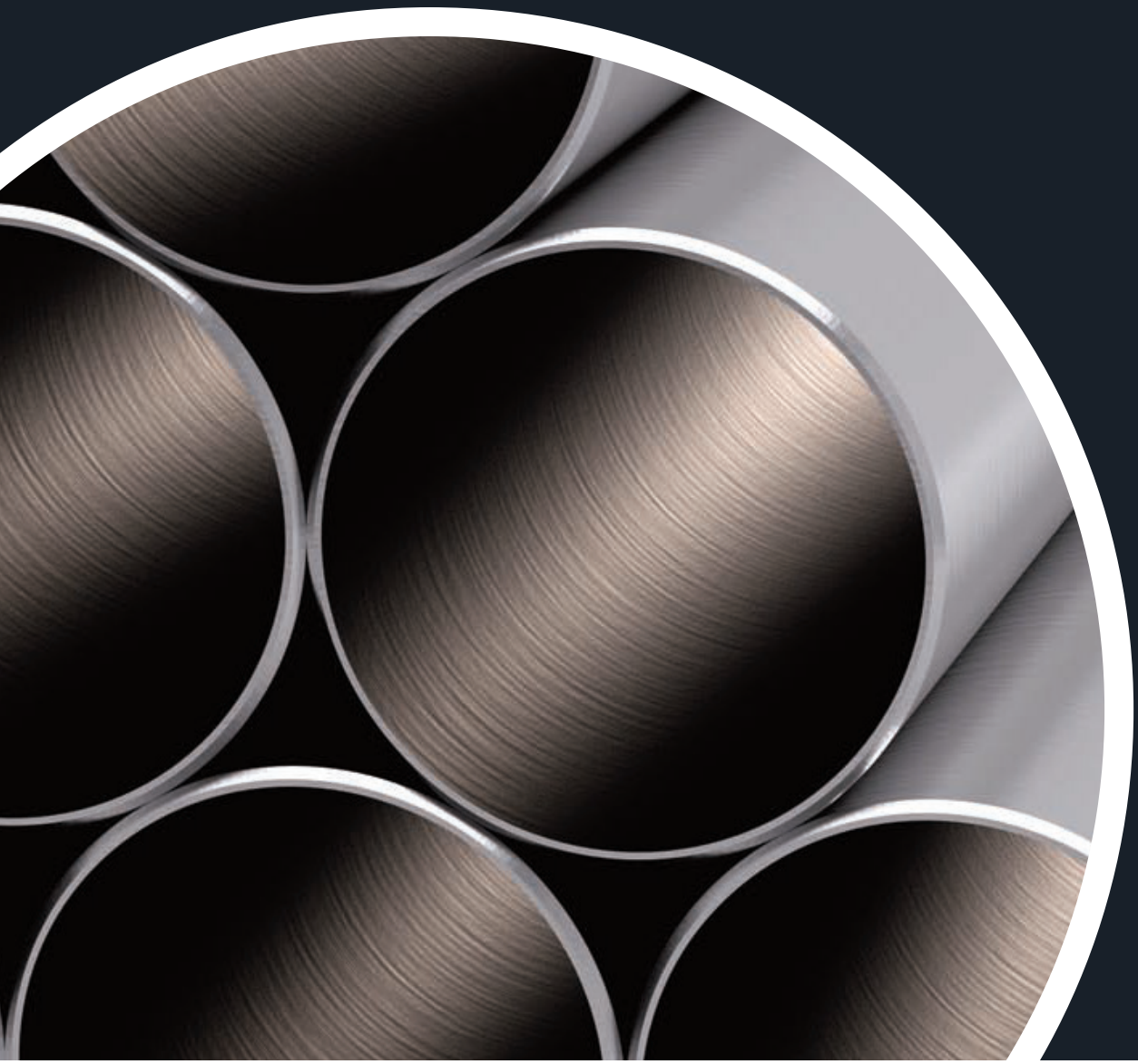
Tube & Pipe Catalogue



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Tubing



SUMMARY OF SCHEDULED SIZES
(all dimensions in mm)

Nom. Pipe Size	Outside Dia	SCH 5S	SCH 10S	SCH 10	SCH 20	SCH 30	SCH 40S	Std. Weight	SCH 40	SCH 60	SCH 80S	Extra Strong	SCH 80	SCH 100	SCH 120	SCH 140	SCH 160	Double Extra Strong	Nom. Pipe Size
1/2	21.34	1.65	2.11				2.77	2.77	2.77		3.73	3.73	3.73				4.77	7.47	1/2
3/4	26.67	1.65	2.11	2.11			2.87	2.87	2.87		3.91	3.91	3.91				5.56	7.82	3/4
1	33.40	1.65	2.77	2.77			3.38	3.38	3.38		4.55	4.55	4.55				6.35	9.09	1
1 1/4	42.16	1.65	2.77	2.77			3.56	3.56	3.56		4.85	4.85	4.85				6.35	9.70	1 1/4
1 1/2	48.26	1.65	2.77	2.77			3.68	3.68	3.68		5.08	5.08	5.08				7.14	10.16	1 1/2
2	60.32	1.65	2.77	2.77			3.91	3.91	3.91		5.54	5.54	5.54				8.74	11.07	2
2 1/2	73.02	2.11	3.05	3.05			5.16	5.16	5.16		7.01	7.01	7.01				9.52	14.02	2 1/2
3	88.90	2.11	3.05	3.05			5.49	5.49	5.49		7.62	7.62	7.62				11.12	15.24	3
3 1/2	101.60	2.11	3.05	3.05			5.74	5.74	5.74		8.08	8.08	8.08					16.15	3 1/2
4	114.30	2.11	3.05	3.05			6.02	6.02	6.02		8.56	8.56	8.56		11.12		13.49	17.12	4
5	141.30	2.77	3.40	3.40			6.55	6.55	6.55		9.52	9.52	9.52		12.70		15.87	19.05	5
6	168.27	2.77	3.40				7.11	7.11	7.11		10.97	10.97	10.97		14.27		18.26	21.95	6
8	219.07	2.77	3.76		6.35	7.04	8.18	8.18	8.18	10.31	12.70	12.70	12.70	15.08	18.26	20.63	23.01	22.22	8
10	273.05	3.40	4.19		6.35	7.80	9.27	9.27	9.27	12.70	12.70	12.70	15.08	18.26	21.44	25.40	28.57	25.40	10
12	323.85	3.96	4.57		6.35	8.38	9.52	9.52	10.31	14.27	12.70	12.70	17.47	21.44	25.40	28.57	33.32	25.40	12
14	355.60	3.96	4.77	6.35	7.92	9.52		9.52	11.12	15.09		12.70	19.05	23.82	27.79	31.75	35.71		14
16	406.40	4.19	4.77	6.35	7.92	9.52		9.52	12.70	16.66		12.70	21.44	26.19	30.96	36.53	40.49		16
18	457.20	4.19	4.77	6.35	7.92	11.12		9.52	14.27	19.05		12.70	23.82	29.36	34.92	39.67	45.24		18
20	508.00	4.77	5.54	6.35	9.52	12.70		9.52	15.08	20.62		12.70	26.19	32.54	38.10	44.45	50.01		20
22	558.80	4.77	5.54	6.35	9.52	12.70		9.52	15.87	22.22		12.70	28.57	34.92	41.27	47.62	53.97		22
24	609.60	5.54	6.35	6.35	9.52	14.27		9.52	17.47	24.61		12.70	30.96	38.89	46.02	52.37	59.54		24
26	660.40			7.92	12.70			9.52				12.70							26
28	711.20			7.92	12.70			9.52				12.70							28
30	762.00	6.35	7.92	7.92	12.70	15.87		9.52				12.70							30
32	812.80			7.92	12.70	15.87		9.52	17.47			12.70							32
34	863.60			7.92	12.70	15.87		9.52	17.47			12.70							34
36	914.40			7.92	12.70	15.87		9.52	19.05			12.70							36

SUMMARY OF SCHEDULED SIZES
(all dimensions in inch)

Nom. Pipe Size	Outside Dia	SCH 5S	SCH 10S	SCH 10	SCH 20	SCH 30	SCH 40S	Std. Weight	SCH 40	SCH 60	SCH 80S	Extra Strong	SCH 80	SCH 100	SCH 120	SCH 140	SCH 160	Double Extra Strong	Nom. Pipe Size
1/2	0.840	0.065	0.083				0.109	0.109	0.109		0.147	0.147	0.147				0.188	0.294	1/2
3/4	1.050	0.065	0.083				0.113	0.113	0.113		0.154	0.154	0.154				0.219	0.308	3/4
1	1.315	0.065	0.109				0.133	0.133	0.133		0.179	0.179	0.179				0.250	0.358	1
1 1/4	1.660	0.065	0.109				0.140	0.140	0.140		0.191	0.191	0.191				0.250	0.382	1 1/4
1 1/2	1.900	0.065	0.109				0.145	0.145	0.145		0.200	0.200	0.200				0.281	0.400	1 1/2
2	2.375	0.065	0.109				0.154	0.154	0.154		0.218	0.218	0.218				0.344	0.436	2
2 1/2	2.875	0.083	0.120				0.203	0.203	0.203		0.276	0.276	0.276				0.375	0.552	2 1/2
3	3.500	0.083	0.120				0.216	0.216	0.216		0.300	0.300	0.300				0.438	0.600	3
3 1/2	4.000	0.083	0.120				0.226	0.226	0.226		0.318	0.318	0.318					0.636	3 1/2
4	4.500	0.083	0.120				0.237	0.237	0.237		0.337	0.337	0.337		0.438		0.531	0.674	4
5	5.563	0.109	0.134				0.258	0.258	0.258		0.375	0.375	0.375		0.500		0.625	0.750	5
6	6.625	0.109	0.134				0.280	0.280	0.280		0.432	0.432	0.432		0.562		0.719	0.864	6
8	8.625	0.109	0.148		0.250	0.277	0.322	0.322	0.322	0.406	0.500	0.500	0.500	0.594	0.719	0.812	0.906	0.875	8
10	10.750	0.134	0.165		0.250	0.307	0.365	0.365	0.365	0.500	0.500	0.500	0.594	0.719	0.844	1.000	1.125	1.000	10
12	12.750	0.156	0.180		0.250	0.330	0.375	0.375	0.406	0.562	0.500	0.500	0.688	0.844	1.000	1.125	1.312	1.000	12
14	14.000	0.156	0.188	0.250	0.312	0.375		0.375	0.438	0.594		0.500	0.750	0.938	1.094	1.250	1.406		14
16	16.000	0.165	0.188	0.250	0.312	0.375		0.375	0.500	0.656		0.500	0.844	1.031	1.219	1.438	1.594		16
18	18.000	0.165	0.188	0.250	0.312	0.438		0.375	0.562	0.750		0.500	0.938	1.156	1.375	1.562	1.781		18
20	20.000	0.188	0.218	0.250	0.375	0.500		0.375	0.594	0.812		0.500	1.031	1.281	1.500	1.750	1.969		20
22	22.000	0.188	0.218	0.250	0.375	0.500		0.375	0.625	0.875		0.500	1.125	1.375	1.625	1.875	2.125		22
24	24.000	0.218	0.250	0.250	0.375	0.562		0.375	0.688	0.969		0.500	1.219	1.531	1.812	2.062	2.344		24
26	26.000			0.312	0.500			0.375				0.500							26
28	28.000			0.312	0.500	0.625		0.375				0.500							28
30	30.000	0.250	0.312	0.312	0.500	0.625		0.375				0.500							30
32	32.000			0.312	0.500	0.625		0.375	0.688			0.500							32
34	34.000			0.312	0.500	0.625		0.375	0.688			0.500							34
36	36.000			0.312	0.500	0.625		0.375	0.750			0.500							36

Nominal I.P.S. diameter (inch)	Outside dia		Schedule 5S				Schedule 10s				Schedule 40S				Schedule 80S			
	inch	mm	Wallth.		Weight		Wallth.		Weight		Wallth.		Weight		Wallth.		Weight	
			inch	mm	lbs/ft	kg/m	inch	mm	lbs/ft	kg/m	inch	mm	lbs/ft	kg/m	inch	mm	lbs/ft	kg/m
1/8	0.405	10.3					0.049	1.24	0.1880	0.2798	0.068	1.7	0.2470	0.3676	0.095	2.4	0.3175	0.4725
1/4	0.540	13.7					0.065	1.7	0.3328	0.4953	0.088	2.2	0.4287	0.6380	0.119	3.0	0.5401	0.8038
3/8	0.675	17.1					0.065	1.7	0.4274	0.6361	0.091	2.3	0.5729	0.8526	0.126	3.2	0.7457	1.1097
1/2	0.840	21.3	0.065	1.7	0.5430	0.8081	0.083	2.1	0.6773	1.0079	0.109	2.8	0.8589	1.2782	0.147	3.7	1.098	1.6340
3/4	1.050	26.7	0.065	1.7	0.6902	1.0271	0.083	2.1	0.8652	1.2876	0.113	2.9	1.141	1.6980	0.154	3.9	1.487	2.2129
1	1.315	33.4	0.065	1.7	0.8759	1.3035	0.109	2.8	1.4170	2.1087	0.133	3.4	1.695	2.5225	0.179	4.5	2.192	3.2621
1 1/4	1.660	42.2	0.065	1.7	1.117	1.6623	0.109	2.8	1.8220	2.7115	0.140	3.6	2.294	3.4139	0.191	4.8	3.025	4.5017
1 1/2	1.900	48.3	0.065	1.7	1.286	1.9138	0.109	2.8	2.1040	3.1311	0.145	3.7	2.743	4.0821	0.200	5.1	3.665	5.4541
2	2.375	60.3	0.065	1.7	1.619	2.4093	0.109	2.8	2.6620	3.9615	0.154	3.9	3.687	5.4869	0.218	5.5	5.069	7.5435
2 1/2	2.875	73.0	0.083	2.1	2.498	3.7174	0.120	3.05	3.5640	5.3038	0.203	5.2	5.847	8.7013	0.276	7.0	7.733	11.5080
3	3.500	88.9	0.083	2.1	3.057	4.5493	0.120	3.05	4.3720	6.5063	0.216	5.5	7.647	11.38	0.300	7.6	10.35	15.4025
3 1/2	4.000	101.6	0.083	2.1	3.505	5.2160	0.120	3.05	5.0190	7.4691	0.226	5.7	9.194	13.6822	0.318	8.08	12.62	18.7806
4	4.500	114.3	0.083	2.1	3.952	5.8812	0.120	3.05	5.6660	8.4320	0.237	6.0	10.89	16.2061	0.337	8.6	15.12	22.5011
5	5.563	141.3	0.109	2.8	6.409	9.5376	0.134	3.4	7.8419	11.6702	0.258	6.6	14.75	21.9504	0.375	9.5	20.97	31.2068
6	6.625	168.3	0.109	2.8	7.656	11.3934	0.134	3.4	9.3759	13.9530	0.280	7.1	19.15	28.4983	0.432	11.0	28.84	42.9187
8	8.625	219.1	0.109	2.8	10.010	14.8965	0.148	3.8	13.5199	20.1200	0.322	8.2	28.82	42.8889	0.500	12.7	43.79	65.1667
10	10.750	273.0	0.134	3.4	15.340	22.8285	0.165	4.2	18.8298	28.0221	0.365	9.3	40.86	60.8064	0.500	12.7	55.25	82.2211
12	12.750	323.8	0.156	4.0	21.180	31.5193	0.180	4.6	24.3897	36.2963	0.375	9.5	50.03	74.4529	0.500	12.7	66.03	98.2635
14	14.000	355.6	0.156	4.0	23.280	34.6445	0.188	4.8	27.9897	41.6537								
16	16.000	406.4	0.165	4.2	28.170	41.9216	0.188	4.8	32.0497	47.6957								
18	18.000	457.2	0.165	4.2	31.720	47.2046	0.188	4.8	36.0996	53.7227								
20	20.000	508.0	0.188	4.8	40.150	59.7498	0.218	5.5	46.4896	69.1848								
22	22.000	558.8	0.188	4.8	44.210	65.7917	0.218	5.5	51.1895	76.1791								
24	24.000	609.6	0.218	5.5	55.890	83.1735	0.250	6.4	64.0094	95.2574								
30	30.000	762.0	0.250	6.4	80.180	119.3210	0.312	7.9	99.8490	148.5932								

Conversion Factor For Types 347. 347H. 348. 348H
x 1.014
Conversion Factor For Incoloy 800 x 1.014
Conversion Factor For Incoloy 825 x 1.028
Conversion Factor For Inconel 600 x 1.063
Conversion Factor For Hastelloy B x 1.168
Conversion Factor For Hastelloy C x 1.129
Nominal Dimensions of 1/8 to 12" in Scheduel 5S. 10S. 40S. & 80S are per ASA B 36.19-1965.

Millimeter Equivalents of Wire and Sheet Metal Gauges

No.	Imperial Standard Wire Gauge I. W. G. S. W. G.	Birmingham Wire Gauge B. W. G.	American Brown & Sharpe Wire Gauge
	mm	mm	mm
7/0	12.700		
6/0	11.786		
5/0	10.973		
4/0	10.160	11.532	11.684
3/0	9.449	10.795	10.414
2/0	8.839	9.652	9.271
1/0	8.230	8.636	8.255
1	7.620	7.620	7.341
2	7.010	7.214	6.553
3	6.401	6.579	5.817
4	5.893	6.045	5.182
5	5.385	5.588	4.623
6	4.877	5.156	4.115
7	4.470	4.572	3.658
8	4.064	4.191	3.251
9	3.658	3.759	2.896
10	3.251	3.404	2.591
11	2.946	3.048	2.311
12	2.642	2.769	2.057
13	2.337	2.413	1.829
14	2.032	2.108	1.626
15	1.829	1.829	1.448
16	1.626	1.651	1.295
17	1.422	1.473	1.143
18	1.219	1.245	1.016
19	1.016	1.067	0.914
20	0.914	0.889	0.813
21	0.813	0.813	0.724
22	0.711	0.711	0.643
23	0.610	0.635	0.574
24	0.559	0.559	0.510
25	0.508	0.508	0.455
26	0.457	0.457	0.404
27	0.417	0.406	0.361
28	0.376	0.356	0.320
29	0.345	0.330	0.287
30	0.315	0.305	0.254

HEAT-EXCHANGER & CONDENSER TUBES
Stock Sizes and Grades

Tube OD AD	Thickness WS	ASTM A179	ST 35.8/I DIN 17175	ASTM A 199/ A 213 T5	ASTM A 199/ A 213 T9/T11	ASTM A 214	ASTM B 111 C 687 BS 2871/3 CZ110	ASTM B 111 C443 BS 2871/3 CZ111	ASTM B 111 C 706 BS 2871/3 CN 102	ASTM B 111 C 715 BS 2871/3 CN 107	Tube OD AD in mm	Thickness WS in mm
5/8"	18 SWG						•	•			15.88	1.219
5/8"	18 BWG						•	•			15.88	1.245
5/8"	16 BWG	•	•				•	•			15.88	1.651
5/8"	14 BWG										15.88	2.11
5/8"	12 BWG										15.88	2.77
3/4"	18 BWG						•	•	• (1)	• (1)	19.0	1.245
3/4"	16 BWG						•	•	• (1)	• (1)	19.05	1.626
3/4"	16 BWG	•	•			•	•	•	• (1)	• (1)	19.05	1.651
3/4"	14 SWG				•	•	•	•	• (1)	• (1)	19.05	2.032
3/4"	14 BWG	•	•	•			•	•	• (1)	• (1)	19.05	2.108
3/4"	12 BWG	•	•				•	•			19.05	2.769
3/4"	11 BWG										19.05	3.05
3/4"	10 BWG										19.05	3.40
1"	16 BWG										25.40	1.65
1"	14 SWG						•	•			25.40	2.108
1"	14 BWG	•	•	•		•	•	•			25.40	2.108
1"	13 BWG						•	•			25.40	2.413
1"	12 BWG	•	•	•	•	•	•	•			25.40	2.769
1"	11 BWG										25.40	3.05
1"	10 BWG	•	•								25.40	3.404
1 1/4"	14 BWG										31.75	2.11
1 1/4"	12 BWG										31.75	2.77
1 1/4"	10 BWG										31.75	3.40
1 1/2"	12 BWG										38.10	2.77
1 1/2"	10 BWG										38.10	3.40
20MM	2.00MM	• (1)	• (1)								20.00	2.00
25MM	2.00MM	• (1)	• (1)								25.00	2.00
25MM	2.50MM	• (1)	• (1)								25.00	2.50

Please note that the above range gives only an indication of our stock range. We have many other dimensions available from stock. Please contact us with your specific requirements.

(1) Average wall thickness

HEAT-EXCHANGER & CONDENSER TUBES
Carbon Steel

STANDARD GRADE	ASTM A 179	ASTM A 192	DIN 17175 ST 35.8/I	BS3059 Part 1	NFA 49-215 TU 37 C Steel 320
C	0,06 - 0,18	0,06 - 0,18	0,17 max.	0,16 max.	0,18 max.
Mn	0,27 - 0,63	0,27 - 063	0,40 - 0,80	0,30 - 0,70	0,30 - 0,80
P	0,035 max.	0,035 max.	0,040 max.	0,040 max.	0,045 max.
S	0,035 max.	0,035 max.	0,040 max.	0,040 max.	0,045 max.
Si		0,25 max.	0,10 - 0,35	0,10 - 0,35	0,05 - 0,27
Cu					0,25 max.
Sn					0,03 max.
Yield Strength	180 min.	180 min.	215 min.	195 min.	220 min.
N/mm2					
Tensile Strength	325 min.	325 min.	360 - 480	320 - 480	360 - 450
N/mm2					
Elongation (%)	35 min.	35 min.	25 min.	25 min.	Rm (A-2)›10500 min.
Hardness HRB	72 max.	77 max.			

HEAT-EXCHANGER & CONDENSER TUBES
Low Alloy Steel | Grade T5

STANDARD GRADE	ASTM A 213 T5	ASTM A 199 T5	DIN 17176 12 CrMo 195	BS30604 Part 1 Type 625	NFA 49-215 TU Z 10 CD 5.05
C	0,15 max.	0,15 max.	0,08 - 0,15	0,15 max.	0,15 max.
Mn	0,30 - 0,60	0,30 - 060	0,30 - 0,60	0,30 - 0,60	0,30 - 0,60
P	0,025 max.	0,025 max.	0,025 max.	0,030 max.	0,030 max.
S	0,025 max.	0,025 max.	0,020 max.	0,030 max.	0,030 max.
Si	0,50 max.	0,50 max.	0,50 max.	0,50 max.	0,10 - 0,50
Cr	4,00 - 6,00	4,00 - 6,00	4,00 - 6,00	4,00 - 6,00	4,00 - 6,00
Mo	0,45 - 0,65	0,45 - 0,65	0,45 - 0,65	0,45 - 0,65	0,45 -0,65
Cu	0,25 max. Sn	0,030 max Al	0,02 max.		
Yield Strength	min. 205	min. 170	min. 175	min. 170	min. 205
N/mm2					
Tensile Strength	min. 415	min. 415	410 - 540	450 - 600	410 - 560
N/mm2					
Elongation (%)	min. 30	min. 30	min. 22	min. 20	min. 22
Hardness HRB	85 max.	85 max.			

NON FERROUS HEAT EXCHANGER & CONDENSER TUBES
Carbon Alloy Steel

WT / OD	SWG M/W mm	SWG A/W mm	BWG M/W mm	BWG A/W mm	SWG M/W mm	SWG A/W mm	BWG M/W mm	BWG A/W mm	SWG M/W mm	SWG A/W mm	BWG M/W mm	BWG A/W mm	SWG M/W mm	SWG A/W mm	BWG M/W mm	BWG A/W mm	SWG M/W mm	SWG A/W mm	BWG M/W mm
	25.00 0.508	25.00 0.508	25.00 0.507	25.00 0.507	23.00 0.610	23.00 0.610	23.00 0.634	23.00 0.634	22.00 0.711	22.00 0.711	22.00 0.711	22.00 0.711	21.00 0.813	21.00 0.813	21.00 0.812	21.00 0.812	20.00 0.914	20.00 0.914	20.00 0.889
3/16" 4.76 mm	0.058	0.053	0.058	0.053	0.068	0.062	0.075	0.065	0.077	0.071	0.077	0.071	0.086	0.079	0.086	0.079	0.094	0.087	0.092
1/4" 6.35 mm	0.080	0.073	0.080	0.073	0.095	0.086	0.098	0.089	0.108	0.099	0.108	0.099	0.121	0.111	0.121	0.111	0.133	0.123	0.131
3/8" 9.53 mm	0.125	0.113	0,125	0.113	0.148	0.134	0.153	0.139	0.170	0.155	0.170	0.155	0.192	0.175	0.192	0.175	0.213	0.194	0.208
1/2" 12.7mm	0.169	0.153	0.169	0.152	0.201	0.182	0.208	0.189	0.232	0.210	0.232	0.210	0.262	0,238	0.262	0.238	0.292	0.266	0.285
5/8" 15.88 mm																0.372	0.337	0.362	
3/4" 19.05 mm																0.451	0.409	0.440	
7/8" 22.2 mm																			
1" 25.4 mm																			
1 1/16" 26.99 mm																			
1 1/8" 28.58 mm																			
1 1/4" 31.75 mm																			
1 1/2" 38.1 mm																			
1 3/4" 44.45 mm																			
2" 50.8 mm																			
2 1/4" 57.15 mm																			
2 1/2" 63.5 mm																			
2 3/4" 69.85 mm																			
3" 76.2 mm																			

WT / OD	SWG M/W mm	SWG A/W mm	BWG M/W mm	BWG A/W mm	SWG M/W mm	SWG A/W mm	BWG M/W mm	BWG A/W mm	SWG M/W mm	SWG A/W mm	BWG M/W mm	BWG A/W mm	SWG M/W mm	SWG A/W mm	BWG M/W mm	BWG A/W mm	SWG M/W mm	SWG A/W mm	BWG M/W mm
	13.00 2.337	13.00 2.337	13.00 2.413	13.00 2.413	12.00 2.642	12.00 2.642	12.00 2,768	12.00 2.768	11.00 2.947	11.00 2.947	11.00 3.048	11.00 3.048	10.00 3.251	10.00 3.251	10.00 3.403	10.00 3.403	9.00 3.658	9.00 3.658	9.00 3.760
1/2" 12.7 mm	0.647	0.597	0.662	0.612	0.706	0.655	0.729	0.678											
5/8" 15.88 mm	0.850	0.780	0.872	0,801	0.936	0.862	0.970	0.895											
3/4" 19.05 mm	1.053	0.962	1.082	0.990	1.165	1.069	1.210	1.111											
7/8" 22.2 mm	1.255	1.146	1.290	1.179	1.394	1.276	1.450	1.328	1.523	1.401	1.523	1.441	1.657	1.521		1.579			
1" 25.4 mm	1.459	1.329	1.502	1.368	1.624	1.483	1.691	1.545	1.780	1.632	1.835	1.680	1.940	1.776	2.014	1.846	2.137	1.961	
1 1/16" 26.99 mm	1.561	1.421	1.607	1.463	1.742	1.586	1.814	1.654	1.915	1.747	1.972	1.800	2.083	1.903	2.165	1.980	2.298	2.105	
1 1/8" 28.58 mm	1.660	1.512	1.710	1.557	1.854	1.690	1.933	1.763	2.041	1.862	2.101	1.919	2.223	2.030	2.310	2.112	2.455	2.248	
1 1/4" 31.75 mm	1.865	1.695	1.921	1.764	2.082	1.897	2.171	1.979	2.290	2.093	2.365	2.157	2.505	2.285	2.607	2.379	2.772	2.534	2.836
1 1/2" 38.1 mm	2.268	2.061	2.341	2.124	2.541	2.310	2.656	2.412	2.801	2.555	2.894	2.635	3.071	2.794	3.199	2.912	3.408	3.107	3.489
1 3/4" 44.45 mm	2.676	2.427	2.759	2.502	3.003	2.724	3.137	2.845	3.311	3.015	3.423	3.112	3.636	3.303	3.791	3.445	4.044	3.680	4.142
2" 50.8 mm	3.084	2.793	3.180	2.879	3.461	3.138	3.619	3.279	3.822	3.478	3.953	3.589	4.201	3.812	4.380	3.978	4.680	4.253	4.795
2 1/4" 57.15 mm	3.490	3.159	3.596	3.256	3.920	3.551	4.098	3.712	4.332	3.939	4.482	4.066	4.765	4.321	4.975	4.510	4.332	3.939	5.450
2 1/2" 63.5 mm	3.896	3.525	4.020	3.635	4.379	3.965	4.582	4.146	4.843	4.401	5.011	4.544	5.332	4.830	5.567	5.044	5.951	5.398	6.101
2" 50.8 mm	4.302	3.891	4.436	4.013	4.838	4.379	5.060	4.580	5.353	4.862	5.541	5.021	5.897	5,339	6.159	5.576	6.587	5.971	6.757
2 3/4" 69.85 mm	4.708	4.257	4.859	4.391	5.297	4.792	5.545	5.013	5.864	5.323	6.070	5.499	6.462	5.848	6.751	6.109	7.223	6.544	7.411
3" 76.2 mm	5.115	4.623	5.278	4.768	5.757	5.206	6.023	5.446	6.394	5.785	6.599	5.976	7.027	6.356	7.343	6.642	7.858	7.116	8.064
3 1/4" 82.55 mm	5.521	4.989	5.698	5.145	6.216	5.620	6.504	5.879	6.885	6.246	7.129	6.453	7.593	6.866	7.935	7.175	8.494	7.689	8.713
3 1/2" 95.25 mm					6.675	6.034	6.985	6.313	7.395	6.708	7.657	6.930	8.158	7.375	8.526	7.708	9.130	8.262	9.370
4" 101.6 mm																			

