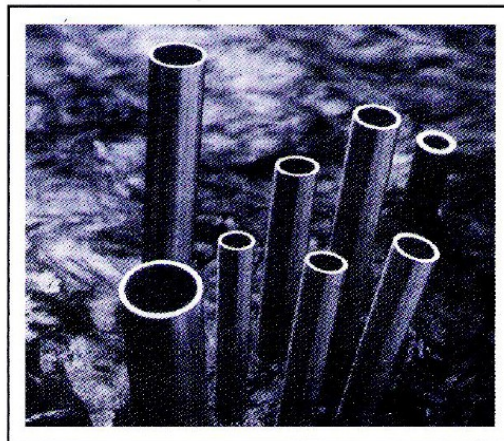


STAINLESS STEEL PIPE DIMENSION AS PER ASTM AND WEIGHT-KG. PER MTR. (ANSI B 36.19-1965)

Nominal Bore		Outside Diameter mm	Schedule 5S		Schedule 10S		Schedule 40S		Schedule 80S		Schedule 160S		Schedule XXS	
mm	INCH		Wt mm	Weight (Kg/mt)	Wt mm	Weight (Kg/mt)	Wt mm	Weight (Kg/mt)	Wt mm	Weight (Kg/mt)	Wt mm	Weight (Kg/mt)	Wt mm	Weight (Kg/mt)
3	1/8	10.3	1.24	0.276	1.24	0.28	1.73	0.37	2.41	0.47	-	-	-	-
6	1/4	13.7	1.24	0.390	1.65	0.49	2.24	0.631	3.02	0.80	-	-	-	-
10	3/8	17.1	1.24	0.490	1.65	0.63	2.31	0.845	3.20	1.10	-	-	-	-
15	1/2	21.3	1.65	0.800	2.11	1.00	2.77	1.27	3.75	1.62	4.75	1.94	7.47	2.55
20	3/4	26.7	1.65	1.03	2.11	1.28	2.87	1.68	3.91	2.20	5.54	2.89	7.82	3.63
25	1	33.4	1.65	1.30	2.77	2.09	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	3.56	3.38	4.85	4.47	6.35	5.61	9.70	7.77
40	1.1/2	48.3	1.65	1.91	2.77	3.11	3.68	4.05	5.08	5.41	7.14	7.25	10.16	9.54
50	2	60.3	1.65	2.40	2.77	3.93	3.91	5.44	5.54	7.48	8.74	11.1	11.07	13.44
65	2.1/2	73.0	2.11	3.69	3.05	5.26	5.16	8.63	7.01	11.4	9.53	14.9	14.2	20.39
80	3	88.9	2.11	4.51	3.05	6.45	5.49	11.30	7.62	15.2	11.1	21.3	15.24	27.65
100	4	114.3	2.11	5.84	3.05	8.36	6.02	16.07	8.56	22.3	13.49	33.54	17.12	41.03
125	5	141.3	2.77	9.47	3.40	11.57	6.55	21.8	9.53	31.97	15.88	49.11	19.05	57.43
150	6	168.3	2.77	11.32	3.40	13.84	7.11	28.3	10.97	42.7	18.2	67.56	21.95	79.22
200	8	219.1	2.77	14.79	3.76	19.96	8.18	42.6	12.7	64.6	23.0	111.2	22.23	107.8
250	10	273.1	3.40	22.63	4.19	27.78	9.27	60.5	12.7	96.0	28.6	172.4	25.40	155.15
300	12	323.9	3.96	31.25	4.57	36.00	9.52	73.88	12.7	132.0	33.32	238.76	25.40	186.97
350	14	355.6	3.96	34.36	4.78	41.3	11.13	94.59	19.05	158.08	35.71	281.70	-	-
400	16	406.4	4.19	41.56	4.78	47.29	12.7	123.30	21.41	203.33	40.46	365.11	-	-
450	18	457.2	4.19	46.80	4.78	53.42	14.27	155.80	23.8	254.36	45.71	466.40	-	-
500	20	508.0	4.78	59.25	5.54	68.71	15.09	183.42	26.19	311.2	49.99	564.68	-	-
600	24	609.6	5.54	82.47	6.35	94.45	17.48	255.41	30.96	442.08	59.54	808.22	-	-

