

GUIDE TO SELECTION

Mechanical Tubing – Carbon and Alloy

HOT FINISHED SEAMLESS

Produced to ASTM A519 from 1020/1026 carbon steel and various alloy grades. Hot finished seamless is usually stocked in larger OD, heavier wall combinations than other mechanical tubing. Used when dimensional tolerances and surface finish is of secondary importance.

COLD DRAWN SEAMLESS

Produced to A519 from 1020/1026 carbon steel and various alloy grades. Cold drawn seamless has closer dimensional tolerances, better surface finish and higher mechanical properties than corresponding grades of hot finished seamless.

DOM

Produced from ERW tubing shells that are cold drawn through a die and over a mandrel. Commonly produced from 1020/1026 steel to ASTM A513, Type 5. It is also available in certain alloy grades. DOM offers superior dimensional tolerances, concentricity and mechanical properties.

COLD DRAWN BUTTWELD (CDBW)

Cold drawn from furnace welded shells. Produced to ASTM A512 from low carbon steel, it does not have the weld strength inherent to ERW tubing. Used in applications requiring no internal pressure, CDBW is very versatile.

A-512 ERW - (Electric Resistance Welded)

Produced to mechanical properties and dimensional tolerances of ASTM A-512, using ERW shells and attains the weld integrity of this product. Not recommended for internal pressure applications, it has many of the advantages of DOM at the lower CDBW price.

A-513 ERW - (Electric Resistance Welded)

Produced as A-513, Type 1 and 2 in the as welded condition and furnished in 1008 to 1015 steel, it is the lowest cost mechanical tubing available. Wall thickness 18 gauge and lighter are produced from cold rolled steel. Heavier than 18 gauge is produced from hot rolled steel.

HOLLOW STRUCTURAL TUBING

Structural tubing is produced in square, rectangular and round shapes to industry standard conforming to ASTM A-500 Grade B, and lends itself to most types of fabrication including welding, bending and flattening. ASTM A-500 Grade C, High Strength Low Alloy, and Roll Over Protection grades are also available.



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
1/4"	26	.018	.214	.0446
	24	.022	.206	.0536
	23	.025	.200	.0601
	22	.028	.194	.0664
	21	.032	.187	.0745
	20	.035	.180	.0804
	19	.042	.166	.0933
	18	.049	.152	.1052
	17	.058	.134	.1189
	16	.065	.120	.1284
	14	.083	.084	.1480
5/16"	13	.095	.060	.1573
	24	.022	.268	.0684
	23	.025	.263	.0769
	22	.028	.256	.0852
	21	.032	.249	.0960
	20	.035	.242	.1039
	19	.042	.229	.1216
	18	.049	.214	.1382
	17	.058	.196	.1580
	16	.065	.182	.1722
	14	.083	.147	.2039
3/8"	13	.095	.122	.2212
	12	.109	.095	.2375
	11	.120	.073	.2473
	24	.022	.331	.0829
	23	.025	.325	.0935
	22	.028	.319	.1038
	21	.032	.311	.1172
	20	.035	.305	.1271
	19	.042	.291	.1494
	18	.049	.277	.1706
	17	.058	.259	.1964
16	.065	.245	.2152	
15	.072	.231	.2330	
14	.083	.209	.2585	
13	.095	.185	.2841	
12	.109	.157	.3097	
11	.120	.135	.3268	
10	.134	.107	.3449	

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TUBING AND PIPE

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MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

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C.D. BUTTWELD ASTM A-512

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
7/16"	24	.022	.394	.0977
	23	.025	.388	.1103
	22	.028	.381	.1226
	21	.032	.374	.1388
	20	.035	.367	.1506
	19	.042	.354	.1776
	18	.049	.340	.2036
	17	.058	.322	.2354
	16	.065	.307	.2589
	14	.083	.272	.3147
	13	.095	.247	.3480
	12	.109	.220	.3830
	11	.120	.197	.4075
	10	.134	.169	.4351
1/2"	26	.018	.464	.0927
	24	.022	.456	.1123
	23	.025	.450	.1268
	22	.028	.444	.1411
	21	.032	.436	.1599
	20	.035	.430	.1738
	19	.042	.416	.2054
	18	.049	.402	.2360
	17	.058	.384	.2738
	16	.065	.370	.3020
	15	.072	.356	.3291
	14	.083	.334	.3696
	13	.095	.310	.4109
	12	.109	.282	.4552
	11	.120	.260	.4870
	10	.134	.232	.5238
	17/32"	5/32	.156	.187
3/16		.187	.125	.6264
16		.065	.401	.3237
	14	.083	.365	.3871
	13	.095	.341	.4426
	11	.120	.291	.5271

