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# PIPE FITTINGS

## ABOUT COMPANY

Ema Flow Control USA LLC. holds the state of art manufacturing facilities equipped with ultra modern production equipment and exporting the finest quality Carbon Steel, Stainless Steel, Duplex, Alloy Steel, Nickel, Monel, Inconel, Incoloy and Hastalloy Pipe Fittings, including Elbows, Long Radius Bends, Tees, Reducers, End Caps, Stub Ends and allied fittings.

Some of the key industries where our products are being used are Oil & Gas, Petrochemical, Chemical, Power Plant, Pharmaceutical, Food & Beverages, Sugar Mills, Paper Industry and Cement Industry.

We operate on philosophy to provide Immediate Response, Excellent Quality, Quick Delivery and Customer Satisfaction followed by commitment as "What we commit, We deliver" based on this we are having satisfied customers in more than 10 countries throughout the world.

We have stringent Quality Management and Control System to ensure the superior quality of products. All of our products are strictly inspected at each stage of the production process from the Inspection of Raw Material to the finish products. Each order is carried out as per Inspection / Test Plan, Required Specifications and Applicable Manufacturing / Quality Standards.

## MISSION

Ema Flow Control USA LLC. focused to provide the superior quality products at competitive prices to its customers around the world by utilizing the company's human resources and advanced technology equipment with the strong commitment to R&D, Health, Safety, Environment and company's core values.

## VISION

To make our brand "the first choice of customers".

## CORE VALUES

The core values of our company guide and drive our business to achieve our mission and a step ahead towards our vision.

**Quality:** It is our primary focus to produce and deliver superior quality products.

**Commitment:** What we commit, We deliver.

**Team Work:** We believe on team work which is the most important element to accomplish the set objective.

**Customer Satisfaction:** To achieve customer satisfaction with our Quality, Commitment and Team Work.

# Weld End Pipe Fittings Index

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## Material and Manufacturing Standards

The manufacture of welding fittings is governed by industry standards established by such associations as 1) the American Society for Testing and Materials (ASTM): 2) the American National Standards Institute (ANSI): 3) the Manufacturer's Standardization Society of the Valve and Fittings Industry (MSS): 4) the Pipe Fabrication Institute (PFI): and 5) the Canadian Standards Association (CSA). They cover specifications for materials, methods of manufacture, dimensions and quality control procedures. All Ema welding fittings conform to one or more of these standards.

### ASTM STANDARDS

Ema carbon steel welding fittings are manufactured from seamless steel tubing and furnished in accordance with ASTM Standard A-234, with material specifications in accordance with ASTM A-106, Grade B, for fittings made from pipe; ASTM A-515, Grade 65 or 70, for fittings made from plate.

Ema alloy steel welding fittings are furnished in accordance with ASTM standard A-234, with materials specification including A-335, Grade P1, carbon-molybdenum, and Grade P12, P11, P22, P5, P7; P9 chrome molybdenum, for fittings made from pipe.

ASTM A-204 Grade B, carbon molybdenum, and ASTM A-387 Grades 12, 11, 22, 5, 7, 9 chrome molybdenum for fittings made from plate.

Ema welding fittings are also available in accordance with ASTM specification A-420 covering low-temperature service, down to -150°F (-101°C).

Ema stainless steel welding fittings are manufactured and available in the following types: 304, 304L, 316, 316L and 347. They are furnished in accordance with ASTM Standard A-403, with material specifications to ASTM A-312 covering fittings made from pipe, and A-240 for fittings made from plate. Refer to Ema catalogue "Stainless Steel Welding Fittings".

### ANSI, MSS, ASME and CSA Standards

ASME/ANSI and MSS standards govern fitting dimensions and tolerances, ASME/ANSI B16.9 "Wrought Steel Buttwelding Fittings", is the basic standard. It covers steel butt-welding fittings sizes NPS 1/2 through NPS 48 (DN 15 through DN 1200).

Other ASME/ANSI and MSS standards, written to supplement B16.9, are as follows:

ASME/ANSI B16.25:	Butt-welding Ends
ASME/ANSI B16.28:	Butt-welding short radius elbows and returns
MSS SP-43:	Light-wall stainless steel fittings, NPS 3/4 through NPS 24 (DN 20 through DN 600)
MSS SP-75:	High Test Wrought Welding Fittings

The following codes and standards influence the manufacture of welding fittings, where applicable.

ASME/ANSI B31.1:	Power piping
ASME/ANSI B31.3:	Petroleum refinery piping
ASME/ANSI B31.4:	Liquid petroleum transportation piping system
ASME/ANSI B31.5:	Refrigeration piping
ASME/ANSI B31.8:	Gas transmission and distribution piping systems
ANSI/ASME B36.10M:	Welded and seamless wrought steel pipe
ANSI/ASME B36.19M:	Stainless steel pipe
CSA Z183:	Oil pipe line transportation systems
CSA Z184:	Gas pipe line systems
CAN3-Z245.11-M91:	Requirements for wrought steel butt welding fittings
ASME:	Boiler and pressure vessel code

### SPECIAL METALS

**High Test Steel.** High test pipe line welding fittings, conforming to CSA Standard CAN3-Z245.11 or MSS SP-75, are available with physical properties to match pipe with \*42,000, 46,000, 52,000, 60,000, 65,000, and over p.s.i. minimum yield strengths.

**Other Ferrous Alloys.** Fittings are available manufactured from ASTM alloy specifications other than those listed in the "ASTM Standards" above.

**Non-Ferrous Metals.** Fittings of relatively common metals, such as aluminum, nickel, copper, etc., can be readily furnished; production is limited only by availability of raw materials. The same is true of less common metals, such as the various grades of Hastelloy, Inconel, Incoloy, Monel, Alloy-20, rare types of stainless steel and other unusual analyses.

\*Equals 290, 317, 359, 414, 448 Mpa, respectively.

### METRIC EQUIVALENTS

The International System (SI) metric equivalent of British units are shown throughout this catalogue.

NPS (Nominal Pipe Size)	= DN, ▲ (Nominal Diameter)
Operating Pressure Class	= PN, ▲ (Pressure Number)
1 inch	= 25.4 millimetres
1 pound, weight	= 0.4536 kilograms
1 psi	= 0.06895 bars
1 psi, stress	= 0.006895 megapascals (MPa)

▲ From the SI designations, Diamètre Nominal and Pression Nominale.

# \*DIMENSIONS & TOLERANCES

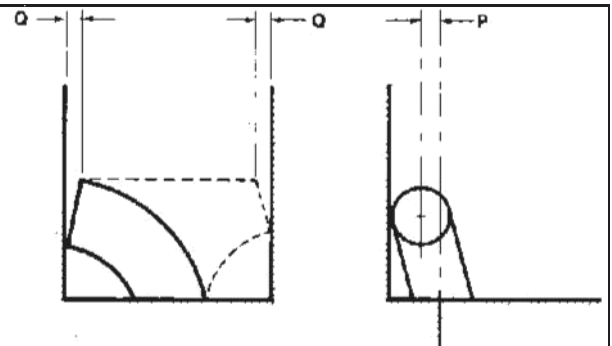
## DIMENSIONAL TOLERANCES

All Fittings				90° & 45° Elbows Tees Crosses Laterals	Caps	180° Returns			Lap-Joint Stub Ends and Reducers	Lap-Joint Stub Ends			
NPS	Outside Diameter at Bevel	Inside Diameter at End	Wall Thickness	Center to End A,B,C,M	Overall Length E	Center to Center H	Back to Face K	Parallely of Planes of Ends	Overall Length F,L	Outside Diameter of Lap G	Thickness of Lap t	Fillet Radius of Lap R	Outside Diameter of Barrel
DN	O.D.	i.D.											
1/2 - 2 1/2	+0.06 -0.03	±0.03	W a l l T h i c k n e s  S e e S p e c i f i c a t i o n s  Z o n e	±0.06	±0.12	±0.25	±0.25	±0.03	±0.06	+0 -0.03	+0.06 -0	+0 -0.03	
15-65	±1	±8		±2	±4	±7	±7	±1	±2	+0 -1	+2 -0	+0 -1	
3-3 1/2	±0.06	±0.06		±0.06	±0.12	±0.25	±0.25	±0.03	±0.06	+0 -0.03	+0.06 -0	+0 -0.03	
80-90	±1	±1.6		±2	±4	±7	±7	±1	±2	+0 -1	+2 -0	+0 -1	
4	±0.06	±0.06		±0.06	±0.12	±0.25	±0.25	±0.03	±0.06	+0 -0.03	+0.06 -0	+0 -0.06	
100	+2 -1	±1.6		±2	±4	±7	±7	±1	±2	+0 -1	+2 -0	+0 -2	
5 - 6	+0.09 -0.06	±0.06		±0.06	±0.25	±0.25	±0.25	±0.03	±0.06	+0 -0.03	+0.06 -0	+0 -0.06	
125 - 150	+3 -1	±1.6		±2	±7	±7	±7	±1	±2	+0 -1	+2 -0	+0 -2	
8	+0.09 -0.06	±0.06		±0.06	±0.25	±0.25	±0.25	±0.03	±0.06	+0 -0.03	+0.06 -0	+0 -0.06	
200	±2	±1.6		±2	±7	±7	±7	±1	±2	+0 -1	+2 -0	+0 -2	
10	+0.16 -0.12	±0.12		±0.09	±0.25	±0.38	±0.25	±0.06	±0.09	+0 -0.06	+0.06 -0	+0 -0.06	
250	+4 -3	±3.2		±2	±7	±10	±7	±2	±2	+0 -2	+2 -0	+0 -2	
12-18	+0.16 -0.12	±0.12		±0.09	±0.25	±0.38	±0.25	±0.06	±0.09	+0 -0.06	+0.06 -0	+0 -0.06	
300 - 450	+4 -3	±3.2		±3	±7	±10	±7	±2	±3	+0 -2	+2 -0	+0 -2	
20-24	±0.25 -0.19	±0.19		±0.09	±0.25	±0.38	±0.25	±0.06	±0.09	+0 -0.06	+0.06 -0	+0 -0.06	
500 - 600	+6 -5	±4.8		±3	±7	±10	±7	±2	±3	+0 -2	+2 -0	+0 -2	
26-30	+0.25 -0.19	±0.19	+0.12	+0.38					±0.19				
650 - 750	+7 -5	±4.8	±3	±10					±5				
32-48	±0.25 -0.19	±0.19	±0.19	±0.38					±0.19				
800 - 1200	+7 -5	±4.8	±5	±10					±5				

<sup>1</sup>Out-of-round is the sum of absolute values of plus and minus tolerance.

## ANGULARITY TOLERANCES, ASME/ANSI B16.9

ANGULARITY TOLERANCES ±					
Nominal Pipe Size	Off Angle	Off Plane	Nominal Pipe Size	Off Angle	Off Plane
NPS DN	Q	P	NPS DN	Q	P
1/2-4	.03	.06	18-24	.12	.38
15 - 100	1	2	450 - 600	4	10
5 - 8	.06	.12	26-30	.19	.38
125 - 200	2	4	650 - 750	5	10
10-12	.09	.19	32-34	.19	.50
250 - 300	3	5	800 - 850	5	13
14-16	.09	.25	44-48	.19	.75
350 - 400	3	7	1125 - 1200	5	20



\*For design and dimensions of butt welding ends see page 24.

INCHES
MILLIMETRES

## ASME/ANSI B36.10m

\*Dimensions of Seamless and Welded Pipe Standards:

## ASME/ANSI B36.19m

NPS	DN	O.D.	SCH. 5		SCH. 10		Gas Dist.		SCH. 20		SCH. 30		STD		SCH. 40	
			I.D.	Wall	I.D.	Wall	I.D.	Wall	I.D.	Wall	I.D.	Wall	I.D.	Wall	I.D.	Wall
1/8	3	.405											.269	.068	STD	STD
		10.3											7.52	1.73	STD	STD
1/4	6	.540											.364	0.88	STD	STD
		13.7											9.25	2.24	STD	STD
3/8	10	.675											.493	.091	STD	STD
		17.2											12.52	2.31	STD	STD
1/2	15	.840											.622	.109	STD	STD
		21.4											15.80	2.77	STD	STD
3/4	20	1.050	.920	.065	.884	.083							.824	.113	STD	STD
		26.7	23.37	1.65	22.45	2.11							20.93	2.87	STD	STD
1	25	1.315	1.185	.065	1.097	.109							1.049	.133	STD	STD
		33.4	30.10	1.65	27.86	2.77							26.64	3.38	STD	STD
1 1/4	32	1.660	1.530	.065	1.442	.109							1.380	.140	STD	STD
		42.2	38.86	1.65	36.63	2.77							35.05	3.56	STD	STD
1 1/2	40	1.900	1.770	.065	1.682	.109							1.610	.145	STD	STD
		48.3	44.96	1.65	42.72	2.77							40.89	3.68	STD	STD
2	50	2.375	2.245	.065	2.157	.109							2.067	.154	STD	STD
		60.4	57.02	1.65	54.79	2.77							52.50	3.91	STD	STD
2 1/2	65	2.875	2.709	.083	2.635	.120							2.469	.203	STD	STD
		73.1	68.81	2.11	66.93	3.05							62.71	5.16	STD	STD
3	80	3.500	3.334	.083	3.260	.120							3.068	.216	STD	STD
		88.9	84.68	2.11	82.80	3.05							77.93	5.49	STD	STD
3 1/2	90	4.000	3.834	.083	3.760	.120							3.548	.226	STD	STD
		101.6	97.38	2.11	95.50	3.05							90.12	5.74	STD	STD
4	100	4.500	4.334	.083	4.260	.120	4.124	.188					4.026	.237	STD	STD
		114.3	110.08	2.11	108.20	3.05	104.75	4.78					102.26	6.02	STD	STD
5	125	5.563	5.345	.109	5.295	.134							5.047	.258	STD	STD
		141.3	135.76	2.77	134.49	3.40							128.19	6.55	STD	STD
6	150	6.625	6.407	.109	6.357	.134	6.187	2.19					6.065	.280	STD	STD
		168.3	162.74	2.77	161.47	3.40	157.15	5.56					154.05	7.11	STD	STD
8	200	8.625	8.407	.109	8.329	.148	8.187	.219	8.125	.250	8.071	.277	7.981	.322	STD	STD
		219.1	213.54	2.77	211.56	3.76	207.95	5.56	206.38	6.35	205.00	7.04	202.72	8.18	STD	STD
10	250	10.750	10.482	.134	10.420	.165	10.312	.219	10.250	.250	10.136	.307	10.020	.365	STD	STD
		273.1	266.24	3.40	264.67	4.19	261.92	5.56	260.35	6.35	257.45	7.80	254.51	9.27	STD	STD
12	300	12.750	12.420	.156	12.390	.180	12.250	.250	12.250	.250	12.090	.330	12.000	.375	11.938	406
		323.9	315.47	3.96	314.71	4.57	311.15	6.35	311.15	6.35	307.09	8.38	304.80	9.53	303.23	10.31
14	350	14.000			13.500	.250	13.500	.250	13.376	.312	STD	STD	13.250	.375	13.124	.438
		355.6			342.90	6.35	342.90	6.35	339.75	7.92	STD	STD	336.55	9.53	333.35	11.12
16	400	16.000			15.500	.250	15.500	.250	15.376	.312	STD	STD	15.250	.375	XS	XS
		406.4			393.70	6.35	393.70	6.35	390.55	7.92	STD	STD	387.35	9.53	XS	XS
18	450	18.000			17.500	.250	17.500	.250	17.376	.312	17.124	.438	17.250	.375	16.876	.562
		457.2			444.50	6.35	444.50	6.35	441.35	7.92	434.95	11.12	438.15	9.53	428.65	14.27
20	500	20.000			19.500	.250	19.500	.250	STD	STD	XS	XS	19.250	.375	18.814	.594
		508.0			495.30	6.35	495.30	6.35	STD	STD	XS	XS	488.95	9.53	477.88	15.09
22	550	22.000			21.500	.250			STD	STD	XS	XS	21.250	.375		
		558.8			546.10	6.35			STD	STD	XS	XS	539.75	9.53		
24	600	24.000			23.500	.250	23.500	.250	STD	STD	22.876	.562	23.250	.375	22.624	.688
		609.6			596.90	6.35	596.90	6.35	STD	STD	581.05	14.27	590.55	9.53	574.65	17.47
26	650	26.000			25.376	.312			XS	XS			25.250	.375		
		660.4			644.55	7.92			XS	XS			641.35	9.53		
28	700	28.000			27.376	.312			XS	XS	26.750	.625	27.250	.375		
		711.2			695.35	7.92			XS	XS	679.45	15.88	692.15	9.53		
30	750	30.000			29.376	.312			XS	XS	28.750	.625	29.250	.375		
		762.0			746.15	7.92			XS	XS	730.25	15.88	742.95	9.53		
36	900	36.000			35.376	.312			XS	XS	34.750	.625	35.250	.375	34.500	.750
		914.4			898.55	7.92			XS	XS	882.65	15.88	895.35	9.53	876.30	19.05
42	1100	42.000									40.750	.625	41.250	.375	40.500	.750
		1067									1035.0	15.88	1047.8	9.53	1028.7	19.05
44	-	44.000											43.250	.375		
		1118											1098.6	9.56		
46	-	46.000											42.250	.375		
		1168											1149.4	9.53		
48	1200	48.000											47.250	.375		
		1219											1200.2	9.53		

\*Wall dimensions shown are nominal thickness.