TOLERANCE: ASTM SPECIFICATION FOR TUBING & PIPING

Specification	Allowable Outside Diameter Variation in mm			Allowable Wall Thickness Variation		Exact Length Testing Tolerance in mm		
	Nominal Diameter Under 25.4	Over	Under	%Over	%Under	Over	Under	
ASTM-A213 Seamless Boiler Superheater and Heat Exchanger Tubes	25.4-38.1 incl 38.1-50.8 excl 50.8-63.5 excl 63.5-76.2 excl 76.2-101.6 incl	.1016 .1524 .2032 .254 .3048 .381	.1016 .1524 .2032 .254 .3048 .381	+20 +22 +22 +2 +22 +22	-0 -0 -0 -0 -0 -0	3.175 3.175 3.176 4.46 4.76 4.76	0 0 0 0 0 0	Tension Test Flattening Test Flare Test Hardness Test 100% Hydrostatic test Refer to ASTM A-450
ASTM-A249 Welded Boiler Superheater, Heat Exchanger And Condenser Tubes	Under 25.4 25.4-38.1 incl 38.1-50.8 Excl 50.0-63.5 excl 63.5-76.2 excl 76.2-101.6 incl	.1016 .1524 .2032 .254 .3848 .381	.1016 .1524 .2032 .254 .3048 .381	+10 +10 +10 +10 +10 +10	-10 -10 -10 -10 -10 -10	3.175 3.175 3.175 4.76 4.76 4.76	0 0 0 0 0 0	Tension Test Flattening Test Flare Test Reverse Bend Test Hardness Test 100% Hydrostatic Test *Reverse flattening Test Refer to ASTM A-450 *Wherever applicable
ASTM-A269 Seamless & Welded Tubing for General Service	Untp 12.7 12.7-38.1 excl 38.1-88.9 excl 88.9-139.7 excl 139.7-203.2 excl	.13 .13 .25 .38 .76	.13 .13 .25 .38 .76	+15 +10 +10 +10 +10	-15 -10 -10 -10 -10	3.2 3.2 4.8 4.8 4.8	0 0 0 0 0	Flare Test Flance Test (Welded Only) Hardness Test Reverse Flattening Test (Welded only) 100% Hydrostatic Test Refer to ASTM-A269
ASTM-A270 Semless & Welded Sanitary Tubing	25.4 38.1 50.8 60.5 76.2 101.6	.05 .05 .05 .05 .08 .08	.20 .20 .28 .28 .30 .38	+12.5 +12.5 +12.5 +12.5 +12.5 +12.5	-12.5 -12.5 -12.5 -12.5 -12.5 -12.5	3.2 3.2 3.2 3.2 3.2 3.2	0 0 0 0 0 0	Reverse flattening Test 100% Hydrostastic Test Externa' polish on all tubes Refer to ASTM A-270
ASTM-A312 Semless & Welded pipe	3.175-38.1 incl 38.1-1016 incl 101.6-203.2 imcl	.4 .79 1.59	.79 .79 .79	Minimum Wall 12.5% under nominal wall Specified		6.4 6.4 6.4	0 0 0	Tension Test Flattening Test 100% Hydrostatic Test (Normally Random Lengths ordered) Refer to ASTM A-530
ASTM A-358 Welded pipe	219.08-750mm or 0.01 inch	+0.5%		-0.3		6.0		Refer to ASTM A-530



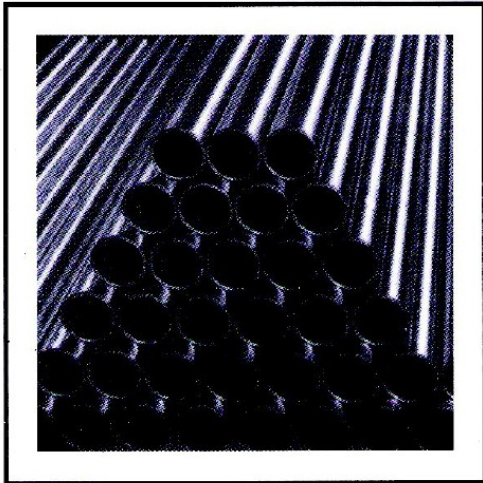
CHEMICAL COMPOSITION OF S. S. PIPES & TUBES