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MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

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Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.	
	B.W. Ga.	Dec. Inches			
9/16"	24	.022	.519	.1271	
	23	.025	.513	.1436	
	22	.028	.506	.1600	
	21	.032	.499	.1815	
	20	.035	.492	.1974	
	19	.042	.479	.2337	
	18	.049	.464	.2690	
	17	.058	.447	.3128	
	16	.065	.432	.3457	
	14	.083	.396	.4255	
	12	.109	.344	.5285	
	11	.120	.322	.5677	
	10	.134	.295	.6140	
	5/32	.156	.250	.6781	
	3/16	.188	.188	.7529	
	5/8"	24	.022	.581	.1417
		23	.025	.575	.1602
22		.028	.569	.1785	
21		.032	.561	.2027	
20		.035	.555	.2205	
19		.042	.541	.2615	
18		.049	.527	.3014	
17		.058	.509	.3512	
16		.065	.495	.3888	
15		.072	.481	.4252	
14		.083	.459	.4805	
13		.095	.435	.5377	
12		.109	.407	.6007	
11		.120	.385	.6472	
10		.134	.357	.7027	
5/32		.156	.312	.7814	
3/16		.188	.250	.8774	
7/32	.219	.187	.9496		
1/4	.250	.125	1.0010		
11/16"	24	.022	.644	.1565	
	23	.025	.638	.1770	
	22	.028	.632	.1974	
	21	.032	.624	.2242	
	20	.035	.617	.2441	

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MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

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Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.	
	B.W. Ga.	Dec. Inches			
1 1/16"	18	.049	.589	.3344	
	17	.058	.572	.3902	
	16	.065	.557	.4325	
	14	.083	.521	.5363	
	13	.095	.497	.6017	
	12	.109	.469	.6740	
	11	.120	.447	.7279	
	10	.134	.419	.7928	
	5/32	.156	.375	.8864	
	3/16	.188	.312	1.0040	
	7/32	.219	.250	1.0970	
	3/4"	24	.022	.706	.1711
		23	.025	.700	.1936
22		.028	.694	.2159	
21		.032	.686	.2454	
20		.035	.680	.2673	
18		.049	.652	.3668	
17		.058	.634	.4286	
16		.065	.620	.4755	
15		.072	.606	.5214	
14		.083	.584	.5913	
13		.095	.560	.6646	
12		.109	.532	.7462	
11		.120	.510	.8074	
10		.134	.482	.8816	
5/32		.156	.437	.9897	
3/16		.188	.375	1.1280	
7/32		.219	.313	1.2420	
1/4	.250	.250	1.3350		
1 3/16"	24	.022	.769	.1859	
	22	.028	.757	.2347	
	20	.035	.742	.2908	
	18	.049	.715	.3998	
	17	.058	.697	.4677	
	16	.065	.682	.5193	
	14	.083	.647	.6471	
	13	.095	.622	.7285	
	12	.109	.595	.8195	
	11	.120	.572	.8881	

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C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

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Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
13/16"	10	.134	.544	.9717
	5/32	.156	.500	1.0950
	3/16	.188	.437	1.2550
	7/32	.219	.375	1.3890
	1/4	.250	.312	1.5030
7/8"	24	.022	.831	.2004
	22	.028	.819	.2533
	21	.032	.811	.2881
	20	.035	.805	.3140
	18	.049	.777	.4323
	17	.058	.759	.5061
	16	.065	.745	.5623
	15	.072	.731	.6175
	14	.083	.709	.7021
	13	.095	.685	.7914
	12	.109	.657	.8917
	11	.120	.635	.9676
	10	.134	.607	1.0600
	5/32	.156	.562	1.1980
	3/16	.188	.500	1.3790
	7/32	.219	.437	1.5340
	1/4	.250	.375	1.6690
9/32	.281	.313	1.7830	
5/16	.313	.250	1.8790	
15/16"	24	.022	.894	.2152
	22	.028	.882	.2721
	20	.035	.868	.3375
	18	.049	.839	.4652
	17	.058	.822	.5451
	16	.065	.807	.6060
	14	.083	.772	.7579
	13	.095	.748	.8553
	12	.109	.720	.9651
	11	.120	.697	1.0480
	10	.134	.669	1.1510
	5/32	.156	.625	1.3030
	3/16	.188	.562	1.5060
	7/32	.219	.500	1.6820
	1/4	.250	.438	1.8370