INCHES
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**\*Dimensions of Seamless and Welded Pipe Standards: ASME/ANSI B36.10m  
ASME/ANSI B36.19m**

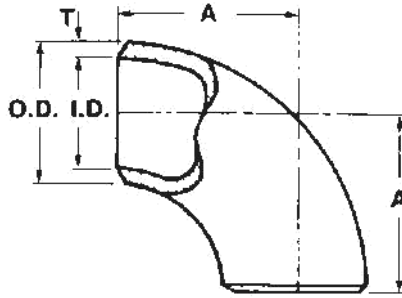
SCH. 60		XS		SCH. 80		SCH. 100		SCH. 120		SCH. 140		SCH. 160		XXS		NPS DN
I.D.	Wall	I.D.	Wall	I.D.	Wall	I.D.	Wall	I.D.	Wall	I.D.	Wall	I.D.	Wall	I.D.	Wall	
		.215	.095	XS	XS											1/8
		5.46	2.41	XS	XS											3
		.302	.229	XS	XS											1/4
		7.67	3.02	XS	XS											6
		.423	.126	XS	XS											3/8
		10.74	3.20	XS	XS											10
		.546	.147	XS	XS							.464	.188	.252	.294	1/2
		13.87	3.73	XS	XS							11.79	4.78	6.40	7.47	15
		.742	.154	XS	XS							.612	.219	4.34	.308	3/4
		18.85	3.91	XS	XS							15.54	5.56	11.02	7.82	20
		.957	.179	XS	XS							.815	.250	.599	.358	1
		24.31	4.75	XS	XS							20.70	6.35	15.21	9.09	25
		1.278	.191	XS	XS							1.160	.250	.896	.382	1 1/4
		32.46	4.85	XS	XS							29.46	6.35	22.76	9.70	32
		1.500	.200	XS	XS							1.338	.281	1.100	.400	1 1/2
		38.10	5.08	XS	XS							33.99	7.14	27.94	10.16	40
		1.939	.218	XS	XS							1.687	.344	1.503	.436	2
		49.25	5.54	XS	XS							42.85	8.74	38.18	11.07	50
		2.323	.276	XS	XS							2.125	.375	1.771	.552	2 1/2
		59.00	7.01	XS	XS							53.98	9.53	44.98	14.02	65
		2.900	.300	XS	XS							2.624	.438	2.300	.600	3
		73.66	7.62	XS	XS							66.65	11.13	58.42	15.24	80
		3.364	.318	XS	XS									(1)2.728	(1)6.36	3 1/2
		85.45	8.08	XS	XS									69.29	16.15	90
		3.826	.337	XS	XS			.3624	.438			3.438	.531	3.152	.674	4
		97.18	8.56	XS	XS			92.05	11.13			87.33	13.49	80.06	17.12	100
		4.813	.375	XS	XS			4.563	.500			4.313	.625	4.063	.750	5
		122.25	9.53	XS	XS			115.90	12.70			109.55	15.88	103.20	19.05	125
		5.761	.432	XS	XS			5.501	.562			5.187	.719	4.897	.864	6
		146.33	10.97	XS	XS			139.73	14.27			131.75	18.26	124.38	21.95	150
7.813	.406	7.625	.500	XS	XS	7.437	.594	7.187	.719	7.001	.812	6.813	.906	6.875	.875	8
196.45	10.31	193.68	12.70	XS	XS	188.90	15.09	182.55	18.26	177.83	20.62	173.05	23.01	174.63	22.23	200
XS	XS	9.750	.500	9.562	.594	9.312	.719	9.062	.844	8.750	1.000	8.500	1.125	SCH. 140		10
XS	XS	247.65	12.70	242.87	15.09	236.52	18.26	230.17	21.44	222.25	25.40	215.90	28.58	SCH.140		250
11.626	.582	11.750	.500	11.374	.688	11.062	.844	10.750	1.000	10.500	1.125	10.126	1.312	SCH. 120		12
295.30	14.27	298.45	12.70	288.90	17.48	280.97	21.44	273.05	25.40	266.70	28.58	257.20	33.32	SCH. 120		300
12.812	.594	13.000	.500	12.500	.750	12.124	.938	11.812	1.094	11.500	1.250	11.188	1.406			14
325.42	15.09	330.20	12.70	317.50	19.05	307.95	23.83	300.02	27.79	292.10	31.75	284.18	35.71			350
14.688	.656	15.000	.500	14.312	.844	13.938	1.031	13.562	1.219	13.124	1.438	12.812	1.594			16
373.08	16.66	381.00	12.70	363.52	21.44	354.03	26.19	344.47	30.96	333.35	36.53	325.42	40.49			400
16.500	.750	17.000	.500	16.124	.938	15.688	1.156	15.250	1.375	14.876	1.562	14.438	1.781			18
419.10	19.05	431.80	12.70	409.55	23.83	398.48	29.36	387.35	34.93	377.85	39.67	366.73	45.24			450
18.376	.812	19.000	.500	17.938	1.031	17.438	1.281	17.000	1.500	16.500	1.750	16.062	1.969			20
466.75	20.62	482.60	12.70	455.63	26.19	442.93	32.54	431.80	38.10	419.10	44.45	407.97	50.0			500
20.250	.875	21.000	.500	19.750	1.225	19.250	1.375	18.750	1.625	18.250	1.875	17.750	2.125			22
514.35	22.23	533.40	12.70	501.65	28.58	488.95	34.93	476.25	41.28	463.55	47.63	450.85	53.98			550
22.082	.969	23.000	.500	21.562	1.219	20.938	1.531	20.376	1.812	19.876	2.06	19.312	2.344			24
560.37	24.61	584.20	12.70	547.67	30.96	531.83	38.89	517.55	46.02	504.85	52.37	490.52	59.54			600
		25.000	.500													26
		635.00	12.70													650
		27.000	.500													28
		685.80	12.70													700
		29.000	.500													30
		736.6	12.70													750
		35.000	.500													36
		889.00	12.70													900
		41.000	.500													42
		1041.4	12.70													1100
		43.000	.500													44
		1092.2	12.70													-
		45.000	.500													46
		1143.0	12.70													-
		4.000	.500													48
		1193.8	12.70													1200

(1) Not in ASME/ANSI B36.10M, ASME/ANSI B36.19M

INCHES
MILLIMETRES

# 90° ELBOW LONG RADIUS

Standard, Extra Strong,  
Schedule 160, Double Extra Strong  
Carbon and ferritic alloy steel,  
ASTM A-234  
ASME/ANSI B16.9

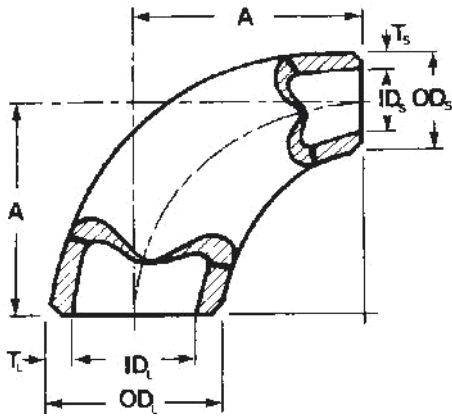


NPS DN	Outside Diameter at Bevel O.D.	Centre to End A	STANDARD WEIGHT			EXTRA STRONG			SCHEDULE 160			DOUBLE EXTRA STRONG		
			Inside Diameter I.D.	Wall Thickness T	Approx. Weight	Inside Diameter I.D.	Wall Thickness T	Approx. Weight	Inside Diameter I.D.	Wall Thickness T	Approx. Weight	Inside Diameter I.D.	Wall Thickness T	Approx. Weight
1/2 15	.840 21	1.50 38	.622 15.80	0.109 2.77	0.2 0.09	.546 13.87	.147 3.73	0.2 .09	- -	- -	- -	- -	- -	- -
3/4 20	1.050 27	<sup>(1)</sup> 1.12 29	.824 20.93	0.113 2.87	0.3 0.14	.742 18.85	.154 3.91	0.2 .09	- -	- -	- -	- -	- -	- -
1 25	1.315 33	1.50 38	1.049 26.64	0.133 3.38	0.4 0.18	.957 24.31	.179 4.55	0.5 0.23	0.815 20.7	.250 6.35	0.6 0.27	.599 15.21	.358 9.09	0.8 0.36
1 1/4 32	1.660 42	1.88 48	1.380 35.05	0.140 3.56	0.5 0.23	1.278 32.46	.191 4.85	0.7 0.32	1.160 29.5	.250 6.35	1.0 0.45	.896 22.76	.382 9.70	1.4 0.63
1 1/2 40	1.900 48	2.25 57	1.610 40.89	0.145 3.68	0.75 0.34	1.500 38.10	.200 5.08	1.0 0.45	1.338 34.0	.281 7.14	1.8 0.81	1.100 27.94	.400 10.16	2.0 0.90
2 50	2.375 60	3.0 76	2.067 52.50	0.154 3.91	1.5 0.68	1.939 49.25	.218 5.54	2.0 0.9	1.687 42.9	.344 8.74	3.2 1.44	1.503 38.18	.436 11.07	3.8 1.71
2 1/2 65	2.875 73	3.75 95	2.469 62.71	0.203 5.16	3.0 1.35	2.323 59.00	.276 7.01	4.0 1.8	2.125 54.0	.375 9.53	6.0 2.70	1.771 44.98	.552 14.02	7.1 3.20
3 80	3.500 89	4.50 114	3.068 77.93	0.216 5.49	4.5 2.03	2.900 73.66	.300 7.62	6.0 2.7	2.624 66.7	.438 11.13	9.0 4.05	2.300 58.42	.600 15.24	11.2 5.04
<sup>(2)</sup> 3 1/2 90	4.000 102	5.25 133	3.548 90.12	0.226 5.74	6.2 2.8	3.364 85.45	.318 8.08	8.5 3.83	- -	- -	- -	<sup>(2)</sup> 2.728 69.29	<sup>(2)</sup> .636 16.15	16.2 7.3
4 100	4.500 114	6.00 152	4.026 102.26	0.237 6.02	8.5 3.8	3.826 97.18	.337 8.56	12 5.4	3.438 87.3	.531 13.49	19 8.5	3.152 80.06	.674 17.12	21.2 9.5
5 125	5.563 141	7.50 190	5.047 128.19	0.258 6.55	14.2 6.4	4.813 122.25	.375 9.53	20 9.0	4.313 109.6	.625 15.88	33 15	4.063 103.20	.750 19.05	38 17
6 150	6.625 168	9.00 229	6.065 154.05	0.280 7.11	23 10.4	5.761 146.33	.432 10.97	32 14	5.187 131.8	.719 18.26	59 27	4.897 124.38	.864 21.95	63 28
8 200	8.625 219	12.00 305	7.981 202.72	0.322 8.18	45 20	7.625 193.68	.500 12.70	68 31	6.813 173.05	.906 23.01	127 57	6.875 174.63	.875 22.23	120 54
10 250	10.750 273	15.00 381	10.02 254.5	0.365 9.27	78 35	9.750 247.65	.500 12.70	112 50	8.500 215.90	1.125 28.58	270 122			
12 300	12.750 324	18.00 457	12.00 304.8	0.375 9.53	118 53	11.750 298.45	.500 12.70	150 68	10.126 257.20	1.312 33.53	460 207			
14 350	14.000 356	21.0 533	13.25 336.6	0.375 9.53	147 66	13.00 330.2	.500 12.70	192 86	11.188 284.18	1.406 35.71	563 253			
16 400	16.000 406	24.0 610	15.25 386.1	0.375 9.53	202 91	15.00 381.0	.500 12.70	258 116	12.812 325.42	1.594 40.49	825 371			
18 450	18.000 457	27.0 686	17.25 438.2	0.375 9.53	256 115	17.00 431.8	.500 12.70	326 147						
20 500	20.000 508	30.0 62	19.25 489.0	0.375 9.53	310 139	19.00 482.6	.500 12.70	420 189						
22 550	22.000 559	33.0 838	21.25 539.8	0.375 9.53	394 177	21.00 533.4	.500 12.70	520 234						
24 600	24.000 616	36.0 914	23.25 590.6	0.375 9.53	446 201	23.00 584.2	.500 12.70	606 273						
26 650	26.000 660	39.0 991	25.25 641.4	0.375 9.53	550 247	25.00 635.0	.500 12.70	729 328						
30 750	30.000 762	45.0 1143	29.25 743.0	0.375 9.53	736 331	29.00 736.6	.500 12.70	953 429						
36 900	36.000 914	54.0 1372	35.25 895.4	0.375 9.53	1062 478	35.00 889.0	.500 12.70	1412 635						
42 <sup>▲</sup> 1100	42.000 1067	63.0 1600	41.25 1047.8	0.375 9.53	1370 616	41.00 1041.1	.500 12.70	1890 820						

- (1) May be furnished as 1.5 in (38mm) at the manufacturer's option.
  - (2) 3-1/2XXS is not specified in ASME/ANSI B36.10M.
  - (▲) Produced from X-rayed, stress-relieved welded pipe. Welds are 100% radiographed in accordance with the requirements of ASME Boiler & Pressure Vessel Code.
- These fittings are also available in other sizes and/or wall thicknesses.

