

Product Range



Pipes & Tubes

Stainless Steel: ASTM A312 TP 304/ 304L/ 304H/ 316/ 316L/ 317/ 317L/ 321/310/ 347/904L etc.

Carbon Steel: ASTMA53 GR. B/A106 GR. B/API 5L GRADE B/API 5L GR.X42/46/52/56/60/65/70/

Low Temperature, Carbon Steel: A333 Gr.3/ Gr.6 etc.

Alloy Steel: ASTMA335 GR. P1/P5/P9/P11/P22/P91 etc.

Nickel Alloys: Monel, Nickel, Inconel, Hastalloy, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel,

Non Ferrous Metal: Copper, Brass, Bronze, Zinc, Lead etc.

Types: Round, Square, Rectangular.

Size: Upto 24" NB. (Seamless & Welded)

Wall Thickness: Sch. 5S to Sch. XXS



Butt Weld Fittings

Stainless Steel: ASTMA403 WP 304/ 304L/ 304H/316/ 316L/ 317/ 317L/ 321/ 310/ 347/904L etc.

Carbon Steel: ASTM A234 WPB/A420 WPL3/A420 WPL6/ MSS-SP-75 WPHY 42/46/52/ 56/60/65/70

Alloy Steel: ASTMA234 WP1/ WP5/ WP9/ WP11/ WP22/ WP91 etc.

Others: Monel, Nickel, Inconel, Hastalloy, Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead, etc.

Types: Elbow, Tee, Reducer, Return Bends, Stub-Ends, Cap, Collar, Cross, Insert etc.

Size: 1/4" NB TO 32" NB. (Seamless & Welded)

Wall Thickness: Sch. 5S To Sch. XXS.



Flanges

Stainless Steel: ASTM A182 F304/ 304L/ 304H/ 316/ 316L/ 317/ 317L/ 321/ 310/ 347/ 904L etc.

Carbon Steel: ASTMA105/A694F42/46/52/56/60/65/70/A350 LF3/A350 LF2, etc.

Alloy Steel: ASTMA182 F1/ F5/ F9/ F11/ F22/ F91 etc.

Others: Monel, Nickel, Inconel, Hastalloy, Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead, etc.

Types: Weldneck, Slipon, Blind, Socket Weld, Lap Joint, Spectacles, Ring Joint, Orifcae, Long Weldneck, Deck Flange, RTJ, Flange

Size: 1/2" NB TO 24" NB.

Class: 150#, 300#, 400#, 600#, 900#, 1500# & 2500#.



Forged Socketweld & Screwed Fittings

Stainless Steel: ASTMA182 F304/ 304L/ 304H/ 316/ 316L/ 317/ 317L/ 321/310/ 347/ 904L etc.

Carbon Steel: ASTMA105/A694 F42/46/ 52/56/ 60/ 65/70 /A350 LF3/A350 LF2.

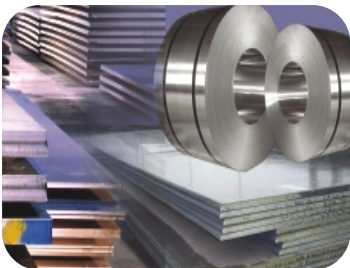
Alloy Steel: ASTMA182 F1/ F5/ F9/ F11/ F22/ F91 etc.

Others: Monel, Nickel, Inconel, Hastalloy, Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead, etc.

Types: Elbow, Tee, Union, Cross, Coupling, Cap, Bushing, Plug, Swage Nipple, Welding Boss, Hexagon Nipple, Barrel Nipple, Welding Nipple, Parraler Nipple, Street Elbow, Hexagon Nut, Hose Nipple, Bend, Adapter, Insert, Weldolet, Elbowlet, Sockolet, Thredolet, Nipolet, Letrolet, etc.

Size: 1/4" NB TO 4" NB. (Socketweld & Threaded)

Class: 3000#, 6000#, 9000#.



Sheets, Plates
Coils & Rods

Material Grade: Stainless Steel, Nickel Alloys, Carbon Steel, Alloy Steel, Other Ferrous & Non-Ferrous Metals.

Types: Sheet, Plates, Strips, Round Bars, Wires, Channel, etc.



Fasteners

Stainless Steel: AISI 302, 304, 304L, 316, 316L, 310, 317, 317L, 321, 347, 410, 420, 904L etc.

Alloy Steel: 4.6, 5.6, 6.6, 8.8, 10.9 & 12.9/ 'R', 'S', 'T' Conditions.

Carbon Steel: Bare Condition, Galvanized, Phosphetised, Cadum Plated, Hot Deep Galvanized, Bloodied, Nickel Chrome Plated, etc.

Non Ferrous Metal: Copper, Brass, Aluminium, Titanium, Nichrome, Al.Bronze Phosphorous Bronze, etc.

Types: Bolts, Nuts, Washers, Anchor Fasteners, Stud Bolts, Eye Bolt, Stud, Threaded Rod, Cotter Pin, Socket Screw, Fine Fasteners & Spares, Foundation Fasteners, etc.

PIPES & TUBES



PIPES DETAILS

Stainless & Duplex Steel Pipes

Leveraging on our finest manufacturing unit and experienced work force, our company offers stainless and duplex steel pipes. High quality pipes are stainless because of a protective layer on their surfaces which reduces the rate of corrosion to almost negligible levels. Available in different grades and dimensions, these stainless steel and duplex steel pipes are widely used in various industries such as construction, cement, petrochemical and more.

Carbon & Alloy Steel Pipes

We are one of the most trusted manufacturers for offering finest range of Carbon and Alloy Steel pipes. Used in different industries for diverse applications, these pipes can be availed in standard as well as customized dimensions as per the requirement of the clients. These pipes are appreciated for their sturdy and precise construction. We are known for offering our product range at reasonable prices and delivering consignment within given time frame.

Nickel & Copper Alloy Pipes

Adopting the highest industry standards, we manufacture finest range of nickel and copper alloy pipes. These pipes are fabricated from qualitative raw material as per global demand and ensures accurate precision. Available in wide range of technical specifications, our comprehensive range is highly acknowledged in Indian as well as overseas market for their attributes of high strength, excellent finish, and complete reliability in services.

Stainless Steel

ASTM / ASME SA 312 GR. TP 304, 304L, 304H, 309S, 309H, 310S, 310H, 316, 316TI, 316H, 316LN, 317, 317L, 321, 321H, 347, 347H, 904L. ASTM / ASME SA 358 CL 1 & CL 3 GR . 304, 304L, 304H, 309S, 309H, 310S, 310H, 316, 316H, 321, 321H, 47.

Duplex Steel

ASTM / ASME SA 790 UNS NO

Carbon Steel

ASTM / ASME A 53 GR. A & B, ASTM A 106 GR. A, B & C. API 5L GR. B, API 5L X 42, X 46, X 52, X 60, X 65 & X 70. ASTM / ASME A 691 GR A, B & C

Alloy Steel

ASTM / ASME A 335 GR P 1, P 5, P 9, P 11, P 12, P 22, P 23, P 91 ASTM / ASME A 691 GR 1 CR, 1 1/4 CR, 2 1/4 CR,

Nickel Alloy

ASTM / ASME SB 163 UNS 2200 (NICKEL 200)
ASTM / ASME SB 163 UNS 2201 (NICKEL 201)
ASTM / ASME SB 163 / 165 UNS 4400 (MONEL 400)
ASTM / ASME SB 464 UNS 8020 (ALLOY 20 / 20 CB 3)
ASTM / ASME SB 704/705 UNS 8825 INCONEL (825)A
STM / ASME SB 167 / 517 UNS 6600 (INCONEL 600)
ASTM / ASME SB 167 UNS 6601 (INCONEL 601)
ASTM / ASME SB 704 /705 UNS 6625 (INCONEL 625)
ASTM / ASME SB 619/622/626 UNS 10276 (HASTELLOY C 276)

Copper Alloy

ASTM / ASME SB 111 UNS NO. C 10100, 10200, 10300, 10800, 12000, 12200, 70600, 71500.
ASTM / ASME SB 466 UNS NO. C 70600 (CU -NI- 90/10), C 71500 (CU -NI- 70/30)
IBR & NON-IBR

C.S / A.S PIPES AND TUBES SCHEDULE DIMENSIONS, WALL THICKNESS, WT./MTR.(KG)

ANSI B 36.10													ANSI B 36.19											
Nominal Pipe Size	Outside Dia- meter	Schedule 10	Schedule 20	Schedule 30	Schedule STD	Schedule 40	Schedule 60	Schedule XS	Schedule 80	Schedule 100	Schedule 120	Schedule 140	Schedule 160	Schedule XXS	Schedule 5S	Schedule 10S	Schedule 40S	Schedule 80S						
		mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m					
1/4"	13.7				2.24	0.63		3.02	0.80	3.02	0.80					1.65	0.50	2.24	0.64	3.02	0.81			
3/8"	17.1				2.31	0.84		3.20	1.10	3.20	1.10					1.65	0.64	2.31	0.86	3.20	1.12			
1/2"	21.3				2.77	1.27	1.27	3.73	1.62	3.73	1.62			4.78	1.95	2.55	1.02	2.77	1.29	3.73	1.65			
3/4"	26.7				2.87	1.69	1.69	3.91	2.20	3.91	2.20		5.56	2.90	3.64	1.65	1.03	2.11	3.02	2.87	1.71	2.23		
1"	33.4				3.38	2.50	3.38	4.55	3.24	4.55	3.24		6.35	4.24	5.45	1.65	1.31	2.77	2.13	3.38	2.54	4.55	3.29	
1 1/4"	42.2				3.56	3.39	3.56	4.85	4.47		4.85	4.47		6.35	5.61	7.77	1.65	1.68	2.77	2.73	3.56	3.44	4.85	4.53
1 1/2"	48.3				3.68	4.05	3.68	5.08	5.41	5.08	5.41		7.14	7.25	9.56	1.65	1.93	2.77	3.16	3.68	4.11	5.08	5.49	
2"	60.3				3.91	5.44	3.91	5.54	7.48		5.54	7.48		8.74	11.11	13.44	1.65	2.42	2.77	3.99	3.91	5.52	5.54	7.60
2 1/2"	73.0				5.16	8.63	5.16	7.01	11.41	7.01	11.41		9.53	14.92	20.39	2.11	3.75	3.05	5.35	5.16	8.77	7.01	11.59	
3"	88.9				5.49	11.29	5.49	7.62	15.27		7.62	15.27		11.13	21.35	27.68	2.11	4.59	3.05	6.56	5.49	11.47	7.62	15.51
3 1/2"	101.6				5.74	13.57	5.74	8.08	18.63		8.08	18.63				2.11	5.26	3.05	7.53	5.74	13.78	8.08	18.92	
4"	114.3				6.02	16.07	6.02	8.56	22.32		8.56	22.32	11.13	33.54	41.03	2.11	5.93	3.05	8.50	6.02	16.32	8.56	22.67	
5"	141.3				6.55	21.77	6.55	9.53	30.97		9.53	30.97	12.70	40.28	57.43	2.77	9.61	3.40	11.74	6.55	22.10	9.53	31.44	
6"	168.3				7.11	28.26	7.11	10.97	42.56		10.97	42.56	14.27	54.20	79.22	2.77	11.48	3.40	14.04	7.11	28.70	10.97	43.22	
8"	219.1		6.35	33.31	8.18	42.55	10.31	12.70	64.64	12.70	64.64	15.09	75.92	18.26	107.90	2.77	14.9	3.80	20.12	8.18	43.20	12.70	65.64	
10"	273.0		6.35	41.77	9.53	51.03	12.70	81.55	15.09	96.01	18.26	114.70	21.44	133.00	155.10	3.40	22.95	4.19	28.20	9.27	61.22	12.70	82.78	
12"	323.8		6.35	49.73	8.38	65.20	9.53	73.88	10.31	79.73	14.27	108.90	12.70	186.90	208.10	3.96	31.71	4.57	36.53	9.53	74.94	12.70	98.96	
14"	355.6	6.35	54.69	7.92	67.90	9.53	81.33	9.53	81.33	11.13	94.55	15.09	126.70	224.60	31.75	3.96	34.87	4.78	41.99	9.53	82.50	12.70	109.05	
16"	406.4	6.35	62.64	7.92	77.83	9.53	93.27	9.53	93.27	12.70	123.30	16.66	160.10	286.60	36.53	4.19	42.20	4.78	48.07	9.53	94.61	12.70	125.20	
18"	457.2	6.35	70.57	7.92	87.71	11.13	122.30	9.53	105.10	14.27	155.80	19.05	205.70	363.50	39.67	4.19	47.53	4.78	54.15	9.53	106.83	12.70	141.35	
20"	508.0	6.35	78.55	9.53	117.10	12.70	155.10	9.53	117.10	15.09	183.40	20.62	247.80	441.40	44.45	4.78	60.23	5.54	69.70	9.53	118.95	12.70	157.51	
22"	558.8	6.35	86.54	9.53	129.10	12.70	171.00	9.53	129.10			22.23	294.20	672.20		4.78	66.31	5.54	76.75	9.53	131.07	12.70	173.66	
24"	609.6	6.35	94.53	9.53	141.10	14.27	209.60	9.53	141.10	17.48	255.40	24.61	355.20			5.54	83.80	6.35	95.92	9.53	143.20	12.70	189.82	
26"	660.4	7.92	127.30	12.70	202.70			9.53	152.80															
28"	711.2	7.92	137.30	12.70	218.60	15.88	217.20	9.53	164.80								9.53	155.22	12.70	205.85				
30"	762.0	7.92	147.20	12.70	234.60	15.88	291.10	9.53	176.80								9.53	167.39	12.70	222.06				
32"	812.8	7.92	157.20	12.70	250.60	15.88	312.10	9.53	188.80	17.48	342.90						6.35	120.15	7.92	149.55	9.53	179.56	12.70	238.28
34"	863.6	7.92	167.20	12.70	266.60	15.88	332.10	9.53	200.30	17.48	364.90													
36"	914.4	7.92	176.90	12.70	282.20	15.88	351.70	9.53	212.50	19.05	420.40													