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MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

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Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
15/16"	9/32	.281	.376	1.9720
	5/16	.130	.312	2.0890
1"	24	.022	.956	.2298
	22	.028	.944	.3907
	21	.032	.936	.3308
	20	.035	.930	.3607
	18	.049	.902	.4977
	17	.058	.884	.5835
	16	.065	.870	.6491
	15	.072	.856	.7136
	14	.083	.834	.8129
	13	.095	.810	.9182
	12	.109	.782	1.0370
	11	.120	.760	1.1280
	10	.134	.732	1.2390
	5/32	.156	.687	1.4060
	3/16	.188	.625	1.6300
	7/32	.219	.652	1.8270
	1/4	.250	.500	2.0030
	1-1/16"	9/32	.281	.438
5/16		.313	.375	2.2970
11/32		.344	.312	2.4100
3/8		.375	.250	2.5030
22		.028	1.007	.3095
20		.035	.992	.3843
18		.049	.964	.5306
16		.065	.932	.6928
14		.083	.897	.8687
13		.095	.872	.9821
12		.109	.844	1.1110
11		.120	.822	1.2090
10		.134	.795	1.3300
5/32		.156	.750	1.5110
3/16	.188	.687	1.7570	
7/32	.219	.625	1.9740	
1/4	.250	.562	2.1710	
9/32	.281	.500	2.3470	
5/16	.313	.437	2.5070	

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TUBING AND PIPE





MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
1-1/8"	22	.028	1.069	.3280
	21	.032	1.061	.3735
	20	.035	1.055	.4074
	18	.049	1.027	.5631
	17	.058	1.009	.6609
	16	.065	.995	.7359
	14	.083	.959	.9237
	13	.095	.935	1.0450
	12	.109	.907	1.1830
	11	.120	.885	1.2880
	10	.134	.857	1.4180
	5/32	.156	.812	1.6140
	3/16	.188	.750	1.8810
	7/32	.219	.688	2.1190
	1/4	.250	.625	2.3360
	9/32	.281	.563	2.5330
	5/16	.313	.500	2.7140
3/8	.375	.375	3.0040	
1-3/16"	22	.028	1.132	.3469
	21	.032	1.124	.3951
	20	.035	1.117	.4310
	18	.049	1.090	.5691
	17	.058	1.072	.7000
	16	.065	1.057	.7796
	14	.083	1.022	.9795
	13	.095	.997	1.1090
	12	.109	.970	1.2560
	11	.120	.947	1.3690
	10	.134	.920	1.5080
	5/32	.156	.875	1.7190
	3/16	.188	.812	2.0080
	7/32	.219	.750	2.2660
	1/4	.250	.687	2.5040
	5/16	.313	.562	2.9250
	1-1/4"	22	.028	1.194
20		.035	1.180	.4542
18		.049	1.152	.6285
17		.058	1.134	.7384
16		.065	1.120	.8226

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MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

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C.D. BUTTWELD ASTM A-512

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
1-1/4"	14	.083	1.084	1.0340
	13	.095	1.060	1.1720
	12	.109	1.032	1.3280
	11	.120	1.010	1.4480
	1/8	.125	1.000	1.5020
	10	.134	.982	1.5970
	5/32	.156	.937	1.8230
	3/16	.188	.875	2.1320
	7/32	.219	.812	2.4100
	1/4	.250	.750	2.6700
	9/32	.281	.687	2.9080
	5/16	.313	.625	3.1320
	11/32	.344	.562	3.3290
	3/8	.375	.500	3.5040
	7/16	.437	.375	3.7980
	1-5/16"	21	.032	1.249
20		.035	1.242	.4777
18		.049	1.215	.6615
17		.058	1.197	.7774
16		.065	1.182	.8664
14		.083	1.147	1.0900
13		.095	1.122	1.2360
12		.109	1.095	1.4020
11		.120	1.072	1.5290
10		.134	1.044	1.6870
5/32		.156	1.000	1.9280
3/16		.188	.937	2.2590
7/32		.219	.875	2.5590
1/4		.250	.812	2.8380
9/32		.281	.750	3.0970
5/16		.313	.688	3.3430
3/8	.375	.562	3.7570	
1-3/8"	24	.022	1.331	.3179
	22	.028	1.319	.4028
	20	.035	1.305	.5009
	18	.049	1.277	.6938
	17	.058	1.259	.8158
	16	.065	1.245	.9094
	14	.083	1.209	1.1450

