203.20	8.62	218.95	6.62	168.15	7.00	177.80	6.62	168.15
8 x 8 x 5	203.20 x 203.20 x 127.00			8.62	218.95	5.56	141.22	7.00	177.80	6.38	162.05
8 x 8 x 4	203.20 x 203.20 x 101.60			8.62	218.95	4.50	114.30	7.00	177.80	6.12	155.45
8 x 8 x 3½	203.20 x 203.20 x 88.90			8.62	218.95	4.00	101.60	7.00	177.80	6.00	152.40
8 x 8 x 3	203.20 x 203.20 x 76.20			8.62	218.95	3.50	88.90	7.00	177.80	***	***
10 x 10 x 8	254.00 x 254.00 x 203.20	10	254.00	10.75	273.05	8.62	218.95	8.50	215.90	8.00	203.20
10 x 10 x 6	254.00 x 254.00 x 152.40			10.75	273.05	6.62	168.15	8.50	215.90	7.62	193.55
10 x 10 x 5	254.00 x 254.00 x 127.00			10.75	273.05	5.56	141.22	8.50	215.90	7.50	190.50
10 x 10 x 4	254.00 x 254.00 x 101.60			10.75	273.05	4.50	114.30	8.50	215.90	7.25	184.15
12 x 12 x 10	304.80 x 304.80 x 254.00	12	304.80	12.75	323.85	10.75	273.05	10.00	254.00	9.50	241.30
12 x 12 x 8	304.80 x 304.80 x 203.20			12.75	323.85	8.62	218.95	10.00	254.00	9.00	228.60
12 x 12 x 6	304.80 x 304.80 x 152.40			12.75	323.85	6.62	168.15	10.00	254.00	8.62	218.95
12 x 12 x 5	304.80 x 304.80 x 127.00			12.75	323.85	5.56	141.22	10.00	254.00	8.50	215.90
12 x 12 x 4	304.80 x 304.80 x 101.60			***	***	***	***	***	***	***	***
14 x 14 x 12	355.60 x 355.60 x 304.80	14	355.60	14.00	355.60	12.75	323.85	11.00	279.40	10.62	269.75
14 x 14 x 10	355.60 x 355.60 x 254.00			14.00	355.60	10.75	273.05	11.00	279.40	10.12	257.05
14 x 14 x 8	355.60 x 355.60 x 203.20			14.00	355.60	8.62	218.95	11.00	279.40	9.75	247.65
14 x 14 x 6	355.60 x 355.60 x 152.40			14.00	355.60	6.62	168.15	11.00	279.40	9.38	238.25
16 x 16 x 14	406.40 x 406.40 x 355.60	16	406.40	16.00	406.40	14.00	355.60	12.00	304.80	12.00	304.80
16 x 16 x 12	406.40 x 406.40 x 304.80			16.00	406.40	12.75	323.85	12.00	304.80	11.62	295.15
16 x 16 x 10	406.40 x 406.40 x 254.00			16.00	406.40	10.75	273.05	12.00	304.80	11.12	282.45
16 x 16 x 8	406.40 x 406.40 x 203.20			16.00	406.40	8.62	218.95	12.00	304.80	10.75	273.05
16 x 16 x 6	406.40 x 406.40 x 152.40			16.00	406.40	6.62	168.15	12.00	304.80	10.38	263.65
18 x 18 x 16	457.20 x 457.20 x 406.40	18	457.20	18.00	457.20	16.00	406.40	13.50	342.90	13.00	330.20
18 x 18 x 14	457.20 x 457.20 x 355.60			18.00	457.20	14.00	355.60	13.50	342.90	13.00	330.20
18 x 18 x 12	457.20 x 457.20 x 304.80			18.00	457.20	12.75	323.85	13.50	342.90	12.62	320.55
18 x 18 x 10	457.20 x 457.20 x 254.00			18.00	457.20	10.75	273.05	13.50	342.90	12.12	307.85
18 x 18 x 8	457.20 x 457.20 x 203.20			18.00	457.20	8.62	218.95	13.50	342.90	11.75	298.45
20 x 20 x 18	508.00 x 508.00 x 457.20	20	508.00	20.00	508.00	18.00	457.20	15.00	381.00	14.50	368.30
20 x 20 x 16	508.00 x 508.00 x 406.40			20.00	508.00	16.00	406.40	15.00	381.00	14.00	355.60
20 x 20 x 14	508.00 x 508.00 x 355.60			20.00	508.00	14.00	355.60	15.00	381.00	14.00	355.60
20 x 20 x 12	508.00 x 508.00 x 304.80			20.00	508.00	12.75	323.85	15.00	381.00	13.62	345.95
20 x 20 x 10	508.00 x 508.00 x 254.00			20.00	508.00	10.75	273.05	15.00	381.00	13.12	333.25
20 x 20 x 8	508.00 x 508.00 x 203.20			20.00	508.00	8.62	218.95	15.00	381.00	12.75	323.85
22 x 22 x 20	558.80 x 558.80 x 508.00			22	558.80	22.00	558.80	20.00	508.00	16.50	419.10
22 x 22 x 18	558.80 x 558.80 x 457.20	22.00	558.80			18.00	457.20	16.50	419.10	15.50	393.70
22 x 22 x 16	558.80 x 558.80 x 406.40	22.00	558.80			16.00	406.40	16.50	419.10	15.00	381.00
22 x 22 x 14	558.80 x 558.80 x 355.60	22.00	558.80			14.00	355.60	16.50	419.10	15.00	381.00
22 x 22 x 12	558.80 x 558.80 x 304.80	22.00	558.80			12.75	323.85	16.50	419.10	14.62	371.35
22 x 22 x 10	558.80 x 558.80 x 254.00	22.00	558.80			10.75	273.05	16.50	419.10	14.12	358.65
24 x 24 x 22	609.60 x 609.60 x 558.80	24	609.60			24.00	609.60	22.00	558.80	17.00	431.80
24 x 24 x 20	609.60 x 609.60 x 508.00			24.00	609.60	20.00	508.00	17.00	431.80	17.00	431.80
24 x 24 x 18	609.60 x 609.60 x 457.20			24.00	609.60	18.00	457.20	17.00	431.80	16.50	419.10
24 x 24 x 16	609.60 x 609.60 x 406.40			24.00	609.60	16.00	406.40	17.00	431.80	16.00	406.40
24 x 24 x 14	609.60 x 609.60 x 355.60			24.00	609.60	14.00	355.60	17.00	431.80	16.00	406.40
24 x 24 x 12	609.60 x 609.60 x 304.80			24.00	609.60	12.75	323.85	17.00	431.80	15.62	396.75
24 x 24 x 10	609.60 x 609.60 x 254.00			24.00	609.60	10.75	273.05	17.00	431.80	15.12	384.05
30 x 30 x 24	762.00 x 762.00 x 609.60			30	762.00	30.00	762.00	24.00	609.60	22.00	558.80
30 x 30 x 20	762.00 x 762.00 x 508.00	30.00	762.00			20.00	508.00	22.00	558.80	20.00	508.00
30 x 30 x 18	762.00 x 762.00 x 457.20	30.00	762.00			18.00	457.20	22.00	558.80	19.50	493.30
30 x 30 x 16	762.00 x 762.00 x 406.40	30.00	762.00			16.00	406.40	22.00	558.80	19.00	482.60

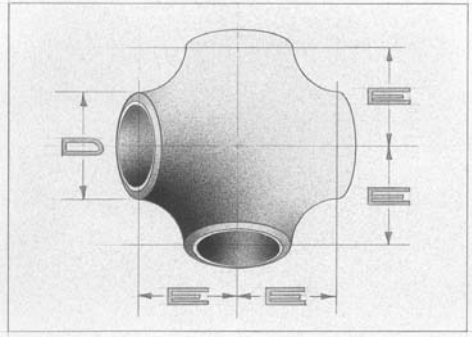
***Call factory for dimensions.

Reducing TEES



Key		Nominal Wall Thickness: inches mm Inside Diameter: inches mm Weight: Call factory for weights													
		Reducing Sizes		Schedule											
inches	mm	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
8 x 8 x 6	203.20 x 203.20 x 152.40	.219	-	.250	.277	.322	.322	.406	.500	.500	.594	.719	.812	.906	.875
8 x 8 x 5	203.20 x 203.20 x 127.00	5.563	-	6.350	7.036	8.179	8.179	10.312	12.700	12.700	15.088	18.263	20.625	23.012	22.225
8 x 8 x 4	203.20 x 203.20 x 101.60	8.187	-	8.125	8.071	7.981	7.981	7.813	7.625	7.625	7.437	7.187	7.001	6.813	6.875
8 x 8 x 3½	203.20 x 203.20 x 88.90	207.949	-	206.375	205.003	202.717	202.717	198.450	193.675	193.675	188.900	182.550	177.825	173.050	174.625
8 x 8 x 3	203.20 x 203.20 x 76.20														
10 x 10 x 8	254.00 x 254.00 x 203.20	.219	-	.250	.307	.365	.365	.500	.500	.594	.719	.844	1.000	1.125	1.000
10 x 10 x 6	254.00 x 254.00 x 152.40	5.563	-	6.350	7.798	9.271	9.271	12.700	12.700	15.088	18.263	21.438	25.400	28.575	25.400
10 x 10 x 5	254.00 x 254.00 x 127.00	10.312	-	10.250	10.136	10.020	10.020	9.750	9.750	9.562	9.312	9.062	8.750	8.500	8.750
10 x 10 x 4	254.00 x 254.00 x 101.60	261.925	-	260.350	257.454	254.508	254.508	247.650	247.650	242.875	236.525	230.175	222.250	215.900	222.250
12 x 12 x 10	304.80 x 304.80 x 254.00	.250	-	.250	.330	.406	.375	.562	.500	.688	.844	1.000	1.125	1.312	1.000
12 x 12 x 8	304.80 x 304.80 x 203.20	6.350	-	6.350	8.382	10.312	9.525	14.275	12.700	17.475	21.438	25.400	28.575	33.325	25.400
12 x 12 x 6	304.80 x 304.80 x 152.40	12.250	-	12.250	12.090	11.938	12.000	11.626	11.750	11.374	11.062	10.750	10.500	10.126	10.750
12 x 12 x 5	304.80 x 304.80 x 127.00	311.150	-	311.150	307.086	303.225	304.800	295.300	298.450	288.900	280.975	273.050	266.700	257.200	273.050
12 x 12 x 4	304.80 x 304.80 x 101.60														
14 x 14 x 12	355.60 x 355.60 x 304.80	.250	.250	.312	.375	.438	.375	.594	.500	.750	.938	1.094	1.250	1.406	-
14 x 14 x 10	355.60 x 355.60 x 254.00	6.350	6.350	7.925	9.525	11.125	9.525	15.088	12.700	19.050	23.825	27.788	31.750	35.712	-
14 x 14 x 8	355.60 x 355.60 x 203.20	13.500	13.500	13.376	13.250	13.124	13.250	12.812	13.000	12.500	12.124	11.812	11.500	11.188	-
14 x 14 x 6	355.60 x 355.60 x 152.40	342.900	342.900	339.750	336.550	333.350	336.550	325.425	330.200	317.500	307.950	300.025	292.100	284.175	-
16 x 16 x 14	406.40 x 406.40 x 355.60	.250	.250	.312	.375	.500	.375	.656	.500	.844	1.031	1.219	1.438	1.594	-
16 x 16 x 12	406.40 x 406.40 x 304.80	6.350	6.350	7.925	9.525	12.700	9.525	16.662	12.700	21.438	26.187	30.963	36.525	40.488	-
16 x 16 x 10	406.40 x 406.40 x 254.00	15.500	15.500	15.376	15.250	15.000	15.250	14.688	15.000	14.312	13.938	13.562	13.124	12.812	-
16 x 16 x 8	406.40 x 406.40 x 203.20	393.700	393.700	390.550	387.350	381.000	387.350	373.075	381.000	363.525	354.025	344.475	333.350	325.425	-
16 x 16 x 6	406.40 x 406.40 x 152.40														
18 x 18 x 16	457.20 x 457.20 x 406.40	.250	.250	.312	.438	.562	.375	.750	.500	.938	1.156	1.375	1.562	1.781	-
18 x 18 x 14	457.20 x 457.20 x 355.60	6.350	6.350	7.925	11.125	14.275	9.525	19.050	12.700	23.825	29.362	34.925	39.675	45.237	-
18 x 18 x 12	457.20 x 457.20 x 304.80	17.500	17.500	17.376	17.124	16.876	17.250	16.500	17.000	16.124	15.688	15.250	14.876	14.438	-
18 x 18 x 10	457.20 x 457.20 x 254.00	444.500	444.500	441.350	434.950	428.650	438.150	419.100	431.800	409.550	398.475	387.350	377.850	366.725	-
18 x 18 x 8	457.20 x 457.20 x 203.20														
20 x 20 x 18	508.00 x 508.00 x 457.20	.250	.250	.375	.500	.594	.375	.812	.500	1.031	1.281	1.500	1.750	1.969	-
20 x 20 x 16	508.00 x 508.00 x 406.40	6.350	6.350	9.525	12.700	15.088	9.525	20.625	12.700	26.187	32.537	38.100	44.450	50.013	-
20 x 20 x 14	508.00 x 508.00 x 355.60	19.500	19.500	19.250	19.000	18.812	19.250	18.376	19.000	17.938	17.438	17.000	16.500	16.062	-
20 x 20 x 12	508.00 x 508.00 x 304.80	495.300	495.300	488.950	482.600	477.825	488.950	466.750	482.600	455.625	442.925	431.800	419.100	407.975	-
20 x 20 x 10	508.00 x 508.00 x 254.00														
20 x 20 x 8	508.00 x 508.00 x 203.20														
22 x 22 x 20	558.80 x 558.80 x 508.00	-	.250	.375	.500	-	.375	.875	.500	1.125	1.375	1.625	1.875	2.125	-
22 x 22 x 18	558.80 x 558.80 x 457.20	-	6.350	9.525	12.700	-	9.525	22.225	12.700	28.575	34.925	41.275	47.625	53.975	-
22 x 22 x 16	558.80 x 558.80 x 406.40	-	21.500	21.250	21.000	-	21.250	20.250	21.000	19.750	19.250	18.750	18.250	17.750	-
22 x 22 x 14	558.80 x 558.80 x 355.60	-	546.100	539.750	533.400	-	539.750	514.350	533.400	501.650	488.950	476.250	463.550	450.850	-
22 x 22 x 12	558.80 x 558.80 x 304.80														
22 x 22 x 10	558.80 x 558.80 x 254.00														
24 x 24 x 22	609.60 x 609.60 x 558.80	.250	.250	.375	.562	.688	.375	.969	.500	1.219	1.531	1.812	2.062	2.344	-
24 x 24 x 20	609.60 x 609.60 x 508.00	6.350	6.350	9.525	14.275	17.475	9.525	24.613	12.700	30.963	38.887	46.025	52.375	59.538	-
24 x 24 x 18	609.60 x 609.60 x 457.20	23.500	23.500	23.250	22.876	22.624	23.250	22.062	23.000	21.562	20.938	20.376	19.876	19.312	-
24 x 24 x 16	609.60 x 609.60 x 406.40	596.900	596.900	590.500	581.050	574.650	590.550	560.375	584.200	547.675	531.825	517.550	504.850	490.525	-
24 x 24 x 14	609.60 x 609.60 x 355.60														
24 x 24 x 12	609.60 x 609.60 x 304.80														
24 x 24 x 10	609.60 x 609.60 x 254.00														
30 x 30 x 24	762.00 x 762.00 x 609.60	-	.312	.500	.625	-	.375	-	.500	-	-	-	-	-	-
30 x 30 x 20	762.00 x 762.00 x 508.00	-	7.925	12.700	15.875	-	9.525	-	12.700	-	-	-	-	-	-
30 x 30 x 18	762.00 x 762.00 x 457.20	-	29.376	29.000	28.750	-	29.250	-	29.000	-	-	-	-	-	-
30 x 30 x 16	762.00 x 762.00 x 406.40	-	746.150	736.600	730.250	-	742.950	-	736.600	-	-	-	-	-	-

