Company Profile

Dear Customers,

*May we draw your attention towards our business profile as we are not new as far as the consumption of the materials belonging to Pipe Line Fittings & Flanges are concerned. You are well aware that "**SHREE ARADHANA IMPEX** " is the destination for the entire range of materials in **Stainless Steel, Carbon Steel, Alloy Steel,** Copper, Brass, Aluminium, Lead in the Shape theof Pipes / Tubes (in Seamless ERW), Rods, Sheets, Plates, Chequred Plate, Perforated Sheet, Wires, Angles, Coils, Strips, Plates, Circles, Wire Mesh and the entire range of Pipe Fittings such as BW / SW / Screwed / Forges & Compression Type with Ferrules such as Elbows, Tees, Reducers, Stubends, Collers, Flanges, Unions, Caps, Nipples, Couplings, Elbowlets, Weldolets, Thredolets, Sockolet, Nuts, Bolts, Studs, Washers, Valves & Gaskets, Almost in all specification, shape & sizes Right product for the right requirement at the right price i.e. rather than a mere supplier of the product at the right price. We are a customer driven, knowledge rich organisation.*

In addition to above as we already had proved our ability to meet the supply against your specific order in accordance to the terms and conditions which have been instructed to us besides on direct credit facility too as to deal on credit facility isn't the problem among us which may please be noted to consider our-case.

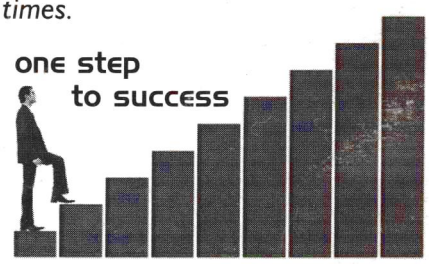
Since a long time we didn't receive any to he your order or even an enquiry for which we are waiting anxiously. As such may we request you very earnestly to please call upon us and rush your requirement at the latest which will take our immediate attentions.

These are really the facts of our high reputation as we are on the list of various GOVT. SEMI-GOVT. & private sector industries. Also note that all the terms & conditions are stable. You are requested to therefore please do concentrate on our case & provide us with your procurement at the latest which will take our immediate attention on lucrative trade discounts.

You are one of the our regular clients in view of our business relationship, we inform you that the market prices is reduce & now the same is stable. So you are requested to look into this matter and send us your all the enquiries from time to time and we will quote our most competitive prices regularly.

We will be glade if you could register us in your list of your approved vendors & send us your regular enquiries. Thanking you and assuring you of our best services and prompt attention at all times.

*For **SHREE ARADHANA IMPEX***



Auth. Signatory

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Pipes & Tubes

Pipes & Tubes

The following table represents size rang, product standards and materials grades of industrial pipes & tubes and industrial steel pipes. Our range includes:

MATERIAL TYPE :-		
Stainless Steel	:	ASTM A 312, A 213, A 249, A 269, A 358, A 240 **Grade:** TP 304, 304L, 304H, 316, 316L 316Ti, 309, 309H, 310, 310S, 317, 317L, 321, 347, 904L.
Carbon Steel	:	ASTM A-106 GR.B / A-53 GR.B / API A 5L GR. A, B, C, ASTM A333, GR. 1, 3, 4, 6, 7, 8, 9 (IBR & NON IBR)
Alloy Steel	:	A335 GR P1, P2, P5, P5b, P5c, P9, P11, P12, P15, P21, P22, P23, P91, P92, P122, P911, Class1, Class2 A333 GR 1, GR 3, GR 4, GR 6, GR 7, GR 8, GR 9, GR 10, A334 GR 1, GR 3, GR 6, GR 7, GR 8, GR 9., A200, A249, A269
Others	:	Monel, Nickel, Inconel, Hastalloy, Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead, etc.
Types	:	Round , Square, Rectangular
Size Range	:	Upto 24" NB (ERW / EFW & Seamless)
Wall Thickness	:	Sch. 5S To Sch. XXS
Dimensions	:	ANSI B 36.10, B 36.19, Etc

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Chemical Composition of Stainless Steel

Grade	Chemical Composition - Per cent									Nearest Equivalent Specification	
AISI	C Max	Mn Max	P Max	S Max	Si Max	Cr	Ni	Mo	Other Element	I.S.	En'
AUSTENITIC											
201	0.15	5.5/7.5	0.06	0.03	1	16.0/18.0	3.5/5.5	-	-	-	-
202	0.15	7.5/10	0.06	0.03	1	17.0/19.0	4.0/6.0	-	-	-	-
301	0.15	2.0max	0.045	0.040	1.0	16.0/18.0	6.0/8.0	-	-	10Cr17Ni7	-
302	0.15	2.0	0.045	0.030	1.0	17.0/19.0	8.0/10.0	-	E-4-3-4%	07Cr.18Ni9	En-58A
302HQ	0.03	2.0	0.045	0.03	1	17.0/19.0	9.0/10.0	-	CU:3-4.0	-	-
303	0.15	2.0	0.045	0.15min	1.0	17.0/19.0	8.0/10.0	-	E-4-1% max	15Cr18Ni9	En-58M
303EHS	0.15	2.0	0.02	0.3-0.33	1	17.0/19.0	8.0/10.0	-	CU:1% Max	-	-
304	0.08	2.0	0.045	0.030	1.0	18.0/20.0	8.0/10.0	-	-	04Cr18Ni10	En-58E
304L	0.030	2.0	0.045	0.030	1.0	18.0/20.0	8.0/12.0	-	-	02Cr18Ni11	-
304H.C.	0.05	2.0	0.040	0.03	1	18.0/20.0	8.5/9.5	-	CU:2-2.50	-	-
308	0.08	2.0	0.045	0.030	1.0	18.0/21.0	10.0/12.0	-	-	-	-
308LER	0.02	1.5/2.0	0.025	0.02	0.5	19.0/21.0	9.5/11.0	-	-	-	-
309	0.20	2.0 max	0.045	0.030	1.0	22.0/24.0	12.0/15.0	-	-	20Cr24Ni12	-
309LER	0.03	1.5/2.5	0.02	0.015	0.5	23.0/25.0	12.0/14.0	-	-	-	-
309S	0.08	2.0	0.045	0.030	1.0	22.0/24.0	12.0/15.0	-	-	-	-
310	0.25	2.0	0.045	0.030	1.50	24.0/26.0	19.0/22.0	-	-	10Cr25Ni12	-
310S	0.08	2.0	0.045	0.030	1.50	24.0/26.0	19.0/22.0	-	-	-	-
314	0.25	2.0	0.040	0.030	1.5to3	25.0/26.0	19.0/22.0	-	-	-	-
316	0.08	2.0	0.045	0.030	1.0	16.0/18.0	10.0/14.0	2.0/3.0	-	04Cr17Ni12Mo2	En 58H
316L	0.030	2.0	0.045	0.030	1.0	16.0/18.0	10.0/14.0	2.0/3.0	-	03Cr17Ni12Mo2	-
316LER	0.02	1.5/2.0	0.02	0.02	0.5	18.0/20.0	12.0/14.0	2.0/2.75	-	-	-
316TI	0.080	2.0	0.045	0.030	1.0	16.0/18.0	10.0/14.0	2.0/3.0	Ti5xCmin	-	-
317	0.08	2.0	0.045	0.030	1.0	18.0/20.0	11.0/15.0	3.0/4.0	-	-	-
317L	0.030	2.0	0.045	0.030	1.0	18.0/20.0	11.0/15.0	3.0/4.0	N:0.10/0.22	-	-
317LN	0.03	2.0	0.045	0.03	1	18.0/20.0	11.0/15.0	3.0/4.0	N:0.10/0.22	-	-
321	0.08	2.0	0.045	0.030	1.0	17.0/19.0	9.0/12.0	-	Ti5Cmin	04Cr18Ni10Ti20	En-58C
347	0.08	2.0	0.045	0.030	1.0	17.0/19.0	9.0/12.0	-	Nb/Ta10xCmin	04Cr18Ni10Nb-40	En-58G
904L	0.02	2.0	0.045	0.035	1	19.0/23.0	23.0/28.0	4.0-5.0	CU:1-2	-	-
FERRITIC											
410	0.15	1.00	0.04	0.03	1.0	11.50/13.5	0.60	-	-	12Cr13	En-56A
416	0.15	1.25	0.06	0.15min	1.0	12.0/14.0	1.25/2.50	-	-	-	-
420	0.15min	1.0	0.04	0.03	1.0	12.0/14.0	0.60	-	-	-	En-56C&D
430	0.12	1.0	0.04	0.03	1.0	16.0/18.0	0.60	-	-	07Cr17	En-60
430L	0.03	1.0	0.04	0.03	1.0	16.0/18.0	0.60	-	-	-	-
430F	0.12	1.25	0.06	0.15min	1.0	16.0/18.0	0.60	-	-	-	-
431	0.2	1.0	0.04	0.03	1.0	15.0/17.0	1.25/2.5	-	-	-	En-57
17.4-PH	0.07	1.0	0.04	0.03	1.0	15.0/17.0	3.0/5.0	-	NB:0.15/0.45	-	-
DUPLEX											
1905	0.03	1.2/1.8	0.04	0.03	1.2/2	18.0/19.0	4.3/5.2	2.5/3	N:0.5/0.10	-	-
2205	0.03	2	0.03	0.02	1.0	21.0/23.0	4.5/6.5	2.5/3.5	N:0.8/0.20	-	-
2506	0.08	1.0	0.04	0.03	0.75	26.0/28.0	4/5	1.3/2	-	-	-

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ANSI B 36.19 Stainless Steel Pipe Dimension in MM & Weight Per Kg.

Nominal Pipe size		Outside Diameter	Schedule 5 S		Schedule 10 S		Schedule 20 S		Schedule 40 S		Schedule 80 S		Schedule 160 S		XXS	
mm	inch	mm	Wt. mm	WEIGHT(KG/M)	WT. mm	WEIGHT(KG/M)	WT. mm	WEIGHT(KG/M)	WT. mm	WEIGHT(KG/M)	WT. mm	WEIGHT(KG/M)	WT. mm	WEIGHT(KG/M)	WT. mm	WEIGHT(KG/M)
3	1/8	10.3	1.2	0.26	1.24	0.28	1.5	0.33	1.73	0.37	2.41	0.47	-	-	-	-
6	1/4	13.7	1.2	0.37	1.65	0.49	2.00	0.58	2.24	0.630	3.02	0.80	-	-	-	-
10	3/8	17.1	1.2	0.47	1.65	0.63	2.00	0.74	2.31	0.840	3.20	1.10	-	-	-	-
15	1/2	21.3	1.65	0.80	2.11	1.00	2.30	1.07	2.77	1.27	3.73	1.62	4.78	1.94	7.47	2.55
20	3/4	26.7	1.65	1.02	2.11	1.28	2.55	1.52	2.87	1.69	3.91	2.20	5.56	2.90	7.82	3.64
25	1	33.4	1.65	1.30	2.77	2.09	2.55	1.94	3.38	2.50	4.55	3.24	6.35	4.24	9.09	5.45
32	1 1/4	42.2	1.65	1.65	2.77	2.70	3.00	2.90	3.56	3.39	4.85	4.47	6.35	5.61	9.70	7.77
40	1 1/2	48.3	1.65	1.90	2.77	3.11	3.00	3.35	3.68	4.05	5.08	5.41	7.14	7.25	10.15	9.55
50	2	60.3	1.65	2.39	2.77	3.93	3.00	4.24	3.91	5.44	5.54	7.48	8.74	11.11	11.07	13.44
65	2 1/2	73.0	2.11	3.69	3.05	5.26	4.00	6.81	5.16	8.63	7.01	11.41	9.53	14.91	14.02	20.39
80	3	88.9	2.11	4.51	3.05	6.45	4.00	8.37	5.49	11.29	7.62	15.27	11.1	21.30	15.24	27.68
100	4	114.3	2.11	5.84	3.05	8.36	4.50	12.18	6.02	16.07	8.56	22.32	13.49	33.54	17.12	41.03
125	5	141.3	2.77	9.47	3.40	11.57	5.00	16.80	6.55	21.8	9.53	30.97	15.88	49.11	19.05	57.43
150	6	168.3	2.77	11.32	3.40	13.82	6.35	25.36	7.11	28.26	10.97	42.56	18.25	67.53	21.95	79.22
200	8	219.1	2.77	14.78	3.76	19.96	6.35	33.31	8.18	42.55	12.7	64.64	23.01	111.27	22.23	107.92
250	10	273.1	3.40	22.61	4.19	27.78	6.35	41.77	9.27	60.31	12.7	81.55	28.58	172.33	25.40	155.15
300	12	323.8	3.96	31.24	4.57	36.00	6.35	49.7	9.53	73.85	12.7	97.43	33.32	238.68	25.40	186.90
350	14	355.6	3.96	34.34	4.78	41.3	7.92	67.90	11.13	94.54						
400	16	406.4	4.19	41.56	4.78	47.34	7.92	77.82	12.7	123.30						
450	18	457.2	4.19	46.81	4.78	53.32	7.92	87.74	14.27	155.86						
500	20	508.0	4.78	59.31	5.54	68.64	9.53	117.14	15.09	183.42						
600	24	610.0	5.54	82.57	6.35	94.52	9.53	141.11	17.48	255.41						

ASTM A 312 TP 304

ASTM A 312 TP 316L

ASTM A 312 TP 317L

Formula - Pipe Weight Kg / Mtr OD - Thick x Thick x 0.02466 = Kg Per Mtr.