STAINLESS STEEL SEAMLESS & WELDED PIPES CHEMICAL & PHYSICAL PROPERTIES

Chemical Composition										Tensile Test				
Grade	C	Si	Mn	P Max	S Max	Cr	Mo	Ni	Other Elements	Tensile Strength	Yield Point	Elongation in 2 or 50mm min%		
										kg/mm ²	kg/mm ²	Curved strip and Tubular Specimens		
										min	min	Longitudinal Transverse		
												t ≤ 5/16in	t ≥ 5/16in	t ≤ 5/16in
TP304	0.08 max	0.75 max	2.0 max	0.040	0.030	18.0-20.0		8.00-11.0	-	52.52	20.90	35	-	25
TP304H	0.04-0.10	0.75 max	2.0 max	0.040	0.030	18.0-20.0		8.00-11.0	-	52.52	20.90	35	-	25
TP304L	0.035 max	0.75 max	2.0 max	0.040	0.030	18.0-20.0		8.00-13.0	-	49.46	17.34	35	-	25
TP304N	0.08 max	0.75 max	2.0 max	0.040	0.030	18.0-20.0		8.00-11.0	N 0.10-0.16	56.10	24.61	35	-	25
TP304LN	0.035 max	0.75 max	2.0 max	0.040	0.030	18.0-20.0		8.00-11.0	N 0.10-0.16	52.52	20.90	35	-	25
TP309S	0.08 max	0.75 max	2.0 max	0.045	0.030	22.0-24.0	0.75 Max	12.0-15.0	-	52.52	20.90	35	-	25
TP310S	0.08 max	0.75 max	2.0 max	0.045	0.030	24.0-26.0	0.75 Max	19.0-22.0	-	52.52	20.90	35	-	25
TP316	0.08 max	0.75 max	2.0 max	0.040	0.030	16.0-18.0	2.00-3.00	11.0-14.0	-	52.52	20.90	35	-	25
TP316H	0.04-0.10	0.75 max	2.0 max	0.040	0.030	16.0-18.0	2.00-3.00	11.0-14.0	-	52.52	20.90	35	-	25
TP316L	0.035 max	0.75 max	2.0 max	0.040	0.030	16.0-18.0	2.00-3.00	10.0-15.0	-	49.46	17.34	35	-	25
TP316N	0.08 max	0.75 max	2.0 max	0.040	0.030	16.0-18.0	2.00-3.00	11.0-14.0	N 0.10~0.16	56.10	24.61	35	-	25
TP316LN	0.035 max	0.75 max	2.0 max	0.040	0.030	16.0-18.0	2.00~3.00	11.0-14.0	N 0.10~0.16	52.52	20.90	35	-	25
TP317	0.08 max	0.75 max	2.0 max	0.040	0.030	18.0-20.0	3.00~4.00	11.0-14.0	-	52.52	20.90	35	-	25
TP317L	0.035 max	0.75 max	2.0 max	0.040	0.030	18.0-20.0	3.00~4.00	11.0-15.0	-	52.52	20.90	35	-	25
TP321	0.08 max	0.75 max	2.0 max	0.040	0.030	17.0-20.0		9.0-13.0	Ti5xC%-0.70	52.52	20.90	35	-	25
TP321H	0.04-0.10	0.75 max	2.0 max	0.040	0.030	17.0-20.0		9.0-13.0	Ti4xC%-0.60	52.52	20.90	35	-	25
TP347	0.08 max	0.75 max	2.0 max	0.040	0.030	17.0-20.0		9.0-13.0	Nb+TA10xC%-1.00	52.52	20.90	35	-	25
TP347H	0.04-0.10	0.75 max	2.0 max	0.040	0.030	17.0-20.0		9.0-13.0	Nb+TA8xc%~1	52.52	20.90	35	-	25
TP348	0.08 max	0.75 max	2.0 max	0.040	0.030	17.0-20.0		9.0-13.0	Nb+TA10xc%~1	52.52	20.90	35	-	25
TP348H	0.04-0.10	0.75 max	2.0 max	0.040	0.030	17.0-20.0		9.0-13.0	Nb+TA8xc%~1	52.52	20.90	35	-	25
TPXM-10	0.08 max	1.00 max	8.00-10.00	0.040	0.030	19.0-21.50		5.50-7.50	NO.15~0.40	63.22	35.18	35	-	25
TPXM-11	0.04 max	1.00 max	8.00-10.00	0.040	0.030	19.0-21.50		5.50-7.50	NO.15~0.40	63.22	35.18	35	-	25
A240 TP304	0.08 max	0.75 max	2.0 max	0.045	0.030	18.0-20.0	-	8.00-10.50	NO.10 Max			Class 1: Double welded pipes & full Radiography		
TP310S	0.08 max	0.75 max	2.0 max	0.045	0.030	24.0-26.0	-	19.0-22.0				Class 2: Double welded no Radiography		
TP316	0.08 max	0.75 max	2.0 max	0.045	0.030	16.0-18.0	2.0-3.0	10.0-14.0	NO.10 Max			Class 3: Single welded full Radiography		
TP316L	0.035 max	0.75 max	2.0 max	0.045	0.030	16.0-18.0	2.0-3.0	10.0-14.0	NO.10 Max			Class 4: Single welded full Radiography rootpass without addition of filler metal		
TP317L	0.035 max	0.75 max	2.0 max	0.045	0.030	18.0-20.0	3.0-4.0	11.0-15.0	NO.10 Max			Class 5: Double welded spot Radiography		
TP321	0.08 max	0.75 max	2.0 max	0.045	0.030	17.0-19.0	-	9.0-12.0	NO.10 Max					
TP347	0.08 max	0.75 max	2.0 max	0.045	0.030	17.0-19.0	-	9.0-13.0	Cb+TA10xC/1.0					

MATERIAL SPECIFICATION FOR PIPE & TUBES OF STAINLESS STEEL, ALLOY STEEL, CARBON STEEL & MILD STEEL.

