



**ENGINEER'S
HAND BOOK**



PRIYANK STEELS

STOCKIST OF :

**S. S. SHEET, PIPE, COILS, PLATE,
PATA, CIRCLES, ROD, IN 304, 316, 310, 410,
SUPPLIERS IN ALU., BRASS, COPPER ETC.**

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FOREWORD

Dear Sir,

We would like to introduce ourselves as one of the leading stockist and suppliers of the following items and have great pleasures to present this book on Stainless Steel & Other metals which we hope will come to you useful for your daily routine.

STAINLESS STEEL : Aisi 304, 304L, 316, 316L, 321, 347, 410, 431 grade available in Sheets, Plates, Pipes, Tubes Rods, Strips, Wires, Bolts & Nuts Pipe Fittings and Flanges Both Imported and Indegenous.

NON FERROUS METAL : Copper, Brass, Aluminium, Monel, Nicklet, Inconel in Sheets Plates, Pipes, Rods, Strips, wires, Ingots and Copper Tubes.

We can supply these items form the ready stock at very reasonable prices. The above item we supplied to various parties throughout - India, who are fully satisfied with our performance.

As you are the regular user of the items dealt by us, we request you to please register our name in your suppliers list and favour us with you valued enquiries. We assure you of our prompt attention and best services.

We invite your suggestions to improve this book and point out mistake if any.

Thanking you,

Your's faithfully,

For, **PRIYANK STEELS**

(Prahlabdhai B. Shah)



PRIYANK STEELS

WEIGHT FORMULA

- (1) Weight of S. S. Sheet - Plate (in mm)
Length x Width x Thick x 0.000785 = Kg.
Per Sheet
- (2) Weight of S. S. Pipe (in mm)
OD - Thick x Thick 0.00756 Weight per Ft.
- (3) Weight Copper Pipe (in mm)
OD - Thick x Thick x 0.0079 = Weight per Ft.
- (4) Weight of S. S. Round (in mm)
Dia x Dia x 0.0019 = Weight per Ft.
- (5) Weight of S. S. Hex (in mm)
Dia x Dia x 0.002072 = Weight per Ft.
- (6) Weight of S. S. Square (in mm)
Dia x Dia x 0.0024 = Weight per Ft.
- (7) Weight of S. S. Sheets, Plate, Pipe Round,
Hex, Circle, Square, Flats ÷ 3 = Aluminium
weight approx
- (8) Making of Pipe from sheets of plate
OD - Wall Thick x 3.14 = 3.1428 Width of
Sheet
- (9) 1 Meter = 3.2808 Foot



CONVERSION FACTORS

MULTIPLE	BY	TO OBTAIN
Acress	4047.00	Square Meters
Acress	0.001562	Square Meters
Acress	0.404686	Hectares
B. T. Units	1055	Joules
Centimeters	0.393701	Inchese
Cubic Cm.	0.061024	Cubic Inches
Centimeters	0.393701	Inches
Cubic Cm.	0.061024	Cubic Inches
Cubic Feet	6.228	Callons
Cubic Feet	0.02832	Cubic Meters
Cubic Inches	16.3871	Cubic Centimeters
Cubic Meters	35.31445	Cubic Feet
Cubic Meters	1.30794	Cubic Yards
Cubic Yards	0.76456	Cubic Merters
*Farenheat	0.556	°C(°F-32)
Feet	0.3048	Metres
Gallons	0.1606	Cubic Feet
Gallons (U.K.)	4.536	Litres
Grams	0.03527	Ounces
Hactares	2.47105	Acress
Horsepower	0.7457	Kilowatts
Inches	2.539998	Centimetres
Inches	25.39998	Millimeters
Kilograms	2.204620	Pounds
Kilograms	0.0009842	Tons (U.K.)
Kilometers	0.621372	Miles



CONVERSION FACTORS

MULTIPLE	BY	TO OBTAIN
Kilowatts	1.341	Horsepower
Litres	0.22009	Gallons (U.K.)
Litres	1.76072	Pints
Metres	3.2808	Feet
Metric Tones	0.98421	Tons (U.K.)
Miles	1.609343	Kilometers
Millimeters	0.03937	Inches
Ounces	28.34953	Grams
Pints	0.56795	Litres
Pounds	0.4536	Kilograms
Sq. Centimeters	0.15500	Squares
Sq. Feet	0.09290	Sq. meters
Sq. Inches	6.45163	Sq. Centimeters
Sq. Kilograms	0.386102	Sq. Miles
Sq. Meters	0.0002471	Acres
Sq. Meters	1.19599	Sq. Yards
Sq. Miles	640.00	Acres
Sq. Miles	2.58999	Sq. Kilometers
Sq. Yards	0.83613	Sq. Meters
Tons (U.K.)	1.60105	Metric Tons
Tons (U.K.)	1016.0470	Kilograms
Torque/Ft-Pound	1.356	Newton Meters
	0.138	Kg. Meters
Yards	0.914399	Meters



TECHNICAL DATA ON WORK AND POWER

Work - force x distance or Power x time

Power is $\frac{\text{force x distance}}{\text{Time}}$

Units of work or Energy : (Metric System)

1 Kilowatt-hour (kWh) - 1.36 metric

horse power-hours (PSh) - 367200 meter kilograms (mkg) - 860 kilo calories (Kcal)

1 PS - 270000 mkg - 0.735 Kwh - 632 Kcal

1 Kcal - 426.9 mkg 0.00116 Kwh - 0.00158 PSh.

Units of Power :

1 Kilowatt (KW) = 1.36 metric horsepower (PS) - mkg /sec - 0.236 Kcal/Sec.

1 PS - mkg/sec = 0.735 KW - 0.176 kcl/sec.

1 Kilo Calories (Kcal or WE) is equal to the quantity of heat required to raise the temperature of 1 kg of water from 14.5° to 15.5°C

The units of pressure (force per unit area) is 1 atmosphere (at) equivalent to the pressure of a coloum of water at 62°F 33.9 ft. high or euqal to the pressure of 1 kilogram per 1 sq. cm. (14.7 pound per square inch.)