Chemical Composition & Mechanical Properties of Pipes

SUMMARY OF THE MAIN ASTM STANDARDS GENERALLY USED FOR PIPING

ASTM	Grade	C Max	Mn Max	P Max	S Max	Si Max	Ni	Cr.	Mo	Cu	Others	Tensile Strength	Yield Strength Mini-Mpa/Psi Mini-MPa/Psi	Elong mini %	Impact test at C	Impact test at F
A 53	A	0.25	0.95	0.05	0.06		0.40 max	0.40 max	0.15 max	0.40-max	0.08 max	300-48000	205-30000	36		
	B	0.30	1.20	0.05	0.06		0.40 max	0.40 max	0.15 max	0.40 max	0.08 max	415-60000	240-35000	29.5		
A 106	A	0.25	0.27-0.93	0.025	0.025	0.10 mini	0.40 max	0.40 max	0.15 max	0.40 max	0.08 max	330-48000	205-30000	L35-T25		
	B	0.30	0.29-1.06	0.025	0.025	0.10 mini	0.40 max	0.40 max	0.15 max	0.40 max	0.08 max	415-60000	240-35000	L30-T16.5		
	C	0.35	0.29-0.06	0.025	0.025	0.10 mini	0.40 max	0.40 max	0.15 max	0.40 max	0.08 max	485-70000	275-40000	L30-T16.5		
A 333	1	0.25	0.27-0.93	0.025	0.025							380-55000	205-30000	L35-T25	-45	-50
	3	0.19	0.31-0.64	0.025	0.025	0.18-0.37	3.18-3.82					450-65000	240-35000	L30-T20	-100	-150
	4	0.12	0.50-1.05	0.025	0.025	0.18-0.37	0.47-0.98	0.44-1.01		0.40-0.75	Ai:0.40-0.30%	415-60000	240-35000	L30-T16	-100	-150
	6	0.30	0.29-1.06	0.025	0.025	0.10 mini						415-60000	240-35000	L30-T16	-45	-50
	9	0.20	0.40-1.06	0.025	0.025		1.60-2.24			0.75-1.25		435-63000	315-46000	L28	-75	-100
A 335	P1	0.10-0.20	0.30-0.80	0.025	0.025	0.10-0.50			0.44-0.65			380-55000	205-30000	L30-T20		
	P5	0.15	0.30-0.60	0.025	0.025	0.50		4.00-6.00	0.45-0.65			415-60000	205-30000	L30-T20		
	P9	0.15	0.30-0.60	0.025	0.025	0.25-1.00		8.00-10.0	0.90-1.10			415-60000	205-30000	L30-T20		
	P11	0.05-0.15	0.30-0.60	0.025	0.025	0.50-1.00		1.00-1.50	0.44-0.65			415-60000	205-30000	L30-T20		
	P12	0.05-0.15	0.30-0.61	0.025	0.025	0.50		0.80-1.25	0.44-0.65			415-60000	220-32000	L30-T20		
	P21	0.05-0.15	0.30-0.60	0.025	0.025	0.50		2.65-3.35	0.80-1.06			415-60000	205-30000	L30-T20		
	P22	0.05-0.15	0.30-0.60	0.025	0.025	0.50		1.90-2.60	0.87-1.13			415-60000	205-30000	L30-T20		
	P91	0.08-0.12	0.30-0.60	0.020	0.010	0.20-0.50	0.40 max	8.00-9.50	0.85-1.05		Vo-0.18-0.25%	585-85000	415-65000	L20		
A 358	TP 304	0.08	2.00	0.045	0.030	0.75	8.0-10.50	18.0-20.0	-				Class 1 : Double welded pipes & full			
	TP 310S	0.08	2.00	0.45	0.030	1.50	19.0-22.0	24.0-26.0	-				Radiography			
	TP 316	0.08	2.00	0.045	0.030	0.75	10.0-14.0	16.0-18.0	2.0-3.0				Class 2 : Double welded no Radiography			
	TP 316L	0.030	2.00	0.045	0.030	0.75	10.4-14.0	16.0-18.0	2.0-3.0				Class 3 : Single welded full Radiography			
	TP 317L	0.035	2.00	0.045	0.030	0.75	11.0-15.0	18.0-20.0	3.0-4.0				Class 4 : Single welded full Radiography			
	TP 321	0.08	2.00	0.045	0.030	0.75	9.0-12.0	17.0-20.0	-			Ti5xC<0.70%	not pass without addition of filler metal			
	TP 347	0.08	2.00	0.045	0.030	0.75	9.0-13.0	17.0-20.0	-			Cb10xC<1.00%	Class 5 : Double Welded sport Radiography			

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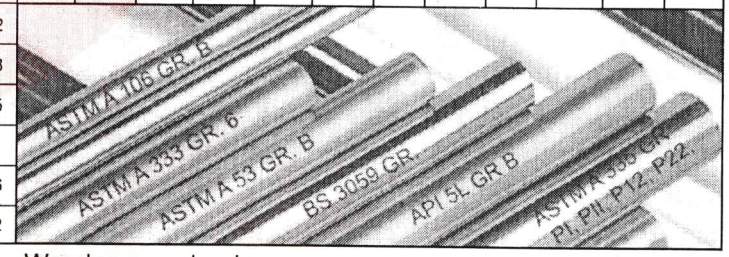
ANSI B 36.10 Carbon Steel, Seamless Pipe Weight Per Kg/mtr.

Nominal Pipe size		O/D	Schedule 10		Schedule 20		Schedule 30		Schedule STD		Schedule 40		Schedule 60		Schedule Extra Strong (XS)		Schedule 80		Schedule 100		Schedule 120		Schedule 140		Schedule 160		Schedule Double Extra Strong	
mm	inch	mm	mm	kg/m	mm	kg/m	mm	kg/m	wall	wt.	wall	wt.	wall	wt.	wall	wt.	wall	wt.	wall	wt.	wall	wt.	wall	wt.	wall	wt.	wall	wt.
3	1/8	10.3	-	-	-	-	-	-	1.73	0.37	1.73	0.37	-	-	2.41	0.47	2.41	0.47	-	-	-	-	-	-	-	-	-	-
6	1/4	13.7	-	-	-	-	-	-	2.24	0.63	2.24	0.63	-	-	3.02	0.80	3.02	0.80	-	-	-	-	-	-	-	-	-	-
10	3/8	17.1	-	-	-	-	-	-	2.31	0.84	2.31	0.84	-	-	3.20	1.10	3.20	1.10	-	-	-	-	-	-	-	-	-	-
15	1/2	21.3	-	-	-	-	-	-	2.77	1.27	2.77	1.27	-	-	3.73	1.62	3.73	1.62	-	-	-	-	-	-	4.78	1.95	7.5	2.55
20	3/4	26.7	-	-	-	-	-	-	2.87	1.69	2.87	1.69	-	-	3.91	2.20	3.91	2.20	-	-	-	-	-	-	5.56	2.90	7.82	3.64
25	1	33.4	-	-	-	-	-	-	3.38	2.50	3.38	2.50	-	-	4.55	3.24	4.55	3.24	-	-	-	-	-	-	6.35	4.24	9.1	5.45
32	1¼	42.2	-	-	-	-	-	-	3.56	3.39	3.56	3.39	-	-	4.85	4.47	4.85	4.47	-	-	-	-	-	-	6.35	5.61	9.7	7.77
40	1½	48.3	-	-	-	-	-	-	3.68	4.05	3.68	4.05	-	-	5.08	5.41	5.08	5.41	-	-	-	-	-	-	7.14	7.25	10.2	9.56
50	2	60.3	-	-	-	-	-	-	3.91	5.44	3.91	5.44	-	-	5.54	7.48	5.54	7.48	-	-	-	-	-	-	8.74	11.11	11.1	13.4
65	2½	73.0	-	-	-	-	-	-	5.16	8.63	5.16	8.63	-	-	7.01	11.41	7.01	11.41	-	-	-	-	-	-	9.53	14.92	14.0	20.4
80	3	88.9	-	-	-	-	-	-	5.49	11.3	5.49	11.3	-	-	7.62	15.3	7.62	15.3	-	-	-	-	-	-	11.13	21.35	15.24	27.7
90	3½	101.6	-	-	-	-	-	-	5.74	13.57	5.74	13.57	-	-	8.08	18.63	8.08	18.63	-	-	-	-	-	-	-	-	-	-
100	4	114.3	-	-	-	-	-	-	6.02	16.07	6.02	16.07	-	-	8.56	22.3	8.56	22.3	-	-	11.13	28.32	-	-	13.5	33.5	17.12	41.03
125	5	141.3	-	-	-	-	-	-	6.55	21.77	6.55	21.77	-	-	9.53	30.9	9.53	30.9	-	-	12.7	40.2	-	-	15.9	49.11	19.0	57.4
150	6	168.3	-	-	-	-	-	-	7.11	28.26	7.11	28.26	-	-	10.97	42.5	10.97	42.5	-	-	14.3	54.2	-	-	18.3	67.5	21.95	79.22
200	8	219.1	-	-	6.35	33.3	7.0	36.8	8.18	42.5	8.18	42.5	10.31	53.1	12.7	64.6	12.7	64.5	15.1	75.92	18.3	90.4	20.6	100.9	23.0	111.27	22.23	108.0
250	10	273.0	-	-	6.35	41.7	7.8	51.3	9.27	60.3	9.27	60.3	12.7	81.5	12.7	81.5	15.1	96.0	18.3	114.7	21.44	133.0	25.4	155	28.6	172.3	25.4	155.0
300	12	323.8	-	-	6.35	49.7	8.4	65.2	9.53	73.8	10.31	79.7	14.27	109.0	12.7	97.4	17.5	132.0	21.4	160.0	25.4	187.0	28.6	208	33.3	238.7	25.4	187.0
350	14	355.6	6.35	54.7	7.92	68.1	9.53	81.3	9.53	81.3	11.13	94.6	15.09	126.0	12.7	107.0	19.0	158.0	23.8	195.0	27.8	224.0	31.8	253.5	35.7	281	-	-
400	16	406.4	6.35	62.6	7.92	77.9	9.53	93.3	9.53	93.3	12.7	123.0	16.66	160.0	12.7	123.0	21.44	203.0	26.2	245.0	30.9	286.0	36.53	333	40.5	366.0	-	-
450	18	457.2	6.35	70.6	7.92	87.7	11.13	122.0	9.53	105.0	14.20	156.0	19.05	206.0	12.7	139.0	23.8	254.6	29.36	310.0	34.0	363.0	39.7	408.3	45.2	459.0	-	-
500	20	508.0	6.35	78.5	9.53	117.2	12.7	155.1	9.53	117.2	15.09	183.0	20.62	248.0	12.7	155.1	26.2	311.0	32.5	381.0	38.1	441.0	44.4	508	50.0	564.0	-	-
550	22	558.8	6.35	86.6	9.53	129.0	12.7	171.0	9.53	129.0	-		22.2	294.0	12.7	171.0	28.6	373.0	34.9	451.0	41.3	527.0	47.6	600	54.0	672.0	-	-
600	24	610.0	6.35	94.5	9.53	141.0	14.3	210.0	9.53	141.0	17.48	255.0	24.61	355.0	12.7	187.0	30.9	442.08	38.8	547.7	46.0	640.0	52.4	720.15	59.5	808.22	-	-
650	26	660.0	7.92	127.3	12.7	203.0	-	-	9.53	153.0	-	-	-	-	12.7	202												
700	28	711.0	7.92	137.4	12.7	218.0	15.88	272.0	9.53	165.0	-	-	-	-	12.7	218												
750	30	762.0	7.92	147.9	12.7	234.6	15.88	292.18	9.53	176.0	-	-	-	-	12.7	235												
800	32	812.8	7.92	157.9	12.7	250.6	15.88	312.0	9.53	188.2	17.48	342.0	-	-	12.7	251												
850	34	863.6	7.92	167.9	12.7	266.5	15.88	331.7	9.53	200.0	17.48	364.9	-	-	12.7	266												
900	36	914.4	7.92	176.9	12.7	282.4	15.88	352.2	9.53	212.0	19.05	420.6	-	-	12.7	282												



Formula - Pipe Weight Kg/Mtr. (OD - Thick x Thick x 0.02466 = Kg Per Mtr.)

We also supply pipes A 335 P 5, A 106 Gr B, API - 5L - GrB, A 333 Gr 6

Tolerance Dimensional Variation as per ASTM Specifications for Tubes

Tube Specification ASTM	Out Side Diameter (mm)	Permissible variations in Outside Diameter (mm)				Permissible variations in Wall Thickness (mm)												Under All THK. HFS/ CFS/ WLD
		Over		Under		Over												
						2.4 Wt.			>2.4 to 3.8 Ind.			>3.8-4.6 Ind.			>4.6		
		HF Seamless	CFS and Welded	HFS	CFS and Welded	HFS	CFS	WLD	HFS	CFS	WLD	HFS	CFS	WLD	HFS	CFS	WLD	
A-213 Seamless Ferritic& Austinitic Tube	Under 25.4		0.10		0.10		20%			20%			20%			20%		
	25.4 to 38.1 Incl.		0.15		0.15													
A 249 Welded Heat Ex. & Condenser Tube	Over 38.1 to 50.8 Excl.		0.20		0.20	40%		18%	35%		18%	33%		18%	28%		18%	○
	Over 50.8 to 63.5 Excl.	0.4	0.25	0.8	0.25													
	Over 63.5 to 76.2 Excl.		0.30		0.30		22%			22%			22%			22%		
A 269 Seamless & Welded Austinitic S. S. Tubes	Over 76.2 to 101.6 Incl.		0.38		0.38													
	Over 101.6 to 190.5 Incl.		0.38	1.2	0.64													

Dimensional Variation as per ASTM Specifications for Pipes

Tubes Specification ASMT	Nominal Pipe Size(mm)	Permissible variations in Outisde Diameter (mm)		Permissible variations in THK	Permissible variations in Length (mm)		Straight tolerance
		Over	Under		Over	Under	Max. curvature in any meter Length
A 106 CS Seamless Pipe for High Temp.	3 to 40 Incl.	0.4	0.8	-12.5%	6	0	Up to 125 mm O/D & 12 mm THK Pipe -0.76 mm
A 312 Seamless & Welded Austinitic SS Pipes	Over 40 to 100 Incl.	0.8	0.8				
	Over 100 to 200 Incl.	1.6	0.8				Over 125 mm O/D to 200 mm O/D Incl. -1.15 mm
A333 Seamless & Welded Pipe for LT Service	Over 200 to 450 Incl.	2.4	0.8				
	Over 450 to 650 Incl.	3.2	0.8	Except for Welded pipe will filler Metal Added			
A335 Seamless Ferritic Alloy Steel Pipe for High Temp. Service	Over 650 to 850 Incl.	4.0	0.8				Over 200 mm O/D to 324 mm O/D inclusive -1.52 mm
	Over 850 to 1200	4.8	0.8				
A 358 ERW Austinitic Cr-NiAs Pipe for High Temp. serv.	All Sizes (upto 200 NB)	+0.5% (Based on Circum-ferencial Measurement)	-0.5%	-0.3 mm			3 mm 3/metres
A409 ERW Large Dia Austinitic Steel Pipes	450 to 750 (SCH 5 S & 10 S)	+0.2% +0.4% Based on Circumferential Measurement	+0.2% (For T<4.8mm) -0.4% (For T 4.8mm)	-0.46 mm			4.8mm/3 metres