PIPE & TUBES ASTM / API / BS / DIN / IS

PIPE SPECIFICATION	CHEMICAL PROPERTIES							MECHANICAL PROPERTIES				OTHERS
	C%	Mn%	P% (Max)	S% (Max)	Cr%	Ni%	Mo%	U.T.S. (Min) Mpa	Y.S. (Min) Mpa	ELONG. (Min)		
										L	T	
ASTMA 312 Gr. TP 304	0.080 Max	2.00 Max	0.045	0.030	18.0-20.0	8.0-11.0	-	515	205	35	25	-
ASTMA 312 Gr. TP 304L	0.035 Max	2.00 Max	0.045	0.030	1.00 Max	8.0-13.0	-	485	170	35	25	-
ASTMA 312 Gr. TP 304H	0.04-0.10	2.00 Max	0.045	0.030	1.00 Max	8.0-11.0	-	515	205	35	25	-
ASTMA 312 Gr. TP 304LN	0.035 Max	2.00 Max	0.045	0.030	1.00 Max	8.0-12.0	-	515	205	35	25	N%=0.10-0.16
ASTMA 312 Gr. TP 309S	0.080 Max	2.00 Max	0.045	0.030	1.00 Max	12.0-15.0	0.75 Max	515	205	35	25	-
ASTMA 312 Gr. TP 310S	0.080 Max	2.00 Max	0.045	0.030	1.00 Max	19.0-22.0	0.75 Max	515	205	35	25	-
ASTMA 312 Gr. TP 316	0.080 Max	2.00 Max	0.045	0.030	1.00 Max	11.0-14.0	2.00-3.00	515	205	35	25	-
ASTMA 312 Gr. TP 316L	0.035 Max	2.00 Max	0.045	0.030	1.00 Max	10.0-14.0	2.00-3.00	485	170	35	25	-
ASTMA 312 Gr. TP 316H	0.04-0.10	2.00 Max	0.045	0.030	1.00 Max	11.0-14.0	2.00-3.00	515	205	35	25	-
ASTMA 312 Gr. TP 316LN	0.035 Max	2.00 Max	0.045	0.030	1.00 Max	11.0-14.0	2.00-3.00	515	205	35	25	N%=0.10-0.16
ASTMA 312 Gr. TP 317	0.080 Max	2.00 Max	0.045	0.030	1.00 Max	11.0-14.0	3.00-4.00	515	205	35	25	-
ASTMA 312 Gr. TP 317L	0.035 Max	2.00 Max	0.045	0.030	1.00 Max	11.0-15.0	3.00-4.00	515	205	35	25	-
ASTMA 312 Gr. TP 321	0.080 Max	2.00 Max	0.045	0.030	1.00 Max	9.0-12.0	-	515	205	35	25	Tt%=(5XC)-0.70
ASTMA 312 Gr. TP 321H	0.04-0.10	2.00 Max	0.045	0.030	1.00 Max	9.0-12.0	-	515	205	35	25	Tt%=(4XC)-0.60
ASTMA 312 Gr. TP 347	0.080 Max	2.00 Max	0.045	0.030	1.00 Max	9.0-13.0	-	515	205	35	25	Cb%=(10XC)-1.00
ASTMA 312 Gr. TP 347H	0.04-0.10	2.00 Max	0.045	0.030	1.00 Max	9.0-13.0	-	515	205	35	25	Cb%=(8XC)-1.10
ASTMA 358 Gr. TP 304	0.080 Max	2.00 Max	0.045	0.030	18.0-20.0	8.0-10.5	-	515	205	40	40	N%=0.10 Max, HRB=92 Max
ASTMA 358 Gr. TP 304L	0.035 Max	2.00 Max	0.045	0.030	18.0-20.0	8.0-12.0	-	485	170	40	40	N%=0.10 Max, HRB=92 Max
ASTMA 358 Gr. TP 309S	0.080 Max	2.00 Max	0.045	0.030	22.0-24.0	12.0-15.0	-	515	205	40	40	HRB=95 Max
ASTMA 358 Gr. TP 310S	0.080 Max	2.00 Max	0.045	0.030	24.0-26.0	19.0-22.0	-	515	205	40	40	HRB=95 Max
ASTMA 358 Gr. TP 316	0.080 Max	2.00 Max	0.045	0.030	16.0-18.0	10.0-14.0	2.00-3.00	515	205	40	40	N%=0.10 Max, HRB=95 Max
ASTMA 358 Gr. TP 316L	0.035 Max	2.00 Max	0.045	0.030	16.0-18.0	10.0-14.0	2.00-3.00	485	170	40	40	N%=0.10 Max, HRB=95 Max
ASTMA 358 Gr. TP 321	0.080 Max	2.00 Max	0.045	0.030	17.0-19.0	9.0-12.0	-	515	205	40	40	N%=0.10 Max, Tt%=5X(C+N)-0.70, HRB=95 Max
ASTMA 358 Gr. TP 347	0.080 Max	2.00 Max	0.045	0.030	17.0-19.0	9.0-13.0	-	515	205	40	40	Cb%=(10XC)-1.00, HRB=92 Max
ASTMA 106 Gr. A	0.25 Max	0.27-0.93	0.035	0.035	0.10 Min	0.40 Max	0.15 Max	330	205	35	25	Cu%:0.40 Max, Va%: 0.08
ASTMA 106 Gr. B	0.30 Max	0.29-1.06	0.035	0.035	0.10 Min	0.40 Max	0.15 Max	415	240	30	16.5	Cu%:0.40 Max, Va%: 0.08
ASTMA 106 Gr. C	0.35 Max	0.29-1.06	0.035	0.035	0.10 Min	0.40 Max	0.15 Max	485	275	30	16.5	Cu%:0.40 Max, Va%: 0.08
ASTMA 53 Gr. A	0.25 Max	0.95 Max	0.050	0.045	-	0.40 Max	0.15 Max	330	205	30	16.5	Cu%:0.40 Max, Va%: 0.08
ASTMA 53 Gr. B	0.30 Max	1.20 Max	0.050	0.045	-	0.40 Max	0.15 Max	415	240	30	16.5	Cu%:0.40 Max, Va%: 0.08
ASTMA 333 Gr. 1	0.30 Max	0.40-1.06	0.025	0.025	-	-	-	380	205	35	25	Impact Test= -45 °C, J=18 Min, HRB=85 Max
ASTMA 333 Gr. 6	0.30 Max	0.29-1.06	0.025	0.025	0.10 Min	-	-	415	240	30	16.5	Impact Test= -45 °C, J=18 Min, HRB=85 Max
ASTMA 335 Gr. P1	0.10-0.20	0.30-0.80	0.025	0.025	0.10-0.50	-	0.44-0.65	380	205	30	20	
ASTMA 335 Gr. P2	0.10-0.20	0.30-0.61	0.025	0.025	0.50-0.81	-	0.44-0.65	380	205	30	20	
ASTMA 335 Gr. P5	0.15 Max	0.30-0.60	0.025	0.025	4.00-6.00	-	0.45-0.65	415	205	30	20	
ASTMA 335 Gr. P9	0.15 Max	0.30-0.60	0.025	0.025	8.00-10.00	-	0.90-1.10	415	205	30	20	
ASTMA 335 Gr. P11	0.05-0.15	0.30-0.60	0.025	0.025	1.00-1.50	-	0.44-0.65	415	205	30	20	
ASTMA 335 Gr. P12	0.05-0.15	0.30-0.61	0.025	0.025	0.80-1.25	-	0.44-0.65	415	220	30	20	
ASTMA 335 Gr. P22	0.05-0.15	0.30-0.60	0.025	0.025	1.90-2.60	-	0.87-1.13	415	205	30	20	
ASTMA 335 Gr. P91	0.08-0.12	0.30-0.60	0.020	0.010	8.00-9.50	0.40 Max	0.85-1.05	620	440	20	-	V%=0.18-0.25, N%=0.030-0.070, A%=0.02 Max, Cb%=0.06-0.10
ASTMA 213 Gr. T2	0.10-0.20	0.30-0.61	0.025	0.025	0.10-0.30	-	0.44-0.65	415	205	30	30	HRB=85 Max
ASTMA 213 Gr. T5	0.15 Max	0.30-0.60	0.025	0.025	4.00-6.00	-	0.45-0.65	415	205	30	30	HRB=85 Max
ASTMA 213 Gr. T11	0.05-0.15	0.30-0.60	0.025	0.025	1.00-1.50	-	0.44-0.65	415	205	30	30	HRB=85 Max
ASTMA 213 Gr. T12	0.05-0.15	0.30-0.61	0.025	0.025	0.80-1.25	-	0.44-0.65	415	220	30	30	HRB=85 Max
ASTMA 213 Gr. T22	0.05-0.15	0.30-0.60	0.025	0.025	1.90-2.60	-	0.87-1.13	415	205	30	30	HRB=85 Max
ASTMA 179	0.06-0.18	0.27-0.63	0.035	0.035	-	-	-	325	180	35	35	HRB=72 Max
ASTMA 210 Gr. A1	0.27 Max	0.93 Max	0.035	0.035	0.10 Min	-	-	415	255	30	30	HRB=79 Max

CARBON STEEL, ALLOY STEEL, LOW TEMP, PIPE AND TUBES SPECIFICATION

CHEMICAL ANALYSIS									MECHANICAL PROPERTIES			SPECIFIC REQUIREMENT
									TENSILE STRENGTH	YIELD STRENGTH	ELONGATION	
SPECIFICATION	WT	C%	Mn %	P % MAX	S% MAX	Si%	Cr%	Mo%	Mpa	Mpa	50mm MIN Longitudinal	
ASTM A 53/A	AW	0.25MAX	0.95MAX	0.050	0.060	-	-	-	331MIN	207MIN	36	Cr Mo Cu Ni Va 0.40 0.15 0.40 0.40 0.08 Five elements not to exceed 1%
ASTM A 53/B	AW	0.30MAX	1.20MAX	0.050	0.060	-	-	-	413MIN	240MIN	29.5	
ASTM A 106/A	AW	0.25MAX	0.27-0.93	0.025	0.025	0.10MIN	0.40MAX	0.15MAX	330MIN	205MIN	35/28	
ASTM A 106/B	AW	0.30MAX	0.29-1.06	0.025	0.025	0.10MIN	0.40MAX	0.15MAX	415 MIN	240MIN	30/22	
ASTM A 106/C	AW	0.35MAX	0.29-1.06	0.025	0.025	0.10MIN	0.40MAX	0.15MAX	485MIN	275MIN	30/22	
ASTM A 179	MW	0.06-018	0.27-0.63	0.048	0.048	-	-	-	325MIN	180MIN	35.0	Hardness 72 HRB Max
ASTM A 214	MW	0.18MAX	0.27-0.63	0.050	0.050	-	-	-	385MIN	180MIN	35.0	Hardness 72 HRB Max
ASTM A 192	MW	0.06-0.18	0.27-0.63	0.048	0.048	0.25MAX	-	-	325MIN	180MIN	35.0	Hardness 77 HRB Max
ASTM A 209/T1	MW	0.10-0.20	0.30-0.80	0.045	0.045	0.10-0.50	-	0.44-0.65	380MIN	205MIN	30/22	Hardness 80 HRB Max
ASTM A 209/T1a	MW	0.15-0.25	0.30-0.80	0.045	0.045	0.10-0.50	-	0.44-0.65	365MIN	195MIN	30/22	Hardness 81 HRB Max
ASTM A 209/T1B	MW	0.14MAX	0.30-0.80	0.045	0.045	0.10-0.50	-	0.44-0.65	415MIN	220MIN	30/22	Hardness 77 HRB Max
ASTM A 210/A-1	MW	0.27max	0.93max	0.048	0.058	0.10MIN	-	-	415MIN	255MIN	30/22	Hardness 79 HRB Max
ASTM A 210/C	MW	0.35MAX	0.29-1.06	0.048	0.058	0.10MIN	-	-	485MIN	275MIN	30/22	Hardness 89 HRB Max
ASTM A 213/T2	MW	0.10/0.20	0.30-0.61	0.045	0.045	0.10-0.30	0.50-0.81	0.44-0.65	415MIN	205MIN	30/22	Hardness 85 HRB Max
ASTM A 213/T5	MW	0.15MAX	0.30-0.60	0.030	0.030	0.50MAX	4.00-6.00	0.44-0.65	415MIN	205MIN	30/22	Hardness 85 HRB Max
ASTM A 213/T11	MW	0.15MAX	0.30-0.60	0.030	0.030	0.50-1.00	1.00-1.50	0.44-0.65	415MIN	205MIN	30/22	Hardness 85 HRB Max
ASTM A 213/T12	MW	0.15MAX	0.30-0.61	0.045	0.045	0.50MAX	0.80-1.25	0.44-0.65	415MIN	205MIN	30/22	Hardness 85 HRB Max
ASTM A 213/T22	MW	0.15MAX	0.30-0.60	0.030	0.030	0.50MAX	1.90-2.60	0.87-1.13	415MIN	205MIN	30/22	Hardness 85 HRB Max
ASTM A 333/1	AW	0.30MAX	0.40-1.06	0.025	0.025	-	-	-	380MIN	205MIN	25/20	IMPACT AS -50F FOR 40X10J/18/14 -50F40X10J/18/14 90 HRB MAX
ASTM A 333/6	AW	0.30MAX	0.29-1.06	0.025	0.025	0.10MIN	-	-	415MIN	240MIN	30/22	
ASTM A 334/1	AW	0.30MAX	0.40-1.06	0.025	0.025	-	-	-	380MIN	205MIN	35/28	
ASTM A 334/6	MW	0.30MAX	0.29-1.06	0.025	0.025	0.10MIN	-	-	415MIN	240MIN	30/22	
ASTM A 335/P1	AW	0.10-0.20	0.30-0.80	0.025	0.025	0.10-0.50	-	0.44-0.65	380MIN	205MIN	30/22	
ASTM A 335/P2	AW	0.10-0.20	0.30-0.61	0.025	0.025	0.10-0.30	0.50-0.81	0.44-0.65	380MIN	205MIN	30/22	
ASTM A 335/P5	AW	0.15MAX	0.30-0.60	0.025	0.025	0.50MAX	4.00-6.00	0.45-0.65	415MIN	205MIN	30/22	
ASTM A 335/P9	AW	0.15MAX	0.30-0.60	0.025	0.025	0.25-1.00	8.00-10.00	0.09-1.10	415MIN	172MIN	30/22	
ASTM A 335/P11	AW	0.15MAX	0.30-0.60	0.025	0.025	0.50-1.00	1.00-1.50	0.44-0.65	415MIN	205MIN	30/22	
ASTM A 335/P12	AW	0.15MAX	0.30-0.61	0.025	0.025	0.50MAX	0.80-1.25	0.44-0.65	415MIN	205MIN	50/22	
ASTM A 335/P22	AW	0.15MAX	0.30-0.60	0.025	0.025	0.50MAX	1.90-2.60	0.87-1.13	415MIN	205MIN	30/22	
BS/3059/1/33		0.15Max	0.30-0.70	0.050	0.050	-	-	-	324-441	186MIN	25	
BS/3059/2/33		0.15MAX	0.40-0.70	0.050	0.050	0.10-0.35	-	-	324-441	186MIN	21	
BS/3059/2/45		0.12-0.18	0.90-1.20	0.035	0.035	0.10-0.35	-	-	441-560	245MIN	22	
BS/3059/2/620		0.10-0.15	0.40-0.70	0.040	0.040	0.10-0.35	0.70-1.10	0.45-0.65	441-618	235MIN	22	
DIN/17175/ST35.8		0.17MAX	0.40MIN	0.040	0.040	0.35MAX	-	-	340-441	235MIN	25	
DIN/17175/ST45.8		0.22MAX	0.45MIN	0.040	0.040	0.10-0.35	-	-	441-540	255 MIN	25	
DIN/17175/15MO3		0.12-0.20	0.50-0.80	0.040	0.040	0.10-0.35	-	0.25-0.35	441-540	284MIN	21	
DIN/17175/13CrMo44		0.10-0.18	0.40-0.70	0.040	0.040	0.10-0.35	0.70-1.60	0.40-0.50	441-570	294MIN	22	
DIN/17175/10CrM910		0.15MAX	0.40-0.60	0.040	0.040	0.15-0.50	2.0-2.5	0.9-1.10	441-570	294MIN	22	
ASTM A 199/T5	MW	0.50-0.15	0.30-0.60	0.030	0.030	0.50MAX	4.00-6.00	0.45-0.65	415MIN	170MIN	30/22	HARDNESS 85 HRB MAX
ASTM A 199/T11	MW	0.05-0.15	0.30-0.60	0.030	0.030	0.50-1.00	1.00-1.50	0.44-0.65	415MIN	170MIN	30/22	HARDNESS 85 HRB MAX
ASTM A 199/T22	MW	0.05-0.15	0.30-0.60	0.030	0.030	0.50MAX	1.90-2.60	0.87-1.13	415MIN	170MIN	30/22	HARDNESS 85 HRB MAX
ASTM A 199/T4	MW	0.15MAX	0.30-0.60	0.030	0.030	0.50-1.00	2.15-2.85	0.44-0.65	415MIN	170MIN	30/22	HARDNESS 85 HRB MAX
ASTM A 199/T7	MW	0.15MAX	0.30-0.60	0.030	0.030	0.50-1.00	6.00-8.00	0.45-0.65	415MIN	170MIN	30/22	HARDNESS 85 HRB MAX
ASTM A 200/T5	MW	0.15MAX	0.30-0.60	0.030	0.030	0.50-1.00	4.00-6.00	0.45-0.65	415MIN	170MIN	30/22	HARDNESS 85 HRB MAX
ASTM A 200/T11	MW	0.05-0.15	0.30-0.60	0.030	0.030	0.50-1.00	1.00-1.50	0.44-0.65	415MIN	170MIN	30/22	HARDNESS 85 HRB MAX
ASTM A 200/T22	MW	0.05-0.15	0.30-0.60	0.030	0.030	0.50MAX	1.90-2.60	0.87-1.13	415MIN	170MIN	30/22	HARDNESS 85 HRB MAX
ASTM A 200/T4	MW	0.05-0.15	0.30-0.60	0.030	0.030	0.50-1.00	2.15-2.85	0.44-0.65	415MIN	170MIN	30/22	HARDNESS 85 HRB MAX
ASTM A 200/T7	MW	0.15MAX	0.30-0.60	0.030	0.030	0.50-1.00	6.00-8.00	0.45-0.65	415MIN	170MIN	30/22	HARDNESS 85 HRB MAX
ASTM A 199/T9	MW	0.15MAX	0.30-0.60	0.030	0.030	0.25-1.00	8.00-10.0	0.90-1.10	415MIN	170MIN	30/22	HARDNESS 89 HRB MAX