Grade	UNS Designation	Composition %															
		Carbon max	Manganese max	Sulfur max	Phosphorus max	Silicon	Nickel	Chromium	Molybdenum	Titanium	Columbium plus Tantalum	Tantalum max	Nitrogen	Vanadium	Copper	Cerium	Ba
TP304	S30400	0.08	2.00	0.045	0.030	0.75 max	8.00-11.0	18.0-20.0	---	---	---	---	---	---	---	---	---
TP304H	S30409	0.04-0.10	2.00	0.045	0.030	0.75 max	8.00-11.0	18.0-20.0	---	---	---	---	---	---	---	---	---
TP304L	S30403	0.035	2.00	0.045	0.030	0.75 max	8.00-13.0	18.0-20.0	---	---	---	---	---	---	---	---	---
TP304LN	S30451	0.08	2.00	0.045	0.030	0.75 max	8.00-11.0	18.0-20.0	---	---	---	0.10-0.16	---	---	---	---	---
TP309Cb	S30940	0.08	2.00	0.045	0.030	0.75 max	8.00-11.0	18.0-20.0	---	---	---	0.10-0.18	---	---	---	---	---
TP309H	S30909	0.04-0.10	2.00	0.045	0.030	0.75 max	12.0-15.0	22.0-24.0	---	---	---	---	---	---	---	---	---
TP309HCb	S3041	0.04-0.10	2.00	0.045	0.030	0.75 max	12.0-16.0	22.0-24.0	0.75 max	---	---	---	---	---	---	---	---
TP309S	S30908	0.08	2.00	0.045	0.030	0.75 max	12.0-15.0	22.0-24.0	0.75 max	---	---	---	---	---	---	---	---
TP310Cb	S31040	0.08	2.00	0.045	0.030	0.75 max	19.0-22.0	24.0-26.0	0.75 max	---	---	---	---	---	---	---	---
TP310H	S31009	0.04-0.10	2.00	0.045	0.030	0.75 max	19.0-22.0	24.0-26.0	---	---	---	---	---	---	---	---	---
TP310HCb	S31041	0.04-0.10	2.00	0.045	0.030	0.75 max	19.0-22.0	24.0-26.0	0.75 max	---	---	---	---	---	---	---	---
TP310S	S31008	0.08	2.00	0.045	0.030	0.75 max	19.0-22.0	24.0-26.0	0.75 max	---	---	---	---	---	---	---	---
	S31272	0.08-0.12	1.5	0.030	0.015	0.3-0.7	14.0-16.0	14.0-16.0	1.0-1.4	0.3-0.6	---	---	---	---	---	---	0.04-0.08
TP316	S31600	0.08	2.00	0.045	0.030	0.75 max	11.0-14.0	16.0-18.0	2.00-3.00	---	---	---	---	---	---	---	---
TP316H	S31609	0.04-0.10	2.00	0.045	0.030	0.75 max	11.0-14.0	16.0-18.0	2.00-3.00	---	---	---	---	---	---	---	---
TP316L	S31603	0.035	2.00	0.045	0.030	0.75 max	10.0-15.0	16.0-18.0	2.00-3.00	---	---	---	---	---	---	---	---
TP316LN	S31651	0.08	2.00	0.045	0.030	0.75 max	11.0-14.0	16.0-18.0	2.00-3.00	---	---	0.10-0.16	---	---	---	---	---
TP317	S31700	0.08	2.00	0.045	0.030	0.75 max	11.0-14.0	16.0-18.0	2.00-3.00	---	---	0.10-0.18	---	---	---	---	---
TP317L	S31703	0.035	2.00	0.045	0.030	0.75 max	11.0-14.0	16.0-18.0	2.00-3.00	---	---	---	---	---	---	---	---
TP321	S32100	0.08	2.00	0.045	0.030	0.75 max	11.0-14.0	16.0-18.0	3.00-4.00	---	---	---	---	---	---	---	---
TP347H	S34700	0.10	2.00	0.045	0.030	0.75 max	9.00-13.0	17.0-20.0	---	---	---	---	---	---	---	---	---
TP347LN	S34709	0.04-0.10	2.00	0.045	0.030	0.75 max	9.00-13.0	17.0-20.0	---	---	---	---	---	---	---	---	---