NON FERROUS HEAT EXCHANGER & CONDENSER TUBES

Principal Inch and SWG-BWG Sizes and their mm Equivalents

SWG A/W mm	SWG M/W mm	BWG A/W mm	BWG M/W mm	SWG A/W mm	SWG M/W mm	BWG A/W mm	BWG M/W mm	SWG A/W mm	SWG M/W mm	BWG A/W mm	BWG M/W mm	SWG A/W mm	SWG M/W mm	BWG A/W mm	BWG M/W mm	SWG A/W mm	SWG M/W mm	BWG A/W mm	WT / OD
19 1.016	19 1.086	19 1.086	18 1.219	18 1.219	18 1.244	18 1.244	16 1.626	16 1.626	16 1.651	16 1.651	15 1.829	15 1.829	15 1.828	15 1.828	14 2.032	14 2.032	14 2.108	14 2.108	
0.094	0.106	0.089																	3/16" 4.76 mm
0.134	0.153	0.141	0.167	0.154	0.169	0.157	0.202	0.189	0.204	0.191	0.216	0.204	0.216	0.204					1/4" 6.35 mm
0.213	0.247	0.226	0.273	0.250	0.278	0.254	0.344	0.317	0.348	0.321	0.375	0.347	0.375	0.347					3/8" 9.53 mm
0.293	0.342	0.311	0.379	0.345	0.385	0.351	0.485	0.444	0.491	0.450	0.534	0.490	0.534	0.490	0.581	0.536	0.599	0.551	1/2" 12.7mm
0.372	0.436	0.396	0.485	0.441	0.494	0.449	0.626	0.572	0.635	0.579	0.693	0.634	0.693	0.633	0.758	0.694	0.781	0.716	5/8" 15.88 mm
0.452	0.530	0.481	0.590	0.536	0.601	0.545	0.766	0.698	0.779	0.709	0.852	0.777	0.852	0.777	0.936	0.853	0.964	0.881	3/4" 19.05 mm
			0.696	0.631	0.709	0.643	0.909	0.826	0.919	0.836	1.010	0.919	1.009	0.918	1.112	1.012	1.147	1.045	7/8" 22.2 mm
			0.802	0.726	0.817	0.714	1.048	0.953	1.068	0.970	1.170	1.063	1.169	0.918	1.290	1.171	1.331	1.211	1" 25.4 mm
							1.121	1.017	1.137	1.032	1.251	1.135	1.250	1.134	1.377	1.251	1.424	1.294	1 1/16" 26.99 mm
							1.193	1.081	1.210	1.097	1.331	1.207	1.329	1.206	1.466	1.330	1.514	1.376	1 1/8" 28.58 mm
							1.333	1.208	1.350	1.225	1.487	1.349	1.487	1.349	1.644	1.489	1.697	1.541	1 1/4" 31.75 mm
							1.615	1.462	1.637	1.483	1.805	1.636	1.805	1.636	1.998	1.807	2.064	1.871	1 1/2" 38.1 mm
															2.351	2.126	2.430	2.201	1 3/4" 44.45 mm
															2.704	2.444	2.796	2.531	2" 50.8 mm
															3.054	2.762	3.163	2.861	2 1/4" 57.15 mm
															3.407	3.080	3.529	3.192	2 1/2" 63.5 mm
															3.761	3.399	3.896	3.522	2 3/4" 69.85 mm
															4.121	3.716	4.262	3.852	3" 76.2 mm

	SWG A/W mm	SWG M/W mm	BWG A/W mm	BWG M/W mm	SWG A/W mm	SWG M/W mm	BWG A/W mm	WT / OD
	8 40.64	8 4.191	8 4.191	7 4.471	7 4.471	7 4.572	7 4.572	
								1/2" 12.7 mm
								5/8" 15.88 mm
								3/4" 19.05 mm
								7/8" 22.2 mm
	2.137		2.192					1" 25.4 mm
								1 1/16" 26.99 mm
								1 1/8" 28.58 mm
	2.775	3.108	2.848					1 1/4" 31.75 mm
	3.411	3.836	3.505	4.055	3.708	4.133	3.780	1 1/2" 38.1 mm
	4.047	4.564	4.161	4.833	4.408	4.928	4.496	1 3/4" 44.45 mm
	4.684	5.292	4.817	5.610	5.108	5.717	5.212	2" 50.8 mm
	5.320	6.022	5.473	6.387	5.808	6.517	5.928	2 1/4" 57.15 mm
	5.957	6.751	6.130	7.164	6.508	7.312	6.644	2 1/2" 63.5 mm
	6.593	7.479	6.786	7.941	7.208	8.106	7.36	2" 50.8 mm
	7.229	8.208	7.442	8.718	7.908	8.106	8.076	2 3/4" 69.85 mm
	7.866	8.933	8.098	9.496	8.608	9.696	8.792	3" 76.2 mm
	8.502	9.661	8.755	10.273	9.308	10.491	9.508	3 1/4" 82.55 mm
	9.138	10.393	9.411	11.050	10.009	11.285	10.223	3 1/2" 95.25 mm
	9.775	11.122	10.066	11.827	10.709	12.080	10.939	4" 101.6 mm

Weights in kg/m		
Conversion Factors	Carbon Steel	
Aluminium Brass (Alloy 687)	x	1.057
Admiralty Brass (Alloy 443)	x	1.082
Cu/Ni 90/10 (Alloy 706)	x	1.133
Cu/Ni 70/30 (Alloy 715)	x	1.133
Stainless steel	x	1.015
UNS N04400	x	1.125
UNS N06600	x	1.073
UNS N08800	x	1.013
UNS N08810	x	1.013
UNS N08825	x	1.037
UNS N0N10665	x	1.174
UNS N0N06455	x	1.131

NON FERROUS HEAT EXCHANGER & CONDENSER TUBES

Weights & Dimensions for the most popular sizes

Size	Material Cu/Ni 90/10 - Cu/Ni 70/30		Material Aluminium Brass		Material Admiralty Brass	
	Min. Wall	Aver. Wall	Min. Wall	Aver. Wall	Min. Wall	Aver. Wall
3/4" x 12 BWG	1.338	1.280	1.248	1.194	1.275	1.217
12 SWG	1.287	1.231	1.201	1.149	1.227	1.170
13 BWG	1.192	1.140	1.112	1.064	1.136	1.084
13 SWG	1.160	1.109	1.082	1.035	1.105	1.055
14 BWG	1.060	1.014	0.989	0.946	1.011	0.964
14 SWG	1.027	0.982	0.958	0.916	0.978	0.934
15 BWG	0.935	0.894	0.872	0.834	0.891	0.850
15 SWG	0.935	0.894	0.872	0.835	0.891	0.850
16 BWG	0.853	0.816	0.796	0.761	0.813	0.776
16 SWG	0.841	0.805	0.785	0.751	0.802	0.765
18 BWG	0.658	0.629	0.614	0.587	0.627	0.598
18 SWG	0.645	0.617	0.602	0.576	0.615	0.587
19 BWG	0.579	0.554	0.540	0.517	0.552	0.527
19 SWG	0.544	0.520	0.507	0.485	0.519	0.495
20 BWG	0.479	0.458	0.447	0.428	0.457	0.436
20 SWG	0.492	0.471	0.459	0.439	0.469	0.448
1" x 10 BWG	2.223	2.126	2.074	1.984	2.118	2.021
10 SWG	2.138	2.045	1.995	1.908	2.038	1.944
11 BWG	2.023	1.935	1.887	1.805	1.928	1.839
11 SWG	1.965	1.879	1.833	1.753	1.873	1.787
12 BWG	1.860	1.779	1.735	1.660	1.773	1.691
12 SWG	1.785	1.708	1.666	1.593	1.702	1.623
13 BWG	1.647	1.575	1.536	1.470	1.570	1.498
13 SWG	1.601	1.531	1.493	1.428	1.525	1.455
14 BWG	1.458	1.394	1.360	1.301	1.390	1.326
14 SWG	1.410	1.349	1.315	1.258	1.344	1.282
15 BWG	1.280	1.224	1.194	1.142	1.219	1.163
15 SWG	1.280	1.224	1.194	1.142	1.220	1.164
16 BWG	1.165	1.114	1.086	1.039	1.110	1.059
16 SWG	1.148	1.098	1.071	1.024	1.094	1.044
18 BWG	0.892	0.853	0.832	0.796	0.850	0.811
18 SWG	0.875	0.837	0.817	0.781	0.834	0.796
19 BWG	0.784	0.750	0.731	0.700	0.747	0.713
19 SWG	0.736	0.704	0.686	0.657	0.701	0.669
20 BWG	0.647	0.619	0.604	0.577	0.617	0.588
20 SWG	0.665	0.636	0.620	0.593	0.633	0.604
10 x 1 mm	0.267	0.256	0.249	0.239	0.255	0.243
12 x 1 mm	0.327	0.312	0.305	0.292	0.311	0.297
12 x 1.5 mm	0.468	0.447	0.436	0.417	0.446	0.425
14 x 1 mm	0.386	0.369	0.360	0.345	0.368	0.351
14 x 1.5 mm	0.557	0.533	0.519	0.497	0.531	0.506
16 x 1 mm	0.446	0.426	0.416	0.398	0.425	0.405
16 x 1.5 mm	0.646	0.618	0.602	0.576	0.616	0.587
18 x 1 mm	0.505	0.483	0.471	0.451	0.481	0.459
18 x 1.5 mm	0.735	0.703	0.686	0.656	0.700	0.668
20 x 2 mm	1.069	1.022	0.997	0.954	1.019	0.972
20 x 2.5 mm	1.299	1.243	1.212	1.159	1.238	1.181
22 x 2 mm	1.188	1.136	1.108	1.060	1.132	1.080
22 x 2.5 mm	1.448	1.385	1.350	1.292	1.380	1.316
25 x 2 mm	1.366	1.306	1.274	1.219	1.302	1.242
25 x 2.5 mm	1.671	1.598	1.558	1.491	1.592	1.519

Weight Factors (Cu/Ni + Brass) (Steel = 0.02466)		min.	Av
1. Aluminium Brass	(Al 687)	0.0262009	0.0265	0.0275
2. Admiralty Brass	(Al 443)	0.0267978	0.0270	0.0281
3. Cu/Ni	(Al 706)	0.0280859	0.0284	0.0295
4. Cu/Ni	(Al 715)	0.0280859	0.0284	0.0295

Weight formula: [O.D. (mm) - W.T. (mm)] x W.T. (mm) x weight factor = kg/meter

NON FERROUS HEAT EXCHANGER & CONDENSER TUBES
Aluminium Brass | ALLOY 687

Standard Grade	BS 2871/PART 3 CZ 110	ASTM B 111 C 68700	DIN 17660/1785 CuZn20Al2	NFA 51102 CuZn20Al2	JIS H3300 C 6870
Cu	76.0 - 78.0	76.0 - 79.0	76.0 - 79.0	76.0 - 79.0	76.0 - 79.0
Al	1.8 - 2.3	1.8 - 2.5	1.8 - 2.3	1.8 - 2.5	1.8 - 2.5
Pb	0.07 max	0.07 max	0.07 max.	0.07 max.	0.07 max.
Ni			0.1 max.		
Fe	0.06 max.	0.06 max.	0.07 max.	0.06 max.	0.06 max.
Zn	Rem.	Rem.	Rem.	Rem.	Rem.
As	0.02 - 0.06	0.02 - 0.10	0.02 - 0.035	0.02 - 0.06	0.02 - 0.06
P			0.01 max.		
Mg	10G		0.005 max.		
Mn	9G		0.1 max.		
Total Impurities	0.3 max.		Others Total	0.03 max.	
			0.1 max.		
CONDITION	M	061	F39	Annealed (X690)	O
	TA		F34	—	—
	O			—	—
Yield Strength	—	125 min.	150 - 230	—	—
N/mm2	—	—	120 - 180	—	—
	—	—		—	—
Tensile Strength	—	345 min.	390 min.	—	373 min.
N/mm2	—	—	340 min.	—	—
	—	—	—	—	—
Elongation (%)	—	—	45 min.	—	40 min.
	—	—	55 min.	—	—
	—	—	—	—	—
Hardness Hv5	150 min.	—	—	80 - 130	—
	85 - 110	—	—	—	—
	75 max.	—	—	—	—
Grain Size (mm)	0.050 max.	0.010 - 0.045	0.010 - 0.050	0.010 - 0.045	0.010 - 0.045
	(Condition TA)				

Typical use: Most used copper alloy for heat exchanger tubes application. Represents the best option for any heat exchanger which is involved with saline water. The addition of arsenic has solved the problem of dezincfication.

Melting Point: 935° C
Density (20° C): 8.33 g/cm3

- Hot Working Properties: OK
- Cold Working Properties: Very Good

Weight formula: Average wall: (OD-WT) x WT x 0.0265 = Kg/m (all sizes in mm)
Minimum wall: (OD-WT) x WT x 0.0275 = Kg/m (all sizes in mm)

Standard Grade	BS 2871/PART 3 CZ 111	ASTM B 111 C 44300	DIN 17660/1785 CuZn28Sn1	NFA 51102 CuZn29Sn1	JIS H3300 C 4430
Cu	70.0 - 73.0	70.0 - 73.0	70.0 - 72.5	70.0 - 73.0	70.0 - 73.0
Sn	1.0 - 1.5	0.9 - 1.2	0.9 - 1.3	0.9 - 1.2	0.9 - 1.2
Pb	0.07 max.	0.07 max	0.07 max.	0.07 max.	0.07 max.
Ni			0.1 max.		
Fe	0.06 max.	0.06 max.	0.07 max.	0.06 max.	0.06 max.
Zn	Rem.	Rem.	Rem.	Rem.	Rem.
As	0.02 - 0.06	0.02 - 0.06	0.02 - 0.035	0.02 - 0.06	0.02 - 0.06
P			0.01 max.		
Mn			0.1 max.		
Total Impurities	0.3 max.		Others Total	0.03 max.	
			0.1 max.		
CONDITION	M	061	F36	Annealed (X690)	O
	TA		F32	—	—
	O			—	—
Yield Strength	—	105 min.	140 - 220	—	—
N/mm2	—	—	100 - 170	—	—
	—	—		—	—
Tensile Strength	—	310 min.	360 min.	—	314 min.
N/mm2	—	—	320 min.	—	—
	—	—	—	—	—
Elongation (%)	—	—	45 min.	—	30 min.
	—	—	55 min.	—	—
	—	—	—	—	—
Hardness Hv5	150 min.	—	—	80 - 120	—
	85 - 105	—	—	—	—
	75 max.	—	—	—	—
Grain Size (mm)	0.050 max.	0.010 - 0.045	0.010 - 0.050	0.010 - 0.045	0.010 - 0.045
	(Condition TA)				

Typical use:
The specific copper alloy for application fresh water.
Often used for heat exchangers which are involved with operations in petroleum refineries and petrochemical plants.

Melting Point: 935 ° C
Density (20° C): 8.53 g/cm3

- Hot Working Properties: OK
- Cold Working Properties: Very Good

Weight formula:
Average wall: (OD-WT) x WT x 0.0270 = Kg/m (all sizes in mm)
Minimum wall: (OD-WT) x WT x 0.0281 = Kg/m (all sizes in mm)

NON FERROUS HEAT EXCHANGER & CONDENSER TUBES

Copper Nickel 90/10 | ALLOY 706

Standard Grade	BS 2871/PART 3 CN 102	ASTM B 111 C 70600	DIN 17664/1785 CuNi10Fe1Mn	NFA 51102 CuNi10Fe1Mn	JIS H3300 C 7060
Cu	Rem.	Rem.	Rem.	Rem.	Rem.
Pb	0.01 max.	0.05 max.	0.03 max.	0.05 Sn+Pb max.	0.05 max.
Ni	10.0 - 11.0	9.0 - 11.0	9.0 - 11.0	9.0 - 11.0	9.0 - 11.0
Fe	1.0 - 2.0	1.0 - 1.8	1.0 - 1.8	1.0 - 2.0	1.0 - 1.8
Mn	0.5 - 1.0	1.0 max.	0.5 - 1.0	0.3 - 1.0	0.2 - 1.0
Zn		1.0 max.	0.5 max.	0.5 max.	0.5 max.
S	0.05 max.		0.05 max.	0.02 max.	
C	0.05 max.		0.05 max.	0.05 max.	
Cu+Ni+Fe+Mn					99.5 min.
Total Impurities	0.3 max.		Others Total		
			0.1 max.		
CONDITION	M	061	F29	Annealed (X690)	O
	O	H55		—	—
Yield Strength	—	105 min.	90 - 180	—	—
N/mm2	—	240 min.	—	—	—
Tensile Strength	—	275 min.	290 min.	—	275 min.
N/mm2	—	310 min.		—	—
Elongation (%)	—	—	30 min.	—	30 min.
	—	—	—	—	—
Hardness Hv5	150 min.	—	—	70 - 100	—
	80 - 110	—	—	—	—
Grain Size (mm)	0.050 max.	0.010 - 0.045	0.010 - 0.050	0.010 - 0.045	0.010 - 0.045
	(Condition O)				

Typical use: Used for working in sea water, mainly for shipbuilding and sea water pipelines, stations, desalination, because of its very good corrosive resistance.

Melting Point: 1150° C
Density (20° C): 8.94 g/cm3

- Hot Working Properties: Good
- Cold Working Properties: Good

Weight formula: Average wall: (OD-WT) x WT x 0.0284 = Kg/m (all sizes in mm)
Minimum wall: (OD-WT) x WT x 0.0295 = Kg/m (all sizes in mm)

STANDARD GRADE	BS 2871/PART 3 CN 107	ASTM B 111 C 71500	DIN 17664/1785 CuNi30Mn1Fe	NFA 51102 CuNi30Mn1Fe	JIS H3300 C 7150
Cu	Rem.	Rem.	Rem.	Rem.	Rem.
Pb	0.01 max.	0.05 max.	0.03 max.	0.05 Sn+Pb max.	0.05 max.
Ni	30.0 - 32.0	29.0 - 33.0	30.0 - 32.0	29.0 - 32.0	29.0 - 33.0
Fe	0.4 - 1.0	0.4 - 1.0	0.4 - 1.0	0.4 - 0.7	0.4 - 0.7
Mn	0.5 - 1.5	1.0 max.	0.5 - 1.5	0.5 - 1.5	0.2 - 1.0
Zn		1.0 max.	0.5 max.	0.5 max.	0.5 max.
S	0.08 max.		0.06 max.	0.02 max.	
C	0.06 max.		0.06 max.	0.06 max.	
Cu+Ni+Fe+Mn					99.5 min.
Total Impurities	0.3 max.		Others Total	0.1 max.	
			0.1 max.		
CONDITION	M	061	F37	Annealed (X690)	O
	O	HR50	—	—	—
Yield Strength	—	125 min.	120 - 220	—	—
N/mm2	—	345 min.	—	—	—
Tensile Strength	—	360 min.	370 min.	—	363 min.
N/mm2	—	495 min.	—	—	—
Elongation (%)	—	—	35 min.	—	30 min.
	—	12 min. (WT 1.21 mm)	—	—	—
		15 min. (WT>1.21 mm)			
Hardness Hv5	150 min.	—	—	90 - 130	—
	90 - 120	—	—	—	—
Grain Size (mm)	0.050 max.	0.010 - 0.045	0.010 - 0.050	0.010 - 0.045	0.010 - 0.045
	(Condition O)				

Typical use: This alloy has all the characteristics of CuNi 90/10, but also offers excellent corrosion resistance in high velocity sea water. Also the operating temperature is much higher than of CuNi 90/10. Can assure a long service life and reliability.

Melting Point: 1240° C
Density (20° C): 8.94 g/cm3

- Hot Working Properties: Good
- Cold Working Properties: Good

Weight formula: Average wall: (OD-WT) x WT x 0.0284 = Kg/m (all sizes in mm)
Minimum wall: (OD-WT) x WT x 0.0295 = Kg/m (all sizes in mm)

NON FERROUS HEAT EXCHANGER & CONDENSER TUBES

Copper Nickel Iron Manganese 66/30/2/2 | ALLOY 71640

STANDARD GRADE	BS 2871/PART 3 CN 108	ASTM B 111 C 71640	DIN 17664/1785 CuNi30Fe2Mn2	NFA 51102 CuNi30Fe2Mn2	JIS H3300 C 7164
Cu	Rem.	Rem.	Rem.	Rem.	Rem.
Pb		0.05 max.	0.02 max.	0.05 Sn+Pb max.	0.05 max.
Ni	29.0 - 32.0	29.0 - 32.0	29.0 - 32.0	29.0 - 32.0	29.0 - 32.0
Fe	1.7 - 2.3	1.7 - 2.3	1.5 - 2.5	1.5 - 2.0	1.7 - 2.3
Mn	1.5 - 2.5	1.5 - 2.5	1.5 - 2.5	1.5 - 2.0	1.5 - 2.5
Zn		1.0 max.	0.5 max.	0.5 max.	0.5 max.
S			0.06 max.	0.02 max.	
C			0.05 max.	0.06 max.	
Cu+Ni+Fe+Mn					min. 99.5
Total Impurities	0.3 max.		0.3 max.	0.1 max.	
CONDITION	M	061	F42	Annealed (X690)	O
	O	HR50	—		—
Yield Strength	—	170 min.	150 - 260	—	—
N/mm2	—	400 min.	—	—	—
Tensile Strength	—	435 min.	420 min.	—	430 min.
N/mm2	—	560 min.	—	—	—
Elongation (%)	—	—	30 min.	—	30 min.
	—	—	—	—	—
Hardness Hv5	150 min.	—	—	90 - 130	—
	90 - 120	—	—	—	—
Grain Size (mm)	0.050 max.	0.010 - 0.045	0.010 - 0.050	0.010 - 0.045	0.010 - 0.045
	(Condition O)				

Typical use: Has the most resistance against impingement attack and corrosion by suspended solids of all copper based alloys which are used for heat exchanger tube applications. This alloy is preferred for desalination plants.

Melting Point: 1240° C
Density (20° C): 8.94 g/cm3

- Hot Working Properties: Good
- Cold Working Properties: Good

Weight formula: Average wall: (OD-WT) x WT x 0.0284 = Kg/m (all sizes in mm)
Minium wall: (OD-WT) x WT x 0.0295 = Kg/m (all sizes in mm)

WEIGHTS FOR PRECISION STEEL TUBES
kg/m

Wall mm	Outside diameter in mm									Wall mm
	4	5	6	7	8	9	10	11	12	
0.5	0.043	0.055	0.068	0.080	0.092	0.105	0.117	0.129	0.142	0.5
0.6	0.050	0.065	0.080	0.095	0.109	0.124	0.139	0.154	0.169	0.6
0.7	0.057	0.074	0.091	0.109	0.126	0.143	0.161	0.178	0.195	0.7
0.8	0.063	0.083	0.103	0.122	0.142	0.162	0.181	0.201	0.221	0.8
0.9	0.069	0.091	0.113	0.135	0.158	0.180	0.202	0.224	0.246	0.9
1	0.074	0.099	0.123	0.148	0.173	0.197	0.222	0.247	0.271	1
1.1	0.079	0.106	0.133	0.160	0.187	0.214	0.241	0.269	0.296	1.1
1.2	0.083	0.112	0.142	0.172	0.201	0.231	0.260	0.290	0.320	1.2
1.3	0.087	0.119	0.151	0.183	0.215	0.247	0.279	0.311	0.343	1.3
1.4	0.090	0.124	0.159	0.193	0.228	0.262	0.297	0.331	0.366	1.4
1.5	0.092	0.129	0.166	0.203	0.240	0.277	0.314	0.351	0.388	1.5
1.6			0.174	0.213	0.253	0.292	0.331	0.371	0.410	1.6
1.7			0.180	0.222	0.264	0.306	0.348	0.390	0.432	1.7
1.8			0.186	0.231	0.275	0.320	0.364	0.408	0.453	1.8
1.9			0.192	0.239	0.286	0.333	0.379	0.426	0.473	1.9
2			0.197	0.247	0.296	0.345	0.395	0.444	0.493	2
2.2			0.206	0.260	0.315	0.369	0.423	0.477	0.532	2.2
2.50					0.339	0.401	0.462	0.524	0.586	2.50
2.8							0.497	0.566	0.635	2.8
3							0.518	0.592	0.666	3
3.25							0.541	0.621	0.701	3.25
3.50							0.561	0.647	0.734	3.50
3.75							0.578	0.670	0.763	3.75
4							0.592	0.691	0.789	4
4.25									0.812	4.25
4.50									0.832	4.50



WEIGHTS FOR PRECISION STEEL TUBES
kg/m

Wall mm	Outside diameter in mm									Wall mm
	13	14	15	16	17	18	19	20	21	
0.5	0.154	0.166	0.179	0.191	0.203	0.216	0.228	0.240	0.253	0.5
0.6	0.183	0.198	0.213	0.228	0.243	0.257	0.272	0.287	0.302	0.6
0.7	0.212	0.230	0.247	0.264	0.281	0.299	0.316	0.333	0.350	0.7
0.8	0.241	0.260	0.280	0.300	0.320	0.339	0.359	0.379	0.399	0.8
0.9	0.269	0.291	0.313	0.335	0.357	0.380	0.402	0.424	0.446	0.9
1	0.296	0.321	0.345	0.370	0.395	0.419	0.444	0.469	0.493	1
1.1	0.323	0.350	0.377	0.404	0.431	0.458	0.486	0.513	0.540	1.1
1.2	0.349	0.379	0.408	0.438	0.468	0.497	0.527	0.556	0.586	1.2
1.3	0.375	0.407	0.439	0.471	0.503	0.535	0.567	0.599	0.632	1.3
1.4	0.400	0.435	0.470	0.504	0.539	0.573	0.608	0.642	0.677	1.4
1.5	0.425	0.462	0.499	0.536	0.573	0.610	0.647	0.684	0.721	1.5
1.6	0.450	0.489	0.529	0.568	0.608	0.647	0.687	0.726	0.765	1.6
1.7	0.474	0.516	0.558	0.599	0.641	0.683	0.725	0.767	0.809	1.7
1.8	0.497	0.542	0.586	0.630	0.675	0.719	0.763	0.808	0.852	1.8
1.9	0.520	0.567	0.614	0.661	0.707	0.754	0.801	0.848	0.895	1.9
2	0.543	0.592	0.641	0.690	0.740	0.789	0.838	0.888	0.937	2
2.2	0.586	0.640	0.694	0.749	0.803	0.857	0.911	0.966	1.020	2.2
2.50	0.647	0.709	0.771	0.832	0.894	0.956	1.017	1.079	1.141	2.50
2.8	0.704	0.773	0.842	0.911	0.981	1.050	1.119	1.188	1.257	2.8
3	0.740	0.814	0.888	0.962	1.036	1.110	1.184	1.258	1.332	3
3.25	0.781	0.862	0.942	1.022	1.102	1.182	1.262	1.342	1.423	3.25
3.50	0.820	0.906	0.993	1.079	1.165	1.251	1.338	1.424	1.510	3.50
3.75	0.855	0.948	1.040	1.133	1.225	1.318	1.410	1.503	1.595	3.75
4	0.888	0.986	1.085	1.184	1.282	1.381	1.480	1.578	1.677	4
4.25	0.917	1.022	1.127	1.231	1.336	1.441	1.546	1.651	1.755	4.25
4.50	0.943	1.054	1.165	1.276	1.387	1.498	1.609	1.720	1.831	4.5
4.75		1.084	1.201	1.318	1.435	1.552	1.669	1.786	1.903	4.75
5		1.110	1.233	1.356	1.480	1.603	1.726	1.850	1.973	5
5.25			1.262	1.392	1.521	1.651	1.780	1.910	2.039	5.25
5.50			1.289	1.424	1.560	1.695	1.831	1.967	2.102	5.50
5.75			1.312	1.453	1.595	1.737	1.879	2.021	2.162	5.75
6				1.480	1.628	1.776	1.924	2.072	2.220	6
6.25								2.119	2.273	6.25
6.50								2.164	2.324	6.50
6.75								2.206	2.372	6.75
7								2.244	2.417	7