INCHES	POUNDS
MILLIMETRES	KILOGRAMS





# 90° REDUCING ELBOWS LONG RADIUS

Standard Weight  
and Extra Strong,  
(2)Carbon and ferritic alloy steel,  
ASTM A-234,  
ASME/ANSI B16.9

NPS	Centre to End Nominal A	Standard Approx. Weight	Extra Strong Approx. Weight	NPS	Centre to End Nominal A	Standard Approx. Weight	Extra Strong Approx. Weight	NPS	Centre to End Nominal A	Standard Approx. Weight	Extra Strong Approx. Weight
DN				DN				DN			
2 x 1	3.00	1.10	1.5	6 x 3	9.00	16	24.0	18 x 12	27.0	218	295
50 x 25	76	0.5	0.7	150 x 80	229	7.3	10.8	450 x 300	686	98	133
2 x 1 1/4	3.00	1.20	1.8	6 x 3 1/2	9.00	17	25.5	18 x 14	27.0	230	310
50 x 32	76	0.5	0.8	150 x 90	229	7.7	11.5	450 x 350	686	103	140
2 x 1 1/2	3.00	1.30	2.2	6 x 4	9.00	19	17.0	18 x 16	27.0	240	322
50 x 40	76	0.6	1.0	150 x 100	229	8.6	12	450 x 400	686	108	145
2 1/2 x 1 1/4	3.75	2.10	2.3	6 x 5	9.00	21	31.0	20 x 10	30.0	252	327
65 x 32	95	0.9	1.0	150 x 125	229	9.4	14	500 x 250	762	113	147
2 1/2 x 1 1/2	3.75	2.20	2.5	8 x 4	12.0	32	48.2	20 x 12	30.0	265	345
65 x 40	95	1.0	1.1	(2)200 x 100	305	14	22	500 x 300	762	119	155
2 1/2 x 2	3.75	2.45	3.3	8 x 5	12.0	35	53.0	20 x 14	30.0	280	365
65 x 50	95	1.1	1.5	200 x 125	305	16	24	500 x 350	762	126	164
3 x 1 1/2	4.50	3.20	4.3	8 x 6	12.0	40	59.4	20 x 16	30.0	295	390
80 x 40	114	1.4	1.9	200 x 150	305	18	27	500 x 400	762	133	176
3 x 2	4.50	3.50	4.7	10 x 5	15.0	57	78	20 x 18	30.0	310	405
80 x 50	114	1.6	2.1	250 x 125	381	26	35	500 x 450	762	139	182
3 x 2 1/2	4.50	4.15	5.5	10 x 6	15.0	61	86	24 x 12	36.0	345	455
80 x 65	114	1.9	2.5	250 x 150	381	28	39	600 x 300	914	155	205
3 1/2 x 2	5.25	4.50	6.3	10 x 8	15.0	71	101	24 x 14	36.0	360	485
90 x 50	133	2.0	2.8	250 x 200	381	32	45	600 x 350	914	162	218
3 1/2 x 2 1/2	5.25	5.40	7.3	12 x 6	18.0	85	116	24 x 16	36.0	375	500
90 x 65	133	2.4	3.3	300 x 150	457	39	52	600 x 400	914	169	225
3 1/2 x 3	5.25	6.00	8.2	12 x 8	18.0	97	134	24 x 18	36.0	400	520
90 x 80	133	2.7	3.7	300 x 200	457	46	60	600 x 450	914	180	234
4 x 2	6.00	5.95	8.3	12 x 10	18.0	110	149	24 x 20	36.0	415	545
100 x 50	152	2.7	3.7	300 x 250	457	50	67	600 x 500	914	187	245
4 x 2 1/2	6.00	6.70	9.3	14 x 8	21.0	116	152	24 x 22	36.0	430	570
100 x 65	152	3.0	4.2	350 x 200	533	52	68	600 x 550	914	194	257
4 x 3	6.00	7.50	10.4	14 x 10	21.0	126	165	(1)30 x 16	45.0	605	830
100 x 80	152	3.4	4.7	350 x 250	533	57	74	(1)750 x 400	1143	272	374
4 x 3 1/2	6.00	8.20	11.3	14 x 12	21.0	138	180	(1)30 x 18	45.0	620	840
100 x 90	152	3.7	5.1	350 x 300	533	62	81	(1)750 x 450	1143	279	378
5 x 2 1/2	7.50	10.5	15.5	16 x 10	24.0	155	202	(1)30 x 20	45.0	635	855
125 x 65	190	4.8	7.1	400 x 250	610	71	93	(1)750 x 500	1143	292	393
5 x 3	7.50	11.4	16.5	16 x 12	24.0	170	220	(1)30 x 22	45.0	645	865
125 x 80	190	5.2	7.6	400 x 300	610	78	101	(1)750 x 550	1143	297	398
5 x 3 1/2	7.50	12.2	17.1	16 x 14	24.0	179	233	(1)30 x 24	45.0	660	875
125 x 90	190	5.6	7.9	400 x 350	610	82	107	(1)750 x 600	1143	304	403
5 x 4	7.50	13.1	18.4	18 x 10	27.0	210	280	(1)30 x 26	45.0	675	890
125 x 100	190	6.0	8.3	450 x 250	686	97	129	(1)750 x 650	1143	310	409

(1) NPS 30 (DN 750) sizes are not covered by ASME/ANSI B16.9

(2) Sizes NPS 8 (DN 200) and larger may not be supplied as seamless.

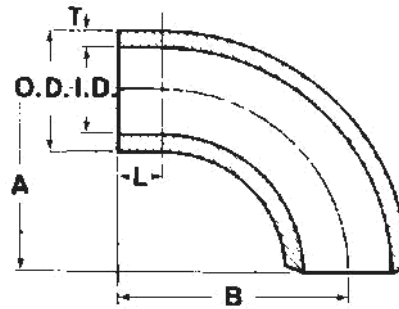
These fittings are also available in other sizes and/or wall thicknesses.

INCHES	POUNDS
MILLIMETRES	KILOGRAMS

See page 6 for I.D., and wall thickness (T) for large (L) and small (S) ends.

# 90° ELBOWS LONG TANGENT

Standard and  
Extra Strong  
Carbon and ferritic alloy steel,  
ASTM A-234



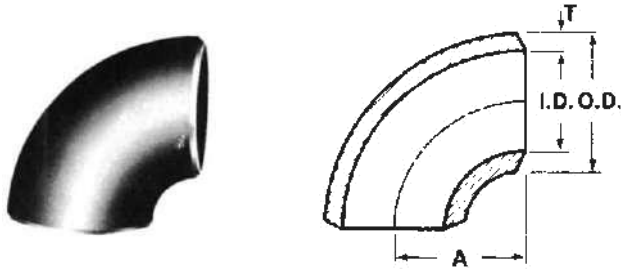
NPS DN	Outside Diameter at Bevel O.D.	Centre to Short End Nominal A	Tangent Length L	Centre to Long End Nominal B	STANDARD WEIGHT			EXTRA STRONG		
					Wall Thickness T	Inside Diameter I.D.	Approx. Weight	Wall Thickness T	Inside Diameter I.D.	Approx. Weight
1 1/2 40	1.900 48	2.25 57	1.0 25.4	3.25 83	0.145 3.68	1.610 40.89	1.12 0.50	.200 5.08	1.500 38.10	1.45 0.65
2 50	2.375 60	3.0 76	1.25 31.8	4.25 108	0.154 3.91	2.067 52.50	1.94 0.87	.218 5.54	1.939 49.25	2.67 1.20
2 1/2 65	2.875 73	3.75 95	1.25 31.8	5.0 127	0.203 5.16	2.469 62.71	3.63 1.63	.276 7.01	2.323 59.00	4.66 2.10
3 80	3.500 89	4.5 114	1.25 31.8	5.75 146	0.216 5.49	3.068 77.93	5.57 2.5	.300 7.62	2.900 73.66	7.24 3.26
3 1/2 90	4.000 102	5.25 133	1.50 38.1	6.75 171	0.226 5.74	3.548 90.12	7.81 3.5	.318 8.08	3.364 85.45	10.3 4.6
4 100	4.500 114	6.0 152	1.50 38.1	7.5 191	0.237 6.02	4.026 102.26	10.3 4.6	.337 8.56	3.826 97.18	14.4 6.5
5 125	5.563 141	7.5 190	1.50 38.1	9.0 229	0.258 6.55	5.047 128.19	17.1 7.7	.375 9.53	4.813 122.25	24.5 11
6 150	6.625 168	9.0 229	1.75 44.5	10.75 273	0.280 7.11	6.065 154.05	26.4 12	.432 10.97	5.761 146.33	39.7 18
8 200	8.625 219	12.0 305	1.75 44.5	13.75 349	0.322 8.18	7.981 202.72	51.0 23	.500 12.70	7.625 193.68	76.3 34
10 250	10.750 273	15.0 381	2.0 50.8	17.0 432	0.365 9.27	10.020 254.51	89.5 40	.500 12.70	9.750 247.65	118.0 53
12 300	12.750 324	18.0 457	2.5 63.5	20.5 521	0.375 9.53	12.000 304.80	133.0 60	.500 12.70	11.750 298.45	171.0 77

\* Tangent end is supplied square unless otherwise specified.  
Short end is supplied with standard bevel. ASME/ANSI B16.25.  
Dimensional tolerances conform with ASME/ANSI B16.9 (see page 5).  
Wall thicknesses conform with ASME/ANSI B36.10M (see page 6).

These fittings are also available in other sizes and/or wall thicknesses.

# 90° ELBOWS SHORT RADIUS

Standard Weight, Extra Strong,  
and Double Extra Strong  
Carbon and ferritic alloy steel,  
ASME/ANSI B16.28, ASTM A-234



NPS	DN	Outside Diameter at Bevel O.D.	Centre to End Nominal A	STANDARD WEIGHT			EXTRA STRONG			DOUBLE EXTRA STRONG		
				Inside Diameter I.D.	Wall Thickness T	Approx. Weight	Inside Diameter I.D.	Wall Thickness T	Approx. Weight	Inside Diameter I.D.	Wall Thickness T	Approx. Weight
1	25	1.315 33	1.0 25	1.049 26.64	.133 3.38	.25 .11	-	-	-	-	-	-
1 1/4	32	1.660 42	1.25 32	1.380 35.05	.140 3.56	.38 .17	-	-	-	-	-	-
1 1/2	40	1.900 48	1.5 38	1.610 40.89	.145 3.68	.50 .23	1.500 38.10	.200 5.08	.75 .34	1.100 27.94	.400 10.16	1.5 .68
2	50	2.375 60	2.0 51	2.067 52.50	.154 3.91	.88 .40	1.939 49.25	.218 5.54	1.50 .68	1.503 38.13	.436 11.07	2.8 1.26
2 1/2	65	2.875 73	2.5 64	2.469 62.71	.203 5.16	1.75 .79	2.323 59.00	.276 7.01	2.25 1.01	1.771 44.98	.552 14.02	4.9 2.21
3	80	3.500 89	3.0 76	3.068 77.93	.216 5.49	3.00 1.35	2.900 73.66	.300 7.62	3.75 1.69	2.300 58.42	.600 15.24	7.0 3.15
3 1/2	90	4.000 102	3.5 89	3.548 90.12	.226 5.74	4.00 1.80	3.364 85.45	.318 8.08	5.50 2.48	(1)2.728 69.29	(1).636 16.15	10.5 4.73
4	100	4.500 114	4.0 102	4.026 102.26	.237 6.02	6.00 2.70	3.826 97.18	.337 8.56	7.75 3.5	3.152 80.06	.674 17.12	14.1 6.35
5	125	5.563 141	5.0 127	5.047 128.19	.258 6.55	9.5 4.28	4.813 122.25	.375 9.53	13.5 6.1	4.063 103.20	.750 19.05	26 12
6	150	6.625 168	6.0 152	6.065 154.05	.280 7.11	15.5 7	5.761 146.33	.432 10.97	22.5 10.1	4.897 124.38	.864 21.95	43 19.4
8	200	8.625 219	8.0 203	7.981 202.72	.322 8.18	31 14	7.625 193.68	.500 12.70	46 21	6.875 174.63	.875 22.23	80 36
10	250	10.750 273	10.0 254	10.02 254.5	.365 9.27	55 25	9.750 147.65	.500 12.70	71 32			
12	300	12.750 324	12.0 305	12.00 304.8	.375 9.53	78 35	11.750 298.45	.500 12.70	100 45			
14	350	14.000 356	14.0 356	13.25 336.6	.375 9.53	104 47	13.00 330.02	.500 12.70	132 59			
16	400	16.000 406	16.0 406	15.25 387.4	.375 9.53	118 53	15.00 381.0	.500 12.70	160 72			
18	450	18.000 457	18.0 457	17.25 438.2	.375 9.53	148 67	17.00 431.8	.500 12.70	160 87			
20	500	20.000 508	20.0 508	19.25 489.0	.375 9.53	210 95	19.00 482.6	.500 12.70	280 126			
24	600	24.000 610	24.0 610	23.25 590.6	.375 9.53	288 130	23.00 584.2	.500 12.70	370 167			
(2)30	(2)750	30.000 762	30.0 762	29.25 743.0	.375 9.53	480 216	29.00 736.6	.500 12.70	634 285			
(2)36	(2)900	36.000 914	36.0 914	35.25 895.4	.375 9.53	695 313	35.00 889.0	.500 12.70	940 423			

(1) NPS 3-1/2 (DN 90) XXS is not specified in ASME/ANSI B36.10.

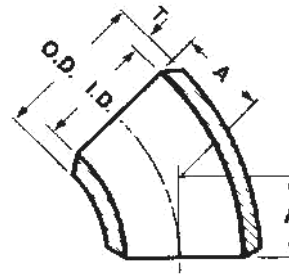
(2) These sizes not covered in ASME/ANSI B16.28.

These fittings are also available in other sizes and/or wall thicknesses.

INCHES	POUNDS
MILLIMETRES	KILOGRAMS

# 45° ELBOWS LONG RADIUS

Standard Weight,  
Extra Strong, Schedule 160,  
Double Extra Strong  
Carbon and ferritic alloy steel,  
ASTM A-234, ASME/ANSI B16.9



NPS	Outside Diameter at Bevel O.D.	Centre to End Nominal A	STANDARD WEIGHT			EXTRA STRONG			SCHEDULE 160			DOUBLE EXTRA STRONG		
			Inside Diameter I.D.	Wall Thickness T	Approx. Weight	Inside Diameter I.D.	Wall Thickness T	Approx. Weight	Inside Diameter I.D.	Wall Thickness T	Approx. Weight	Inside Diameter I.D.	Wall Thickness T	Approx. Weight
1/2	.840	.62	.622	.109	.08	-	-	-	-	-	-	-	-	-
15	21	16	15.80	2.77	.04	-	-	-	-	-	-	-	-	-
3/4	1.050	.44	.824	.113	.08	.742	.154	.16	-	-	-	.434	.308	0.17
20	27	11	20.93	2.87	.04	18.85	3.91	.07	-	-	-	11.02	7.82	.08
1	1.315	.88	1.049	.133	.25	.957	.179	.28	.815	.250	.38	.599	.358	.40
25	33	22	26.24	3.38	.11	24.31	4.55	.13	20.70	6.35	.17	15.21	9.09	.18
1 1/4	1.660	1.00	1.380	.140	.33	1.278	.191	.44	1.160	.250	.50	.896	.382	.55
32	42	25	35.05	3.56	.15	32.46	4.85	.20	29.46	6.35	.23	22.76	9.70	.25
1 1/2	1.900	1.12	1.610	.145	.47	1.500	.200	.60	1.338	.281	1.00	1.100	.400	1.15
40	48	29	40.89	3.68	.21	38.10	5.08	.27	34.0	7.14	.45	27.94	10.16	.52
2	2.375	1.38	2.067	.154	.78	1.939	.218	1.05	1.687	.344	1.75	1.503	.436	2.13
50	60	35	52.50	3.91	.35	49.25	5.54	.47	42.85	8.74	.79	38.18	11.07	.96
2 1/2	2.875	1.75	2.469	.203	1.66	2.323	.276	1.91	2.125	.375	3.00	1.771	.552	3.75
65	73	44	62.71	5.16	.75	59.00	7.01	.86	53.98	9.53	1.35	44.98	14.02	1.7
3	3.500	2.00	3.068	.216	2.25	2.900	.300	3.08	2.624	.438	4.5	2.300	.600	5.75
80	89	51	77.93	5.49	1.01	73.66	7.62	1.39	66.65	11.13	2.0	58.42	15.24	2.6
3 1/2	4.000	2.25	3.548	.226	3.16	3.364	.318	4.75	-	-	-	*2.728	*.636	8.65
90	102	57	90.12	5.74	1.42	85.45	8.08	2.14	-	-	-	69.29	16.15	3.9
4	4.500	2.50	4.026	.237	4.25	3.826	.337	5.88	3.428	.531	9.5	3.152	.674	10.7
100	114	64	102.26	6.02	1.91	97.18	8.56	2.65	87.33	13.49	4.3	80.06	17.12	4.8
5	5.563	3.12	5.047	.258	7.25	4.813	.375	10.0	4.313	.625	4.3	4.063	.750	19
125	141	79	128.19	6.55	3.26	122.25	9.53	4.65	109.55	15.88	7.65	103.20	19.05	8.6
6	6.625	3.75	6.065	.280	11.5	5.761	.432	16.7	5.187	.719	30	4.897	.864	32
150	168	95	154.05	7.11	5.18	146.33	10.97	7.5	131.8	18.26	13.5	124.38	21.95	14.4
8	8.625	5.00	7.981	.322	22.5	7.625	.500	34	6.813	.906	64	6.875	.875	60
200	219	127	202.72	8.18	10	193.68	12.70	15	173.05	23.01	29	174.63	22.23	27
10	10.750	6.25	10.02	.365	39	9.750	.500	53	8.500	1.125	135	-	-	-
250	273	150	254.5	9.27	18	247.65	12.70	24	215.9	28.58	61	-	-	-
12	12.750	7.50	12.00	.375	59	11.750	.500	74	10.126	1.312	230	-	-	-
300	324	190	304.8	9.53	27	298.45	12.70	33	257.2	33.32	104	-	-	-
14	14.000	8.75	13.25	.375	74	13.00	.500	95	11.188	1.406	278	-	-	-
350	356	222	336.6	9.53	33	330.2	12.70	43	284.2	35.71	125	-	-	-
16	16.000	10.00	15.25	.375	101	15.00	.500	131	12.812	1.594	415	-	-	-
400	406	254	387.4	9.53	46	381.0	12.70	59	325.4	40.49	187	-	-	-
18	18.000	11.25	17.25	.375	128	17.00	.500	170						
450	457	286	438.2	9.53	5	431.8	12.70	77						
20	20.000	12.50	19.25	.375	155	19.00	.500	205						
500	508	318	489.0	9.53	70	482.6	12.70	92						
22	22.000	13.50	21.25	.375	197	21.00	.500	260						
550	559	343	539.8	9.53	89	533.4	12.70	117						
24	24.000	15.00	23.25	.375	223	23.00	.500	295						
600	610	381	590.6	9.53	100	584.2	12.70	133						
26	26.000	16.00	25.25	.375	275	25.00	.500	365						
650	660	406	641.4	9.53	124	635.0	12.70	164						
30	30.000	18.50	29.25	.375	367	29.00	.500	475						
750	762	470	743.0	9.53	165	736.6	12.70	214						
36	36.000	22.25	35.25	.375	531	35.00	.500	706						
900	914	565	895.4	9.53	239	889.0	12.70	318						
42*	42.000	26.00	41.25	.375	710	41.00	.500	950						
1100	1067	860	1047.8	9.53	320	1041.4	12.70	428						