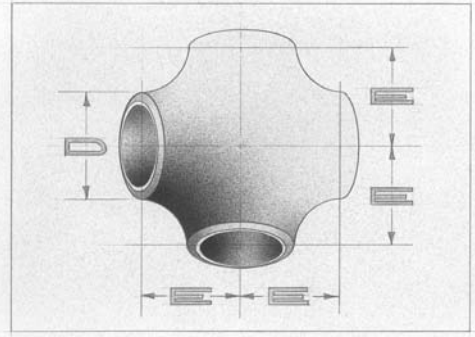
CROSSES



Key			Nominal Wall Thickness: inches mm													
			Inside Diameter: inches mm													
			Approximate Weight: Pounds (see page 3 for Kg)													
Nominal Pipe Size	"D" Outside Diameter at Bevel	"E" Center-to-End	Schedule													
			L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
inches mm	inches mm	inches mm														
1 1/4"	1.66	1.88	-	-	-	-	.140	.140	-	.191	.191	-	-	-	.250	.382
			-	-	-	-	3.556	3.556	-	4.851	4.851	-	-	-	6.350	9.703
			-	-	-	-	1.380	1.380	-	1.278	1.278	-	-	-	1.160	.896
			31.75	42.16	47.75	-	-	-	-	35.052	35.052	-	32.461	32.461	-	-
			-	-	-	-	1.5	1.5	-	1.9	1.9	-	-	-	-	-
1 1/2"	1.90	2.25	-	-	-	-	.145	.145	-	.200	.200	-	-	-	.281	.400
			-	-	-	-	3.683	3.683	-	5.080	5.080	-	-	-	7.137	10.160
			-	-	-	-	1.610	1.610	-	1.500	1.500	-	-	-	1.338	1.100
			38.10	48.26	57.15	-	-	-	-	40.894	40.894	-	38.100	38.100	-	-
			-	-	-	-	2.3	2.3	-	2.8	2.8	-	-	-	-	-
2"	2.38	2.50	-	-	-	-	.154	.154	-	.218	.218	-	-	-	.344	.436
			-	-	-	-	3.912	3.912	-	5.537	5.537	-	-	-	8.738	11.074
			-	-	-	-	2.067	2.067	-	1.939	1.939	-	-	-	1.687	1.503
			50.80	60.45	63.50	-	-	-	-	52.502	52.502	-	49.251	49.251	-	-
			-	-	-	-	3.4	3.4	-	4.2	4.2	-	-	-	-	-
2 1/2"	2.88	3.00	-	-	-	-	.203	.203	-	.276	.276	-	-	-	.375	.552
			-	-	-	-	5.156	5.156	-	7.010	7.010	-	-	-	9.525	14.021
			-	-	-	-	2.469	2.469	-	2.323	2.323	-	-	-	2.125	1.771
			63.50	73.15	76.20	-	-	-	-	62.713	62.713	-	59.004	59.004	-	-
			-	-	-	-	5.9	5.9	-	7.2	7.2	-	-	-	-	-
3"	3.50	3.38	-	-	-	-	.216	.216	-	.300	.300	-	-	-	.438	.600
			-	-	-	-	5.486	5.486	-	7.620	7.620	-	-	-	11.125	15.240
			-	-	-	-	3.068	3.068	-	2.900	2.900	-	-	-	2.624	2.300
			76.20	88.90	85.85	-	-	-	-	77.927	77.927	-	73.660	73.660	-	-
			-	-	-	-	8.3	8.3	-	10.3	10.3	-	-	-	14.4	23.6
3 1/2"	4.00	3.75	-	-	-	-	.226	.226	-	.318	.318	-	-	-	-	.636*
			-	-	-	-	5.740	5.740	-	8.077	8.077	-	-	-	-	16.154
			-	-	-	-	3.548	3.548	-	3.364	3.364	-	-	-	-	2.728
			88.90	101.60	95.25	-	-	-	-	90.119	90.119	-	85.446	85.446	-	-
			-	-	-	-	10.8	10.8	-	13.8	13.8	-	-	-	-	-
4"	4.50	4.13	.188	-	-	-	.237	.237	-	.337	.337	-	.438	-	.531	.674
			4.775	-	-	-	6.020	6.020	-	8.560	8.560	-	11.125	-	13.487	17.120
			4.124	-	-	-	4.026	4.026	-	3.826	3.826	-	3.624	-	3.438	3.152
			101.60	114.30	104.90	104.749	-	-	-	102.260	102.260	-	97.180	97.180	-	92.050
			-	-	-	-	13.9	13.9	-	17.8	17.8	-	24.0	-	26.8	28.8
5"	5.56	4.88	-	-	-	-	.258	.258	-	.375	.375	-	.500	-	.625	.750
			-	-	-	-	6.553	6.553	-	9.525	9.525	-	12.700	-	15.875	19.050
			-	-	-	-	5.047	5.047	-	4.813	4.813	-	4.563	-	4.313	4.063
			127.00	141.22	123.95	-	-	-	-	128.194	128.194	-	122.250	122.250	-	115.900
			-	-	-	-	21.6	21.6	-	28.2	28.2	-	-	-	-	-
6"	6.63	5.63	.219	-	-	-	.280	.280	-	.432	.432	-	.562	-	.719	.864
			5.563	-	-	-	7.112	7.112	-	10.973	10.973	-	14.275	-	18.263	21.946
			6.187	-	-	-	6.065	6.065	-	5.761	5.761	-	5.501	-	5.187	4.897
			152.40	168.40	143.00	157.150	-	-	-	154.051	154.051	-	146.329	146.329	-	139.725
			-	-	-	-	31.5	31.5	-	43.4	43.4	-	66.7	-	-	-

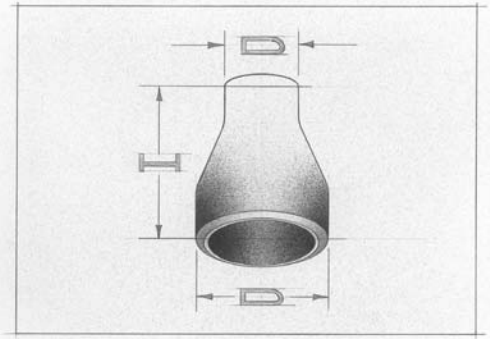
*Not given in ASME B36.10

CROSSES



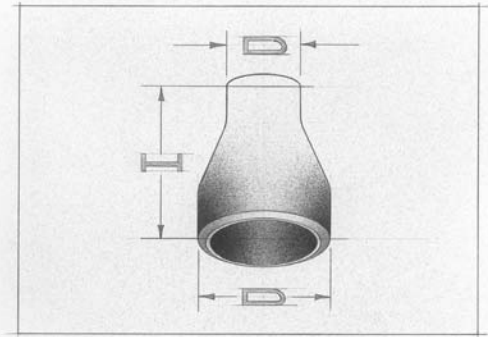
Key			Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)													
			Schedule													
Nominal Pipe Size	"D" Outside Diameter at Bevel	"E" Center-to-End	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
inches mm	inches mm	inches mm														
8"	8.63	7.00	.219	-	.250	.277	.322	.322	.406	.500	.500	.594	.719	.812	.906	.875
			5.563	-	6.350	7.036	8.179	8.179	10.312	12.700	12.700	15.088	18.263	20.625	23.012	22.225
			8.187	-	8.125	8.071	7.981	7.981	7.813	7.625	7.625	7.437	7.187	7.001	6.813	6.875
			203.20	219.20	177.80	207.949	-	206.375	205.003	202.717	202.717	198.450	193.675	188.900	182.550	177.825
10"	10.75	8.50	.219	-	.250	.307	.365	.365	.500	.500	.594	.719	.844	1.000	1.125	1.000
			5.563	-	6.350	7.798	9.271	9.271	12.700	12.700	15.088	18.263	21.438	25.400	28.575	25.400
			10.312	-	10.250	10.136	10.020	10.020	9.750	9.750	9.562	9.312	9.062	8.750	8.500	8.500
			254.00	273.05	215.90	261.925	-	260.350	257.454	254.508	254.508	247.650	247.650	242.875	236.525	230.175
12"	12.75	10.00	.250	-	.250	.330	.406	.375	.562	.500	.688	.844	1.000	1.125	1.312	1.000
			6.350	-	6.350	8.382	10.312	9.525	14.275	12.700	17.475	21.438	25.400	28.575	33.325	25.400
			12.250	-	12.250	12.090	11.938	12.000	11.626	11.750	11.374	11.062	10.750	10.500	10.126	10.750
			304.80	323.85	254.00	311.150	-	311.150	307.086	303.225	304.800	295.300	298.450	288.900	280.975	273.050
14"	14.00	11.00	.250	.250	.312	.375	.438	.375	.594	.500	.750	.938	1.094	1.250	1.406	-
			6.350	6.350	7.925	9.525	11.125	9.525	15.088	12.700	19.050	23.825	27.788	31.750	35.712	-
			13.500	13.500	13.376	13.250	13.124	13.250	12.812	13.000	12.500	12.124	11.812	11.500	11.188	-
			355.60	355.60	279.40	342.900	342.900	339.750	336.550	333.350	336.550	325.425	330.200	317.500	307.950	300.025
16"	16.00	12.00	.250	.250	.312	.375	.500	.375	.656	.500	.844	1.031	1.219	1.438	1.594	-
			6.350	6.350	7.925	9.525	12.700	9.525	16.662	12.700	21.438	26.187	30.963	36.525	40.488	-
			15.500	15.500	15.376	15.250	15.000	15.250	14.688	15.000	14.312	13.938	13.562	13.124	12.812	-
			406.40	406.40	304.80	393.700	393.700	390.550	387.350	381.000	387.350	373.075	381.000	363.525	354.025	344.475
18"	18.00	13.50	.250	.250	.312	.438	.562	.375	.750	.500	.938	1.156	1.375	1.562	1.781	-
			6.350	6.350	7.925	11.125	14.275	9.525	19.050	12.700	23.825	29.362	34.925	39.675	45.237	-
			17.500	17.500	17.376	17.124	16.876	17.250	16.500	17.000	16.124	15.688	15.250	14.876	14.438	-
			457.20	457.20	342.90	444.500	444.500	441.350	434.950	428.650	438.150	419.100	431.800	409.550	398.475	387.350
20"	20.00	15.00	.250	.250	.375	.500	.594	.375	.812	.500	1.031	1.281	1.500	1.750	1.969	-
			6.350	6.350	9.525	12.700	15.088	9.525	20.625	12.700	26.187	32.537	38.100	44.450	50.013	-
			19.500	19.500	19.250	19.000	18.812	19.250	18.376	19.000	17.938	17.438	17.000	16.500	16.062	-
			508.00	508.00	381.00	495.300	495.300	488.950	482.600	477.825	488.950	466.750	482.600	455.625	442.925	431.800
22"	22.00	16.50	-	.250	.375	.500	-	.375	.875	.500	1.125	1.375	1.625	1.875	2.125	-
			-	6.350	9.525	12.700	-	9.525	22.225	12.700	28.575	34.925	41.275	47.625	53.975	-
			-	21.500	21.250	21.000	-	21.250	20.250	21.000	19.750	19.250	18.750	18.250	17.750	-
			558.80	558.80	419.10	-	546.100	539.750	533.400	-	539.750	514.350	533.400	501.650	488.950	476.250
24"	24.00	17.00	.250	.250	.375	.562	.688	.375	.969	.500	1.219	1.531	1.812	2.062	2.344	-
			6.350	6.350	9.525	14.275	17.475	9.525	24.613	12.700	30.963	38.887	46.025	52.375	59.538	-
			23.500	23.500	23.250	22.876	22.624	23.250	22.062	23.000	21.562	20.938	20.376	19.876	19.312	-
			609.60	609.60	431.80	596.900	596.900	590.550	581.050	574.650	590.550	560.375	584.200	547.675	531.825	517.550

Concentric REDUCERS



Key									
Reducing Sizes		Nominal Pipe Size		"D" Outside Diameter at Bevel				"H" End-to-End	
				Large End		Small End			
inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
-	-	½	12.70	-	-	-	-	-	-
¾ x ½	19.05 x 12.70	¾	19.05	1.05	26.67	0.84	21.34	1.50	38.10
1 x ¾ 1 x ½	25.40 x 19.05 25.40 x 12.70	1	25.40	1.32 1.32	33.53 33.53	1.05 0.84	26.67 21.34	2.00 2.00	50.80 50.80
1¼ x 1 1¼ x ¾ 1¼ x ½	31.75 x 25.40 31.75 x 19.05 31.75 x 12.70	1¼	31.75	1.66 1.66 1.66	42.16 42.16 42.16	1.32 1.05 0.84	33.53 26.67 21.34	2.00 2.00 2.00	50.80 50.80 50.80
1½ x 1¼ 1½ x 1 1½ x ¾ 1½ x ½	38.10 x 31.75 38.10 x 25.40 38.10 x 19.05 38.10 x 12.70	1½	38.10	1.90 1.90 1.90 1.90	48.26 48.26 48.26 48.26	1.66 1.32 1.05 0.84	42.16 33.53 26.67 21.34	2.50 2.50 2.50 2.50	63.50 63.50 63.50 63.50
2 x 1½ 2 x 1¼ 2 x 1 2 x ¾	50.80 x 38.10 50.80 x 31.75 50.80 x 25.40 50.80 x 19.05	2	50.80	2.38 2.38 2.38 2.38	60.45 60.45 60.45 60.45	1.90 1.66 1.32 1.05	48.26 42.16 33.53 26.67	3.00 3.00 3.00 3.00	76.20 76.20 76.20 76.20
2½ x 2 2½ x 1½ 2½ x 1¼ 2½ x 1	63.50 x 50.80 63.50 x 38.10 63.50 x 31.75 63.50 x 25.40	2½	63.50	2.88 2.88 2.88 2.88	73.15 73.15 73.15 73.15	2.38 1.90 1.66 1.32	60.45 48.26 42.16 33.53	3.50 3.50 3.50 3.50	88.90 88.90 88.90 88.90
3 x 2½ 3 x 2 3 x 1½ 3 x 1¼	76.20 x 63.50 76.20 x 50.80 76.20 x 38.10 76.20 x 31.75	3	76.20	3.50 3.50 3.50 3.50	88.90 88.90 88.90 88.90	2.88 2.38 1.90 1.66	73.15 60.45 48.26 42.16	3.50 3.50 3.50 3.50	88.90 88.90 88.90 88.90
3½ x 3 3½ x 2½ 3½ x 2 3½ x 1½ 3½ x 1¼	88.90 x 76.20 88.90 x 63.50 88.90 x 50.80 88.90 x 38.10 88.90 x 31.75	3½	88.90	4.00 4.00 4.00 4.00 4.00	101.60 101.60 101.60 101.60 101.60	3.50 2.88 2.38 1.90 1.66	88.90 73.15 60.45 48.26 42.16	4.00 4.00 4.00 4.00 4.00	101.60 101.60 101.60 101.60 101.60
4 x 3½ 4 x 3 4 x 2½ 4 x 2 4 x 1½	101.60 x 88.90 101.60 x 76.20 101.60 x 63.50 101.60 x 50.80 101.60 x 38.10	4	101.60	4.50 4.50 4.50 4.50 4.50	114.30 114.30 114.30 114.30 114.30	4.00 3.50 2.88 2.38 1.90	101.60 88.90 73.15 60.45 48.26	4.00 4.00 4.00 4.00 4.00	101.60 101.60 101.60 101.60 101.60
5 x 4 5 x 3½ 5 x 3 5 x 2½ 5 x 2	127.00 x 101.60 127.00 x 88.90 127.00 x 76.20 127.00 x 63.50 127.00 x 50.80	5	127.00	5.56 5.56 5.56 5.56 5.56	141.22 141.22 141.22 141.22 141.22	4.50 4.00 3.50 2.88 2.38	114.30 101.60 88.90 73.15 60.45	5.00 5.00 5.00 5.00 5.00	127.00 127.00 127.00 127.00 127.00