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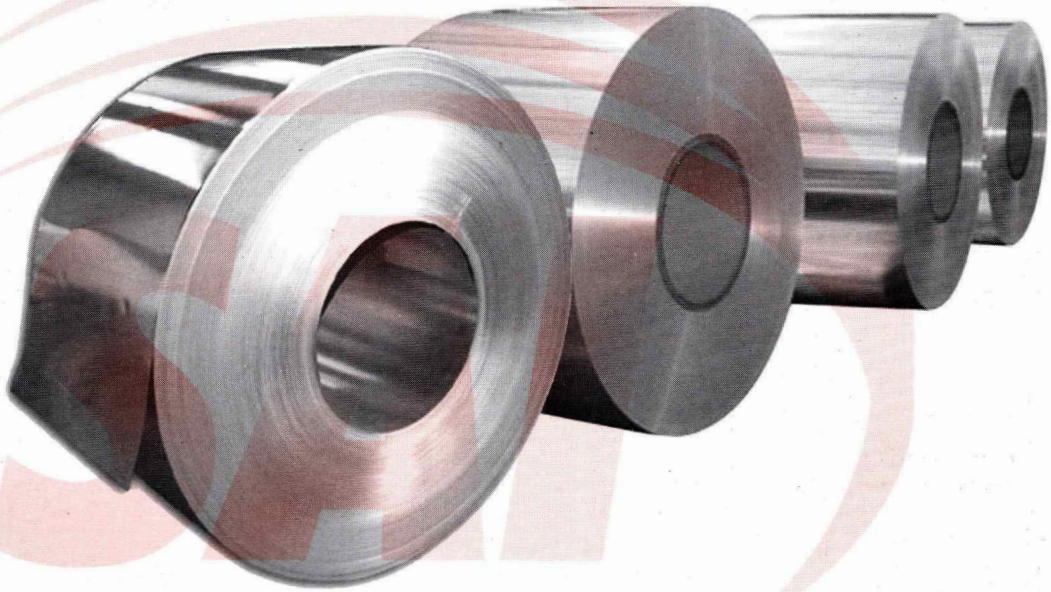
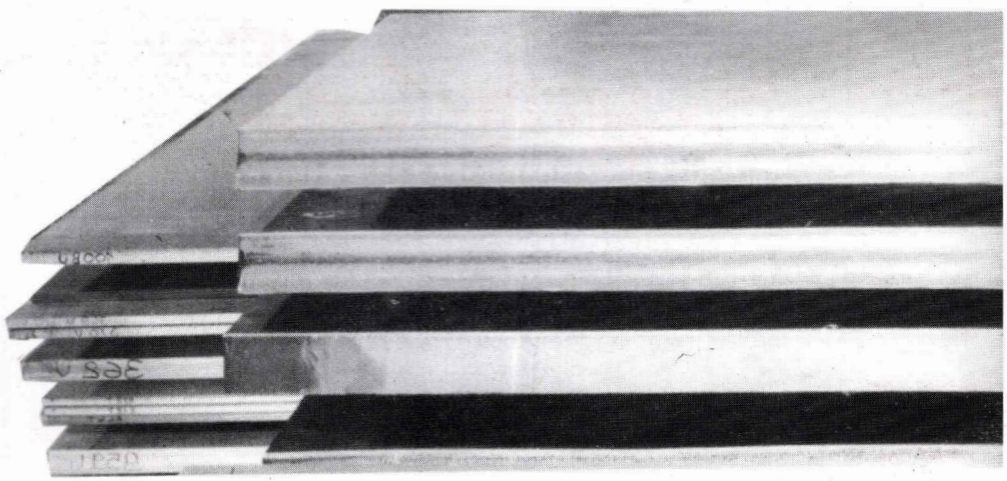
Sheets, Plates & Coils





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ASTM	Grade	Chemical requirements percent (%)										Mechanical requirements					
		C max	Mn max	P max	S max	Si max	Ni	Cr.	Mo	Cu	Others	Tensile Strength mini-MPa		Yeild Strength mini-MPa		Elong mini %	Hardness Brinell	Hardness Rockwell
A240	304	0.08	2.00	0.045	0.030	0.75	8.0-10.5	18.00-20.0				515		205		40	201	92
	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
	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>5xC<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			Cb+Ta>10xC<1.10	515		205		40	201	92
A 387 Class1 Class2												Class 1	Class 2	Class 1	Class 2			
	2	005-0.21	0.55-0.80	0.035	0.040	0.15-0.40		0.50-0.80	0.45-0.60			380	486	230	310	22	max201HB	max92HRB
	5	0.15	0.30-0.60	0.04	0.030	0.050		4.00-6.00	0.45-0.65			415	515	205	310	18	max202HB	max92HRB
	7	0.15	0.30-0.60	0.030	0.030	1.00		6.00-8.00	0.45-0.65			415	515	205	310	18	max217HB	max95HRB
	9	0.15	0.30-0.60	0.030	0.030	1.00		8.00-10.0	0.90-1.10			415	515	205	310	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	515	240	310	22	max217HB	max95HRB
	12	0.04-0.15	0.40-0.65	0.035	0.04	0.15-0.40		0.80-1.15	0.45-0.60			380	450	230	275	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	515	205	310	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	515	205	310	18	max201HB	max92HRB
A 515	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 516	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	085-1.20	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		
A 537	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		
	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		

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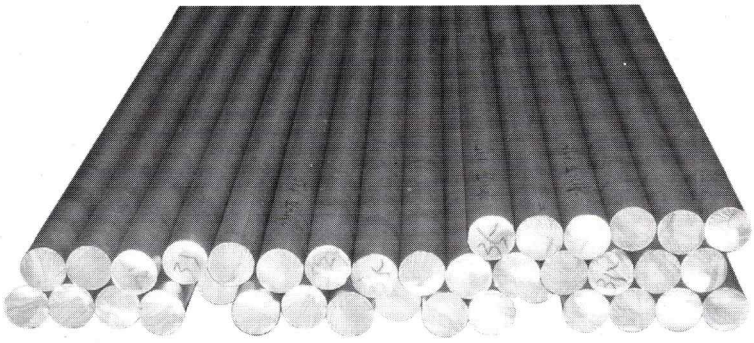
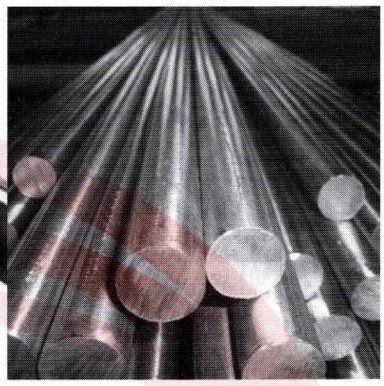
Rods





WEIGHT OF RODS IN KILOGRAMS PER LINER FOOT

Size			Brass			Aluminium			Stainless Steel / Alloy Steel		
Inch	Fraction of inch	mm	Round	Hex	Sq.	Round	Hex	Sq.	Round	Hex	Sq.
1/8"	0.125	3.173	0.020	0.023	0.026	--	--	--	--	--	--
3/16"	0.187	4.762	0.046	0.051	0.059	0.015	0.017	0.020	0.043	0.047	0.054
1/4"	0.250	6.350	0.082	0.091	0.104	0.030	0.035	0.037	0.076	0.084	0.097
5/16"	0.312	7.937	0.129	0.142	0.164	0.042	0.047	0.054	0.119	0.132	0.151
3/8"	0.375	9.52	0.185	0.224	0.235	0.061	0.068	0.078	0.171	0.188	0.218
7/16"	0.437	11.112	0.252	0.278	0.321	0.083	0.092	0.106	0.233	0.257	0.296
1/2"	0.500	12.700	0.329	0.363	0.419	0.109	0.120	0.138	0.305	0.336	0.386
9/16"	0.562	14.287	0.416	0.461	0.529	0.138	0.152	0.175	0.384	0.424	0.490
5/8"	0.625	15.875	0.516	0.566	0.652	0.170	0.188	0.217	0.473	0.520	0.604
11/16"	0.687	17.462	0.621	0.684	0.789	0.206	0.227	0.262	0.587	0.647	0.760
3/4"	0.750	19.050	0.739	0.817	0.940	0.245	0.270	0.312	0.687	0.736	0.870
13/16"	0.812	20.637	0.867	0.958	1.104	0.287	0.317	0.366	0.800	0.882	1.021
7/8"	0.875	22.225	1.008	1.109	1.282	0.333	0.368	0.424	0.931	1.038	1.184
15/16"	0.937	23.812	1.154	1.273	1.474	0.383	0.422	0.486	1.067	1.176	1.359
1"	1.00	25.400	1.314	1.451	1.675	0.436	0.481	0.555	1.223	1.350	1.546
1.1/8"	1.125	28.575	1.665	1.834	2.122	0.553	0.608	0.705	1.569	1.730	1.950
1.1/4"	1.250	31.750	2.053	2.268	2.619	0.680	0.748	0.867	1.888	2.080	2.415
1.3/8"	1.375	34.925	2.487	2.742	3.167	0.980	1.082	1.248	2.760	3.042	3.478
1.1/2"	1.500	38.100	2.961	3.262	3.167	0.821	0.907	1.082	2.318	2.554	2.922
1.5/8"	1.625	41.275	3.742	3.833	4.426	1.152	1.272	1.466	3.205	3.540	4.072
1.3/4"	1.750	44.450	4.029	4.444	5.129	1.352	1.474	1.720	3.738	4.120	4.756
1.7/8"	1.875	47.625	4.627	5.101	5.890	1.529	1.692	1.942	4.300	4.740	5.475
2"	2.000	50.800	5.266	5.804	6.703	1.742	1.919	2.220	4.905	5.415	6.224
2.1/4"	2.250	57.150	6.662	7.346	8.482	2.204	2.433	2.802	6.210	6.850	7.910
2.1/2"	2.500	63.500	8.225	9.067	10.472	2.722	3.005	3.462	7.614	8.400	9.700
2.3/4"	2.750	69.850	10.199	11.225	12.955	3.003	3.315	3.820	9.282	10.20	11.820
3"	3.000	76.200	12.454	13.267	15.341	3.919	4.327	4..990	10.996	12.210	14.000
3.1/2"	3.500	88.900	16.364	18.040	20.824	5.408	5.970	6.884	14.946	16.500	19.020
4"	4.000	101.600	21.477	23.210	27.358	6.968	7.693	8.870	19.619	21.620	25.000

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CHEMICAL & PHYSICAL PROPERTIES OF C.S., S.S. & A.S., S.W. FORGED FITTINGS

ASTM A 105/A 105M Forged Socket Weld, Screwed, Flanges, Carbon Steel Pipe Fittings

IASTM GRADE	C	MnSi	Si	S	P	Cr	Ni	Mo	Other Psi (Mpa)	Tensile (MPa)	Psi Yield %	Elangation in Area	Hardness	Redu
A 105/105 M	0.35 max	0.60 1.05	0.35 max	0.50 max	0.04 max	-	-	-	-	70000 485	36000 (250)	30-Strip 22-Round	187 HB max	30 Round
A 182C1160&170 30000(20.29)	0.08 max	1.10 max	0.32 max	0.35min 0.50max	0.05 max	- -	- -	- -	- -	Cl.70-70000(49-46) Cl.60-60000(42.32)	30000 (200)	22	-	35

ASTM A 182/A 182M Austentic, Stainless Steel Forged (SW), Screwed, Flanges, For High Temps, Service

IA 182/182M F 304	0.08 max	2.00 max	1.00 max	0.03 max	0.04 max	18.0 20.0	8.0 11.0	-	-	75000 (515)	30000 (205)	30		50
A 182/182 M F 304L	0.035 max	2.00 max	1.00 max	0.03 max	0.04 max	18.0 20.0	18.0 13.0	-	-	70000 (485)	25000 (170)	30	223	50
A 182/182M F 316	0.08 max	2.00 max	1.00 max	0.03 max	0.04 max	16.0 18.0	10.0 14.0	2.0 3.0	-	75000 (515)	30000 (205)	30(Long) 25(Trans)	-	50 (Long) 45 (Trans)
A 182/182M F316L	0.035 max	2.00 max	1.00 max	0.03 max	0.04 max	16.0 18.0	10.0 15.0	2.0 3.0	-	70000 (485)	25000 (170)	30	-	50
A182/182M F 316 H	0.04 0.10	2.00 max	1.00 max	0.03 max	0.04 max	16.0 18.0	10.0 14.0	2.0 3.0	-	75000 (515)	30000 (205)	30	-	50
A182/182M F321	0.08 max	2.00 max	1.00 max	0.03 max	0.04 max	17.0 mm.	9.0 12.0	-	Tixc= 0.70max	75000 (515)	30000 (205)	30	-	50
A182/182M F310	0.15 max	2.00 max	1.00 max	0.03 max	0.04 max	24.0 26.0	19.0 22.0	-	-	75000 (515)	30000 (205)	30	-	50
A182/182M F317L	0.030 max	2.00 max	1.00 max	0.03 max	0.045 max	18.0 20.0	11.0 15.0	3.00 4.00	-	70000 (485)	25000 (170)	30	-	50 50
A182/182M F347H	0.04 0.10	2.00 max	1.00 max	0.03 max	0.04 max	17.0 20.0	9.0 13.0		Cb+Ta= 8.0=1.10	75000 (515)	30000 (205)	30	-	50

ASTM A182M Forged Alloy Steel, (SW), Screwed, Flanges, for High Temperature Service

IA 182/182M F1	0.28 max	0.60 0.90	0.15 0.35	0.045 max	0.045 max		-	0.44 0.65	-	70000 (485)	40000 (275)	20	143-192 Bremell Hrdn.	30
IA 182/182M F12 Class2	0.10 0.20	0.30 0.80	0.10 0.60	0.04 max	0.04 max	0.80 1.25	-	0.44 0.65	-	70000 (485)	40000 (275)	20	143-207	30
IA 182 / 182M F11 Class2	0.10 0.20	0.30 0.80	0.50 1.0	0.04 max	0.04 max	1.0 1.50	-	0.44 0.65	-	70000 (485)	40000 (275)	20	143-207	30
IA 182/1821M F22 Class3	0.05 0.15	0.30 0.60	0.5 max	0.04 max	0.04 max	2.0 2.50	- -	0.87 1.13	- -	75000 (515)	45000 (310)	20	156-207	30
IA 182/182M F5	0.15 max	0.30 0.60	0.50 max	0.03 max	0.03 max	4.0 6.0	0.5 max	0.44 0.65		70000 (485)	40000 (275)	20	143-217	35
IA 182/182M F9	0.15 max	0.30 0.60	0.5 max	0.03 max	0.03 max	8.0 10.0	-	0.90 1.10	-	85000 (585)	55000 (386)	20	179-217	40