WEIGHTS FOR PRECISION STEEL TUBES

kg/m

Wall mm	Outside diameter in mm									Wall mm
	22	23	24	25	26	27	28	29	30	
0.5	0.265	0.277	0.290	0.302	0.314	0.327	0.339	0.351	0.364	0.5
0.6	0.317	0.331	0.346	0.361	0.376	0.391	0.405	0.420	0.435	0.6
0.7	0.368	0.385	0.402	0.419	0.437	0.454	0.471	0.489	0.506	0.7
0.8	0.418	0.438	0.458	0.477	0.497	0.517	0.537	0.556	0.576	0.8
0.9	0.468	0.490	0.513	0.535	0.557	0.579	0.601	0.624	0.645	0.9
1	0.518	0.543	0.567	0.592	0.617	0.641	0.666	0.690	0.715	1
1.1	0.567	0.594	0.621	0.648	0.675	0.703	0.730	0.757	0.784	1.1
1.2	0.616	0.645	0.675	0.704	0.734	0.763	0.793	0.823	0.852	1.2
1.3	0.664	0.696	0.728	0.760	0.792	0.824	0.856	0.888	0.920	1.3
1.4	0.711	0.746	0.780	0.815	0.849	0.884	0.918	0.953	0.987	1.4
1.5	0.758	0.795	0.832	0.869	0.906	0.943	0.98	1.017	1.054	1.5
1.6	0.805	0.844	0.884	0.923	0.963	1.002	1.042	1.081	1.121	1.6
1.7	0.851	0.893	0.935	0.977	1.019	1.061	1.103	1.144	1.186	1.7
1.8	0.897	0.941	0.985	1.030	1.074	1.119	1.163	1.207	1.252	1.8
1.9	0.942	0.989	1.035	1.082	1.129	1.176	1.223	1.270	1.317	1.9
2	0.986	1.036	1.085	1.134	1.184	1.233	1.282	1.332	1.381	2
2.2	1.074	1.129	1.183	1.237	1.291	1.346	1.400	1.454	1.508	2.2
2.50	1.202	1.264	1.325	1.387	1.449	1.510	1.572	1.634	1.695	2.50
2.8	1.326	1.395	1.464	1.533	1.602	1.671	1.740	1.809	1.878	2.8
3	1.406	1.480	1.554	1.628	1.702	1.776	1.850	1.923	1.997	3
3.25	1.503	1.583	1.663	1.743	1.823	1.903	1.984	2.064	2.144	3.25
3.50	1.597	1.683	1.769	1.856	1.942	2.028	2.115	2.201	2.287	3.50
3.75	1.688	1.780	1.873	1.965	2.056	2.150	2.243	2.335	2.427	3.75
4	1.776	1.874	1.973	2.071	2.170	2.269	2.367	2.466	2.565	4
4.25	1.860	1.965	2.070	2.175	2.280	2.384	2.489	2.594	2.699	4.25
4.50	1.942	2.053	2.164	2.275	2.386	2.497	2.608	2.719	2.830	4.50
4.75	2.021	2.138	2.255	2.372	2.489	2.606	2.723	2.841	2.958	4.75
5	2.096	2.219	2.343	2.466	2.589	2.713	2.836	2.959	3.083	5
5.25	2.169	2.298	2.427	2.557	2.686	2.816	2.945	3.075	3.204	5.25
5.50	2.238	2.374	2.509	2.645	2.780	2.916	3.052	3.187	3.323	5.50
5.75	2.304	2.446	2.588	2.730	2.871	3.013	3.155	3.297	3.439	5.75
6	2.368	2.515	2.663	2.811	2.959	3.107	3.255	3.403	3.551	6
6.25	2.428	2.582	2.736	2.890	3.044	3.198	3.352	3.506	3.660	6.25
6.50	2.485	2.645	2.805	2.966	3.126	3.286	3.446	3.607	3.767	6.50
6.75	2.539	2.705	2.872	3.038	3.204	3.371	3.537	3.704	3.870	6.75
7	2.589	2.762	2.935	3.107	3.280	3.453	3.625	3.798	3.971	7
7.25				3.174	3.325	3.531	3.710	3.889	4.068	7.25
7.50				3.237	3.422	3.607	3.792	3.977	4.162	7.50
7.75				3.297	3.488	3.679	3.870	4.061	4.253	7.75
8				3.354	3.551	3.749	3.946	4.143	4.340	8
8.50							4.088	4.297	4.507	8.50
9							4.217	4.439	4.661	9
9.50									4.803	9.50
10									4.932	10

WEIGHTS FOR PRECISION STEEL TUBES
kg/m

Wall mm	Outside diameter in mm									Wall mm
	31	32	33	34	35	36	37	38	39	
0.5	0.376	0.388	0.401	0.413	0.425	0.438	0.450	0.462	0.475	0.5
0.6	0.450	0.465	0.479	0.494	0.509	0.524	0.539	0.553	0.568	0.6
0.7	0.523	0.540	0.558	0.575	0.592	0.609	0.627	0.644	0.661	0.7
0.8	0.596	0.616	0.635	0.655	0.675	0.694	0.714	0.734	0.754	0.8
0.9	0.668	0.690	0.712	0.735	0.757	0.779	0.801	0.823	0.846	0.9
1	0.740	0.764	0.789	0.814	0.838	0.863	0.888	0.912	0.937	1
1.1	0.811	0.838	0.865	0.892	0.920	0.947	0.974	1.001	1.028	1.1
1.2	0.882	0.911	0.941	0.971	1.000	1.030	1.059	1.089	1.119	1.2
1.3	0.952	0.984	1.016	1.048	1.080	1.112	1.144	1.177	1.209	1.3
1.4	1.022	1.056	1.091	1.125	1.160	1.195	1.229	1.264	1.298	1.4
1.5	1.091	1.128	1.165	1.202	1.239	1.276	1.313	1.350	1.387	1.5
1.6	1.160	1.199	1.239	1.278	1.318	1.357	1.397	1.436	1.476	1.6
1.7	1.228	1.270	1.312	1.354	1.396	1.438	1.480	1.522	1.564	1.7
1.8	1.296	1.341	1.385	1.429	1.474	1.518	1.562	1.607	1.651	1.8
1.9	1.363	1.410	1.457	1.504	1.551	1.598	1.645	1.691	1.738	1.9
2	1.430	1.480	1.529	1.578	1.628	1.677	1.726	1.776	1.825	2
2.2	1.563	1.617	1.671	1.725	1.780	1.834	1.888	1.942	2.051	2.2
2.50	1.757	1.819	1.880	1.942	2.004	2.065	2.127	2.189	2.250	2.50
2.8	1.947	2.016	2.085	2.154	2.223	2.293	2.362	2.431	2.500	2.8
3	2.071	2.145	2.219	2.293	2.367	2.441	2.515	2.589	2.663	3
3.25	2.224	2.304	2.384	2.464	2.545	2.625	3.705	2.785	2.865	3.25
3.50	2.374	2.460	2.546	2.632	2.719	2.805	2.891	2.978	3.064	3.50
3.75	2.520	2.612	2.705	2.797	2.890	2.982	3.075	3.167	3.260	3.75
4	2.663	2.762	2.861	2.959	3.058	3.156	3.255	3.354	3.452	4
4.25	2.804	2.908	3.013	3.118	3.223	3.328	3.432	3.537	3.642	4.25
4.50	2.941	3.052	3.163	3.274	3.385	3.496	3.607	3.717	3.828	4.50
4.75	3.075	3.192	3.309	3.426	3.543	3.660	3.778	3.895	4.012	4.75
5	3.206	3.329	3.452	3.576	3.699	3.822	3.946	4.069	4.192	5
5.25	3.334	3.463	3.599	3.722	3.852	3.981	4.111	4.240	4.369	5.25
5.50	3.459	3.594	3.730	3.865	4.001	4.137	4.272	4.408	4.544	5.50
5.75	3.580	3.722	3.864	4.006	4.148	4.289	4.431	4.573	4.715	5.75
6	3.699	3.847	3.995	4.143	4.291	4.439	4.587	4.735	4.883	6
6.25	3.815	3.969	4.123	4.277	4.431	4.585	4.739	4.893	5.048	6.25
6.50	3.927	4.087	4.248	4.408	4.568	4.729	4.889	5.049	5.209	6.50
6.75	4.037	4.203	4.369	4.536	4.702	4.869	5.035	5.202	5.968	6.75
7	4.143	4.316	4.488	4.661	4.834	5.006	5.179	5.351	5.524	7
7.25	4.246	4.425	4.604	4.783	4.962	5.140	5.319	5.498	5.676	7.25
7.50	4.347	4.532	4.716	4.901	5.086	5.271	5.456	5.641	5.826	7.50
7.75	4.444	4.635	4.826	5.017	5.208	5.399	5.590	5.782	5.973	7.75
8	4.538	4.735	4.932	5.130	5.327	5.524	5.721	5.919	6.116	8
8.50	4.717	4.926	5.136	5.345	5.555	5.765	5.974	6.184	6.394	8.50
9	4.883	5.105	5.327	5.549	5.771	5.993	6.215	6.437	6.659	9
9.50	5.037	5.271	5.506	5.740	5.974	6.209	6.443	6.677	6.811	9.50
10	5.179	5.426	5.672	5.919	6.165	6.412	6.659	6.905	7.152	10

WEIGHTS FOR PRECISION STEEL TUBES
kg/m

Wall mm	Outside diameter in mm									Wall mm
	40	41	42	43	44	45	46	47	48	
0.5	0.487	0.499	0.512	0.524	0.536	0.549	0.561	0.573	0.586	0.5
0.6	0.583	0.598	0.613	0.627	0.642	0.657	0.672	0.687	0.701	0.6
0.7	0.678	0.696	0.713	0.730	0.747	0.765	0.782	0.799	0.817	0.7
0.8	0.773	0.793	0.813	0.833	0.852	0.872	0.892	0.911	0.931	0.8
0.9	0.868	0.890	0.912	0.934	0.957	0.979	1.001	1.023	1.045	0.9
1	0.962	0.986	1.011	1.036	1.060	1.085	1.110	1.134	1.159	1
1.1	1.055	1.082	1.109	1.136	1.164	1.191	1.218	1.245	1.272	1.1
1.2	1.148	1.178	1.207	1.237	1.267	1.296	1.326	1.355	1.385	1.2
1.3	1.241	1.273	1.305	1.337	1.369	1.401	1.433	1.465	1.497	1.3
1.4	1.333	1.367	1.402	1.436	1.471	1.505	1.540	1.574	1.609	1.4
1.5	1.424	1.461	1.498	1.535	1.572	1.609	1.646	1.683	1.720	1.5
1.6	1.515	1.555	1.594	1.633	1.673	1.712	1.752	1.791	1.831	1.6
1.7	1.606	1.648	1.689	1.731	1.773	1.815	1.857	1.899	1.941	1.7
1.8	1.696	1.740	1.784	1.829	1.873	1.918	1.962	2.006	2.051	1.8
1.9	1.785	1.832	1.879	1.926	1.973	2.019	2.066	2.113	2.160	1.9
2	1.874	1.923	1.973	2.022	2.071	2.121	2.170	2.219	2.269	2
2.2	2.051	2.105	2.159	2.214	2.268	2.322	2.376	2.431	2.485	2.2
2.50	2.312	2.374	2.435	2.497	2.558	2.620	2.682	2.743	2.805	2.50
2.8	2.569	2.638	2.707	2.776	2.845	2.914	2.983	3.052	3.121	2.8
3	2.737	2.811	2.885	2.959	3.033	3.107	3.181	3.255	3.329	3
3.25	2.945	3.025	3.106	3.186	3.266	3.346	3.426	3.506	3.586	3.25
3.50	3.150	3.237	3.323	3.409	3.496	3.582	3.668	3.754	3.841	3.50
3.75	3.352	3.445	3.537	3.630	3.722	3.815	3.907	4.000	4.092	3.75
4	3.551	3.650	3.748	3.847	3.946	4.044	4.143	4.242	4.340	4
4.25	3.747	3.852	3.956	4.061	4.166	4.271	4.376	4.480	4.585	4.25
4.50	3.939	4.050	4.161	4.272	4.383	4.494	4.605	4.716	4.827	4.50
4.75	4.129	4.246	4.363	4.480	4.598	4.715	4.832	4.949	5.066	4.75
5	4.316	4.439	4.562	4.685	4.809	4.932	5.055	5.179	5.302	5
5.25	4.499	4.628	4.758	4.887	5.017	5.146	5.276	5.405	5.535	5.25
5.50	4.679	4.815	4.950	5.086	5.222	5.357	5.493	5.629	5.764	5.50
5.75	4.856	4.998	5.140	5.282	5.424	5.565	5.707	5.849	5.991	5.75
6	5.031	5.179	5.327	5.475	5.622	5.770	6.918	6.066	6.214	6
6.25	5.202	5.356	5.510	5.664	5.818	5.972	6.126	6.281	6.435	6.25
6.50	5.370	5.530	5.690	5.851	6.011	6.171	6.331	6.492	6.652	6.50
6.75	5.535	5.701	5.868	6.034	6.200	6.367	6.533	6.700	6.866	6.75
7	5.696	5.869	6.042	6.214	6.387	6.560	6.732	6.905	7.077	7
7.25	5.855	6.034	6.213	6.392	6.570	6.749	6.928	7.107	7.285	7.25
7.50	6.011	6.196	6.381	6.566	6.751	6.936	7.121	7.306	7.490	7.50
7.75	6.164	6.355	6.546	6.737	6.928	7.119	7.310	7.501	7.692	7.75
8	6.313	6.511	6.708	6.905	7.103	7.299	7.497	7.694	7.891	8
8.50	6.603	6.813	7.022	7.232	7.442	7.651	7.861	8.071	8.280	8.50
9	6.881	7.102	7.324	7.546	7.768	7.990	8.212	8.434	8.656	9
9.50	7.146	7.380	7.614	7.849	8.083	8.317	8.551	8.786	9.020	9.50
10	7.398	7.645	7.892	8.138	8.385	8.632	8.878	9.125	9.371	10
11	7.867	8.138	8.410	8.681	8.952	9.223	9.495	9.766	10.04	11
12	8.286	8.582	8.878	9.174	9.470	9.766	10.06	10.36	10.65	12

WEIGHTS FOR PRECISION STEEL TUBES
kg/m

Wall mm	Outside diameter in mm									Wall mm
	49	50	51	52	53	54	55	56	57	
0.5	0.598	0.610								0.5
0.6	0.716	0.731								0.6
0.7	0.834	0.851								0.7
0.8	0.951	0.971								0.8
0.9	1.068	1.090								0.9
1	1.184	1.208	1.233	1.258	1.282	1.307	1.332	1.356	1.381	1
1.1	1.299	1.326	1.354	1.381	1.408	1.435	1.462	1.489	1.516	1.1
1.2	1.414	1.444	1.474	1.503	1.533	1.562	1.592	1.622	1.651	1.2
1.3	1.529	1.561	1.593	1.625	1.657	1.689	1.722	1.754	1.786	1.3
1.4	1.643	1.678	1.712	1.747	1.781	1.816	1.850	1.885	1.920	1.4
1.5	1.757	1.794	1.831	1.867	1.905	1.942	1.979	2.016	2.053	1.5
1.6	1.870	1.910	1.949	1.988	2.028	2.067	2.107	2.146	2.186	1.6
1.7	1.983	2.025	2.067	2.109	2.151	2.193	2.234	2.276	2.318	1.7
1.8	2.095	2.140	2.184	2.228	2.273	2.317	2.361	2.406	2.450	1.8
1.9	2.207	2.254	2.901	2.347	2.394	2.441	2.488	2.535	2.582	1.9
2	2.318	2.367	2.417	2.466	2.515	2.565	2.614	2.663	2.713	2
2.2	2.539	2.593	2.648	2.702	2.756	2.810	2.865	2.919	2.973	2.2
2.50	2.867	2.928	2.990	3.052	3.113	3.175	3.237	3.298	3.360	2.50
2.8	3.190	3.259	3.328	3.397	3.466	3.535	3.605	3.674	3.743	2.8
3	3.403	3.477	3.551	3.625	3.699	3.773	3.847	3.921	3.995	3
3.25	3.667	3.747	3.827	3.907	3.987	4.067	4.148	4.228	4.308	3.25
3.50	3.927	4.013	4.100	4.186	4.272	4.359	4.445	4.531	4.618	3.50
3.75	4.184	4.277	4.369	4.462	4.554	4.647	4.739	4.832	4.924	3.75
4	4.439	4.537	4.636	4.735	4.833	4.932	5.031	5.129	5.228	4
4.25	4.690	4.795	4.900	5.004	5.109	5.214	5.319	5.424	5.528	4.25
4.50	4.938	5.049	5.160	5.271	5.382	5.493	5.604	5.715	5.826	4.50
4.75	5.183	5.300	5.417	5.535	5.652	5.769	5.886	6.003	6.120	4.75
5	5.425	5.549	5.672	5.795	5.918	6.042	6.165	6.288	6.412	5
5.25	5.664	5.794	5.923	6.052	6.182	6.311	6.441	6.570	6.700	5.25
5.50	5.900	6.036	6.171	6.307	6.442	6.578	6.714	6.849	6.985	5.50
5.75	6.133	6.274	6.416	6.558	6.700	6.842	6.983	7.125	7.267	5.75
6	6.362	6.510	6.658	6.806	6.954	7.102	7.250	7.398	7.546	6
6.25	6.589	6.743	6.897	7.051	7.205	7.359	7.514	7.668	7.822	6.25
6.50	6.812	6.973	7.133	7.293	7.453	7.614	7.774	7.934	8.095	6.50
6.75	7.033	7.199	7.366	7.532	7.699	7.865	8.031	8.198	8.364	6.75
7	7.250	7.423	7.595	7.768	7.941	8.113	8.286	8.458	8.631	7
7.25	7.464	7.643	7.822	8.001	8.179	8.358	8.537	8.716	8.895	7.25
7.50	7.675	7.860	8.045	8.230	8.415	8.600	8.785	8.970	9.155	7.50
7.75	7.883	8.075	8.266	8.547	8.648	8.839	9.030	9.221	9.412	7.75
8	8.088	8.286	8.483	8.680	8.878	9.075	9.272	9.469	9.667	8
8.50	8.490	8.699	8.909	9.119	9.328	9.538	9.747	9.957	10.17	8.50
9	8.878	9.100	9.322	9.544	9.766	9.988	10.21	10.43	10.65	9
9.50	9.254	9.489	9.723	9.957	10.19	10.43	10.66	10.89	11.13	9.50
10	9.618	9.865	10.11	10.36	10.60	10.85	11.10	11.34	11.59	10
11	10.31	10.58	10.85	11.12	11.39	11.67	11.94	12.21	12.48	11
12	10.95	11.25	11.54	11.84	12.13	12.43	12.73	13.02	13.32	12
13		11.86	12.18	12.50	12.82	13.15	13.47	13.79	14.11	13
14				13.12	13.47	13.81	14.16	14.50	14.85	14
15				13.69	14.06	14.43	14.80	15.17	15.54	15
16				14.21	14.60	14.99	15.39	15.78	16.18	16

WEIGHTS FOR PRECISION STEEL TUBES

kg/m

Wall mm	Outside diameter in mm									Wall mm
	58	59	60	61	62	63	64	65	66	
1	1.406	1.430	1.455	1.480	1.504	1.529	1.554	1.578	1.603	1
1.1	1.543	1.570	1.598	1.625	1.652	1.679	1.706	1.733	1.760	1.1
1.2	1.681	1.710	1.740	1.770	1.799	1.829	1.858	1.888	1.918	1.2
1.3	1.818	1.850	1.882	1.914	1.946	1.978	2.010	2.042	2.074	1.3
1.4	1.954	1.989	2.023	2.058	2.092	2.127	2.161	2.196	2.230	1.4
1.5	2.090	2.127	2.164	2.201	2.238	2.275	2.312	2.349	2.386	1.5
1.6	2.225	2.265	2.304	2.344	2.383	2.423	2.462	2.502	2.541	1.6
1.7	2.360	2.402	2.444	2.486	2.528	2.570	2.612	2.654	2.696	1.7
1.8	2.495	2.539	2.583	2.628	2.672	2.717	2.761	2.805	2.850	1.8
1.9	2.629	2.675	2.722	2.769	2.816	2.863	2.910	2.956	3.003	1.9
2	2.762	2.811	2.861	2.910	2.959	3.009	3.058	3.107	3.156	2
2.2	3.027	3.082	3.136	3.190	3.244	3.299	3.353	3.407	3.461	2.2
2.50	3.422	3.483	3.545	3.607	3.668	3.730	3.791	3.853	3.915	2.50
2.8	3.812	3.881	3.950	4.019	4.088	4.157	4.226	4.295	4.364	2.8
3	4.069	4.143	4.217	4.291	4.365	4.439	4.513	4.587	4.661	3
3.25	4.388	4.468	4.548	4.628	4.709	4.789	4.869	4.949	5.029	3.25
3.50	4.704	4.790	4.877	4.963	5.049	5.135	5.222	5.308	5.394	3.50
3.75	5.017	5.109	5.202	5.294	5.387	5.479	5.572	5.664	5.757	3.75
4	5.327	5.425	5.524	5.622	5.721	5.820	5.918	6.017	6.116	4
4.25	5.633	5.738	5.843	5.948	6.052	6.157	6.262	6.367	6.472	4.25
4.50	5.937	6.048	6.159	6.270	6.381	6.492	6.603	6.714	6.825	4.50
4.75	6.237	6.355	6.472	6.589	6.706	6.823	6.940	7.057	7.175	4.75
5	6.535	6.658	6.782	6.905	7.028	7.151	7.275	7.398	7.521	5
5.25	6.829	6.959	7.088	7.218	7.347	7.477	7.606	7.736	7.865	5.25
5.50	7.121	7.256	7.392	7.527	7.663	7.799	7.934	8.070	8.206	5.50
5.75	7.409	7.551	7.692	7.834	7.976	8.118	8.260	8.401	8.543	5.75
6	7.694	7.842	7.990	8.138	8.286	8.434	8.582	8.730	8.878	6
6.25	7.976	8.130	8.284	8.438	8.592	8.747	8.901	9.055	9.209	6.25
6.50	8.255	8.415	8.576	8.736	8.896	9.056	9.217	9.377	9.537	6.50
6.75	8.531	8.697	8.864	9.030	9.197	9.363	9.530	9.696	9.862	6.75
7	8.804	8.976	9.149	9.321	9.494	9.667	9.839	10.01	10.18	7
7.25	9.073	9.252	9.431	9.610	9.788	9.967	10.15	10.32	10.50	7.25
7.50	9.340	9.525	9.710	9.895	10.08	10.26	10.45	10.63	10.82	7.50
7.75	9.604	9.795	9.986	10.18	10.37	10.56	10.75	10.94	11.13	7.75
8	9.864	10.06	10.26	10.46	10.65	10.85	11.05	11.24	11.44	8
8.50	10.38	10.59	10.80	11.01	11.22	11.42	11.63	11.84	12.05	8.50
9	10.88	11.10	11.32	11.54	11.76	11.99	12.21	12.43	12.65	9
9.50	11.36	11.60	11.83	12.07	12.30	12.53	12.77	13.00	13.24	9.50
10	11.84	12.08	12.33	12.58	12.82	13.07	13.32	13.56	13.81	10
11	12.75	13.02	13.29	13.56	13.84	14.11	14.38	14.65	14.92	11
12	13.61	13.91	14.21	14.50	14.80	15.09	15.39	15.69	15.98	12
13	14.43	14.75	15.07	15.39	15.71	16.03	16.35	16.67	16.99	13
14	15.19	15.54	15.88	16.23	16.57	16.92	17.26	17.61	17.95	14
15	15.91	16.28	16.65	17.02	17.39	17.76	18.13	18.50	18.87	15
16	16.57	16.97	17.36	17.76	18.15	18.55	18.94	19.34	19.73	16

WEIGHTS FOR PRECISION STEEL TUBES
kg/m

Wall mm	Outside diameter in mm									Wall mm
	67	68	69	70	71	72	73	74	75	
1	1.628	1.652	1.677	1.702	1.726	1.751	1.776	1.800	1.825	1
1.1	1788	1.815	1.842	1.869	1.896	1.923	1.950	1.977	2.005	1.1
1.2	1.947	1.977	2.006	2.036	2.066	2.095	2.125	2.154	2.184	1.2
1.3	2.106	2.138	2.170	2.202	2.234	2.267	2.299	2.331	2.363	1.3
1.4	2.265	2.299	2.334	2.368	2.403	2.437	2.472	2.506	2.541	1.4
1.5	2.423	2.460	2.497	2.534	2.571	2.608	2.645	2.682	2.719	1.5
1.6	2.580	2.620	2.659	2.699	2.738	2.778	2.817	2.857	2.896	1.6
1.7	2.738	2.779	2.821	2.863	2.905	2.947	2.989	3.031	3.073	1.7
1.8	2.894	2.938	2.982	3.027	3.072	3.116	3.160	3.204	3.249	1.8
1.9	3.050	3.097	3.144	3.191	3.238	3.284	3.331	3.378	3.425	1.9
2	3.206	3.255	3.304	3.354	3.403	3.452	3.502	3.551	3.600	2
2.2	3.516	3.570	3.624	3.679	3.739	3.787	9.841	3.896	3.950	2.2
2.50	3.976	4.038	4.100	4.161	4.223	4.285	4.346	4.408	4.470	2.50
2.8	4.433	4.502	4.571	4.640	4.709	4.778	4.847	4.917	4.986	2.8
3	4.735	4.809	4.883	4.957	5.031	5.105	5.179	5.252	5.327	3
3.25	5.109	5.189	5.270	5.350	5.430	5.510	5.590	5.670	5.750	3.25
3.50	5.481	5.567	5.653	5.740	5.826	5.912	5.999	6.085	6.171	3.50
3.75	5.849	5.942	6.034	6.126	6.219	6.311	6.404	6.496	6.589	3.75
4	6.214	6.313	6.412	6.510	6.609	6.708	6.806	6.905	7.003	4
4.25	6.577	6.681	6.786	6.891	6.996	7.101	7.205	7.310	7.415	4.25
4.50	6.936	7.047	7.158	7.269	7.380	7.490	7.601	7.712	7.823	4.50
4.75	7.292	7.409	7.526	7.643	7.760	7.877	7.994	8.112	8.229	4.75
5	7.645	7.768	7.891	8.015	8.138	8.261	8.384	8.508	8.631	5
5.25	7.994	8.124	8.253	8.383	8.512	8.642	8.771	8.901	9.030	5.25
5.50	8.341	8.477	8.613	8.748	8.884	9.019	9.155	9.291	9.426	5.50
5.75	8.685	8.827	8.969	9.110	9.252	9.394	9.536	9.678	9.819	5.75
6	9.026	9.174	9.321	9.469	9.617	9.765	9.913	10.06	10.21	6
6.25	9.363	9.517	9.671	9.825	9.980	10.13	10.29	10.44	10.60	6.25
6.50	9.698	9.858	10.02	10.18	10.34	10.50	10.66	10.82	10.98	6.50
6.75	10.03	10.20	10.36	10.53	10.69	10.86	11.03	11.19	11.36	6.75
7	10.36	10.53	10.70	10.88	11.05	11.22	11.39	11.57	11.74	7
7.25	10.68	10.86	11.04	11.22	11.40	11.58	11.76	11.93	12.11	7.25
7.50	11.00	11.19	11.37	11.56	11.74	11.93	12.11	12.30	12.48	7.50
7.75	11.32	11.51	11.71	11.90	12.09	12.28	12.47	12.66	12.85	7.75
8	11.64	11.84	12.03	12.23	12.43	12.63	12.82	13.02	13.22	8
8.50	12.26	12.47	12.68	12.89	13.10	13.31	13.52	13.73	13.94	8.50
9	12.87	13.10	13.32	13.54	13.76	13.98	14.21	14.43	14.65	9
9.50	13.47	13.71	13.94	14.17	14.41	14.64	14.88	15.11	15.35	9.50
10	14.06	14.30	14.55	14.80	15.04	15.29	15.54	15.78	16.03	10
11	15.19	15.46	15.73	16.01	16.28	16.55	16.82	17.09	17.36	11
12	16.28	16.57	16.87	17.16	17.46	17.76	18.05	18.35	18.64	12
13	17.31	17.63	17.95	18.27	18.60	18.92	19.24	19.56	19.8g	13
14	18.30	18.64	18.99	19.34	19.68	20.03	20.37	20.72	21.06	14
15	19.24	19.61	19.98	20.35	20.72	21.09	21.46	21.83	22.20	15
16	20.12	20.52	20.91	21.31	21.70	22.10	22.49	22.89	23.28	16
17	20.96	21.38	21.80	22.22	22.64	23.06	23.48	23.90	24.32	17
18	21.75	22.20	22.64	23.08	23.53	23.97	24.42	24.86	25.30	18