STANDARD WIRE GAUGE

NO. OF GAUGE	INCH	MM.	NO. OF GAUGE	INCH	MM.
0	.324	8.229	26	.018	.457
1	.300	7.620	27	.0164	.416
2	.276	7.010	28	.0148	.375
3	.252	6.400	29	.0136	.345
4	.232	5.892	30	.0124	.314
5	.212	5.384	31	.0116	.294
6	.192	4.876	32	.0108	.274
7	.176	4.470	33	.0100	.254
8	.160	4.064	34	.0092	.233
9	.144	3.657	35	.0084	.213
10	.128	3.251	36	.0076	.193
11	.116	2.946	37	.0068	.172
12	.104	2.641	38	.0060	.152
13	.092	2.336	39	.0052	.132
14	.080	2.032	40	.0048	.121
15	.072	1.828	41	.0044	.111
16	.064	1.625	42	.0040	.101
17	.056	1.422	43	.0036	.091
18	.048	1.219	44	.0032	.081
19	.040	1.016	45	.0028	.071
20	.036	0.914	46	.0024	.061
21	.032	0.812	47	.0020	.051
22	.028	0.711	48	.0016	.041
23	.024	0.609	49	.0012	.030
24	.022	0.558	50	.0010	.025
25	.020	0.508			

TABLE OF CONVERSION FACTORS

Mesure of Legth

Mesure of Surface and area For Conversion

From	Into	Multiply By	From	Into	Multiply By
mm.	inches	0.039	mm ²	sq.in	0.00155
Mt.	Feet	3.281	cm ²	sq.in	0.155
Km.	Miles	6021	mt ²	sq.ft	10.764
Inches	mm.	25.400	sq.in	mm ²	645.1
Feet	mt.	0.305	sq.in	cm ²	0.093
Miles	km.	1.609	sq.ft	mt ²	0.093
Round	Hex	1.104	kh.	pounds	2.205
Round	square	1.273	pounds	kg.	0.454



PHSYCAL CONSTANT OF TECHNICALLY IMPORTANT METALS

Metal	Chemical Symbol	Atomic Weight	Density at 20°C g/cm ²	Melting Tempe reture °C	Boiling Tempe reture °C	Co. efficient of linear Expansion at 20°C 10-61 °C	Mouduls of Elasticity kg mm ²	Electric Resistivity at 20°C Ω mm ² m	Electric Conductivity at 20°C m Ω mm ²	Specific Heat cal goC	Thermal Conductivity cal C°cms
Aluminium	Al	26.97	2.70	660	2060	23.9	7220	0.0266	37.6	0.215	0.53
Lead	Pb	207.21	11.34	327	1740	26.3	1600	0.207	4.82	0.031	0.083
Chromium	Cr	52.01	7.19	1890	2500	6.2	19000	0.13	6.7	0.11	0.16
Cobalt	Co	58.94	8.9	1495	2900	12.3	21280	0.062	16.1	0.099	0.165
Copper	Cu	63.54	8.96	1083	2600	16.2	12500	0.0167	60	0.092	0.94
Iron	Fe	56.85	7.87	1539	2740	11.7	21550	0.097	10.3	0.11	0.18
Magnesium	Mg	24.32	1.74	650	1110	24.5	4515	0.045	222	0.25	0.38
Managanese	Mn	54.94	7.43	1245	2150	22	20160	1.85	0.54	0.115	
Molybledum	Mo	95.95	10.2	2625	4800	2.8	33630	0.052	19.4	0.061	0.35
Nickel	Ni	58.69	8.90	1455	2730	13.3	19700	0.068	14.6	0.105	0.22
Silicon	Si	28.06	2.33	1430	2300	7	1500	103	10	0.162	0.20
Titanium	Ti	47.90	4.5	1660	-	8.5	11000	0.4.0.6	2	0.14	0.045
Tungston	W	183.92	19.3	3410	6930	2.4	41530	0.055	18.2	0.032	0.48
Tin	Sn	118.70	7.30	232	2270	20.5	5500	0.115	8.7	0.054	0.16
Zinc	Zn	65.38	7.14	419	906	29.8	9400	0.059	16.9	0.915	0.27

WEIGHT OF RODS IN KILOGRAMS PER LINEAR FOOT											
In	Size	m.m.	Brass			Aluminium			Stainless Steel		
	Fraction of inch		Round	Hex	Sq.	Round	Hex	Sq.	Round	Hex	Sq.
1	2	3	4	5	6	7	8	9	10	11	12
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	6.35	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	9.525	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	0.814	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

WEIGHT OF RODS IN KILOGRAMS PER LINEAR FOOT

Size			Brass			Aluminium			Stainless Steel		
In	Fraction of inch	m.m	Round	Hex	Sq.	Round	Hex	Sq.	Round	Hex	Sq.
1	2	3	4	5	6	7	8	9	10	11	12
1"	1.000	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	0.533	0.608	0.705	1.569	1.730	1.956
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	0.821	0.907	1.082	2.318	2.554	2.922
1.1/2"	1.500	38.1	2.961	3.262	3.769	0.980	1.082	1.248	2.760	3.042	3.478
1.5/8"	1.625	41.450	3.742	3.833	4.426	1.152	1.474	1.466	3.738	3.450	4.072
1.3/4"	1.750	44.450	4.029	4.444	5.129	1.352	1.474	1.720	3.73	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	10.220	11.820
3"	3.000	76.2	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	16.363	18.040	20.824	5.408	5.970	6.884	14.946	16.500	19.020
4"	4.000	101.600	2.477	23.210	27.358	6.968	7.693	8.870	19.619	21.620	25.000

APPROX, WEIGHT OF SHEETS IN KILOGRAM PER SQ. FT.							
In	Thickness	Copper	Brass	Aluminium	Stainless Steels	Lead Sheet	per Sq.Ft.
	Gauge				Gauge		
1/4'	3	5.286	5.049	1.620	3	4.860	7.280
3/16'	6	4.027	3.846	1.210	6	3.630	5.460
5/32'	8	3.356	3.209	1.026	8	3.080	
1/8'	10	2.685	2.567	0.810	10	2.430	3.640
	12	2.181	2.083	0.660	12	1.980	
	14	1.678	1.602	0.505	14	1.515	2.730
	16	1.312	1.247	0.406	16	1.218	1.820
1/16'	18	1.006	0.961	0.305	18	0.915	
	20	0.755	0.722	0.230	20	0.690	0.910
	22	0.587	0.561	0.180	22	0.540	
	24	0.461	0.441	0.140	24	0.418	
	26	0.377	0.361	0.115	26	0.350	
	28	0.310	0.299	0.090	-	-	
	30	0.260	0.249	0.080	-	-	
	32	0.226	0.216	0.070	-	-	

PRIYANK STEELS
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STAINLESS STEELS

CHEMICAL COMPOSITION % MAX.