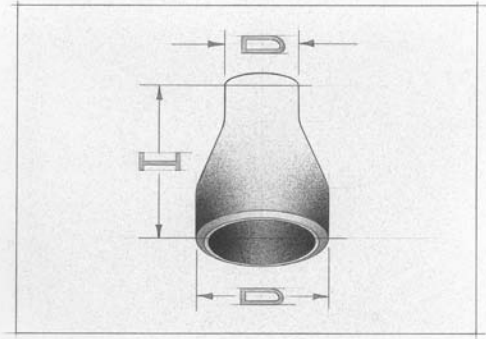
Concentric REDUCERS



Key		Nominal Wall Thickness: inches mm Inside Diameter: inches mm Weight: Call factory for weights													
		Reducing Sizes		Schedule											
inches	mm	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
-	-	-	-	-	-	.109 2.769 .622 15.799	.109 2.769 .622 15.799	-	.147 3.734 .546 13.868	.147 3.734 .546 13.868	-	-	-	.188 4.775 .464 11.786	.294 7.468 .252 6.401
¾ x ½	19.05 x 12.70	-	-	-	-	.113 2.870 .824 20.930	.113 2.870 .824 20.930	-	.154 3.912 .742 18.847	.154 3.912 .742 18.847	-	-	-	.219 5.563 .612 15.545	.308 7.823 .434 11.024
1 x ¾ 1 x ½	25.40 x 19.05 25.40 x 12.70	-	-	-	-	.133 3.378 1.049 26.645	.133 3.378 1.049 26.645	-	.179 4.547 .957 24.308	.179 4.547 .957 24.308	-	-	-	.250 6.350 .815 20.701	.358 9.093 .599 15.215
1¼ x 1 1¼ x ¾ 1¼ x ½	31.75 x 25.40 31.75 x 19.05 31.75 x 12.70	-	-	-	-	.140 3.556 1.380 35.052	.140 3.556 1.380 35.052	-	.191 4.851 1.278 32.461	.191 4.851 1.278 32.461	-	-	-	.250 6.350 1.160 29.464	.382 9.703 .896 22.758
1½ x 1¼ 1½ x 1 1½ x ¾ 1½ x ½	38.10 x 31.75 38.10 x 25.40 38.10 x 19.05 38.10 x 12.70	-	-	-	-	.145 3.683 1.610 40.894	.145 3.683 1.610 40.894	-	.200 5.080 1.500 38.100	.200 5.080 1.500 38.100	-	-	-	.281 7.137 1.338 33.985	.400 10.160 1.100 27.940
2 x 1½ 2 x 1¼ 2 x 1 2 x ¾	50.80 x 38.10 50.80 x 31.75 50.80 x 25.40 50.80 x 19.05	-	-	-	-	.154 3.912 2.067 52.502	.154 3.912 2.067 52.502	-	.218 5.537 1.939 49.251	.218 5.537 1.939 49.251	-	-	-	.344 8.738 1.687 42.850	.436 11.074 1.503 38.176
2½ x 2 2½ x 1½ 2½ x 1¼ 2½ x 1	63.50 x 50.80 63.50 x 38.10 63.50 x 31.75 63.50 x 25.40	-	-	-	-	.203 5.156 2.469 62.713	.203 5.156 2.469 62.713	-	.276 7.010 2.323 59.004	.276 7.010 2.323 59.004	-	-	-	.375 9.525 2.125 53.975	.552 14.021 1.771 44.983
3 x 2½ 3 x 2 3 x 1½ 3 x 1¼	76.20 x 63.50 76.20 x 50.80 76.20 x 38.10 76.20 x 31.75	-	-	-	-	.216 5.486 3.068 77.927	.216 5.486 3.068 77.927	-	.300 7.620 2.900 73.660	.300 7.620 2.900 73.660	-	-	-	.438 11.125 2.624 66.650	.600 15.240 2.300 58.420
3½ x 3 3½ x 2½ 3½ x 2 3½ x 1½ 3½ x 1¼	88.90 x 76.20 88.90 x 63.50 88.90 x 50.80 88.90 x 38.10 88.90 x 31.75	-	-	-	-	.226 5.740 3.548 90.119	.226 5.740 3.548 90.119	-	.318 8.077 3.364 85.446	.318 8.077 3.364 85.446	-	-	-	-	.636* 16.154 2.728 69.291
4 x 3½ 4 x 3 4 x 2½ 4 x 2 4 x 1½	101.60 x 88.90 101.60 x 76.20 101.60 x 63.50 101.60 x 50.80 101.60 x 38.10	.188 4.775 4.124 104.749	-	-	-	.237 6.020 4.026 102.260	.237 6.020 4.026 102.260	-	.337 8.560 3.826 97.180	.337 8.560 3.826 97.180	-	.438 11.125 3.624 92.050	-	.531 13.487 3.438 87.325	.674 17.120 3.152 80.061
5 x 4 5 x 3½ 5 x 3 5 x 2½ 5 x 2	127.00 x 101.60 127.00 x 88.90 127.00 x 76.20 127.00 x 63.50 127.00 x 50.80	-	-	-	-	.258 6.553 5.047 128.194	.258 6.553 5.047 128.194	-	.375 9.525 4.813 122.250	.375 9.525 4.813 122.250	-	.500 12.700 4.563 115.900	-	.625 15.875 4.313 109.550	.750 19.050 4.063 103.200

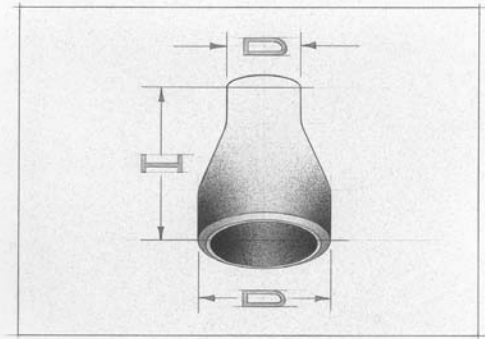
*Not given in ASME B36.10

Concentric REDUCERS



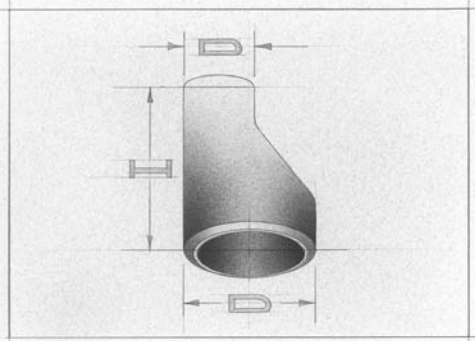
Key									
Reducing Sizes		Nominal Pipe Size		"D" Outside Diameter at Bevel				"H" End-to-End	
				Large End		Small End			
inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
6 x 5	152.40 x 127.00	6	152.40	6.62	168.15	5.56	141.22	5.50	139.70
6 x 4	152.40 x 101.60			6.62	168.15	4.50	114.30	5.50	139.70
6 x 3½	152.40 x 88.90			6.62	168.15	4.00	101.60	5.50	139.70
6 x 3	152.40 x 76.20			6.62	168.15	3.50	88.90	5.50	139.70
6 x 2½	152.40 x 63.50			6.62	168.15	2.88	73.15	5.50	139.70
6 x 2	152.40 x 50.80			6.62	168.15	-	-	5.50	139.70
8 x 6	203.20 x 152.40	8	203.20	8.63	219.20	6.63	168.40	6.00	152.40
8 x 5	203.20 x 127.00			8.63	219.20	5.56	141.22	6.00	152.40
8 x 4	203.20 x 101.60			8.63	219.20	4.50	114.30	6.00	152.40
8 x 3½	203.20 x 88.90			8.63	219.20	4.00	101.60	6.00	152.40
8 x 3	203.20 x 76.20			8.63	219.20	-	-	6.00	152.40
10 x 8	254.00 x 203.20	10	254.00	10.75	273.05	8.63	219.20	7.00	177.80
10 x 6	254.00 x 152.40			10.75	273.05	6.63	168.40	7.00	177.80
10 x 5	254.00 x 127.00			10.75	273.05	5.56	141.22	7.00	177.80
10 x 4	254.00 x 101.60			10.75	273.05	4.50	114.30	7.00	177.80
12 x 10	304.80 x 254.00	12	304.80	12.75	323.85	10.75	273.05	8.00	203.20
12 x 8	304.80 x 203.20			12.75	323.85	8.63	219.20	8.00	203.20
12 x 6	304.80 x 152.40			12.75	323.85	6.63	168.40	8.00	203.20
12 x 5	304.80 x 127.00			12.75	323.85	5.56	141.22	8.00	203.20
14 x 12	355.60 x 304.80	14	355.60	14.00	355.60	12.75	323.85	13.00	330.20
14 x 10	355.60 x 254.00			14.00	355.60	10.75	273.05	13.00	330.20
14 x 8	355.60 x 203.20			14.00	355.60	8.63	219.20	13.00	330.20
14 x 6	355.60 x 152.40			14.00	355.60	6.63	168.40	13.00	330.20
16 x 14	406.40 x 355.60	16	406.40	16.00	406.40	14.00	355.60	14.00	355.60
16 x 12	406.40 x 304.80			16.00	406.40	12.75	323.85	14.00	355.60
16 x 10	406.40 x 254.00			16.00	406.40	10.75	273.05	14.00	355.60
16 x 8	406.40 x 203.20			16.00	406.40	8.63	219.20	14.00	355.60
18 x 16	457.20 x 406.40	18	457.20	18.00	457.20	16.00	406.40	15.00	381.00
18 x 14	457.20 x 355.60			18.00	457.20	14.00	355.60	15.00	381.00
18 x 12	457.20 x 304.80			18.00	457.20	12.75	323.85	15.00	381.00
18 x 10	457.20 x 254.00			18.00	457.20	10.75	273.05	15.00	381.00
20 x 18	508.00 x 457.20	20	508.00	20.00	508.00	18.00	457.20	20.00	508.00
20 x 16	508.00 x 406.40			20.00	508.00	16.00	406.40	20.00	508.00
20 x 14	508.00 x 355.60			20.00	508.00	14.00	355.60	20.00	508.00
20 x 12	508.00 x 304.80			20.00	508.00	12.75	323.85	20.00	508.00
22 x 20	558.80 x 508.00	22	558.80	22.00	558.80	20.00	508.00	20.00	508.00
22 x 18	558.80 x 457.20			22.00	558.80	18.00	457.20	20.00	508.00
22 x 16	558.80 x 406.40			22.00	558.80	16.00	406.40	20.00	508.00
22 x 14	558.80 x 355.60			22.00	558.80	14.00	355.60	20.00	508.00
24 x 22	609.60 x 558.80	24	609.60	24.00	609.60	22.00	558.80	20.00	508.00
24 x 20	609.60 x 508.00			24.00	609.60	20.00	508.00	20.00	508.00
24 x 18	609.60 x 457.20			24.00	609.60	18.00	457.20	20.00	508.00
24 x 16	609.60 x 406.40			24.00	609.60	16.00	406.40	20.00	508.00

Concentric REDUCERS



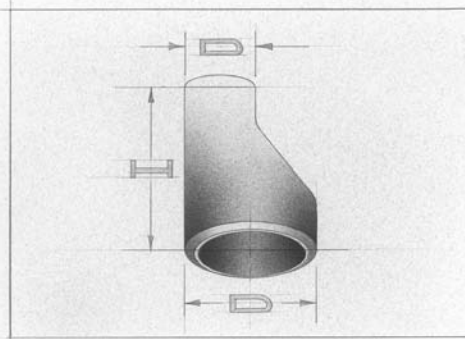
Key		Nominal Wall Thickness: inches mm Inside Diameter: inches mm Weight: Call factory for weights													
		Reducing Sizes		Schedule											
inches	mm	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
6 x 5	152.40 x 127.00	.219	-	-	-	.280	.280	-	.432	.432	-	.562	-	.719	.864
6 x 4	152.40 x 101.60	5.563	-	-	-	7.112	7.112	-	10.973	10.973	-	14.275	-	18.263	21.946
6 x 3½	152.40 x 88.90	6.187	-	-	-	6.065	6.065	-	5.761	5.761	-	5.501	-	5.187	4.897
6 x 3	152.40 x 76.20	157.150	-	-	-	154.051	154.051	-	146.329	146.329	-	139.725	-	131.750	124.384
6 x 2½	152.40 x 63.50														
6 x 2	152.40 x 50.80														
8 x 6	203.20 x 152.40	.219	-	.250	.277	.322	.322	.406	.500	.500	.594	.719	.812	.906	.875
8 x 5	203.20 x 127.00	5.563	-	6.350	7.036	8.179	8.179	10.312	12.700	12.700	15.088	18.263	20.625	23.012	22.225
8 x 4	203.20 x 101.60	8.187	-	8.125	8.071	7.981	7.981	7.813	7.625	7.625	7.437	7.187	7.001	6.813	6.875
8 x 3½	203.20 x 88.90	207.949	-	206.375	205.003	202.717	202.717	198.450	193.675	193.675	188.900	182.550	177.825	173.050	174.625
8 x 3	203.20 x 76.20														
10 x 8	254.00 x 203.20	.219	-	.250	.307	.365	.365	.500	.500	.594	.719	.844	1.000	1.125	1.000
10 x 6	254.00 x 152.40	5.563	-	6.350	7.798	9.271	9.271	12.700	12.700	15.088	18.263	21.438	25.400	28.575	25.400
10 x 5	254.00 x 127.00	10.312	-	10.250	10.136	10.020	10.020	9.750	9.750	9.562	9.312	9.062	8.750	8.500	8.750
10 x 4	254.00 x 101.60	261.925	-	260.350	257.454	254.508	254.508	247.650	247.650	242.875	236.525	230.175	222.250	215.900	222.250
12 x 10	304.80 x 254.00	.250	-	.250	.330	.406	.375	.562	.500	.688	.844	1.000	1.125	1.312	1.000
12 x 8	304.80 x 203.20	6.350	-	6.350	8.382	10.312	9.525	14.275	12.700	17.475	21.438	25.400	28.575	33.325	25.400
12 x 6	304.80 x 152.40	12.250	-	12.250	12.090	11.938	12.000	11.626	11.750	11.374	11.062	10.750	10.500	10.126	10.750
12 x 5	304.80 x 127.00	311.150	-	311.150	307.086	303.225	304.800	295.300	295.300	288.900	280.975	273.050	266.700	257.200	273.050
14 x 12	355.60 x 304.80	.250	.250	.312	.375	.438	.375	.594	.500	.750	.938	1.094	1.250	1.406	-
14 x 10	355.60 x 254.00	6.350	6.350	7.925	9.525	11.125	9.525	15.088	12.700	19.050	23.825	27.788	31.750	35.712	-
14 x 8	355.60 x 203.20	13.500	13.500	13.376	13.250	13.124	13.250	12.812	13.000	12.500	12.124	11.812	11.500	11.188	-
14 x 6	355.60 x 152.40	342.900	342.900	339.750	336.550	333.350	336.550	325.425	330.200	321.500	307.950	300.025	292.100	284.175	-
16 x 14	406.40 x 355.60	.250	.250	.312	.375	.500	.375	.656	.500	.844	1.031	1.219	1.438	1.594	-
16 x 12	406.40 x 304.80	6.350	6.350	7.925	9.525	12.700	9.525	16.662	12.700	21.438	26.187	30.963	36.525	40.488	-
16 x 10	406.40 x 254.00	15.500	15.500	15.376	15.250	15.000	15.250	14.688	15.000	14.312	13.938	13.562	13.124	12.812	-
16 x 8	406.40 x 203.20	393.700	393.700	390.550	387.350	381.000	387.350	373.075	381.000	363.525	354.025	344.475	333.350	325.425	-
18 x 16	457.20 x 406.40	.250	.250	.312	.438	.562	.375	.750	.500	.938	1.156	1.375	1.562	1.781	-
18 x 14	457.20 x 355.60	6.350	6.350	7.925	11.125	14.275	9.525	19.050	12.700	23.825	29.362	34.925	39.675	45.237	-
18 x 12	457.20 x 304.80	17.500	17.500	17.376	17.124	16.876	17.250	16.500	17.000	16.124	15.688	15.250	14.876	14.438	-
18 x 10	457.20 x 254.00	444.500	444.500	441.350	434.950	428.650	438.150	419.100	431.800	409.550	398.475	387.350	377.850	366.725	-
20 x 18	508.00 x 457.20	.250	.250	.375	.500	.594	.375	.812	.500	1.031	1.281	1.500	1.750	1.969	-
20 x 16	508.00 x 406.40	6.350	6.350	9.525	12.700	15.088	9.525	20.625	12.700	26.187	32.537	38.100	44.450	50.013	-
20 x 14	508.00 x 355.60	19.500	19.500	19.250	19.000	18.812	19.250	18.376	19.000	17.938	17.438	17.000	16.500	16.062	-
20 x 12	508.00 x 304.80	495.300	495.300	488.950	482.600	477.825	488.950	466.750	482.600	455.625	442.925	431.800	419.100	407.975	-
22 x 20	558.80 x 508.00	-	.250	.375	.500	-	.375	.875	.500	1.125	1.375	1.625	1.875	2.125	-
22 x 18	558.80 x 457.20	-	6.350	9.525	12.700	-	9.525	22.225	12.700	28.575	34.925	41.275	47.625	53.975	-
22 x 16	558.80 x 406.40	-	21.500	21.250	21.000	-	21.250	20.250	21.000	19.750	19.250	18.750	18.250	17.750	-
22 x 14	558.80 x 355.60	-	546.100	539.750	533.400	-	539.750	514.350	533.400	501.650	488.950	476.250	463.550	450.850	-
24 x 22	609.60 x 558.80	.250	.250	.375	.562	.688	.375	.969	.500	1.219	1.531	1.812	2.062	2.344	-
24 x 20	609.60 x 508.00	6.350	6.350	9.525	14.275	17.475	9.525	24.613	12.700	30.963	38.887	46.025	52.375	59.538	-
24 x 18	609.60 x 457.20	23.500	23.500	23.250	22.876	22.624	23.250	22.062	23.000	21.562	20.938	20.376	19.876	19.312	-
24 x 16	609.60 x 406.40	596.900	596.900	590.550	581.050	574.650	590.550	560.375	584.200	547.675	531.825	517.550	504.850	490.525	-