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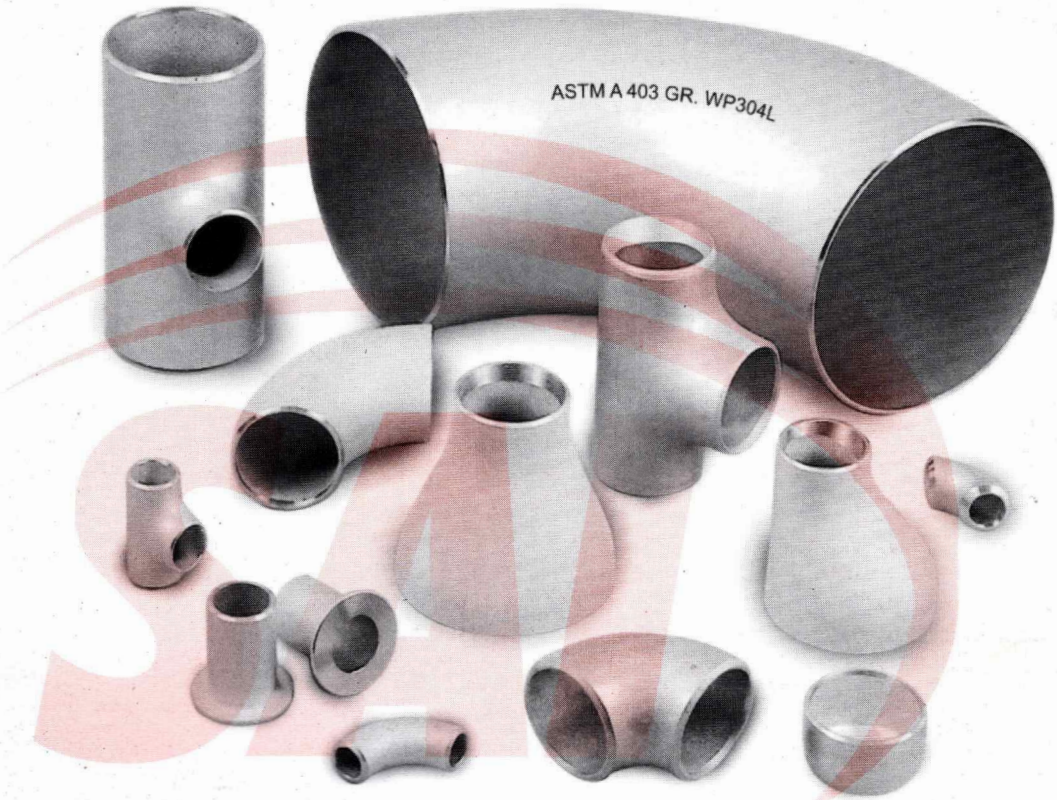
Butt-weld Pipe Fittings



The following table represents size range, product standards and material grades of industrial pipe fittings like stainless steel, carbon steel & alloy steel pipe fittings etc. The range includes:

MATERIAL TYPE :-		
Stainless Steel	:	ASTM A403 WP 304, 304L, 304H, 316, 316L, 316Ti, 317, 317L, 321, 309, 310, 310S, 347, 347H, 904L etc...
Carbon Steel	:	ASTM A-234 WPB / A420 WPL3/ A420 WPL6/ MSS-SP-75 WPHY 42/46/52/56/60/65/70 etc. (IBR & NON IBR)
Alloy Steel	:	ASTM A 234, GR. WP1,WP5, WP9, WP11, WP12, 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, Nipple, Cross, Insert etc.
Size Range	:	1/8" NB TO 48" NB. [Seamless & ERW (Welded)]
Wall Thickness	:	Sch. 5S To Sch. XXS

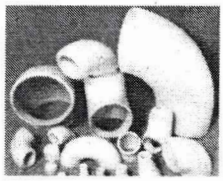
Chemical Composition & Mechanical Properties

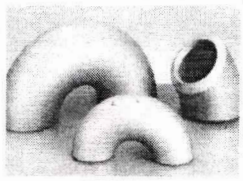
Steel Type	ASTM Grade	Chemical Composition									Mechanical Composition				
		C% max	Mn%	P% max	S% max	Si%	Cr%	Mo%	Ni%	Others	R.min Tensile Strength MPa	S.min Yield Strength Mpa	A% min(21/4D) Elongation Long	A% min(21/4D) Elongation Transv.	Impact Test KCV (2) J
A234	WPB(1)	03	0.29-1.06	0.05	0.058	0.10min	0.4	0.15	0.4	Cu-0.4 V=0.08 Cb=0.02	415-585	240	30	20	
	WPC(1)	035	0.29-1.06	0.05	0.058	0.10min	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	Cu-0.4 V=0.08 Cb-0.02	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=0.06-010 N=0.03-0.07 A=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	-
	WP31254	0.02	1	0.03	0.01	0.8	19.5-20.5	6.0-2.5	17.5-18.5	N=0,18-0.22 Cu=0.5-1.0	515	205	28	20	-
A815	S31803	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 Al=0,15-0.60 Tr=0,15-0.60 Fe=39.5min Al+Ti=0.85-1.20	450	170	30	-	-
	WPNIC11	0.06-0.10	1.5		0.015	1	19.0-23.0	-	30.0-35.0		450	170	30		

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

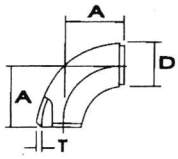
For each reduction of 0.01% below the specified carbon max, an increase of 0.06% Mn above the specified max, willbe permitted upto 1.35% max.

2) Relative to 10x10 specimen.

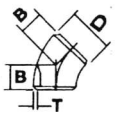




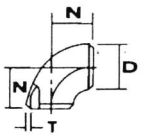
Butt Welding Pipe Fittings Dimensional Standard ANSI B-16.9, B-16.28



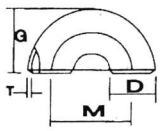
90° Elbol long radius



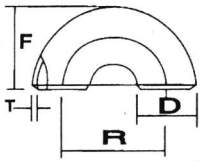
45° Elbow



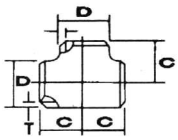
90° Elbow short radius



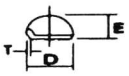
180° Return short radius



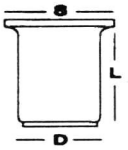
180° Return long radius



Tee equal tee

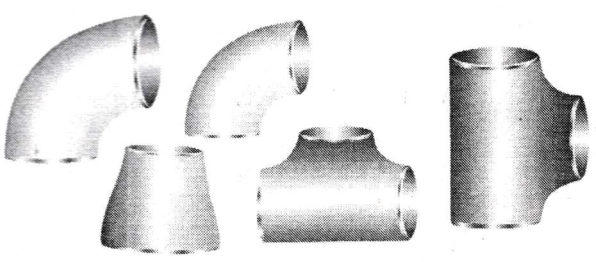


Caps



Stubends

Nominal Pipe Size		Outside Diameter	Centre to Face				Back to Face			Centre to Centre			Length "L" MSSSP43 B16.9	
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	73.0	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	21.91	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	127.0	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	508.0	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	614.40	152.4	305.0
24	600	610.0	914	381.0	432.0	610.0	267.0	1219.0	914.0	1829.0	1219.0	692.0	152.4	305.0
26	650	660.0	991.0	406.0	495.0	660.0	267.0							
28	700	711.0	1067.0	438.0	521.0	771.0	267.0							
30	750	762.0	1143.0	470.0	589.0	762.0	267.0							
32	800	813.0	1219.0	502.0	597.0	813.0	267.0							
34	850	864.0	1295.0	533.0	635.0	864.0	267.0							
36	900	914.0	1372.0	565.0	673.0	914.0	267.0							

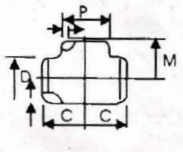


T=Wall Thickness

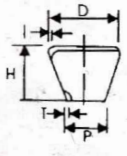
Butt Welding Pipe Fittings Dimensional Standard ANSI B-16.9 and B-16.28

Nominal Pipe Size		Outside Diameter		Center to end		Length
Inch	mm	D	P	C	M	H
1/2 x 3/8	15 x 10	21.3	17.1	25	25	-
1/2 x 1/4	15 x 8	21.3	13.7	25	25	-
3/4 x 1/2	20 x 15	33.4	21.3	29	29	38
3/4 x 3/8	20 x 10	33.4	17.1	29	29	38
1 x 3/4	25 x 20	26.7	26.7	38	38	51
1 x 1/2	25 x 15	26.7	21.3	38	38	51
1¼ x 1	32 x 25	42.2	33.4	48	48	51
1¼ x 3/4	32 x 20	42.2	26.7	48	48	51
1¼ x 1/2	32 x 15	42.2	21.3	48	48	51
1½ x 1½	40 x 32	48.3	42.2	57	57	64
1½ x 1	40 x 25	48.3	33.4	57	57	64
1½ x 3/4	40 x 20	48.3	26.7	57	57	64
1½ x 1/2	40 x 15	48.3	21.3	57	57	64
2 x 1½	50 x 40	60.3	48.2	64	60	76
2 x 1¼	50 x 32	60.3	42.2	64	57	76
2 x 1	50 x 25	60.3	33.4	64	51	76
2 x 3/4	50 x 20	60.3	26.7	64	44	76
2½ x 2	65 x 50	73.0	60.3	76	70	89
2½ x 1½	65 x 40	73.0	48.3	76	67	89
2½ x 1¼	65 x 32	73.0	42.2	76	64	89
2½ x 1	65 x 25	73.0	33.4	76	57	89
3 x 2½	80 x 65	88.9	73.0	86	83	89
3 x 2	80 x 50	88.9	60.3	86	76	89
3 x 1½	80 x 40	88.9	48.3	86	73	89
3 x 1¼	80 x 32	88.9	42.2	86	70	89
4 x 3½	100 x 90	114.3	101.6	105	102	102
4 x 3	100 x 80	114.3	88.9	105	98	102
4 x 2½	100 x 65	114.3	73.0	105	95	102
4 x 2	100 x 50	114.3	60.3	105	89	102
4 x 1½	100 x 40	114.3	48.3	105	86	102
5 x 4	125 x 100	141.3	114.3	124	117	127
5 x 3½	125 x 90	141.3	101.6	124	114	127
5 x 3	125 x 80	141.3	88.9	124	111	127
5 x 2½	125 x 65	141.3	73.0	124	108	127
5 x 2	125 x 50	141.3	60.3	124	105	127
6 x 5	150 x 125	168.3	141.3	143	137	140
6 x 4	150 x 100	168.3	114.3	143	130	140
6 x 3½	150 x 90	168.3	101.6	143	127	140
6 x 3	150 x 80	168.3	88.9	143	124	140
6 x 2½	150 x 65	168.3	73.0	143	121	140

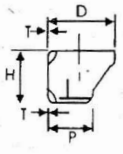
Nominal Pipe Size		Outside Diameter		Center to end		Length
Inch	mm	D	P	C	M	H
8 x 6	200 x 150	219.1	168.3	178	168	152
8 x 5	200 x 125	219.1	141.3	178	162	152
8 x 4	200 x 100	219.1	114.3	178	156	152
8 x 3½	200 x 90	219.1	101.6	178	152	152
10 x 8	250 x 200	273.1	219.1	216	203	178
10 x 6	250 x 150	273.1	168.1	216	194	178
10 x 5	250 x 125	273.1	141.3	216	191	178
10 x 4	250 x 100	273.1	114.3	216	184	178
12 x 10	300 x 250	323.9	273.1	254	241	203
12 x 8	300 x 200	323.9	219.1	254	229	203
12 x 6	300 x 150	323.9	168.3	254	219	203
12 x 5	300 x 125	323.9	141.3	254	216	203
14 x 12	350 x 300	355.6	323.9	279	270	330
14 x 10	350 x 250	355.6	273.1	279	257	330
14 x 8	350 x 200	355.6	219.1	279	248	330
14 x 6	350 x 150	355.6	168.3	279	238	330
16 x 14	400 x 350	406.4	355.6	305	305	356
16 x 12	400 x 300	406.4	323.9	305	295	356
16 x 10	400 x 250	406.4	273.1	305	283	356
16 x 8	400 x 200	406.4	219.1	305	273	356
16 x 6	400 x 150	406.4	168.3	305	264	---
18 x 16	450 x 400	457.0	355.6	343	330	381
18 x 14	450 x 350	457.0	323.9	343	330	381
18 x 12	450 x 300	457.0	273.1	343	321	381
18 x 10	450 x 250	457.0	219.1	343	308	381
18 x 8	450 x 200	457.0	168.3	343	298	---
20 x 18	500 x 450	508.0	457.0	381	368	508
20 x 16	500 x 400	508.0	406.4	381	356	508
20 x 14	500 x 350	508.0	355.6	381	356	508
20 x 12	500 x 300	508.0	323.9	381	346	508
20 x 10	500 x 250	508.0	273.1	381	333	---
20 x 8	500 x 200	508.0	219.1	381	324	---
24 x 22	600 x 550	610.0	559.0	432	432	508
24 x 20	600 x 500	610.0	508.0	432	432	508
24 x 18	600 x 450	610.0	457.0	432	419	508
24 x 16	600 x 400	610.0	406.4	432	406	508
24 x 14	600 x 350	610.0	355.6	432	406	---
24 x 12	600 x 300	610.0	323.9	432	397	---
24 x 10	600 x 250	610.0	273.1	432	384	---



REDUCING TEES



CONCENTRIC REDUCERS



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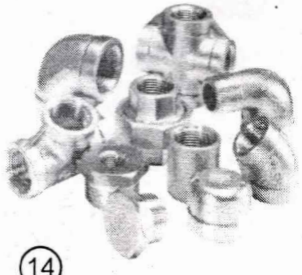
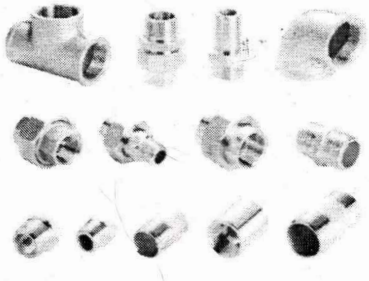
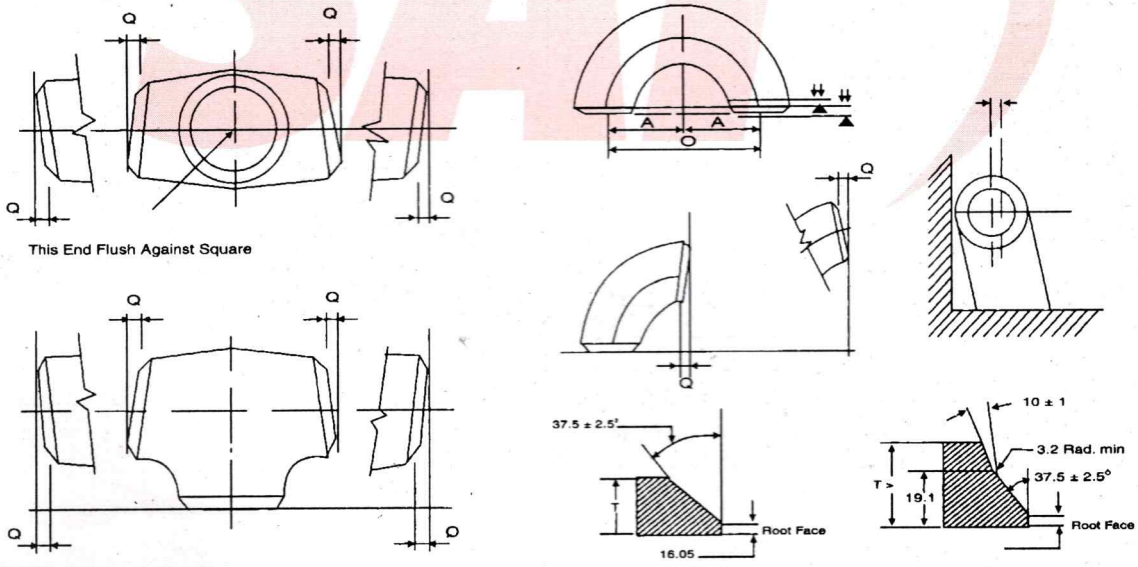