Austenitic St. Steel								
AISI	C	Si	Mn	P	S	Ni	Cr.	Mo
303	0.15	1.00	2.00	0.20	0.15	8.00/ 10.00	17.00/ 19.00	
304	0.06	1.00	2.00	0.045	0.030	8.00/ 10.00	18.00/ 20.00	
304L	0.03	1.00	2.00	0.045	0.030	11	18	
316	0.07	1.00	2.00	0.045	0.030	11	18	2.00/ 3.00
316L	0.03	1.00	2.00	0.045	0.030	13	18	2.00/ 3.00
317	0.06	1.00	2.00	0.045	0.030	14	19	3.00/ 4.00
317L	0.03	0.50	1.75	0.045	0.030	18	19	3.00/ 3.50
321	0.08	1.00	2.00	0.045	0.030	11	18	
325	0.25	2.00	0.60	0.045	0.030	19.00/ 23.00	10	
347	0.08	1.00	2.00	0.045	0.030	11	18	
Heat Resisting Steel								
309	0.20	1.00	2.00	0.045	0.030	12.00/ 15.00	22.00/ 24.00	
310	0.25	1.50	2.00	0.045	0.030	19.00/ 22.00	24.00/ 26.00	
Ferritic St. Steel								
409	0.08	1.00	1.00	0.050	0.030	-	11.50/ 14.50	
Martensitic St. Steel								
410	0.12	1.00	1.00	0.040	0.030	-	12.50	
416A	0.12	1.00	1.25	0.060	0.15	-	12.50	
420	0.23	1.00	1.00	0.040	0.030	-	12.50	
431	0.20	1.00	1.00	0.040	0.030	2.00	16.00	



**WEIGHT & THICKNESS OF
S.S. PIPE KG. / PER FT. (GUG.)**

Size	O.D	10G(3.25)	12G(2.64)	14G(2.03)	16G(1.62)	18G(1.21)	20G(0.91)	22G(0.71)
1/4"	6.35	0.075	0.070	0.065	0.058	0.046	0.037	0.030
5/16"	7.93	0.114	0.105	0.089	0.079	0.080	0.048	0.038
3/8"	9.52	0.152	0.135	0.113	0.097	0.080	0.58	0.046
1/2"	12.7	0.226	0.200	0.157	0.134	0.105	0.079	0.063
3/4"	19.05	0.386	0.326	0.256	0.215	0.161	0.124	0.097
1"	25.4	0.541	0.450	0.351	0.294	0.218	0.167	0.131
1.1/4"	31.82	0.696	0.580	0.448	0.375	0.0275	0.200	-
1.1/2"	38.1	0.851	0.700	0.542	0.452	0.332	-	-
2.3/4"	44.45	1.020	0.832	0.646	0.530	0.390	-	-
2"	50.8	1.161	0.960	0.733	0.607	0.447	-	-
2.1/4"	57.15	1.315	1.085	0.828	0.687	0.504	-	-
2.1/2"	63.5	1.472	1.210	0.924	0.792	0.562	-	-
2.3/4"	69.85	1.630	1.338	1.022	0.847	0.619	-	-
3"	76.2	1.782	1.460	1.115	0.924	0.676	-	-
3.1/2"	88.9	2.092	1.718	1.306	1.082	0.791	-	-
4"	101.6	2.403	1.971	1.497	1.239	0.905	-	-
4.1/2"	114.3	2.713	2.224	1.688	1.397	1.020	-	-
5"	127.0	3.023	2.477	1.879	1.554	1.134	-	-
5.1/2"	139.7	3.336	2.730	2.070	1.713	1.250	-	-
6"	152.4	3.654	2.983	2.261	1.875	1.364	-	-
6.1/2"	165.1	3.975	3.256	2.452	2.028	1.478	-	-



**TYPICAL MECHANICAL PROPERTIES
OF STAINLESS STEEL SHEETS / PLATES**

AISI Type	Condition	UTS Kg/mm ² min.	YS (0.2% offset) min. kg / mm ²	%EL in50mm Min.	Hardness max. RB
AUSTENITIC					
201	Annealed	67.0	31.5	40.0	-
202	Annealed	63.5	31.5	40.0	-
301	Annealed	53.0	21.0	40.0	94
302	Annealed	53.0	21.0	40.0	94
304	Annealed	53.0	21.0	40.0	94
304L	Annealed	49.0	17.5	40.0	94
309	Annealed	53.0	21.0	40.0	95
310	Annealed	53.0	21.0	40.0	95
316	Annealed	53.0	21.0	40.0	96
316L	Annealed	49.0	17.5	40.0	96
317	Annealed	53.0	21.0	40.0	96
321	Annealed	53.0	21.0	40.0	94
347	Annealed	53.0	21.0	40.0	94
FERRITIC					
430	Annealed	45.5	21.0	22.0	94
446	Annealed	53.0	28.0	20.0	95
MARTENSITIC					
403	Annealed	45.5	21.0	20.0	94
410	Annealed	45.5	21.0	22.0	88



WEIGHT & THICKNESS OF SCHEDULE PIPE OF STAINLESS STEEL

NOMINAL		Sch 5		Sch10		Sch 40		Sch 80		Sch 160	
Inch	Mm	THK	(kg/F)	THK	(kg/F)	THK	(kg/F)	THK	(kg/F)	THK	(kg/F)
	O/D										
1/8	10.3	-	-	1.24	0.085	1.73	0.111	2.41	0.143	-	-
1/4	13.7	-	-	1.65	0.150	2.24	0.193	3.02	0.243	-	-
3/8	17.2	-	-	1.65	0.192	2.31	0.258	3.20	0.335	-	-
1/2	21.3	1.65	0.244	2.11	0.305	2.77	0.387	3.75	0.494	4.75	0.591
3/4	26.7	1.65	0.311	2.11	0.390	2.87	0.512	3.91	0.671	5.54	0.881
1	33.4	1.65	0.393	2.77	0.637	3.38	0.762	4.55	0.988	6.35	1.29
1.1/4	42.2	1.65	0.503	2.77	0.820	3.56	1.03	4.85	1.36	6.35	1.71
1.1/2	48.3	1.65	0.579	2.77	0.948	3.68	1.23	5.08	1.65	7.14	2.21
2	60.3	1.65	0.728	2.77	1.20	3.91	1.66	5.54	2.28	9.41	3.38