Eccentric REDUCERS



Key									
Reducing Sizes		Nominal Pipe Size		"D" Outside Diameter at Bevel				"H" End-to-End	
				Large End		Small End			
inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
-	-	½	12.70	-	-	-	-	-	-
¾ x ½	19.05 x 12.70	¾	19.05	1.05	26.67	0.84	21.34	1.50	38.10
1 x ¾ 1 x ½	25.40 x 19.05 25.40 x 12.70	1	25.40	1.32 1.32	33.53 33.53	1.05 0.84	26.67 21.34	2.00 2.00	50.80 50.80
1¼ x 1 1¼ x ¾ 1¼ x ½	31.75 x 25.40 31.75 x 19.05 31.75 x 12.70	1¼	31.75	1.66 1.66 1.66	42.16 42.16 42.16	1.32 1.05 0.84	33.53 26.67 21.34	2.00 2.00 2.00	50.80 50.80 50.80
1½ x 1¼ 1½ x 1 1½ x ¾ 1½ x ½	38.10 x 31.75 38.10 x 25.40 38.10 x 19.05 38.10 x 12.70	1½	38.10	1.90 1.90 1.90 1.90	48.26 48.26 48.26 48.26	1.66 1.32 1.05 0.84	42.16 33.53 26.67 21.34	2.50 2.50 2.50 2.50	63.50 63.50 63.50 63.50
2 x 1½ 2 x 1¼ 2 x 1 2 x ¾	50.80 x 38.10 50.80 x 31.75 50.80 x 25.40 50.80 x 19.05	2	50.80	2.38 2.38 2.38 2.38	60.45 60.45 60.45 60.45	1.90 1.66 1.32 1.05	48.26 42.16 33.53 26.67	3.00 3.00 3.00 3.00	76.20 76.20 76.20 76.20
2½ x 2 2½ x 1½ 2½ x 1¼ 2½ x 1	63.50 x 50.80 63.50 x 38.10 63.50 x 31.75 63.50 x 25.40	2½	63.50	2.88 2.88 2.88 2.88	73.15 73.15 73.15 73.15	2.38 1.90 1.66 1.32	60.45 48.26 42.16 33.53	3.50 3.50 3.50 3.50	88.90 88.90 88.90 88.90
3 x 2½ 3 x 2 3 x 1½ 3 x 1¼	76.20 x 63.50 76.20 x 50.80 76.20 x 38.10 76.20 x 31.75	3	76.20	3.50 3.50 3.50 3.50	88.90 88.90 88.90 88.90	2.88 2.38 1.90 1.66	73.15 60.45 48.26 42.16	3.50 3.50 3.50 3.50	88.90 88.90 88.90 88.90
3½ x 3 3½ x 2½ 3½ x 2 3½ x 1½ 3½ x 1¼	88.90 x 76.20 88.90 x 63.50 88.90 x 50.80 88.90 x 38.10 88.90 x 31.75	3½	88.90	4.00 4.00 4.00 4.00 4.00	101.60 101.60 101.60 101.60 101.60	3.50 2.88 2.38 1.90 1.66	88.90 73.15 60.45 48.26 42.16	4.00 4.00 4.00 4.00 4.00	101.60 101.60 101.60 101.60 101.60
4 x 3½ 4 x 3 4 x 2½ 4 x 2 4 x 1½	101.60 x 88.90 101.60 x 76.20 101.60 x 63.50 101.60 x 50.80 101.60 x 38.10	4	101.60	4.50 4.50 4.50 4.50 4.50	114.30 114.30 114.30 114.30 114.30	4.00 3.50 2.88 2.38 1.90	101.60 88.90 73.15 60.45 48.26	4.00 4.00 4.00 4.00 4.00	101.60 101.60 101.60 101.60 101.60
5 x 4 5 x 3½ 5 x 3 5 x 2½ 5 x 2	127.00 x 101.60 127.00 x 88.90 127.00 x 76.20 127.00 x 63.50 127.00 x 50.80	5	127.00	5.56 5.56 5.56 5.56 5.56	141.22 141.22 141.22 141.22 141.22	4.50 4.00 3.50 2.88 2.38	114.30 101.60 88.90 73.15 60.45	5.00 5.00 5.00 5.00 5.00	127.00 127.00 127.00 127.00 127.00

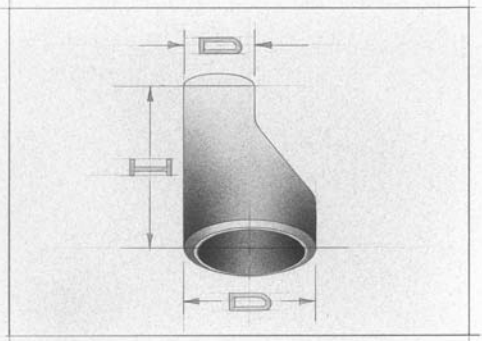
Eccentric REDUCERS



Key		Nominal Wall Thickness: inches mm Inside Diameter: inches mm Weight: Call factory for weights													
		Reducing Sizes		Schedule											
inches	mm	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
-	-	-	-	-	-	.109 2.769	.109 2.769	-	.147 3.734	.147 3.734	-	-	-	.188 4.775	.294 7.468
		-	-	-	-	.622 15.799	.622 15.799	-	.546 13.868	.546 13.868	-	-	-	.464 11.786	.252 6.401
¾ x ½	19.05 x 12.70	-	-	-	-	.113 2.870	.113 2.870	-	.154 3.912	.154 3.912	-	-	-	.219 5.563	.308 7.823
		-	-	-	-	.824 20.930	.824 20.930	-	.742 18.847	.742 18.847	-	-	-	.612 15.545	.434 11.024
1 x ¾ 1 x ½	25.40 x 19.05 25.40 x 12.70	-	-	-	-	.133 3.378	.133 3.378	-	.179 4.547	.179 4.547	-	-	-	.250 6.350	.358 9.093
		-	-	-	-	1.049 26.645	1.049 26.645	-	.957 24.308	.957 24.308	-	-	-	.815 20.701	.599 15.215
1¼ x 1 1¼ x ¾ 1¼ x ½	31.75 x 25.40 31.75 x 19.05 31.75 x 12.70	-	-	-	-	.140 3.556	.140 3.556	-	.191 4.851	.191 4.851	-	-	-	.250 6.350	.382 9.703
		-	-	-	-	1.380 35.052	1.380 35.052	-	1.278 32.461	1.278 32.461	-	-	-	1.160 29.464	.896 22.758
1½ x 1¼ 1½ x 1 1½ x ¾ 1½ x ½	38.10 x 31.75 38.10 x 25.40 38.10 x 19.05 38.10 x 12.70	-	-	-	-	.145 3.683	.145 3.683	-	.200 5.080	.200 5.080	-	-	-	.281 7.137	.400 10.160
		-	-	-	-	1.610 40.894	1.610 40.894	-	1.500 38.100	1.500 38.100	-	-	-	1.338 33.985	1.100 27.940
2 x 1½ 2 x 1¼ 2 x 1 2 x ¾	50.80 x 38.10 50.80 x 31.75 50.80 x 25.40 50.80 x 19.05	-	-	-	-	.154 3.912	.154 3.912	-	.218 5.537	.218 5.537	-	-	-	.344 8.738	.436 11.074
		-	-	-	-	2.067 52.502	2.067 52.502	-	1.939 49.251	1.939 49.251	-	-	-	1.687 42.850	1.503 38.176
2½ x 2 2½ x 1½ 2½ x 1¼ 2½ x 1	63.50 x 50.80 63.50 x 38.10 63.50 x 31.75 63.50 x 25.40	-	-	-	-	.203 5.156	.203 5.156	-	.276 7.010	.276 7.010	-	-	-	.375 9.525	.552 14.021
		-	-	-	-	2.469 62.713	2.469 62.713	-	2.323 59.004	2.323 59.004	-	-	-	2.125 53.975	1.771 44.983
3 x 2½ 3 x 2 3 x 1½ 3 x 1¼	76.20 x 63.50 76.20 x 50.80 76.20 x 38.10 76.20 x 31.75	-	-	-	-	.216 5.486	.216 5.486	-	.300 7.620	.300 7.620	-	-	-	.438 11.125	.600 15.240
		-	-	-	-	3.068 77.927	3.068 77.927	-	2.900 73.660	2.900 73.660	-	-	-	2.624 66.650	2.300 58.420
3½ x 3 3½ x 2½ 3½ x 2 3½ x 1½ 3½ x 1¼	88.90 x 76.20 88.90 x 63.50 88.90 x 50.80 88.90 x 38.10 88.90 x 31.75	-	-	-	-	.226 5.740	.226 5.740	-	.318 8.077	.318 8.077	-	-	-	-	.636* 16.154
		-	-	-	-	3.548 90.119	3.548 90.119	-	3.364 85.446	3.364 85.446	-	-	-	-	2.728 69.291
4 x 3½ 4 x 3 4 x 2½ 4 x 2 4 x 1½	101.60 x 88.90 101.60 x 76.20 101.60 x 63.50 101.60 x 50.80 101.60 x 38.10	.188 4.775	-	-	-	.237 6.020	.237 6.020	-	.337 8.560	.337 8.560	-	.438 11.125	-	.531 13.487	.674 17.120
		4.124 104.749	-	-	-	4.026 102.260	4.026 102.260	-	3.826 97.180	3.826 97.180	-	3.624 92.050	-	3.438 87.325	3.152 80.061
5 x 4 5 x 3½ 5 x 3 5 x 2½ 5 x 2	127.00 x 101.60 127.00 x 88.90 127.00 x 76.20 127.00 x 63.50 127.00 x 50.80	-	-	-	-	.258 6.553	.258 6.553	-	.375 9.525	.375 9.525	-	.500 12.700	-	.625 15.875	.750 19.050
		-	-	-	-	5.047 128.194	5.047 128.194	-	4.813 122.250	4.813 122.250	-	4.563 115.900	-	4.313 109.550	4.063 103.200

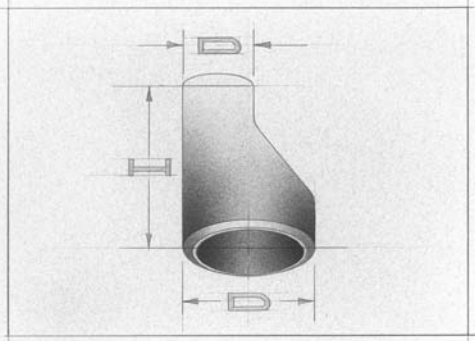
*Not given in ASME B36.10

Eccentric REDUCERS



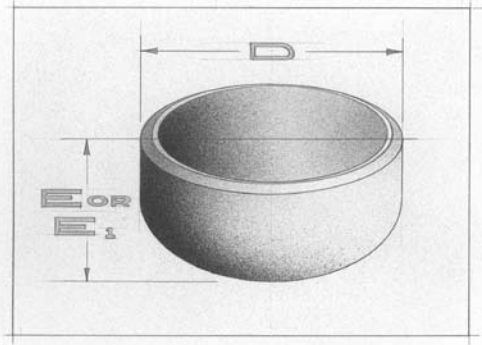
Key									
Reducing Sizes		Nominal Pipe Size		"D" Outside Diameter at Bevel				"H" End-to-End	
				Large End		Small End			
inches	mm	inches	mm	inches	mm	inches	mm	inches	mm
6 x 5	152.40 x 127.00	6	152.40	6.62	168.15	5.56	141.22	5.50	139.70
6 x 4	152.40 x 101.60			6.62	168.15	4.50	114.30	5.50	139.70
6 x 3½	152.40 x 88.90			6.62	168.15	4.00	101.60	5.50	139.70
6 x 3	152.40 x 76.20			6.62	168.15	3.50	88.90	5.50	139.70
6 x 2½	152.40 x 63.50			6.62	168.15	2.88	73.15	5.50	139.70
6 x 2	152.40 x 50.80			6.62	168.15	-	-	5.50	139.70
8 x 6	203.20 x 152.40	8	203.20	8.63	219.20	6.63	168.40	6.00	152.40
8 x 5	203.20 x 127.00			8.63	219.20	5.56	141.22	6.00	152.40
8 x 4	203.20 x 101.60			8.63	219.20	4.50	114.30	6.00	152.40
8 x 3½	203.20 x 88.90			8.63	219.20	4.00	101.60	6.00	152.40
8 x 3	203.20 x 76.20			8.63	219.20	-	-	6.00	152.40
10 x 8	254.00 x 203.20	10	254.00	10.75	273.05	8.63	219.20	7.00	177.80
10 x 6	254.00 x 152.40			10.75	273.05	6.63	168.40	7.00	177.80
10 x 5	254.00 x 127.00			10.75	273.05	5.56	141.22	7.00	177.80
10 x 4	254.00 x 101.60			10.75	273.05	4.50	114.30	7.00	177.80
12 x 10	304.80 x 254.00	12	304.80	12.75	323.85	10.75	273.05	8.00	203.20
12 x 8	304.80 x 203.20			12.75	323.85	8.63	219.20	8.00	203.20
12 x 6	304.80 x 152.40			12.75	323.85	6.63	168.40	8.00	203.20
12 x 5	304.80 x 127.00			12.75	323.85	5.56	141.22	8.00	203.20
14 x 12	355.60 x 304.80	14	355.60	14.00	355.60	12.75	323.85	13.00	330.20
14 x 10	355.60 x 254.00			14.00	355.60	10.75	273.05	13.00	330.20
14 x 8	355.60 x 203.20			14.00	355.60	8.63	219.20	13.00	330.20
14 x 6	355.60 x 152.40			14.00	355.60	6.63	168.40	13.00	330.20
16 x 14	406.40 x 355.60	16	406.40	16.00	406.40	14.00	355.60	14.00	355.60
16 x 12	406.40 x 304.80			16.00	406.40	12.75	323.85	14.00	355.60
16 x 10	406.40 x 254.00			16.00	406.40	10.75	273.05	14.00	355.60
16 x 8	406.40 x 203.20			16.00	406.40	8.63	219.20	14.00	355.60
18 x 16	457.20 x 406.40	18	457.20	18.00	457.20	16.00	406.40	15.00	381.00
18 x 14	457.20 x 355.60			18.00	457.20	14.00	355.60	15.00	381.00
18 x 12	457.20 x 304.80			18.00	457.20	12.75	323.85	15.00	381.00
18 x 10	457.20 x 254.00			18.00	457.20	10.75	273.05	15.00	381.00
20 x 18	508.00 x 457.20	20	508.00	20.00	508.00	18.00	457.20	20.00	508.00
20 x 16	508.00 x 406.40			20.00	508.00	16.00	406.40	20.00	508.00
20 x 14	508.00 x 355.60			20.00	508.00	14.00	355.60	20.00	508.00
20 x 12	508.00 x 304.80			20.00	508.00	12.75	323.85	20.00	508.00
22 x 20	558.80 x 508.00	22	558.80	22.00	558.80	20.00	508.00	20.00	508.00
22 x 18	558.80 x 457.20			22.00	558.80	18.00	457.20	20.00	508.00
22 x 16	558.80 x 406.40			22.00	558.80	16.00	406.40	20.00	508.00
22 x 14	558.80 x 355.60			22.00	558.80	14.00	355.60	20.00	508.00
24 x 22	609.60 x 558.80	24	609.60	24.00	609.60	22.00	558.80	20.00	508.00
24 x 20	609.60 x 508.00			24.00	609.60	20.00	508.00	20.00	508.00
24 x 18	609.60 x 457.20			24.00	609.60	18.00	457.20	20.00	508.00
24 x 16	609.60 x 406.40			24.00	609.60	16.00	406.40	20.00	508.00