WEIGHTS FOR PRECISION STEEL TUBES
kg/m

Wall mm	Outside diameter in mm									Wall mm
	76	77	78	79	80	81	82	83	84	
1	1.850	1.874	1.899	1.923	1.948	1.973	1.997	2.022	2.047	1
1.1	2.032	2.059	2.086	2.113	2.140	2.167	2.194	2.222	2.249	1.1
1.2	2.213	2.243	2.273	2.302	2.332	2.361	2.391	2.421	2.450	1.2
1.3	2.395	2.427	2.459	2.491	2.523	2.555	2.587	2.619	2.651	1.3
1.4	2.575	2.610	2.645	2.679	2.714	2.748	2.783	2.817	2.852	1.4
1.5	2.756	2.793	2.830	2.867	2.904	2.941	2.978	3.015	3.052	1.5
1.6	2.936	2.975	3.014	3.054	3.093	3.133	3.172	3.212	3.251	1.6
1.7	3.115	3.157	3.198	3.241	3.282	3.324	3.366	3.408	3.450	1.7
1.8	3.294	3.338	3.382	3.427	3.471	3.516	3.560	3.604	3.649	1.8
1.9	3.472	3.519	3.566	3.612	3.659	3.706	3.753	3.800	3.847	1.9
2	3.650	3.699	3.748	3.798	3.847	3.896	3.946	3.995	4.044	2
2.2	4.004	4.058	4.113	4.167	4.221	4.275	4.330	4.384	4.438	2.2
2.50	4.531	4.593	4.655	4.716	4.778	4.840	4.901	4.963	5.024	2.50
2.8	5.055	5.124	5.193	5.262	5.331	5.400	5.469	5.538	5.607	2.8
3	5.401	5.475	5.549	5.622	5.696	5.770	5.844	5.918	5.992	3
3.25	5.831	5.911	5.991	6.071	6.151	6.231	6.311	6.392	6.472	3.25
3.50	6.257	6.344	6.430	6.516	6.603	6.689	6.775	6.862	6.948	3.50
3.75	6.681	6.774	6.866	6.959	7.051	7.144	7.236	7.325	7.421	3.75
4	7.102	7.201	7.299	7.398	7.497	7.595	7.694	7.793	7.891	4
4.25	7.520	7.625	7.729	7.835	7.939	8.044	8.149	8.253	8.358	4.25
4.50	7.934	8.045	8.156	8.267	8.378	8.489	8.600	8.711	8.822	4.50
4.75	8.346	8.463	8.580	8.697	8.814	8.932	9.049	9.166	9.283	4.75
5	8.754	8.878	9.001	9.124	9.248	8.371	9.494	9.617	9.741	5
5.25	9.160	9.289	9.419	9.548	9.678	9.807	9.936	10.07	10.20	5.25
5.50	9.562	9.698	9.833	9.969	10.10	10.24	10.38	10.51	10.65	5.50
5.75	9.961	10.10	10.24	10.39	10.53	10.67	10.81	10.95	11.10	5.75
6	10.36	10.51	10.65	10.80	10.95	11.10	11.24	11.39	11.54	6
6.25	10.75	10.90	11.06	11.21	11.37	11.52	11.67	11.83	11.98	6.25
6.50	11.14	11.30	11.46	11.62	11.78	11.94	12.10	12.26	12.42	6.50
6.75	11.53	11.69	11.86	12.03	12.19	12.36	12.53	12.69	12.86	6.75
7	11.91	12.08	12.25	12.43	12.60	12.77	12.95	13.12	13.29	7
7.25	12.29	12.47	12.65	12.83	13.01	13.19	13.36	13.54	13.72	7.25
7.50	12.67	12.85	13.04	13.22	13.41	13.59	13.78	13.96	14.15	7.50
7.75	13.04	13.23	13.43	13.62	13.81	14.00	14.19	14.38	14.57	7.75
8	13.42	13.61	13.81	14.01	14.20	14.40	14.60	14.80	14.99	8
8.50	14.15	14.36	14.57	14.78	14.99	15.20	15.41	15.62	15.83	8.50
9	14.87	15.09	15.32	15.54	15.76	15.98	16.20	16.43	16.65	9
9.50	15.58	15.81	16.05	16.28	16.52	16.75	16.99	17.22	17.45	9.50
10	16.28	16.52	16.77	17.02	17.26	17.51	17.76	18.00	18.25	10
11	17.63	17.90	18.18	18.45	18.72	18.99	19.26	19.53	19.80	11
12	18.94	19.24	19.53	19.83	20.12	20.42	20.72	21.01	21.31	12
13	20.20	20.52	20.84	21.16	21.48	21.80	22.12	22.44	22.76	13
14	21.41	21.75	22.10	22.44	22.79	23.13	23.48	23.82	24.17	14
15	22.57	22.94	23.31	23.68	24.05	24.42	24.79	25.16	25.53	15
16	23.68	24.07	24.46	24.86	25.25	25.65	26.04	26.44	26.83	16
17	24.74	25.16	25.57	25.99	26.41	26.83	27.52	27.67	28.09	17
18	25.75	26.19	26.63	27.08	27.52	27.97	28.41	28.85	29.30	18

WEIGHTS FOR PRECISION STEEL TUBES
kg/m

Wall mm	Outside diameter in mm									Wall mm
	85	86	87	88	89	90	95	100	105	
1	2.071	2.096	2.121	2.145	2.170	2.195				1
1.1	2.276	2.303	2.330	2.357	2.984	2.412				1.1
1.2	2.480	2.509	2.539	2.569	2.598	2.628				1.2
1.3	2.683	2.715	2.747	2.779	2.811	2.844				1.3
1.4	2.886	2.921	2.955	2.989	3.024	3.059				1.4
1.5	3.089	3.126	3.163	3.200	3.237	3.274	3.459			1.5
1.6	3.291	3.330	3.370	3.409	3.448	3.488	3.686			1.6
1.7	3.492	3.534	3.576	3.618	3.660	3.702	3.912			1.7
1.8	3.693	3.737	3.782	3.826	3.871	3.915	4.137			1.8
1.9	3.894	3.940	3.987	4.034	4.081	4.128	4.362			1.9
2	4.094	4.143	4.192	4.242	4.291	4.340	4.587	4.833	5.080	2
2.2	4.492	4.547	4.601	4.655	4.709	4.764	5.035	5.306	5.701	2.2
2.50	5.086	5.148	5.209	5.271	5.333	5.394	5.703	6.011	6.319	2.50
2.8	5.676	5.745	5.814	5.883	5.952	6.021	6.367	6.712	7.057	2.8
3	6.066	6.140	6.214	6.288	6.362	6.436	6.806	7.176	7.546	3
3.25	6.552	6.632	6.712	6.792	6.872	6.953	7.353	7.754	8.155	3.25
3.50	7.034	7.121	7.207	7.293	7.380	7.466	7.897	8.329	8.760	3.50
3.75	7.514	7.606	7.699	7.791	7.883	7.976	8.438	8.901	9.363	3.75
4	7.990	8.088	8.187	8.286	8.384	8.483	8.976	9.469	9.963	4
4.25	8.463	8.568	8.673	8.777	8.882	8.987	9.511	10.04	10.56	4.25
4.50	8.933	9.044	9.155	9.266	9.377	9.488	10.04	10.60	11.15	4.50
4.75	9.400	9.517	9.634	9.751	9.869	9.986	10.57	11.16	11.74	4.75
5	9.864	9.987	10.11	10.23	10.36	10.48	11.10	11.71	12.33	5
5.25	10.32	10.45	10.58	10.71	10.84	10.97	11.61	12.27	12.91	5.25
5.50	10.78	10.92	11.05	11.19	11.33	11.46	12.14	12.82	13.50	5.50
5.75	11.24	11.38	11.52	11.66	11.80	11.95	12.66	13.36	14.07	5.75
6	11.69	11.84	11.98	12.13	12.28	12.43	13.17	13.91	14.65	6
6.25	12.14	12.29	12.45	12.60	12.75	12.91	13.68	14.45	15.22	6.25
6.50	12.58	12.74	12.90	13.06	13.22	13.38	14.19	14.99	15.79	6.50
6.75	13.03	13.19	13.36	13.52	13.69	13.86	14.69	15.52	16.35	6.75
7	13.46	13.64	13.81	13.98	14.15	14.33	15.19	16.05	16.92	7
7.25	13.90	14.08	14.26	14.44	14.62	14.79	15.69	16.58	17.48	7.25
7.50	14.33	14.52	14.70	14.89	15.07	15.26	16.18	17.11	18.03	7.50
7.75	14.76	14.95	15.15	15.34	15.53	15.72	16.67	17.63	18.59	7.75
8	15.19	15.39	15.59	15.78	15.98	16.18	17.16	18.15	19.14	8
8.50	16.04	16.25	16.46	16.67	16.88	17.08	18.13	19.18	20.23	8.50
9	16.87	17.09	17.31	17.53	17.76	17.98	19.09	20.20	21.31	9
9.50	17.69	17.92	18.16	18.39	18.63	18.86	20.03	21.20	22.37	9.50
10	18.50	18.74	18.99	19.24	19.48	19.73	20.96	22.20	23.43	10
11	20.08	20.35	20.62	20.89	21.16	21.43	22.79	24.14	25.50	11
12	21.60	21.90	22.2	22.49	22.79	23.08	24.56	26.04	27.52	12
13	23.08	23.40	23.72	24.05	24.37	24.69	26.29	27.89	29.50	13
14	24.51	24.86	25.20	25.55	25.90	26.24	27.97	29.69	31.42	14
15	25.90	26.27	26.63	27.00	27.37	27.74	29.59	31.44	33.29	15
16	27.23	27.62	28.02	28.41	28.81	29.20	31.17	33.15	35.12	16
17	28.51	28.93	29.35	29.77	30.19	30.61	32.70	34.80	36.89	17
18	29.74	30.19	30.63	31.07	31.52	31.96	34.18	36.40	38.62	18
19	30.93	31.39	31.86	32.33	32.80	33.27	35.61	37.95	40.30	19
20	32.06	32.55	33.05	33.54	34.03	34.53	36.99	39.46	41.93	20

WEIGHTS FOR PRECISION STEEL TUBES
kg/m

Wall mm	Outside diameter in mm									Wall mm
	110	115	120	125	130	135	140	145	150	
2	5.327	5.573	5.820	6.067						2
2.2	5.977	6.254	6.532							2.2
2.50	6.627	6.936	7.244	7.553						2.50
2.8	7.402	7.747	8.093	8.438						2.8
3	7.916	8.286	8.656	9.026	9.395	9.765	10.14	10.51	10.88	3
3.25	8.555	8.956	9.357	9.758	10.16	10.56	10.96	11.36	11.76	3.25
3.50	9.192	9.624	10.06	10.49	10.92	11.35	11.78	12.21	12.64	3.50
3.75	9.825	10.29	10.75	11.21	11.67	12.14	12.60	13.06	13.52	3.75
4	10.46	10.95	11.44	11.94	12.43	12.92	13.42	13.91	14.40	4
4.25	11.08	11.61	12.13	12.66	13.18	13.70	14.23	14.75	15.28	4.25
4.50	11.71	12.26	12.82	13.37	13.93	14.48	15.04	15.59	16.15	4.50
4.75	12.33	12.91	13.50	14.09	14.67	15.26	15.84	16.43	17.01	4.75
5	12.95	13.56	14.17	14.80	15.41	16.03	16.65	17.26	17.88	5
5.25	13.56	14.21	14.86	15.50	16.15	16.80	17.45	18.09	18.74	5.25
5.50	14.17	14.85	15.53	16.21	16.89	17.56	18.24	18.92	19.60	5.50
5.75	14.78	15.49	16.20	16.91	17.62	18.33	19.04	19.74	20.45	5.75
6	15.39	16.13	16.87	17.61	18.35	19.09	19.83	20.57	21.31	6
6.25	15.99	16.76	17.53	18.30	19.07	19.84	20.61	21.38	22.16	6.25
6.50	16.59	17.39	18.19	18.99	19.80	20.60	21.40	22.20	23.00	6.50
6.75	17.19	18.02	18.85	19.68	20.52	21.35	22.18	23.01	23.84	6.75
7	17.78	18.64	19.51	20.37	21.23	22.10	22.96	23.82	24.68	7
7.25	18.37	19.26	20.16	21.05	21.95	22.84	23.73	24.63	25.52	7.25
7.50	18.96	19.88	20.81	21.73	22.66	23.58	24.51	25.43	26.36	7.50
7.75	19.54	20.50	21.45	22.41	23.36	24.32	25.27	26.23	27.19	7.75
8	20.12	21.11	22.10	23.08	24.07	25.05	26.04	27.03	28.01	8
8.50	21.28	22.33	23.37	24.42	25.47	26.52	27.57	28.61	29.66	8.50
9	22.42	23.53	24.64	25.75	26.86	27.97	29.08	30.19	31.30	9
9.50	23.55	24.72	25.89	27.06	28.23	29.40	30.57	31.75	32.92	9.50
10	24.66	25.90	27.13	28.36	29.59	30.83	32.06	33.29	34.53	10
11	26.86	28.21	29.57	30.93	32.28	33.64	35.00	36.35	37.71	11
12	29.00	30.48	31.96	33.44	34.92	36.40	37.88	39.36	40.84	12
13	31.10	32.70	34.30	35.91	37.51	39.11	40.72	42.32	43.92	13
14	33.15	34.87	36.60	38.32	40.05	41.78	43.50	45.23	46.96	14
15	35.14	36.99	38.84	40.69	42.54	44.39	46.24	48.09	49.94	15
16	37.09	39.06	41.04	43.01	44.98	46.96	48.93	50.90	52.87	16
17	38.99	41.09	43.18	45.28	47.38	49.47	51.57	53.66	55.76	17
18	40.84	43.06	45.28	47.50	49.72	51.94	54.16	56.38	58.60	18
19	42.64	44.98	47.33	49.67	52.01	54.35	56.70	59.04	61.38	19
20	44.39	46.86	49.32	51.79	54.26	56.72	59.19	61.65	64.12	20

WEIGHTS FOR PRECISION STEEL TUBES
kg/m

Wall mm	Outside diameter in mm										Wall mm
	155	160	165	170	175	180	185	190	195	200	
3	11.25	11.62	11.99	12.36	12.73	13.10	13.47	13.84	14.21	14.58	3
3.25	12.16	12.56	12.96	13.37	13.77	14.17	14.57	14.97	15.37	15.77	3.25
3.50	13.08	13.51	13.94	14.37	14.80	15.24	15.67	16.10	16.53	16.96	3.50
3.75	13.99	14.45	14.91	15.37	15.84	16.30	16.76	17.22	17.69	18.15	3.75
4	14.89	15.69	15.88	16.37	16.87	17.36	17.86	18.35	18.84	19.34	4
4.25	15.80	16.32	16.85	17.37	17.90	18.42	18.95	19.47	19.99	20.52	4.25
4.50	16.70	17.26	17.81	18.37	18.92	19.48	20.03	20.59	21.14	21.70	4.50
4.75	17.60	18.19	18.77	19.36	19.94	20.53	21.12	21.70	22.29	22.87	4.75
5	18.50	19.11	19.73	20.34	20.96	21.58	22.19	22.81	23.43	24.04	5
5.25	19.39	20.03	20.68	21.33	21.98	22.62	23.27	23.92	24.57	25.21	5.25
5.50	20.28	20.95	21.68	22.31	22.99	23.67	24.35	25.02	25.70	26.38	5.50
5.75	21.16	21.87	22.58	23.29	24.00	24.71	25.42	26.13	26.83	27.54	5.75
6	22.05	22.79	23.53	24.27	25.01	25.75	26.48	27.22	27.96	28.70	6
6.25	22.99	23.70	24.47	25.24	26.01	26.78	27.55	28.32	29.09	29.86	6.25
6.50	23.80	24.60	25.41	26.21	27.01	27.81	28.61	29.41	30.21	31.02	6.50
6.75	24.68	25.51	26.34	27.17	28.01	28.84	29.67	30.50	31.34	32.17	6.75
7	25.55	26.41	27.27	28.14	29.00	29.86	30.73	31.59	32.45	33.32	7
7.25	26.42	27.31	28.20	29.10	29.99	30.89	31.78	32.67	33.57	34.46	7.25
7.50	27.28	28.20	29.13	30.05	30.98	31.90	32.83	33.75	34.68	35.60	7.50
7.75	28.14	29.10	30.05	31.01	31.96	32.92	33.88	34.83	35.79	36.74	7.75
8	29.00	29.99	30.97	31.96	32.95	33.93	34.92	35.90	36.89	37.99	8
8.50	30.71	31.76	32.81	33.85	34.90	35.90	37.00	38.05	39.10	40.14	8.50
9	32.41	33.52	34.62	35.73	36.84	37.95	39.05	40.17	41.28	42.39	9
9.50	34.09	35.26	36.43	37.60	38.77	39.95	41.12	42.29	43.46	44.63	9.50
10	35.76	36.99	38.23	39.46	40.69	41.92	43.16	44.39	45.62	46.86	10
11	39.06	40.42	41.78	43.13	44.49	45.85	47.20	48.56	49.92	51.27	11
12	42.32	43.80	45.28	46.76	48.24	49.72	51.20	52.68	54.16	55.64	12
13	45.53	47.13	48.73	50.33	51.94	53.54	55.14	56.75	58.35	59.95	13
14	48.68	50.41	52.13	53.86	55.59	57.31	59.04	60.77	62.49	64.22	14
15	51.79	53.64	55.49	57.34	59.19	61.04	62.89	64.74	66.59	68.44	15
16	54.85	56.82	58.79	60.77	62.74	64.71	66.68	68.66	70.63	72.60	16
17	57.86	59.95	62.05	64.14	66.24	68.34	70.43	72.53	74.63	76.72	17
18	60.82	63.04	65.26	67.47	69.69	71.91	74.13	76.35	78.57	80.79	18
19	63.73	66.07	68.41	70.75	73.10	75.44	77.78	80.13	82.47	84.81	19
20	66.59	69.05	71.52	73.98	76.45	78.92	81.38	83.85	86.92	88.79	20

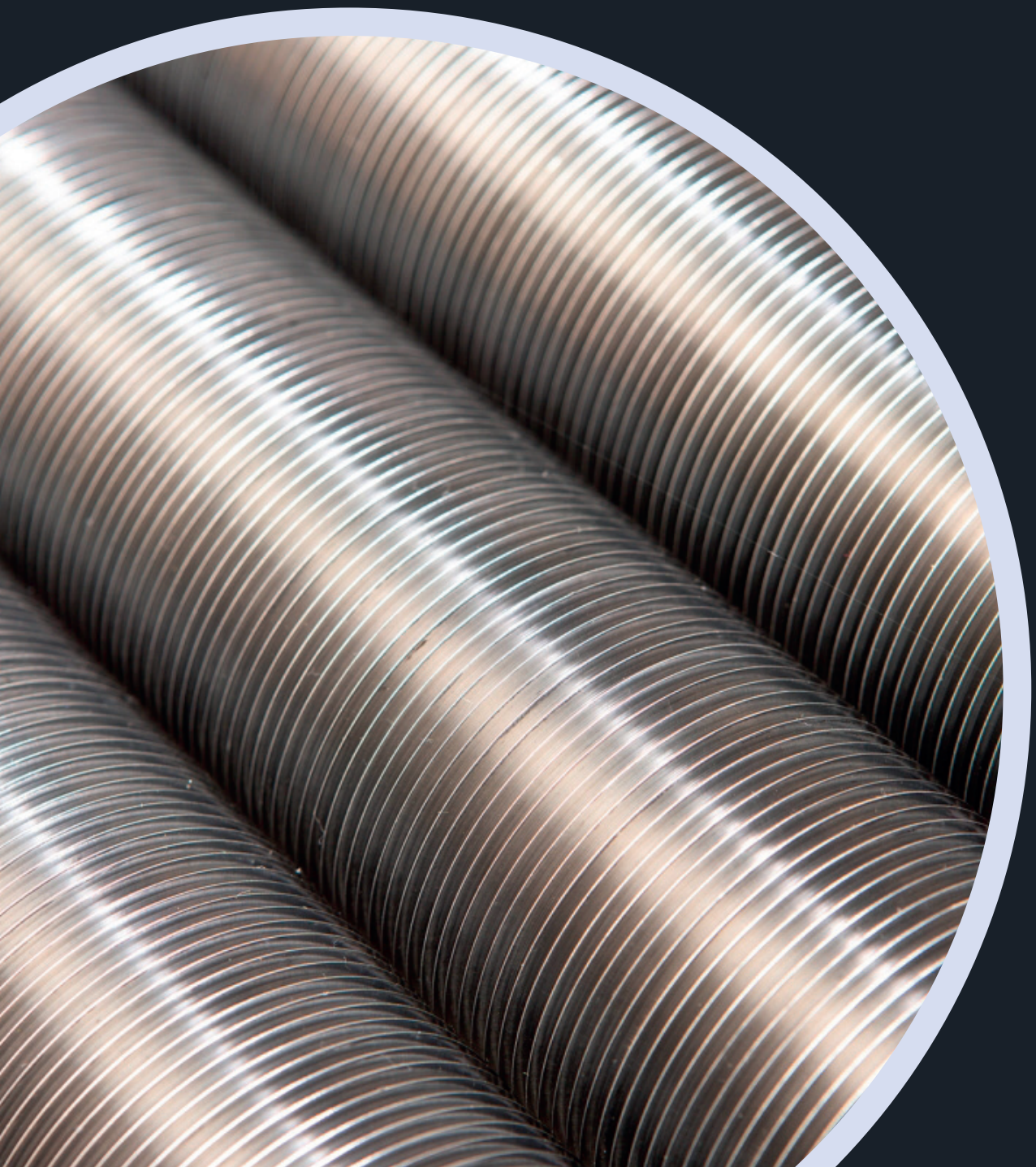
JIS SIZES G 3463

Dimensions and weight of Stainless Steel Boiler and Heat Exchanger Tubes

O.D.	Wall Thickness																		Unit: kg/m
mm \ mm	1.2	1.6	2.0	2.3	2.6	2.9	3.2	3.5	4.0	4.5	5.0	5.5	6.0	6.5	7.0	8.0	9.5	11.0	12.5
15.9	0.435	0.564	0.686	0.771	0.853	0.930													
19.0	0.527	0.687	0.838	0.947	1.050	1.150													
21.7	0.607	0.793	0.972	1.100	1.220	1.340	1.460												
25.4	0.716	0.939	1.150	1.310	1.460	1.610	1.750	1.890											
27.2	0.769	1.010	1.240	1.410	1.580	1.740	1.890	2.050	2.290										
31.8	0.905	1.190	1.470	1.670	1.870	2.070	2.260	2.440	2.740	3.030									
34.0		1.280	1.580	1.800	2.010	2.220	2.430	2.630	2.960	3.270	3.580								
38.1		1.440	1.780	2.030	2.280	2.520	2.750	2.990	3.360	3.730	4.080	4.420							
42.7			2.010	2.290	2.570	2.850	3.120	3.380	3.820	4.240	4.650	5.050	5.430						
45.0			2.120	2.420	2.720	3.010	3.300	3.580	4.040	4.490	4.930	5.360	5.770	6.170					
48.6			2.300	2.630	2.950	3.270	3.580	3.890	4.400	4.890	5.380	5.850	6.300	6.750	7.180				
50.8			2.410	2.750	3.090	3.430	3.760	4.080	4.620	5.140	5.650	6.140	6.630	7.100	7.560	8.440	9.680	10.800	11.800
54.0			2.560	2.930	3.300	3.650	4.010	4.360	4.930	5.490	6.040	6.580	7.100	7.630	8.110	9.070	10.400	11.700	12.800
57.1			2.720	3.110	3.490	3.880	4.250	4.630	5.240	5.840	6.420	7.000	7.560	8.110	8.650	9.690	11.600	12.500	13.700
60.3			2.880	3.290	3.700	4.100	4.510	4.900	5.550	6.190	6.820	7.430	8.030	8.620	9.200	10.300	11.900	13.400	14.700
63.5				3.470	3.900	4.330	4.760	5.180	5.870	6.550	7.210	7.870	8.510	9.140	9.750	10.900	12.700	14.200	15.700
65.0				3.560	4.000	4.440	4.880	5.310	6.020	6.710	7.400	8.070	8.700	9.380	10.000	11.200	13.000	14.600	16.200
70.0				3.840	4.320	4.800	5.270	5.740	6.510	7.270	8.010	8.750	9.470	10.200	10.900	12.200	14.200	16.000	17.700
76.2				4.190	4.720	5.240	5.760	6.270	7.120	7.960	8.780	9.590	10.400	11.200	11.900	13.500	15.600	17.700	19.600
82.6							6.270	6.830	7.750	8.670	9.570	10.500	11.300	12.200	13.000	14.700	17.100	19.400	21.600
88.9							6.760	7.370	8.370	9.370	10.300	11.300	12.300	13.200	14.100	16.000	18.600	21.100	23.600
101.6								8.470	9.630	10.800	11.900	13.000	14.100	15.200	16.300	18.500	21.600	24.600	27.500
114.3									10.900	12.200	13.500	14.800	16.000	17.300	18.500	21.000	24.600	28.000	31.400
127.0									12.100	13.600	15.000	16.500	17.900	19.300	20.700	23.500	27.500	31.500	35.300
139.8												18.200	19.800	19.800	21.400	26.000	30.500	34.900	39.200



Finned Tubing



In our brand new, purpose built facility we have installed three fin tube machines, engineered and manufactured with the most up to date technology available. The machines produce helically high and extruded fin tubes. Full details of scope of supply and our production range are set out in this brochure. We also supply low fin tube, details of which are in a separate brochure.