Dimensional Tolerances as Per ANSI B 16.9/B 16.28 / MSS SP-43 Butt Weld Fittings

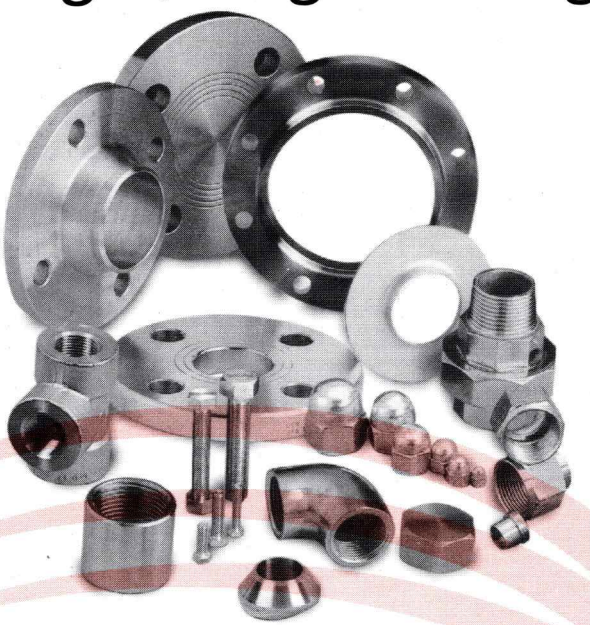
ALL FITTINGS						90°/60°/45° /30° ELBOWS & TEES		REDUCERS		180° RETURNS				CAPS		ANGULARITY TOLERANCE			
Nominal Pipe Size Inch/mm	Outside Diameter at Level		Inside Dia meter	Wall Thickness at End		Center to End		Overall Length Dimensions		Center to End		Back to Face Dimensions		Alignment of End Dimensions		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 21/2" 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	±1.6															5" TO 8" 125 TO 200	2		4
4" 100	+2 -1					±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		Not Less Than 87.5% Nominal Thk.	Not Less Than 87.5% Nominal Thk.											±7	±6.35	14" TO 16" 350 TO 400	3	16"TO 24" 400 TO 600 1.6	7
8" 200	±2	-0.79																18" TO 24" 450 TO 600	4		10
10" TO 18" 250 TO 450	+4 -3	+2.38 -0.79	±3.2			FROM 12"TO30" ±3 300TO750	±2.38	FROM 12"TO30" ±3 300TO750	10"TO24" +2.38 250TO 600	±10"	±9.53			±2.0"	±1.59			26" TO 30" 650 TO 750	5	26" TO 36" 650 TO 900 2.4	10
20" TO 24" 500 TO 600	+6 -5	3.17 0.79																32" TO 42" 800 TO 1050	5		13
26" TO 30" 550 TO 750	+7 -5		±4.8													±10		44" TO 48" 1000 TO 1200	5	38" TO 48" 950 TO 1200 3.2	20
32" TO 48" 800 TO 1200	+7 -5					±5												42" TO 48" 1050 TO 1200	±5		±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

Flanges, Forged Fittings



FLANAGES :

The following table represents size range, product standards and material grades of industrial flanges like industrial steel flanges, stainless steel, carbon steel & alloy steel flanges etc. The range includes:

MATERIAL TYPE :-		
Stainless Steel	:	ASTM A-240 / A182 F 304, 304L, 304H, 316, 316L 316Ti, 309, 309H, 310, 310S, 317, 317L, 321, 347, 904L.
Carbon Steel	:	ASTM A105/ IS-2062, A350 LF3/ A350 LF2, LF3, etc. (IBR & NON IBR)
Alloy Steel	:	ASTM A182 F1, F5, F9, F11, F12, F22, F91 etc.
Others	:	Monel, Nickel, Inconel, Hastalloy, Copper, Brass, Bronze, Titanium, Tantalum, Bismuth, Aluminium, High Speed Steel, Zinc, Lead, etc.
Types	:	SLIPON, BLIND, WELD NECK, SOCKET WELD, SCREWED, LAP JOINT, RING JOINT, SPECTACLE, ORIFCAE, REDUCING, PLATE, PLATE BLANK ETC...
Size Range	:	1/2" NB TO 48" NB
Standard	:	150#, 300#, 600#, 900#, 1500#, 2500#, BS-10 Standard Table D, E, F, H & ALSO DIN Standard.

FORGED FITTINGS SOCKET WELD & SCREWED

The following table represents size range, product standards and material grades of forged high pressure fittings, socket weld & Screwed like stainless steel, carbon steel & alloy steel etc. The range includes:

MATERIAL TYPE :-		
Stainless Steel	:	ASTM A182 F304/ 304L/ 304H/ 316/ 316L/ 317/ 317L/ 321/ 310/ 347/ 904L/ etc.
Carbon Steel	:	ASTM A105/ A105N/ 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	:	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, Cross, Weldolet, Elbowlet, Sockolet, Thredolet, Nipolet, Letrolet, etc.
Size	:	1/8" NB TO 4" NB. (Socketweld & Threaded)
Class	:	150#, 3000#, 6000# & 9000#.

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ASTM A105/A 105M Forged Socket Weld, Screwed, Flanges, Carbon Steel Pipe Fittings

ASTM GRADE	C	Mn	Si	S	P	Cr	Ni	Mo	Other	Tensile Psi(Mpa)	Psi Yeild (MPa)	Elangation %	Hardness	Redu in Area
A 105/105M	0.35 max	0.60 1.05	0.35 max	0.50 max	0.04 max	-	-	-	-	70000 485	36000 (250)	30-strip 22-Round	187 HB max	30 Round
A 182c1160&170 30000(20.29)	0.08 max	1.10 max	0.32 max	0.35 min 0.50 max	0.05 max	- -	- -	- -	- -	Cl.70-70000(49.46) Cl.60-60000(42.32)	30000 (200)	22	-	35

ASTM A182/A 182M Austentic, Stainless Steel Forged (SW), Screwed, Flanges, for High Temps. Service

A182/182M F 304	0.08 max	2.00 max	1.00 max	0.03 max	0.04 max	18.0 20.0	8.0 11.0	-	-	75000 (515)	30000 (205)	30		50
A 182/182M F 304L	0.035 max	2.00 max	1.00 max	0.03 max	0.04 max	18.0 20.0	8.0 13.0	-	-	70000 (485)	25000 (170)	30	223	50
A182/182M F 316	0.08 max	2.00 max	1.00 max	0.03 max	0.04 max	16.0 18.0	10.0 14.0	2.0 3.0	-	75000 (515)	30000 (205)	30 (Long) 25 (Trans)	-	50(Long) 45 (Trans)
A182/182M F 316L	0.035 max	2.00 max	1.00 max	0.03 max	0.04 max	16.0 18.0	10.0 15.0	2.0 3.0	-	70000 (485)	25000 (170)	30	-	50
A182/182M F 316 H	0.04 0.10	2.00 max	1.00 max	0.03 max	0.04 max	16.0 18.0	10.0 14.0	2.0 3.0	-	75000 (515)	30000 (205)	30	-	50
A182/182M F321	0.08 max	2.00 max	1.00 max	0.03 max	0.04 max	17.0 min.	9.0 12.0	-	Tixc= 0.70 max	75000 (515)	30000 (205)	30	-	50
A182/182M F310	0.15 max	2.00 max	1.00 max	0.03 max	0.04 max	24.0 26.0	19.0 22.0	-	-	75000 (515)	30000 (205)	30	-	50
A182/182M F317L	0.030 max	2.00 max	1.00 max	0.03 max	0.045 max	18.0 20.0	11.0 15.0	3.00 4.0	-	70000 (485)	25000 (170)	30	-	50 50
A182/182M F347H	0.04 0.10	2.00 max	1.00 max	0.03 max	0.04 max	17.0 20.0	9.0 13.0		Cb+Ta= 8.0=1.10	75000 (515)	30000 (205)	30	-	50

ASTM A 182/A 182M Forged Alloy Steel, (SW), Screwed, Flanges, for High Temperature Service

A182/182M F1	0.28 max	0.60 0.90	0.15 0.35	0.045 max	0.045 max	-	-	0.44 0.65	-	70000 (485)	40000 (275)	20	143-192 Brenel Hrdn.	30
A182/182M F12 Class2	0.10 0.20	0.30 0.80	0.10 0.60	0.04 max	0.04 max	0.80 1.25	-	0.44 0.65	-	70000 (485)	40000 (275)	20	143-207	30
A182/182M F11 Class2	0.10 0.20	0.30 0.80	0.50 1.0	0.04 max	0.04 max	1.0 1.50	-	0.44 0.65	-	70000 (485)	40000 (275)	20	143-207	30
A182/182M F22 Class 3	0.05 0.15	0.30 0.60	0.5 max	0.04 max	0.04 max	2.0 2.50	-	0.87 1.13	-	75000 (515)	45000 (310)	20	156-207	30
A182/182M F5	0.15 max	0.30 0.60	0.50 max	0.03 max	0.03 max	4.0 6.0	0.5 max	0.44 0.65	-	70000 (485)	40000 (275)	20	143-217	35
A182/182M F9	0.15 max	0.30 0.60	0.5 1.00	0.03 max	0.03 max	8.0 10.0	-	0.90 1.10	-	85000 (585)	55000 (386)	20	179-217	40

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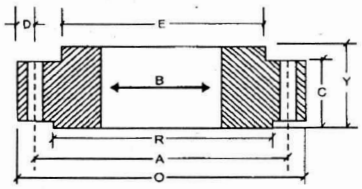
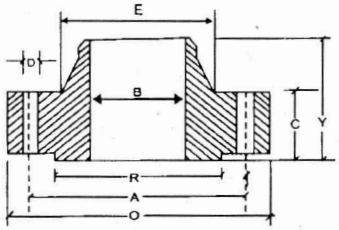
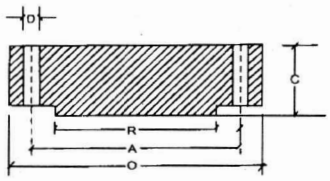
Dimensions of Forged Flanges ANSI B 16.5



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	Length 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 wil be furnished with (1.6mm) Raised Face, which is included in Thickness (C) and Length 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	Length 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	482.3	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	188.3	152.4	615.9	615.9	692.1	-	609.60

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

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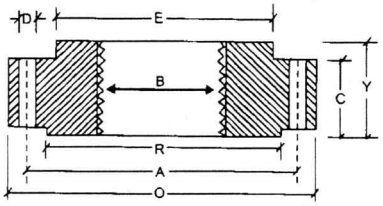
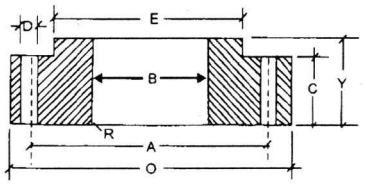
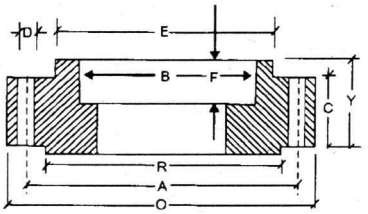
Dimensions of Forged Flanges ANSI B 16.5



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	Length through Hub S/O & S/W Y	Length through Hub W/N Y	Length through Hub L/J Y	Dia of Bore S/O & S/W B	Dia of Bore L/J B	Dia of R/R R	Depth of Socket F	Pipe Dia X
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	66.4	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

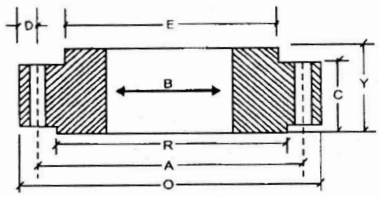
All Dimensions are in Millimeters • Flanges except Lap Joint wil be furnished with (6.35mm) Raised Face, which is not included in Thickness (C) and Length through Hub(Y).

Dimensions of Class 900 Flanges as per ANSI B 16.5

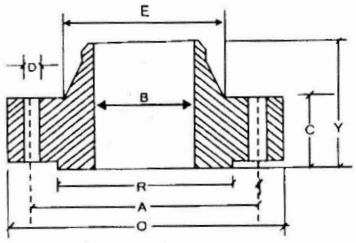
Nominal Pipe Size (MM)	Flange Dia O	Dia of Bolt Circle A	Dia of Bolt Holes D	No. of Holes	Thk of Flange C	Dia of Hub E	Length through Hub S/O & S/W Y	Length through Hub W/N Y	Length through Hub L/J Y	Dia of Bore S/O & S/W B	Dia of Bore L/J B	Dia of R/R R	Depth of Socket F	Pipe Dia X
15	120.6	82.5	22.2	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 wil be furnished with (6.35mm) Raised Face, which is not included in Thickness (C) and Length through Hub(Y).

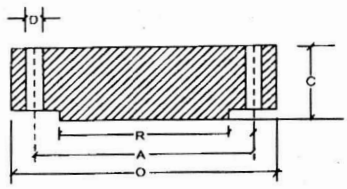
DIMENSIONS OF FORGED FLANGES ANSI B 16.5



SLIP-ON FLANGE



WELDING NECK FLANGE



BLIND FLANGE

Dimensions of Class 1500 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	Length 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	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 wil be furnished with (6.35mm) Raised Face, which is not included in Thickness (C) and Length through Hub(Y).