Eccentric REDUCERS



Key		Nominal Wall Thickness: inches mm Inside Diameter: inches mm Weight: Call factory for weights													
		Reducing Sizes		Schedule											
inches	mm	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS
6 x 5	152.40 x 127.00	.219	-	-	-	.280	.280	-	.432	.432	-	.562	-	.719	.864
6 x 4	152.40 x 101.60	5.563	-	-	-	7.112	7.112	-	10.973	10.973	-	14.275	-	18.263	21.946
6 x 3½	152.40 x 88.90	6.187	-	-	-	6.065	6.065	-	5.761	5.761	-	5.501	-	5.187	4.897
6 x 3	152.40 x 76.20	157.150	-	-	-	154.051	154.051	-	146.329	146.329	-	139.725	-	131.750	124.384
6 x 2½	152.40 x 63.50														
6 x 2	152.40 x 50.80														
8 x 6	203.20 x 152.40	.219	-	.250	.277	.322	.322	.406	.500	.500	.594	.719	.812	.906	.875
8 x 5	203.20 x 127.00	5.563	-	6.350	7.036	8.179	8.179	10.312	12.700	12.700	15.088	18.263	20.625	23.012	22.225
8 x 4	203.20 x 101.60	8.187	-	8.125	8.071	7.981	7.981	7.813	7.625	7.625	7.437	7.187	7.001	6.813	6.875
8 x 3½	203.20 x 88.90	207.949	-	206.375	205.003	202.717	202.717	198.450	193.675	193.675	188.900	182.550	177.825	173.050	174.625
8 x 3	203.20 x 76.20														
10 x 8	254.00 x 203.20	.219	-	.250	.307	.365	.365	.500	.500	.594	.719	.844	1.000	1.125	1.000
10 x 6	254.00 x 152.40	5.563	-	6.350	7.798	9.271	9.271	12.700	12.700	15.088	18.263	21.438	25.400	28.575	25.400
10 x 5	254.00 x 127.00	10.312	-	10.250	10.136	10.020	10.020	9.750	9.750	9.562	9.312	9.062	8.750	8.500	8.750
10 x 4	254.00 x 101.60	261.925	-	260.350	257.454	254.508	254.508	247.650	247.650	242.875	236.525	230.175	222.250	215.900	222.250
12 x 10	304.80 x 254.00	.250	-	.250	.330	.406	.375	.562	.500	.688	.844	1.000	1.125	1.312	1.000
12 x 8	304.80 x 203.20	6.350	-	6.350	8.382	10.312	9.525	14.275	12.700	17.475	21.438	25.400	28.575	33.325	25.400
12 x 6	304.80 x 152.40	12.250	-	12.250	12.090	11.938	12.000	11.626	11.750	11.374	11.062	10.750	10.500	10.126	10.750
12 x 5	304.80 x 127.00	311.150	-	311.150	307.086	303.225	304.800	295.300	295.300	288.900	280.975	273.050	266.700	257.200	273.050
14 x 12	355.60 x 304.80	.250	.250	.312	.375	.438	.375	.594	.500	.750	.938	1.094	1.250	1.406	-
14 x 10	355.60 x 254.00	6.350	6.350	7.925	9.525	11.125	9.525	15.088	12.700	19.050	23.825	27.788	31.750	35.712	-
14 x 8	355.60 x 203.20	13.500	13.500	13.376	13.250	13.124	13.250	12.812	13.000	12.500	12.124	11.812	11.500	11.188	-
14 x 6	355.60 x 152.40	342.900	342.900	339.750	336.550	333.350	336.550	325.425	330.200	317.500	307.950	300.025	292.100	284.175	-
16 x 14	406.40 x 355.60	.250	.250	.312	.375	.500	.375	.656	.500	.844	1.031	1.219	1.438	1.594	-
16 x 12	406.40 x 304.80	6.350	6.350	7.925	9.525	12.700	9.525	16.662	12.700	21.438	26.187	30.963	36.525	40.488	-
16 x 10	406.40 x 254.00	15.500	15.500	15.376	15.250	15.000	15.250	14.688	15.000	14.312	13.938	13.562	13.124	12.812	-
16 x 8	406.40 x 203.20	393.700	393.700	390.550	387.350	381.000	387.350	373.075	381.000	363.525	354.025	344.475	333.350	325.425	-
18 x 16	457.20 x 406.40	.250	.250	.312	.438	.562	.375	.750	.500	.938	1.156	1.375	1.562	1.781	-
18 x 14	457.20 x 355.60	6.350	6.350	7.925	11.125	14.275	9.525	19.050	12.700	23.825	29.362	34.925	39.675	45.237	-
18 x 12	457.20 x 304.80	17.500	17.500	17.376	17.124	16.876	17.250	16.500	17.000	16.124	15.688	15.250	14.876	14.438	-
18 x 10	457.20 x 254.00	444.500	444.500	441.350	434.950	428.650	438.150	419.100	431.800	409.550	398.475	387.350	377.850	366.725	-
20 x 18	508.00 x 457.20	.250	.250	.375	.500	.594	.375	.812	.500	1.031	1.281	1.500	1.750	1.969	-
20 x 16	508.00 x 406.40	6.350	6.350	9.525	12.700	15.088	9.525	20.625	12.700	26.187	32.537	38.100	44.450	50.013	-
20 x 14	508.00 x 355.60	19.500	19.500	19.250	19.000	18.812	19.250	18.376	19.000	17.938	17.438	17.000	16.500	16.062	-
20 x 12	508.00 x 304.80	495.300	495.300	488.950	482.600	477.825	488.950	466.750	482.600	455.625	442.925	431.800	419.100	407.975	-
22 x 20	558.80 x 508.00	-	.250	.375	.500	-	.375	.875	.500	1.125	1.375	1.625	1.875	2.125	-
22 x 18	558.80 x 457.20	-	6.350	9.525	12.700	-	9.525	22.225	12.700	28.575	34.925	41.275	47.625	53.975	-
22 x 16	558.80 x 406.40	-	21.500	21.250	21.000	-	21.250	20.250	21.000	19.750	19.250	18.750	18.250	17.750	-
22 x 14	558.80 x 355.60	-	546.100	539.750	533.400	-	539.750	514.350	533.400	501.650	488.950	476.250	463.550	450.850	-
24 x 22	609.60 x 558.80	.250	.250	.375	.562	.688	.375	.969	.500	1.219	1.531	1.812	2.062	2.344	-
24 x 20	609.60 x 508.00	6.350	6.350	9.525	14.275	17.475	9.525	24.613	12.700	30.963	38.887	46.025	52.375	59.538	-
24 x 18	609.60 x 457.20	23.500	23.500	23.250	22.876	22.624	23.250	22.062	23.000	21.562	20.938	20.376	19.876	19.312	-
24 x 16	609.60 x 406.40	596.900	596.900	590.550	581.050	574.650	590.550	560.375	584.200	547.675	531.825	517.550	504.850	490.525	-

CAPS



Key					Nominal Wall Thickness: inches mm Inside Diameter: inches mm Approximate Weight: Pounds (see page 3 for Kg)																
Nominal Pipe Size	"D" Outside Diameter at Bevel	"E" Length (1)	Limiting Wall Thickness for Length E	"E" Length (2)	Schedule																
inches mm	inches mm	inches mm	inches mm	inches mm	L.W.G.	10	20	30	40	STD WT	60	XS	80	100	120	140	160	XXS			
½"	.84	1.00	0.18	1.00	-	-	-	-	.109	.109	-	.147	.147	-	-	-	-	.188	.294		
					-	-	-	-	2.769	2.769	-	3.734	3.734	-	-	-	-	-	4.775	7.468	
					-	-	-	-	.622	.622	-	.546	.546	-	-	-	-	-	-	.464	.252
					-	-	-	-	15.799	15.799	-	13.868	13.868	-	-	-	-	-	-	11.786	6.401
12.70	21.34	25.40	4.57	25.40	-	-	-	-	0.1	0.1	-	0.1	0.1	-	-	-	-	-	0.5		
					-	-	-	-	.113	.113	-	.154	.154	-	-	-	-	-	.219	.308	
					-	-	-	-	2.870	2.870	-	3.912	3.912	-	-	-	-	-	-	5.563	7.823
					-	-	-	-	.824	.824	-	.742	.742	-	-	-	-	-	-	.612	.434
¾"	1.05	1.00	0.15	1.00	-	-	-	-	20.930	20.930	-	18.847	18.847	-	-	-	-	15.545	11.024		
					-	-	-	-	0.1	0.1	-	0.2	0.2	-	-	-	-	-	-	-	
					-	-	-	-	.133	.133	-	.179	.179	-	-	-	-	-	-	.250	.358
					-	-	-	-	3.378	3.378	-	4.547	4.547	-	-	-	-	-	-	6.350	9.093
19.05	26.67	25.40	3.81	25.40	-	-	-	-	1.049	1.049	-	.957	.957	-	-	-	-	.815	.599		
					-	-	-	-	26.645	26.645	-	24.308	24.308	-	-	-	-	-	20.701	15.215	
					-	-	-	-	0.2	0.2	-	0.3	0.3	-	-	-	-	-	0.4	1.0	
					-	-	-	-	.140	.140	-	.191	.191	-	-	-	-	-	-	.250	.382
1"	1.32	1.50	0.18	1.50	-	-	-	-	3.556	3.556	-	4.851	4.851	-	-	-	-	6.350	9.703		
					-	-	-	-	1.380	1.380	-	1.278	1.278	-	-	-	-	-	1.160	.896	
					-	-	-	-	35.052	35.052	-	32.461	32.461	-	-	-	-	-	29.464	22.758	
					-	-	-	-	0.3	0.3	-	0.4	0.4	-	-	-	-	-	0.5	1.5	
31.75	42.16	38.10	4.83	38.10	-	-	-	-	.145	.145	-	.200	.200	-	-	-	-	.281	.400		
					-	-	-	-	3.683	3.683	-	5.080	5.080	-	-	-	-	-	7.137	10.160	
					-	-	-	-	1.610	1.610	-	1.500	1.500	-	-	-	-	-	1.338	1.100	
					-	-	-	-	40.894	40.894	-	38.100	38.100	-	-	-	-	-	33.985	27.940	
38.10	48.26	38.10	5.08	38.10	-	-	-	-	0.4	0.4	-	0.5	0.5	-	-	-	-	0.6	2.5		
					-	-	-	-	.154	.154	-	.218	.218	-	-	-	-	-	.344	.436	
					-	-	-	-	3.912	3.912	-	5.537	5.537	-	-	-	-	-	8.738	11.074	
					-	-	-	-	2.067	2.067	-	1.939	1.939	-	-	-	-	-	1.687	1.503	
50.80	60.45	38.10	5.59	44.45	-	-	-	-	52.502	52.502	-	49.251	49.251	-	-	-	-	42.850	38.176		
					-	-	-	-	0.6	0.6	-	0.8	0.8	-	-	-	-	-	1.3	3.0	
					-	-	-	-	.203	.203	-	.276	.276	-	-	-	-	-	-	.375	.552
					-	-	-	-	5.156	5.156	-	7.010	7.010	-	-	-	-	-	-	9.525	14.021
63.50	73.15	38.10	7.11	50.80	-	-	-	-	2.469	2.469	-	2.323	2.323	-	-	-	-	2.125	1.771		
					-	-	-	-	62.713	62.713	-	59.004	59.004	-	-	-	-	-	53.975	44.983	
					-	-	-	-	0.9	0.9	-	1.0	1.0	-	-	-	-	-	-	1.8	4.0
					-	-	-	-	.216	.216	-	.300	.300	-	-	-	-	-	-	.438	.600
76.20	88.90	50.80	7.62	63.50	-	-	-	-	5.486	5.486	-	7.620	7.620	-	-	-	-	11.125	15.240		
					-	-	-	-	3.068	3.068	-	2.900	2.900	-	-	-	-	-	2.624	2.300	
					-	-	-	-	77.927	77.927	-	73.660	73.660	-	-	-	-	-	66.650	58.420	
					-	-	-	-	1.5	1.5	-	1.8	1.8	-	-	-	-	-	2.9	6.0	
88.90	101.60	63.50	8.13	76.20	-	-	-	-	.226	.226	-	.318	.318	-	-	-	-	-	.636*		
					-	-	-	-	5.740	5.740	-	8.077	8.077	-	-	-	-	-	-	16.154	
					-	-	-	-	3.548	3.548	-	3.364	3.364	-	-	-	-	-	-	2.728	2.288
					-	-	-	-	90.119	90.119	-	85.446	85.446	-	-	-	-	-	-	-	69.291
101.60	114.30	63.50	8.64	76.20	-	-	-	-	1.9	1.9	-	2.8	2.8	-	-	-	-	-	7.5		
					-	-	-	-	.237	.237	-	.337	.337	-	.438	-	-	.531	.674		
					-	-	-	-	6.020	6.020	-	8.560	8.560	-	11.125	-	-	13.487	17.120		
					-	-	-	-	4.026	4.026	-	3.826	3.826	-	3.438	-	-	3.438	3.152		
127.00	141.22	76.20	9.65	88.90	-	-	-	-	102.260	102.260	-	97.180	97.180	-	92.050	-	87.325	80.061			
					-	-	-	-	2.5	2.5	-	3.3	3.3	-	5.8	-	5.9	-	9.0		
					-	-	-	-	.258	.258	-	.375	.375	-	.500	-	-	.625	.750		
					-	-	-	-	6.553	6.553	-	9.525	9.525	-	12.700	-	-	15.875	19.050		
127.00	141.22	76.20	9.65	88.90	-	-	-	-	5.047	5.047	-	4.813	4.813	-	4.563	-	4.313	4.063			
					-	-	-	-	128.194	128.194	-	122.250	122.250	-	115.900	-	109.550	103.200			
					-	-	-	-	4.7	4.7	-	5.5	5.5	-	8.9	-	-	10.0	13.5		
					-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

GENERAL NOTES: The shape of these caps shall be ellipsoidal and shall conform to the shape requirements as given in the ASME Boiler and Pressure Vessel Code.
 NOTES: (1) Length E applies for thickness not exceeding that given in column "Limiting Wall Thickness for Length E."
 (2) Length E₁ applies for thickness greater than that given in column "Limiting Wall Thickness" for NPS 24 and smaller. For NPS 26 and larger, length E₁ shall be by agreement between manufacturer and purchaser.



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SPECIFICATIONS:

ASME B16.9, NACE MR-01-75/ISO 15162, 10CFR49 Part 192 ASME Pressure Vessel and Piping Design Codes and special customer specifications.

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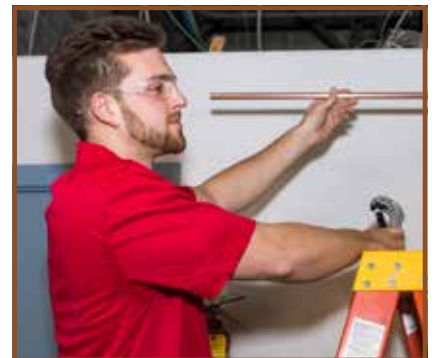
Product	Application	Temper	Lengths	Color Code	Specification
Water Tube Type K	Domestic Water Service, Fire Protection, Solar, Fuel Oil, HVAC	Hard/ Soft	10 and 20 ft. Straight Length 60 and 100 ft. Coil	Green	C12200, ASTM B-88
Water Tube Type L	Domestic Water Service, Fire Protection, Solar, Fuel Oil, HVAC, Natural Gas	Hard/Soft	10 and 20 ft. Straight Length 60 and 100 ft. Coil	Blue	C12200, ASTM B-88
Water Tube Type M	Domestic Water Service, Fire Protection, Solar, Fuel Oil, HVAC	Hard	10 and 20 ft. Straight Length	Red	C12200, ASTM B-88
DWV Tube	Drainage	Hard	10 and 20 ft. Straight Length	Yellow	C12200, ASTM B-306

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STANDARD COPPER TUBE

Mueller Copper Tube products are manufactured in the USA. All tubing produced in Fulton, MS, and Cedar City, UT is seamless and of UNS C12200 grade of copper. It is manufactured to meet the chemical, mechanical, cleanliness, and eddy current testing requirements of the applicable ASTM specifications set forth below.

Although Mueller Copper Tube strives to meet all requirements specified in the ASTM specifications, Standard Tube may not fully meet ASTM dimensional requirements. Standard Tube will be provided unless Certified Tube is clearly defined on the Purchase Order. When specified at order placement, Mueller Copper Tube can supply Certified Tube to meet all requirements of the current applicable ASTM specification, at an additional cost.

- Streamline Copper Water Tube (Types K,L,M) is produced in accordance with, ASTM B88 and ANSI/ NSF 61**
- Streamline Copper Refrigeration Service Coils are produced in accordance with ASTM B280
- Streamline Nitrogenized ACR Hard Drawn Copper Tube is produced in accordance with ASTM B280
- Streamline Copper Drainage Tube (DWV) is produced in accordance with ASTM B306
- Oxygen & Medical Service Tube - To ASTM B819 (Types K & L) Hard Drawn Straight Lengths Only in accordance to CGA Cleanliness Specification; CGA G4.1 (Compressed Gas Association); & NFPA 99 (Health Care Facilities).

** NSF 61 Restriction Statement Copper Tube (Alloy C12200) is certified by Truesdail to NSF/ANSI 61 / 372 for public water supplies meeting or in the process of meeting the U.S. EPA Lead and Copper Rule (56FR 26460, June 7, 1991). Water supplies with pH less than 6.5 may require corrosion control to limit copper solubility in drinking water."

Last revision: May 15, 2020

COPPER TUBE FOR PLUMBING AND MECHANICAL APPLICATIONS

Job Name	Contractor
Job Location	Wholesaler
Engineer	Streamline[®] Rep

Product Description:

Streamline[®] CopperTube for use in plumbing and mechanical applications. Available sizes (Type K, L, M, & DWV) ranging from ¼” to 8” in diameter. All tube shall be manufactured in the United States.

Material:

Streamline[®] CopperTube is manufactured from UNS C12200 grade of copper.