\* NPS 3-1/2 (DN 90) XXS is not specified in ASME/ANSI B36.10M.

\* Produced from x-rayed, stress relieved welded pipe. Welds are 100% radiographed in accordance with the requirements of ASME Boiler & Pressure Vessel Code.

These fittings are also available in other sizes and/or wall thicknesses.

INCHES  
MILLIMETRES

POUNDS  
KILOGRAMS

## PRODUCT DESCRIPTION

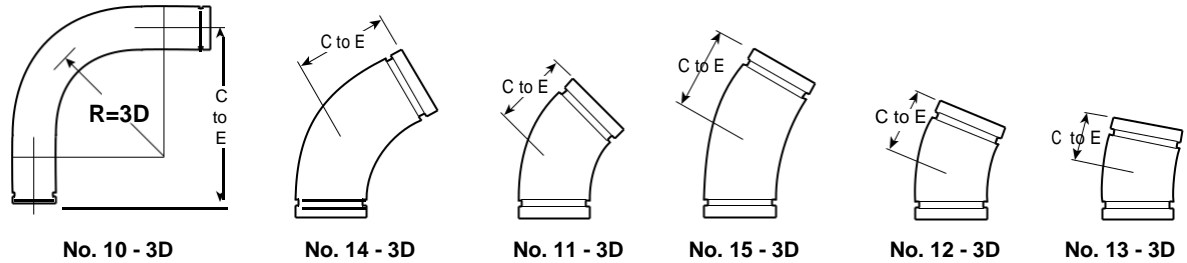
Ema long radius bends are formed from standard wall steel pipe to ASTM A-53 Grade B. Fittings are painted orange enamel with galvanized optionally available.

Bends are supplied with standard cut grooves unless otherwise requested. They are also available with plain ends by request.

# Long Radius Steel Bends 3D, 5D and 6D

## DIMENSIONS

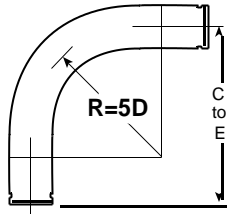
### Long Radius Steel Bends – 3D



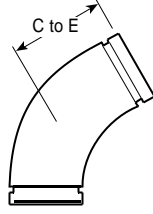
Fitting Size		No. 10 – 3D 90°		No. 14 – 3D 60°		No. 11 – 3D 45°		No. 15 – 3D 30°		No. 12 – 3D 22½°		No. 13 – 3D 11¼°	
Nominal Outside Dia. In./mm	Actual Outside Dia. In./mm	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg
2 50	2.375 60,3	10.00 254	5.3 2,4	7.50 191	4.3 2,0	6.50 165	3.9 1,8	5.75 146	3.4 1,5	5.25 133	3.2 1,5	4.50 114	2.8 1,3
2½ 65	2.875 73,0	11.50 292	9.5 4,3	8.25 210	7.7 3,5	7.25 184	6.7 3,0	6.00 152	5.8 2,6	5.50 140	5.3 2,4	4.75 121	4.6 2,1
3 80	3.500 88,9	13.00 330	14.0 6,4	9.25 235	11.0 5,0	7.75 197	9.5 4,3	6.50 165	8.0 3,6	5.75 146	7.3 3,3	5.00 127	6.2 2,8
3½ 90	4.000 101,6	14.50 368	18.6 8,4	10.00 254	14.4 6,5	8.50 216	12.3 5,6	6.75 172	10.2 4,6	6.00 152	9.2 4,2	5.00 127	7.6 3,4
4 100	4.500 114,3	16.00 407	24.1 10,9	11.00 279	18.5 8,4	9.00 229	15.7 7,1	7.25 184	12.8 5,8	6.50 165	11.4 5,2	5.25 133	9.3 4,2
4½ 120	5.000 127,0	18.00 457	31.6 14,3	12.25 311	24.2 11,0	10.00 254	20.5 9,3	8.25 210	16.8 7,6	7.25 184	14.9 6,8	5.75 146	12.2 5,5
5 125	5.563 141,3	20.00 508	40.9 18,6	13.75 349	31.3 14,2	11.25 286	26.5 12,0	9.00 229	21.8 9,9	8.00 203	19.4 8,8	6.50 165	15.8 7,2
6 150	6.625 168,3	24.00 610	63.7 28,9	16.50 419	48.8 22,1	13.50 343	41.3 18,7	10.75 273	33.9 15,4	9.50 241	30.1 13,7	7.75 197	24.6 11,2
8 200	8.625 219,1	32.00 813	127.8 58,0	22.00 559	97.9 44,4	18.00 457	82.9 37,6	14.50 368	68.0 30,8	12.75 324	60.5 27,4	10.50 267	49.3 22,4
10 250	10.750 273,0	40.00 1016	226.4 102,7	27.25 692	173.4 78,7	22.50 572	146.9 66,6	18.00 457	120.5 54,7	16.00 406	107.2 48,6	13.00 330	87.3 39,6
12 300	12.750 323,9	48.00 1219	332.7 150,9	32.75 832	254.8 115,6	27.00 686	215.9 97,9	21.75 553	177.0 80,3	19.25 489	157.5 71,4	15.50 394	128.3 58,2
14 350	14.000 355,6	56.00 1422	427.3 193,8	38.25 972	327.3 148,5	31.50 800	277.3 125,8	25.25 641	227.3 103,1	22.50 572	202.3 91,8	18.25 464	164.8 74,8
15 375	15.000 381,0	60.00 1524	480.8 218,1	41.00 1041	368.3 167,1	33.75 857	312.0 141,5	27.00 686	255.8 116,0	24.00 610	227.6 103,2	19.50 495	185.4 84,1
16 400	16.000 406,4	64.00 1626	560.1 254,1	43.75 1111	429.0 194,6	36.00 914	363.5 164,9	29.00 737	297.9 135,1	25.50 648	265.2 120,3	20.75 527	216.0 98,0
18 450	18.000 457,2	72.00 1829	710.7 322,4	49.25 1251	544.4 246,9	40.50 1029	461.3 209,2	32.50 826	378.1 171,5	28.75 730	336.5 152,6	23.25 591	274.1 124,3
20 500	20.000 508,0	80.00 2032	879.3 398,9	54.75 1391	673.5 305,5	45.00 1143	540.7 245,3	36.00 914	467.8 212,2	32.00 813	416.3 188,8	26.00 660	339.2 153,9
22 550	22.000 559,0	88.00 2235	1067.7 484,3	60.25 1530	817.9 371,0	49.25 1251	692.9 314,3	39.75 1010	568.0 257,6	35.25 895	505.2 229,2	28.50 724	411.8 186,8
24 600	24.000 609,6	96.00 2438	1270.3 576,2	65.50 1664	973.0 441,4	53.75 1365	824.4 373,9	43.25 1099	675.7 306,5	38.25 972	601.4 272,8	31.00 787	490.0 222,3

## DIMENSIONS

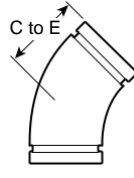
### Long Radius Steel Bends – 5D



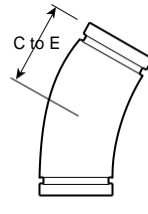
No. 10 - 5D



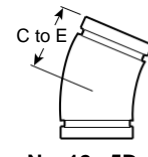
No. 14 - 5D



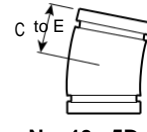
No. 11 - 5D



No. 15 - 5D



No. 12 - 5D

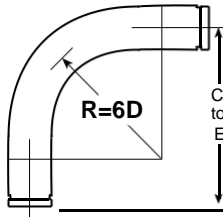


No. 13 - 5D

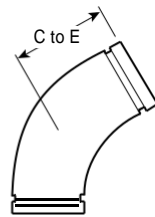
Fitting Size		No. 10 - 5D 90°		No. 14 - 5D 60°		No. 11 - 5D 45°		No. 15 - 5D 30°		No. 12 - 5D 22½°		No. 13 - 5D 11¼°	
Nominal Outside Dia. In./mm	Actual Outside Dia. In./mm	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg
2 50	2.375 60,3	14.00 356	7.2 3,3	9.75 248	5.6 2,5	8.25 210	4.8 2,2	6.75 172	4.0 1,8	6.00 152	3.6 1,6	5.00 127	3.0 1,4
2½ 65	2.875 73,0	16.00 419	13.3 6,0	11.25 286	10.2 4,6	9.25 235	8.6 3,9	7.50 191	7.0 3,2	6.50 165	6.2 2,8	5.25 133	5.0 2,3
3 80	3.500 88,9	19.00 488	19.9 9,0	12.75 324	15.0 6,8	10.25 260	12.5 5,7	8.00 203	10.0 4,5	7.00 178	8.8 4,0	5.50 140	6.9 3,1
3½ 90	4.000 101,6	21.50 546	26.9 12,2	14.25 362	20.0 9,1	11.25 286	16.5 7,5	8.75 222	13.0 5,9	7.50 191	11.3 5,1	5.75 146	8.7 3,9
4 100	4.500 114,3	24.00 610	35.4 16,1	15.50 394	26.0 11,8	12.50 318	21.3 9,7	9.50 241	16.6 7,5	8.00 203	14.3 6,5	6.00 152	10.7 4,9
4½ 120	5.000 127,0	27.00 686	46.3 21,0	17.50 445	34.0 15,4	13.75 349	27.9 12,7	10.50 267	21.7 9,8	9.00 229	18.6 8,4	6.75 172	14.0 6,4
5 125	5.563 141,3	30.00 762	60.0 27,2	19.50 495	44.1 20,0	15.50 394	36.1 16,4	11.75 299	28.1 12,7	10.00 254	24.1 10,9	7.50 191	18.2 8,3
6 150	6.625 168,3	36.00 914	93.5 42,4	23.25 591	68.6 31,1	18.50 470	56.2 25,5	14.00 356	43.8 19,9	12.00 305	37.6 17,1	9.00 229	28.3 12,8
8 200	8.625 219,1	48.00 1219	187.6 85,1	31.00 787	137.7 62,5	24.50 622	112.8 51,2	18.75 476	87.9 39,9	16.00 406	75.4 34,2	12.00 305	56.8 25,8
10 250	10.750 273,0	60.00 1524	332.4 150,8	39.00 991	244.1 110,7	30.75 781	199.9 90,7	23.50 597	155.8 70,7	20.00 508	133.7 60,6	15.00 381	100.6 45,6
12 300	12.750 323,9	72.00 1829	488.4 221,5	46.75 1188	358.6 162,7	37.00 940	293.7 133,2	28.00 711	228.9 103,8	24.00 610	196.4 89,1	18.00 457	147.8 67,0
14 350	14.000 355,6	84.00 2134	627.4 284,6	54.50 1384	460.7 209,0	43.00 1092	377.3 171,1	32.75 832	294.0 133,4	28.00 711	252.3 114,4	21.00 533	189.8 86,1
15 375	15.000 381,0	90.00 2286	705.8 320,2	58.25 1498	518.3 235,1	46.00 1168	424.6 192,6	35.25 895	330.8 150,1	30.00 762	283.9 128,8	22.50 572	213.6 96,6
16 400	16.000 406,4	96.00 2438	822.2 372,9	62.25 1581	603.8 273,9	49.25 1251	494.5 224,3	37.50 953	385.3 174,8	32.00 813	330.7 150,0	24.00 610	248.8 112,9
18 450	18.000 457,2	108.00 2743	1043.4 473,3	70.00 1778	766.2 347,5	55.25 1403	627.6 284,7	42.25 1073	489.0 221,8	36.00 914	419.7 190,4	27.00 686	315.7 143,2
20 500	20.000 508,0	120.00 3048	1290.9 585,6	77.75 1975	947.9 430,0	61.50 1562	776.4 352,2	46.75 1188	605.0 274,4	40.00 1016	519.2 235,5	30.00 762	390.6 177,2
22 550	22.000 559,0	132.00 3353	1567.4 711,0	85.50 2172	1150.9 522,0	67.50 1715	942.7 427,6	51.50 1308	734.6 333,2	44.00 1118	630.5 286,0	32.75 832	474.3 215,1
24 600	24.000 609,6	144.00 3658	1864.8 845,9	93.25 2369	1369.3 621,1	73.75 1873	1121.6 508,8	56.25 1429	873.9 396,4	48.00 1219	750.1 340,2	35.75 908	564.3 256,0

## DIMENSIONS

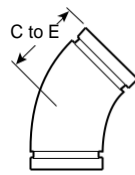
### Long Radius Steel Bends – 6D



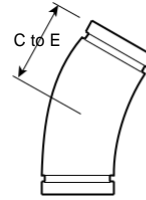
No. 10 - 6D



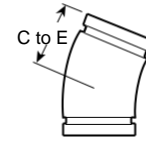
No. 14 - 6D



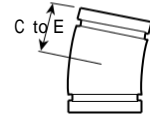
No. 11 - 6D



No. 15 - 6D



No. 12 - 6D

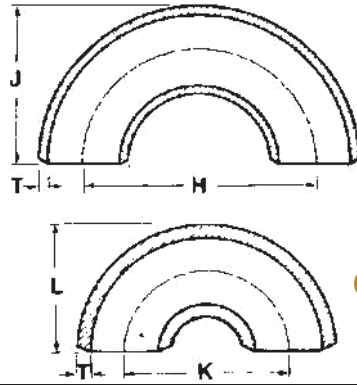
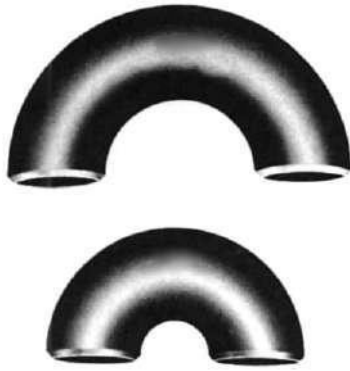