Dimensions of Class 2500 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	Length 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	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							381.0	-	323.85

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

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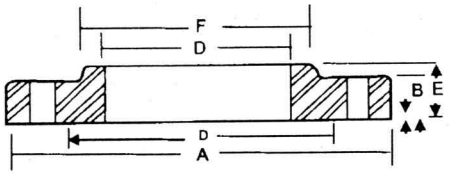
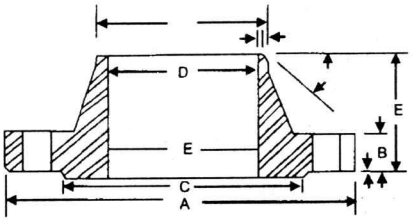
Dimensional Tolerances for Forged Steel Flanges

Threaded, lap joint, slip-on and Blind Flanges
ANSI B 16.5



Welding neck flanges
ANSI B 16.5

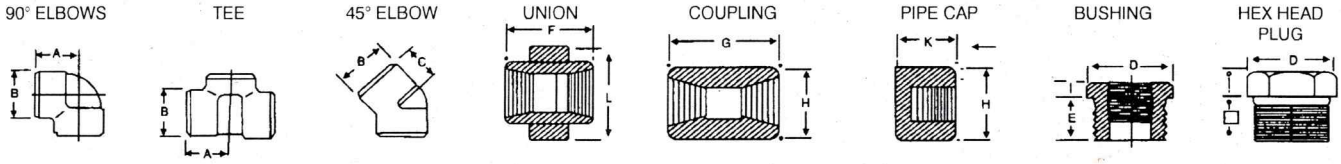
This tolerance not covered by ANSI B 16.5



Outside Diameter (A)	When O.D. is 24" or less	±1/16**	Outside Dia. of Hub (F)	12" and smaller	+3/32"*-1/16**
	When O.D. is over 24"	± 1/8**		Over 12"	±1/8**
Inside Diameter (D)	Threaded	Within limits on Boring gauge	Drilling	Bolt Circle	±1/16*
				Bolt hole spacing	±1/32*
	Slip on and Lap Joint	10" and Smaller + 1/32", -0"		Eccentricity between 2 ½" and smaller bolt circle diameter and machined facing Diameter	1/32" Max. 3" and larger 1/16" Max.
		12 and larger + 1/16"-0."			
Diameter of Contact Face (C)	1/16 Raised Face	±1/32"	Overall Height (E)	On flanges 18" and smaller	+1/8"*-1/32"*
	1/4 Raised Face, Tongue and Groove of male and Female	± 1/64"		On flanges larger than 13"	+3/15"*-1/16"*
			Thickness (E)	13" and smaller	41/8"-0"
				Over 18"	+3/16"-0"
Diameter of Counter bore	Same as for inside diameter			Where allowance has been left On face for finish : All sizes	+ 1/8"*-1/16"*

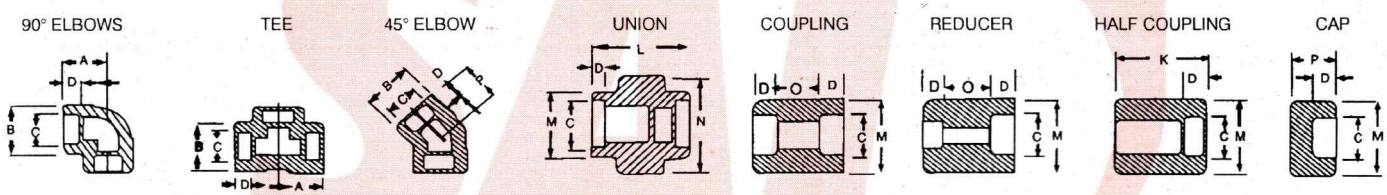
Outside Diameter (A)	When O. D. is 24" or less	±1/16**	Drilling	Bolt Circle	± 1/16"
	When O. D. is over 24"	± 1/8**		Bolt hole spacing	± 1/32"
smaller inside Diameter (D)	10" and smaller	± 1/32*		Eccentricity between½" and smaller 2½" and bolt circle diameter and machined facing diameter	1/32" max 3" and larger 1/16" max
	12" to 18"	± 1/16			
	Over 18"	+ 1/8-1/16"	Width of Land	All sizes	± 1/32"
Diameter of Contact Face (C)	1/16" Raised Face	± 1/32"	Angle of Hub Bevel	All Sizes	± 2½"
	1/4" Raised face, Tongue and Groove, or Male and Female	± 1/64"		18" and smaller	± 1/16
Diameter of Hub at Point of Welding (G)	5" and smaller	+3/32"-1/32"	Overall Height (E)	12" and larger ±	± 1/8"
	5" and larger	+5/32"-1/32		10" and smaller	+ 1/8"-0"
			Thickness (E)	Over 18"	+ 3/16"-0"
Diameter of Hub at Base (F)	When "F" is 24" and smaller	± 1/8"*		Where allowance has been left on face for Finish, All size	+1/8"*-1/16"*
	When "F" is over 24"	± 1/8"*			

DIMENSION OF FORGED SCREWED & SOCKET WELD



Dimension in MM of Forged Screwed Fittings to ANSI B-16.11 Threaded to ASA B 2.1

NOM	PIPE	3000 L.B.S.						COMMON FACTORS						6000 L.B.S.					
BORE	O.D.	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	79	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

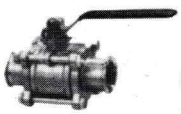


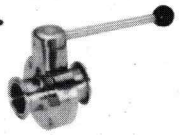
Socket Weld Fitting to ANSI B-16.11

NOM	PIPE	3000 L.B.S.						COMMON FACTORS						6000 L.B.S.					
BORE	O.D.	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"	89.0	76	110	52	51	127	108.8	140	44	16	89.8	16	14	24		121		58	
4"	114.5	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


NRV Valve


Ball Valve


Butterfly Valve


Sight Glass


Bend


Cross


Tee


Reducer


TC end Ball Valve


Threaded Butterfly Valve


Sight Glass

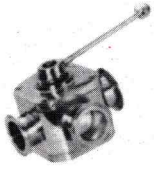

SMS Three Way Valve


TC and Tee


Ring


SMS Union


TC Ferrule


Three Way Valve


Diaphragm Valve


Auto-Ball Flushing


Sample Valve

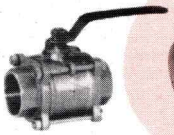

SMS Nipple


SMS Nut


SMS Liner


TC Blank Ferrule


Threaded Ball Valve


Threaded Ball Valve


Threaded Union


But-Weld Tee


Reducer


TC Clamp


TC Hose


Pipe Holder


Cupling


Reducer


Con Reducer


But-Weld Reducer


Diaphragm Valve


Pipe Holder

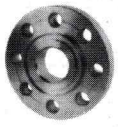

TC Clamp


TC Ferrule


But-Weld Bend


But-Weld Stubend


But-Weld Tee


Slip On Flange

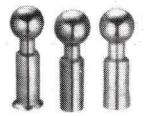

Weld Neck Flange


Spray Ball


TC end Ball Valve


TC end Butterfly


Reducer


Cleaning Ball

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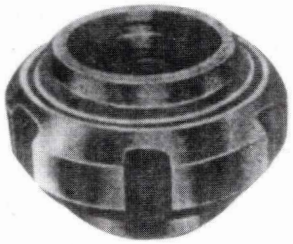
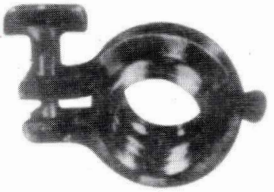
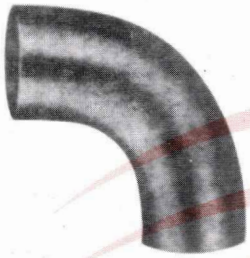
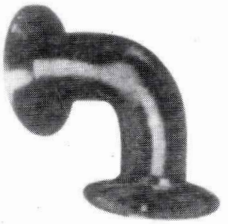
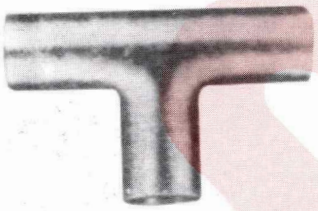
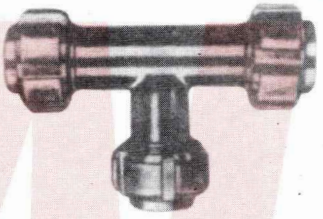
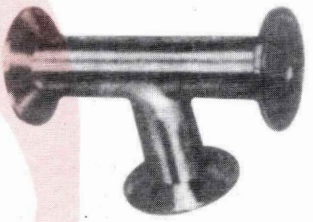
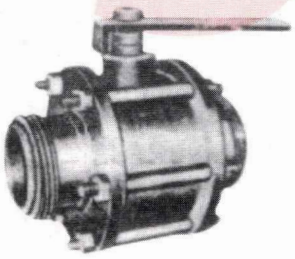
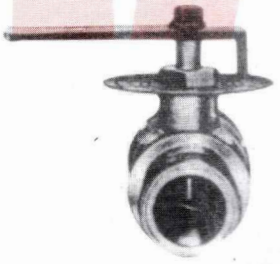
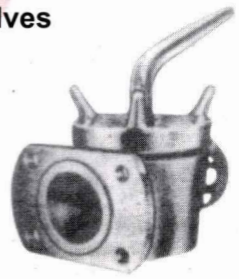
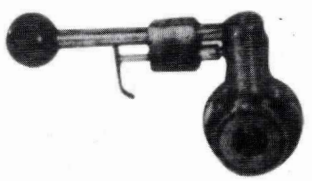
Union : SMS 	**Union : IDF** 	**Union : Triclover** 
Bends 	**Bends with Union IDF** 	**Bends with Triclover Ends** 
Tees 	**Tees with Union IDF** 	**Tees with Triclover Ends** 
Ball Valves 	**Flow regulating valves** 	**Plug valves** 
Non-return valves 	**Diaphram Valves** 	**Butterfly valves** 

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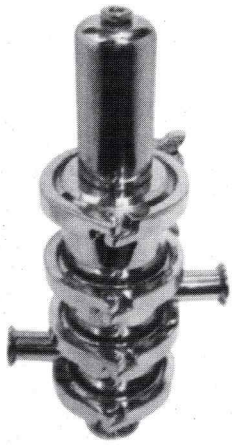
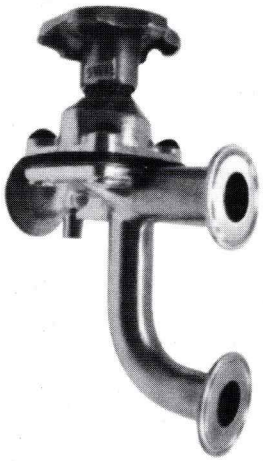
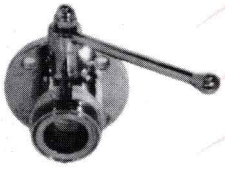
VALVES



High Purity
Flow Diversion Valve

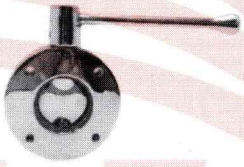


Zero Deod Leg
Diaphragm Valve



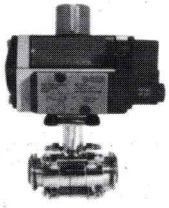
Flush Bottom Valve-TC End
Ball Valve

Butterfly Valve-TC End



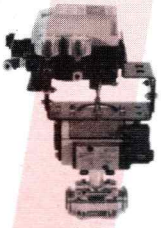
Butterfly Valve-Flange End

Butterfly Valve-
One Side TC & One Side Cone



3 Piece Design-TC End
Ball Valve with Actuator

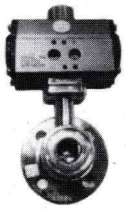
3 Piece Design-TC End
Ball Valve with Actuator
and Feedback System



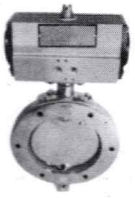
3 Piece Design with Actuator
and Electro Pneumatic Rotary Type
Positioner

2 pieces Design-TC End
Ball Valve with Actuator

3 Way Design-TC End
Ball Valve with Actuator



Flush Bottom Valve-TC End
with Actuator



Butterfly Valve-Flange
End with Actuator

Butterfly Valve-Flange
End with Actuator
and Feedback System

Butterfly Valve-TC End with Actuator
and Electro Pneumatic Rotary Type
Positioner

Butterfly Valve-TC End
with Actuator

Butterfly Valve-
Pneumatic Rapid Installed

Diaphragm Valve
with Single Acting Actuator

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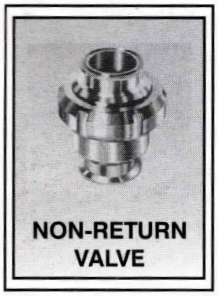
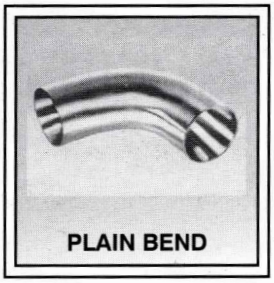
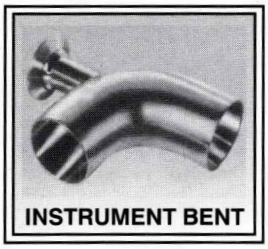
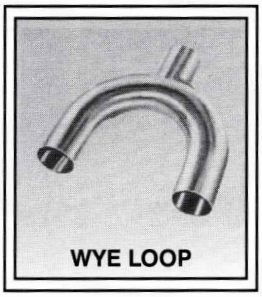
DAIRY FITTINGS

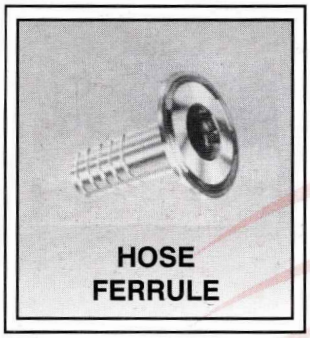

NON-RETURN VALVE

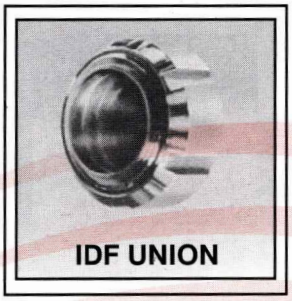

PLAIN BEND

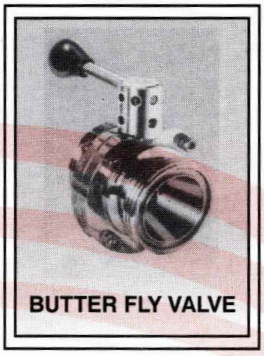

INSTRUMENT BENT


WYE LOOP

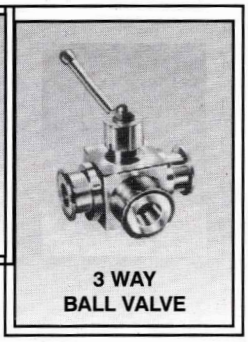

TRICLOVER BEND

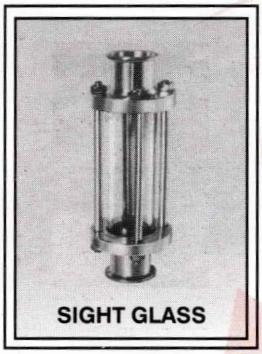

HOSE FERRULE


IDF UNION


BUTTER FLY VALVE


TRICLOVER UNION

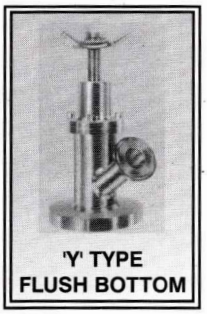

3 WAY BALL VALVE

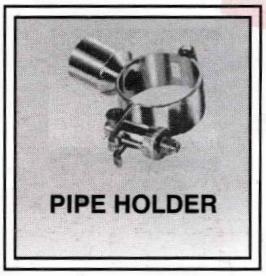

SIGHT GLASS

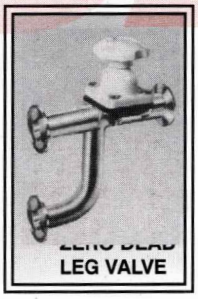

3 PCS BALL VALVE


TRICLOVER TEE

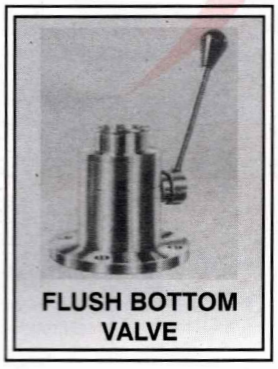

PLAIN TEE


'Y' TYPE FLUSH BOTTOM


PIPE HOLDER


LEG VALVE

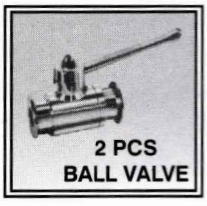

DIAPHRAGM VALVE


FLUSH BOTTOM VALVE

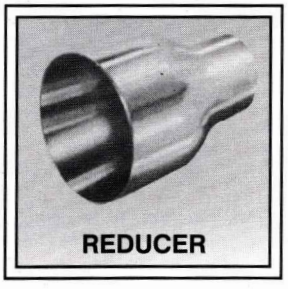

CONICAL STRAINER


DIN UNION


TRICLOVER BLANK


2 PCS BALL VALVE


SPRAY BALL


REDUCER

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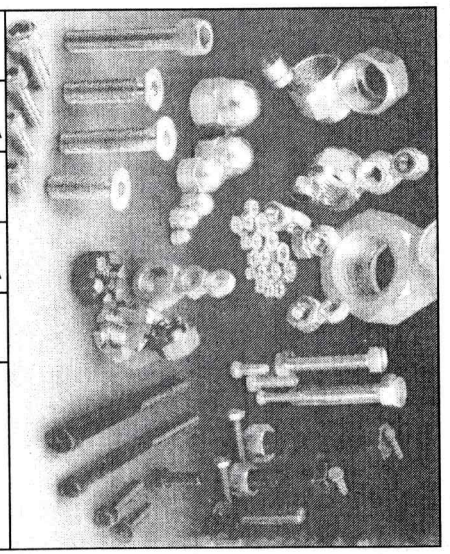
ASTM A 193/A 193M Alloy Steel, Carbon Steel, Carbon Steel & Stainless Steel Bolting for High Temperature Service