7 Fin Types

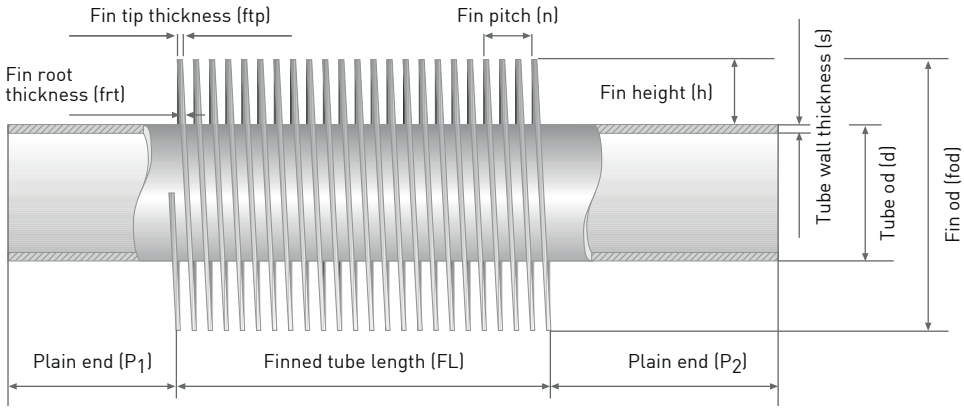
Applied Fins - Manufactured from Fin Strip

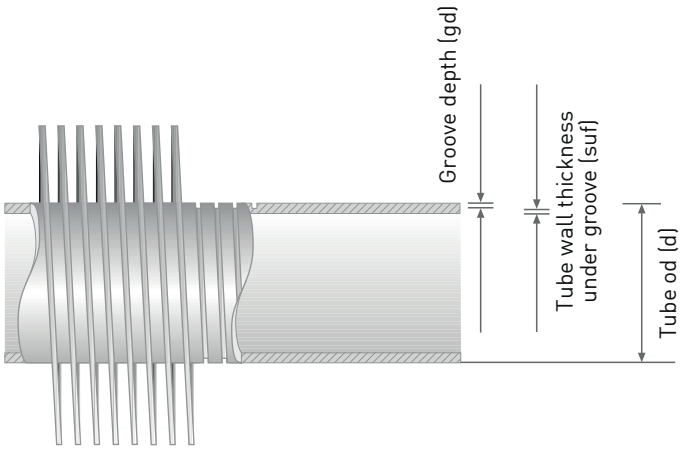
G (Embedded/Grooved).
L (Wrap On /L Foot).
LL (Overlapped Footed/Double L).
KL (Wrap On Knurled/Knurled L).
KLL (Overlapped Footed Knurled/ Knurled Double L).

Extruded Fins – Manufactured from Tube

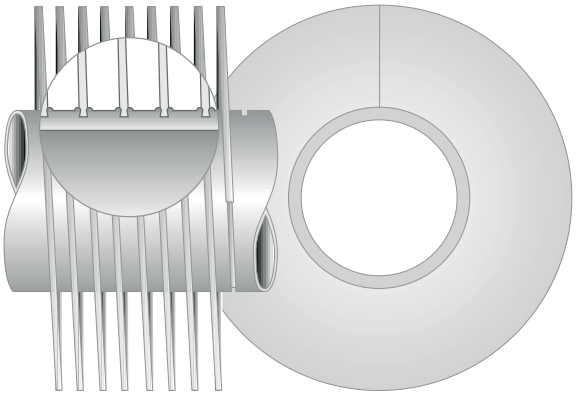
EX (Extruded).
EXS (Extruded Serrated).

Fin Tube Nomenclature





HELICAL HIGH AND EXTRUDED FINNED TUBE
'G' (Embedded) Fin



Product Benefits

- High performance and efficiency.
- Use at high operating temperature.
- Can be used for low and high temperature applications.
- Dimensionally stable.
- Resists high loads and shocks, both mechanically and thermally.

Fin Contact:
Mechanical bond (fin embedded in tube groove).

Maximum Tube Wall Operating Temperature:
400°C.

Type of Service: High temperature.

Manufacture

Fin strip is rolled in a uniform taper, helically wound into a plowed groove into the tube wall and simultaneously backfilled (by flat rotating discs) on both sides to lock the fin to the tube. No tube material is removed. This gives an excellent bond with high pull out loads.

Fin Material: Aluminium/Copper/Carbon Steel.

Core Tube Material: Carbon Steel/Carbon Alloy Steel/Stainless Steel/ Nickel Alloys/Copper/Copper Alloys.

Tube diameter: 5/8" (15.875mm) to 2" (50.8mm).

Tube Wall Thickness: › 0.065" (1.65mm) depending on tube material and outside diameter.

Tube Overall Length: 300mm to 20000mm.

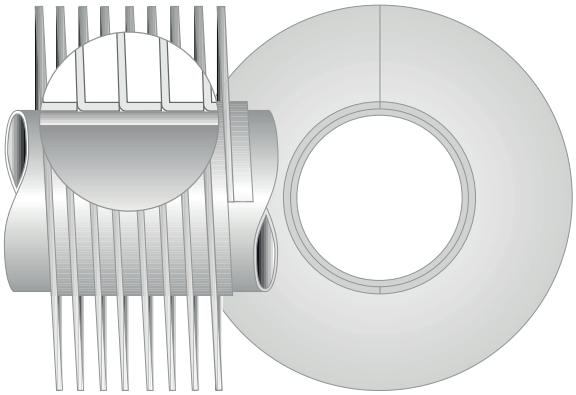
Fin Heights: 1/4" (6.35mm) to 1" (25.4mm).

Fin Pitches: 5 to 13 fins per inch.

Fin Strip Thickness: 0.012" (0.30mm) to 0.020" (0.50mm).

Other fin configurations are possible.
Please enquire.

HELICAL HIGH AND EXTRUDED FINNED TUBE
'L' (Wrap On /L Foot) Fin



Product Benefits

- Economic solution.
- Relative thin wall core tubes can be used.
- Some atmospheric corrosion protection of the core tube.
- Enhanced heat transfer with the L foot.

Fin Contact: Interference fit.

Maximum Tube Wall Operating Temperature: 130°C.

Type of Service: Low temperature

Manufacture

Fin strip is pre-formed into an accurately controlled L shape, rolled in a uniform taper, and helically wound under tension onto a tube. The foot of one fin butts up against the next fin and there is no gap between the fins giving a degree of coverage to the core tube.

Fin Material: Aluminium/Copper.

Core Tube Material: Carbon Steel/Carbon Alloy Steel/Stainless Steel/ Nickel Alloys/Copper/Copper Alloys/Titanium.

Tube diameter: 1/2" (12.7mm) to 2" (50.8mm).

Tube Wall Thickness: › 0.035" (0.889mm) depending on tube material and outside diameter.

Tube Overall Length: 300mm to 20000mm.

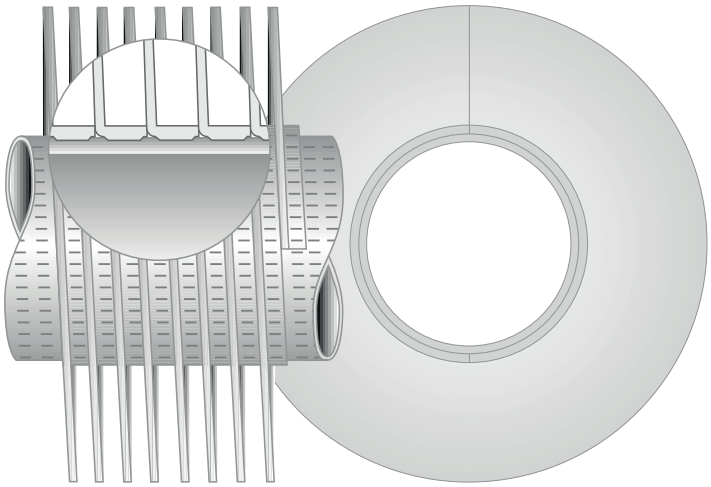
Fin Heights: 3/8" (9.525mm) to 1" (25.4mm).

Fin Pitches: 5 to 12 fins per inch.

Fin Strip Thickness: 0.012" (0.30mm) to 0.020" (0.50mm).

Other fin configurations are possible.
Please enquire.

HELICAL HIGH AND EXTRUDED FINNED TUBE
'KL' (Wrap On Knurled/Knurled L) Fin



Product Benefits

- Medium temperature applications.
- Increased fin to tube bond.
- Greater thermal contact than standard L fin.
- Added heat transfer performance due to the knurling.
- Increased atmospheric corrosion protection of the core tube.
- Good stability.

Fin Contact: Interference fit with mechanical pressed knurled bond.

Maximum Tube Wall Operating Temperature: 260°C.

Type of Service: Medium temperature

Manufacture

Fin strip is pre-formed into an accurately controlled L shape, rolled in a uniform taper, and helically wound under tension onto a core tube. Knurling tools both proceed and follow the laying down of the fin foot. The foot of the fin is knurled into the pre-knurled tube giving a tight bond.

Fin Material: Aluminium/Copper.

Core Tube Material: Carbon Steel/Carbon Alloy Steel/Stainless Steel/ Nickel Alloys/Copper/Copper Alloys/Titanium.

Tube diameter: 1/2" (12.7mm) to 2" (50.8mm).

Tube Wall Thickness: › 0.049" (1.244mm) depending on tube material and outside diameter.

Tube Overall Length: 300mm to 20000mm.

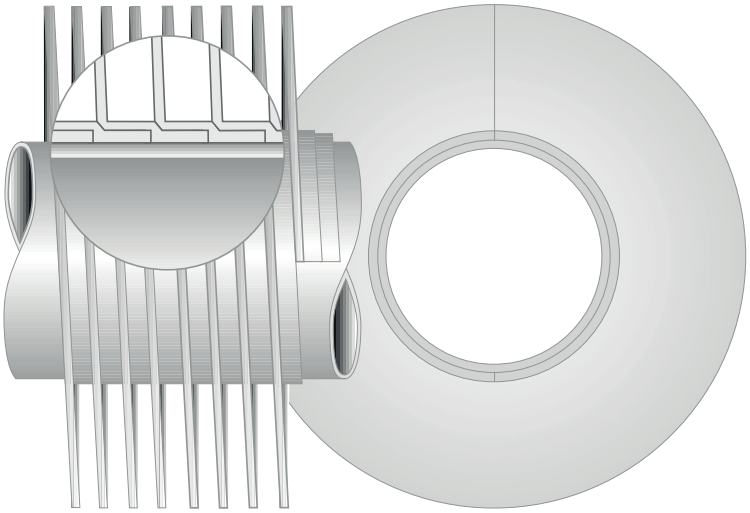
Fin Heights: 1/4" (6.35mm) to 1" (25.4mm).

Fin Pitches: 5 to 12 fins per inch.

Fin Strip Thickness: 0.012" (0.30mm) to 0.020" (0.50mm).

Other fin configurations are possible.
Please enquire.

HELICAL HIGH AND EXTRUDED FINNED TUBE
'LL' (Overlapped Footed/Double L) Fin



Product Benefits

- Economic alternative to Extruded fin tubes.
- Relative thin wall core tubes can be used.
- Greater atmospheric corrosion protection of the core tube (complete coverage of the core tube).
- Enhanced heat transfer with the LL foot.

Fin Contact: Interference fit.

Maximum Tube Wall Operating Temperature: 180°C.

Type of Service: Low temperature, corrosive atmospheric environment applications.

Manufacture

Fin strip is pre-formed into an accurately controlled stepped double L shape, rolled in a uniform taper, and helically wound under tension onto a tube. The foot of one fin overlaps the foot of the next fin giving complete coverage of the core tube.

Fin Material: Aluminium/Copper.

Core Tube Material: Carbon Steel/Carbon Alloy Steel/Stainless Steel/ Nickel Alloys/Copper/Copper Alloys/Titanium.

Tube diameter: 1/2" (12.7mm) to 2" (50.8mm).

Tube Wall Thickness: › 0.035" (0.889mm) depending on tube material and outside diameter.

Tube Overall Length: 300mm to 20000mm.

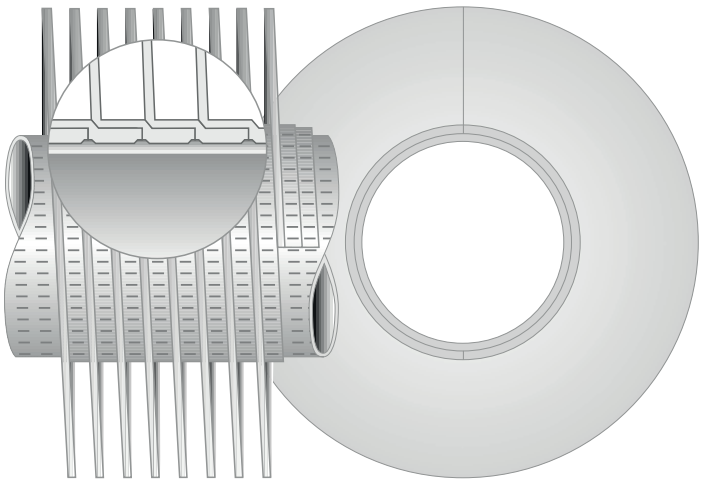
Fin Heights: 1/4" (6.35mm) to 1" (25.4mm).

Fin Pitches: 5 to 12 fins per inch.

Fin Strip Thickness: 0.012" (0.30mm) to 0.020" (0.50mm).

Other fin configurations are possible.
Please enquire.

HELICAL HIGH AND EXTRUDED FINNED TUBE
'KLL' (Overlapped Footed Knurled/Knurled Double L) Fin



Product Benefits

- Medium temperature applications.
- Increased fin to tube bond.
- Greater thermal contact than standard L fin.
- Added heat transfer performance due to the knurling.
- Increased atmospheric corrosion protection of the core tube.
- Good stability.

Fin Contact: Interference fit with mechanical pressed knurled bond.

Maximum Tube Wall Operating Temperature: 260°C.

Type of Service: Medium temperature, severe atmospheric corrosive environment.

Manufacture

Fin strip is pre-formed into an accurately controlled stepped double L shape, rolled in a uniform taper, and helically wound under tension onto a tube. The foot of one fin overlaps the foot of the next fin giving complete coverage of the core tube. Knurling tools both proceed and follow laying down of the double fin foot. The foot of the fin is knurled into the pre-knurled tube. An additional tool completes the double foot knurling. This gives a tight bond.

Fin Material: Aluminium/Copper.

Core Tube Material: Carbon Steel/Carbon Alloy Steel/Stainless Steel/ Nickel Alloys/Copper/Copper Alloys/Titanium.

Tube diameter: 1/2" (12.7mm) to 2" (50.8mm).

Tube Wall Thickness: › 0.049" (1.244mm) depending on tube material and outside diameter.

Tube Overall Length: 300mm to 20000mm.

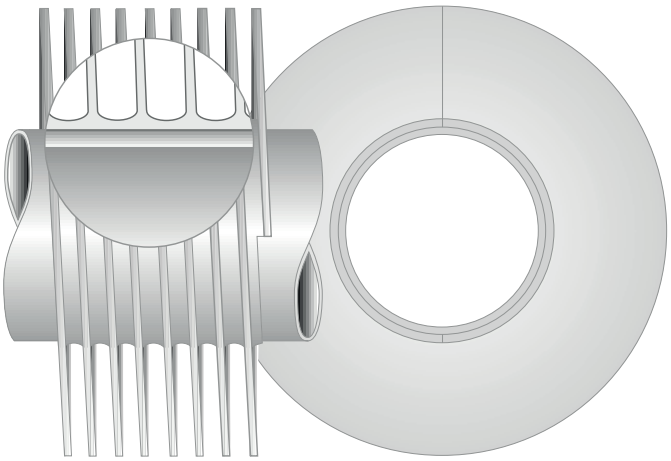
Fin Heights: 1/4" (6.35mm) to 1" (25.4mm).

Fin Pitches: 5 to 12 fins per inch.

Fin Strip Thickness: 0.012" (0.30mm) to 0.020" (0.50mm).

Other fin configurations are possible.
Please enquire.

HELICAL HIGH AND EXTRUDED FINNED TUBE
'EX' (Extruded) Fin



Product Benefits

- Relative thin wall core tubes can be used.
- Excellent heat transfer performance (100% contact between tube and fin).
- Excellent atmospheric corrosion (complete coverage of the core tube).
- Airtight fin to tube bond.
- Robust fins resist mechanical damage.
- Can be cleaned with high pressure water/steam.

Fin Contact: Interference fit with mechanically solid pressed bond.

Maximum Tube Wall Operating Temperature: 300°C.

Type of Service: Medium temperature, severe atmospheric corrosive environment.

Manufacture

The fins are rotary cold rolled from a smooth thick walled hollow blank tube slid over the core tube. Three multi spindle disc packs extrude the hollow blank tube into helical high fins. During this process the inner diameter of the hollow blank tube is reduced and at the same time pressed on the core tube. This results in a mechanically solid joint.

Fin Material: Aluminium/Copper.

Core Tube Material: Carbon Steel/Carbon Alloy Steel/Stainless Steel/ Nickel Alloys/Copper/Copper Alloys/Titanium.

Tube diameter: 3/4" (19.05mm) to 2" (50.8mm).

Tube Wall Thickness: › 0.042" (1.067mm) depending on tube material and outside diameter.

Tube Overall Length: 1000mm to 20000mm.

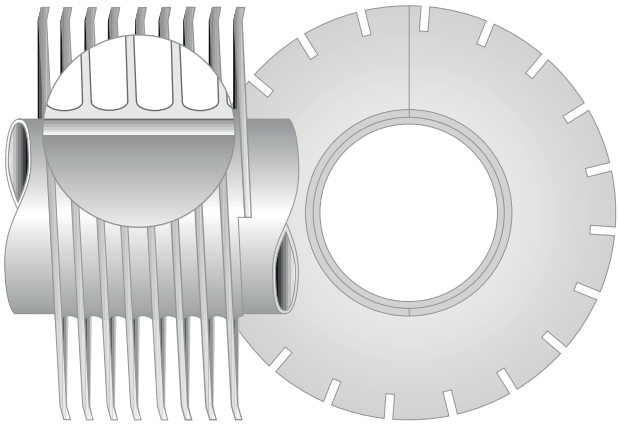
Fin Heights: 1/2" (12.7mm) and 5/8" (15.875mm).

Fin Pitches: 8 to 11 fins per inch.

Fin Strip Thickness: 0.016" (0.40mm).

Other fin configurations are possible.
Please enquire.

HELICAL HIGH AND EXTRUDED FINNED TUBE
'EXS' (Extruded Serrated) Fin



Product Benefits

- Relative thin wall core tubes can be used.
- Excellent heat transfer performance (100% contact between tube and fin).
- Excellent atmospheric corrosion (complete coverage of the core tube).
- Airtight fin to tube bond.
- Robust fins resist mechanical damage.
- Can be cleaned with high pressure water/steam.

Fin Contact: Interference fit with mechanically solid pressed bond.

Maximum Tube Wall Operating Temperature: 300°C.

Type of Service: Medium temperature, severe atmospheric corrosive environment.

Manufacture

The fins are rotary cold rolled from a smooth thick walled hollow blank tube slid over the core tube. Three multi spindle disc packs extrude the hollow blank tube into helical high fins. During this process the inner diameter of the hollow blank tube is reduced and at the same time pressed on the core tube. This results in a mechanically solid joint. Longitudinal slots are cut into the outer periphery with inclined fin tips.

Fin Material: Aluminium

Core Tube Material: Carbon Steel/Carbon Alloy Steel/Stainless Steel/ Nickel Alloys/Copper/Copper Alloys/Titanium.

Tube diameter: 1" (25.4mm).

Tube Wall Thickness: › 0.042" (1.067mm) depending on tube material and outside diameter.

Tube Overall Length: 1000mm to 20000mm.

Fin Heights: 5/8" (15.875mm).

Fin Pitches: 8 to 11 fins per inch.

Fin Strip Thickness: 0.016" (0.40mm).

Other fin configurations are possible.
Please enquire.

COPPER 'INTEGRON' LOW FIN TUBING

APPLICATIONS

'Integron' Low Fin Tubing is supplied in copper and copper alloys and is the perfect choice in shell and tube heat exchangers, evaporators, calorifiors and coolers for the refrigeration, air conditioning, liquefied natural gas (LNG), offshore and power generation industries.

DESIGN DATA

Low Fin 'Integron' tubes are manufactured in accordance with internationally recognised standards such as ASTM B359, DIN 17679 and Vd TUV 420/1 or to your special requirements. The most commonly used low fin 'Integron' tubes have an outside diameter at the plain end in the range ½" – 1" (12.7mm i 25.4mm), a nominal fin height of 1/16" (1.5mm) and fin spacing of 19 per inch (750 per mtr), 26 per inch (1025 per mtr) and 28 per inch (1102 per mtr).

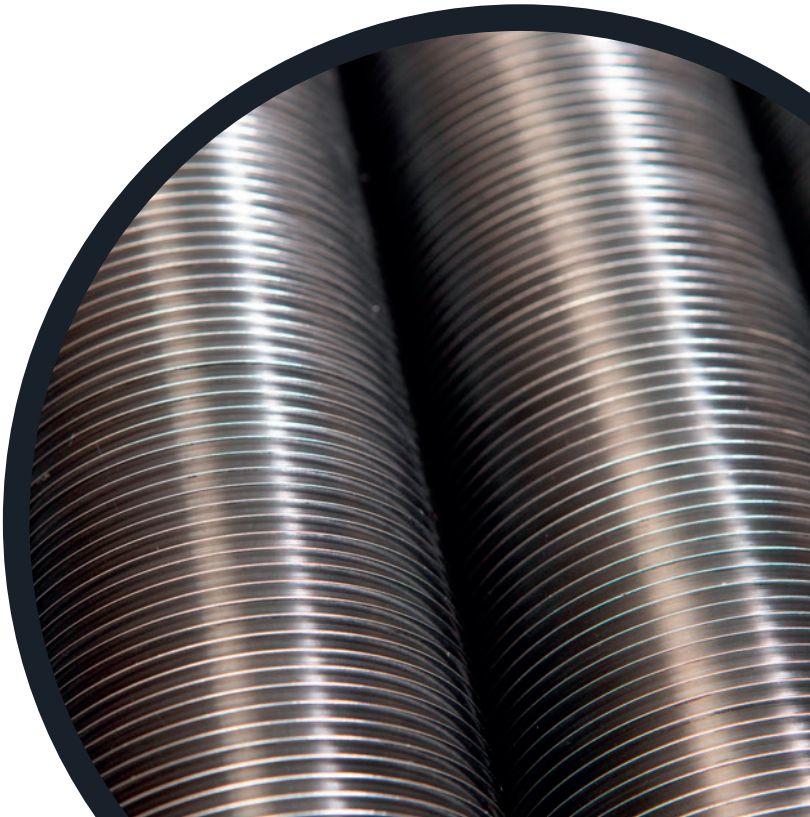
The outside surface of low fin 'Integron' varies from 2½ to 3 or more times that of an equivalent plain tube, and most sizes can usually be bent to a centre line radius of twice the tube diameter. The tables on the next page detail the more commonly used sizes of 'Integron' low fin tubes.

Enquiries for tubes with other dimensions will be considered upon request.

SPECIFICATIONS

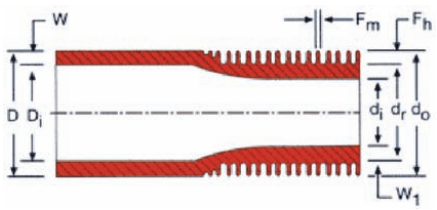
- ALL STRAIGHT LENGTH TUBES air tested at 250 psi after finning.
- ALL 'U' BENDS hydro-tested after bending.
- ALL TUBES NDENT (eddy current) after finning (when specified).
- MINIMUM LAND LENGTH: 1.0"/25.4mm.
- MINIMUM PLAIN LAND LENGTH: 1.0"/25.4mm.
- MINIMUM DISTANCE BETWEEN LANDS: 18"/457.2mm.

AVAILABLE IN CARBON STEEL, STAINLESS STEEL, DUPLEX, SUPER DUPLEX, NICKEL, SPECIAL ALLOYS, TITANIUM AND COPPER ALLOYS.



COPPER 'INTEGRON' LOW FIN TUBING

Code	Plain End OD in	Nominal wall Thickness Plain Ends in	Finned Section in	Mean Bore in	Mean External Area ft^2/ft	Surface Area Ratio Ext/Int
194049	0.625	0.067	0.049	0.402	0.405	3.84
194065	0.625	0.079	0.065	0.37	0.405	4.19
195035	0.75	0.054	0.035	0.555	0.496	3.41
195042	0.75	0.057	0.042	0.540	0.496	3.50
195049	0.75	0.067	0.049	0.527	0.496	3.59
195065	0.75	0.079	0.065	0.495	0.496	3.84
195083	0.75	0.099	0.083	0.459	0.496	4.14
196049	0.875	0.067	0.049	0 652	0.588	3.44
196065	0.875	0.080	0.065	0.620	0.588	3.63
196083	0.875	0.099	0.083	0.584	0.588	3.84
197049	1.0	0.069	0.049	0.777	0.678	3.33
197065	1.0	0.082	0.065	0.745	0.678	3.48
197083	1.0	0.099	0.083	0.709	0.678	3.66
265028	0.75	0.053	0.028	0.569	0.640	4.30
265035	0.75	0.055	0.035	0.555	0.640	4.40
265042	0.75	0.059	0.042	0.541	0.640	4.52



D	= Outside Diameter of Plain End
Di	= Inside Diameter of Plain End
dr	= Root Diameter
do	= Diameter Over Fins
di	= Inside Diameter of Fin Section
W	= Wall Thickness of Plain End
W1	= Wall Thickness over Fin
Fh	= Height of Fin
Fm	= Mean Fin Thickness

DEFINITION OF PART NUMBERS
Example: 195049

19:	FINS PER INCH
5:	ROOT DIAMETER (REFERENCE) IN EIGHTHS OF AN INCH
049:	WALL THICKNESS UNDER FIN IN THOUSANDTHS OF AN INCH

Steel Low Fin tube is an integral finned tube produced from welded and /or seamless purchased tubes made to requirements of ASTM Specifications in Carbon, Carbon Alloy, Stainless Steel and Copper Alloys.

All Low Fin which meets the requirements of ASME Boiler and Pressure Vessel Code, Section VIII, is made to an average wall in the fin area. When a minimum wall is required the next heavier wall size should be ordered.

RANGES OF SIZES

See Table 2

The standard maximum length for shipment by truck is 24 mtrs. For shipments of longer lengths contact Salem Tube directly.

TEMPERS

Steel is normally supplied in the 'as finned' temper. Plain ends and lands are supplied in the condition as described by the governing plain tube ASTM or ASME standard.

PLAIN SECTION REQUIREMENTS

Plain end lengths 25.4mm and over are supplied as standard. If plain end less than 25.4mm are required contact Salem Tube directly.

Distances of 457.2mm and over between lands are supplied as standard. If distances down to 203.2mm minimum are required contact Salem Tube directly.

TOLERANCES

Applicable tolerances for diameter and wall thickness are shown in Table 2. Other tolerances are per the governing ASTM or ASME standard.

TESTING

All Low Fin is Eddy Current and Air tested at 250psi, after finning per ASME specifications.

ALLOYS

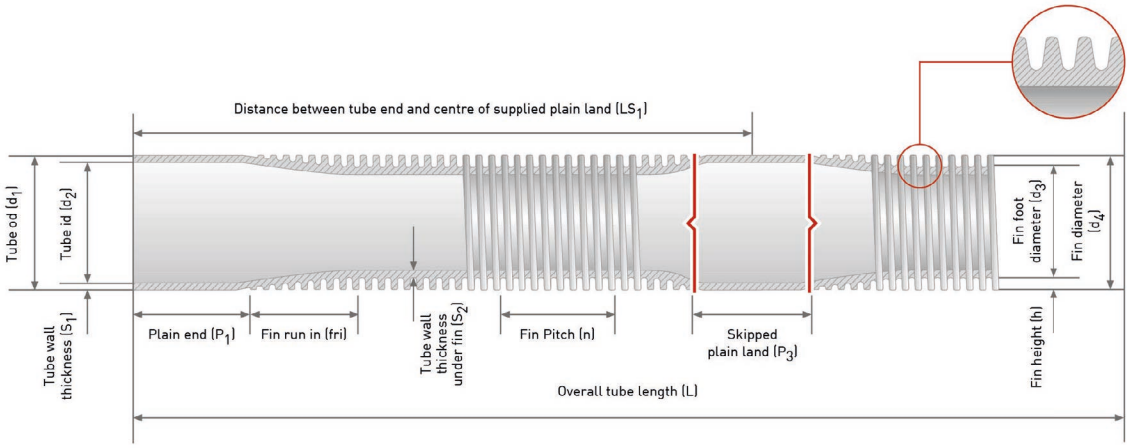
Applicable plain tube specifications and mechanical properties.