No. 13 - 6D

Fitting Size		No. 10 - 6D 90°		No. 14 - 6D 60°		No. 11 - 6D 45°		No. 15 - 6D 30°		No. 12 - 6D 22½°		No. 13 - 6D 11¼°	
Nominal Outside Dia. In./mm	Actual Outside Dia. In./mm	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg	C to E Inches mm	Aprx. Wgt. Ea. Lb./kg
2 50	2.375 60,3	16.00 406	8.2 3,7	11.00 279	6.3 2,9	9.00 229	5.3 2,4	7.25 184	4.3 2,0	6.50 165	3.9 1,8	5.25 133	3.2 1,5
2½ 65	2.875 73,0	19.00 483	15.2 6,9	12.75 324	11.4 5,2	10.25 260	9.5 4,3	8.00 203	7.7 3,5	7.00 178	6.7 3,0	5.50 140	5.3 2,4
3 80	3.500 88,9	22.00 559	22.9 10,4	14.50 368	17.0 7,7	11.50 292	14.0 6,4	8.75 222	11.0 5,0	7.50 191	9.5 4,3	5.75 146	7.3 3,3
3½ 90	4.000 101,6	25.00 635	31.1 14,1	16.25 413	22.8 10,3	12.75 324	18.6 8,4	9.75 248	14.4 6,5	8.25 210	12.3 5,6	6.00 152	9.2 4,2
4 100	4.500 114,3	28.00 711	41.1 18,6	18.00 457	29.8 13,5	14.00 356	24.1 10,9	10.50 267	18.5 8,4	8.75 222	15.7 7,1	6.50 165	11.4 5,2
4½ 120	5.000 127,0	31.50 800	53.7 24,4	20.00 508	39.0 17,7	15.75 400	31.6 14,3	11.75 299	24.2 11,0	10.00 254	20.5 9,3	7.25 184	14.9 6,8
5 125	5.563 141,3	35.00 889	69.6 31,6	22.25 565	50.5 22,9	17.50 445	40.9 18,6	13.00 330	31.3 14,2	11.00 279	26.5 12,0	8.00 203	19.4 8,8
6 150	6.625 168,3	42.00 1067	108.4 49,2	26.75 680	78.6 35,7	21.00 533	63.7 28,9	15.75 400	48.8 22,1	13.25 337	41.3 18,7	9.50 241	30.1 13,7
8 200	8.625 219,1	56.00 1422	217.5 98,7	35.75 908	157.7 71,5	28.00 711	127.8 58,0	21.00 533	97.9 44,4	17.50 445	82.9 37,6	12.75 324	60.5 27,4
10 250	10.750 273,0	70.00 1778	385.4 174,8	44.75 1137	279.4 126,7	35.00 889	226.4 102,7	26.00 660	173.4 78,7	22.00 559	146.9 66,6	16.00 406	107.2 48,6
12 300	12.750 323,9	84.00 2134	566.2 256,8	53.50 1359	410.5 186,2	41.75 1061	332.7 150,9	31.25 794	254.8 115,6	26.25 667	215.9 97,9	19.00 483	157.5 71,4
14 350	14.000 355,6	98.00 2489	727.4 329,9	62.50 1588	527.3 239,2	48.75 1238	427.3 193,8	36.50 927	327.3 148,5	30.75 781	277.3 125,8	22.25 565	202.3 91,8
15 375	15.000 381,0	105.00 2667	818.4 371,2	67.00 1702	593.3 269,1	52.25 1327	480.2 217,8	39.25 997	386.3 167,1	33.00 838	312.0 141,5	24.00 609	227.6 103,2
16 400	16.000 406,4	112.00 2845	953.3 432,4	71.50 1816	691.1 313,5	55.75 1416	560.1 254,1	41.75 1061	429.0 194,6	35.25 895	363.5 164,9	25.50 648	265.2 120,3
18 450	18.000 457,2	126.00 3200	1209.7 548,7	80.50 2045	877.1 397,9	62.75 1594	710.7 322,4	47.00 1194	544.4 246,9	39.50 1003	461.3 209,2	28.75 730	336.5 152,6
20 500	20.000 508,0	140.00 3556	1496.6 678,9	89.25 2267	1085.1 492,2	69.75 1772	879.3 398,9	52.25 1327	673.5 305,5	44.00 1118	570.7 258,9	31.75 807	416.3 188,8
22 550	22.000 559,0	154.00 3912	1817.3 824,3	98.25 2496	1317.5 597,6	76.75 1950	1067.7 484,3	57.50 1461	817.9 371,0	48.25 1256	693.0 314,3	35.00 889	505.5 229,3
24 600	24.000 609,6	168.00 4267	2162.0 980,7	107.25 2724	1567.5 711,0	83.75 2127	1270.3 576,2	62.50 1588	973.0 441,4	52.75 1340	824.4 373,9	38.25 972	601.4 272,8

#### NOTES

1. Long radius elbows (3D, 5D and 6D) in sizes up to and including 4" are provided with 4" integral tangent; remaining sizes provided with integral tangents with lengths equal to nominal pipe size.
2. Grooved or plain end available. Specify choice on order.
3. Material: standard wall steel pipe to ASTM A-53 grade B (other materials available on request).
4. Bends to conform to above radii.
5. C to E tolerances: 2 - 6" ± 1/8"; 8 - 16" ± 1/4"; 18 - 24" ± 3/8"
6. All weights are approximate based on calculated weight of pipe.



# 180° RETURNS LONG RADIUS SHORT RADIUS

Standard Weight & Extra Strong  
Carbon and ferritic alloy steel, ASTM A-234,  
ASME/ANSI B16.9  
ASME/ANSI B16.28

NPS	DN	Outside Diameter O.D.	LONG RADIUS		SHORT RADIUS		STANDARD WEIGHT				EXTRA STRONG			
			Center to Center Nominal H	Back to Face Nominal J	Center to Center Nominal K	Back to Face Nominal L	Inside Diameter I.D.	Wall Thickness T	Long Radius Approx. Weight	Short Radius Approx. Weight	Inside Diameter I.D.	Wall Thickness T	Long Radius Approx. Weight	Short Radius Approx. Weight
1/2	15	.840 21	.300 76	1.88 48	(1) - (1) -	- -	.622 15.80	.109 2.77	.25 .11	(1) - (1) -	.546 13.87	.147 3.73	.45 .20	(1) - (1) -
3/4	20	1.050 27	2.25 57	1.69 43	(1) - (1) -	- -	.824 20.93	.113 2.87	.33 .15	(1) - (1) -	.742 18.85	.154 3.91	.45 .20	(1) - (1) -
1	25	1.315 33	3.00 76	2.19 56	2.0 51	1.62 41	1.049 26.64	.133 3.38	.75 .34	.50 .23	.957 24.31	.179 4.55	1.0 .45	(1) - (1) -
1 1/4	32	1.660 42	3.75 95	2.75 70	2.5 64	2.06 52	1.380 35.05	.140 3.56	1.0 .45	.75 .34	1.278 32.46	.191 4.85	1.5 .68	(1) - (1) -
1 1/2	40	1.900 48	4.50 114	3.25 83	3.0 76	2.44 62	1.610 40.89	.145 3.68	1.5 .68	1.0 .45	1.500 38.10	.200 5.08	2.0 .90	1.5 .68
2	50	2.375 60	6.00 152	4.19 106	4.0 102	3.19 81	2.067 52.50	.154 3.91	3.0 1.35	1.8 .81	1.939 49.25	.213 5.54	4.4 2.0	3.0 1.35
2 1/2	65	2.875 73	7.50 191	5.19 132	5.0 127	3.94 100	2.469 62.71	.203 5.16	6.0 2.70	3.5 1.58	2.323 59.00	.276 7.01	7.5 3.38	4.5 2.03
3	80	3.500 89	9.00 229	6.25 159	6.0 152	4.75 121	3.068 77.93	.216 5.49	9.0 4.05	6.0 2.70	2.900 73.66	.300 7.62	12.0 5.40	7.5 3.38
3 1/2	90	4.000 102	10.50 267	7.25 184	7.0 178	5.5 140	3.548 90.12	.226 5.74	12.5 5.63	8.0 3.60	3.364 85.45	.318 8.08	17.0 7.65	11.0 5
4	100	4.500 114	12.0 305	8.25 210	8.0 203	6.25 159	4.026 102.26	.237 6.02	17.0 7.65	12.0 5.40	3.826 97.18	.337 8.56	23.5 10.6	15.5 7
5	125	5.563 141	15.0 381	10.31 262	10.0 254	7.75 197	5.047 128.19	.258 6.55	28.5 12.83	19.0 8.55	4.813 122.25	.375 9.53	40.0 18	27.0 12
6	150	6.625 168	18.0 457	12.31 313	12.0 305	9.31 237	6.065 154.05	.280 7.11	46 20.70	31.0 14	5.761 146.33	.432 10.97	67 30	45.0 20
8	200	8.625 219	24.0 610	16.31 414	16.0 406	12.31 313	7.981 202.72	.322 8.18	90 40.50	62 28	7.625 193.68	.500 12.70	138 62	92 41
10	250	10.750 273	30.0 762	20.38 518	20.0 508	15.38 391	10.02 254.5	.365 9.27	156 70.20	110 49.5	9.750 247.65	.500 12.70	215 62	142 41
12	300	12.750 324	36.0 914	24.38 619	24.0 610	18.38 467	12.00 304.8	.375 9.53	236 106.20	156 70	11.750 298.45	.500 12.70	300 135	200 90
14	350	14.000 356	42.0 1067	28.0 711	28.0 711	21.0 533	13.25 336.6	.395 9.53	294 132.30	208 94	13.00 330.2	.500 12.70	376 236	264 144
16	400	16.000 406	48.0 1219	32.0 813	32.0 813	24.0 610	15.25 387.4	.375 9.53	404 181.80	236 106	15.00 381.0	.500 12.70	524 236	320 144
18	450	18.000 457	54.0 1372	36.0 914	36.0 914	27.0 686	17.25 438.2	.375 9.53	512 230.4	296 133	17.00 431.8	.500 12.70	676 304	388 175
20	500	20.000 508	60.0 1524	40.0 1018	40.0 1016	30.0 762	19.25 489.0	.375 9.53	617 277.7	420 189	19.00 482.6	.500 12.70	824 371	560 252
22	550	22.000 559	66.0 1676	44.0 1118	(2) - (2) -	- -	21.25 539.8	.375 9.53	787 354.2	(2) - (2) -	21.00 533.4	.500 12.70	1040 468	(2) - (2) -
24	600	24.000 610	72.0 1829	48.0 1219	48.0 1219	36.0 914.4	23.25 590.6	.375 9.53	890 400.5	576 259	23.00 584.2	.500 12.70	1183 468	740 (2) -
(3)26	(3)650	26.000 660	78.0 1981	52.0 1321	(2) - (2) -	- -	25.25 641.4	.375 9.53	1100 495.0	(2) - (2) -	25.00 635.0	.500 12.70	1458 656	(2) - (2) -
(3)30	(3)750	30.000 762	90.0 2286	60.0 1524	60.0 1524	45.0 1143	29.25 743.0	.375 9.53	1441 648.5	960 432	29.00 736.6	.500 12.70	1910 860	1272 572

(1) These sizes of Short Radius Returns are not available.  
 (2) Available by special order only.  
 (3) These sizes not covered by ASME/ANSI B16.9 or ASME/ANSI B16.28.

Particulars and specifications of Long Radius, Sch. 160 and XXS, and Short Radius XXS available on request.

These fittings are also available in other sizes and/or wall thicknesses.

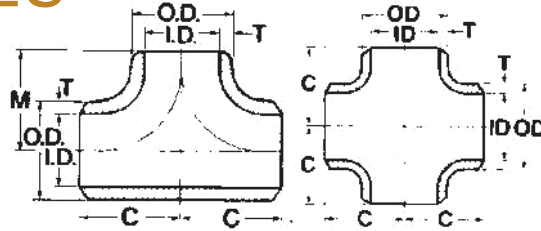
INCHES	POUNDS
MILLIMETRES	KILOGRAMS



# STRAIGHT TEES & CROSSES\*

Standard Weight and Extra Strong

Carbon and ferritic alloy steel, ASTM A-234, ASME/ANSI B16.9



NPS	DN	Outside Diameter O.D.	Centre to End, Run. C	Center to End, Outlet M	STANDARD WEIGHT				EXTRA STRONG			
					Inside Diameter I.D.	Wall Thickness T	Approx. Weight Tee	Approx. Weight Cross	Inside Diameter I.D.	Wall Thickness T	Approx. Weight Tee	Approx. Weight Cross
1/2	15	.840 21	1.00 25	1.00 25	.622 15.80	.109 2.77	.25 .11	- -	.546 187	.147 3.73	.34 .15	- -
3/4	20	1.050 27	1.12 29	1.12 29	.824 20.93	.113 2.87	.37 .17	- -	.742 18.85	.154 3.91	.44 .2	- -
1	25	1.315 33	1.50 38	1.50 38	1.049 26.64	.133 3.38	.63 .28	- -	.957 24.31	.179 4.55	.8 .36	- -
1 1/4	32	1.660 42	1.88 48	1.88 48	1.380 35.05	.140 3.56	1.25 .57	1.60 .72	1.278 32.46	.191 4.85	1.6 .73	2.20 .99
1 1/2	40	1.900 48	2.25 57	2.25 57	1.610 40.89	.145 3.68	1.5 .68	2.10 .95	1.500 38.10	.200 5.08	2.0 .9	2.60 1.17
2	50	2.375 60	2.50 64	2.50 64	2.067 52.50	.154 3.91	2.0 .9	2.55 1.15	1.939 49.25	.218 5.54	3.0 1.3	3.25 1.46
2 1/2	65	2.875 73	3.00 76	3.00 76	2.469 62.71	.203 5.16	4.0 1.8	3.40 1.53	2.323 59.00	.276 7.01	5.7 2.6	4.15 1.87
3	80	3.500 89	3.38 86	3.38 86	3.068 77.93	.216 5.49	6.0 2.7	4.10 1.85	2.900 73.66	.300 7.62	7.7 3.5	6.20 2.79
3 1/2	90	4.000 102	3.75 95	3.75 95	3.548 90.12	.226 5.74	7.5 3.4	5.65 2.54	3.364 85.45	.318 8.08	10.0 .45	9.50 4.28
4	100	4.500 114	4.12 105	4.12 105	4.026 102.3	.237 6.02	10.2 4.6	9.25 4.16	3.826 97.18	.337 8.56	14 6.3	12.7 5.72
5	125	5.563 141	4.88 125	4.88 125	5.047 128.2	.258 6.55	16 7.3	11.20 5.04	4.813 122.2	.375 9.53	23 10.4	18.0 9.1
6	150	6.625 188	5.62 143	5.62 143	6.065 154.0	.280 7.11	23.5 10.7	25.0 11	5.761 146.3	.432 10.97	38.2 17	31.5 14
8	200	8.625 218	7.00 178	7.00 178	7.981 202.7	.322 8.18	44.8 20	41.5 19	7.625 193.7	.500 12.70	67 30	52.0 24
10	250	10.750 273	8.50 216	8.50 216	10.02 254.5	.365 9.27	74.2 34	72 32	9.750 247.6	.500 12.70	110 50	85.0 38
12	300	12.750 324	10.0 254	10.0 254	12.00 304.8	.375 9.53	126 56.70	96 43	11.750 298.4	.500 12.70	165 74	130 59
14	350	14.000 356	11.0 279	11.0 279	13.25 336.6	.375 9.53	159 71.55	121 54	13.00 330.2	.500 12.70	225 101	145 65
16	400	16.000 406	12.0 305	12.0 305	15.25 387.4	.375 9.53	220 99.0	145 65	15.00 381.0	.500 12.70	265 119	180 81
18	450	18.000 457	13.5 343	13.5 343	17.25 438.2	.375 9.53	295 132.8	170 77	17.00 431.8	.500 12.70	358 161	210 95
20	500	20.000 508	15.0 381	15.0 381	19.25 489.0	.375 9.53	363 163.4	195 88	19.00 482.6	.500 12.70	358 161	210 95
22	550	22.000 559	16.5 419	16.5 419	21.25 539.8	.375 9.53	449 202	- -	21.00 533.4	.500 12.70	540 243	- -
24	600	24.000 610	17.0 432	17.0 590.6	23.25 590.6	.375 9.53	515 230	230 584.2	23.00 584.2	.500 12.70	625 281	300 135
26	650	26.000 860	19.5 495	19.5 495	25.25 641.4	.375 9.53	655 295	- -	25.00 635.0	.500 12.70	840 378	- -
30	750	30.000 762	22.0 559	22.0 559	29.25 743.0	.375 9.53	1010 455	- -	29.00 736.6	.500 12.70	1175 529	- -
36	900	36.000 914	26.5 673	26.5 673	35.25 895.4	.375 9.53	1450 653	- -	35.00 889.0	.500 12.70	1650 743	- -
42	1100	42.000 1067	30.0 762	28.0 711	41.25 1048	.375 9.53	1730 779	- -	41.00 1041	.500 12.70	1970 887	- -

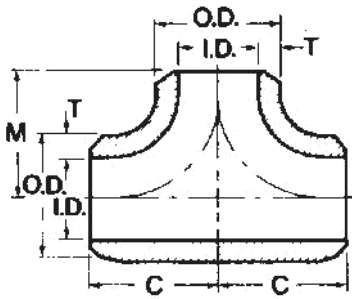
Tees size 20 NPS (DN 500) and smaller, and Crosses size 16 NPS (DN 400) and smaller, are normally furnished as seamless. Larger size non-seamless Tees and Crosses are produced from X-rayed, stress relieved welded pipe. Welds are 100% radiographed in accordance with the requirements of ASME Boiler & Pressure Vessel Code.