ASTM GRADE	C	Mn	Si	S	P	Cr	Ni	Mo	Other	Hardness	Tensile Psi(MPa)	Yield Psi(MPa)	Elongation in Area%	Redu
A193 B8-B8A AISI Type 304	0.08	2.00 Max	1.00 Max	0.030 Max	0.045 Max	18.00 20.00	8.00 10.50	- -	- -	223HB	75000(515)	30000(205)	30	50
A193B8-B8MA AISI Type 316	0.08 Max	2.00 Max	1.00 Max	0.030 Max	0.045 Max	16.00 18.00	10.00 14.00	2.00 3.00	- -	223HB	75000(515)	30000(205)	30	50
A193B8T-B8TA AISI Type 321	0.08 Max	2.00 Max	1.00 Max	0.030 Max	0.045 Max	17.00 19.00	9.00 12.00	-	Ti5xC 0.70Min	223HB	75000(515)	30000(205)	30	50
A193 B8C-B8CA AISI Type 347	0.08 Max	2.00 Max	1.00 Max	0.030 Max	0.045 Max	17.00 19.00	9.00 13.00	-	CbxPTA= 1.10c Min	192HB	75000(515)	30000(205)	30	50
A193B6-B6X AISI Type 410	0.15 Max	1.00 -	1.00 Max	0.03 Max	0.040 Max	11.50 13.50	-				110000(760)	85000(585)	15	50
A193 B7-B7M Alloy Steel (Cr. Mo)	0.37 0.49	0.65 1.10	0.15 0.35	0.040 Max	0.035 Max	0.75 1.20	- -	0.15 0.25	- -	- -	125000(860)	105000(720)	16	50
A193B5 A S-5% Cr. AISI50 1	0.10 min	1.00 Max	1.00 Max	0.030 Max	0.040 Max	4.00 6.00	-	0.40	-	-	100000(690)	80000(550)	16	50

ASTM A 194/A 194M Carbon Steel, Alloy Steel & Stainless Steel Nuts, Bolts for High Pressure & High Temperature Service

A1948/8A AISI Type 304	0.08 Max	2.00 Max	1.00 Max	0.03 Max	0.045 Max	18.00 20.00	8.00 10.50	-	-	126-300 Grade 8 126 - 182 Grade 8A
A 194 8M/MA AISI Type 316	0.08 Max	2.00 Max	1.00 Max	0.03 Max	0.045 Max	16.00 18.00	10.00 14.00	2.00 3.00	-	126 - 300 Grade 8m 126 - 192 Grade 8 MA
A194/8T/8TA AISI Type 321	0.08 19.00	2.00 12.00	1.00 -	0.03 0.78 Min	0.045	17.00	9.00	-	Ti5xC	126 - 300 Grade 8T 126-192 Grade 8 TA
A194/8C/MCA AISI Type 347	0.08 Max	2.00 Max	1.00 Max	0.03 Max	0.045 Max	17.00 19.00	9.00 13.00	-	CbxTa= 1.10CMin	126 - 300 Grade 8CA 126 - 192 Grade 8 CA
A194-6 AISI Type-410	0.15 Max	1.00 Max	1.00 Max	0.03 Max	0.040 Max	11.50 13.50	-	-	1.10 C min	228 271 HRC-20-28
A194 22HM & 2H Carbon Steel	0.4 min	1 Max	0.4 Max	1.050. Max	0.040 Max	- -	- -	- -	- -	159-352GR.2 248-352GR.2H 159-237GR.2HM
A194-7/7M Alloy Steel A194-30.10 A.S.-5%Cr. AISI 501	0.37 0.49 0.10 Max	0.65 1.1 1.00 Max	0.15 0.35 1.00 Max	0.04 Max 0.030 Max	0.4 Max 0.040 Max	0.75 1.2 4.00 6.00	- - - -	0.15 0.25 0.4 0.65	- - - -	248-352GR.7 159-237GR.7M 248-352 (HRC-24-38)



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Chemical & Physical Properties of Nickel Base Alloys

NOMINAL CHEMICAL COMPOSITION, % (not for specification purposes)																
	Ni	Cu	Iron	Mn	C	Si	S	Co	Al	Ti	Cr	Mo	Ti	Vanadium	Phosphrous	Niobium+Tantalum
Nickel 200	9.00min	0.25max	0.40max	0.35max	0.15max	0.35max	0.010max									
Monel 400	63.0min	28.0-34.0	2.50max	2.00max	0.30max	0.50max	0.024max									
Inconel 600	72.0min	0.50max	6.00-10.00	1.00max	0.15max	0.50max	0.015max				14.0-17.0					
Inconel 601	58.0-63.0	1.00max	Bal.	1.00max	0.10max	0.50max	0.015max		1.00-1.70		21.0-25.0					
Inconel 625	58.0min		5.00max	0.50max	0.10max	0.50max	0.015max	1.00max	0.40max	0.40max	20.00-23.00	8.00-10.00			0.015max	3.15-4.15
Incoloy 800	30.0-35.0	0.75max	39.50max	1.50max	0.10max	1.00max	0.015max		0.15-0.60	0.15-0.60	19.0-23.0					
Incoloy 800H	30.0-35.0	0.75max	39.50min	1.50max	0.50-0.10	1.00max	0.015max		0.15-0.60	0.15-0.60	19.0-23.0					
Incoloy 800HT	30.0-35.0	0.75max	39.5min	1.50max	0.06-0.10	1.00max	0.015max		0.85-1.20	0.25-0.60	19.0-23.0					
Incoloy 803	32.0-37.0	0.75max	Bal.	1.50max	0.06-0.10	1.00max	0.015max		0.15-0.60	0.15-0.60	25.0-29.0					
Incoloy 825	38.0-46.0	1.50-3.00	22.00min	1.00max	0.05max	0.50max	0.03max		0.20max	0.60-1.20	19.50-23.50	2.50-3.50				
C-276	Bal.		4.00-7.00	1.00max	0.01max	0.08max	0.03max	2.50max			14.50-16.50	15.00-17.00	3.00-4.50	0.35max	0.04max	
Alloy 020	32.00-38.00	3.00-4.00	Bal.	2.00max	0.07max	1.00max	0.035max				19.00-21.00	2.00-3.00			0.045max	8XC-1.00

Physical and Mechanical Properties

	Tensile psi	Tensile Mpa	Yield psi*	Yield Mpa*	Elongation %	Hardness, HV
Nickel 200	68,000	469	27,000	186	47	171
Monel ® 400	82,000	565	39,000	269	45	137
Inconel ® 600	99,000	683	45,000	310	43	160
Inconel ® 601	92,000	634	40,000	276	56	137
Inconel ® 625	130,000	896	70,000	483	50	183
Incoloy ® 800	85,000	586	42,000	290	45	155
Incoloy ® 800H	80,000	552	35,000	241	45	145
Incoloy ® 800HT®	80,000	552	35,000	241	45	145
Incoloy ® 803	89,000	614	46,000	317	47	143
Incoloy ® 825	100,000	690	45,000	310	45	155
INCO C-276	115,000	793	50,000	345	60	188
INCO 020	99,000	683	60,000	414	35	148

*0.2% Offset

ALUMINIUM ALLOY : ALLOY EQUIVALENT (APPROX.)

INDIA		U.S.A. (A.A.)	Britain (B.S)	Canada	Germany (DIN)	Russia	I.S.O.	French ND
New IS	Old IS							
19501	1E	1350 (E.C.)	1E	C1S	E-A1-99.5	--	--	--
19500	1B	1050	1B	1S	A1-99.5	--	A1-99.5	1050A
19600	--	1060	--	--	--	--	--	--
19700	--	1070	--	--	A1-99.7	--	A1-99.7	--
19800	1A	1080	1A	--	--	--	A1-99.8	--
19000	1C	1100	1C	2S	A1-99.0	AD	A1-99.0	1200
--	--	2011	FC1	28S	AL-Cu-BiPb	--	A1-Cu-6BiPb	2011
24345	H15	2014	H15	B26S	A1-Cu-sl	AK	--	--
24534	H14	2017	H14	17S/16S	--	D1	AL-Cu-4MgSi	--
--	--	2024	--	24S	A1-CuMg.2	--	A1-Cu-4Mn1	2024
31000	N3	3003	N3	3S	A1-Mn	A-Mn	A1-Mn1	3003
43000	N21	4043	N21	33S	A1-Si-5	AK	A1-Si5	4043
46000	N2	4047	N2	35S	--	--	--	--
51000A	--	5005	--	B57S	--	--	A1-Mg-1	--
52000	N4	5052	N4	M57S	A1-Mg-2	A-Mg	A1-Mg-2	5051
53000	N5	5086	N5	54S	--	A-Mg-3	A1-Mg-23.5	--
54300	N8	5083	N8	D54S	A1-Mg-4.5Mn	--	A1-Mg-4.5 Mn	5083
55000	N6	5056	N6	A56S	A1-Mg-5	--	A1-Mg-5	5356
65032	H20	6061	H20	65S	A1-Mg-SiCu	--	A1-Mg-1SiCu	--
63400	H9	6063	H9	50S	A1-Mg-Si 0.5	--	A1-Mg-Si	--
64430	H30	6351	H30	B51S	A1-Mg-Si 1	AV	A1-Si-1Mg	6081
64423	H11	6066	H11	C62S	--	--	--	--
62400	--	6005	--	C51S	--	--	--	--
63401	91E	6101	91E	D50S	E.A1MgSi 0.5	--	--	--
64401	--	6201	--	--	--	--	--	--
74530	--	7039	--	D74S	A1-Zn-Mg.1	--	--	3004
--	--	7075	DTDT124	75S	A1-Zn-Mg	--	A1-Zn6MgCu	7075
					Cu 1.5			

ALUMINIUM ALLOY : CHEMICAL COMPOSITION STD. (PERCENT)

Alloy	Equivalent (ISS) alloy (A.A.)		Copper		Manganese		Silicon		Iron	Manganese		Others	Remark
Old	New	U.S.A.	Min.	Max.	Min.	Max.	Min.	Max.	Max.	Min.	Max.	Max.	
1 B	19500	1050	-	0.05	-	-	-	0.30	0.4	-	0.05	0.1	Al. 99.5 % Min.
1 E	19501	1050(EC)	-	0.04	-	-	-	0.15	0.35	-	-	0.1	Al. 99.5% Min.
-	19700	1070	-	0.03	-	-	-	0.20	0.25	-	0.03	0.1	Al. 99.7 % Min.
1 A	19800	1080	-	0.03	-	-	-	0.15	0.15	-	0.03	0.1	Al. 99.8 % Min.
1 C	19000	1100	-	0.1	-	0.2	-	0.50	0.7	-	0.1	0.2	Al. 99.0 % Min.
-	-	2011	5.0	6.0	-	0.1	-	0.4	0.7	-	0.1	0.4	Also lead & bis muth 0.2/0.6 % each
H 15	24345	2014	3.8	5.0	0.2	0.8	0.5	1.2	0.7	0.3	1.2	0.5	
H 14	24534	2017	3.5	4.7	0.4	1.2	0.2	0.7	0.7	0.4	1.2	0.5	
N3	31000	3003	-	0.1	-	0.1	-	0.6	0.7	0.8	1.5	0.4	
N21	43000	4043	-	0.1	-	0.2	4.5	6.0	0.6	-	0.5	0.5	
N2	46000	4047	-	0.1	-	0.2	10.0	13.0	0.6	-	0.5	0.5	
N 4	52000	5052	-	0.1	1.7	2.6	-	0.6	0.7	-	0.5	0.4	
N 5	53000	5056	-	0.1	2.8	4.0	-	0.6	0.7	-	0.5	0.4	
N 6	55000	5086	-	0.1	4.5	5.0	-	0.6	0.7	-	1.01	0.4	Cr upto 0.25
N 8	54300	5083	-	0.1	4.0	4.9	-	0.4	0.7	0.5	1.0	0.4	Cr upto 0:25
H 20	65032	6061	0.15	0.4	0.8	1.2	0.4	0.8	0.7	0.2	0.8	0.4	Cr (0-15-0-35) Either Mn or Cr. shall be present
H 9	63400	6063	-	0.1	0.4	0.9	0.3	0.7	0.6	-	0.3	0.4	
-	-	6066	0.7	1.2	0.8	1.4	0.9	1.8	0.7	0.6	1.1	0.4	
-	64423	-	0.5	1.0	0.5	1.3	0.7	1.3	0.8	1.0	-	-	
91 E	63401	6101	-	0.1	0.35	0.8	0.3	0.7	0.5	-	0.03	0.1	
-	64401	6201	-	0.1	0.6	0.9	0.5	0.9	0.5	-	0.03	0.1	
H 30	64430	6351	-	0.1	0.4	1.2	0.6	1.3	0.6	0.4	1.0	0.4	
-	74530	7039	-	0.2	1.0	1.5	-	0.4	0.7	0.2	0.7	0.4	Zinc (4-5 %)
-	-	7075	1.20	2.0	2.1	2.9	--	0.4	0.5	-	0.3	0.5	Zinc (5.1-6.4) & Chromium 0.1-0.25