WEIGHT & THICKNESS OF SCHEDULE PIPE OF STAINLESS STEEL

NOMINAL		Sch 5		Sch10		Sch 40		Sch 80		Sch 160	
Inch	Mm	THK	(kg/F)	THK	(Kg/F)	THK	(Kg/F)	THK	(Kg/F)	THK	(Kg/F)
	OD										
2.1/2	730	211	1.13	305	1.60	5.16	2.63	7.01	3.47	9.53	4.54
3	88.9	211	1.38	305	1.97	5.49	3.44	7.62	4.66	11.1	6.49
3.1/2	101.6	211	1.58	305	2.26	5.74	4.15	8.08	5.67	-	-
4	114.3	211	1.81	305	2.55	6.02	4.91	8.56	6.80	13.8	10.2
5	141.3	217	2.85	340	3.54	6.55	6.64	9.53	9.45	-	-
6	168.3	277	4.51	376	6.10	8.18	13.0	12.7	19.7	23.0	33.8
8	219.1	277	4.51	376	6.10	8.18	13.0	12.7	19.7	23.0	33.8
10	273.0	340	5.84	4.19	8.47	8.74	18.4	12.7	29.3	28.6	57.4
12	323.89	396	9.525	4.57	10.990	9.53	22.520	12.7	29.710		

PHYSICAL PROPERTIES OF STAINLESS STEELS

	GRADE					
	301	304	316	310S	430	409
Density (gm/cm ³)	7.9	7.9	8.0	7.9	7.7	7.7
Modulus of Elasticity(Kg/mm ²)	19700	19700	19700	20300	20300	20300
Specific Heat Capacity(cal/gm ^o C)	0.12	0.12	0.12	0.12	0.11	0.11
Thermal Conductivity (cal/cm ² /sec ^o C/at 100 ^o C)	0.039	0.039	0.0373	0.033	0.0625	0.0595
Specific Electrical Resistance (μ /Cm ²)	72	72	74	80	60	57
Coefficient of Thermal Expansion ($^{\circ}$ C x 10 ⁶ at 500 ^o C)	19.08	18.4	16.0	16.9	11.34	11.52
Melting Range($^{\circ}$ C)	1400	1400	1370	1400	1430	1430
	1420	1455	1400	1455	1510	1510
Magnetic	Non-magnetic	Non-magnetic	Non-magnetic	Non-magnetic	Ferro-magnetic	Ferro-magnetic

*Slightly magnetic when cold worked



PRIYANK STEELS

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EQUIVALENT SPECIFICATIONS OF STAINLESS STEEL

S.S.P.	IS	AISI	DIN	AFNOR	JIS	BS	SIS	UNS	UNI
Reference	India	USA	Germany	FRANCE	Japan	Britain	Sweden		Italy
301	10 Cr 17 Ni 7	301	1.4310	Z 12 CN	17-08	SUS 301	301 S21	142331 S30100	x12CrNi 1707
304	04Cr 18 Ni 10	304	1.4301	Z 6 CN	18-09	SUS 304	304 S15	142333 S 30400	x5crNi 1810
304L	02Cr 18 Ni11	304L	1.4306	Z 2 CN	18-10	SUS 304L	304 S11	142352 S 30403	xcCrNi 1811
310S	-	310S	1.4845	-	-	SUS 310S	-	142361 S 31008	x6CrNi 2520
316	04Cr 17 Ni 12Mo2	316	1.4401	Z 6 CND	17-11	SUS 316	316 S31	142347 S 31600	X8CrNiMo 1713
			1.4436	142343				142343	1713
316L	02Cr 17 Ni 12 Mo2	316L	1.4404	Z 2 CND	17-12	SUS 316L	316 S 11	142348 S 31603	x2CrNiMo 1712
			1.4435	Z 2 CND	17-13			142353	x2CrNiMo 1713
321	04 Cr 18 Ni 10 Ti 20	321	1.4878	Z 6 CNT	18-12	SUS 321	321 S31	142337 S 32100	x6CrNiTi 1811
409	-	409	1.4512	Z 5 CT	12	SUS 409	409 S17	- S 40900	-
410S	-	410S	-	-	-	-	-	-	-
430	05 Cr 17	430	1.4016	Z 8 C	17	SUS 430	430 S17	142320 S 43000	X12Cr17 17 C

**PROPERIES AT ELEVATED
TEMPERATURES IN S.S.**

ULTIMATE TENSILE STRANGTH (N/MM²)

Type	100°C	500°C	700°C	900°C
301	590	430	250	-
304	530	400	270	90
310S	540	470	340	130
316	540	450	320	120
321	540	400	300	150
430	490	300	70	-

**MAXIMUM RECOMMENDED SERVICE TEMPRATURE
(OXIDING CONDITIONS)**

Type	Continuos (°C)	Intermittent(°C)
301	900	840
304/304L	925	650
310S	1150	1035
316/316L	925	870
321	925	870
430	750	850
409/409M	600	750

**DO NOT USE TYPE 430 IN TEMPERATURE
RANGE 450° - 500° C**



APPROXIMATE WEIGHT OF COPPER AND BRASS SHEETS (SIZE 14" X 48")					
S.W.G.	Decimal inches	m m	Copper wt/sheet inches	Brass wt/sheet Kgs.	S.W.G.
3swg	.250	6.35	24.520	23.320	3
6swg	.190	4.8	18.390	17.490	6
8swg	.160	4.00	15.670	14.920	8
10swg	.128	3.251	12.540	11.940	10
12swg	.104	2.642	10.180	9.700	12
14swg	.080	2.032	7.840	7.460	14
16swg	.063	1.6	6.130	5.830	16
18swg	.048	1.22	4.700	4.480	18
20swg	.036	.914	3.520	3.360	20
22swg	0.28	.711	2.740	2.610	22
24swg	.022	.560	2.150	2.050	24
26swg	.018	.457	1.760	1.680	26
28swg	.015	.376	1.450	1.380	28
30swg	.0124	.315	1.210	1.160	30
32swg	.011	.274	1.060	1.000	32
34swg	.009	.234	0.900	0.860	34
36swg	.0076	.193	0.740	0.710	36
38swg	.006	.152	0.590	0.560	38
40swg	.0048	.122	0.470	0.450	40
42swg	.004	.1016	0.390	0.370	42
44swg	.0032	.0813	0.310	0.300	44