\*Reduced outlet crosses available on request. These fittings are also available in other sizes and/or wall thicknesses.

INCHES	POUNDS
MILLIMETRES	KILOGRAMS

# STRAIGHT TEES

Schedule 160 &  
 Double Extra Strong  
 Carbon and ferritic alloy steel,  
 ASTM A-234,  
 ASME/ANSI B16.9



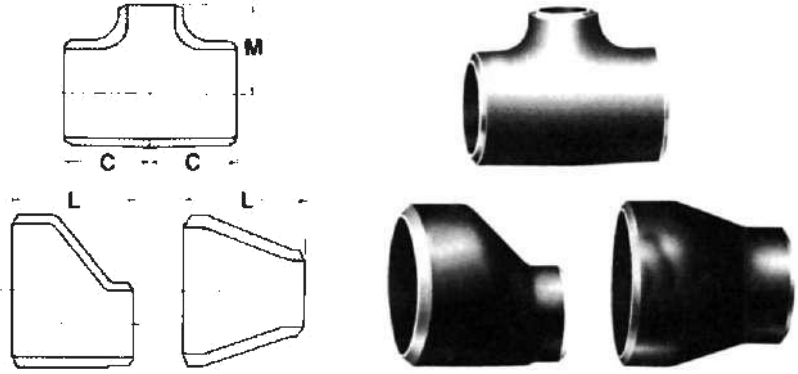
NPS	DN	Outside Diameter at Bevel O.D.	Centre to End, Run. Nominal C	Center to End, Outlet. Nominal M	SCHEDULE 160			DOUBLE EXTRA STRONG		
					Inside Diameter I.D.	Wall Thickness T	Approx. Weight	Inside Diameter I.D.	Wall Thickness T	Approx. Weight
3/4	20	1.050 27	1.12 29	1.12 29	.612 15.54	.219 5.6	.65 .29	.434 11.02	.308 7.82	1.16 .52
1	25	1.315 33	1.50 38	1.50 38	.815 20.70	.250 6.35	1.10 .50	.599 15.21	.358 9.09	1.25 .56
1 1/4	32	1.660 42	1.88 48	1.88 48	1.160 29.46	.250 6.35	2.10 .95	.896 22.76	.382 9.70	2.32 1.04
1 1/2	40	1.900 48	2.25 57	2.25 57	1.338 33.99	.281 7.14	3.00 1.35	1.100 27.94	.400 10.16	3.38 1.52
2	50	2.375 60	2.50 64	2.50 64	1.687 42.85	.344 8.74	4.5 2.03	1.503 38.18	.436 11.07	5.20 2.34
2 1/2	65	2.875 73	3.00 76	3.00 76	2.125 53.98	.375 9.53	7.0 3.15	1.771 44.98	.552 14.02	9.63 4.33
3	80	3.500 89	3.38 86	3.38 86	2.624 66.65	.438 11.13	11.5 5.18	2.300 58.42	.600 15.24	13.5 6.08
3 1/2	90	4.000 102	3.75 95	3.75 95	- -	- -	- -	2.728 69.29	.636 16.15	23 10.35
4	100	4.500 114	4.12 105	4.12 105	3.438 87.33	.531 13.49	21.5 9.7	3.152 80.06	.674 17.12	25 11
5	125	5.563 141	4.88 124	4.88 124	4.313 109.6	.625 15.88	37 17	4.063 103.2	.750 19.05	40 18
6	150	6.625 188	5.62 143	5.62 143	5.187 131.8	.719 18.26	63 28	4.897 124.4	.864 21.95	66 30
8	200	8.625 219	7.00 178	7.00 178	6.813 173.1	.906 23.01	114 51	6.875 174.6	.875 22.23	120 54
10	250	10.750 273	8.50 216	8.50 216	8.500 215.9	1.125 28.58	265 119	- -	- -	- -
12	300	12.750 324	10.00 254	10.00 254	10.126 257.2	1.312 33.32	389 175	- -	- -	- -
14	350	14.000 356	11.00 279	11.00 279	11.188 284.2	1.406 35.71	525 236	- -	- -	- -
16	400	16.000 406	12.00 305	12.00 305	12.812 325.4	1.594 40.49	820 369	- -	- -	- -

INCHES  
MILLIMETRES

POUNDS  
KILOGRAMS

# \*REDUCING TEES & REDUCERS

Concentric and Eccentric  
Standard Weight, Extra Strong,  
Schedule 160,  
Double Extra Strong  
Carbon and ferritic alloy steel,  
ASTM A-234, ASME/ANSI B16.9



Run	Outlet or Reduced End		Nominal Center-to-End Tees		Nominal Length of Reducers	APPROXIMATE WEIGHTS							
	NPS	DN	Run	Outlet		STANDARD WEIGHT		EXTRA STRONG		SCHEDULE 160		DOUBLE EXTRA STRONG	
						Tee	Reducer	Tee	Reducer	Tee	Reducer	Tee	Reducer
1/2	15	6	1.00	1.00	-	.25	-	.27	-	-	-	-	-
			25	25	-	.11	-	.12	-	-	-	-	-
			1.00	1.00	-	.25	-	.28	-	-	-	-	-
3/4	20	10	1.12	1.12	1.5	.37	.22	.43	.24	.63	.27	-	-
			29	29	38	.17	0.1	.20	.11	.29	.12	-	-
			1.12	1.12	1.5	.37	.25	.44	.25	.63	.29	1.12	-
1	25	10	1.50	1.50	2.0	.60	.27	.75	.31	.90	.31	-	2.50
			38	38	51	.25	0.1	.34	.14	.41	.14	-	1.13
			1.50	1.50	2.0	.65	.30	.75	.33	.90	.6	1.14	2.50
1 1/4	32	15	1.88	1.88	2.0	1.3	.34	1.65	.42	1.67	.46	1.95	2.61
			48	48	51	.59	0.15	.75	.19	.76	.21	.88	1.18
			1.88	1.88	2.0	1.2	.37	1.66	.46	1.68	.51	2.02	2.72
1 1/2	40	15	2.25	2.25	2.5	2.1	.44	2.2	.52	2.41	.66	2.84	2.90
			57	57	64	.95	0.2	1.00	.24	1.09	.30	1.29	1.32
			2.25	2.25	2.5	1.8	.47	2.3	.55	2.49	.74	2.93	2.96
2	50	20	2.50	1.75	3.0	2.0	.82	2.7	.89	3.35	1.30	4.26	3.06
			64	44	76	.91	.37	1.22	.40	1.52	.59	1.93	1.39
			2.50	2.00	3.0	2.0	.89	2.7	.90	3.60	1.52	4.41	3.12
2 1/2	65	25	3.00	2.25	3.5	3.0	1.42	4.2	1.55	5.90	2.10	8.00	3.40
			76	57	89	1.36	.64	1.91	.70	2.68	.95	3.63	1.54
			3.00	2.50	3.5	3.2	1.59	4.3	1.75	6.00	2.31	8.40	3.46
3	80	32	3.38	2.62	3.5	3.5	1.71	4.5	2.02	6.20	2.43	9.13	3.52
			76	64	89	1.45	.72	1.95	.79	2.72	1.05	3.81	1.57
			3.00	2.62	3.5	3.5	1.71	4.5	2.02	6.20	2.43	9.13	3.52
3	80	40	3.00	2.75	3.5	3.5	1.84	4.5	2.25	6.60	2.59	9.18	3.64
			76	70	89	1.60	.78	2.04	.92	2.81	1.10	4.14	1.60
			3.00	2.75	3.5	3.5	1.84	4.5	2.25	6.60	2.59	9.18	3.64
3	80	50	3.38	2.62	3.5	5.0	2.10	6.0	2.45	-	-	-	-
			86	67	89	2.27	1.0	2.72	1.11	-	-	-	-
			3.38	2.75	3.5	5.1	2.28	6.0	2.60	9.20	2.91	12.0	3.75
3	80	50	3.38	2.88	3.5	5.1	2.42	6.12	2.70	9.35	3.10	12.2	3.9
			86	73	89	2.31	1.1	2.81	1.22	4.24	1.41	5.5	1.77
			3.38	3.00	3.50	5.2	2.56	6.4	2.75	9.68	3.43	12.5	4.00
3	80	50	3.38	3.00	3.50	5.2	2.56	6.4	2.75	9.68	3.43	12.5	4.00
			86	76	89	2.36	1.16	2.95	1.25	4.4	1.6	5.7	1.8
			3.38	3.00	3.50	5.2	2.56	6.4	2.75	9.68	3.43	12.5	4.00

CONTINUED ON PAGES 17, 18, 19  
REFER TO PAGE 19 FOR FOOTNOTES.  
For ordering information see page 19.

INCHES	POUNDS
MILLIMETRES	KILOGRAMS

## \*REDUCING TEES & REDUCERS CONCENTRIC AND ECCENTRIC continued

Run	Outlet or Reduced End		Nominal Center-to-End Tees		Nominal Length of Reducers L	APPROXIMATE WEIGHTS							
	NPS DN	NPS DN	Run C	Outlet M		STANDARD WEIGHT		EXTRA STRONG		SCHEDULE 160		DOUBLE EXTRA STRONG	
						Tee	Reducer	Tee	Reducer	Tee	Reducer	Tee	Reducer
	2 1/2	65	3.38	3.25	3.5	6.0	2.64	7.5	2.90	10.20	3.75	13.5	4.25
			86	83	89	2.72	1.20	3.40	1.32	4.6	1.7	6.1	1.9
3 1/2	#1 14		-	-	4.00	7.5	2.68	-	3.10	-	-	-	4.72
	90	32	-	-	102	3.40	68.1	-	78.7	-	-	-	119.9
	1 1/2	40	3.75	3.12	4.00	7.5	2.72	11.0	3.20	-	-	16.3	5.30
			95	79	102	3.40	1.23	5.0	1.45	-	-	7.4	2.4
	2	50	3.75	3.25	4.00	8.2	2.77	11.2	3.35	-	-	16.7	5.64
			95	83	102	3.72	1.26	5.1	1.52	-	-	7.6	2.6
	2 1/2	65	3.75	3.50	4.00	8.3	2.82	12.0	3.50	-	-	17.5	5.92
			95	89	102	3.76	1.28	5.4	1.59	-	-	7.9	2.7
	3	80	3.75	3.62	4.00	9.5	2.88	12.6	4.00	-	-	18.5	6.20
			95	92	102	4.31	1.31	5.7	1.81	-	-	8.4	2.8
4	#^ 1		-	-	4.00	12.0	2.91	-	4.10	-	-	-	-
	100	25	-	-	102	5.44	73.9	-	104.1	-	-	-	-
	1 1/2	40	4.12	3.38	4.00	12.0	2.94	13.0	4.30	16.8	5.40	21.5	6.53
			105	86	102	5.44	1.33	5.9	1.95	7.6	2.5	9.8	3.0
	2	50	4.12	3.50	4.00	9.4	2.97	13.0	4.50	17.2	5.59	22.0	6.72
			105	89	102	4.26	1.35	5.9	2.04	7.8	2.5	10.0	3.1
	2 1/2	65	4.12	3.75	4.00	9.4	3.02	13.6	4.60	17.7	5.64	22.7	6.89
			105	95	102	4.26	1.37	6.2	2.1	8.0	2.6	10.3	3.1
	3	80	4.12	3.88	4.00	9.5	3.08	14.2	4.75	18.5	5.81	23.3	7.10
			105	98	102	4.31	1.40	6.4	2.2	8.4	2.6	10.6	3.2
	3 1/2	90	4.12	4.00	4.00	10.0	3.12	14.9	4.90	-	-	24.5	7.40
			105	102	102	4.35	1.42	6.8	2.2	-	-	11	3.4
5	2	50	4.88	4.12	5.00	14.5	3.28	18.0	5.30	30.5	7.95	35.6	10.5
			124	105	127	6.6	1.49	8.1	2.4	13.8	3.6	16.2	4.8
	2 1/2	65	4.88	4.25	5.00	14.5	3.36	18.2	5.50	31.0	9.00	36.2	12.2
			124	108	127	6.6	1.52	8.3	2.5	14.1	4.1	16.4	5.5
	3	80	4.88	4.38	5.00	14.5	3.55	18.8	5.75	31.7	10.5	37.2	13.7
			124	111	127	6.6	1.61	8.5	2.6	14.4	4.8	17	6.2
	3 1/2	90	4.88	4.50	5.00	15.0	3.69	20.0	6.10	-	-	38.0	14.9
			124	114	127	6.8	1.67	9.1	2.8	-	-	17	6.8
	4	100	4.88	4.62	5.00	15.1	3.81	22.5	6.50	33.2	11.7	39.0	15.5
			124	117	127	6.9	1.74	10.2	3.0	15.1	5.3	18	7.0
6	#^ 2		5.62	4.75	5.50	19.5	4.28	30	7.75	45.5	-	53.0	-
	150	50	143	121	140	8.9	1.94	13.6	3.5	20.6	-	24	-
	2 1/2	65	5.62	4.75	5.50	20.0	4.40	31	8.25	48.2	13.0	56.6	17.5
			143	121	140	9.1	2.00	14.1	3.7	21.9	5.9	26	7.9
	3	80	5.62	4.88	5.50	21.0	4.64	31.5	8.75	48.9	15.0	57.5	18.2
			143	124	140	9.5	2.10	14.3	4.0	22.2	6	26	8.3
	3 1/2	90	5.62	5.00	5.50	21.5	4.81	32.0	9.50	-	-	58.5	19.0
			143	127	140	9.8	2.18	14.5	4.3	-	-	27	8.6
	4	100	5.62	5.12	5.50	21.5	5.06	32.5	11.00	50.5	17.5	59.3	19.7
			143	130	140	9.8	2.30	14.7	5.0	22.9	7.9	27	8.9
	5	125	5.62	5.38	5.50	23	5.32	33.0	12.00	52.6	19.1	62.1	21.0
			143	137	140	10.4	2.41	15	5.4	23.9	7	28	9.5
8	#^ 3		7.00	6.00	6.00	38	7.29	63	14.50	-	28.5	-	25.7
	200	80	178	152	152	17.2	3.31	29	6.6	-	12.9	-	11.7
	3 1/2	90	7.00	67.00	6.00	39	7.65	63	16.0	-	-	96.5	27.1
			178	152	152	17.7	3.47	29	7.3	-	-	44	12.3
	4	100	7.00	6.12	6.00	40.5	8.12	64	16.5	98.7	33.0	97.5	28.5
			178	156	152	18.4	3.68	29	7.5	44.8	15.0	44	13
	5	125	7.0	6.38	6.0	41.0	8.53	65	17.0	101	37.0	100	29.7
			178	162	152	18.6	3.8	30	7.7	46	17	45.5	13.5
	6	150	7.0	6.62	6.0	44.0	9.02	65	18.5	104	41.0	104	33.0
			178	168	152	20	4.1	30	8.4	47	19	47	15
10	#^ 3		8.5	7.25	7.0	72.0	11.0	90	21.0	181	-	-	-
	250	80	216	184	178	32	5.0	41	9.5	82	-	-	-
	4	100	8.5	7.25	7.0	75.0	12.5	92	23.0	183	45.0	-	41.0
			216	184	178	34	5.6	41	10.4	83	20.5	-	19
	5	125	8.5	7.50	7.0	75.0	15.0	96	25.0	190	49.0	-	44.0
			216	191	178	34	6.8	43	11.3	86	22	-	20
	6	150	8.5	7.62	7.0	79.0	17.0	98	28.0	193	53.0	-	48.0
			216	194	178	36	7.7	44	12.7	88	24	-	22
	8	200	8.5	8.00	7.0	79.2	21.0	100	29.5	208	59.0	-	52.0
			216	203	178	36	9.5	45	13.4	94	27	-	24

\*Wall thickness and other pipe size data are in accordance with ASME/ANSI B36.10M. Refer to page 6. For ordering information see page 19.