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COMPARISION OF STAINLESS STEEL TO VARIOUS STANDARDS APPROXIMATELY

USA		West Germany		Great Britain		Poland		Romania		Soviet Union	Sweden
AISI	SAE	Stand-dard No.	DIN	BS 970: Part 4: 1970	EN Steel Replaced	Spec. No. PN	Type	Spec. No. STAS	Type	GOST	SIS-14
301	30301	1.4310	X12CrNi177	30IS21	--	--	--	--	--	--	
302	30302	1.4300	X12CrNi188	302S25	58A	86020	IH 18N9	3583	10NC 180	12Kh 18N 19	2330/2331
302B	30302B	1.4330	--	--	--	--	--	--	--	--	--
303	30303	1.4305	X12CrNiS`188	303S21	58M	--	--	--	--	--	2346
303Se	30303Se	1.4305	X12CrNiS188	303S41	58M	--	--	--	--	--	2346
304	30304	1.4301	X5CrNi189	304S15	58E	86020	7NC 180	3583	7NC 180	08Kh 18N 10	2332/2333
304L	30304L	1.4306	X2CrNi 189	304S15	--	86020	--	--	--	--	2352
309	30309	1.4828	X15CrNiSi20 12	309S24	--	86022	155NC200	3583	155NC200	20Kh20N 14S2	--
309S	30309S	--	--	--	--	--	--	--	--	--	--
310	30310	1.4841	X15CrNiSi2520	310S24	--	86022	15SNC250	3583	15SNC250	20Kh25N20S2	--
310S	30310S	1.4845	X5CrNi2521	--	--	86022	--	--	--	--	2361
316	30316	1.4401	X5CrNiMo1810	316S16	58J	--	T12MSMoNC 10	6855	512MSMoNC 10	--	2347/2343
316TI	--	1.4571	--	--	--	--	--	--	--	--	--
316L	30316L	1.4404	X2CrNiMo 1810	316S 12	--	86020	--	--	--	--	2353
317	30317	1.4449	X5CrNiMo 17 13	317S 16	--	--	--	--	--	--	--
317L	--	1.4435	X2CrNiMo 18 12	317S 12	--	--	--	--	--	03Ch 17N 14M2	--
321	30321	1.4541	X10CrNiTi 189	321S 20	--	--	7TNC 180	3583	7TNC 180	1Kh 18N 10T	2337
--	--	--	--	321S 12	58B&58C	86020	--	--	--	--	--
347	30347	1.4550	X10CrNiNb189	347S 17	58F&58G	86020	7NbNC 180	3583	7NbNC 180	08Kh 18N 12B	2338
403	51403	1.4024	X10Cr13	403S 17	--	--	12C 130	3583	12C 130	12Kh 13	2302
405	51405	1.4002	X7CrA113	--	--	86020	--	--	--	--	--
410	51410	1.4006	X10Cr13	410S 21	56A	--	12C 130	3583	12C 130	12Kh 13	2302
414	51414	--	--	--	--	--	--	--	--	--	--
416	51416	1.4005	X12CrS13	416S 21	56 AM	--	--	--	--	--	--
416Se	51416Se	--	--	416S 41	56 AM	--	--	--	--	--	--
420	51420	1.4021	X20Cr 13	420S 37	56C	86020	20C 130	3583	20C 130	20Kh 13	2302
420F	51420F	--	--	--	--	--	--	--	--	--	--
430	51430	1.4016	X8Cr17	430S 15	60	86020	10C17	3583	10C170	12Kh 17	2320
430F	51430F	1.4104	X12CrMoS17	--	--	--	--	--	--	--	--
430FSe	51430FSe	1.4104	X12CrMoS17	--	--	--	--	--	--	--	--
431	51431	1.4057	X12CrNi17	413S 29	57	86020	--	--	--	20Kh 17N2	2321
436	51436	--	--	--	--	--	--	--	--	--	2322
440B	--	1.4112	X90CrMo V18	--	--	--	--	--	--	--	--
446	--	1.4762	--	--	--	--	--	--	--	--	--

COMPARISION TABLE OF DIN - ASTM - API - BS

		Tensile Strength daN/mm² kg/mm² abt.	Tensile Strength ltn/in² abt.	Yield Point daN/mm² kg/mm² abt.	Yield Point ltn/in² abt.	Elon-gation Min% abt	%C	%C	%Sl	% Min	% P=max	% S=max	% Mo	% Cr	Standad for Size + Tol	TECHNICAL SPEC.	CORRESPONDING QUALTITY ASA	DIN	BS
DIN	St 00	35-45	22-29	24	15	25	0	0	0	0	0	0	0		Din 2448	Din 1629/2	0	0	0
	St 36	35-45	22-29	24	15	25	0-18			0.05	0.05				Din 2448	Din 1629/3	A 53 A		3601 HFS22
	St 46	35-55	29-35	26	16.5	21	0.25			0.05	0.05				Din 2448	Din 1629/3	A 53 B		3601 HFS 27
	St 55	55-65	35-41	30	19	17	0.36			0.05	0.05				Din 2448	Din 1629/3			3601 HFS 35
	St 52	52-62	33-29	36	23	22	0.20	0.55	1.50	0.05	0.05				Din 2448	Din 1629/3			
	St 35.8	35-45	22-29	24	15	25	0.17	0.35	4.04	0.05	0.05				Din 2448	Din 17175	A 106 A		3059/1-2
	St 45.8	45-55	29-35	26	16.5	21	0.22	0.10/0.35	0.40/0.60	0.045	0.05				Din 2448	Din 17175	A 106 B		3059/5-6
	TT St 35 N	35-45	22-29	23	14.5	25	0.16	0.10/0.35	0.50/0.80	0.04	0.04				Din 2448	SE WERKSTOFF			
																BLATT680	A 333GR1		3603LT27
	15 Mo 3	45-55	29-35	29	18.5	22	0.12/0.20	0.15/0.35	0.05/0.80	0.04	0.04	5.25/0.35			Din 2448	Din 17175	A 935 PI		3059/7-8
	16 Mo 5	38.7	24				0.10/0.20	0.10/0.50	0.30/0.80	0.045		0.045/0.65			Din 2448	WORKST BL 210	A 335 PI		3059/7-8
	13 Cr Mo 44	45-58	29-37	30	19	22	0.010/0.18	0.15/0.35	0.40/0.070	0.04	0.04	0.40/0.50	0.70/1.00		Din 2448	Din 17175	A 335 P12/P11		6304 GR 620
	10 Cr Mo 910	45-60	29-38	27	17	20	0.15	0.15/0.50	0.40/0.60	0.04	0.04	0.90/1.10	2.0/2.50		Din 2448	Din 17175	A 335 P22		36004 GR 622
	12 Cr Mo 195	42	27	18	11.5	21	0.15	0.50	0.30/0.60	0.03	0.04	0.45/0.65	4.6		Din 2448	WORKST BL 231	A335 P5		3600 GR 625
	Machanical C 35	60	38	32	20	0.20	0.35	0.40	0.60	0.04	0.035				Din 17200				
	St 52.3	52-62	33-39	34	21.5	22	0.20	0.55	1.50	0.05	0.05				Din 17100				
ASTM	ASTM A 53 A	33.7	21	21.1	13.5	35		(0.10-0.30)		0.048					ASAB 36.10	AP1 5L GR A	St 35		3601HPS22
	A 53 B	42.2	27	24.6	15.5	30		(0.10-0.30)		0.048					ASAB 36.10	AP1 5L GR B	St 45		3601HFS27
	A 106 A	33.7	21	21.1	13.5	35	0.25	0.10	0.27/0.93	0.048	0.058				ASAB 36.10	AP1 5L GR A	St 35.8		3059/1-2
	A 106 B	42.2	27	24.6	15.5	30	0.30	0.10	0.29/1.06	0.048	0.058				ASAB 36.10	AP1 5L GR B	St 45.8		3059/5-6
	ASTM A 333/1	38.7	24.5	21.1	13.5	35	0.30		0.10/1.06	0.05	0.06				ASAB 36.10		TT St 35N		3503J.T.27
	A333/3	45.7	29	24.6	15.5	30	0.19	0.18/0.37	0.31/0.64	0.05	0.05			3.18/3.82	ASAB 36.10		10NI 14		3603 503LT
	ASTM A 335 P1	38.7	24.5	21.1	13.5	30	0.10/0.20	0.10/0.50	0.30/0.60	0.045	0.045	0.44/0.65			ASAB 36.10		15 Mo 3 16 Mo 5	-	100 3059/7-8
	P2	38.7	24.5	21.1	13.5	30	0.10/0.20	0.10/0.20	0.30/0.61	0.045	0.045	0.44/0.65	0.50/0.81		ASAB 36.10		13 GR Mo 44		
	P11	42.2	27	21.1	13.5	30	0.15	0.50/1.00	0.30/0.60	0.03	0.03	0.44/0.65	1-1.5		ASBA 36.10		13 CR Mo 44		3604GR621
	P12	42.2	27	21.1	13.5	30	0.15	0.50	0.30/0.61	0.045	0.045	0.44/0.65	0.8/125		ASBA 36.10		13 CR Mo 44		3604GR620
	P22	42.2	27	21.1	13.5	30	0.15	0.50	0.30/0.60	0.03	0.03	0.87/1.13	1.9/2.6		ASAB 36.10		10 CR Mo 910		3604GR622
	P5	42.2	27	21.1	13.5	30	0.15	0.50	0.30/0.60	0.03	0.03	0.45/0.65	4.6		ASAB 36.10		12 CR Mo 195		3604GR625
APILINEPIPE	API5L GR. A	33.7	21	21.1	13.5	variable	0.22		0.09	0.04	0.04				ASAB 36.10		ASTMA 53 A		
	API 5L GR. B	42.2	27	24.6	15.5	,,	0.27		1.25	0.04	0.04				ASAB 36.10		ASTMA 53 B		
	API 5L N X 42	42.2	27	29	19	,,	0.29		1.25	0.05					ASAB 36.10				
	API 5 X 46	44.3	28	32.2	20	,,	0.31		1.35	0.04	0.05				ASAB 36.10				
	API 5L X 56	49.9	31.5	39.2	25	,,	0.26		1.35	0.04	0.05				ASAB 36.10				
	API 5L X 60	52.7	33.5	42.2	27	,,	0.26		1.35	0.04	0.05				ASAB 36.10				
	API 5 LX 65	56.2	35.5	45.7	29	,,	0.26		1.40	0.04	0.05				ASAB 36.10				
BS	BS 3601 HFS 22	34.6	22	21.3	13.5	700	0.22		0.70	0.05	0.05						A 53 A		
						ts=lonsf.ub²													
	BS 3601HFS 27	42.5	27	25.2	16	,,	0.25		0.70	0.05	0.05						A 53 B		
	BS 3601 HFS 35	55.1	35	31.5	20	,,	0.40	1.20	0.05	0.05	0.05								
	BS 3602 HFS 23	36.2-47.2	23-30	21.3	13.5	,,	0.20	(0.10-0.35)	0.30/0.70	0.05	0.05						A 106 A		
	BS 3602 HFS 27	42.5-55.1	27-35	25.2	16	,,	0.25	(0.10-0.35)	0.30/0.70	0.05	0.05						A 106 B		
	BS 3602 HFS 35	52.1-67.7	35-45	31.5	20	,,	0.35	(0.10-0.35)	0.70/0.10	0.05	0.05						A 106 C		
	BS 30593 ERW	31.5-44.1	20-28	-	-	,,				0.05	0.05								

M.S. ANGLES (EQUAL SIZE)

Size in mm	Weight Kg./m	Size in mm	Weight Kg./m
20x3	0.90	80x80x10	11.8
25x32	1.10	80x80x12	14.0
225x5	1.80	90x90x6	8.2
30x3	1.40	90x90x8	10.8
35x5	2.60	90x90x10	13.4
35x6	3.00	90x90x12	15.8
40x3	1.80	100x100x6	9.2
40x5	3.00	100x100x8	12.1
40x6	3.50	100x100x10	14.9
45x45x3	2.1	100x100x12	17.7
45x45x5	3.4	110x110x8	13.4
45x45x6	4.0	110x11x10	16.5
50x50x3	2.3	110x110x12	19.6
50x50x5	3.8	110x110x15	24.2
50x50x6	4.5	130x130x8	15.9
65x65x5	4.9	130x130x10	19.7
65x65x6	5.8	130x130x12	23.4
65x65x8	7.7	130x130x15	28.9
65x65x10	9.4	150x150x10	22.8
75x75x10	5.7	150x150x12	27.2
75x75x6	6.8	150x150x15	33.6
75x75x8	8.9	150x150x16	35.8
75x75x10	11.0	150x150x20	44.1
80x80x6	7.3	200x200x16	48.5
80x80x8	9.6	200x200x20	60.0

TOR STEEL / RIBBED BARS PLATES

Size in mm	Weight Kg./m	Size in mm	Weight Kg./m
8	0.395	5	39.2
10	0.617	6	47.1
12	0.890	8	62.8
16	1.58	10	78.5
18	2.00	12	94.2
20	2.47	14	110
22	2.99	16	125
28	4.83	18	140
32	6.31	20	157
36	7.99	22	172.7
40	9.89	25	196.2
		28	220
		32	251

CHEQUERRED PLATES	
5 M.M.	42.4
6 M.M.	56.1
8 M.M.	65.9
10 M.M.	79.3
12 M.M.	103.7

M. S. ANGLES

M. S.BEAMS

Size in mm	Weight Kg./m	Size in mm	Weight Kg./m
45x30x5	2.8	100x116	23.0
45x30x6	3.3	125x70	13.2
75x50x6	5.6	150x75	15.0
75x50x8	7.4	175x85	19.4
90x60x6	6.8	200x100	25.4
90x60x8	8.9	225x110	31.3
90x60x10	11.0	250x125	37.3
100x75x6	8.0	300x140	44.2
100x75x8	10.5	300x140	52.4
100x75x10	13.5	400x140	61.6
125x75x8	12.1	440x150	72.4
125x75x10	14.9	500x180	86.9
150x75x8	13.7	600x210	122.6
150x75x10	16.9		
150x75x12	20.1		
150x115x10	20.0		
150x115x12	23.8		

M. S. CHANNELS

BLACK SHEETS

Size in mm	Weight Kg./m	Size in mm		Weight Kg./m
41x32	5.05	3.15	10G	24.75
75x40	7.1	2.80	11	22.00
100x50	9.6	2.50	12	19.00
125x65	13.1	2.24	13	17.60
150x75	16.8	2.00	14	15.70
175x75	19.6	1.80	15	14.15
200x75	22.3	1.60	16	12.55
225x80	26.1	1.40	17	11.00
250x80	30.6	1.25	18	9.80
300x90	36.3	1.12	19	8.80
350x100	42.7	1.00	20	7.85
400x100	50.1	0.90	21	7.05
		0.80	22	6.30
		0.63	24	4.95
		0.50	26	3.90
		0.40	28	3.15

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