PRIYANK STEELS
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CONVERSION TABLES

INCHES AND FRACTION OF INCHES TO MILLIMETRES

h	0'	1'	2'	3'	4'	5'	6'	7'	8'	9'	10'	11'
0"	0.000	25.400	50.799	76.199	101.60	127.00	152.40	177.80	203.20	228.60	254.00	279.39
1/16"	1.587	26.987	52.387	77.786	103.19	128.59	153.98	179.39	204.78	230.18	255.58	280.98
1/8"	3.175	28.574	53.974	79.374	104.77	130.17	155.57	180.97	206.37	231.77	257.17	282.57
3/16"	4.762	30.162	55.561	80.961	106.36	131.76	157.16	182.56	207.96	233.36	258.76	284.16
1/4"	6.352	31.749	57.149	82.549	107.95	133.35	158.75	184.15	209.55	234.95	260.35	285.74
5/16"	7.937	33.337	58.736	84.136	109.54	134.94	160.33	185.73	211.13	236.53	261.93	287.33
3/8"	9.525	34.924	60.324	85.733	111.12	136.52	161.92	187.32	212.72	238.12	263.52	288.92
7/16"	11.112	36.512	61.911	87.311	112.71	138.11	163.51	188.91	214.31	239.71	265.11	290.51
1/2"	12.700	38.099	63.499	88.898	114.30	139.70	165.10	190.50	215.90	241.30	266.70	292.09
9/16"	14.287	39.687	65.086	90.486	115.89	141.28	166.68	192.08	217.48	242.88	268.28	293.68
5/8"	15.875	41.274	66.674	92.073	117.47	142.87	168.27	193.67	219.07	244.47	269.87	295.27
11/16"	17.462	42.862	68.261	93.661	119.06	144.46	169.86	195.26	220.66	246.06	271.46	296.86
3/4"	19.050	44.449	69.879	95.248	120.65	146.05	171.45	196.85	222.25	247.65	273.05	298.44
13/16"	20.637	46.037	71.486	96.836	122.24	147.63	173.03	198.47	223.83	249.23	274.63	300.03
7/8"	22.225	47.624	73.024	98.423	123.82	149.22	174.62	200.02	225.42	250.82	276.22	301.62
15/16"	23.812	49.212	74.611	100.01	125.41	150.81	176.21	201.61	227.01	252.41	277.71	303.21

WEIGHT OF S.S. FLATS IN KG/FT.**THICKNESS IN INCHES**

Width \ Thick	1/8"	3/16"	1/4"	5/16"	3/8"	1/2"	5/8"	3/4"
1/2"	0.097	0.162	0.205	0.260	0.292	0.422	0.520	0.617
3/4"	0.142	0.237	0.301	0.381	0.380	0.617	0.760	0.902
1"	0.187	0.312	0.397	0.500	0.562	0.812	1.000	1.187
1 1/4"	0.240	0.400	0.508	0.640	0.720	1.040	1.280	1.520
1 1/2"	0.285	0.475	0.603	0.760	0.855	1.235	1.520	1.850
2"	0.375	0.625	0.793	1.000	1.125	1.625	2.000	2.375
2 1/2"	0.472	0.788	1.000	1.260	1.420	2.047	2.520	3.000
3"	0.570	0.950	1.206	1.520	1.710	2.470	3.040	3.610
4"	0.757	1.262	1.603	2.020	2.272	3.282	4.040	4.797
5"	0.952	1.588	2.016	2.540	2.857	4.127	5.08	6.032
6"	1.140	1.900	2.413	3.040	3.420	4.940	6.08	7.220

WEIGHT OF ALLUMINIUM SHEETS					
SWG	Inch	Milli metres	Kg Sq./Foot	Kg 8'x4'	Kg 8'x3'
1	2	3	4	5	6
3/8'	.375	9.53	2.399	76.740	57.540
30	.372	9.45	2.376	75.890	57.080
20	.348	8.84	2.227	71.210	53.430
10	.324	8.23	2.072	66.300	49.720
5/16"	.312	7.93	1.995	63.860	47.900
1	.300	7.62	1.918	61.370	46.630
2	.276	7.01	1.764	56.410	42.350
3	.252	6.40	1.610	51.560	38.690
1/4'	.250	6.35	1.596	51.166	38.380
4	.232	5.89	1.483	47.480	35.600
5	.212	5.38	1.356	43.370	32.510
6	.192	4.88	1.229	39.280	29.480
3/16'	.187	4.75	1.197	38.210	28.710
7	.176	4.47	1.125	36.600	27.410
8	.160	4.06	1.025	32.730	24.520
9	.144	3.66	0.921	29.480	22.080
10	.128	3.25	0.816	26.170	19.650
1/8'	.125	3.18	0.798	25.570	19.190
11	.116	2.95	0.744	23.720	17.830
12	.104	2.64	0.667	21.250	15.950
13	.092	2.34	0.590	18.810	14.090
14	.080	2.03	0.512	16.320	12.240
15	.072	1.83	0.462	14.730	11.050
16	.064	1.63	0.409	13.090	9.830
17	.056	1.42	0.359	11.480	8.610
18	.048	1.22	0.307	9.830	7.330
19	.040	1.02	0.225	8.160	6.116
20	.036	0.914	0.230	7.330	5.520
21	.032	0.813	0.205	6.520	4.490

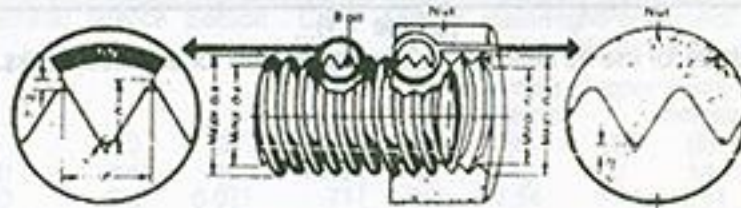
N.B. For Calculating weight of Stainless Steel Angle Multiply by 3 times each.