Key Specifications:

Streamline[®] CopperTube (Type K, L, M) shall conform to the NSF/ANSI 61 Annex G requirements and is manufactured to meet ASTM B88. Copper drainage tube (DWV) is made to meet ASTM B306. Copper refrigeration coils, ACR/Nitrogenized straight lengths and line sets are made to meet the chemical, mechanical, cleanness and eddy current testing requirements of the applicable specifications of ASTM B280.

Installation:

Installations shall comply with the latest applicable building codes for the local jurisdiction. For detailed installation instructions, consult the Copper Development Association at copper.org.

References:

- | | |
|---------------------|--|
| C12200 | 99.9% Pure Copper (can be used for potable water) |
| NSF/ANSI 61 Annex G | Safe Drinking Water Act (third party certification) |
| ASTM B88 | Seamless Copper Water and Gas Tube (Type K, L, M) |
| ASTM B280 | Seamless Copper Tube for Air Conditioning and Refrigerants |
| ASTM B306 | Seamless Drainage Tube Code (DWV) |

Copper [tube or fitting] UNS C122000 has been evaluated by NSF International to NSF/ANSI 61 for use in drinking water supplies of pH 6.5 and above. Drinking water supplies that are less than pH 6.5 may require corrosion control to limit leaching of copper into the drinking water.



COPPER TUBE DATA

Streamline[®] Copper Tube sets the standard for quality, consistency and service in the plumbing industries. With a full line of copper tube products to support most all plumbing supply and DWV applications, Streamline[®] Copper Tube is available in all common types including Type K, Type L, Type M and DWV. Each piece of tube is incised marked and color coded for easy, long lasting identity. Manufactured in accordance with applicable standards, our ongoing commitment to quality continues to make Streamline[®] Copper Tube the preferred and specified brand of industry professionals.

TYPE K RATED WORKING PRESSURE (PSIG)

NOM. DIA.	WT/FT	FT/BNDL	150°F	200°F	300°F	400°F
1/4	0.145	500	913	860	842	537
3/8	0.269	500	960	904	885	565
1/2	0.344	500	758	713	698	446
5/8	0.418	200	626	589	577	368
3/4	0.641	200	724	682	668	426
1	0.839	100	557	524	513	327
1 1/4	1.04	100	452	425	416	266
1 1/2	1.36	100	420	396	387	247
2	2.06	–	370	348	341	217
2 1/2	2.93	–	338	319	312	199
3	4.00	–	328	308	302	193
3 1/2	5.12	–	311	293	286	183
4	6.51	–	306	288	282	180
5	9.67	–	293	276	270	172
6	13.90	–	295	277	271	173
8	25.90	–	314	295	289	184

TYPE L

1/4	0.126	500	775	729	714	456
3/8	0.198	500	662	623	610	389
1/2	0.285	500	613	577	565	361
5/8	0.362	200	537	505	495	316
3/4	0.455	200	495	466	456	291
1	0.655	100	420	395	387	247
1 1/4	0.884	100	373	351	344	219
1 1/2	1.14	100	347	327	320	204
2	1.75	–	309	291	285	182
2 1/2	2.48	–	285	269	263	168
3	3.33	–	270	254	248	159
3 1/2	4.29	–	258	243	238	152
4	5.38	–	249	235	230	147
5	7.61	–	229	215	211	135
6	10.2	–	213	201	196	125
8	19.3	–	230	216	212	135

Tables give computed allowable stress for annealed copper tube at indicated temperature.

COPPER TUBE DATA

TYPE M RATED WORKING PRESSURE (PSIG)

NOM. DIA.	WT/FT	FT/BNDL	150°F	200°F	300°F	400°F
3/8	0.145	500	485	456	447	285
1/2	0.204	500	420	395	387	247
3/4	0.328	200	346	326	319	204
1	0.465	100	286	270	264	169
1 1/4	0.682	100	287	271	265	169
1 1/2	0.94	100	282	265	259	166
2	1.46	-	254	239	234	149
2 1/2	2.03	-	233	219	215	137
3	2.68	-	215	203	199	127
3 1/2	3.58	-	214	202	197	126
4	4.66	-	213	201	197	126
5	6.66	-	198	186	182	116
6	8.92	-	186	175	171	109
8	16.5	-	195	183	180	115

TYPE DWV

NOM. DIA	WT/FT	FT/BNDL	150°F	200°F	300°F	400°F
1 1/4	0.65	100	280	269	258	165
1 1/2	0.809	100	249	240	230	147
2	1.07	-	185	178	170	109
3	1.69	-	135	130	125	80
4	2.87	-	127	122	117	75
5	4.43	-	129	124	119	76
6	6.1	-	126	121	116	74
8	10.6	-	124	119	114	73

Table give computed allowable stress for annealed copper tube at indicated temperature.

TECHNICAL DATA

Values of allowable internal working pressure for copper tube in service are based on the formula from ANSI B31, Standard Code for Pressure Piping:

$$P = \frac{2 S tm}{D \text{ max} - 0.8 \text{ tm}}$$

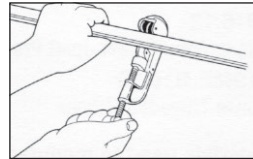
P = Allowable Pressure	@ 150°F S = 5100 PSIG annealed
S = Allowable stress	@ 200°F S = 4800 PSIG annealed
T = Wall thickness	@ 300°F S = 4700 PSIG annealed
D Max = Outside Diameter	@ 400°F S = 3000 PSIG annealed

All ratings listed for types K, L, M, DWV and refrigeration service tube in the preceding charts are calculated for tube in the annealed condition. These values should be used when soldering, brazing or welding is employed for joining components in a system. While the ratings for hard drawn tube are substantially higher, they should only be used for systems using properly designed flare or compression mechanical joints, since joining by any heating process might anneal (soften) the tube.

In designing a system, careful consideration should also be given to joint ratings as well as those of the components.

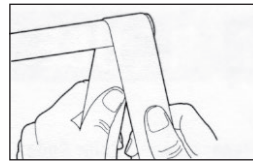
COPPER TUBE AND SOLDER TYPE FITTINGS

1. Cut tube square with the cutter or fine hack saw (32 tooth blade is recommended). Remove Burr.



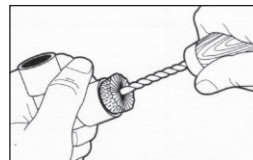
1. Cut tube to length & remove burr with file or scraper.

2. Clean outside end of copper tube thoroughly with sand cloth or sandpaper equal depth of fitting. Leave no dark spots.



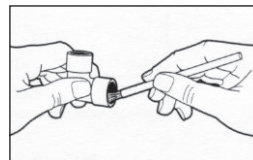
2. Clean outside of tube with sandpaper or sand cloth.

3. Clean inside of fitting carefully to tube stop with wire brush. Note: Sand cloth or sandpaper may also be used.



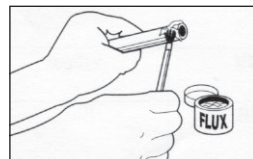
3. Clean inside of fitting with wire brush, sand cloth or sandpaper.

4. Using a brush, apply light uniform coat of soldering flux to the outside of the tube and inside of the fitting.



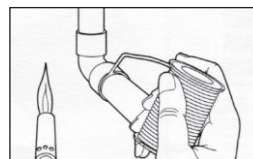
4. Apply flux thoroughly to inside of fitting.

5. Slip tube into fitting to tube stop. Turn tube back and forth once or twice to distribute flux evenly.



5. Apply flux thoroughly to outside of tube - assemble tube and fitting.

6. Apply heat uniformly around the fitting with torch. When solder melts upon contact with heated fitting, the proper soldering temperature has been reached. Remove flame and feed solder slightly off center at the bottom of the joint. Proceed across the bottom of the fitting and up to the top center position. Return to the starting point, and then proceed up the incomplete side to the top, again, overlapping the solder metal. Wipe off surplus solder with a piece of cloth.



6. Apply heat with torch. When solder melts upon contact with heated fitting, the proper temp for soldering has been reached. Remove flame & feed solder to the joint at one or two points until a ring of solder appears at the end of the fitting.

CAUTION: No not overheat the joint or direct the flame into the face of the fitting cup. Overheating could burn the flux, which will destroy its effectiveness and the solder will not enter the joint properly.

Specifications

All of the advantages found in copper as a metal have been capitalized to the utmost in the manufacture of NIBCO® Fittings. Because of the accuracy of construction and design, copper plumbing is more efficient and less expensive.

NIBCO manufactures nine general types of fittings: Wrot Pressure; Cast Pressure; Wrot Drainage; Cast Drainage; Flanges; Flared Tube; Threaded Bronze; Insert Fittings for PEX; Barbed Insert Fittings for Polybutylene. Each has its particular place and use and each offers its own advantages when used for the proper service requirement.

Material & Construction — NIBCO Fittings are made from the highest quality raw materials — Cast Fittings are offered in traditional copper alloys C83600, and C84400 and high quality lead-free* dezincification-resistant (DZR) silicon bronze alloy C87850 cast or 69300 forged Performance Bronze™ per ASTM Specification B584. Wrot Copper Fittings are made from commercially pure copper mill products already meeting current lead-free* requirements per ASTM Specifications B75 Alloy C12200.

Lead Free refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤ 0.25%.

NIBCO Fittings are produced to meet the requirements of applicable standards.

The majority of NIBCO® brand wrot and cast fittings are manufactured in the U.S.A. and Mexico*. The manufacturing plants at Stuarts Draft, VA, Nacogdoches, TX and Reynosa, Mexico are registered to ISO 9001 quality standards.

Following is suggested phrasing to be incorporated in your specifications or bills of material for Copper Tube Fittings.

WROT SOLDER JOINT FITTINGS — "Solder Joint Fittings shall be produced to one of the following specifications:

1. "Material and workmanship shall be in accordance with ASME/ANSI B16.22; Wrought Copper and Copper Alloy Solder Joint Pressure Fittings."
2. "The dimensional, material and workmanship shall meet the requirements of MSS SP-104; Wrought Copper Solder Joint Pressure Fittings."
3. "The dimensional, material and workmanship of 5"–12" copper fittings shall meet the requirements of MSS SP-109 "Welded Fabricated Copper Solder Joint Pressure Fittings."
4. "Third party certified to NSF/ANSI/CAN-61."
5. "Lead-free* fittings are third party certified to NSF/ANSI/CAN-61."

CAST COPPER ALLOY SOLDER JOINT FITTINGS — "Cast Copper Alloy Solder Joint Fittings shall be in accordance with ASME B16.18."

WROT DRAINAGE FITTINGS — "Wrot Drainage Fittings shall be in accordance with ASME B16.29."

CAST COPPER ALLOY SOLDER JOINT DRAINAGE FITTINGS — "Cast Copper Alloy Solder Joint Drainage Fittings shall be in accordance with ASME B16.23."

CAST COPPER ALLOY FLARED TUBE FITTINGS — "Cast Copper Alloy Flared Tube Fittings shall be in accordance with ASME B16.26."

CAST COPPER ALLOY FLANGES AND FLANGED FITTINGS —

CLASS 150 — "Cast Copper Alloy Flanges and Flanged Fittings shall meet the requirements of MSS SP-106" and/or "the workmanship and dimensions of Federal Specifications WW-F-406 or ASME Std. B16.24."

CLASS 125 — Material, workmanship and dimensions of flanges shall be in accordance with MSS SP-106."

CAST BRONZE THREADED FITTINGS —

"Cast Bronze Threaded Fittings shall be in accordance with ASME B16.15."

POLYBUTYLENE COPPER INSERT TYPE VALVES AND FITTINGS — "Wrot Copper Insert Fittings shall be manufactured per MSS SP-103."

NIBCO® Copper Tube Fittings are all produced to above Standards. To simplify, write your specifications to read: "Copper Tube Fittings to be in accordance with specifications as outlined in NIBCO Copper Fittings Catalog."

WROT COPPER MEDICAL GAS SYSTEM COMPONENTS —

"Wrot copper fittings that are to be installed in medical gas applications shall be prepared in accordance with NFPA 99, Health Care Facilities Gas and Vacuum Systems and the Compressed Gas Association, Pamphlet G4.1. Packaging shall be adequately protective and include labeling that identifies the preparer and states that the product has been cleaned and bagged for oxygen or med gas service."

For technical information and dimensions refer to the engineering section contained in this catalog.

* NIBCO, may, from time to time, source and/or supplement a wrot or cast fitting product from suppliers outside of the U.S.A. and/or Mexico.

Visit our website for the most current information.

SOLDER FITTINGS

Job Name:	
Job Location:	
Engineer:	
Contractor:	
Tag:	
PO Number:	
Representative:	
Wholesale Distributor:	

Description:

WROT-COPPER and CAST-COPPER Alloy fittings from Elkhart Products Corporation are for use in plumbing and other mechanical applications. All 1/8” – 8” fittings are manufactured in the United States at one of our three locations; Elkhart Indiana, Geneva Indiana and Fayetteville Arkansas. WROTCOPPER fittings are designed to join ASTM B88 and ASTM B280 seamless copper tube.

Specifications:

NSF/ANSI 61	Drinking Water System Components - Health Effects
MSS SP73	Brazing Joints for Copper and Copper Alloy Pressure Fittings
MSS SP104	Wrought Copper Solder Joint Pressure Fittings
MSS SP106	Cast Copper Alloy Flanges and Flange Fittings; Class 125, 150 and 300
MSS SP123	Non-Ferrous Threaded and Solder-Joint Unions for Use with Copper Water Tube
MSS SP109	Welded Fabricated Copper Solder Joint Pressure Fittings
ASME/ANSI B16.29	Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV
ASME/ANSI B16.18	Cast Copper Alloy Solder Joint Pressure Fittings
ASME/ANSI B16.15	Cast Bronze Threaded Fittings
ASME/ANSI B16.26	Cast Copper Alloy Fittings for Flared Copper Tube
ASME/ANSI B16.23	Cast Copper Alloy Solder Joint Drainage Fittings - DWV
ASME/ANSI B16.24	Bronze Pipe Flanges and Flanged Fittings
ASME/ANSI B16.22	Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings
ASME/ANSI B16.50	Wrought Copper and Copper Alloy Braze Joint Pressure Fittings
RoHS 2011/65/EC	European Union’s Restrictions of Hazardous Substances

Material:

ASTM B75 Alloy C12200	Seamless Copper Tube (0% Lead)
ASTM B152 Alloy C11000	Copper Sheet, Strip, Plate and Rolled Bar (0% Lead)
ASTM B584 Alloy C84400	Copper Alloy Sand Castings for General Applications (>0.25% Lead)
ASTM B584 Alloy C89833	Copper Alloy Sand Castings (< 0.25% Lead)
ASTM B584 Alloy C87700	Copper Alloy Sand Castings (< 0.25% Lead)

LEED Compliance:

The copper tubing and rod used to produce all E.P.C. copper fittings is manufactured from copper cathode which in turn is made up from twenty-five (25) percent post-consumer scrap as described above. Another fifty (50) percent is postindustrial scrap (turnings, shavings and chips).

Lead Free

All WROTCOPPER fittings are manufactured in compliance with federal and state lead content requirements of 0.25% lead or less. Products are identified with “LF”, “LL” or NSF 61-G or NSF 372.

Elkhart Products Corporation
 1255 Oak Street, Elkhart, IN 46514
 www.elkhartproducts.com | (574) 264-3181

This specification is provided for reference only. Elkhart Products Corporation reserves the right to change any portion of this specification without notice and without incurring obligation to make such changes to Elkhart products previously or subsequently sold.



SOLDER FITTINGS

Job Name:	
Job Location:	
Engineer:	
Contractor:	
Tag:	
PO Number:	
Representative:	
Wholesale Distributor:	

Large Diameter Weld:

Each large diameter (5", 6" and 8") fitting is electrically welded using silicone bronze meeting AWS A5.7-91R and AMS 4616B to produce a MSS SP-109 compliant product. Each fitting is individually tested with air under water. The burst pressure of EPC welded fitting exceeds the recommended working pressure of the comparable diameter, annealed, straight, seamless ASTM B88-96 type "L" copper water tube by safety factor of 4.

Pressure Ratings:

The table of maximum working pressures below must be understood to reflect what is generally considered as good engineering practice under reasonably constant and favorable conditions; i.e., pressures which are fairly steady, absence of particularly corrosive media, etc. Unusual conditions require increased safety factors and therefore, lower working pressures should be used. From the Copper and Brass Research Association;

Rated Internal Working Pressures of Piping System Made of Copper Water Tube and Soldered Fittings

Solder Used in joints	Service Temp. °F	POUNDS PER SQUARE INCH Water (a) Copper Water Tube-Nominal Sizes			
		1/8" to 1" Incl.	1 1/4" to 2" Incl.	2 1/2" to 4" Incl.	5" to 8" Incl.
* 50-50 Tin-Lead (b)	100	200	175	150	135
	150	150	125	100	90
	200	100	90	75	70
	250	85	75	50	45
95-5 Tin-Antimony (c) (d)	100	500	400	300	270
	150	400	350	275	250
	200	300	250	200	180
	250	200	175	150	135
Brazing Alloys Melting at or above 1000° F	Temperature and pressure ratings consistent with the materials and procedures employed.				