BUTT-WELD PIPE FITTINGS



Stainless Steel: ASTM A403 WP 304/ 304L/ 304H/316/ 316L/ 317/ 317L/ 321/ 310/ 347/904L etc.

Carbon Steel: ASTM A234 WPB/A420 WPL3/A420 WPL6/ MSS-SP-75 WPHY 42/46/52/ 56/60/65/70

Alloy Steel: ASTM A234 WP1/ WP5/ WP9/ WP11/ WP22/ WP91 etc.

Others: Monel, Nickel, Inconel, Hastalloy, Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead, etc.

Types: Elbow, Tee, Reducer, Return Bends, Stub-Ends, Cap, Collar, Cross, Insert etc.

Size: 1/4" NB TO 32" NB. (Seamless & Welded)

Wall Thickness: Sch. 5S To Sch. XXS.

CHEMICAL COMPOSITION & MECHANICAL PROPERTIES

Steel type	ASTM Grade	Chemical composition									Mechanical properties				
		C% max	Mn%	P% max	S% max	Si%	Cr%	Mo%	Ni%	Others	R.min. Tensile Strength MPa	S.min. Yield Strength MPa	A% min.(2" /4D) Elongation		Impact test KCV (2) J
													Long.	Transv.	
A234	WPB(1)	0.3	0.29-1.06	0.05	0.058	0.10 min	0.4	0.15	0.4	Cu=0.4 V=0.08 Cb=0.02	415-585	240	30	20	-
	WPC(1)	0.35	0.29-1.06	0.05	0.058	0.10 min	0.4	0.15	0.4	Cu=0.4 V=0.08 Cb=0.02	485-655	275	30	20	-
A420	WPL/6(1)	0.3	0.6-1.35	0.035	0.04	0.15-0.30	0.3	0.12	0.4	V=0.08 Cb=0.02 Cu=0.4	415-585	240	30	16.5	-45°C 17.6/13.6
	WPL3	0.2	0.31-0.64	0.05	0.05	0.13-0.37	-	-	3.2-3.8	-	450-620	240	30	20	-101°C 17.6/13.6
A234	WP1	0.28	0.30-0.9	0.045	0.045	0.10-0.50	-	0.44-0.65	-	-	380-550	205	30	20	-
	WP12CL1	0.05-0.2	0.3-0.8	0.045	0.045	0.6	0.8-1.25	0.44-0.65	-	-	415-585	220	30	20	-
	WP12CL2	-	-	-	-	-	-	-	-	-	485-655	275	30	20	-
	WP11CL1	0.5-0.15	0.3-0.6	0.3	0.3	0.5-10	1.0-1.5	0.44-0.65	-	-	415-585	205	30	20	-
	WP11CL2	0.5-0.2	0.3-0.8	0.4	0.4	0.5-10	1.0-1.5	0.44-0.65	-	-	485-655	275	30	20	-
	WP11CL3	-	-	-	-	-	-	-	-	-	520-690	310	30	20	-
	WP22CL1	0.05-0.15	0.3-0.6	0.04	0.04	0.5	1.9-2.6	0.87-113	-	-	415-585	205	30	20	-
	WP22CL3	-	-	-	-	-	-	-	-	-	520-690	310	30	20	-
	WP5	0.15	0.3-0.6	0.04	0.03	0.5	4.0-6.0	0.44-0.65	-	-	415-585	205	30	20	-
	WP9	0.15	0.3-0.6	0.03	0.03	0.25-10	8.0-10.0	0.9-1.10	-	-	415-585	205	30	20	-
	WP91	0.08-0.12	0.3-0.6	0.02	0.01	0.2-0.5	8.0-9.5	0.85-1.05	0.4	V=0.18-0.25 Cb=0.06-0.10 N=0.03-0.07 Al=0.04	585-760	415	20	-	-
A403	WP304	0.08	2	0.045	0.03	1	18-20	-	8.0-11.0	-	515	205	28	20	-
	WP304L	0.035	2	0.045	0.03	1	18-20	-	8.0-13.0	-	485	170	28	20	-
	WP304H	0.04-0.10	2	0.045	0.03	1	18-20	-	8.0-11.0	-	515	205	28	20	-
	WP316	0.08	2	0.045	0.03	1	18-20	2.0-3.0	11.0-14.0	-	515	205	28	20	-
	WP316L	0.035	2	0.045	0.03	1	18-20	2.0-3.0	10.0-16.0	-	485	170	28	20	-
	WP321	0.08	2	0.045	0.03	1	17.0-20.0	-	9.0-13.0	Ti=5xC max 0.70%	515	205	28	20	-
	WP321H	0.04-0.10	2	0.045	0.03	1	17.0-20.0	-	9.0-13.0	Ti=4xC max 0.60%	515	205	28	20	-
	WP347	0.08	2	0.045	0.03	1	17.0-20.0	-	9.0-13.0	Cb+Ta>=10x%C max 0.10%	515	205	28	20	-
	WP347H	0.04-0.10	2	0.045	0.03	1	17.0-20.0	-	9.0-13.0	Cb+Ta>=8x%C max 0.10%	515	205	28	20	-
	WPS 31254	0.02	1	0.03	0.01	0.8	19.5-20.5	6.0-6.5	17.5-18.5	N=0.18-0.22 Cu=0.5-1.0	515	205	28	20	-
A815	S 31803	0.03	2	0.03	0.02	1	21.0-23.0	2.5-3.5	4.5-6.5	N=0.08-0.2	620	450	25	-	-
	WP410	0.15	1	0.04	0.03	1	11.5-13.5	-	0.5	-	485-655	205	20	-	-
B366	WPNIC10	0.06-0.10	1.5		0.015	1	19.0-23.0	-	30.0-35.0	Cu=0.75	450	170	30		
	WPNIC11	0.06-0.10	1.5		0.015	1	19.0-23.0	-	30.0-35.0	Al=0.15-0.60 Ti=0.15-0.60 Fe=39.5 min. Al+Ti=0.85-1.20	450	170	30		

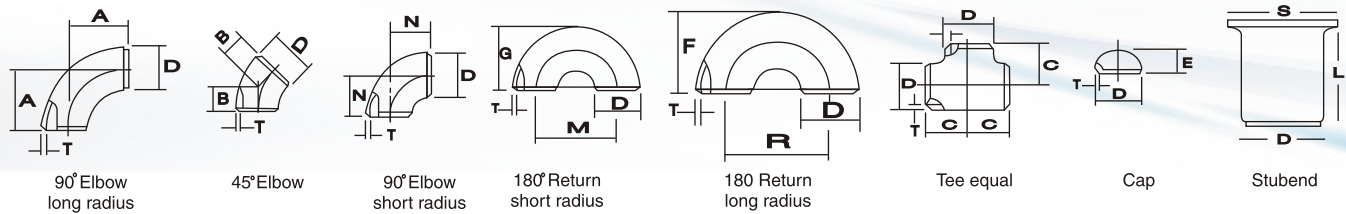


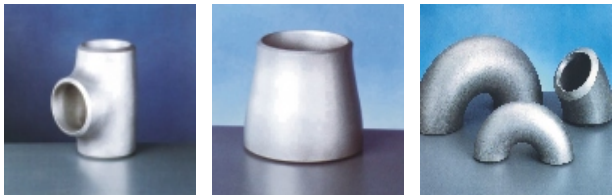
Titanium alloys, Nickel alloys, Inconel alloys, Coupro nickel & Aluminium alloys are also available upon request.

For each reduction of 0.01% below the specified carbon max., an increase of 0.06% Mn above the specified max. will be permitted up to 1.35% max.

2) Relative to 10x10 specimen.