TP348	S34800	0.08	2.00	0.045	0.030	0.75 max	9.00-13.0	17.0-20.0	---	---	0.2-0.5 ^H	0.06-0.10	---	---	---	---	---
TP348H	S34809	0.04-0.10	2.00	0.045	0.030	0.75 max	9.00-13.0	17.0-20.0	---	---	---	---	---	---	---	---	---
TPXM 10	S21900	0.08-10.00	8.00-10.00	0.045	0.030	1.00 max	5.50-7.50	19.0-21.5	---	---	0.10	---	---	---	---	---	---
TPXM 11	S21904	0.04-10.00	8.00-10.00	0.045	0.030	1.00 max	5.50-7.50	19.0-21.5	---	---	---	0.15-0.40	---	---	---	---	---
TPXM-15	S38100	0.08	2.00	0.030	0.030	1.50-2.50	17.5-18.5	17.0-19.0	---	---	---	0.15-0.40	---	---	---	---	---
TPXM-19	S20910	0.060	4.00-6.00	0.040	0.030	1.00 max	11.5-13.5	20.5-3.00	1.50-3.00	---	0.10-0.30	---	---	---	---	---	---
TPXM-29	S24000	0.080	11.5-14.5	0.060	0.030	1.00 max	2.25-3.75	17.0-19.0	---	---	---	0.20-0.40	0.10-0.30	---	---	---	---
---	S31254	0.020	1.00	0.030	0.010	0.80 max	17.5-18.5	19.5-20.5	6.00-6.50	---	---	0.20-0.40	---	---	---	---	---
---	S30615	0.16-0.24	2.00	0.030	0.030	3.2-4.0	13.5-16.0	17.0-19.5	---	---	---	0.18-0.22	---	0.50-1.00	---	---	---
---	S30815	0.05-0.10	0.80	0.040	0.030	1.40-2.00	10.0-12.0	20.0-22.0	---	---	---	0.14-0.20	---	---	---	---	---
---	S31050	0.025	2.00	0.020	0.015	0.4	20.5-23.5	24.0-26.0	1.6-2.6	---	---	0.09-0.15	---	---	---	0.03-0.08	---
---	S30600	0.018	2.00	0.020	0.020	3.7-4.3	14.0-15.5	17.0-18.5	0.20 max	---	---	---	---	---	---	---	---
---	S31725	0.03	2.00	0.040 ^J	0.030	0.75	13.5-17.5	18.0-20.0	4.0-5.0	---	---	---	---	0.50 max	---	---	---
---	S31726	0.03	2.00	0.040 ^J	0.030	0.75	13.5-17.5	17.0-20.0	4.0-5.0	---	---	0.10 max	---	0.75 max	---	---	---
---	S32615	0.07	2.00	0.045	0.030	4.8-6.0	19.0-22.0	16.5-19.5	0.3-1.5	---	---	0.10-0.20	---	0.75 max	---	---	---
---	S33228	0.04-0.09	1.00	0.020	0.015	0.30 max	31.0-33.0	26.0-28.0	---	---	0.6-1.0	---	---	1.5-2.5	---	---	---
---	S24565	0.03	5.0-7.0	0.030	0.010	1.00 max	16.0-18.0	23.0-25.0	4.0-5.0	---	0.1 max	---	---	---	---	0.05-0.10	---
---	S30415	0.4-0.06	0.80	0.045	0.030	1.00-2.00	9.00-10.0	18.0-19.0	---	---	---	0.04-0.6	---	---	---	---	---
---	S32654	0.020	2.00-4.00	0.030	0.005	0.50 max	21.0-23.0	24.0-25.0	7.00-8.00	---	---	0.12-0.16	---	---	---	0.03-0.08	---
---	S35315	0.04-0.08	2.00	0.045	0.030	0.75	34.0-36.0	24.0-26.0	---	---	---	0.45-0.55	---	0.030-0.60	---	---	---
---	N08367	0.030	2.00	0.030	0.030	1.00 max	23.50-25.50	20.00-22.00	6.00-7.00	---	---	0.12-0.18	---	---	---	0.03-0.08	---
---	N08904	0.020	2.00	0.045	0.035	1.00	23.0-28.0	19.0-23.0	4.0-5.0	---	---	0.18-0.25	---	0.75 max	---	---	---