APPROX WEIGHT OF S.S. PATTA & PATTI								
Width Size	Thk. (Wt. Per Ft. In Kg.)							
	5mm	6mm	8mm	10mm	12mm	16mm	20mm	25mm
20mm	0.240	0.288	0.384	0.480	0.576	0.768	0.960	1.200
25mm	0.300	0.360	0.480	0.600	0.720	0.960	1.200	1.500
32mm	0.384	0.460	0.614	0.768	0.960	1.152	1.536	1.920
40mm	0.480	0.576	0.768	0.960	1.152	1.536	1.920	2.400
50mm	0.600	0.720	0.960	1.200	1.440	1.920	2.400	3.000
65mm	0.780	0.936	1.248	1.560	1.872	2.496	3.120	3.900
75mm	0.900	1.080	1.440	1.800	2.160	2.880	3.600	4.500
100mm	1.200	1.440	1.920	2.400	2.880	3.840	4.800	6.000

APPROX WEIGHT OF S.S. SQUARE PIPE					
WEIGHT PER FEET IN KG.					
Size	10swg	14swg	16swg	18swg	20swg
1/2"x1/2"	0.300	0.200	0.155	0.125	0.100
5/8x5/8	0.395	0.280	0.215	0.175	0.130
3/4"x3/4"	0.510	0.355	0.270	0.220	0.165
1"x1"	0.655	0.450	0.345	0.275	0.210
30x30	0.800	0.545	0.415	0.335	0.250
40x40	1.085	0.740	0.560	0.450	0.340
50x50	1.375	0.930	0.700	0.565	0.425
40x20	0.800	0.545	0.415	0.335	0.250
50x25	0.015	0.690	0.525	0.420	0.315

BRITISH STANDARD WITHOUT THREADS BSW



Thread Size	Bolt and Nut						Nut			Washer	
	Major dia metre	Minor dia metre	Tensile Stress area	Threads per Inch	Pitch head	Thick-ness of (O.S)	Thick-ness	Width across flats	Width across corners	Outside dia meter	Thick-ness
	d, D inches	d mm	D3 mm	mm ²	z	P mm	k	m	SW	f	d ₁
1/4	6.35	4.72	0.175	20	1.27	5	5.5	11	12.7	14	1.5
5/16	7.94	6.13	0.295	18	1.41	6	6.5	14	16.2	18	2
3/8	9.53	7.49	0.441	16	1.59	7	8	17	19.6	22	2.5
1/2	12.70	9.99	0.784	12	2.12	9	11	22	25.4	28	3
5/8	15.88	12.92	1.311	11	2.31	11	13	27	31.2	34	3
3/4	19.05	15.80	1.960	10	2.54	13	16	32	38.9	40	4
7/8	22.23	18.61	2.720	9	2.82	16	18	36	41.6	45	4
1	25.40	21.34	3.575	8	3.18	18	20	41	47.3	52	5
1 1/2	38.58	33.03	4.497	7	3.63	30	22	46	53.1	58	5



TABLE 11 VERTICAL CYLINDRICAL VESSELS. OPEN OR FLAT STOP. FORMED BOTTOM AND LENGTH ON STRAIGHT(H) - APPROXIMATELY 1.5D

(Clause 1.1)

Suitable for use as stills, mixers reaction vessels for extraction tanks.



Nominal capacity	Dia meter d	Length on Straight	Cylinder Volume	Aggregate Volume			
				30° Conical	Torispherical	Deep Radius Dished or 45° Conical	Volume
(2)	(3)	(4)	(5)	0.06D (6)	0.10D (7)	(8)	(9)
litres	mm	mm	litres	litres	litres	litres	litres
10	200	310	9.61	10.2	10.3	10.5	10.6
16	250	350	17.1	18.3	18.4	18.8	19.2
25	300	420	29.8	31.8	32.1	32.8	33.1
40	350	490	47.0	50.3	50.7	51.8	52.6
63	400	560	70.0	74.8	75.5	77.1	78.3
160	500	770	151	160	161	164	167
250	600	840	236	252	254	260	264
400	700	980	377	403	406	415	421
630	800	1 180	592	630	636	648	659
1 000	900	1 490	947	1 002	1004	1 027	1 042
(1 250)	1000	1 500	1 177	1 253	1262	1 288	1 308
1 600	1 100	1 580	1 501	1 602	1615	1 649	1 675
2 000	1 200	1 680	1 898	2 029	2046	2 090	2 124
2 500	1 300	1 820	2 420	2 587	2609	2 664	2 688
(3 200)	1 400	1 960	3 018	3 226	3254	3 322	3 377
4 000	1 500	2 120	3 752	4 018	4042	4 126	4 194
5 000	1 600	2 340	4 703	5 014	5055	5 158	5 239



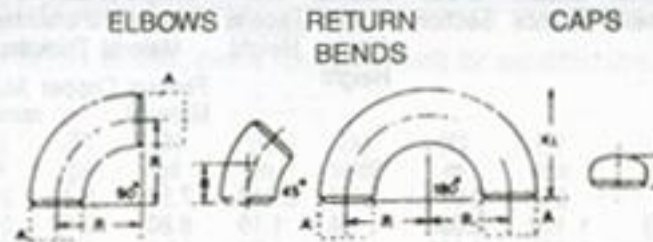
APPENDIX A
(CLAUSE 0.5)
CYLINDRICAL SHELLS

Nominal Diameter D	Circumference	Cross Section	Volume Capacity/m Height	Surface/m Height	Weight of Material per meter Height Per Millimeter Material Thickness		
					Ferrous Material	Copper	Aluminium
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
mm	mm	m	litres	m	kg	kg	kg
300	942	0.071	71	0.942	7.54	8.41	2.54
(350)	1 100	0.096	96	1.10	8.80	9.82	2.97
400	1 257	0.125	125	1.26	10.1	11.3	3.40
500	1 571	0.196	196	1.57	12.5	14.0	4.24
600	1 885	0.282	282	1.89	15.1	16.9	5.10
700	2 199	0.385	385	2.20	17.6	19.6	5.94
800	2 513	0.502	502	2.51	20.1	22.4	6.78
900	2 827	0.636	636	2.83	22.6	25.3	7.64
1000	3 142	0.785	785	3.14	25.1	28.0	8.48
1100	3 456	0.960	950	3.46	27.7	30.9	9.34
1200	3 770	1.13	1 130	3.77	30.2	33.7	10.2
(1300)	4 084	1.33	1 330	4.08	32.6	36.4	11.0
1400	4 398	1.54	1 540	4.40	35.2	39.3	11.9
(1500)	4 712	1.77	1 770	4.71	37.7	42.1	12.7
1600	5 026	2.01	2 010	5.03	40.2	44.9	13.6
1700	5 340	2.27	2 270	5.34	42.7	47.7	14.4
1800	5 655	2.54	2 540	5.66	45.3	50.5	15.3
(1900)	5 969	2.84	2 840	5.97	47.8	53.3	16.1
2000	6 283	3.14	3 140	6.28	50.2	56.1	17.0
(2100)	6 597	3.46	3 460	6.60	52.8	58.9	17.8
2200	6 911	3.80	3 800	6.91	55.3	61.7	18.7
2300	7 225	4.15	4 150	7.23	57.8	64.6	19.5
2400	7 540	4.52	4 520	7.54	60.3	67.3	20.4
2600	8 168	5.31	5 310	8.17	65.3	73.0	22.1
2800	8 796	6.16	6 160	8.80	70.4	78.6	23.8