BUTT WELDING PIPE FITTING DIMENSIONAL STANDARD ANSI B-16.9, B-16.28

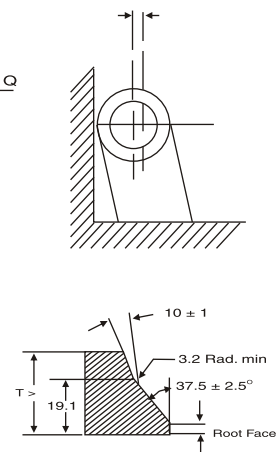
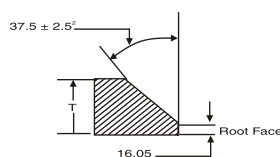
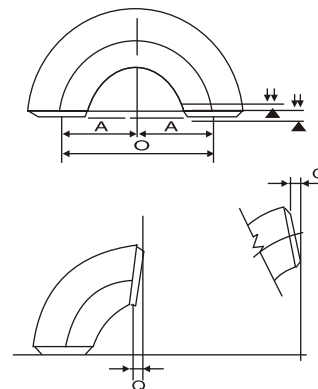
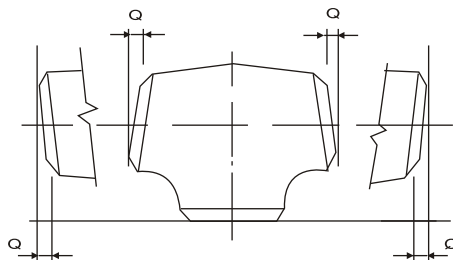
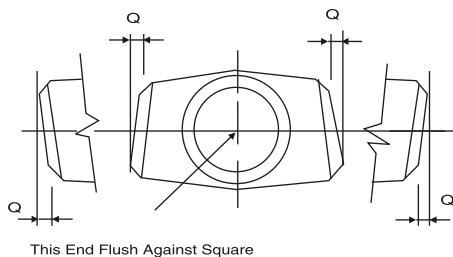


Nominal Pipe Size		Outside Diameter	Center to Face				Back to Face			Center to Center			Length 'L'	
Inch.	mm	D	A	B	C	N	E	F	G	R	M	S	L	L
1/2	15	21.3	38.00	16.0	25.0	—	25.0	48.0	—	76.0		35.0	50.8	76.2
3/4	20	26.7	29.00	11.0	29.0	—	25.0	43.0	—	57.0		43.0	50.8	76.2
1	25	33.4	38.00	22.0	38.0	25.0	38.0	56.0	41.0	76.0	51.0	51.0	50.8	101.6
1.1/4	32	42.2	48.00	25.0	48.0	32.0	38.0	70.0	52.0	95.0	64.0	64.0	50.8	101.6
1.1/2	40	48.3	57.15	29.0	57.0	38.0	38.0	83.0	62.0	114.0	76.0	73.0	50.8	101.6
2	50	60.3	76.00	35.0	64.0	51.0	38.0	106.0	81.0	152.0	102.0	93.0	63.5	152.4
2.1/2	65	73	95.25	44.0	76.0	64.0	38.0	132.0	100.0	191.0	127.0	105.0	63.5	152.4
3	80	88.9	114.30	51.0	86.0	76.0	51.0	159.0	121.0	229.0	152.0	127.0	63.5	152.4
3.1/2	90	101.6	133.35	57.0	95.0	89.0	64.0	184.0	140.0	267.0	178.0	140.0	76.2	152.4
4	100	114.3	152.0	63.0	105.0	102.0	64.0	210.0	159.0	305.0	203.0	157.0	76.2	152.4
5	125	141.3	190.0	79.0	123.0	127.0	76.0	262.0	197.0	381.0	254.0	186.0	76.2	203.2
6	150	168.3	229.0	95.0	143.0	152.0	89.0	313.0	237.0	457.0	305.0	216.0	88.9	203.2
8	200	219.1	305.0	127.0	178.0	203.0	102.0	414.0	313.0	610.0	406.0	270.0	101.6	203.2
10	250	273.1	381.0	159.0	216.0	254.0	127.0	515.0	391.0	762.0	508.0	324.0	127	254
12	300	323.9	457.0	190.0	254.0	303.0	152.0	619.0	467.0	914.0	610.0	381.0	152.4	254
14	350	355.6	533.0	222.0	279.0	356.0	165.0	711.0	533.0	1067.0	711.0	413.0	152.4	305.0
16	400	406.4	610.0	254.0	305.0	406.0	178.0	813.0	610.0	1219.0	813.0	470.0	152.4	305.0
18	450	457.2	686.0	286.0	343.0	457.0	203.0	914.0	686.0	1372.0	914.0	533.0	152.4	305.0
20	500	508	762.0	318.0	381.0	508.0	229.0	1016.0	762.0	1524.0	1016.0	584.0	152.4	305.0
22	550	559	838.0	343.0	419.0	559.0	254.0	1118.0	838.0	1676.0	1118.0	614.4	152.4	305.0
24	600	610	914.0	381.0	432.0	610.0	267.0	1219.0	914.0	1829.0	1219.0	692.0	152.4	305.0
26	650	660	991.0	406.0	495.0	660.0	267.0							
28	700	711	1067.0	438.0	521.0	771.0	267.0							
30	750	762	1143.0	470.0	589.0	762.0	267.0							
32	800	813	1219.0	502.0	597.0	813.0	267.0							
34	850	864	1295.0	533.0	635.0	864.0	267.0							
36	900	914	1372.0	565.0	673.0	914.0	267.0							

T = Wall Thickness

DIMENSIONAL TOLERANCES AS PER ANSI B 16.9/B 16.28/ MSS SP-43 BUTT WELD FITTING

ALL FITTINGS					90°/60°/45° /30° ELBOWS & TEES		REDUCERS		180° RETURNS					CAPS		ANGULARITY TOLERANCE					
Nominal Pipe Size Inch/mm	Outside Diameter at Level		Inside Dia meter	Wall Thickness at End		Centre to End		Overall Length Dimensions		Centre to End		Back to Face Dimensions		Alignment of End Dimensions		Overall length		Nominal Pipe Size	Off Angle Inch/mm		Off Plane
	D			T		A,B,C,M		H		O		K		U		E			Q		P
	(1) B16.9	MSS SP43	(2) B16.9	B16.9	MSS SP43	B16.9	MSS SP43	B16.9	MSS SP43	B16.9	MSS SP43	B16.9	MSS SP43	B16.9	MSS SP43	B16.9	MSS SP43		B16.9	MSS SP43	B16.9
1/2" TO 2 1/2" 80 TO 90	±1.0		±0.8			FROM 1/2"TO10" 15TO250	FROM 3/4"	FROM 1/2"TO10" 15TO250	FROM 1/2"TO8" 15TO200							±4	±3.17	1/2" TO 4" 15 TO 100	1		1
3"TO 3 1/2" 80 TO 90		±0.79																5" TO 8" 125 TO 200	2		4
4" 100	+2 -1		±1.6			±2	±1.59	±2	±1.59	±7	±6.35	±7	±6.35	±1.0	±0.79			10" TO 12" 250 TO 300	3		5
5" TO 6" 125 TO 150	+3 -1	+1.59														±7	±6.35	14"TO16" 350TO 400	3	16"TO 24"	7
8" 200	±2	-0.79		Not Less Than	Not Less Than													18"TO 24" 450 TO 600	4	400 TO 600 1.6	10
10" TO 18" 250 TO 450	+4 -3	+2.38 -0.79	±3.2	87.5% Nominal Thk.	87.5% Nominal Thk.	FROM 12"TO30" ±3	±2.38	FROM 12"TO30" ±3	10"TO24" +2.38 250TO 600	±10"	±9.53			±2.0"	±1.59			26"TO 30" 650 TO 750	5	26"TO 36"	10
20" TO 24" 500 TO 600	+6 -5	3.17 0.79				300TO750		300TO 750	250TO 600									32"TO 42" 800 TO1050	5	650 TO 900 2.4	13
26" TO 30" 550 TO 750	+7 -5		±4.8													±10		44" TO 48" 1100 TO1200	5	38"TO 48"	20
32" TO 48" 800 TO 1200	+7 -5					±5												42" TO 48" 1050 TO 1200	±5	950 TO 1200 3.2	±20



1. Out of round is the sum of absolute values of plus and minus tolerance.
2. The inside diameter at ends and the nominal wall thickness are to be specified by the purchaser.
3. Out of roundness tolerances shall be the difference between the Max. dia measured on any radial cross-section.
4. All dimensions are in millimeters except nominal pipe sizes which are in inches.

WELDING BEVEL STANDARDS ANSI B 16.25

FORGED FITTINGS



Stainless Steel: ASTM A182 F304/ 304L/ 304H/ 316/ 316L/ 317/ 317L/ 321/310/ 347/ 904L etc.

Carbon Steel: ASTM A105 / A694 F42/46/ 52/56/ 60/ 65/70 / A350 LF3/ A350 Lf2.

Alloy Steel: ASTM A182 F1/ F5/ F9/ F11/ F22/ F91 etc.

Others: Monel, Nickel, Inconel, Hastalloy, Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead, etc.

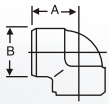
Types: Elbow, Tee, Union, Cross, Coupling, Cap, Bushing , Plug, Swage Nipple, Welding Boss, Hexagon Nipple, Barrel Nipple, Welding Nipple, Parallel Nipple, Street Elbow, Hexagon Nut, Hose Nipple, Bend, Adapter, Insert, Weldolet, Elbowlet, Sockolet, Thredolet, Nipolet, Letrolet, etc.

Size: 1/4" NB TO 4" NB. (Socketweld & Threaded)

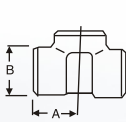
Class: 3000#, 6000#, 9000#.

DIMENSION IN MM OF FORGED SCREWED & SOCKET WELD

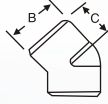
90° ELBOWS



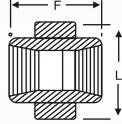
TEE



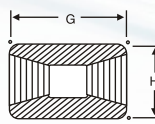
45° ELBOW



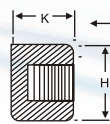
UNION



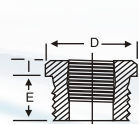
COUPLING



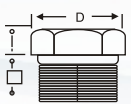
PIPE CAP



BUSHING



HEX HEAD PLUG

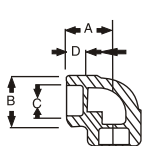


HALF COUPLING = G/2

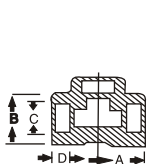
DIMENSION IN MM OF FORGED SCREWED FITTINGS TO ANSI B-16.11 THREADED TO ASA B 2.1

NOM BORE	PIPE O.D.	3000 L.B.S.						COMMON FACTORS						6000 L.B.S					
		A	B	C	G	H	K	D	E	F	I	J	L	A	B	C	G	H	K
1/8"	10.3	21	22	17	32	16	19	11	10	40	-	6	-	25	25	19	32	22	-
1/4"	13.7	25	25	19	35	19	25	16	11	43	3	6	32	29	33	22	35	25	27
3/8"	17.2	29	33	22	38	22	25	17.5	13	48	4	8	38	33	38	25	38	32	27
1/2"	21.3	33	38	25	48	29	32	22	15	51	5	8	46	38	46	29	48	38	33
3/4"	26.7	38	46	29	51	35	37	27	16	57	6	10	51	44	56	33	51	44	38
1"	33.4	44	56	33	60	44	41	35	19	64	6	10	60	51	62	35	60	57	43
1 1/4"	42.2	51	62	35	67	57	44	44.5	21	70	7	14	72	60	75	43	67	64	46
1 1/2"	48.3	60	75	43	79	64	44	51	21	79	8	16	80	64	84	44	79	76	48
2"	60.3	64	84	45	86	76	48	63.5	22	88	9	17	94	83	102	52	86	92	51
2 1/2"	73.02	83	102	52	92	92	60	76	27	118	10	21	122	95	121	64	92	108	64
3"	89.0	95	121	64	108	108	65	89	29	121	10	25	140	106	146	79	108	127	68
4"	114.5	114	152	79	121	140	68	117.5	32	150	13	25	180	114	152	79	121	159	75