New designation established in accordance with Practice E 527 and SAE J 1086.
 Maximum, unless otherwise indicated. The method of analysis for nitrogen shall be a matter of agreement between the purchaser and manufacturer.
 For welded TP316, TP316N, TP316LN, and TP316H pipe, the nickel range shall be 10.0-14.0%. For small diameter or thin walls or both, where many drawing passes are required, a carbon^f maximum of 0.040% is necessary in grades TP304L and TP316L. Small diameter tubes are defined as those less than 0.500 in (12.7mm) in outside diameter and light wall tubes as those less than 0.049 in (1.20 mm) in average wall thickness (1.10 mm) in minimum wall thickness.
 The titanium content shall be not less than five times the carbon content and not more than 0.70%. The titanium content shall be not less than four times the carbon content and not more than 0.60%. The Columbium plus titanium content shall be not less than ten times carbon content and not more than 1.00%.
 The Columbium plus titanium content shall be not less than eight times carbon content and not more than 1.00%.
 For welded pipe, the phosphorus maximum shall be 0.045%. Grade S34751 shall have a columbium (Niobium) plus tantalum content of not less than 4.5 times the carbon content.

MECHANICAL PROPERTIES OF S.S.PIPES

Table-2 Annealing Requirements			A 312/A 312M	Table-3 Tensile Requirements			
Grade or UNS Designation	Solution Treating Temperature	Cooling Requirements	Grade	UNS Designation	Tensile Strength, min Ksi (MPa)	Yield Strength, Min Ksi (MPa)	
All Grades not individually listed below	1900°F (1040°C)	rapid ^c	TP304L	S30403	70 (485)	25 (170)	
TP321H, TP347H, TP348H			TP316L	S31603	70 (485)	25 (170)	
Cold Rolled	2000°F (1100°C)		TP304	S30400	75 (515)	30 (205)	
Hot Rolled only	1925°F (1050°C)		TP304H	S30409	75 (515)	30 (205)	
TP304H, TP316H			TP309Cb	S30940	75 (515)	30 (205)	
Cold Rolled	1900°F (1040°C)		TP309H	S30909	75 (515)	30 (205)	
Hot rolled only	1900°F (1040°C)		TP309HCb	S30941	75 (515)	30 (205)	
TP309H, TP309HCb, TP310H	1900°F (1040°C)		TP309S	S30908	75 (515)	30 (205)	
TP310HCb	1900°F (1040°C)		TP310Cb	S31040	75 (515)	30 (205)	
S30815	1920°F (1050°C)	rapid	TP310H	S31009	75 (515)	30 (205)	
S31272	1920°F (1050°C)	rapid	TP310HCb	S31041	75 (515)	30 (205)	
S31254	2100°F (1150°C)	rapid	TP310S	S31008	75 (515)	30 (205)	
S24565	2050-2140°F (1120-1170°C)	rapid	TP316	S31272	65 (450)	29 (200)	
S35315	2010°F (1100°C)	rapid	TP316H	S31600	75 (515)	30 (2050)	
N08367	2010°F (1100°C)	rapid	TP317	S31609	75 (515)	30 (205)	
N08904	2010°F (1100°C)	rapid	TP317L	S31700	75 (515)	30 (205)	
			TP321	S31703	75 (515)	30 (205)	
				S32100			
			Welded Seamless		75 (515)	30 (205)	
			≤ 3/8 in.		75 (515)	30 (205)	
			> 3/8 in.		70 (485)	25 (170)	
			TP321H	S32109			
			Welded Seamless		75 (515)	30 (205)	
			< 3/8 in.		75 (515)	30 (205)	
			> 3/8 in.		70 (485)	25 (170)	
			TP347	S34700	75 (515)	30 (205)	
			TP347H	S3470	75 (515)	30 (205)	
			TP347LN	S34751	75 (515)	30 (205)	
			TP348	S34800	75 (515)	30 (205)	
			TP348H	S34809	75 (515)	30 (205)	
			TPXM-10	S21900	90 (620)	50 (345)	
			TPXM-11	S21904	90 (620)	50 (345)	
			TPXM-15	S38100	75 (515)	30 (205)	
			TPXM-29	S24000	100 (690)	55 (380)	
			TPXM-19	S20910	100 (690)	55 (380)	
			TP304N	S30451	80 (550)	35 (240)	
			TP316N	S31651	80 (550)	35 (240)	
			TP304LN	S31653	75 (515)	30 (205)	
			---	S31254	94 (650)	44 (300)	
			---	S30615	90 (620)	40 (275)	
			---	S30815	87 (600)	45 (310)	
			---	S30600	78 (540)	35 (240)	
			---	S31725	75 (515)	30 (205)	
			---	S31726	80 (550)	35 (240)	
			---	S31050			
			T<0.25 in.		84 (580)	39 (270)	
			T>0.25 in.		78 (540)	37 (255)	
			---	S32615	80 (550)	32 (220)	
			---	S33228	73 (500)	27 (185)	
			---	S24565	115 (795)	60 (415)	
			---	S30415	87 (600)	42 (290)	
			---	S32654	109 (750)	62 (430)	
			---	S35315	94 (650)	39 (270)	
			---	N08367:			
			t<0.187		100 (690)	45 (310)	
			t>0.187		95 (655)	45 (310)	
			---	N08904	71(490)	31(215)	



Elongation in 2 in or 50 mm (or 4D), min.% Longitudinal Transverse
 All Grades except S 31050 and S 32615 35 25 S32615 S31050 25 --N08367
 Prior to the issuance of A 312/A 312 M- 88a, the tensile and yield strength values were
 76 (515) and 30 (205) respectively, for nominal wall greater than 3/8 in. (9.5 mm).