INCHES	POUNDS
MILLIMETRES	KILOGRAMS

## REDUCING TEES & REDUCERS CONCENTRIC AND ECCENTRIC continued

NPS	Outlet or Reduced End		Nominal Center-to-End Tees		Nominal Length of Reducers L	APPROXIMATE WEIGHTS							
	NPS	DN	Run	Outlet		STANDARD WEIGHT		EXTRA STRONG		SCHEDULE 160		DOUBLE EXTRA STRONG	
	DN	DN	C	M		Tee	Reducer	Tee	Reducer	Tee	Reducer	Tee	Reducer
12	# 4	100	10.0	8.50	8.0	101	23.0	132	32	301	-	-	-
		300	254	216	203	46	10.4	59	14.5	137	-	-	-
	5	125	10.0	8.50	8.0	105	25.0	134	33	305	72.0	-	67.0
		150	254	216	203	47	11.3	60	15	139	32.5	-	30
	6	150	10.0	8.63	8.0	105	28.0	136	34	308	75.0	-	69.0
		200	254	219	203	47	12.6	61	15.5	140	34	-	31
8	200	10.0	9.00	8.0	105	30.0	140	36	315	83.0	-	72.0	
	250	254	229	203	47	13.5	63	16	143	38	-	33	
10	250	10.0	9.50	8.0	130	32.0	148	39	332	94.0	-	75.0	
	300	254	241	203	59	14.4	67	18	151	43	-	34	
14	# 6	150	11.0	9.38	13.0	146	58.0	184	59	410	110	-	-
		200	279	238	330	66	26	83	27	186	50	-	-
	8	200	11.0	9.75	13.0	147	59.5	187	61	435	125	-	-
		250	279	248	330	66	27	84	28	197	57	-	-
10	250	11.0	10.13	13.0	149	61.0	190	62	470	137	-	-	
	300	29	257	330	67	27	86	28	213	62	-	-	
12	300	11.0	10.63	13.0	152	64.0	196	75	495	153	-	-	
		279	270	330	68	29	88	34	225	69	-	-	
16	# 6	150	12.0	10.38	14.0	179	-	231	-	540	-	-	-
		200	305	264	356	81	-	104	-	245	-	-	-
	8	200	12.0	10.75	14.0	186	69.0	236	89	565	168	-	-
		250	305	273	356	84	31	106	40	256	76	-	-
10	250	12.0	11.13	14.0	196	72.0	248	95	610	190	-	-	
		305	283	356	88	32	111	43	277	86	-	-	
12	300	12.0	11.63	14.0	211	75.0	259	101	675	220	-	-	
		305	295	356	95	34	117	48	340	120	-	-	
14	350	12.0	12.00	14.0	219	80	261	106	750	265	-	-	
		305	305	356	99	36	117	48	340	120	-	-	
18	# 8	200	13.5	11.75	15.0	236	-	302	-	-	-	-	-
		250	343	298	381	106	-	136	-	-	-	-	-
	10	250	13.5	12.13	15.0	249	81	311	112	-	-	-	-
		300	343	308	381	112	36	140	51	-	-	-	-
	12	300	13.5	12.63	15.0	261	82	332	115	-	-	-	-
			343	321	381	117	37	149	52	-	-	-	-
14	350	13.5	13.00	15.0	270	84	340	117	-	-	-	-	
		343	330	381	122	38	153	53	-	-	-	-	
16	400	13.5	13.00	15.0	282	85	352	119	-	-	-	-	
		343	330	381	127	38	158	54	-	-	-	-	
20	# 8	200	15.0	12.75	20.0	294	-	379	-	-	-	-	-
		250	381	324	508	133	-	172	-	-	-	-	-
	# 10	250	15.0	13.13	20.0	307	-	385	-	-	-	-	-
		300	381	333	508	139	-	175	-	-	-	-	-
	12	300	15.0	13.63	20.0	316	110	401	149	-	-	-	-
			381	346	508	143	50	182	68	-	-	-	-
14	350	15.0	14.00	20.0	329	117	418	153	-	-	-	-	
		381	356	508	149	53	190	69	-	-	-	-	
16	400	15.0	14.00	20.0	341	123	432	158	-	-	-	-	
		381	356	508	155	56	196	72	-	-	-	-	
18	450	15.0	14.50	20.0	355	126	449	165	-	-	-	-	
		381	368	508	161	57	204	75	-	-	-	-	
22	# 10	250	16.5	14.13	20.0	366	-	471	-	-	-	-	-
		300	419	359	508	166	-	214	-	-	-	-	-
	# 12	300	16.5	14.63	20.0	382	-	479	-	-	-	-	-
		350	419	371	508	173	-	217	-	-	-	-	-
	14	350	16.5	15.00	20.0	395	128	487	168	-	-	-	-
			419	381	508	179	58	221	76	-	-	-	-
16	400	16.5	15.00	20.0	412	133	499	171	-	-	-	-	
		419	381	508	187	60	226	78	-	-	-	-	
18	450	16.5	15.50	20.0	429	140	522	175	-	-	-	-	
		419	394	508	195	64	237	79	-	-	-	-	
20	500	16.5	16.00	20.0	443	143	540	181	-	-	-	-	
		419	406	508	201	65	245	82	-	-	-	-	
24	# 10	250	17.0	15.13	20.0	451	149	556	183	-	-	-	-
		300	43	384	508	25	68	252	83	-	-	-	-
	# 12	300	17.0	15.63	20.0	455	152	562	187	-	-	-	-
		350	432	397	508	206	69	255	85	-	-	-	-
# 14	350	17.0	16.00	20.0	268	154	571	191	-	-	-	-	
	400	432	406	508	12	70	259	87	-	-	-	-	
16	400	17.0	16.00	20.0	479	156	585	194	-	-	-	-	
		432	406	508	217	71	285	88	-	-	-	-	

## REDUCING TEES & REDUCERS CONCENTRIC AND ECCENTRIC continued

NPS	Outlet or Reduced End		Nominal Center-to-End Tees		Nominal Length of Reducers	APPROXIMATE WEIGHTS							
	NPS	DN	Run	Outlet		STANDARD WEIGHT		EXTRA STRONG		SCHEDULE 160		DOUBLE EXTRA STRONG	
			C	M		Tee	Reducer	Tee	Reducer	Tee	Reducer	Tee	Reducer
24	18	450	17.0	16.50	20.0	490	160	597	198	-	-	-	-
			432	419	508	222	73	271	90	-	-	-	-
	20	500	17.0	17.00	20.0	506	165	614	205	-	-	-	-
			432	432	508	230	75	279	93	-	-	-	-
26	#^12	300	19.5	16.63	24.0	534	-	665	-	-	-	-	-
			495	422	610	242	-	302	-	-	-	-	-
	^ 14	350	19.5	17.00	24.0	547	-	679	-	-	-	-	-
			495	432	610	248	-	308	-	-	-	-	-
	^ 16	400	19.5	17.00	24.0	561	-	691	-	-	-	-	-
			495	432	610	254	-	313	-	-	-	-	-
	18	450	19.5	17.50	24.0	575	170	714	215	-	-	-	-
			495	444	610	261	77	324	98	-	-	-	-
	20	500	19.5	18.00	24.0	592	172	733	221	-	-	-	-
			495	457	610	268	78	332	100	-	-	-	-
	22	550	19.5	18.50	24.0	623	174	756	229	-	-	-	-
			495	470	610	283	79	343	104	-	-	-	-
	24	600	19.5	19.00	24.0	643	177	780	235	-	-	-	-
			495	483	610	292	80	354	107	-	-	-	-
30	^ 14	350	22.0	19.0	24.0	675	-	865	-	-	-	-	-
			559	483	610	305	-	392	-	-	-	-	-
	^ 16	400	22.0	19.0	24.0	690	-	895	-	-	-	-	-
			559	483	610	313	-	406	-	-	-	-	-
	^ 18	450	22.0	19.5	24.0	721	-	932	-	-	-	-	-
			559	495	610	327	-	423	-	-	-	-	-
	20	500	22.0	20.0	24.0	744	180	978	264	-	-	-	-
			559	508	610	337	82	444	120	-	-	-	-
	22	550	22.0	20.5	24.0	768	200	1031	270	-	-	-	-
			559	521	610	348	91	468	122	-	-	-	-
	24	600	22.0	21.0	24.0	792	215	1050	275	-	-	-	-
			559	533	610	359	98	476	125	-	-	-	-
	26	650	22.0	21.5	24.0	845	235	1085	282	-	-	-	-
			559	546	610	383	107	492	128	-	-	-	-
36	^ 16	400	26.5	22.0	24.0	1280	-	1220	-	-	-	-	-
			673	559	610	581	-	553	-	-	-	-	-
	^ 18	450	26.5	22.5	24.0	1305	-	1310	-	-	-	-	-
			673	572	610	592	-	594	-	-	-	-	-
	^ 20	500	26.5	23.0	24.0	1360	319	1395	320	-	-	-	-
			673	584	610	617	141	633	145	-	-	-	-
	^ 22	550	26.5	23.5	24.0	1390	-	146	-	-	-	-	-
			673	597	610	631	-	665	-	-	-	-	-
	24	600	26.5	24.0	24.0	1410	340	1510	360	-	-	-	-
			673	610	610	640	154	685	163	-	-	-	-
	26	650	26.5	24.5	24.0	1425	-	1555	-	-	-	-	-
			673	622	610	646	-	705	-	-	-	-	-
	30	750	26.5	25.0	24.0	1432	375	1595	385	-	-	-	-
			673	635	610	650	170	723	175	-	-	-	-
42	^ 18	450	30.0	25.5	24.0	1550	-	1770	-	-	-	-	-
			762	648	610	703	-	803	-	-	-	-	-
	^ 20	500	30.0	26.0	24.0	1590	-	1810	-	-	-	-	-
			762	660	610	721	-	821	-	-	-	-	-
	^ 22	550	30.0	26.0	24.0	1630	-	1850	-	-	-	-	-
			762	660	610	739	-	839	-	-	-	-	-
	^ 24	600	30.0	26.0	24.0	1645	390	1865	405	-	-	-	-
			762	660	610	745	177	846	184	-	-	-	-
	^ 26	650	30.0	27.5	24.0	1665	425	1890	440	-	-	-	-
			762	698	610	755	193	857	200	-	-	-	-
	30	750	30.0	28.0	24.0	1690	445	1910	465	-	-	-	-
			762	711	610	767	202	866	211	-	-	-	-
	36	900	30.0	28.0	24.0	1710	470	1935	495	-	-	-	-
			762	711	610	776	213	878	225	-	-	-	-

When ordering Reducing Tees, specify the run pipe size first, followed by the outlet size. Example 2 x 2 x 1.

When ordering Reducers, specify the Large End first, followed by the Small End size and the type. Example: 2 x 1 eccentric.

These fittings are also available in other sizes and/or wall thicknesses.

Wall thickness and other pipe size data are in accordance with ASME/ANSI B36.10M. Refer to page 6.

#This size of Reducing Outlet Tee is not covered in ANSI B16.9

▲ This size of Reducer is not covered in ANSI B16.9

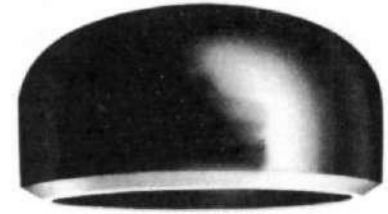
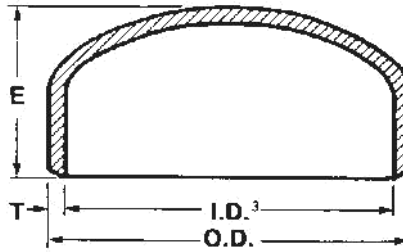
■ This size of Reducer supplied concentric, only.

Tees size 20 NPS (DN 500) and smaller, and Reducers size 24 NPS (DN 600) and smaller, are normally furnished as seamless. Larger size non-seamless Tees and Reducers are produced from X-rayed, stress relieved welded pipe. Welds are 100% radiographed in accordance with the requirements of the ASME Boiler & Pressure Vessel Code.