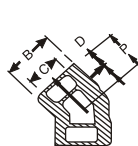
90° ELBOWS



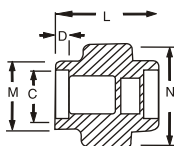
TEE



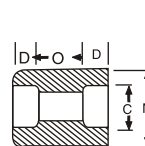
45° ELBOW



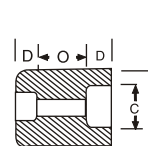
UNION



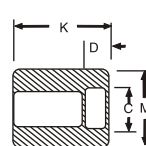
COUPLING



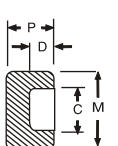
REDUCER



HALF COUPLING



CAP



SOCKET WELD FITTING TO ANSI B-16.11

NOM BORE	PIPE O.D.	3000 L.B.S.						COMMON FACTORS						6000 L.B.S					
		A	B	K	J	L	M	N	P	Q	C	D	O	O	A	B	M	K	N
1/8"	10.3	22	18.5	26	16	40	17.3	32	17.5	10	10.7	10	5	8	22	22	20	25	46
1/4"	13.7	22	22	26	18	43	21.2	32	17.5	10	14.1	10	5	8	27	25	24	25	51
3/8"	17.2	25	25	26	19	48	25.4	36	19	10	17.6	10	3	9	27	28	28	26	60
1/2"	21.3	27	32	30	21	51	31	43	22	10	21.7	10	6	13	31	34	34	31	72
3/4"	26.7	34	38	36	24	57	37	50	25	13	27	13	6	13	37	42	41	35	80
1"	33.4	37	46	40	25	64	45.2	60	27	13	33.8	13	9	17	42	50	50	40	94
1 1/4"	42.2	42	56	40	29	70	55	70	30	13	42.6	13	9	17	47	59	58	41	100
1 1/2"	48.3	47	62	40	30	79	61.4	78	32	13	48.7	13	9	17	53	67	66	43	122
2"	60.3	56	75	52	37	89	75	95	38	13	61.2	16	15	23	59	84	83	55	
2 1/2"	73.02	60	92	52	48	114	91.3	125	38	16	73.8	16	14	24		102		56	
3"	89.00	76	110	52	51	127	108.8	140	44	16	89.8	16	14	24		121		58	
4"	114.50	88	137	58		150	136.9		48	19	115.5	19	14	24		152		64	

DIMENSIONS AND OTHERS SPECIFICATIONS AS PER CUSTOMERS REQUIREMENTS ARE AVAILABLE ON REQUEST

CHEMICAL & PHYSICAL PROPERTIES OF FLANGES & SOCKET WELD FORGED FITTINGS

MATERIAL SPECIFICATION FOR SEAMLESS/WELDED BUTT-WELDING PIPE-FITTINGS.

CARBON STEEL													
A 234 Gr. WPB	0.30 Max	0.29-1.06	0.050	0.058	0.10 Min	0.40 Max	0.15 Max	0.40 Max	415-655	240	30	20	197
A 234 Gr. WPC	0.35 Max	0.29-1.06	0.050	0.058	0.10 Min	0.40 Max	0.15 Max	0.40 Max	485-655	275	30	20	197
LOW TEMPERATURE CARBON STEEL													
A 420 Gr. WPL6	0.30 Max	0.50-1.35	0.035	0.040	0.15-0.40	0.30 Max	0.12 Max	0.40 Max	415-655	240	30	16.5	197
A 420 Gr. WPL 3	0.20 Max	0.31-0.64	0.050	0.050	0.13-0.37	-	-	3.20-3.80	450-620	240	30	20	197
ALLOY STEEL													
A 234 Gr. WP 1	0.28 Max	0.30-0.90	0.045	0.045	0.10-0.50	-	0.44-0.65	-	380-550	205	30	20	197
A 234 Gr. WP 5	0.15 Max	0.30-0.60	0.040	0.030	0.50 Max	4.0-6.0	0.44-0.65	-	415-585	205	30	20	217
A 234 Gr. WP 9	0.15 Max	0.30-0.60	0.030	0.030	1.00 Max	8.0-10.0	0.90-1.10	-	415-585	205	30	20	217
A 234 Gr. WP 11 CL1	0.05-0.15	0.30-0.60	0.030	0.030	0.50-1.0	1.0-1.5	0.44-0.65	-	415-585	205	30	20	197
A 234 Gr. WP 11 CL2	0.05-0.20	0.30-0.80	0.040	0.040	0.50-1.0	1.0-1.5	0.44-0.65	-	485-655	275	30	20	197
A 234 Gr. WP 11 CL3	0.05-0.20	0.30-0.80	0.040	0.040	0.50-1.0	1.0-1.5	0.44-0.65	-	520-690	310	30	20	197
A 234 Gr. WP 12 CL1	0.05-0.20	0.30-0.80	0.045	0.045	0.60 Max	0.80-1.25	0.44-0.65	-	415-585	220	30	20	197
A 234 Gr. WP 12 CL2	0.05-0.20	0.30-0.80	0.045	0.045	0.60 Max	0.80-1.25	0.44-0.65	-	485-655	275	30	20	197
A 234 Gr. WP 22 CL1	0.05-0.15	0.30-0.60	0.040	0.040	0.50 Max	1.90-2.60	0.87-1.13	-	415-585	205	30	20	197
A 234 Gr. WP 22 CL3	0.05-0.15	0.30-0.60	0.040	0.040	0.50 Max	1.90-2.60	0.87-1.13	-	520-690	310	30	20	197
A 234 Gr. WP 91	0.08-0.12	0.30-0.60	0.020	0.010	0.20-0.50	8.0-9.5	0.85-1.05	0.40 Max	585-760	415	20	-	248

MATERIAL SPECIFICATION FOR FORGED FITTINGS & FLANGES

CARBON STEEL													
A 105	0.035 Max	0.60-1.05	0.035	0.040	0.10-0.35	0.30 Max	0.40 Max	0.12 Max	485	250	22	30	187
A 350 Gr. LF 1	0.30 Max	0.60-1.35	0.035	0.040	0.15-0.30	0.30 Max	0.40 Max	0.12 Max	415-585	205	25	38	197
A 350 Gr. LF 2	0.30 Max	0.60-1.35	0.035	0.040	0.15-0.30	0.30 Max	0.40 Max	0.12 Max	485-655	250	22	30	197
A 350 Gr. LF 3	0.20 Max	0.90 Max	0.035	0.040	0.20-0.35	0.30 Max	3.30-3.70	0.12 Max	485-655	260	22	35	197
ALLOY STEEL													
A 182 Gr. F 1	0.28 max	0.60-0.90	0.045	0.045	0.15-0.35	-	-	0.44-0.65	485	275	20	30	143-192
A 182 Gr. F 2	0.05-0.21	0.30-0.80	0.040	0.040	0.10-0.60	0.50-0.81	-	0.44-0.65	485	275	20	30	143-192
A 182 Gr. F 5	0.15 max	0.30-0.60	0.030	0.030	0.50 Max	4.0-6.0	0.5 Max	0.44-0.65	485	275	20	35	143-217
A 182 Gr. F 9	0.15 max	0.30-0.60	0.030	0.030	0.50-1.00	8.0-10.0	-	0.90-1.10	585	380	20	40	179-217
A 182 Gr. F 11 CL1	0.05-0.15	0.30-0.60	0.030	0.030	0.50-1.00	1.0-1.50	-	0.44-0.65	415	205	20	45	121-174
A 182 Gr. F 11 CL2	0.10-0.20	0.30-0.80	0.040	0.040	0.50-1.0	1.0-1.50	-	0.40-0.65	485	275	20	30	143-207
A 182 Gr. F 11 CL3	0.10-0.20	0.30-0.80	0.040	0.040	0.50-1.0	1.0-1.50	-	0.44-0.65	515	310	20	30	156-207
A 182 Gr. F 12 CL1	0.05-0.15	0.30-0.60	0.045	0.045	0.50 Max	0.80-1.25	-	0.44-0.65	415	220	20	45	121-174
A 182 Gr. F 12 CL2	0.10-0.20	0.30-0.80	0.040	0.040	0.10-0.60	0.80-1.25	-	0.44-0.65	485	275	20	30	143-207
A 182 Gr. F 22 CL1	0.05-0.15	0.30-0.60	0.040	0.040	0.50 Max	2.0-2.5	-	0.87-1.13	415	205	20	35	170
A 182 Gr. F 22 CL3	0.05-0.15	0.30-0.60	0.040	0.040	0.50 Max	2.0-2.50	-	0.87-1.13	515	310	20	30	156-207
A 182 Gr. F 91	0.08-0.12	0.30-0.60	0.020	0.010	0.20-0.50	8.0-9.5	0.40 Max	0.85-1.05	585	415	20	40	248

FLANGES FITTINGS



Stainless Steel: ASTM A182 F304/ 304L/ 304H/ 316/ 316L/ 317/ 317L/ 321/ 310/ 347/ 904L etc.

Carbon Steel: ASTM A105/ A694 F42/ 46/ 52/ 56/ 60/ 65/ 70/ A350 LF3/ A350 LF2, etc.

Alloy Steel: ASTM A182 F1/ F5/ F9/ F11/ F22/ F91 etc.

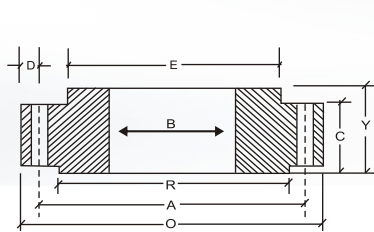
Others: Monel, Nickel, Inconel, Hastalloy, Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead, etc.

Types: Weldneck, Slipon, Blind, Socket Weld, Lap Joint, Spectacles, Ring Joint, Orifcae, Long Weldneck, Deck Flange, RTJ, Flange

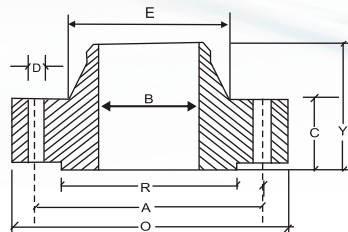
Size: 1/2" NB TO 24" NB.

Class: 150#, 300#, 400#, 600#, 900#, 1500# & 2500#.

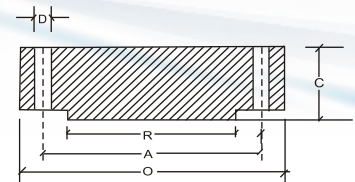
DIMENSIONS OF FORGED FLANGES ANSI B 16.5



SLIP-ON FLANGE



WELDING NECK FLANGE



BLIND FLANGE

DIMENSIONS OF CLASS 150 FLANGES AS PER ANSI B 16.5

Nominal Pipe Size		Flange Dia	Dia of Bolt Circle	Dia of Bolt Holes	No. of Holes	Thk of Flange	Dia of Hub	Lenght through Hub			Dia of Bore		Dia of R/F	Depth of Socket	Pipe Dia
								S/O & S/W	W/N	L/J	S/O & S/W	L/J			
(MM)	(INCH.)	O	A	D		C	E	Y	Y	Y	B	B	R	F	X
15	1/2	88.9	60.3	15.9	4	11.1	30.2	15.9	47.6	15.9	22.3	22.9	34.9	9.5	21.33
20	3/4	98.4	69.8	15.9	4	12.7	38.1	15.9	52.4	15.9	27.7	28.2	42.9	11.1	26.67
25	1	107.9	79.4	15.9	4	14.3	49.2	17.5	55.6	17.5	34.5	35.0	50.8	12.7	33.40
32	1 1/4	117.5	88.9	15.9	4	15.9	58.7	20.6	57.1	20.6	43.2	43.7	63.5	14.3	42.16
40	1 1/2	127.0	98.4	15.9	4	17.5	65.1	22.2	61.9	22.2	49.5	50.0	73.0	15.9	48.26
50	2	152.4	120.6	19.0	4	19.0	77.8	25.4	63.5	25.4	62.0	62.5	92.1	17.5	60.31
65	2 1/2	177.8	139.7	19.0	4	22.2	90.5	28.6	69.8	28.6	74.7	75.4	104.8	19.0	73.02
80	3	190.5	152.4	19.0	4	23.8	107.9	30.2	69.8	30.2	90.7	91.4	127.0	20.6	88.90
100	4	228.6	190.5	19.0	8	23.8	134.9	33.3	76.2	33.3	116.1	116.8	157.2	23.8	114.30
125	5	254.0	215.9	22.2	8	23.8	163.5	36.5	88.9	36.5	143.8	144.5	185.7	23.8	141.30
150	6	279.4	241.3	22.2	8	25.4	192.1	39.7	88.9	39.7	170.7	171.4	215.9	27.0	168.27
200	8	342.9	298.4	22.2	8	28.6	246.1	44.4	101.6	44.4	221.5	222.2	269.9	31.7	219.07
250	10	406.4	361.9	25.4	12	30.2	304.8	49.2	101.6	49.2	276.3	277.4	323.8	33.3	273.05
300	12	482.6	431.8	25.4	12	31.8	365.1	55.6	114.3	55.6	327.1	328.2	381.0	39.7	323.85
350	14	533.4	476.2	28.6	12	34.9	400.0	57.1	127.0	79.4	359.1	360.2	412.7	41.3	355.60
400	16	596.9	539.7	28.6	16	36.5	457.2	63.5	127.0	87.3	410.5	411.2	469.9	44.4	406.40
450	18	635.0	577.8	31.7	16	39.7	504.8	68.3	139.7	96.8	461.8	462.3	533.4	49.2	457.20
500	20	698.5	635.0	31.7	20	42.9	558.8	73.0	144.5	103.2	513.1	514.3	584.2	54.0	508.00
600	24	812.8	749.3	34.9	20	47.6	663.6	82.5	152.4	111.1	615.9	615.9	692.1	63.5	609.60