CARBON STEEL, ALLOY STEEL LOW TEM, PIPE AND TUBE SPECIFICATION

SPECIFICATION	CHEMICAL								MECHANICAL PROPERTIES			SPECIFIC REQUIREMENT
	WT	C%	Mn %	P % MAX	S% MAX	Si%	Cr%	Mo%	TENSILE	YIELD	ELONGATI	
									STRENGTH	STRESS	ON	
									Mpa	Mpa	50mm MIN Longitudinal	
ASTM A53/A ASTM A53/B ASTM A 106/A ASTM A 106/B ASTM A 106/C	AW AW AW AW AW	0.25MAX 0.30MAX 0.25MAX 0.35MAX 0.35MAX	0.95MAX 1.20MAX 0.27-0.93 0.29-1.06 0.29-1.06	0.050 0.050 0.035 0.035 0.035	0.045 0.045 0.025 0.035 0.035	- - 0.10MIN 0.10MIN 0.10MIN	- - 0.40MAX 0.40MAX 0.40MAX	- - 0.15MAX 0.15MAX 0.15MAX	330MIN 415MIN 330MIN 415 MIN 485MIN	205MIN 240MIN 205MIN 240MIN 275MIN	36 29/5 35/2 30/22 30/22	Cr Mo Cu Ni Va 40 15 40 40 08 Five elements not to exceed 1%
ASTM A179 ASTMA214 ASTM A192 ASTM a209/T1 ASTM A209/T1a ASTM A209/T1b ASTM A210/A-1 ASTMA210/C	MW MW MW MW MW MW MW MW	0.06-018 0.18MAX 0.06-0.18 0.10-0.20 0.15-0.25 0.14MAX 0.27max 0.35MAX	0.27-0.63 0.27-0.63 0.27-0.63 0.30-0.80 0.30-0.80 0.30-0.80 0.93max 0.23-1.06	0.035 0.035 0.035 0.025 0.025 0.025 0.035 0.035	0.035 0.035 0.035 0.025 0.025 0.025 0.035 0.035	- - - 0.10-0.50 0.10-0.50 0.10MIN - 0.10MIN	- - - - - - - -	- - 0.44-0.65 - 0.44-0.65 - - -	325MIN 365MIN 325MIN 380MIN 365MIN 415MIN 415MIN 485MIN	180MIN 180MIN 180MIN 205MIN 195MIN 220MIN 255MIN 275MIN	35.0 35.0 35.0 30/22 30/22 30/22 30/22 30/22	Hardness 72 HRB Max Hardness 72 HRB Max Hardness 77 HRB Max Hardness 80 HRB Max Hardness 81 HRB Max Hardness 77 HRB Max Hardness 79 HRB Max Hardness 89 HRB Max
ASTM A213/T2 ASTM A213/T5 ASTM A213/T11 ASTM A213/T12 ASTM A213/T22	MW MW MW 0.05 0.05	0.10/0.20 0.15MAX 0.15MAX 0.15MAX 0.15MAX	0.30-0.61 0.30-0.80 0.30-0.60 0.30-0.61 0.30-0.60	0.025 0.025 0.025 0.025 0.025	0.025 0.025 0.025 0.025 0.025	0.10-0.30 0.50MAX 0.50MAX 0.50MAX 0.50MAX	0.50-0.81 4.00-6.00 1.00-1.50 0.80-1.25 1.90-2.60	0.44-0.65 0.44-0.65 0.44-0.65 0.44-0.65 0.87-1.13	415MIN 415MIN 415MIN 415MIN 415MIN	205MIN 205MIN 205MIN 205MIN 205MIN	30/22 30/22 30/22 30/22 30/22	Hardness 85 HRB Max Hardness 85 HRB Max Hardness 85 HRB Max Hardness 85 HRB Max Hardness 85 HRB Max
ASTM A333/3 ASTM A333/6 ASTM A334/3 ASTM A334/6	AW AW AW MW	0.19MAX 0.30MAX 0.19MAX 0.30MAX	0.31-0.64 0.29-1.06 0.31-0.64 0.9-1.06	0.025 0.025 0.025 0.025	0.025 0.025 0.025 0.025	0.18-0.37 0.10MIN 0.18-0.37 0.10MIN	Ni - Ni -	3.18-3.82 - 3.18-3.82 -	380MIN 415MIN 380MIN 415MIN	205MIN 240MIN 205MIN 240MIN	35/25 30/22 35/28 30/22	IMPACT AS -50f FOR 40X10/18/1490 HRB MAX 50 F 40X10/18/14
ASTM A335/P1 ASTM A335/P2 ASTM A335/P5 ASTM A335/P11 ASTM A335/P12 ASTM A335/P22	AW AW AW 0.05 0.05 0.05	0.10-0.20 0.10-0.20 0.15MAX 0.15MAX 0.15MAX 0.15MAX	0.30-0.80 0.30-0.61 0.30-0.60 0.30-0.60 0.30-0.61 0.30-0.60	0.025 0.025 0.025 0.025 0.025 0.025	0.025 0.025 0.025 0.025 0.025 0.025	0.10-0.50 0.10-0.30 0.50-1.00 0.50-1.00 0.50MAX 0.50MAX	- 0.50-0.81 4.00-6.00 1.00-1.50 0.80-1.25 1.90-2.60	0.40-0.65 0.40-0.65 0.40-0.65 0.40-0.65 0.40-0.65 0.87-1.13	380MIN 380MIN 415MIN 415MIN 415MIN 415MIN	205MIN 205MIN 205MIN 205MIN 205MIN 205MIN	30/22 30/22 30/22 30/22 50/22 30/22	