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MECHANICAL TUBING – CARBON & ALLOY

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C.D. BUTTWELD ASTM A-512

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Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.	
	B.W. Ga.	Dec. Inches			
1-3/8"	13	.095	1.185	1.2990	
	12	.109	1.157	1.4740	
	11	.120	1.135	1.6080	
	10	.134	1.107	1.7760	
	5/32	.156	1.062	2.0310	
	3/16	.188	1.000	2.3830	
	7/32	.219	.938	2.7040	
	1/4	.250	.875	3.0040	
	9/32	.281	.813	3.2830	
	5/16	.313	.750	3.5500	
	3/8	.375	.625	4.0050	
	7/16	.438	.500	4.3830	
	1/2	.500	.375	4.6730	
	1-7/16"	20	.035	1.367	.5244
18		.049	1.339	.7269	
16		.065	1.307	.9531	
14		.083	1.271	1.2100	
13		.095	1.248	1.3630	
11		.120	1.198	1.6890	
10		.134	1.170	1.8660	
5/32		.156	1.125	2.1360	
3/16		.188	1.062	2.5100	
7/32		.219	1.000	2.8510	
1/4		.250	.938	3.1720	
9/32		.281	.876	3.4720	
1-1/2"		22	.028	1.444	.4402
		20	.035	1.430	.5476
	18	.049	1.402	.7593	
	17	.058	1.384	.8932	
	16	.065	1.370	.9962	
	15	.072	1.356	1.0980	
	14	.083	1.334	1.2560	
	13	.094	1.310	1.4260	
	12	.109	1.282	1.6190	
	11	.120	1.260	1.7690	
	10	.134	1.232	1.9550	
	5/32	.156	1.187	2.2390	
	3/16	.188	1.125	2.6340	
	7/32	.219	1.062	2.9960	

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TUBING AND PIPE



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

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Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
1-1/2"	1/4	.250	1.000	3.3380
	9/32	.281	.938	3.6580
	5/16	.313	.875	3.9680
	11/32	.344	.812	4.2470
	3/8	.375	.750	4.5060
	7/16	.438	.625	4.9680
	1/2	.500	.500	5.3400
1-9/16"	20	.035	1.493	.5712
	16	.065	1.432	1.0400
	13	.095	1.373	1.4890
	12	.109	1.345	1.6930
	11	.120	1.323	1.8490
	10	.134	1.295	2.0450
	5/32	.156	1.250	2.3440
	3/16	.187	1.187	2.7610
	7/32	.219	1.125	3.1440
	1/4	.250	1.062	3.5060
	5/16	.313	.937	4.1790
	3/8	.375	.812	4.7580
	1-5/8"	20	.035	1.555
18		.049	1.527	.8248
17		.058	1.509	.9707
16		.065	1.495	1.0830
14		.083	1.459	1.3670
13		.095	1.435	1.5520
12		.109	1.407	1.7650
11		.120	1.385	1.9290
10		.134	1.357	2.1340
5/32		.156	1.312	2.4470
11/64		.172	1.281	2.6690
3/16		.188	1.250	2.8850
7/32		.219	1.187	3.2890
1/4		.250	1.125	3.6710
9/32		.281	1.063	4.0330
5/16		.313	1.000	4.3860
3/8		.375	.875	5.0060
7/16	.438	.749	5.5530	
1/2	.500	.625	6.0080	