ENGINEERING DATA

See Table 1

PACKING

Unless otherwise stated all Low Fin tubes are packed in wooden cases.



TUBE	FIN SECTION
Tube diameter (d_1)	Fin Diameter (d_4)
Tube wall thickness (S_1)	Fin root diameter (d_3)
Tube inside diameter (d_2)	Fin height (h)
Plain ends (P_1) + (P_2)	Fin pitch (n) = fins per inch
Skipped plain land (P_3)	Tube wall thickness under fin (S_2)
Overall tube length (L)	Fin run in/Fin run out (fri)

DEFINITION OF CODING SYSTEM

6 number system Example: Code 195049

19	5	049
Number of fins per inch	Fin root diameter in 1/8th of an inch	Wall thickness of the finned section in 1/1000th of an inch

Fin Code	Ao		Ao A1	IXS		Approx Wt	
	Ft^2/Ft	Cm^2 / Cm		In^2	Cm^2	lbs /Ft	Kgs /M
193042	0.318	9.69	4.13	0.068	0.049	0.234	0.348
193049	0.318	9.69	4.33	0.062	0.040	0.255	0.379
193058	0.318	9.69	4.63	0.054	0.035	0.280	0.417
194049	0.410	12.49	3.87	0.129	0.83	0.343	0.510
194058	0.410	12.49	4.05	0.118	0.76	0.381	0.567
194065	0.410	12.49	4.20	0.109	0.70	0.408	0.608
194072	0.410	12.49	4.36	0.101	0.65	0.438	0.652
195049	0.503	15.33	3.62	0.221	1.43	0.432	0.643
195058	0.503	15.33	3.75	0.206	1.33	0.482	0.717
195065	0.503	15.33	3.86	0.195	1.26	0.520	0.773
195072	0.503	15.33	3.97	0.184	1.19	0.556	0.828
195083	0.503	15.33	4.16	0.168	1.08	0.611	0.909
196058	0.595	18.13	3.57	0.319	2.06	0.583	0.867
196065	0.595	18.13	3.65	0.305	1.97	0.632	0.940
196072	0.595	18.13	3.73	0.291	1.88	0.675	1.004
196083	0.595	18.13	3.87	0.271	1.75	0.747	1.112
196095	0.595	18.13	4.04	0.249	1.61	0.819	1.219
197058	0.688	20.97	3.45	0.456	2.94	0.683	1.017
197065	0.688	20.97	3.51	0.439	2.83	0.742	1.104
197072	0.688	20.97	3.58	0.423	2.72	0.797	1.186
197083	0.688	20.97	3.69	0.398	2.57	0.881	1.312
197095	0.688	20.97	3.82	0.372	2.40	0.969	1.442
197109	0.688	20.97	3.98	0.342	2.21	1.065	1.584

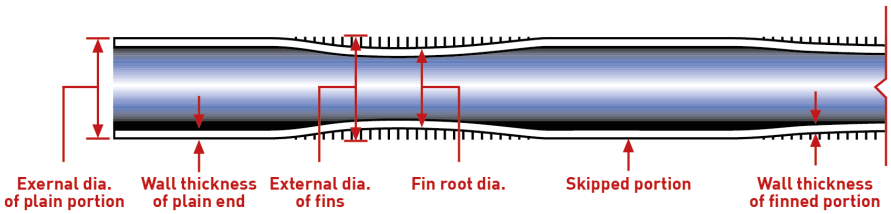
Ao = Average outside area

Ao/Ai = Outside to Inside surface area ratio

IXS = I.D cross – sectional area, average

Approx wt = Approximate weight per unit length (steel)

Standard Size Range of Fin "INTEGRON" Tubes



DEFINITION OF CODING SYSTEM
Example: Code 195049

19: Fins per inch

5: Fin root dia. in 1/8th of an inch

049: Wall thickness of finned portion in 1/1000th of an inch

LOW FIN TUBING

Standard Sizes – Low Fin – Low Carbon, Stainless Steel and Copper Alloys 19 fins per 1" (25.4mm) | Table 2

Standard Sizes					Plain Section Dimensions and Tolerances								Fin Section Dimensions			
Outside Diameter		Wall Thickness		Fin Code	Outside Diameter				Wall Thickness				At-A-Point Root Dia		Minimum Wall Thickness	
					Nominal Size		Tolerances		Nominal Size		Tolerances					
in	mm	in	mm		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
½	13.0	0.042	1.07	193042	0.500	13.0	0.004	0.10	0.060	1.52	0.005	0.15	0.375	9.5	0.37	0.94
		0.049	1.24	193049					0.065	1.65	0.006	0.16			0.044	1.12
		0.058	1.47	193058					0.075	1.90	0.007	0.19			0.049	1.25
5/8	15.9	0.49	1.24	194049	0.625	15.9	0.004	0.10	0.065	1.65	0.006	0.16	0.500	13.0	0.044	1.12
		0.058	1.47	194058					0.075	1.90	0.007	0.19			0.049	1.25
		0.065	1.65	194065					0.085	2.16	0.008	0.22			0.058	1.47
		0.072	1.83	194072					0.085	2.16	0.008	0.22			0.065	1.65
¾	19.1	0.049	1.24	195049	0.750	19.1	0.004	0.10	0.065	1.65	0.006	0.16	0.625	15.9	0.044	1.12
		0.058	1.47	195058					0.075	1.90	0.007	0.19			0.049	1.25
		0.065	1.65	195065					0.085	2.16	0.008	0.22			0.058	1.47
		0.072	1.83	195072					0.085	2.16	0.008	0.22			0.065	1.65
		0.083	2.11	195083					0.095	2.41	0.009	0.24			0.074	1.88
7/8	22.2	0.058	1.47	196058	0.875	22.2	0.004	0.10	0.075	1.90	0.007	0.19	0.750	19.1	0.049	1.25
		0.065	1.65	196065					0.085	2.16	0.008	0.22			0.058	1.47
		0.072	1.83	196072					0.085	2.16	0.008	0.22			0.065	1.65
		0.083	2.11	196083					0.095	2.41	0.009	0.24			0.074	1.88
		0.095	2.41	196095					0.110	2.70	0.010	0.28			0.084	2.13
1	25.4	0.058	1.47	197058	1.000	25.4	0.006	0.15	0.075	1.90	0.007	0.19	0.875	22.2	0.049	1.25
		0.065	1.65	197065					0.085	2.16	0.008	0.22			0.058	1.47
		0.072	1.83	197072					0.085	2.16	0.008	0.22			0.065	1.65
		0.083	2.11	197083					0.095	2.41	0.009	0.24			0.074	1.88
		0.095	2.41	197095					0.110	2.79	0.010	0.28			0.084	2.13
		0.109	2.77	197109					0.125	3.18	0.011	0.32			0.097	2.46

Tolerances are plus or minus

Fins per inch	-	19 + 1 -0
Fin width	-	.011" Avg
Fin height	-	.050" Min

LOW FIN TUBING

Engineering Data Low Fin tube 26 fins per 1" (25.4mm) | Table 3

Fin Code	Ao		Ao A1	IXS		Approx Wt	
	Ft^2/Ft	Cm^2 / Cm		In^2	Cm^2	lbs /Ft	Kgs /M
265035	0.63	19.2	4.38	0.245	1.580	0.360	0.54
265042	0.63	19.2	4.49	0.232	1.496	0.401	0.60
265049	0.63	19.2	4.61	0.221	1.425	0.441	0.66
267035	0.88	26.8	4.15	0.533	3.439	0.510	0.76
267042	0.88	26.8	4.22	0.515	3.322	0.568	0.85

Tolerances are plus or minus

Fins per inch	-	26 +1/-0
Fin width	-	.011" Avg
Fin height	-	.050" Min ,052" Avg

LOW FIN TUBING

Standard Sizes – Low Fin – Low Carbon, Stainless Steel and Copper Alloys 26 fins per 1" (25.4mm) | Table 4

Standard Sizes					Plain Section Dimensions and Tolerances								Fin Section Dimensions			
Outside Diameter		Wall Thickness		Fin Code	Outside Diameter				Wall Thickness				At-A-Point Root Dia		Minimum Wall Thickness	
					Nominal Size		Tolerances		Nominal Size		Tolerances					
in	mm	in	mm		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
¾	19.1	0.035	0.89	265035	0.750	19.1	0.005	0.13	0.055	1.40	0.0055	0.14	0.640	16.3	0.031	0.79
		0.042	1.07	265042					0.065	1.65	0.0065	0.17			0.037	0.94
		0.049	1.24	265049					0.075	1.91	0.0075	0.19			0.044	1.12
1	25.4	0.035	0.89	267035	1.000	25.4	0.005	0.13	0.055	1.40	0.0055	0.14	0.890	22.6	0.031	0.79
		0.042	1.07	267042					0.065	1.65	0.0065	0.17			0.037	0.94

Tolerances are plus or minus

Fin Code	Ao		Ao A1	IXS		Approx Wt	
	Ft^2/Ft	Cm^2 / Cm		In^2	Cm^2	lbs /Ft	Kgs /M
285028	0.52	15.8	3.187	0.301	1.94	0.284	0.423
285035	0.52	15.8	3.261	0.287	1.85	0.331	0.493
285042	0.52	15.8	3.338	0.274	1.77	0.377	0.561
285049	0.52	15.8	3.419	0.261	1.68	0.421	0.626
285065	0.52	15.8	3.619	0.233	1.50	0.520	0.774
285083	0.52	15.8	3.875	0.203	1.31	0.623	0.927
286028	0.61	18.6	3.119	0.435	2.81	0.338	0.503
286035	0.61	18.6	3.179	0.419	2.70	0.394	0.586
286042	0.61	18.6	3.241	0.403	2.60	0.449	0.668
286049	0.61	18.6	3.306	0.387	2.50	0.504	0.750
286065	0.61	18.6	3.464	0.353	2.28	0.624	0.929
286083	0.61	18.6	3.660	0.316	2.04	0.752	1.12
287028	0.77	21.3	3.071	0.593	3.83	0.391	0.582
287035	0.77	21.3	3.121	0.574	3.70	0.457	0.680
287042	0.77	21.3	3.173	0.555	3.58	0.522	0.777
287049	0.77	21.3	3.227	0.537	3.46	0.586	0.872
287055	0.77	21.3	3.357	0.496	3.20	0.728	1.08
287083	0.77	21.3	3.516	0.452	2.92	0.881	1.31

Tolerances are plus or minus

Fins per inch	-	28 +1/-0
Fin width	-	.011" Avg
Fin height	-	.035" Min ,037" Avg

LOW FIN TUBING

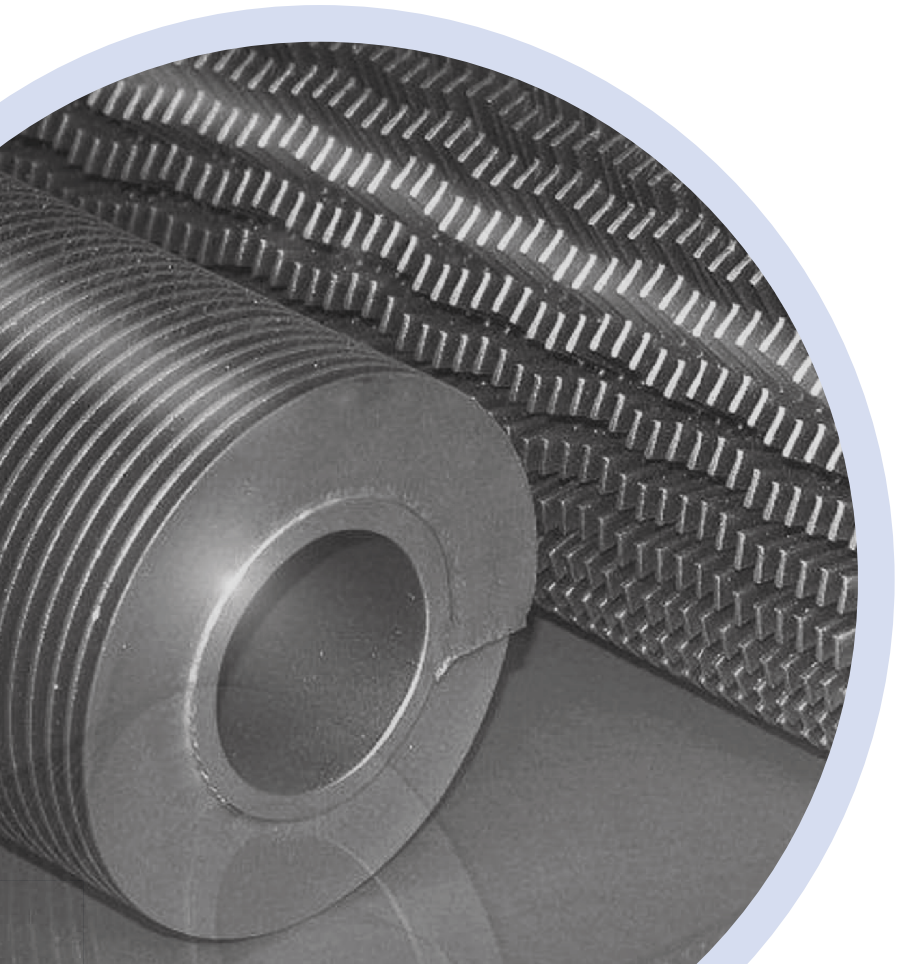
Standard Sizes – Low Fin – Seamless and Welded Stainless Steel
28 fins per 1" (25.4mm) | Table 6

Standard Sizes					Plain Section Dimensions and Tolerances								Fin Section Dimensions			
Outside Diameter		Wall Thickness		Fin Code	Outside Diameter				Wall Thickness				At-A-Point Root Dia		Minimum Wall Thickness	
					Nominal Size		Tolerances		Nominal Size		Tolerances					
in	mm	in	mm		in	mm	in	mm	in	mm	in	mm	in	mm	in	mm
¾	19.1	0.028	0.71	285028	0.750	19.1	0.004	0.10	0.049	1.24	0.005	0.127	0.672	17.1	0.025	0.64
		0.035	0.89	285035					0.058	1.47	0.0055	0.140			0.031	0.79
		0.042	1.07	285042					0.065	1.65	0.0065	0.165			0.037	0.94
		0.049	1.24	285049					0.072	1.83	0.007	0.178			0.044	1.12
		0.065	1.65	285065					0.085	2.16	0.0085	0.216			0.058	1.47
		0.083	2.11	285083					0.095	2.41	0.0095	0.241			0.074	1.88
7/8	22.2	0.028	0.71	286028	0.875	22.2	0.004	0.10	0.049	1.24	0.005	0.127	0.797	20.2	0.025	0.64
		0.035	0.89	286035					0.058	1.47	0.0055	0.140			0.031	0.79
		0.042	1.07	286042					0.065	1.65	0.0065	0.165			0.037	0.94
		0.049	1.24	286049					0.072	1.83	0.007	0.178			0.044	1.12
		0.065	1.65	286065					0.085	2.16	0.0085	0.216			0.058	1.47
		0.083	2.11	286083					0.095	2.41	0.0095	0.241			0.074	1.88
1	25.4	0.028	0.71	287028	1.000	25.4	0.006	0.15	0.049	1.24	0.005	0.127	0.922	23.4	0.025	0.64
		0.035	0.89	287035					0.058	1.47	0.0055	0.140			0.031	0.79
		0.042	1.07	287042					0.065	1.65	0.0065	0.165			0.037	0.94
		0.049	1.24	287049					0.072	1.83	0.007	0.178			0.044	1.12
		0.065	1.65	287065					0.085	2.16	0.0085	0.216			0.058	1.47
		0.083	2.11	287083					0.095	2.41	0.0095	0.241			0.074	1.88

Tolerances are plus or minus

WELDED FIN TUBES

Finned tubes are major components of economizers, heat recovery boilers and many other industrial heat exchanger applications. They are available with solid/ plain or serrated fins. All finned tube configurations are tailored to the customers' specific requirements and flue gas characteristics: serrated fins are mainly used for clean applications such as natural gas firing and solid fins where dusty or abrasive conditions exist.



Tube materials
All common tube materials can be used including: carbon steel, low and high alloy steel and stainless steel. The tube specification can be seamless or welded according to any recognized standard (i.e. ASTM or ASME, DIN, NF, etc) The tubes can be supplied by Salem Tube or be provided as free issue by the customer. The most common materials used are listed below:

STEEL TYPE	MATERIAL NO:	DESIGNATION ACC TO EN STANDARD.	ASTM	GRADE
Carbon Steel	1.0305	P235 GH TC1 or TC2	A 53 + A 106	A
			A 192	
	1.0405	P265 GH TC1 or TC2	A 106	B
			A 210	A-1
Low and Medium Alloy Steels	1.5415	16Mo3	-	-
	1.5423	16Mo5	A 209	T1
			A 335	P1
	1.7335	13 CrMo4-5	A 213	T12
			A 335	P12
	-	-	A 213	T11
			A 335	P11
	1.7380	10 CrMo9-10	A 213	T22
			A 335/ A 369	P22
	1.7362	12CrMo 19-5	A 213	T5
			A 335	P5
	1.7386	X12CrMo 9-1	A 213	T9
			A 335	P9
High Alloy Steels	1.4903	X10CrMoVNb9-1	A 213	T91
			A 335	P91
	1.4301	X 5 CrNi 18 10	A 312/A 213	TP304
	1.4306	X 2 CrNi 19 11	A 312/A 213	TP304L
	1.4948	X 6 CrNi 18 11	A 312/A 213	TP304H
	1.4401	X 5 CrNiMo 17 12 2	A 312/A 213	TP316
	1.4404	X 2 CrNiMo 17 13 2	A 312/A 213	TP316LN
	1.4435	X 2 CrNiMo 18 14 3	A 312/A 213	TP316L
	1.4571	X 6 CrNiMoTi 17 12 2	A 312/A 213	TP316Ti
	1.4919	X 6 CrNiMo 17 13	A 312/A 213	TP316H
	1.4541	X 6 CrNiTi 18 10	A 312/A 213	TP321
	1.4941	X 8 CrNiT 18 10	A 312/A 213	TP321H
	1.4878	X 12 CrNiTi 18 9	-	TP321H
	1.4550	X 6 CrNiNb 18 10	A 312/A 213	TP347
				TP37H
	1.4876	X 10 CrNiAlTi 32 20	-	Alloy 800(H)
	1.4877	X 5 NiCrCeNb 32 27	-	-

Fin Materials

Almost every combination of tube and fin material can be welded. The most common materials are however:-

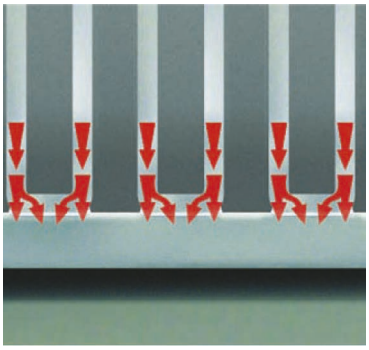
Material Grade	Max. Fintip Temperature
DC01-04 (EN10130) ASTM A 1008	490°C
1.4512 (EN10088-2) / TP409 (ASTM A 240)	650°C
1.4301 (EN 10088-2)/ TP304 (ASTM A 240)	850°C

Stainless Steel like 1.4571 (TP316Ti) or 1.4541 (TP321) are also common fin materials. Should you have a requirement where another material is required, please do not hesitate to contact us.

If needed, we can also produce stainless and carbon steel combinations. By the use of the appropriate filler materials the increase of the hardness values is reduced resp. hardness peaks are avoided.







Solid Fins

These are attached to the tube by HF or GMAW welding. The pressure applied while winding the finstrip onto the tube may lead to a slight thinning of the fintip. The finfoot has a width of up to 120% of the nominal fin thickness because of the compression and added filler metal.

Serrated Fins

Serrated fins are produced by slitting the finstrip equally spaced during the production process. A base 5mm (0.19") high remains unslitted to form the continuous finfoot. When the finstrip is helically wound onto the tube the serrated part of the finstrip divides the outer end thus forming rectangular segments.

U-Shaped Finning

The serrating process as described above is applied on both sides of the finstrip after which the fins are formed with the specified finpitch.

Dimensions

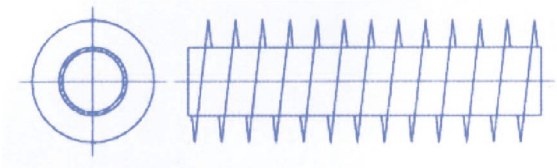


Fig. 1: Tube with solid fins

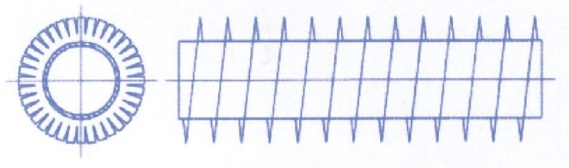


Fig. 2: Tube with serrated fins

ASA Nominal Pipe	OD	Fin height min / max l-fin solid	Fin height min / max l-fin serrated
½"	21.3mm	6.5 – 10mm	6.5 – 32mm
	25mm	6.5 – 13mm	
	25.4mm	6.5 – 13mm	
¾"	26.9mm	6-5 – 14mm	
	31.8mm	6-5 – 19mm	
1"	33.7mm	6.5 – 19mm	
	38mm	6.5 – 25mm	
1 ¼"	42.4mm	6.5 – 27mm	
	44.5mm	6.5 – 29mm	
1 ½"	48.3mm	6.5 – 31mm	
	51mm	6.5 – 32mm	
	57mm	6.5 – 32mm	
2"	60.3mm	6.5 – 32mm	
2 ½"	76.1mm	6.5 – 32mm	
3"	88.9mm	6.5 – 32mm	
	101.6mm	6.5 – 38mm	
4"	114.3mm	6.5 – 38mm	
5"	139.7mm	6.5 – 38mm	
	141.3mm	6.5 – 38mm	
6"	168.3mm	6.5 – 38mm	
8"	219.1mm	6.5 – 38mm	

Tube wall thickness:

min 2mm for O/D 26.9mm resp. 2.3mm for O/D › 26.9mm
The fin height can be determined in steps of 0.1mm

Finned Dimensions

Max.fin density For fin thickness	l-fins	U-fins
1.25mm	303 fpm	
1.0mm	345 fpm	
0.9mm	357 fpm	370 fpm
0.8mm	370 fpm	385 fpm
0.7mm		400 fpm
0.6mm		417 fpm
0.5mm		435 fpm

The fin thickness can be determined in steps of 0.5mm, the max, fin thickness is 2.5mm for solid fins. For serrated fins the maximum fin thickness is 1.5mm for carbon steel and 1.3mm for 1.4512 (TP409)

Finned Tolerances

Finned tubes are produced following the International Standard for Dimensions, Tolerances and Tests of welded fins.

Different Fin Pitch

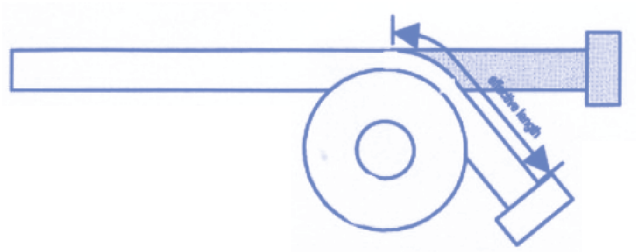
It is also possible to have different fin pitches on one tube.



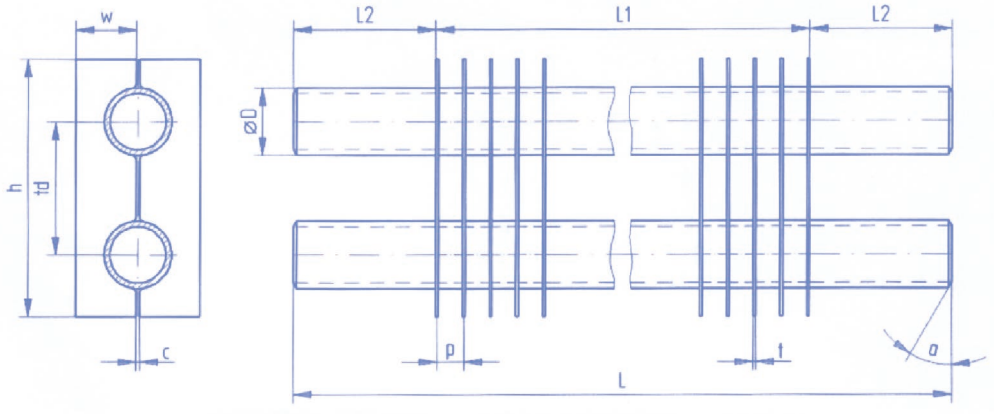
It is also possible to have different fin pitches on one If, for instance, the fin pitch chosen is too big to use thin tube sheets, it can also be decreased locally in certain areas in order to avoid the necessity of alternative and expensive support structures.