* The data given for 50% tin-50% lead applies also for the 40% tin-60% lead alloy

(a) Including other noncorrosive liquids and gases

(b) ASTM B32, Alloy Grade Sn 50

(c) ASTM B32, Alloy Grade Sb 5

(d) The safe Drinking Water Act Amendment of 1986 prohibits the use in potable water systems of any solder having a lead content in excess of 0.2%

SOLDER FITTINGS

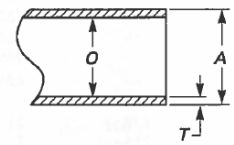
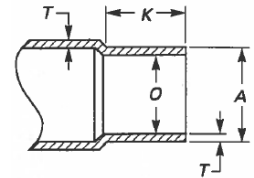
Job Name:	
Job Location:	
Engineer:	
Contractor:	
Tag:	
PO Number:	
Representative:	
Wholesale Distributor:	

Dimensions:

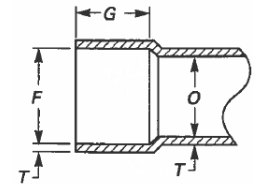
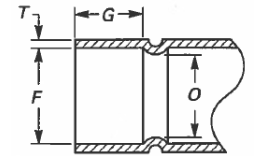
Wrot Copper and Bronze Solder-Joint Pressure Fittings

Dimensions of Soldered-Joint Ends (in inches)

Standard Water Tube Size	Male End		Female End			Wall Thickness T	Inside Diameter of Fitting O	
	Outside Diameter A		Length K	Inside Diameter F				Depth G
	Min.	Max.		Min.	Max.			
1/8	0.248	0.251	0.31	0.252	0.256	0.25	.019	0.18
1/4	0.373	0.376	0.38	0.377	0.381	0.31	.023	0.30
3/8	0.497	0.501	0.44	0.502	0.506	0.38	.026	0.39
1/2	0.622	0.626	0.56	0.627	0.631	0.50	.029	0.52
5/8	0.747	0.751	0.69	0.752	0.756	0.62	.031	0.63
3/4	0.872	0.876	0.81	0.877	0.881	0.75	.033	0.74
1	1.122	1.127	0.97	1.128	1.132	0.91	.040	0.98
1 1/4	1.372	1.377	1.03	1.378	1.382	0.97	.044	1.23
1 1/2	1.621	1.627	1.16	1.628	1.633	1.09	.051	1.47
2	2.121	2.127	1.41	2.128	2.133	1.34	.059	1.94
2 1/2	2.621	2.627	1.53	2.628	2.633	1.47	.067	2.42
3	3.121	3.127	1.72	3.128	3.133	1.66	.075	2.89
3 1/2	3.621	3.627	1.97	3.628	3.633	1.91	.086	3.67
4	4.121	4.127	2.22	4.128	4.133	2.16	.096	3.84
5	5.121	5.127	2.72	5.128	5.133	2.66	.111	4.70
6	6.121	6.127	3.22	6.128	6.133	3.09	.124	5.72
8	8.119	8.127	4.09	8.128	8.133	3.97	.173	7.55



Male End (FTG)



Female End (C)

Installation Instructions:

1. Cut the tube end square using a rotary tube cutter or fine toothed steel saw
2. Deburr and ream to remove burrs on inside and outside of tube
3. Clean outside of tube to remove oxides and surface oils. Should have a shiny finish, leaving no dark spots
4. Clean inside of fitting to remove oxides and surface oils. Should have a shiny finish, leaving no dark spots
5. Apply flux using brush to apply light uniform coat on the outside of tube and inside of fitting
6. Insert tube into fitting
7. Apply uniform heat; proper heat is achieved when the solder melts upon contact with fitting. Removing flame work solder from bottom to top each side at a time. Wipe off excess solder.

Caution:

Do not overheat the joint which can burn the flux, which will affect the solder's ability to enter the joint properly.

SUBMITTAL SHEET

SOLDER FITTINGS

Job Name:	
Job Location:	
Engineer:	
Contractor:	
Tag:	
PO Number:	
Representative:	
Wholesale Distributor:	

Internal Pressure-Temperature Ratings for Copper Fittings, p.s.i.

Standard Water Tube Size	-20°F To						
	100°F	150°F	200°F	250°F	300°F	350°F	400°F
1/4	910	770	740	725	710	605	455
3/8	775	660	635	620	610	515	385
1/2	720	610	585	575	565	480	360
5/8	630	535	515	505	490	420	315
3/4	580	490	475	465	455	385	290
1	490	420	400	395	385	325	245
1 1/4	435	370	355	350	340	290	215
1 1/2	405	345	330	325	315	270	200
2	360	305	295	290	280	240	180
2 1/2	335	285	270	265	260	220	165
3	315	265	255	250	245	210	155
3 1/2	300	255	245	240	235	200	150
4	290	245	235	230	225	195	145
5	265	225	215	215	210	175	130
6	250	210	200	200	195	165	125

PRESSURE LOSS IN FITTINGS EXPRESSED AS EQUIVALENT LENGTH OF TUBE, FEET						
Normal or Standard in Inches	Wrot Copper Fittings					
	90 Degree Ell	45 Degree Ell	Tee Straight Run	Tee Side Branch	Coupling	180 Degree Bend
3/8	0.5	0.5	0.5	1	-	0.5
1/2	0.5	0.5	0.5	1	-	1
5/8	0.5	0.5	0.5	2	-	1
3/4	1	0.5	0.5	2	-	2
1	1	1	0.5	3	-	2
1-1/4	2	1	0.5	4	0.5	3
1-1/2	2	2	1	5	0.5	4
2	2	2	1	7	0.5	8
2-1/2	2	3	2	9	0.5	16
3	3	4	-	-	1	20

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23 21 13, 2.01D Equipment Drains & Overflows

SUITABLE FOR MULTIPLE FIELD USES

Hard Drawn Straight Lengths / Soft Annealed Coils



Founded in 1942, Cambridge-Lee Industries LLC is the copper-focused manufacturer and distributor for the Plumbing, HVAC, Construction, Industrial, and OEM markets.

We pride ourselves on being the easiest company to work with and the best company to work for. Our employees are customer-driven, providing extraordinary service, working with you to solve your problems, and offering new value-add products, services and customized options.

Made in USA

For more information

Phone 610.926.4141
 Toll-free 800.926.5588
 Fax 800.255.7317
 Email CLsales@camlee.com
 86 Tube Dr.
 Reading, PA 19605
www.camlee.com



Cambridge-Lee Industries LLC

Cambridge-Lee Industries manufactures a full range of copper plumbing tube suitable for many uses in the field.

- All tubing is manufactured under strict quality control procedures and inspections
- All tubing is produced to meet chemical, mechanical, cleanliness and Eddy-Current Testing
- Type K, L & M tube meets ASTM B88 specifications
- DWV copper tube meets ASTM B306 specifications
- Our entire business - from sales, production, logistics and delivery is built on quality and customer satisfaction



Uses:

- Water Service and Distribution
- Fire Protection
- Solar
- Drainage
- Fuel Oil / Gas Distribution
- HVAC

Available Sizes

Product	Application	Temper	Lengths	Color Code	Specification
Water Tube Type K	Domestic Water Service, Fire Protection, Solar, Fuel Oil, HVAC	Hard/ Soft	10 and 20 ft. Straight Length 60 and 100 ft. Coil	Green	C12200, ASTM B-88
Water Tube Type L	Domestic Water Service, Fire Protection, Solar, Fuel Oil, HVAC, Natural Gas	Hard/Soft	10 and 20 ft. Straight Length 60 and 100 ft. Coil	Blue	C12200, ASTM B-88
Water Tube Type M	Domestic Water Service, Fire Protection, Solar, Fuel Oil, HVAC	Hard	10 and 20 ft. Straight Length	Red	C12200, ASTM B-88
DWV Tube	Drainage	Hard	10 and 20 ft. Straight Length	Yellow	C12200, ASTM B-306

custom lengths available

Our Promise:

We integrate our manufacturing, marketing, and distribution capabilities to provide our customers with the highest quality products and services and offer them a single source of copper tubing.

We have a solution for every freight challenge





MUELLER STREAMLINE CO.
150 Schilling Blvd., Suite 201
Collierville, TN 38017
P 901.751.7709

STANDARD COPPER TUBE

Mueller Copper Tube products are manufactured in the USA. All tubing produced in Fulton, MS, and Cedar City, UT is seamless and of UNS C12200 grade of copper. It is manufactured to meet the chemical, mechanical, cleanliness, and eddy current testing requirements of the applicable ASTM specifications set forth below.

Although Mueller Copper Tube strives to meet all requirements specified in the ASTM specifications, Standard Tube may not fully meet ASTM dimensional requirements. Standard Tube will be provided unless Certified Tube is clearly defined on the Purchase Order. When specified at order placement, Mueller Copper Tube can supply Certified Tube to meet all requirements of the current applicable ASTM specification, at an additional cost.

- Streamline Copper Water Tube (Types K,L,M) is produced in accordance with, ASTM B88 and ANSI/ NSF 61**
- Streamline Copper Refrigeration Service Coils are produced in accordance with ASTM B280
- Streamline Nitrogenized ACR Hard Drawn Copper Tube is produced in accordance with ASTM B280
- Streamline Copper Drainage Tube (DWV) is produced in accordance with ASTM B306
- Oxygen & Medical Service Tube - To ASTM B819 (Types K & L) Hard Drawn Straight Lengths Only in accordance to CGA Cleanliness Specification; CGA G4.1 (Compressed Gas Association); & NFPA 99 (Health Care Facilities).

** NSF 61 Restriction Statement Copper Tube (Alloy C12200) is certified by Truesdail to NSF/ANSI 61 / 372 for public water supplies meeting or in the process of meeting the U.S. EPA Lead and Copper Rule (56FR 26460, June 7, 1991). Water supplies with pH less than 6.5 may require corrosion control to limit copper solubility in drinking water."

Last revision: May 15, 2020

COPPER TUBE FOR PLUMBING AND MECHANICAL APPLICATIONS

Job Name	Contractor
Job Location	Wholesaler
Engineer	Streamline[®] Rep

Product Description:

Streamline[®] CopperTube for use in plumbing and mechanical applications. Available sizes (Type K, L, M, & DWV) ranging from ¼" to 8" in diameter. All tube shall be manufactured in the United States.

Material:

Streamline[®] CopperTube is manufactured from UNS C12200 grade of copper.

Key Specifications:

Streamline[®] CopperTube (Type K, L, M) shall conform to the NSF/ANSI 61 Annex G requirements and is manufactured to meet ASTM B88. Copper drainage tube (DWV) is made to meet ASTM B306. Copper refrigeration coils, ACR/Nitrogenized straight lengths and line sets are made to meet the chemical, mechanical, cleanliness and eddy current testing requirements of the applicable specifications of ASTM B280.

Installation:

Installations shall comply with the latest applicable building codes for the local jurisdiction. For detailed installation instructions, consult the Copper Development Association at copper.org.

References:

C12200	99.9% Pure Copper (can be used for potable water)
NSF/ANSI 61 Annex G	Safe Drinking Water Act (third party certification)
ASTM B88	Seamless Copper Water and Gas Tube (Type K, L, M)
ASTM B280	Seamless Copper Tube for Air Conditioning and Refrigerants
ASTM B306	Seamless Drainage Tube Code (DWV)

Copper [tube or fitting] UNS C122000 has been evaluated by NSF International to NSF/ANSI 61 for use in drinking water supplies of pH 6.5 and above. Drinking water supplies that are less than pH 6.5 may require corrosion control to limit leaching of copper into the drinking water.



COPPER TUBE DATA

Streamline[®] Copper Tube sets the standard for quality, consistency and service in the plumbing industries. With a full line of copper tube products to support most all plumbing supply and DWV applications, Streamline[®] Copper Tube is available in all common types including Type K, Type L, Type M and DWV. Each piece of tube is incised marked and color coded for easy, long lasting identity. Manufactured in accordance with applicable standards, our ongoing commitment to quality continues to make Streamline[®] Copper Tube the preferred and specified brand of industry professionals.

TYPE K RATED WORKING PRESSURE (PSIG)

NOM. DIA.	WT/FT	FT/BNDL	150°F	200°F	300°F	400°F
1/4	0.145	500	913	860	842	537
3/8	0.269	500	960	904	885	565
1/2	0.344	500	758	713	698	446
5/8	0.418	200	626	589	577	368
3/4	0.641	200	724	682	668	426
1	0.839	100	557	524	513	327
1 1/4	1.04	100	452	425	416	266
1 1/2	1.36	100	420	396	387	247
2	2.06	–	370	348	341	217
2 1/2	2.93	–	338	319	312	199
3	4.00	–	328	308	302	193
3 1/2	5.12	–	311	293	286	183
4	6.51	–	306	288	282	180
5	9.67	–	293	276	270	172
6	13.90	–	295	277	271	173
8	25.90	–	314	295	289	184

TYPE L

1/4	0.126	500	775	729	714	456
3/8	0.198	500	662	623	610	389
1/2	0.285	500	613	577	565	361
5/8	0.362	200	537	505	495	316
3/4	0.455	200	495	466	456	291
1	0.655	100	420	395	387	247
1 1/4	0.884	100	373	351	344	219
1 1/2	1.14	100	347	327	320	204
2	1.75	–	309	291	285	182
2 1/2	2.48	–	285	269	263	168
3	3.33	–	270	254	248	159
3 1/2	4.29	–	258	243	238	152
4	5.38	–	249	235	230	147
5	7.61	–	229	215	211	135
6	10.2	–	213	201	196	125
8	19.3	–	230	216	212	135

Tables give computed allowable stress for annealed copper tube at indicated temperature.

COPPER TUBE DATA

TYPE M RATED WORKING PRESSURE (PSIG)

NOM. DIA.	WT/FT	FT/BNDL	150°F	200°F	300°F	400°F
3/8	0.145	500	485	456	447	285
1/2	0.204	500	420	395	387	247
3/4	0.328	200	346	326	319	204
1	0.465	100	286	270	264	169
1 1/4	0.682	100	287	271	265	169
1 1/2	0.94	100	282	265	259	166
2	1.46	-	254	239	234	149
2 1/2	2.03	-	233	219	215	137
3	2.68	-	215	203	199	127
3 1/2	3.58	-	214	202	197	126
4	4.66	-	213	201	197	126
5	6.66	-	198	186	182	116
6	8.92	-	186	175	171	109
8	16.5	-	195	183	180	115

TYPE DWV

NOM. DIA	WT/FT	FT/BNDL	150°F	200°F	300°F	400°F
1 1/4	0.65	100	280	269	258	165
1 1/2	0.809	100	249	240	230	147
2	1.07	-	185	178	170	109
3	1.69	-	135	130	125	80
4	2.87	-	127	122	117	75
5	4.43	-	129	124	119	76
6	6.1	-	126	121	116	74
8	10.6	-	124	119	114	73

Table give computed allowable stress for annealed copper tube at indicated temperature.

TECHNICAL DATA

Values of allowable internal working pressure for copper tube in service are based on the formula from ANSI B31, Standard Code for Pressure Piping:

$$P = \frac{2 S tm}{D \text{ max} - 0.8 tm}$$

P = Allowable Pressure	@ 150°F S = 5100 PSIG annealed
S = Allowable stress	@ 200°F S = 4800 PSIG annealed
T = Wall thickness	@ 300°F S = 4700 PSIG annealed
D Max = Outside Diameter	@ 400°F S = 3000 PSIG annealed

All ratings listed for types K, L, M, DWV and refrigeration service tube in the preceding charts are calculated for tube in the annealed condition. These values should be used when soldering, brazing or welding is employed for joining components in a system. While the ratings for hard drawn tube are substantially higher, they should only be used for systems using properly designed flare or compression mechanical joints, since joining by any heating process might anneal (soften) the tube.

In designing a system, careful consideration should also be given to joint ratings as well as those of the components.

COPPER TUBE AND SOLDER TYPE FITTINGS

1. Cut tube square with the cutter or fine hack saw (32 tooth blade is recommended). Remove Burr.

2. Clean outside end of copper tube thoroughly with sand cloth or sandpaper equal depth of fitting. Leave no dark spots.

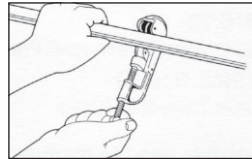
3. Clean inside of fitting carefully to tube stop with wire brush. Note: Sand cloth or sandpaper may also be used.