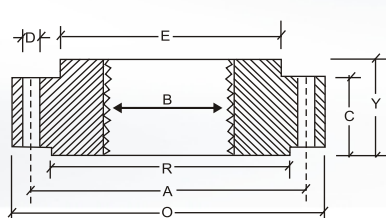
All Dimensions are in Millimeters • Flanges except Lap Joint will be furnished with (1.6mm) Raised Face, which is included in Thickness(C) and Lenght through Hub(Y).

DIMENSIONS OF CLASS 300 FLANGES AS PER ANSI B 16.5

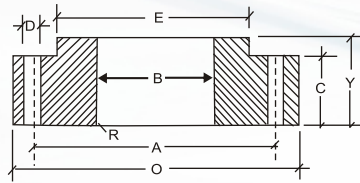
Nominal Pipe Size		Flange Dia	Dia of Bolt Circle	Dia of Bolt Holes	No. of Holes	Thk of Flange	Dia of Hub	Lenght through Hub			Dia of Bore		Dia of R/F	Depth of Socket	Pipe Dia
								S/O & S/W	W/N	L/J	S/O & S/W	L/J			
(MM)	(INCH.)	O	A	D		C	E	Y	Y	Y	B	B	R	F	X
15	1/2	95.2	66.7	15.9	4	14.3	38.1	22.2	52.4	22.2	22.3	22.9	34.9	9.5	21.33
20	3/4	117.5	82.5	19.0	4	15.9	47.6	25.4	57.1	25.4	27.7	28.2	42.9	11.1	26.67
25	1	123.8	88.9	19.0	4	17.5	54.0	27.0	61.9	27.0	34.5	35.0	50.8	12.7	33.40
32	1 1/4	133.3	98.4	19.0	4	19.0	63.5	27.0	65.1	27.0	43.2	43.7	63.5	14.3	42.16
40	1 1/2	155.6	114.3	22.2	4	20.6	69.8	30.2	68.3	30.2	49.5	50.0	73.0	15.9	48.26
50	2	165.1	127.0	19.0	8	22.2	84.1	33.3	69.8	33.3	62.0	62.5	92.1	17.5	60.31
65	2 1/2	190.5	149.2	22.2	8	25.4	100.0	38.1	76.2	38.1	74.7	75.4	104.8	19.0	73.02
80	3	209.5	168.3	22.2	8	28.6	117.5	42.9	79.4	42.9	90.7	91.4	127.0	20.6	88.90
100	4	254.0	200.0	22.2	8	31.8	146.0	47.6	85.7	47.6	116.1	116.8	157.2	23.8	114.30
125	5	279.4	234.9	22.2	8	34.9	177.8	50.8	98.4	50.8	143.8	144.5	185.7	-	141.30
150	6	317.5	269.9	22.2	12	36.5	206.4	52.4	98.4	52.4	170.7	171.4	215.9	-	168.27
200	8	381.0	330.2	25.4	12	41.3	260.3	61.9	111.1	61.9	221.5	222.2	269.9	-	219.07
250	10	444.5	387.3	28.6	16	47.6	320.7	66.7	117.5	95.2	276.3	277.4	323.8	-	273.05
300	12	520.7	450.8	31.7	16	50.8	374.6	73.0	130.2	101.6	327.1	328.2	381.0	-	323.85
350	14	584.2	514.3	31.7	20	54.0	425.4	76.2	142.9	111.1	359.1	360.2	412.7	-	355.60
400	16	647.7	571.5	34.9	20	57.2	482.6	82.5	146.0	120.6	410.5	411.2	469.9	-	406.40
450	18	711.2	628.5	34.9	24	60.3	533.4	88.9	158.7	130.2	461.8	462.3	533.4	-	457.20
500	20	774.7	685.8	34.9	24	63.5	587.4	95.2	161.9	139.7	513.1	514.3	584.2	-	508.00
600	24	914.4	812.8	41.3	24	69.8	701.7	106.4	168.3	152.4	615.9	615.9	692.1	-	609.60

All Dimensions are in Millimeters • Flanges except Lap Joint will be furnished with (1.6mm) Raised Face, which is included in Thickness(C) and Lenght through Hub(Y).

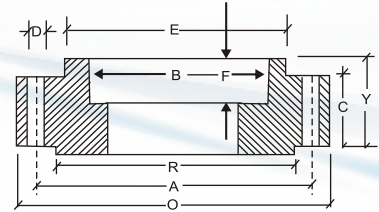
DIMENSIONS OF FORGED FLANGES ANSI B 16.5



THREADED FLANGES



LAP JOINT FLANGES



SOCKET WELD FLANGES

DIMENSIONS OF CLASS 600 FLANGES AS PER ANSI B 16.5

Nominal Pipe Size (MM)	Flange Dia O	Dia of Bolt Circle A	Dia of Bolt Holes D	No. of Holes	Thk of Flange C	Dia of Hub E	Lenght through Hub			Dia of Bore		Dia of R/F R	Depth of Socket F	Pipe Dia X
							S/O & S/W Y	W/N Y	L/J Y	S/O & S/W B	L/J B			
15	95.2	66.7	15.9	4	14.3	38.1	22.2	52.4	22.3	22.3	22.8	34.9	9.5	21.33
20	117.5	82.5	19.0	4	15.9	47.6	25.4	57.1	25.4	27.7	28.1	42.9	11.1	26.67
25	123.8	88.9	19.0	4	17.5	54.0	27.0	61.9	26.9	34.5	35.0	50.8	12.7	33.40
32	133.3	98.4	19.0	4	20.6	63.5	28.6	66.7	28.4	43.2	43.6	63.5	14.2	42.16
40	155.6	114.3	22.2	4	22.2	69.8	31.7	69.8	31.7	49.5	50.0	73.0	15.8	48.26
50	165.1	127.0	19.0	8	25.4	84.1	36.5	73.0	36.5	62.0	62.4	92.1	17.4	60.31
65	190.5	149.2	22.2	8	28.6	100.0	41.3	79.4	41.1	74.7	75.4	104.8	19.0	73.02
80	209.5	168.3	22.2	8	31.8	117.5	46.0	82.5	45.9	90.7	91.4	127.0	-	88.90
100	273.0	215.9	25.4	8	38.1	152.4	54.0	101.6	53.8	116.1	116.8	157.2	-	114.30
125	330.2	266.7	28.6	8	44.4	188.9	60.3	114.3	60.4	143.8	144.5	185.7	-	141.30
150	355.6	292.1	28.6	12	47.6	222.2	66.7	117.5	66.5	170.7	171.4	215.9	-	168.27
200	419.1	349.2	31.7	12	55.6	273.0	76.2	133.3	76.2	221.5	222.2	269.9	-	219.07
250	508.0	431.8	34.9	16	63.5	342.9	85.7	152.4	111.2	276.3	277.4	323.8	-	273.05
300	558.8	488.9	34.9	20	66.7	400.0	92.1	155.6	117.3	327.1	328.2	381.0	-	323.85
350	603.2	527.0	38.1	20	69.9	431.8	93.7	165.1	127.0	359.1	360.1	412.7	-	355.60
400	685.8	603.2	41.3	20	76.2	495.3	106.4	177.8	139.7	410.5	411.2	469.9	-	406.40
450	742.9	654.0	44.4	20	82.6	546.1	117.5	184.1	152.4	461.8	462.3	533.4	-	457.20
500	812.8	723.9	44.4	24	88.9	609.9	127.0	190.5	165.1	513.1	514.3	584.2	-	508.00
600	939.8	838.2	50.8	24	101.6	717.5	139.7	203.2	184.1	615.9	615.9	692.1	-	609.60

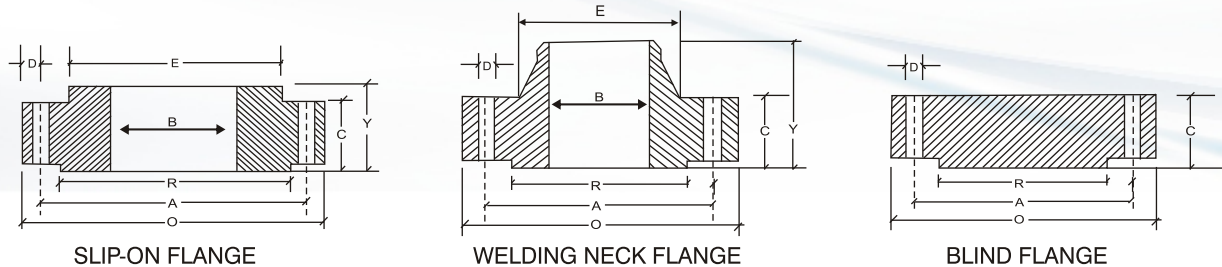
All Dimensions are in Millimeters • Flanges except Lap Joint will be furnished with (6.35mm) Raised Face, which is not included in Thickness (C) and Lenght through Hub (Y).

DIMENSIONS OF CLASS 900 FLANGES AS PER ANSI B 16.5

Nominal Pipe Size (MM)	Flange Dia O	Dia of Bolt Circle A	Dia of Bolt Holes D	No. of Holes	Thk of Flange C	Dia of Hub E	Lenght through Hub			Dia of Bore		Dia of R/F R	Depth of Socket F	Pipe Dia X
							S/O & S/W Y	W/N Y	L/J Y	S/O & S/W B	L/J B			
15	120.6	82.5	22.2	4	22.2	38.1	31.7	60.3	31.7	22.3	22.8	34.9	9.5	21.33
20	130.2	88.9	22.2	4	25.4	44.4	34.9	69.8	35.0	27.7	28.1	42.9	11.1	26.67
25	149.2	101.6	25.4	4	28.6	52.4	41.3	73.0	41.1	34.5	35.0	50.8	12.7	33.40
32	158.7	111.1	25.4	4	28.6	63.5	41.3	73.0	41.1	43.2	43.6	63.5	14.2	42.16
40	177.8	123.8	28.6	4	31.8	69.8	44.4	82.5	44.4	49.5	50.0	73.0	15.8	48.26
50	215.9	165.1	25.4	8	38.1	104.8	57.1	101.6	57.1	62.0	62.4	92.1	17.4	60.31
65	244.5	190.5	28.6	8	41.3	123.8	63.5	104.8	63.5	74.7	75.4	104.8	19.0	73.02
80	241.3	190.5	25.4	8	38.1	127.0	53.9	101.6	53.8	90.7	91.4	127.0	-	88.90
100	292.1	234.9	31.7	8	44.4	158.7	69.8	114.3	69.8	116.0	116.8	157.2	-	114.30
125	349.2	279.4	35.0	8	50.8	190.5	79.3	127.0	79.2	143.7	144.5	185.7	-	141.30
150	381.0	317.5	31.7	12	55.6	234.9	85.8	139.7	85.8	170.6	171.4	215.9	-	168.27
200	469.9	393.7	38.1	12	63.5	298.4	101.6	162.0	114.3	221.4	222.2	269.9	-	219.07
250	546.1	469.9	38.1	16	69.8	368.3	107.9	184.1	127.0	276.3	277.3	323.8	-	273.05
300	609.6	533.4	38.1	20	79.3	419.1	117.4	200.0	142.7	327.1	328.1	381.0	-	323.85

All Dimensions are in Millimeters • Flanges except Lap Joint will be furnished with (6.35mm) Raised Face, which is not included in Thickness (C) and Lenght through Hub (Y).