Tube Bending

Salem Tube can offer the bending of the tube ends up to 90°



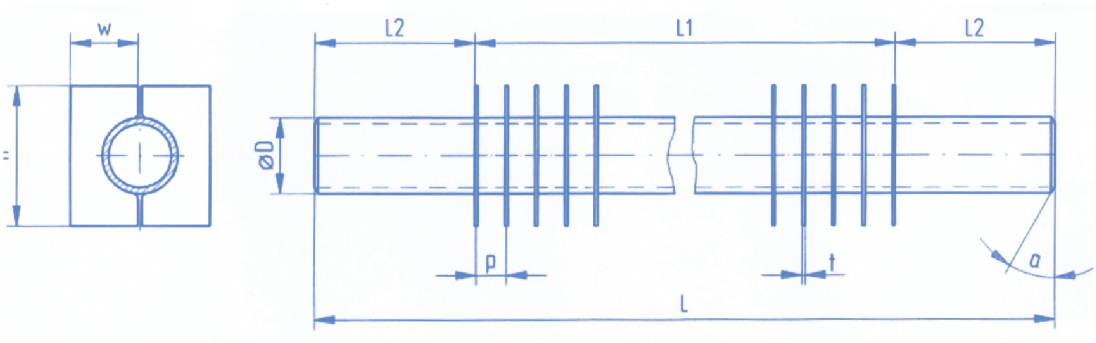
Double Finned Tubes



Dimensions (mm)

D mm	L (max) mm	L2 (min) mm	h mm	w mm	c mm	t mm	td mm	p mm
31.8	16000	100	125	27	6	2.0 + 2.5	65	9 - 40
31.8	16000	100	145	32	6	2.0 + 2.5	75	9 - 40
38.0	16000	100	145	32	6	2.0 + 2.5	75	9 - 40
38.0	16000	100	180	40	10	2.0 + 2.5	92	9 - 40
44.5	16000	100	196	45	6	2.0 + 2.5	100	9 - 40

Single Finned Tubes

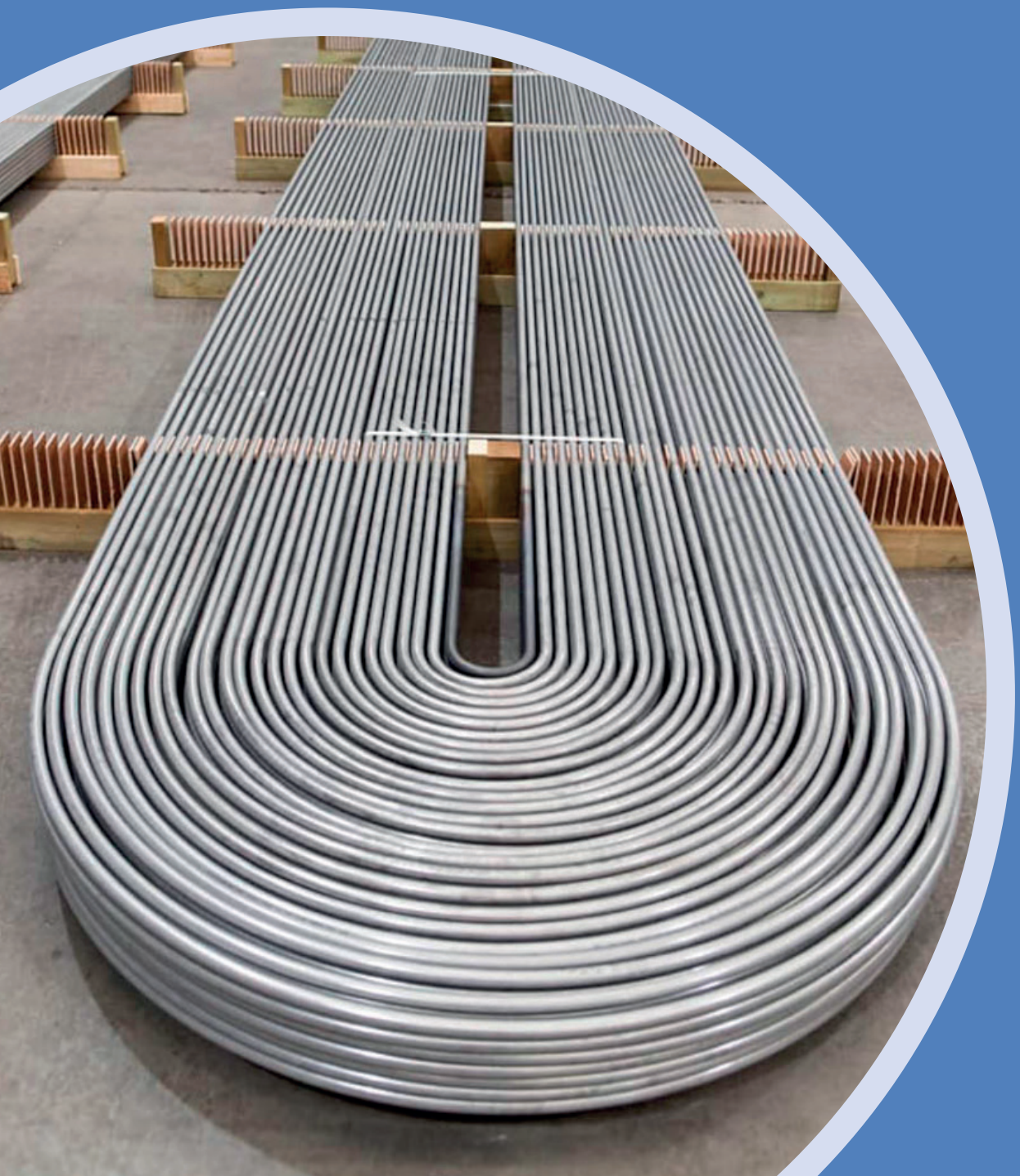


Dimensions (mm)

D mm	L (max) mm	L2 (min)mm	h mm	w mm	c mm	l mm	p mm
31.8	16000	100	60	27	6	2.0 + 2.5	9 - 40
31.8	16000	100	70	32	6	2.0 + 2.5	9 - 40
38.0	16000	100	70	32	6	2.0 + 2.5	9 - 40
44.5	16000	100	96	45	6	2.0 + 2.5	9 - 40

For other dimensions please contact us.

Bending



HEAT TREATMENT OF U BEND

General

Depending on the material composition the bent area can be solution annealed or stress relieved if required.

Cleaning of tube surface

This will be carried out before any heat treatment to remove any residue which if left could be harmful to the finished product.

Procedure

The bend plus 300 mm of the straight leg will be heat treated as required by the material grade using either electric furnace or electrical direct resistance.

Depending on the material and method used, control of the temperature is via thermocouples, optical pyrometers and infrared cameras.

Inert gas is used during the heating process to protect the tube bores from oxidation.

If required, heat discolouration of the material surface can be removed by mechanical polishing upon request

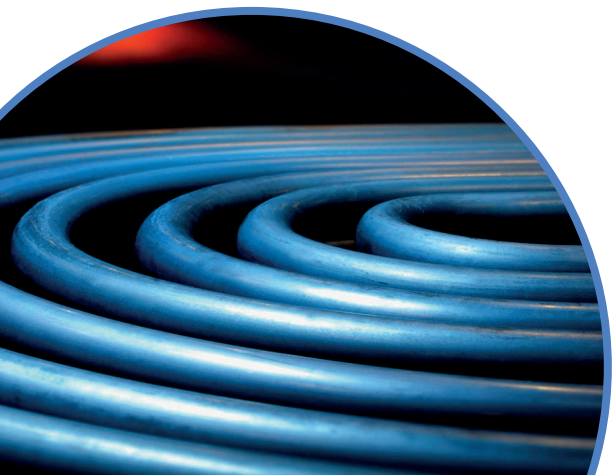
Method

Solution annealing:

The bend area plus 300mm of straight leg is heated according to the material specification, followed by rapid cooling.

Stress relieving:

The bend area plus 300mm of straight leg is heated according to the material specification, followed by slow cooling in still air.



Inspection, packing & documentation

Dimensional inspection

Dimensional checks are undertaken at each stage of the process with particular focus on bend radius, flattening / ovality and thinning of the bend outer wall.

Sample bends of the smallest row are physically sectioned to ensure dimensional tolerances are achieved. On all other rows an ultrasonic measuring machine is used to ensure conformity.

Hydrotest

As standard, all U bends are hydrostatically tested with demineralised water. The pressure is dictated by the specification or as agreed and held for a minimum of 5 seconds.

Dye penetrant test (optional)

Dye penetrant testing of the bend area can be arranged if necessary.

Marking

Each U bend is identified with its respective row number in addition to any marking that is required by the specification.

Cleanliness

The cleanliness of the inside and outside surface is inspected on each U-tube.

End protection

If required, the tube ends can be fitted with plastic caps.

Packing

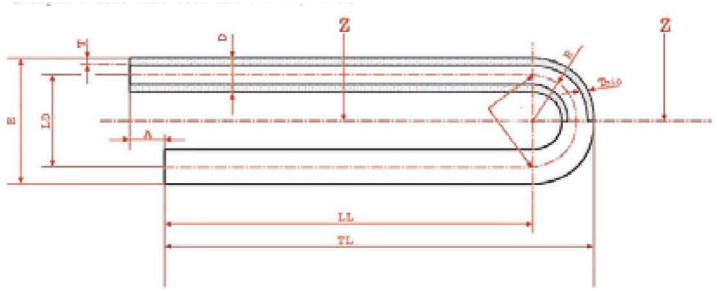
Standard packing methods include 'export quality' wooden cases. Wooden 'fingers' can also be supplied which separate the U bends allowing each individual row to be removed independently. Specific packing requests can be agreed before the placement of any order.

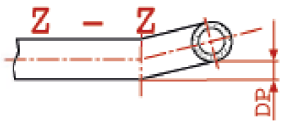
Documentation

Documentation / certification according to EN 10204 3.1 will be issued with all materials

Inspection certificates 3.2 with third parties can also be arranged

The bending of the straight tubes is carried out according to the applicable specifications DIN28179, TEMA RCB- 2.31, ASTM A/ASME SA 688, ASTM B/ASME SB 163 and/or acc. customer´s specification. Usually seamless tubes of austenitic, ferritic, martensitic and Duplex steels as well as nickel alloy tubes with radii from 1.5D can be bent. For radii ‹1.5D tolerances (deviating from the tolerance standard) for ovality/flattening and minimum wall in the bending area have to be agreed. Bending of titanium tubes is possible from radius 2D up.





Meaning of measurements and symbols:

A	leg length difference
E	(2R + D): 2x radius plus outside diameter
D	nominal outside diameter
D_{max}	max. outside diamater
D_{min}	min. outside diamater
LD	leg length distance measured from points of tangency
LL	leg length
TL	total length
R	centerline bend radius
R_{min}	min. radius
T	nominal wall thickness
T_{min}	min. wall thickness in outside bending area
SW	smalles wall thickness of straight tube
O	ovality
DP	deviation from plane of bend
Z	section

Tolerances

Radii tolerance

R 1.5xD - R 200	+/- 1.0 mm
R › 200 - R 400	+/- 1.5 mm
R › 400	+/- 2.0 mm

Wall thinning of bending area

acc. DIN 28179 $T_{min} \geq SW_2 x_x \frac{(2\ R + D)}{(R + D)}$ mm

According to TEMA R-2.3 1 for radii from 1.5D: max. 17% wall thinning based on the minimum wallthickness of the straight tube.

Tolerance on straight leg length

straight leg	≤ 6.000 mm	- 0/+3 mm
straight leg	› 6.000 mm - ≤ 9.000 mm	- 0/+4 mm
straight leg	› 9.000 mm	- 0/+5 mm

Difference in leg length

leg length	≤ 6.000 mm	- 0/+ 3 mm
leg length	› 6.000 mm	- 0/+ 5 mm

Tolerance on ovality

Allowable deviation from ovality in %

R ≤ 4D $O = \frac{D}{5\ R} \times 100$

R › 4 D ≤ 5 %

The deviation O of the ovality is calculated as follows:

$$O = 200 \times \frac{D_{max} - D_{min}}{D_{max} + D_{min}}$$

Flattening on bend (TEMA RCB-2.31 only)

Flattening does not exceed 10% of the nominal diameter

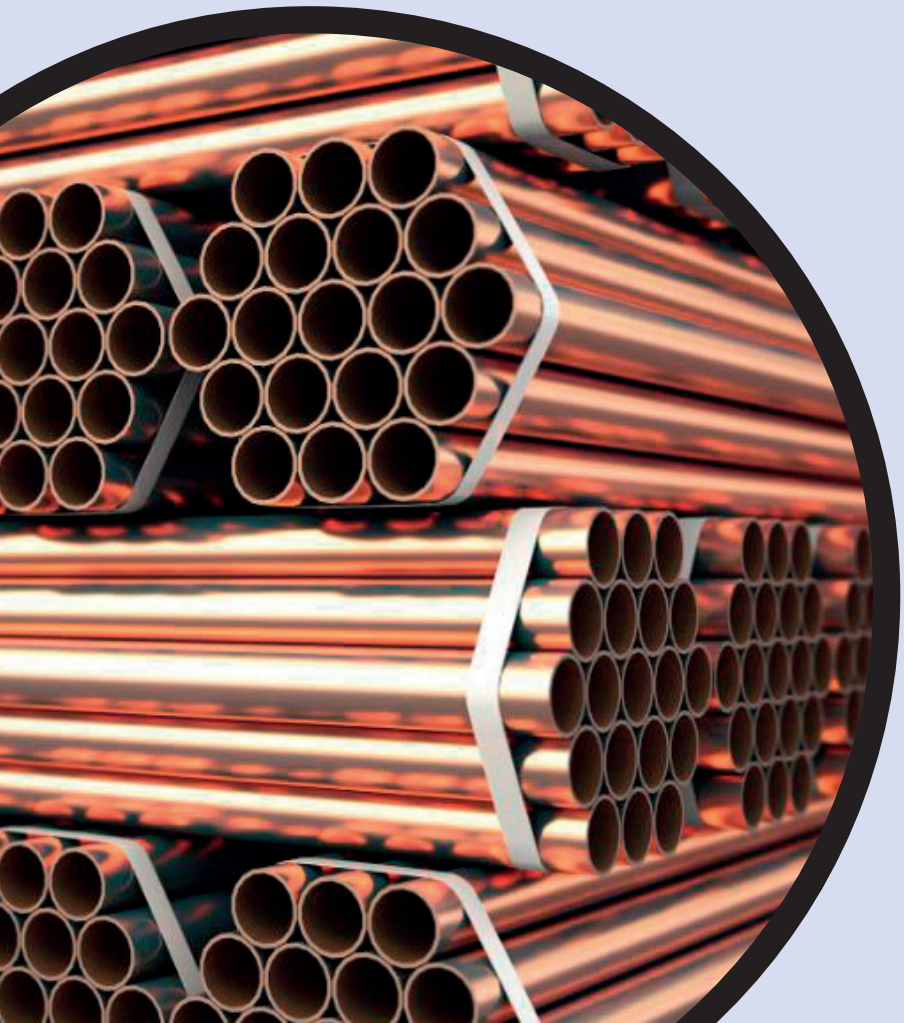
Tolerance on total length

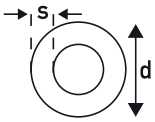
≤ 6000 mm	- 0/+ 5 mm
› 6000 mm	- 0/+ 8 mm

Deviation from plane of bend DP

R ≤ 300 mm ≤ 1.5 mm
R › 300 mm ≤ 2 mm

Non Ferrous



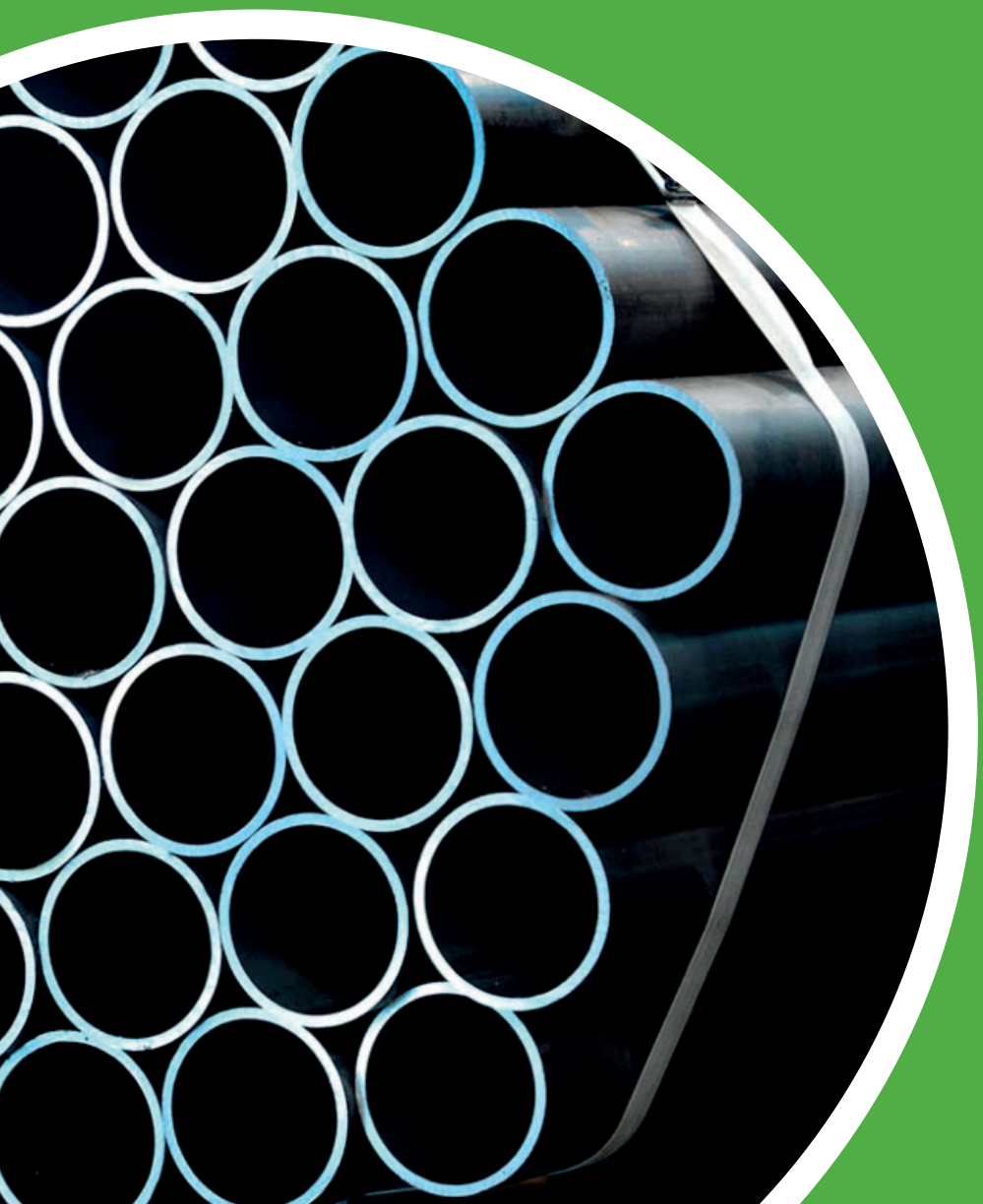


d	s	KG/MTR
10	1	0.252
10	1.5	0.356
10	2	0.447
10	2.5	0.524
11	1	0.279
12	1	0.307
12	1.5	0.440
12	2	0.559
12	3	0.755
13	1.5	0.482
13	3	0.838
14	2	0.671
14	3	0.922
15	1	0.391
15	1.5	0.566
15	2	0.727
15	2.5	0.873
16	1.5	0.608
16	2	0.782
16	3	1.090
16	4	1.341
18	1	0.475
18	1.5	0.692
18	2	0.894
20	1	0.531
20	1.5	0.776
20	2	1.006
20	2.5	1.223
20	5	2.096
22	1	0.587
22	1.5	0.859
22	2	1.118
22	3	1.593
23	1.5	0.901
23	2	1.174
24	2	1.230
24	3	1.761
25	2	1.286
25	2.5	1.572
25	5	2.795
25	7.5	3.668
26	1.5	1.027
26	2	1.341
26	3	1.928
28	1	0.755
28	1.5	1.111
28	2	1.453
28	4	2.683
30	2	1.565
30	2.5	1.921

d	s	KG/MTR
30	3	2.264
30	5	3.493
32	1	0.866
32	2	1.677
33	1.5	1.320
33	4	3.242
34	2	1.789
35	1	0.950
35	1.5	1.404
35	2	1.844
35	2.5	2.271
35	5	4.192
35	75	5.764
36	2	1.900
36	3	2.767
38	1.5	1.530
38	2	2.012
40	1.5	1.614
40	2.5	2.620
40	3	3.104
40	5	4.891
40	10	8.384
42	2	2.236
42	3	3.270
44	2	2.347
44.5	2	2.375
45	5	5.589
45	10	9.781
46	2	2.459
48	1.5	1.949
50	2	2.683
50	3	3.940
50	5	5.142
50	5	6.288
52	1	1.425
52	1.5	2.117
53	1.5	2.159
54	2	2.906
55	5	6.987
55	10	12.576
56	3	4.443
57	3	4.527
57	3.5	5.233
58	3	4.611
60	2.5	4.017
60	5	7.685
60	10	13.973
60	15	18.864
63	3	5.030
64	2	3.465
65	5	8.384
70	2.5	4.716
70	5	9.082
70	10	16.768
74	2	4.024
75	2.5	5.065
76	3	6.120

d	s	KG/MTR
80	2	4.360
80	5	10.480
80	10	19.562
84	2	4.583
85	2.5	5.764
86	3	6.959
89	2.5	6.046
89	3	7.210
90	5	11.877
90	10	22.357
95	2.5	6.463
100	2.5	6.812
100	5	13.274
100	10	25.151
100	20	44.714
102	1.5	4.213
104	2	5.701
105	2.5	7.161
108	2.5	7.375
108	3	8.803
108	4	11.626
110	5	14.672
120	5	16.069
120	10	30.741
130	5	17.466
131	3	10.731
132	3.5	12.569
133	3.5	12.667
133	4	14.420
135	5	18.165
140	10	36.330
150	5	20.261
150	10	39.124
156	3	12.827
158	5	21.379
159	3	13.079
159	6	25.654
160	5	21.658
160	10	41.919
170	5	23.055
170	10	44.714
180	5	24.453
180	10	47.508
191	4	20.904
200	5	27.247
200	10	53.097
206	3	17.019
210	5	28.645
220	10	58.687
256	3	21.211
264	5	36.190
267	3	22.133
300	5	41.220

Conversion Tables



WEIGHT CONVERSIONS
From Steel To Other Materials

MATERIAL	GRADE	FACTOR
Steel		1.0000
Aluminium	1050/ 1060/ 1100	0.3462
Aluminium	2011	0.3604
Aluminium	2014	0.3568
Aluminium	2017	0.3568
Aluminium	2024	0.3533
Aluminium	3003	0.3498
Aluminium	5052	0.3427
Aluminium	5083	0.3392
Aluminium	6061	0.3462
Aluminium	6063	0.3462
Aluminium	7075	0.3568
Brass		1.0840
Bronze		1.1180
Columbium		1.1070
Copper		1.1480
Copper Alloys		1.1200
Gold		2.4590
Magnesium		0.2230
Molybdenum		1.3210
Niobium		1.1070
Tantalum		2.1420
Titanium		0.5750
High Speed Tool Steel		1.1200
Tungsten Moly Tool Steel		1.0400
Tungsten		2.4640
Zinc		0.9040
Zirconium		0.8350

GRADE	MATERIAL	DENSITY	FACTOR
1.3912	Alloy 36	8.20	1.0446
1.3917	Alloy 42	8.20	1.0446
1.3981	Alloy K	8.30	1.0572
1.4314	Alloy 304	7.90	1.0061
1.4324	Alloy 301	7.90	1.0061
1.4361	Alloy 1815	7.85	1.0000
1.4438	Alloy 317 L	7.85	1.0000
1.4462	Alloy 2205	7.80	0.9935
1.4465	Alloy 25252	7.96	1.0138
1.4529	Alloy 254	8.30	1.0572
S32550	Alloy 255	7.90	1.0061
1.4534	PH 13-8 Mo	7.80	0.9935
1.4539	Alloy 904L	8.05	1.0255
1.4542	17-4 PH	7.80	0.9935
1.4544	Alloy 321	7.90	1.0061
1.4545	15-5 PH	7.80	0.9935
1.4546	Alloy 347	7.90	1.0061
1.4548	17-4 PH	7.90	1.0061
1.4549	G-17-4 PH	7.90	1.0061
1.4563	Alloy 28	8.10	1.0316
1.4546	17-7 PH	7.80	0.9935
1.4574	PH 15-7 Mo	7.80	0.9935
1.4575	Alloy 2842	7.70	0.9809
1.4828	Alloy 309	7.90	1.0061
1.4841	Allloy 310	7.90	1.0061
1.4845	Alloy 310 S	7.90	1.0061
1.4864	Alloy DS	8.00	1.0191
1.4865	Alloy 330 G	8.00	1.0191
1.4876	Alloy 800 H/HAT	8.00	1.0191
1.4939	Jethete	7.80	0.9935
1.4943	A-286	7.95	1.0126
1.4944	A-286	7.95	1.0126
1.4957	G N-155	8.25	1.0507
1.4971	N-155	8.25	1.0507
1.4974	N-155	8.25	1.0507
1.4980	A-286	7.95	1.0126
1.6354	MA 300	8.05	1.0255
1.6355	MA 350	8.02	1.0255
1.6356	MA 350	8.02	1.0255
1.6358	MA 300	8.08	1.0292
1.6359	MA 250	8.05	1.0255
1.6604	30NCD16	7.85	1.0000
1.6944	4340	7.85	1.0000
1.7214	4130	7.85	1.0000
1.7220	4135	7.85	1.0000
1.7734	15CDV6	7.85	1.0000
1.7736	E-15CDV6	7.85	1.0000
G43400	Alloy 4340	7.80	0.9742
K44200	Alloy 300M	7.80	0.9742
S45000	Alloy 450	7.80	0.9742
S45500	Alloy 450	7.80	0.9742

GRADE	MATERIAL	DENSITY	FACTOR
2.4053	Nickel 222	8.89	1.1321
2.4060	Nickel 205	8.89	1.1321
2.4061	Nickel 205	8.89	1.1321
2.4066	Nickel 200	8.89	1.1321
2.4068	Nickel 201	8.89	1.1321
2.4360	Alloy 400	8.83	1.1249
2.4361	LC-Alloy 400	8.83	1.1249
2.4375	Alloy K-500	8.46	1.0775
2.4602	Alloy C 22	8.69	1.1071
2.4605	Alloy 59	8.80	1.1208
2.4608	Alloy 333	8.56	1.0904
2.4610	Alloy C 4	8.64	1.1006
2.4617	Alloy B 2	9.22	1.1744
2.4618	Alloy G	8.30	1.0572
2.4619	Alloy G-3	8.30	1.0572
2.4630	Alloy 75	8.40	1.0697
2.4631	Alloy 80A	8.20	1.0446
2.4632	Alloy 90	8.20	1.0446
2.4634	Alloy 105	8.00	1.0191
2.4636	Alloy 115	8.00	1.0191
2.4642	Alloy 690	8.14	1.0369
2.4646	Alloy 214	8.05	1.0255
2.4650	Alloy C-263	8.36	1.0649
2.4654	Waspaloy	8.25	1.0507
2.4660	Alloy 20CB3	8.10	1.0316
2.4662	Alloy 901	8.15	1.0381
2.4663	Alloy 617	8.55	1.0892
2.4665	Alloy X	8.50	1.0827
2.4668	Alloy 718	8.19	1.0430
2.4669	Alloy X-750	8.25	1.0507
2.4670	Alloy 713 LC	8.01	1.0203
2.4671	Alloy 713	8.01	1.0203
2.4674	Alloy 100	7.75	0.9870
2.4676	Alloy M 246	8.50	1.0827
2.4816	Alloy 600	8.42	1.0726
2.4819	Alloy C-276	8.89	1.1322
2.4851	Alloy 601	8.20	1.0446
2.4856	Alloy 625	8.44	1.0750
2.4858	Alloy 825	8.18	1.0418
2.4869	Alloy 80/20	8.30	1.0572
2.4951	Alloy 75	8.37	1.0661
2.4952	Alloy 80A	8.19	1.0430
2.4969	Alloy 90	8.18	1.0418
2.4973	Alloy 41	8.20	1.0446
2.4975	Alloy 901	8.20	1.0446
2.4976	Alloy NiCr20MO	8.20	1.0446
2.4983	Alloy Co500	8.10	1.0316
N06230	Alloy 230	8.83	1.1249
N08330	Alloy 330	8.10	1.0316

CONVERSION TABLE
Tensile Strength

T/sq.in.	lbs/sq.in.	kg/mm²	Mpa	t/sq.in	lb/sq.in.	kg/ mm²	Mpa
10	22.400	15.75	154.3	52	116.480	81.90	802.6
11	24.640	17.32	169.7	54	120.960	85.05	833.4
12	26.880	18.90	185.2	56	125.440	88.20	864.3
13	29.120	20.47	200.6	58	129.920	91.35	895.2
14	31.360	22.05	216.0	60	134.400	94.50	926.1
15	33.600	23.62	231.4	62	138.880	97.65	956.9
16	35.840	25.20	246.9	64	143.360	100.80	987.8
17	38.080	26.77	262.3	66	147.840	103.95	1018.7
18	40.320	28.35	277.8	68	152.320	107.10	1049.5
19	42.560	29.92	293.2	70	156.800	110.25	1080.4
20	44.800	31.50	308.7	72	161.280	113.40	1111.3
21	47.040	33.07	324.0	74	165.760	116.55	1142.1
22	49.280	34.65	339.5	76	170.240	119.70	1173.0
23	51.520	36.22	354.9	78	174.720	122.85	1203.9
24	53.760	37.80	370.4	80	179.200	126.00	1234.8
25	56.000	39.37	385.8	82	183.680	129.15	1265.6
26	58.240	40.95	401.3	84	188.160	132.30	1296.5
27	60.480	42.52	416.6	86	192.640	135.45	1327.4
28	62.720	44.10	432.1	88	197.120	138.60	1358.2
29	64.960	45.67	447.5	90	201.600	141.75	1389.1
30	67.200	47.25	463.0	92	206.080	144.90	1420.0
31	69.440	48.82	478.4	94	210.560	148.05	1450.8
32	71.680	50.40	493.9	96	215.040	151.20	1481.7
33	73.920	51.97	509.3	98	219.520	154.35	1512.6
34	76.160	53.55	524.7	100	224.000	157.50	1543.5
35	78.400	55.12	540.1	102	228.480	160.65	1574.3
36	80.640	56.70	555.6	104	232.960	163.80	1605.2
37	82.880	58.27	571.0	106	237.440	166.95	1636.1
38	85.120	59.85	586.5	108	241.920	170.10	1666.9
39	87.360	61.42	601.9	110	246.400	173.25	1697.8
40	89.600	63.00	617.4	112	250.880	176.40	1728.7
41	91.840	64.57	632.7	114	255.360	179.55	1759.5
42	94.080	66.15	648.2	116	259.840	182.70	1790.4
43	96.320	67.72	663.6	118	264.320	185.85	1821.3
44	98.560	69.30	679.1	120	268.800	189.00	1852.2
45	100.800	70.87	694.5	122	273.280	192.15	1883.0
46	103.040	72.45	710.0	124	277.760	195.30	1913.9
47	105.280	74.02	725.3	126	282.240	198.45	1944.8
48	107.520	75.60	740.8	128	286.720	201.60	1975.6
49	109.760	77.17	756.2	130	291.200	204.85	2007.5
50	112.000	78.75	771.7	132	295.680	208.00	2038.4