4. Using a brush, apply light uniform coat of soldering flux to the outside of the tube and inside of the fitting.

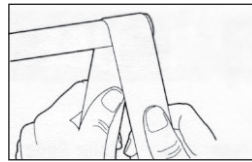
5. Slip tube into fitting to tube stop. Turn tube back and forth once or twice to distribute flux evenly.

6. Apply heat uniformly around the fitting with torch. When solder melts upon contact with heated fitting, the proper soldering temperature has been reached. Remove flame and feed solder slightly off center at the bottom of the joint. Proceed across the bottom of the fitting and up to the top center position. Return to the starting point, and then proceed up the incomplete side to the top, again, overlapping the solder metal. Wipe off surplus solder with a piece of cloth.

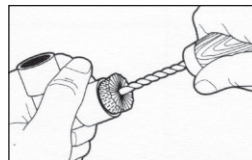
CAUTION: No not overheat the joint or direct the flame into the face of the fitting cup. Overheating could burn the flux, which will destroy its effectiveness and the solder will not enter the joint properly.



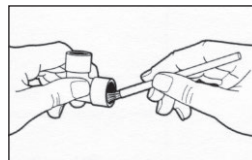
1. Cut tube to length & remove burr with file or scraper.



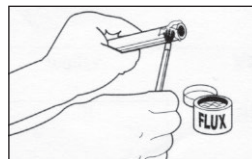
2. Clean outside of tube with sandpaper or sand cloth.



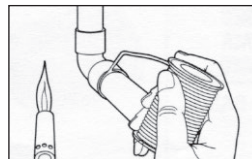
3. Clean inside of fitting with wire brush, sand cloth or sandpaper.



4. Apply flux thoroughly to inside of fitting.



5. Apply flux thoroughly to outside of tube - assemble tube and fitting.



6. Apply heat with torch. When solder melts upon contact with heated fitting, the proper temp for soldering has been reached. Remove flame & feed solder to the joint at one or two points until a ring of solder appears at the end of the fitting.

Specifications

All of the advantages found in copper as a metal have been capitalized to the utmost in the manufacture of NIBCO® Fittings. Because of the accuracy of construction and design, copper plumbing is more efficient and less expensive.

NIBCO manufactures nine general types of fittings: Wrot Pressure; Cast Pressure; Wrot Drainage; Cast Drainage; Flanges; Flared Tube; Threaded Bronze; Insert Fittings for PEX; Barbed Insert Fittings for Polybutylene. Each has its particular place and use and each offers its own advantages when used for the proper service requirement.

Material & Construction — NIBCO Fittings are made from the highest quality raw materials — Cast Fittings are offered in traditional copper alloys C83600, and C84400 and high quality lead-free* dezincification-resistant (DZR) silicon bronze alloy C87850 cast or 69300 forged Performance Bronze™ per ASTM Specification B584. Wrot Copper Fittings are made from commercially pure copper mill products already meeting current lead-free* requirements per ASTM Specifications B75 Alloy C12200.

Lead Free refers to the wetted surface of pipe, fittings and fixtures in potable water systems that have a weighted average lead content ≤ 0.25%.

NIBCO Fittings are produced to meet the requirements of applicable standards.

The majority of NIBCO® brand wrot and cast fittings are manufactured in the U.S.A. and Mexico*. The manufacturing plants at Stuarts Draft, VA, Nacogdoches, TX and Reynosa, Mexico are registered to ISO 9001 quality standards.

Following is suggested phrasing to be incorporated in your specifications or bills of material for Copper Tube Fittings.

WROT SOLDER JOINT FITTINGS — "Solder Joint Fittings shall be produced to one of the following specifications:

1. "Material and workmanship shall be in accordance with ASME/ANSI B16.22; Wrought Copper and Copper Alloy Solder Joint Pressure Fittings."
2. "The dimensional, material and workmanship shall meet the requirements of MSS SP-104; Wrought Copper Solder Joint Pressure Fittings."
3. "The dimensional, material and workmanship of 5"–12" copper fittings shall meet the requirements of MSS SP-109 "Welded Fabricated Copper Solder Joint Pressure Fittings."
4. "Third party certified to NSF/ANSI/CAN-61."
5. "Lead-free* fittings are third party certified to NSF/ANSI/CAN-61."

CAST COPPER ALLOY SOLDER JOINT FITTINGS — "Cast Copper Alloy Solder Joint Fittings shall be in accordance with ASME B16.18."

WROT DRAINAGE FITTINGS — "Wrot Drainage Fittings shall be in accordance with ASME B16.29."

CAST COPPER ALLOY SOLDER JOINT DRAINAGE FITTINGS — "Cast Copper Alloy Solder Joint Drainage Fittings shall be in accordance with ASME B16.23."

CAST COPPER ALLOY FLARED TUBE FITTINGS — "Cast Copper Alloy Flared Tube Fittings shall be in accordance with ASME B16.26."

CAST COPPER ALLOY FLANGES AND FLANGED FITTINGS —

CLASS 150 — "Cast Copper Alloy Flanges and Flanged Fittings shall meet the requirements of MSS SP-106" and/or "the workmanship and dimensions of Federal Specifications WW-F-406 or ASME Std. B16.24."

CLASS 125 — Material, workmanship and dimensions of flanges shall be in accordance with MSS SP-106."

CAST BRONZE THREADED FITTINGS —

"Cast Bronze Threaded Fittings shall be in accordance with ASME B16.15."

POLYBUTYLENE COPPER INSERT TYPE VALVES AND FITTINGS — "Wrot Copper Insert Fittings shall be manufactured per MSS SP-103."

NIBCO® Copper Tube Fittings are all produced to above Standards. To simplify, write your specifications to read: "Copper Tube Fittings to be in accordance with specifications as outlined in NIBCO Copper Fittings Catalog."

WROT COPPER MEDICAL GAS SYSTEM COMPONENTS —

"Wrot copper fittings that are to be installed in medical gas applications shall be prepared in accordance with NFPA 99, Health Care Facilities Gas and Vacuum Systems and the Compressed Gas Association, Pamphlet G4.1. Packaging shall be adequately protective and include labeling that identifies the preparer and states that the product has been cleaned and bagged for oxygen or med gas service."

For technical information and dimensions refer to the engineering section contained in this catalog.

* NIBCO, may, from time to time, source and/or supplement a wrot or cast fitting product from suppliers outside of the U.S.A. and/or Mexico.

Visit our website for the most current information.

SOLDER FITTINGS

Job Name:	
Job Location:	
Engineer:	
Contractor:	
Tag:	
PO Number:	
Representative:	
Wholesale Distributor:	

Description:

WROT-COPPER and CAST-COPPER Alloy fittings from Elkhart Products Corporation are for use in plumbing and other mechanical applications. All 1/8” – 8” fittings are manufactured in the United States at one of our three locations; Elkhart Indiana, Geneva Indiana and Fayetteville Arkansas. WROTCOPPER fittings are designed to join ASTM B88 and ASTM B280 seamless copper tube.

Specifications:

NSF/ANSI 61	Drinking Water System Components - Health Effects
MSS SP73	Brazing Joints for Copper and Copper Alloy Pressure Fittings
MSS SP104	Wrought Copper Solder Joint Pressure Fittings
MSS SP106	Cast Copper Alloy Flanges and Flange Fittings; Class 125, 150 and 300
MSS SP123	Non-Ferrous Threaded and Solder-Joint Unions for Use with Copper Water Tube
MSS SP109	Welded Fabricated Copper Solder Joint Pressure Fittings
ASME/ANSI B16.29	Wrought Copper and Wrought Copper Alloy Solder Joint Drainage Fittings - DWV
ASME/ANSI B16.18	Cast Copper Alloy Solder Joint Pressure Fittings
ASME/ANSI B16.15	Cast Bronze Threaded Fittings
ASME/ANSI B16.26	Cast Copper Alloy Fittings for Flared Copper Tube
ASME/ANSI B16.23	Cast Copper Alloy Solder Joint Drainage Fittings - DWV
ASME/ANSI B16.24	Bronze Pipe Flanges and Flanged Fittings
ASME/ANSI B16.22	Wrought Copper and Copper Alloy Solder-Joint Pressure Fittings
ASME/ANSI B16.50	Wrought Copper and Copper Alloy Braze Joint Pressure Fittings
RoHS 2011/65/EC	European Union’s Restrictions of Hazardous Substances

Material:

ASTM B75 Alloy C12200	Seamless Copper Tube (0% Lead)
ASTM B152 Alloy C11000	Copper Sheet, Strip, Plate and Rolled Bar (0% Lead)
ASTM B584 Alloy C84400	Copper Alloy Sand Castings for General Applications (>0.25% Lead)
ASTM B584 Alloy C89833	Copper Alloy Sand Castings (< 0.25% Lead)
ASTM B584 Alloy C87700	Copper Alloy Sand Castings (< 0.25% Lead)

LEED Compliance:

The copper tubing and rod used to produce all E.P.C. copper fittings is manufactured from copper cathode which in turn is made up from twenty-five (25) percent post-consumer scrap as described above. Another fifty (50) percent is postindustrial scrap (turnings, shavings and chips).

Lead Free

All WROTCOPPER fittings are manufactured in compliance with federal and state lead content requirements of 0.25% lead or less. Products are identified with “LF”, “LL” or NSF 61-G or NSF 372.

Elkhart Products Corporation
 1255 Oak Street, Elkhart, IN 46514
 www.elkhartproducts.com | (574) 264-3181

This specification is provided for reference only. Elkhart Products Corporation reserves the right to change any portion of this specification without notice and without incurring obligation to make such changes to Elkhart products previously or subsequently sold.

SOLDER FITTINGS

Job Name:	
Job Location:	
Engineer:	
Contractor:	
Tag:	
PO Number:	
Representative:	
Wholesale Distributor:	

Large Diameter Weld:

Each large diameter (5", 6" and 8") fitting is electrically welded using silicone bronze meeting AWS A5.7-91R and AMS 4616B to produce a MSS SP-109 compliant product. Each fitting is individually tested with air under water. The burst pressure of EPC welded fitting exceeds the recommended working pressure of the comparable diameter, annealed, straight, seamless ASTM B88-96 type "L" copper water tube by safety factor of 4.

Pressure Ratings:

The table of maximum working pressures below must be understood to reflect what is generally considered as good engineering practice under reasonably constant and favorable conditions; i.e., pressures which are fairly steady, absence of particularly corrosive media, etc. Unusual conditions require increased safety factors and therefore, lower working pressures should be used. From the Copper and Brass Research Association;

Rated Internal Working Pressures of Piping System Made of Copper Water Tube and Soldered Fittings

Solder Used in joints	Service Temp. °F	POUNDS PER SQUARE INCH Water (a) Copper Water Tube-Nominal Sizes			
		1/8" to 1" Incl.	1/4" to 2" Incl.	2 1/2" to 4" Incl.	5" to 8" Incl.
* 50-50 Tin-Lead (b)	100	200	175	150	135
	150	150	125	100	90
	200	100	90	75	70
	250	85	75	50	45
95-5 Tin-Antimony (c) (d)	100	500	400	300	270
	150	400	350	275	250
	200	300	250	200	180
	250	200	175	150	135
Brazing Alloys Melting at or above 1000° F	Temperature and pressure ratings consistent with the materials and procedures employed.				

* The data given for 50% tin-50% lead applies also for the 40% tin-60% lead alloy

(a) Including other noncorrosive liquids and gases

(b) ASTM B32, Alloy Grade Sn 50

(c) ASTM B32, Alloy Grade Sb 5

(d) The safe Drinking Water Act Amendment of 1986 prohibits the use in potable water systems of any solder having a lead content in excess of 0.2%

SOLDER FITTINGS

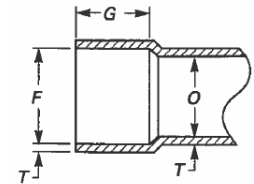
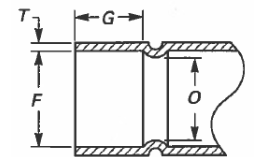
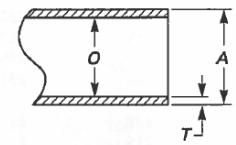
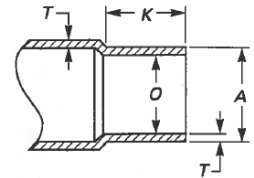
Job Name:	
Job Location:	
Engineer:	
Contractor:	
Tag:	
PO Number:	
Representative:	
Wholesale Distributor:	

Dimensions:

Wrot Copper and Bronze Solder-Joint Pressure Fittings

Dimensions of Soldered-Joint Ends (in inches)

Standard Water Tube Size	Male End		Female End			Wall Thickness T	Inside Diameter of Fitting O	
	Outside Diameter A		Inside Diameter F		Depth G			
	Min.	Max.	Min.	Max.				
1/8	0.248	0.251	0.31	0.252	0.256	0.25	.019	0.18
1/4	0.373	0.376	0.38	0.377	0.381	0.31	.023	0.30
3/8	0.497	0.501	0.44	0.502	0.506	0.38	.026	0.39
1/2	0.622	0.626	0.56	0.627	0.631	0.50	.029	0.52
5/8	0.747	0.751	0.69	0.752	0.756	0.62	.031	0.63
3/4	0.872	0.876	0.81	0.877	0.881	0.75	.033	0.74
1	1.122	1.127	0.97	1.128	1.132	0.91	.040	0.98
1 1/4	1.372	1.377	1.03	1.378	1.382	0.97	.044	1.23
1 1/2	1.621	1.627	1.16	1.628	1.633	1.09	.051	1.47
2	2.121	2.127	1.41	2.128	2.133	1.34	.059	1.94
2 1/2	2.621	2.627	1.53	2.628	2.633	1.47	.067	2.42
3	3.121	3.127	1.72	3.128	3.133	1.66	.075	2.89
3 1/2	3.621	3.627	1.97	3.628	3.633	1.91	.086	3.67
4	4.121	4.127	2.22	4.128	4.133	2.16	.096	3.84
5	5.121	5.127	2.72	5.128	5.133	2.66	.111	4.70
6	6.121	6.127	3.22	6.128	6.133	3.09	.124	5.72
8	8.119	8.127	4.09	8.128	8.133	3.97	.173	7.55



Installation Instructions:

1. Cut the tube end square using a rotary tube cutter or fine toothed steel saw
2. Deburr and ream to remove burrs on inside and outside of tube
3. Clean outside of tube to remove oxides and surface oils. Should have a shiny finish, leaving no dark spots
4. Clean inside of fitting to remove oxides and surface oils. Should have a shiny finish, leaving no dark spots
5. Apply flux using brush to apply light uniform coat on the outside of tube and inside of fitting
6. Insert tube into fitting
7. Apply uniform heat; proper heat is achieved when the solder melts upon contact with fitting. Removing flame work solder from bottom to top each side at a time. Wipe off excess solder.

Caution:

Do not overheat the joint which can burn the flux, which will affect the solder's ability to enter the joint properly.



SUBMITTAL SHEET

SOLDER FITTINGS

Job Name:	
Job Location:	
Engineer:	
Contractor:	
Tag:	
PO Number:	
Representative:	
Wholesale Distributor:	

Internal Pressure-Temperature Ratings for Copper Fittings, p.s.i.

Standard Water Tube Size	-20°F To						
	100°F	150°F	200°F	250°F	300°F	350°F	400°F
1/4	910	770	740	725	710	605	455
3/8	775	660	635	620	610	515	385
1/2	720	610	585	575	565	480	360
5/8	630	535	515	505	490	420	315
3/4	580	490	475	465	455	385	290
1	490	420	400	395	385	325	245
1 1/4	435	370	355	350	340	290	215
1 1/2	405	345	330	325	315	270	200
2	360	305	295	290	280	240	180
2 1/2	335	285	270	265	260	220	165
3	315	265	255	250	245	210	155
3 1/2	300	255	245	240	235	200	150
4	290	245	235	230	225	195	145
5	265	225	215	215	210	175	130
6	250	210	200	200	195	165	125

PRESSURE LOSS IN FITTINGS EXPRESSED AS EQUIVALENT LENGTH OF TUBE, FEET						
Normal or Standard in Inches	Wrot Copper Fittings					
	90 Degree Ell	45 Degree Ell	Tee Straight Run	Tee Side Branch	Coupling	180 Degree Bend
3/8	0.5	0.5	0.5	1	-	0.5
1/2	0.5	0.5	0.5	1	-	1
5/8	0.5	0.5	0.5	2	-	1
3/4	1	0.5	0.5	2	-	2
1	1	1	0.5	3	-	2
1-1/4	2	1	0.5	4	0.5	3
1-1/2	2	2	1	5	0.5	4
2	2	2	1	7	0.5	8
2-1/2	2	3	2	9	0.5	16
3	3	4	-	-	1	20

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