DIMENSION OF FORGED FLANGES AS PER ANSI B 16.5



DIMENSION OF CLASS 1500 FLANGES AS PER ANSI B 16.5

Nominal Pipe Size		Flange Dia O	Dia of Bolt Circle A	Dia of Bolt Holes D	No. of Holes	Thk of Flange C	Dia of Hub E	Lenght through Hub			Dia of Bore		Dia of R/F R	Depth of Socket F	Pipe Dia X
								S/O & S/W Y	W/N Y	L/J Y	S/O & S/W B	L/J B			
(MM)	(INCH.)														
15	1/2	120.6	82.5	22.2	4	22.2	38.1	31.7	60.3	31.7	22.3	22.8	34.9	9.5	21.33
20	3/4	130.2	88.9	22.2	4	25.4	44.4	34.9	69.8	34.9	27.7	28.1	42.9	11.1	26.67
25	1	149.2	101.6	25.4	4	28.6	52.4	41.3	73.0	41.3	34.5	35.0	50.8	12.7	33.40
32	1 1/4	158.7	111.1	25.4	4	28.6	63.5	41.3	73.0	41.3	43.2	43.6	63.5	14.2	42.16
40	1 1/2	177.8	123.8	28.6	4	31.8	69.8	44.4	82.5	44.4	49.5	50.0	73.0	15.8	48.26
50	2	215.9	165.1	25.4	8	38.1	104.8	57.1	101.6	57.1	62.0	62.0	92.1	17.4	60.31
65	2 1/2	244.5	190.5	28.6	8	41.3	123.8	63.5	104.8	63.5	74.7	75.4	104.8	19.0	73.02
80	3	266.7	203.2	31.7	8	47.6	133.3	73.0	117.5	73.0	90.7	91.4	127.0	-	88.90
100	4	311.1	241.3	34.9	8	54.0	161.9	90.5	123.0	90.4	116.1	116.8	157.2	-	114.30
125	5	374.6	292.1	41.3	8	73.0	196.8	104.8	155.6	104.8	143.8	144.5	185.7	-	141.30
150	6	393.7	317.5	38.1	12	82.6	228.6	119.1	171.4	119.1	170.7	171.4	215.9	-	168.27
200	8	482.6	393.7	44.4	12	92.1	292.1	142.9	212.7	142.8	221.5	222.2	269.9	-	219.07
250	10	584.2	482.6	50.8	12	107.9	368.3	158.7	254.0	177.8	276.3	277.3	323.8	-	273.05
300	12	673.1	571.5	54.0	16	123.8	450.8	181.0	282.5	218.9	327.1	328.1	381.0	-	323.85

All Dimensions are in Millimeters • Flanges except Lap Joint will be furnished with (6.35mm) Raised Face, which is not included in Thickness(C) and Lenght through Hub(Y).

DIMENSION OF CLASS 2500 FLANGES AS PER ANSI B 16.5

Nominal Pipe Size		Flange Dia O	Dia of Bolt Circle A	Dia of Bolt Holes D	No. of Holes	Thk of Flange C	Dia of Hub E	Lenght through Hub			Dia of Bore		Dia of R/F R	Depth of Socket F	Pipe Dia X
								S/O & S/W Y	W/N Y	L/J Y	S/O & S/W B	L/J B			
(MM)	(INCH.)														
15	1/2	133.3	88.9	22.2	4	30.2	42.9	39.7	73.0	39.7	22.3	22.3	34.9	-	21.33
20	3/4	139.7	95.3	22.2	4	31.7	50.8	42.9	79.4	42.9	27.7	27.7	42.9	-	26.67
25	1	158.7	107.9	25.4	4	34.9	57.1	47.7	88.9	47.7	34.5	34.5	50.8	-	33.40
32	1 1/4	184.1	130.2	28.6	4	38.1	73.0	52.4	95.2	52.4	43.2	43.2	63.5	-	42.16
40	1 1/2	203.2	146.0	31.7	4	44.4	79.4	60.3	111.1	60.3	49.5	49.5	73.0	-	48.26
50	2	234.9	171.4	28.6	8	50.8	95.2	69.8	127.0	69.8	62.4	62.0	92.1	-	60.31
65	2 1/2	266.7	196.8	31.7	8	57.1	114.3	79.4	142.9	79.4	74.7	74.7	104.8	-	73.02
80	3	304.8	228.6	34.9	8	66.7	133.3	92.1	168.3	92.1	90.7	90.7	127.0	-	88.90
100	4	355.6	273.0	41.2	8	76.2	165.1	107.9	190.5	107.9	116.1	116.1	157.2	-	114.30
125	5	419.1	323.8	47.6	8	92.1	203.2	130.0	228.6	130.0	143.8	143.8	185.7	-	141.30
150	6	482.6	368.3	54.0	8	107.9	234.9	152.4	273.0	152.4	170.7	170.7	215.9	-	168.27
200	8	552.4	438.1	54.0	12	127.0	304.8	177.8	317.5	177.8	221.5	221.5	269.9	-	129.07
250	10	673.1	539.7	66.7	12	165.1	374.6	228.6	419.1	228.6	276.3	276.3	323.8	-	273.05
300	12	762.0	619.1	73.0	12	184.1	441.3	254.0	463.5	254.0	327.1	327.1	381.0	-	323.85

All Dimensions are in Millimeters | Flanges except Lap Joint will be furnished with (6.35mm) Raised Face, which is not included in Thickness(C) and Lenght through Hub(Y).

SUMMARY OF THE MAIN ASTM STANDARDS GENERALLY USED FOR SHEETS / PLATES

ASTM	Grade	Chemical requirements percent (%)										Mechanical requirements				
		C	Mn	P	S	Si	Ni	Cr.	Mo	Cu	Others	Tensile Strength mini-MPa	Yield Strength mini-MPa	Elong mini %	Hardness	
	304	0.08	2.00	0.045	0.030	0.75	8.00-10.5	18.00-20.0				515	205	40	Brinell	Rockwell
	304L	0.03	2.00	0.045	0.030	0.75	8.00-12.0	18.00-20.0				485	170	40	201	92
	310	0.08	2.00	0.045	0.030	1.50	19.0-22.0	24.0-26.0				515	205	40	217	95
A240	316	0.08	2.00	0.045	0.030	0.75	10.0-14.0	16.0-18.0	2.00-3.00			515	205	40	217	95
	316L	0.03	2.00	0.045	0.030	0.75	10.0-14.0	16.0-18.0	2.00-3.00			485	170	40	217	95
	317L	0.03	2.00	0.045	0.030	0.75	11.0-15.0	18.0-20.0	3.00-4.00			515	205	40	217	95
	321	0.08	2.00	0.045	0.030	0.75	9.00-12.0	17.0-19.0			Ti>5%Cr 0.70	515	205	40	217	95
	347	0.08	2.00	0.045	0.030	0.75	9.00-13.0	17.0-19.0			Cu + Ta > 100C < 1.10	515	205	40	201	92
A 387 Class1 Class2	2	0.05-0.21	0.55-0.80	0.035	0.040	0.15-0.40		0.50-0.80	0.45-0.60			Class 1	Class 2	Class 2		
	5	0.15	0.30-0.60	0.04	0.030	0.050		4.00-6.00	0.45-0.65			380	230	22	max201HB	max92HRB
	7	0.15	0.30-0.60	0.030	0.030	1.00		6.00-8.00	0.45-0.65			415	205	18	max202HB	max92HRB
	9	0.15	0.30-0.60	0.030	0.030	1.00		8.00-10.0	0.90-1.10			415	205	18	max217HB	max95HRB
	11	0.04-0.17	0.40-0.65	0.035	0.04	0.50-0.80		1.00-1.50	0.45-0.65			415	240	18	max217HB	max95HRB
	12	0.04-0.17	0.40-0.65	0.035	0.04	0.15-0.40		0.80-1.15	0.45-0.60			380	230	22	max217HB	max95HRB
	21	0.04-0.17	0.30-0.60	0.035	0.035	0.50		2.75-3.25	0.90-1.10			415	205	18	max201HB	max92HRB
	22	0.05-0.17	0.30-0.60	0.035	0.035	0.50		2.00-2.50	0.90-1.10			415	205	18	max201HB	max92HRB
	55	0.22	0.90	0.035	0.04	0.15-0.40						380-515	205	27		
	60	0.27	0.90	0.035	0.04	0.15-0.40						415-550	220	25		
	65	0.31	0.90	0.035	0.04	0.15-0.40						450-585	240	23		
	70	0.33	1.20	0.035	0.04	0.15-0.40						485-620	260	21		
A 515	55	0.20	0.60-1.20	0.035	0.04	0.15-0.40						380-515	205	27		
	60	0.23	0.85-1.20	0.035	0.04	0.15-0.40						415-550	202	25		
	65	0.26	0.85-1.20	0.035	0.04	0.15-0.40						450-585	240	23		
	70	0.28	0.85-1.20	0.035	0.04	0.15-0.40						485-620	260	21		
	Class 1	0.24	0.70-1.35	0.035	0.040	0.15-0.40	0.25 max	0.80 max	0.35 max			485-620	345	22		
A 537	Class 2	0.24	0.70-1.35	0.035	0.040	0.15-0.40	0.25 max	0.80 max	0.35 max			550-690	415	22		

IS-2002-62 STEEL PLATES FOR BOILERS

Grade	Designation	Chemical Composition					Tensile Test			Elongation	
		C	Si	P	S	Tensile strength Mpa	Yield strength Mpa	Tensile strength Mpa	Test Piece	%min	%min
A	IS 2002-1	0.18	0.10-0.35	0.040	0.040	362-442	540	565/Sc 4/Sc	565/Sc 4/Sc	26	30
B	IS 2002-2A	0.20	0.10-0.35	0.050	0.050	412-491	491	560/Sc 4/Sc	560/Sc 4/Sc	25	29
C	IS 2002-2B	0.22	0.10-0.35	0.050	0.050	510-608	491	565/Sc 4/Sc	565/Sc 4/Sc	20	24

IS-2062-92 STEEL FOR GENERAL STRUCTURAL PURPOSES

Grade	Designation	% Chemical Composition					Tensile strength (Min)	Yield Strength (Min)			Bend Test	Std test Piece Charpy V Notch Impact Energy Joule min
		C	MN	S	P	Si		C.E	%E in gauge length 5.56√S	Mpa		
A	FE410 WA	0.23	1.5	0.050	0.050	-	41.8	0.42	23	230	3t	-
B	FE410 WB	0.22	1.5	0.045	0.045	0.40	41.8	0.41	23	250	t<25mm	2t for 27 3t for t>25mm
C	FE410 WC	0.20	1.5	0.040	0.040	0.40	41.8	0.36	23	250	2t	27

Formula - Weight of Stainless Steel Sheets/Plates = Length (mm) x Width (mm) x Thickness (mm) x 7.86 = Kg./Sheet.