Comparison of Hardness Scales approx. ** and Tensile Stress Equivalents approx. (maximum value) in imperial and metric units

Rockwell 'C' Scale	Diamond Pyramid Scale HV10 HV30	Brinell		Tensile Stress Equivalents					Scler Scope Hardness Number	Rockwell		Diamond Pyramid Scale HV10 HV30
		Dia. Imp. For 10 mm Ball	Carbide Ball	Standard Ball	Tons/ in^2	1000 lb/ in^2	kg/ mm^2	MPa (N/ mm^2)				
67.7	900								96	85.6	67.7	900
67.0	880								95	85.0	67.0	880
66.3	860								93	84.7	66.3	860
65.5	840								92	84.2	65.5	840
64.8	820								90	83.8	64.8	820
64.0	800								88	83.4	64.0	800
63.3	780								87	83.0	63.3	780
62.5	760								86	82.6	62.5	760
61.7	740								84	82.2	61.7	740
61.0	725	2.44	630	-		-	-		82	81.8	61.0	725
60.5	710	2.45	627	-		-	-	-		81.5	60.5	710
60.0	698	2.50	601	-	132	295	208	2039	81	81.2	60.0	698
58.9	670	2.55	578	-	127	284	200	1961	78	80.6	58.9	670
57.1	630	2.60	555	-	122	273	192	1884	75	79.6	57.1	630
56.1	609	2.65	534	-	117	262	184	1807	73	79.0	56.1	609
54.4	572	2.70	514	-	112	250	176	1729	71	78.2	54.4	572
51.9	532	2.75	495	495	108	241	170	1668	68	76.9	51.9	532
50.7	517	2.80	477	477	105	235	165	1621	66	76.3	50.7	517
49.5	497	2.85	461	641	101	226	160	1559	64	75.5	49.5	497
47.5	470	2.90	444	444	98	219	155	1513	62	74.2	47.5	470
46.0	452	2.95	429	429	95	212	150	1467	60	73.5	46.0	452
44.8	437	3.00	415	415	92	206	145	1420	58	73.0	44.8	437
43.7	422	3.05	401	401	88	197	139	1359	56	72.5	43.7	422
42.4	408	3.10	388	388	85	190	134	1312	54	71.5	42.4	408
41.3	395	3.15	375	375	82	183	129	1266	52	71.0	41.3	395
39.9	381	3.20	363	363	80	179	126	1235	51	70.3	39.9	381
38.8	370	3.25	352	352	77	172	121	1189	49	69.8	38.8	370
37.7	359	3.30	341	341	75	168	118	1158	48	69.2	37.7	359
36.7	349	3.35	331	331	73	163	114	1127	46	68.8	36.7	349
35.0	337	3.40	321	321	71	159	111	1096	45	68.0	35.0	337
34.0	327	3.45	311	311	68	152	107	1050	43	67.5	34.0	327
33.0	318	3.50	302	302	66	147	104	1019	42	66.8	33.0	318
32.0	308	3.55	293	293	64	143	101	988	41	66.2	32.0	308
30.9	300	3.60	285	285	63	141	99	973	40	65.7	30.9	300
29.8	292	3.65	277	277	61	136	96	942	38	65.2	29.8	292
29.0	284	3.70	269	269	59	132	93	911	37	64.6	29.0	284
27.5	275	3.75	262	262	58	130	91	895	36	64.0	27.5	275
26.6	269	3.80	255	255	56	125	89	865	35	63.6	26.6	269
25.2	261	3.85	248	248	55	123	87	849	34	62.9	25.2	261
24.3	255	3.90	241	241	53	118	84	818	33	62.6	24.3	255
23.0	247	3.95	235	235	51	114	81	787	32	62.0	23.0	247
22.0	241	4.00	229	229	50	112	79	772	31	61.6	22.0	241
20.8	234	4.05	223	223	49	110	77	756	30	60.7	20.8	234
	228	4.10	217	217	48	107	76	-	-	-		228

Hardness "B" Scale	Diamond Pyramid Scale HV10 HV30	Brinell		Tensile Stress Equivalents					Scler Scope Hardness Number	Rockwell Hardness "B" Scale		Diamond Pyramid Scale HV10 HV30
		Dia. Imp. For 10 mm Ball	Carbide Ball	Standard Ball	Tons/ in^2	1000 lb/ in^2	kg/ mm^2	MPa (N/ mm^2)				
98	222	4.15	212	212	46	103	73	710	29	-	98	222
97	218	4.20	207	207	45	101	71	695	28	-	97	218
96	212	4.30	197	197	43	97	68	664	27	-	96	212
93	196	4.40	187	187	41	92	65	632	25	-	93	196
91	188	4.50	179	179	39	88	62	602	-	-	91	188
88.5	178	4.60	170	170	33	81	57	556	24	-	88.5	178
86	171	4.70	163	163	35	78	55	540	-	-	86	171
84.2	163	4.80	156	156	34	76	54	525	23	-	84.2	163
82	156	4.90	149	149	32	72	51	494	-	-	82	156
80	150	5.00	143	143	31	69	49	479	22	-	80	150
77	143	5.10	137	137	30	67	48	463	21	-	77	143
75	137	5.20	131	131	29.5	66	47	455	20.5	-	75	137
72.5	132	5.30	126	126	29	65	46	448	20	-	72.5	132
70	127	5.40	121	121	28	63	44	432	-	-	70	127
67	122	5.50	116	116	26	58	42	401	15	-	67	122

*These charts were prepared using information contained in B.S.860/1967. This standard differs significantly from the superseded standard B.S. 860/1939, and differs slightly from the conversion scales adopted by SAE and ASTM source.

** Where hardness acceptance values are specified and a conversion from one scale to another is necessary the source of the conversion data should be stated and understood by the parties involved.

Hardness

Hardness is the property of a material that enables it to resist plastic deformation, penetration, indentation, and scratching. Therefore, hardness is important from an engineering standpoint because resistance to wear by either friction or erosion by steam, oil, and water generally increases with hardness.

Hardness tests serve an important need in industry even though they do not measure a unique quality that can be termed hardness. The tests are empirical, based on experiments and obsevation, rather than fundamental theory. Its chief value is as an inspection device, able to detect certain differences in material when they arise even though these differences may be undefinable. For example, two lots of material that have the same hardness may or may not be alike, but if their hardness is different, the materials certainly are not alike.

Serveral methods have been developed for hardness testing. Those most often used are Brinell, Rockwell, Vickers, Tukon, Sclerscope, and the files test. The first four are based on indentation tests and the fifth on the rebound height of a diamond tipped metallic hammer. The file test establishes the characteristics of how well a file takes a bite on the material.

As a result of many tests, comparisons have been prepared using formulas, tables, and graphs that show the relationships between the results of various hardness test of specific alloys. There is, however, no exact mathematical relation between any two of the methods. For this reason, the result of one type of hardness test converted to readings of another type should carry the notation"_____converted from_____" (for example "352 Brinell converted from Rockwell C-38").

Another convenient conversion is that of Brinell hardness to ulitmate tensile strenght. For quenched and tempered steel, the tensile strength (psi) is about 500 times the Brinell hardness number (provided the strength is not over 200,00 psi).

CONVERSION TABLE
inch/mm

To convert to millimeters - multiply inches x 25.4
To convert to inches - multiply millimeters x 0.03937*

*for slightly greater accuracy when converting to inches; divide millimeters by 25.4

inches fractional	decimal	metric mm	inches fractional	decimal	metric mm	inches fractional	decimal	metric mm
	0.0039	0.10000		0.55120	14.0000		1.8898	48.0000
	0.0079	0.20000	9/16	0.56250	14.2875		1.9291	49.0000
	0.0118	0.30000		0.57090	14.5000		1.9685	50.0000
1/64	0.0156	0.39690	37/64	0.57810	14.6844	2	2.0000	50.8000
	0.0157	0.40000		0.59060	15.0000		2.0079	51.0000
	0.0197	0.50000	19/32	0.59380	15.0813		2.0472	52.0000
	0.0236	0.60000	39/64	0.60940	15.4781		2.0866	53.0000
	0.0276	0.70000		0.61020	15.5000		2.1260	54.0000
1/32	0.0313	0.79380	5/8	0.62500	15.8750		2.1654	55.0000
	0.0315	0.80000		0.62990	16.0000		2.2047	56.0000
	0.0354	0.90000	41/64	0.64060	16.2719		2.2441	57.0000
	0.0394	1.00000		0.64960	16.5000	2 1/4	2.2500	57.1500
	0.0433	1.10000	21/32	0.65630	16.6688		2.2835	58.0000
3/64	0.0469	1.19060		0.66930	17.0000		2.3228	59.0000
	0.0472	1.20000	43/64	0.67190	17.0656		2.3622	60.0000
	0.0512	1.30000	11/16	0.68750	17.4625		2.4016	61.0000
	0.0551	1.40000		0.68900	17.5000		2.4409	62.0000
	0.0591	1.50000	45/64	0.70310	17.8594		2.4803	63.0000
1/16	0.0625	1.58750		0.70870	18.0000	2 1/2	2.5000	63.5000
	0.0630	1.60000	23/32	0.71880	18.2563		2.5197	64.0000
	0.0669	1.70000		0.72830	18.5000		2.5591	65.0000
	0.0709	1.80000	47/64	0.73440	18.6531		2.5984	66.0000
	0.0748	1.90000		0.74800	19.0000		2.6378	67.0000
5/64	0.0781	1.98440	3/4	0.75000	19.0500		2.6772	68.0000
	0.0787	2.00000	49/64	0.76560	19.4469		2.7165	69.0000
	0.0827	2.10000		0.76770	19.5000	2 3/4	2.7500	69.8500
	0.0866	2.20000	25/32	0.78130	19.8438		2.7559	70.0000
	0.0906	2.30000		0.78740	20.0000		2.7953	71.0000
3/32	0.0938	2.38130	51/64	0.79690	20.2406		2.8346	72.0000
	0.0945	2.40000		0.80710	20.5000		2.8740	73.0000
	0.0984	2.50000	13/16	0.81250	20.6375		2.9134	74.0000
7/64	0.1094	2.77810		0.82680	21.0000		2.9528	75.0000
	0.1181	3.00000	53/64	0.82810	21.0344		2.9921	76.0000
1/8	0.1250	3.17500	27/32	0.84380	21.4313	3	3.0000	76.2000
	0.1378	3.50000		0.84650	21.5000		3.0315	77.0000
9/64	0.1406	3.57190	55/64	0.85940	21.8281		3.0709	78.0000
5/32	0.1563	3.96880		0.86610	22.0000		3.1102	79.0000
	0.1575	4.00000	7/8	0.87500	22.2250		3.1496	80.0000
11/64	0.1719	4.36560		0.88580	22.5000		3.1890	81.0000
	0.1772	4.50000	57/64	0.89063	22.6219		3.2283	82.0000
3/16	0.1875	4.76250		0.90550	23.0000		3.2677	83.0000
	0.1969	5.00000	29/32	0.90625	23.0188		3.3071	84.0000
13/64	0.2031	5.15940	59/64	0.92188	23.4156		3.3465	85.0000
	0.2165	5.50000		0.92520	23.5000		3.3858	86.0000
7/32	0.2188	5.55630	15/16	0.93750	23.8125		3.4252	87.0000
15/64	0.2344	5.95310		0.94490	24.0000		3.4646	88.0000
	0.2362	6.00000	61/64	0.95313	24.2094	3 1/2	3.5000	88.9000
1/4	0.2500	6.35000		0.96460	24.5000		3.5039	89.0000
	0.2559	6.50000	31/32	0.96875	24.6063		3.5433	90.0000
17/64	0.2656	6.74690		0.98430	25.0000		3.5827	91.0000
	0.2756	7.00000	63/64	0.98438	25.0031		3.6220	92.0000
9/32	0.2813	7.14380	1	1.00000	25.4000		3.6614	93.0000

CONVERSION TABLE

Inches	X	25.4	=	Millimetres
Millimetres	X	0.03937	=	Inches
Feet	X	0.3048	=	Metres
Yards	X	0.9144	=	Metres
Metres	X	39.37	=	Inches
Metres	X	3.2808	=	Yards
Kilometres	X	0.6214	=	Miles
Miles	X	1.6093	=	Kilometres
Square centimetres	X	0.1550	=	Square inches
Square inches	X	6.4516	=	Square centimetres
Square metres	X	10.7639	=	Square metres
Square metres	X	1.1960	=	Square yards
Square yards	X	0.8361	=	Square metres
Square feet	X	0.0929	=	Square metres
Cubic centimetres	X	0.0610	=	Cubic inches
Cubic inches	X	16.3871	=	Cubic centimetres
Cubic metres	X	35.3147	=	Cubic feet
Cubic feet	X	0.0283	=	Cubic metres
Centimetres^4	X	0.024025	=	Inches^4
Inches^4	X	41.623	=	Centimetres^4
Grams	X	15.432	=	Grains
Grains	X	0.0648	=	Grams
Kilograms	X	2.2046	=	Pounds
Pounds	X	0.45359	=	Kilograms
Metric tons (1000 kilograms)	X	0.9842	=	Long Tons
Long Tons	X	1.016	=	Metric tons
Kilograms per square metre	X	0.2048	=	Pounds per square foot
Pound per square foot	X	4.882	=	Kilograms per square metre
Grams per square metre	X	0.02949	=	Ounces per square yard
Ounces per square yard	X	33.9056	=	Grams per square metre
Kilograms per square centimetre	X	14.223	=	Pounds per square inch
Pounds per square inch	X	0.0703	=	Kilograms per square centimetre
Tons per square inch	X	1.5749	=	Kilograms per square millimetre
Kilograms per cubic centimetre	X	36.1273	=	Pounds per cubic inch
Kilograms per cubic metre	X	0.06243	=	Pounds per cubic foot
Kilograms per cubic metre	X	1.68555	=	Pounds per cubic yard
Pounds per cubic inch	X	0.0277	=	Kilograms per cubic centimetre
Pounds per cubic foot	X	16.019	=	Kilograms per cubic metre
Pounds per cubic yard	X	0.5933	=	Kilograms per cubic metre
Kilograms per metre run	X	2.016	=	Pounds per yard
Kilograms per metre run	X	0.672	=	Pounds per foot
Pounds per yard run	X	0.496	=	Kilograms per metre
Pounds per foot run	X	1.488	=	Kilograms per metre

The above factors are approximate

CONVERSION TABLE
Pressure

	psi	kPa	kg/cm²	cm H_2O	ft H_2O	inches Hg
psi	1	6.894.757	0.070306958	70.306.927	2.306.723	203.602
kPa	0.1450377	1	0.01019716	1.019.745	0.3345618	0.2952997
kg/cm²	14.233.343	9.806.694	1	1.000.026	32.809.312	2.895.901
cm H_2O	0.0142229	0.0980634	0.00099997	1	0.032808	0.0289581
ft H_2O	0.433515	2.968.916	0.03047912	30.48	1	0.882646
inches Hg	0.4911542	3.386.389	0.0345316	3.453.253	1.132.957	1
mm Hg	0.0193368	0.1333225	0.00135951	1.359.554	0.0446046	0.039370079
inches H_2O	0.03612628	0.2490819	0.00254219	2.54	0.08333	0.0735539
oz / inches²	0.0625	0.4309223	0.004394308	4.394.308	0.14417	0.12725125
at	14.696	10.132.535	1.033.231	10.332.633	338.995	299.213
bar	14.5038	100	1.019.716	10.197.466	334.833	29.53
mbar	0.0145	0.1	0.001019	1.019	0.003456	0.02953
Mpa	0.00689	0.001	10.197	10197.45	334.56	295.299

	inches H_2O	oz / inches²	at	bat	mbar	Ma
psi	2.768.068	16	0.068046	0.06894757	689.476	0.00689
kPa	401.472	2.320.603	0.009669235	0.01	1013.25	0.001
kg/cm²	393.711.806	22.757.349	0.967841569	0.98066494	1013.25	0.09806
cm H_2O	0.3937	0.227566	0.000967814	0.000980634	0.9806	0.00098
ft H_2O	12	693.624	0.02949896	0.02968961	29.689	0.00298
inches Hg	13.595.484	785.847	0.0334211	0.03386389	338.639	0.00386
mm Hg	0.535255	0.3093888	0.001315789	0.001333225	133.322	0.00013
inches H_2O	1	0.57802	0.00245825	0.002490819	249.089	0.000249
oz / inches²	173.004	1	0.004252875	0.004309223	4.309	0.0004309
at	406.794	235.136	1	10.132.535	1013.25	0.1013
bar	4.018.596	2.320.608	0.986923	1	1000	0.1
mbar	0.40146	0.32306	0.00099	0.001	1	0.0001
Mpa	4014.74	2.320.603	9.669	0.1		1

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ALLOY STEEL

ASTM A 161, ASTM A 199
ASTM A 200, ASTM A 209
ASTM A 213, ASTM A 335
ASTM A 423

FERRITIC – MARTENSITIC STEEL

ASTM A 268

STAINLESS STEEL

ASTM A 213, ASRM A 269
ASTM A 271, ASTM A 312
ASTM A 376, ASTM B 677

DUPLEX / SUPERDUPLEX

ASTM A 789, ASTM A 790

NICKEL AND NICKEL ALLOYS

ASTM B 161, ASTM B 163
ASTM B 154, ASTM B 167
ASTM B 407, ASTM B 423
ASTM B 444, ASTM B 622
ASTM B 668, ASTM B 729

TITANIUM

ASTM B 338, ASTM B 861

COPPER AND COPPER ALLOYS

ASTM B 43, ASTM B 68
ASTM B 75, ASTM B 88
ASTM B 111, ASTM B 315
ASTM B 395, ASTM B 466
ASTM B 395, ASTM B 466
ASTM B 543

ALUMINIUM AND ALUMINIUM ALLOYS

ASTM B 210, ASTM B 234
ASTM B 241



WELDED TUBES AND PIPES

ALLOY STEEL

ASTM A 423, ASTM A 671
ASTM A 672, ASTM A 691

FERRITIC – MARTENSITIC STEEL

ASTM A 268

STAINLESS STEEL

ASTM A 249, ASTM A 312
ASTM A 358, ASTM A 409
ASTM B 673, ASTM B 674
ASTM A 731

DUPLEX / SUPERDUPLEX

ASTM A 789, ASTM A 790

NICKEL AND NICKEL ALLOYS

ASTM B 464, ASTM B 468
ASTM B 514, ASTM B 515
ASTM B 516, ASYM B 517
ASTM B 619, ASTM B 626
ASTM B 704, ASTM B 705
ASTM B 725, ASTM B 730
ASTM B 775

TITANIUM

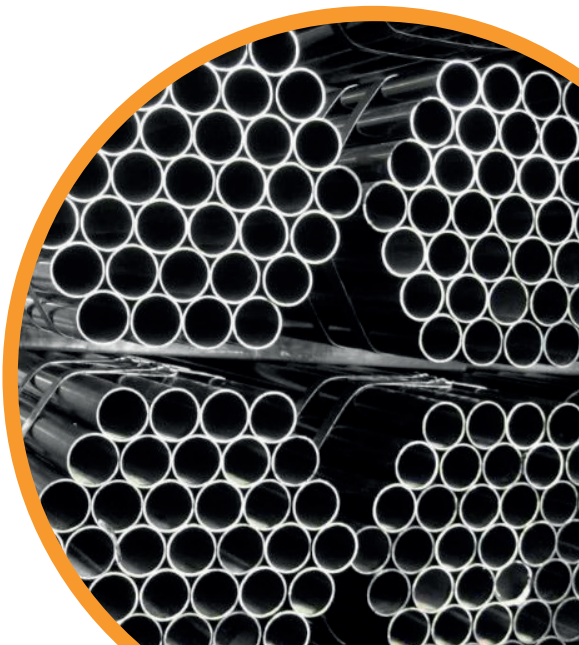
ASTM B 338, ASTM B 862

COPPER AND COPPER ALLOYS

ASTM B 467, ASTM B 543
ASTM B 608

ALUMINIUM AND ALUMINIUM ALLOYS

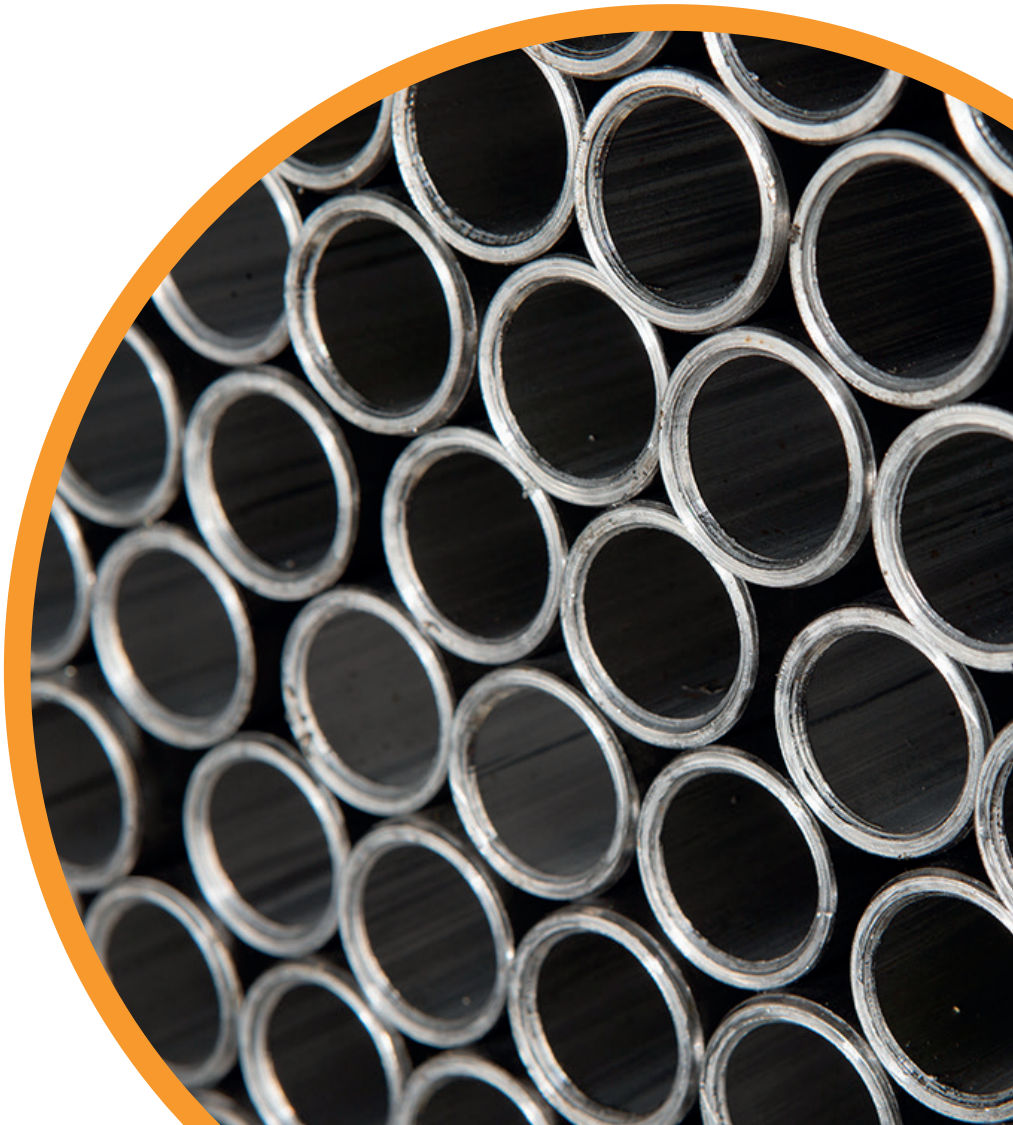
ASTM B 313, ASTM B 547



SEAMLESS / WELDED CARBON STEEL

REFERENCE STANDARDS AND STEEL GRADES

STANDARD	STEEL GRADE
ASTM A 179 - ASME SA 179 Sez.II	LOW CARBON
ASTM A 106 - ASME SA 106 Sez.II	Gr. A - B - C
ASTM A 192 - ASME SA 192 Sez.II	LOW CARBON
ASTM A 209 - ASME SA 209 Sez.II	Gr. T1- T1a - T1b
ASTM A 210 - ASME SA 210 Sez.II	Gr. A1 - C
ASTM A 213 - ASME SA 213 Sez.II	Gr. T2 - T5 - T9 - T11 - T12- T22
ASTM A 333 - ASME SA 333 Sez.II	Gr. 1 - 3 - 6
ASTM A 334 - ASME SA 334 Sez.II	Gr. 1 - 3 - 6
ASTM A 335 - ASME SA 335 Sez.II	Gr. P1 - P2 - P5 - P9 - P11 - P12- P22
ASTM A 556 - ASME SA 556 Sez.II	Gr. A2 - B2 - C2
JIS G 3461	STB 340 - STB 410 - STB 510
JIS G 3462	STBA 12 - STBA 13 - STBA 20 - STBA 22 - STBA 23 - STBA 24 - STBA 25 - STBA 26



EUROPEAN STANDARDS, STEEL GRADE, EN CORRESPONDENCE WITH THE ABROGATED NATIONAL

STANDARD	STEEL GRADE	STANDARD	STEEL GRADE	STANDARD	STEEL GRADE	STANDARD	STEEL GRADE	STANDARD	STEEL GRADE
EN 10216-1	P195TR1								
EN 10216-1	P195TR2*								
EN 10216-1	P235TR1	UNI-663	Fe 35.1- Fe 35.2						
EN 10216-1	P235TR2*								
EN 10216-1	P265TR1	UNI-663	Fe 45.1- Fe45.2						
EN 10216-1	P265TR2*								
EN 10216-2	P195GH			BS 3606	320				
EN 10216-2	P235GH	DIN 17175	St 35.8			UNI 5462	C14	NFA 49215	TU 37 C
EN 10216-2	P265GH	DIN 17175	St 45.8			UNI 5462	C18	NFA 49215	TU 48 C
EN 10216-2	20MnNb6								
EN 10216-2	16Mo3	DIN 17175	15Mo3			UNI 5462	16Mo5	NFA 49215	TU 15 D3
EN 10216-2	8MoB54								
EN 10216-2	14MoV63								
EN 10216-2	10CrMo55			BS 3606	621			NFA 49215	TU 10CD5.05
EN 10216-2	13CrMo45	DIN 17175	13CrMo44	BS 3606	620	UNI 5462	14CrMo3		
EN 10216-2	10CrMo910	DIN 17175	10CrMo910	BS 3606	622	UNI 5462	12CrMo910	NFA 49215	TU 10CD9.10
EN 10216-2	11CrMo910								
EN 10216-2	25CrMo4								
EN 10216-2	X11CrMo5								
EN 10216-2	X11CrMo9			BS 3059-2	629-470				
EN 10216-3	P275NL1	DIN 17179	TStE 285						
EN 10216-3	P275NL2	DIN 17179	EStE 285						
EN 10216-3	P355N	DIN 17179	StE 355						
EN 10216-3	P355NH	DIN 17179	WStE 355						
EN 10216-3	P355NL1	DIN 17179	TStE 355						
EN 10216-3	P355NL2	DIN 17179	EStE 355						
EN 10216-4	P215NL	DIN 17173	TTSt 35N						
EN 10216-4	12Ni14**	DIN 17173	10Ni14						

* Quality class TR2 is conform to PED

** Only on request