BS/3059/1/33 BS/3059/2/33 BS/3059/245		0.15Max 0.15MAX 0.120.18	0.30-0.70 0.400.70 0.90-1.20	0.050 0.050 0.035	0.050 0.050 0.035	- 0.10-0.35 0.10-0.35	- - -	- - -	324-441 324-441 441-560	186MIN 186MIN 245MIN	25 21 22	
BS/3059/2/620 DIN/17175/ST35.8 DIN/17175/ST45.8 DIN/17175/15MO3 DIN/17175/13CrMo44 DIN/17175/10CrMo910		0.10-0.15 0.17MAX 0.22MAX 0.12-0.20 0.10-0.18 0.15MAX	0.40-0.70 0.40MIN 0.45MIN 0.50-0.80 0.40-0.60 0.40-0.60	0.040 0.040 0.040 0.040 0.040 0.040	0.040 0.040 0.040 0.040 0.040 0.040	0.10-0.35 0.35MAX 0.10-0.35 0.10-0.35 0.15-0.50	0.70-1.10 - - 0.70-1.60 2.0-2.5	0.45-0.65 - - 0.250-0.35 0.40-0.50 0.9-1.10	441-618 340-441 441-540 441-540 441-570 441-570	235MIN 235MIN 255 MIN 284MIN 294MIN 249MIN	22 25 25 21 22 22	
ASTM A199/T5 ASTM A199/T11 ASTM A199/T22 ASTM A199/T4 ASTM A199/T7 ASTM A198/T5 ASTM A199/T11 ASTMA199/T22 ASTM A199/T4 ASTM A199/T7 ASTM A199/T9 ASTM A199/T9 ASTM A199/T9 ASTM A335/P9 ASTM A178A ASTM A178C ASTM A178B	MW MW MW MW MW MW MW MW MW MW MW MW MW MW MW MW MW	0.15MAX 0.05-0.15 0.05-0.15 0.15MAX 0.15MAX 0.15MAX 0.05-0.15 0.05-0.15 0.15MAX 0.15MAX 0.15MAX 0.15MAX 0.15MAX 0.06-0.18 0.35 MAX 0.27MAX	0.30-0.60 0.30-0.60 0.30-0.60 0.30-0.60 0.30-0.60 0.30-0.60 0.30-0.60 0.30-0.60 0.30-0.60 0.30-0.60 0.30-0.60 0.30-0.60 0.30-0.60 0.30-0.60 0.27-0.63 0.80 MAX	0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.035 0.035 0.030	0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.025 0.035 0.035 0.015	0.50MAX 0.50-1.00 0.50MAX 0.50-1.00 0.50-1.00 0.50MAX 0.50-1.00 2.15-2.852 0.50-1.00 0.25-1.00 0.25-1.00 0.25-1.00 0.25-1.00 - - 0.10MIN	4.00-6.00 1.00-1.50 1.90-2.60 2.15-2.85 6.00-8.00 4.00-6.00 1.00-1.50 1.90-2.60 2.15-2.852 6.00-8.00 8.00-10.00 8.00-10.00 8.00-10.00 8.00-10.00 - - -	0.45-0.65 0.44-0.65 0.87-1.13 0.44-0.65 0.45-0.65 0.45-0.65 0.44-0.65 0.87-1.13 0.44-0.85 0.45-0.65 0.90-1.10 0.90-1.10 0.90-1.10 0.09-1.10 - - -	415MIN 415MIN 415MIN 415MIN 415MIN 415MIN 415MIN 415MIN 415MIN 415MIN 415MIN 415MIN 415MIN 325MIN 415MIN 485MIN	170MIN 170MIN 170MIN 170MIN 170MIN 170MIN 170MIN 170MIN 170MIN 170MIN 170MIN 170MIN 170MIN 170MIN 170MIN 275MIN	30/22 30/22 30/22 30/22 30/22 30/22 30/22 30/22 30/22 30/22 30/22 30/22 30/22 36 30 30	HARDNESS 85 HRB MAX HARDNESS 85 HRB MAX HARDNESS 85 HRB MAX HARDNESS 85 HRB MAX HARDNESS 85 HRB MAX HARDNESS 85 HRB MAX HARDNESS 85 HRB MAX HARDNESS 85 HRB MAX HARDNESS 85 HRB MAX HARDNESS 85 HRB MAX HARDNESS 85 HRB MAX HARDNESS 85 HRB MAX HARDNESS 85 HRB MAX HARDNESS 89 HRB MAX HARDNESS 89 HRB MAX HARDNESS 89 HRB MAX