Circumference = $3.14 \times D$ mm
 Cross-Section = $(0.7854 \times D^2) / 10^3$ m²
 Volumetric capacity per metre height = $((0.7854 \times D^2) / 10^3)$ litres
 Surface per metre height = $((3.14 \times D) / 10^3)$ m²
 Weights are based on the following specific gravities :
 Ferrous Material 8.0
 Copper 8.93
 Aluminium 2.7



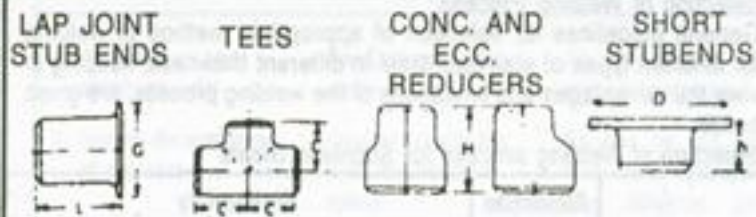
**DIMENSIONS IN M.M. OF BUTT
WELDING FITTINGS TO ANSI B16.9**



Nom BORE	Pipe O.D.	Wall Thickness		IUS				A
		10S	40S	1D	1.5D	2D	3D	
1	2	3	4	5	6	7	8	9
1/2	21.34	2.11	2.77	12.7	19.05	25.4	38.1	12.7
3/4	26.67	2.11	2.87	19.05	28.57	38.10	57.15	19.05
1	33.40	2.77	3.38	25.4	38.1	50.8	76.2	25.4
1 1/4	42.16	2.77	3.56	31.75	47.6	63.5	95.25	31.75
1 1/2	48.26	2.77	3.68	38.1	57.15	76.2	114.3	38.10
2	60.32	2.77	3.91	50.8	76.2	101.6	152.4	50.8
2 1/2	73.02	3.05	5.16	63.5	95.25	127.0	190.5	63.5
3	88.90	3.05	5.49	76.2	114.30	152.4	228.6	76.2
3 1/2	101.60	3.05	5.74	88.9	133.35	177.8	266.7	88.9
4	114.30	3.05	6.02	101.6	152.4	203.2	304.8	101.6
5	141.30	3.40	6.55	127.0	190.5	254.0	381.0	127.0
6	168.27	3.40	7.11	152.4	228.6	304.8	457.2	152.4
8	219.07	3.76	8.18	203.2	304.8	406.8	609.6	203.2



**DIMENSIONS IN M.M. OF BUTI
WELDING FITTINGS TO ANSI B 16.9**



B	C	E	G	L		H	D	h
				SHORT	LONG			
10	11	12	13	14	15	16	17	18
15.9	25.4	25.4	34.9	50.8	76.2	50.8	45	8
11.1	28.6	25.4	42.8	50.8	76.2	50.8	54	8
22.2	38.1	38.1	50.8	50.8	101.6	50.8	64	10
25.0	47.6	38.1	63.5	50.8	101.6	50.8	74	12
28.6	57.2	38.1	73.0	50.8	101.6	63.5	84	12
34.0	63.5	38.1	92.0	63.5	152.4	76.2	102	16
44.0	76.2	38.1	104.8	63.5	152.4	88.9	122	16
50.8	85.7	50.8	127.0	63.5	152.4	88.9	138	18
57.2	95.3	63.5	139.7	76.2	152.4	101.6	148	18
63.5	104.8	63.5	157.2	76.2	152.4	101.6	158	20
82.6	123.8	76.2	185.0	76.2	203.2	127.0	188	25
95.3	158.5	88.9	215.9	88.9	203.2	139.7	212	25
127.0	190.5	101.6	270.0	101.6	203.2	152.4	268	30



FABRICATION GUIDELINES

WELDING

Selection of Welding Process

General guidelines for selection of appropriate method of welding for different types of stainless steel in different thickness, keeping in view the advantages and limitations of the welding process, are given below.

Selection of Welding process for Stainless Steels

Welding	Recommended Thickness mm	Weldability		
		Austenitic	Ferritic	Martensitic
Shield Metal Arc Welding (SMAW)	> 0.8	Easy to weld	Can be welded with care	Difficult to weld Can be welded with care
Gas Tungsten Arc Welding (GTAW)	< 3.0	Easy to weld	Can be welded with care	Can be welded with care
Gas Metal Arc Welding (GMAW)	> 3.0	Easy to Weld	Can be welded with care	Can be welded with care
Submerged Arc Welding (SAW)	> 6.0	Can be welded with care	Can be welded with care	Can be welded with care
Resistance Spot Welding	< 3.0	Easy to weld	Easy to weld	Can be welded with care
Resistance Seam Welding	< 3.0	Easy to weld	Can be weld with care	Difficult to weld Requires Special Care

Consumables :

Keep electrodes in prime condition.

Avoid contamination and dampness.

Never strip an electrode of its coating and use it.

Use only specific filler wires and not ordinary stainless steel wires or sheet trimmings.

Shielding Gas

Use pure Argon / Argon - Hydrogen mixtures depending on type of welding and thickness.