INCHES	POUNDS
MILLIMETRES	KILOGRAMS

# CAPS

Standard, Extra Strong,  
Schedule 160, Double  
Extra Strong  
Carbon and ferritic alloy steel,  
ASTM A-234  
ASME/ANSI B16.9



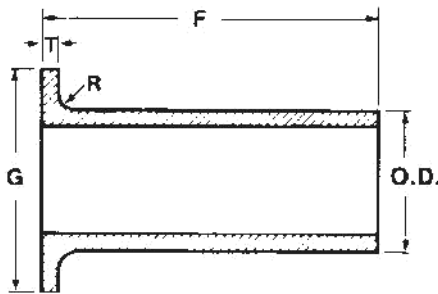
NPS	Outside Diameter at Bevel DN O.D.	STANDARD WEIGHT			EXTRA STRONG			SCHEDULE 160			DOUBLE EXTRA STRONG			
		Wall Thickness T	Nominal Length (1) E	Approx. Weight	Wall Thickness T	Nominal Length (1) E	Approx. Weight	Wall Thickness T	Nominal Length (1) E	Approx. Weight	Wall Thickness T	Nominal Length (1) E	Approx. Weight	
1/2	15	.840 21	.109 2.77	1.0 25	.1 .05	.147 3.73	1.0 25	.09 .04	- -	- -	- -	- -	- -	
3/4	20	1.050 27	.113 2.87	1.0 25	.1 .05	.154 3.91	1.0 25	.1 .05	- -	- -	- -	- -	- -	
1	25	1.315 33	.133 3.38	1.5 38	.2 .09	.179 4.55	1.5 38	.2 .09	.250 6.35	1.5 38	.4 .2	.38 9.09	1.5 38	1.0 .45
1 1/4	32	1.660 42	.140 3.56	1.5 38	.3 .14	.191 4.85	1.5 38	.4 .18	.250 6.35	1.5 38	.5 .2	.382 9.70	1.5 38	1.5 .68
1 1/2	40	1.900 48	.145 3.68	1.5 38	.4 .18	.200 5.08	1.5 38	.5 .23	.281 7.14	1.5 38	.6 .3	.400 10.16	1.5 38	2.5 1.1
2	50	2.375 60	.154 3.91	1.5 38	.6 .27	.218 5.54	1.5 38	.8 .36	.344 8.74	1.75 44	1.25 .6	.436 11.07	1.75 44	3.0 1.4
2 1/2	65	2.875 73	.203 5.16	1.5 38	.9 .41	.276 7.01	1.5 38	1.0 .45	.375 9.53	2.0 51	1.75 .8	.552 14.02	2.0 51	4.0 1.8
3	80	3.500 89	.216 5.49	2.0 51	1.4 .64	.300 7.62	2.0 51	2.0 .91	.438 11.13	2.5 64	2.9 1.3	.600 15.24	2.5 64	6.0 2.7
3 1/2	90	4.000 102	.226 5.74	2.5 64	2.2 1.0	.318 8.08	2.5 64	2.8 1.3	- -	- -	- -	(2).636 (2)16.15	3.0 76	7.5 3.4
4	100	4.500 114	.237 6.02	2.5 64	3.0 1.4	.337 8.56	2.5 64	3.5 1.6	.531 13.49	3.0 76	5.9 2.7	.674 17.12	3.0 76	9.0 4.1
5	125	5.563 141	.258 6.55	3.0 78	4.5 2.0	.375 9.53	3.0 76	5.8 2.6	.625 15.88	3.5 89	10 4.5	.750 19.05	3.5 89	13.5 5.1
6	150	6.625 168	.280 7.11	3.5 89	7.2 3.3	.432 10.97	3.5 89	9.2 4.2	.719 18.26	4.0 102	15 6.8	.864 21.95	4.0 102	18 8.2
8	200	8.625 219	.322 8.18	4.0 102	12.0 5.4	.500 12.70	4.0 102	15 6.8	.906 23.01	5.0 127	31 14	.875 22.23	5.0 127	26 12
10	250	10.750 273	.365 9.27	5.0 127	18 8.2	.500 12.70	5.0 127	25 11.3	1.125 28.58	6.0 152	57 26	- -	- -	- -
12	300	12.750 324	.375 9.53	6.0 152	27 12	.500 12.70	6.0 152	35 16	1.312 33.32	7.0 178	95 43	- -	- -	- -
14	350	14.000 356	.375 9.53	6.5 165	33 15	.500 12.70	6.5 185	43 20	1.406 35.71	7.5 191	130 59	- -	- -	- -
16	400	16.000 405	.375 9.53	7.0 178	42 19	.500 12.70	7.0 178	54 25	1.594 40.49	8.0 203	165 75	- -	- -	- -
18	450	18.000 457	.375 9.53	8.0 203	55 25	.500 12.70	8.0 203	73 33	- -	- -	- -	- -	- -	- -
20	500	20.000 508	.375 9.53	9.0 229	68 31	.500 12.70	9.0 229	90 41	- -	- -	- -	- -	- -	- -
22	550	22.000 559	.375 9.53	10.0 254	86 39	.500 12.70	10.0 254	110 50	- -	- -	- -	- -	- -	- -
24	600	24.000 610	.375 9.53	10.5 267	96 44	.500 12.70	10.5 267	127 58	- -	- -	- -	- -	- -	- -
26	650	26.000 680	.375 9.53	10.5 267	110 50	.500 12.70	10.5 267	145 66	- -	- -	- -	- -	- -	- -
30	750	30.000 762	.375 9.53	10.5 267	132 60	.500 12.70	10.5 267	175 79	- -	- -	- -	- -	- -	- -
36	900	36.000 914	.375 9.53	10.5 267	192 87	.500 12.70	10.5 267	235 107	- -	- -	- -	- -	- -	- -
42	1100	42.000 1067	.375 9.53	12.0 305	225 102	.500 12.70	12.0 305	295 134	- -	- -	- -	- -	- -	- -

(1) See page 5 for Dimensional tolerances.

(2) This size not covered in ASME/ANSI B36.10M. dimensions of wrought steel pipe.

(2) For inside diameter, refer to page 6.

These fittings are also available in other sizes and/or wall thicknesses.



# LAP JOINT STUB ENDS

Standard Weight  
and Extra Strong Carbon and  
ferritic alloy steel, ASTM A-234,  
ASME/ANSI B16.9

NPS	DN	Nominal Outside Diameter of Barrel O.D.	Nominal Length F	Radius R Nom. & Max.	Nom. & Max. Diameter of Lap G	STANDARD WEIGHT		EXTRA STRONG	
						Lap and Wall Thickness (1) T	Approx. Weight	Lap and Wall Thickness (1) T	Approx. Weight
1/2	15	0.84 21.4	3.0 76	.12 3	1.38 35	.109 2.77	.35 .16	1.47 3.73	.45 .2
3/4	20	1.05 26.7	3.0 76	.12 3	1.69 43	.113 2.87	.50 .23	1.54 3.91	.70 .3
1	25	1.32 33.4	4.0 102	.12 3	2.00 51	.133 3.38	.65 .29	1.79 4.55	1.0 .45
1 1/4	32	1.66 42.2	4.0 102	.19 5	2.50 64	.140 3.56	1.0 .45	1.91 4.85	1.4 .6
1 1/2	40	1.90 48.3	4.0 102	.25 6	2.88 73	.145 3.68	1.2 .54	2.00 5.08	1.6 .7
2	50	2.38 60.4	6.0 152	.31 8	3.62 92	.154 3.91	2.3 1.0	2.18 5.54	3.0 1.4
2 1/2	65	2.88 73.1	6.0 152	.31 8	4.12 105	.203 5.16	3.4 1.5	1.76 7.01	4.5 2.0
3	80	3.50 88.9	6.0 152	.38 10	5.00 127	.216 5.49	4.7 2.1	3.00 7.62	6.3 2.9
3 1/2	90	4.00 101.6	6.0 152	.38 10	5.50 140	.226 5.64	5.6 2.5	3.18 8.08	7.4 3.4
4	100	4.50 114.3	6.0 152	.44 11	6.19 157	.237 6.02	6.7 3.0	3.37 8.56	9.0 4.1
5	125	5.56 141.3	8.0 203	.44 11	7.31 186	.258 6.55	11.8 5.4	3.75 9.53	16.5 7.5
6	150	6.62 168.3	8.0 203	.50 13	8.50 216	.280 7.11	16.1 7.3	4.32 10.97	22.5 10
8	200	8.62 219.1	8.0 203	.50 13	10.62 270	.322 8.18	25.5 11.6	5.00 12.70	34.5 16
10	250	10.75 273.1	10.0 254	.50 13	15.00 324	.375 9.27	47 18	5.00 12.70	64.5 24
12	300	12.75 323.9	10.0 254	.50 13	15.00 381	.375 9.53	47 21	5.00 12.70	64.5 29
14	350	14.00 355.6	12.0 305	.50 13	16.25 413	.375 9.58	61 28	5.00 12.70	83 38
16	400	16.00 406.4	12.0 305	.50 13	18.50 470	.375 9.53	74 34	5.00 12.70	95 43
18	450	18.00 457.2	12.0 305	.50 13	21.00 533	.375 9.53	85 39	5.00 12.70	108 49
20	500	20.00 508.0	12.0 305	.50 13	23.00 584	.375 9.53	96 44	5.00 12.70	138 63
24	600	24.00 609.6	12.0 305	.50 13	27.25 692	.375 9.53	126 57	5.00 12.70	167 76

See page 5 for dimensional tolerances.

(1) The basic minimum lap thickness shall not be less than the nominal pipe wall thickness.

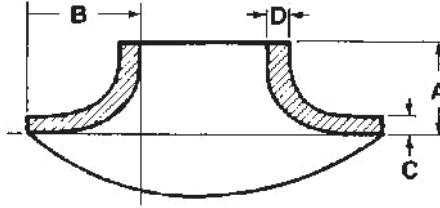
INCHES  
MILLIMETRES

POUNDS  
KILOGRAMS



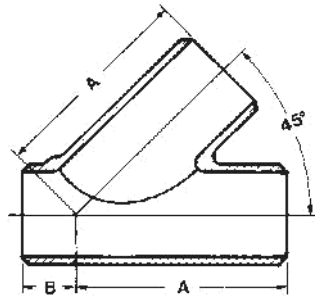
# SADDLES

Carbon and ferritic alloy steel,  
 ASTM A-234  
 A-515 Gr. 70  
 A-106 Gr. B



Nominal Size of Nozzle	Nominal Header Size		STANDARD WEIGHT				Approx. Weight
			A	B	C	D	
NPS	DN	DN					
1/4	6	1/4 - 48	.63	.75	.19	.22	.5
		6 - 1200	16	19	4.8	5.6	.23
1/2	15	1/2 - 48	.81	.88	.19	.22	.5
		15 - 1200	21	22	4.8	5.6	.23
3/4	20	3/4 - 48	.81	1.25	.19	.22	.75
		20 - 1200	21	32	4.8	5.6	.34
1	25	1 - 48	.88	1.31	.19	.22	1.0
		25 - 1200	22	33	4.8	5.6	.45
1 1/4	32	1 1/4 - 48	1.25	1.38	.19	.22	1.0
		32 - 1200	32	35	4.8	5.6	.45
1 1/2	40	1 1/2 - 48	1.50	1.75	.25	.31	2.0
		40 - 1200	38	44	6.4	7.9	.90
2	50	2 - 48	1.50	2.00	.25	.31	3.0
		50 - 1200	38	51	6.4	7.9	1.35
2 1/2	65	2 1/2 - 48	1.63	2.13	.28	.31	4.0
		65 - 1200	41	54	7.1	7.9	1.80
3	80	3 - 48	1.50	2.25	.31	.41	5.0
		80 - 1200	38	57	7.9	10.4	2.25
3 1/2	90	3 1/2 - 48	1.75	2.25	.31	.41	6.0
		90 - 1200	44	57	7.9	10.4	2.70
4	100	4 - 48	1.75	2.50	.38	.38	7.0
		100 - 1200	44	64	7.9	9.7	3.15
5	125	5 - 48	2.00	3.00	.38	.44	12.0
		125 - 1200	51	76	9.7	11.2	5.40
6	150	6 - 48	2.50	3.75	.44	.50	22.0
		150 - 1200	64	95	11.2	12.7	10
8	200	8 - 48	2.75	4.25	.44	.50	33.0
		200 - 1200	70	108	11.2	12.7	15
10	250	10-48	3.00	5.00	.44	.50	45.0
		250 - 1200	76	127	11.2	12.7	20
12	300	12-48	3.50	5.50	.44	.50	57.0
		300 - 1200	89	140	11.2	12.7	26
14	350	14-48	4.00	6.00	.44	.50	76
		350 - 1200	102	152	11.2	12.7	34
16	400	16-48	4.00	7.50	.44	.56	107
		400 - 1200	102	191	11.2	14.2	48
18	450	18-48	4.25	8.00	.50	.63	152
		450 - 1200	108	203	12.7	16.0	69
20	500	20-48	5.25	8.00	.50	.63	163
		500 - 1200	133	203	12.7	16.0	73
24	600	24-48	6.00	9.50	.50	.63	248
		600 - 1200	152	241	12.7	16.0	112

Saddles are used to reinforce intersecting welded junctions and are not intended to be used as pressure containing fittings. A vent hole prevents pressure build-up of welding gasses between saddle and header. Saddles are made from welding grade seamless steel, and are fully normalized.



# WELDING \*LATERALS

Standard Weight  
and Extra Strong  
Carbon and ferritic alloy steel,

NPS	DN	STANDARD WEIGHT			EXTRA STRONG		
		A	B	Approx. Weight	A	B	Approx. Weight
1	25	5.75 146	1.75 45	1.85 .83	6.50 165	2.00 51	2.75 1.24
1 1/4	32	6.25 159	1.75 45	2.60 1.17	7.25 184	2.25 57	4.10 1.85
1 1/2	40	7.00 178	2.00 51	3.45 1.55	8.50 216	2.50 64	5.35 2.41
2	50	8.00 203	2.50 64	4.95 2.23	9.00 229	2.50 64	7.80 3.51
2 1/2	65	9.50 241	2.50 64	9.5 4.28	10.50 267	2.50 64	13.7 6.17
3	80	10.00 245	3.00 76	12.0 5.40	11.00 279	3.00 76	19.2 8.6
3 1/2	90	11.50 292	3.00 76	17.7 8	12.50 318	3.00 76	26. 12
4	100	12.00 305	3.00 76	19.5 9	13.50 343	3.00 76	34.6 16
5	125	13.50 343	3.50 89	29.2 13	15.00 381	3.50 89	51.4 23
6	150	14.50 368	3.50 89	41.7 19	17.50 445	4.00 102	82.3 37
8	200	17.50 445	4.50 114	77.5 35	20.50 521	5.00 127	135 61
10	250	20.50 521	5.00 127	13 59	24.00 610	5.50 140	199 90
12	300	24.50 622	5.50 140	190 86	27.50 699	6.00 152	279 126
14	350	27.00 686	6.00 152	225 101	31.00 787	6.50 165	344 155
16	400	30.00 762	6.50 165	290 131	34.50 876	7.50 191	432 194
18	450	32.00 813	7.00 178	340 153	37.50 953	8.00 203	551 248
20	500	35.00 889	8.00 203	412 185	40.50 1029	8.50 216	637 287
24	600	40.50 1029	9.00 229	554 249	47.50 1207	10.00 254	903 406

Laterals are fabricated from Grade B standard and extra strong seamless pipe.

The working pressure of any fabricated Lateral must be rated at only 40% of the allowable working pressure established for the pipe from which the lateral is made. Dimensions and price of 100% strength laterals will be furnished on request.

Laterals are also available in other materials, sizes and/or wall thicknesses.

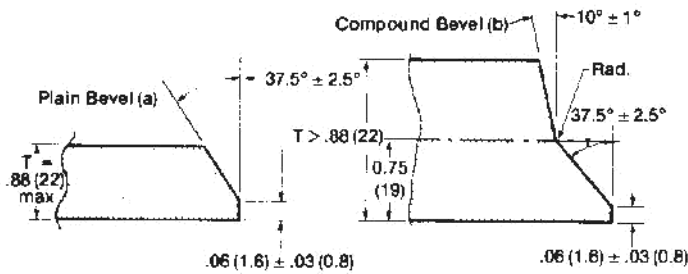
\*Reducing laterals can be supplied with the same centre-to-end dimensions as shown above.

INCHES	POUNDS
MILLIMETRES	KILOGRAMS

# BUTT WELDING ENDS

## ASME/ANSI B16.9

For fittings with wall thickness equal to that of the pipe to which they are to be welded.



Nominal Wall Thickness (T)	End Preparation
Less than $x^*$	Cut square or slightly camfer, at mfr's option
$x^*$ to .88 incl. (22)	Plain bevel as in sketch (a).
More than .88 (22)	Compound bevel as in sketch (b).

$x^* = 0.19$  (5) for carbon steel or ferritic alloy steel and 0.12 (4) for austenitic alloy steel.

Millimetres in brackets.

# SIZE RANGES

## ASME/ANSI B16.9

The following size ranges of Welding Fittings are covered by ANSI B16.9. "Steel Butt-Welding Fittings."

- 90° Long Radius Elbows . . . . . 1/2" to 48" incl.
- 45° Long Radius Elbows . . . . . 1/2" to 48" incl.
- 90° Long Radius Reducing Elbows . . . . . 2" to 24" incl.
- Tees, Straight and Reducing Outlets . . . . . 1/2" to 48" incl.
- Crosses, Straight and Reducing Outlets . . . . . 1/2" to 48" incl.
- Welding Caps . . . . . 1/2" to 48" incl.
- Lap-Joint Stub Ends . . . . . 1/2" to 24" incl.
- Welding Reducers . . . . . 3/4" to 48" incl.
- Long Radius Return Bends . . . . . 1/2" to 24" incl.

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