**DIMENSIONS AND NOMINAL WEIGHTS OF BLACK
STEEL TUBES IN ACCORDANCE WITH IS: 1239 (PART 1) - 1979**

Outside diameter					Thickness						Weight of black tube				Dimension of sockets			
Nominal	Light		Medium & heavy		Light		Medium		Heavy		Light		Medium		Heavy		Outside	
	Max mm	Min mm	Max mm	Min mm	mm	swg	mm	swg	mm	swg	End kg/m	Socketed kg/m	End kg/m	Socketed kg/m	End kg/m	Socketed kg/m	Diameter	length
6	10.1	9.7	10.6	9.8	1.8	15	2.0	14	2.65	12	0.361	0.364	0.407	0.410	0.496	0.496	15	19
8	13.6	13.2	14.0	13.2	1.8	15	2.35	13	2.9	11	0.517	0.521	0.650	0.654	0.769	0.773	18.5	27
10	17.1	16.7	17.5	16.7	1.8	15	2.35	13	2.9	11	0.674	0.680	0.852	0.858	1.02	1.03	22	28
15	21.4	21.0	21.8	21.0	2.0	14	2.65	12	3.25	10	0.952	0.951	1.22	1.23	1.45	1.46	27	37
20	26.9	26.4	27.3	26.5	2.35	13	2.65	12	3.25	10	1.41	1.42	1.58	1.59	1.90	1.91	32.5	39
25	33.8	33.2	34.2	33.3	2.65	12	3.25	10	4.05	8	2.01	2.03	2.44	2.46	2.97	2.99	38.5	46
32	42.5	41.9	42.9	42.0	2.65	12	3.25	10	4.05	8	2.58	2.61	3.14	3.17	3.84	3.87	49	51
40	48.4	47.8	48.8	47.9	2.9	11	3.25	10	4.05	8	3.25	3.29	3.61	3.65	4.43	4.47	56	51
50	60.2	59.6	60.8	59.7	2.9	11	3.65	9	4.5	7	4.11	4.16	5.10	5.17	6.17	6.24	68	60
65	76.0	75.2	76.6	75.3	3.25	10	3.65	9	4.5	7	5.80	5.92	6.51	6.63	7.90	8.02	84	69
80	88.7	87.9	89.5	88.0	3.25	10	4.05	8	4.85	6	6.81	6.98	8.47	8.64	10.1	10.3	98	75
100	113.9	113.0	115.0	113.1	3.65	9	4.5	7	5.4	5	9.89	10.2	12.1	12.4	14.4	14.7	124	87
125	-	-	140.8	138.5	-	-	4.85	6	5.4	5	-	-	16.2	16.7	17.8	18.3	151	96
150	-	-	166.5	163.9	-	-	4.85	6	5.4	5	-	-	19.2	19.8	21.2	21.8	178	96

Tolerances on Thickness and weight :
The following manufacturing shall be permitted on the tubes and sockets.

(a) Thickness :

(1) Butt welded Light tubes	+Not limited -8 percent
Medium and Heavy tubes	+Not limited -10 percent
(2) Seamless tube	-12.5 percent

(b) Weight:

(1) Single tube (light series)	+ 10percent
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