EFFECTIVE CLEANING METHODS

Condition of Surface	Cleaning Agent	Method of Application
1. Atmospheric and construction dirt	Sap/Detergent and water	Sponge or rag Rinse with water, wipe dry
2. Heavier dirt containing oil or grease	Organic solvents like acetone, benzene, xylene	Sponge or rag Rinse with clean water, wipe dry. Observe safety rules (goggles, gloves etc)
3. Rust discoloration from other materials	Commercial pickling pastes, diluted nitric acid (6 to 15% by volume)	Clean cloth or sponge let stand for 20 min Rinse and repeat if necessary Observe safety rules (goggles, gloves etc.)
4. Heat tint or heavy discoloration	5% oxalic acid (warm) 5-15% nitric acid or 5-10% phosphoric acid & follow with neutralizing Rinse.	Swab or immerse. Observe safety rules (goggles, gloves etc)
5. Oil, grease, fatty acids (without swabbing)	4-6% solution of sodium metasilicate/trisodium phosphate.	No swabbing required
6. Oil, Grease, Fatty acids (with swabbing) acetone, kerosene,	Carbon tetrachloride, trichloroethylen (goggles, gloves etc) gasoline, alcohol.	Rub with cloth Observe safety rules (goggles, gloves etc.)
7. Hand and Finger Print smears	Calcium Carbonate line powder, wax based Polish	Rub with cloth



DO'S AND DON'TS WHILE CLEANINGS OF S.S. MATERIAL

- Use the mildest cleaning agent that does the job effectively.
- Follow the polishing lines when using abrasive cleaners.
- Rinse thoroughly after every cleaning operation.
- Wipe dry to avoid water marks.
- Do not use an ordinary steel scraper or knife to remove dirt. This causes rust. Use plastic or stainless steel tools.
- Do not allow chemicals or bleaching agents to remain in prolonged contact with stainless steel.
- Do not use stainless steel container for prolonged storage of food. Pickles or other materials containing salt.

Follow these tips carefully and you can be sure of your stainless steel looking good for years.

Installation of stainless steel components.

Stainless Steel, like most other materials, requires periodic cleaning to remain the original finish. All it takes is a little care during installation and in service.

Keep the following points in mind to avoid problems at a later stage.

- Do not allow steel tools, containers or implements to lie on stainless surfaces. It might lead to galvanic action as a iron contamination.
- Spot Passivation at risk areas should be done to keep off any potential corrosion hazards.
- Make sure it does not come in contact with corrosive chemicals and contaminated elements. This ensures an initial clean passivated surface.
- If the surface aspects are important, use protective coated stainless steel components.
- Avoid cross contamination by steel particles, weld spatter, contaminated grit, etc.



RIGHT DESIGN AND FINISH FOR MINIMUM MAINTENANCE

The kind of finish required depends a great deal on the amount of physical contact the application warrants.

- (a) If there is constant contact, a special ground finish is ideal, it will not register fingerprints as easily as the more reflective finishes. It can be cleaned vigorously without any danger of its appearance being changed. Further, the finish can be reproduced after fabrication as this is obtained by grinding.
- (b) For areas not subjected to high traffic, use a lesser reflective finish like 2D for applications in flat areas. The slightly more reflective finish 2B is chosen for highlighting surfaces like clamp covers, windows etc. which are normally above ground level.

Since 2B and 2D are rolled finishes, they can't be matched by subsequent mechanical finishing. That's why special care should be taken to protect the surface during fabrication, transit and erection.

- (c) A textured finish is of great help in maintenance as it offers more protection against scratches, dents and fingerprints, in areas such as free standing columns, doors, elevator panels etc., the use of textured stainless steel is recommended.
- (d) In large channels, the smoothest finish provides the desired appearance and rigidity. Use the ground impressions in the vertical direction. If used in horizontal direction, it accumulates more dirt and causes subsequent uneven straking of low areas.
- (e) Avoid designs that concentrate flow of water on an exterior surface since this too causes straking.
- (f) Minimise horizontal surfaces and where necessary, make provisions to drain the dirt. Even joints should be so designed to minimise dirt accumulation.



RIGHT DESIGN AND FINISH FOR MINIMUM MAINTENANCE

- (g) Struts and clips made of dissimilar metal should be insulated to prevent bleeding of other metals onto stainless steel.
- (h) Fasteners should be concealed as much as possible for aesthetic reason, its level of corrosion resistance should be equal to that of stainless steel.
- (i) Avoid intricate designs. These collect dirt and make cleaning a difficult task.

WELDING PROCESSES OF TYPICAL APPLICATIONS

Applications	Material	Process recommended
Jobs for static loading	Austenitic Ferritic	Manual metal arc welding MIG welding
Jobs for dynamic loading	Austenitic or Ferritic	MIG or TIG
Tanks for storing normal chemical and less corrosive liquids	Austenitic or Ferritic	Manual Metal arc welding
Tanks meant for highly corrosive liquids	Austenitic	TIG or MIG
Racks and decorative panels	Ferritic	Resistance Welding
Welding on thin sheets and foils	Austenitic or Ferritic	TIG without filler or plasma arc welding
Welding of silencer pipes	Ferritic	Spot Welding (resistance) or TIC Welding
Welding of small jobs Using thin sheets for laboratory or space craft	Austenitic or Ferritic	Plasma arc welding or electron beam welding



TABLE OF WIRE MESH

No. of Mesh per English inch=25.4	SWG mm	Diametre of wire mm	Size Opening Open area	Approx %
4	16	1.626	4.7238	55.4
	18	1.219	5.1308	65.3
6	16	1.626	2.6072	38.0
	18	1.219	3.0142	50.7
8	18	1.219	1.9559	37.9
	20	.914	2.2609	50.7
10	24	.559	2.6159	67.9
	26	.457	2.7179	73.3
	20	.914	1.6259	41.0
	22	.711	1.8289	51.8
12	24	.559	1.9809	60.8
	26	.457	2.0829	67.2
	28	.3759	2.1640	72.6
	24	.559	1.5576	54.1
14	26	.457	1.6596	61.4
	28	.3759	1.7407	67.6
	28	.3759	1.3572	55.9
16	28	.3759	1.4383	62.8
	30	.3150	1.4992	68.2
	25	.508	1.079	46.2
18	26	.457	1.1305	50.7
	28	.3759	1.2116	58.3
	24	.559	.8520	36.4
20	26	.457	.9540	45.6
	28	.3759	1.0351	53.7
	30	.3150	.9550	56.5
24	32	.2743	.9957	61.5
	26	.457	.6013	32.1
	28	.3759	.6824	41.4
	30	.3150	.7433	49.1



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