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TUBING AND PIPE



MECHANICAL TUBING – CARBON & ALLOY

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C.D. BUTTWELD ASTM A-512

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Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
1-11/16"	16	.065	1.558	1.1270
	11	.120	1.447	2.0100
	5/32	.156	1.376	2.5520
	3/16	.187	1.312	3.0120
	7/32	.219	1.250	3.4360
	1/4	.250	1.188	3.8390
	9/32	.281	1.126	4.2230
1-3/4"	20	.035	1.680	.6411
	18	.049	1.652	.8902
	17	.058	1.634	1.0480
	16	.065	1.620	1.1700
	14	.083	1.584	1.4780
	13	.095	1.560	1.6790
	12	.109	1.532	1.9100
	11	.120	1.510	2.0890
	10	.134	1.482	2.3130
	5/32	.156	1.437	2.6560
	3/16	.188	1.375	3.1360
	7/32	.219	1.312	3.5810
	1/4	.250	1.250	4.0050
	9/32	.281	1.188	4.4090
	5/16	.313	1.125	4.8040
	3/8	.375	1.000	5.5070
	7/16	.438	.875	6.1370
1/2	.500	.750	6.6750	
9/16	.563	.625	7.1370	
5/8	.625	.500	7.5090	
1-13/16"	16	.065	1.683	1.2130
	11	.120	1.573	2.1700
	5/32	.156	1.501	2.7610
	3/16	.188	1.439	3.2630
	7/32	.219	1.375	3.7280
	1/4	.250	1.313	4.1730
1-7/8"	20	.035	1.805	.6878
	18	.049	1.777	.9556
	16	.065	1.745	1.2570
	5/64	.078	1.179	1.4970
	14	.083	1.709	1.5890

CONTINUED

TUBING AND PIPE



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

CONTINUED

C.D. BUTTWELD ASTM A-512

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
1-7/8"	13	.095	1.685	1.8060
	12	.109	1.657	2.0560
	11	.120	1.635	2.2490
	10	.134	1.607	2.4920
	5/32	.156	1.563	2.8640
	3/16	.188	1.500	3.3870
	7/32	.219	1.438	3.8730
	1/4	.250	1.375	4.3390
	9/32	.281	1.313	4.7840
	5/16	.313	1.250	5.2220
	3/8	.375	1.125	6.0080
	13/32	.406	1.063	6.3700
	7/16	.437	1.000	6.7220
	1/2	.500	.875	7.3430
	9/16	.563	.750	7.8890
	1-15/16"	11	.120	1.698
5/32		.156	1.625	2.9690
7/32		.219	1.499	4.0210
1/4		.250	1.437	4.5070
3/8		.375	1.188	6.2600
2"	20	.035	1.930	.7345
	18	.049	1.902	1.0210
	16	.065	1.870	1.3430
	14	.083	1.834	1.6990
	13	.095	1.810	1.9330
	12	.109	1.782	2.2010
	11	.120	1.760	2.4090
	1 1/8	.125	1.750	2.5030
	10	.134	1.732	2.6700
	5/32	.156	1.687	3.0720
	3/16	.188	1.625	3.6380
	7/32	.219	1.562	4.1660
	15/64	.234	1.532	4.4130
	1/4	.250	1.500	4.6730
	.260	.260	1.480	4.6800
	9/32	.281	1.437	5.1590
	5/16	.313	1.375	5.6390
	11/32	.344	1.313	6.0840
	3/8	.375	1.250	6.5080

CONTINUED

TUBING AND PIPE



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

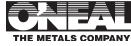
E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
2"	7/16	.438	1.125	7.3070
	1/2	.500	1.000	8.0100
	9/16	.563	.874	8.6400
	5/8	.625	.750	9.1780
	3/4	.750	.500	10.0100
2-1/16"	5/32	.156	1.751	3.1770
	3/16	.188	1.687	3.7650
2-1/8"	1/4	.250	1.563	4.8410
	18	.049	2.027	1.0860
	16	.065	1.995	1.4300
	14	.083	1.959	1.8100
	13	.095	1.935	2.0600
	12	.109	1.907	2.3470
	11	.120	1.885	2.5700
	5/32	.156	1.813	3.2810
	3/16	.188	1.750	3.8890
	7/32	.219	1.687	4.4580
	1/4	.250	1.625	5.0060
	9/32	.281	1.563	5.5340
	5/16	.313	1.500	6.0570
	3/8	.375	1.375	7.0090
	7/16	.438	1.250	7.8920
	1/2	.500	1.125	8.6780
	9/16	.562	1.000	9.3920
2-3/16"	5/8	.625	.875	10.0100
	13	.095	1.998	2.1240
	11	.120	1.948	2.6500
2-1/4"	1/4	.250	1.688	5.1740
	18	.049	2.152	1.1520
	16	.065	2.120	1.5170
	14	.083	2.084	1.9210
	13	.095	2.060	2.1860
	12	.109	2.032	2.4920
	11	.120	2.010	2.7300
	10	.134	1.982	3.0280
	5/32	.156	1.937	3.4890
	3/16	.188	1.875	4.1400

CONTINUED



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
2-1/4"	7/32	.219	1.813	4.7500
	1/4	.250	1.750	5.3400
	9/32	.281	1.688	5.9090
	5/16	.313	1.625	6.4750
	11/32	.344	1.562	7.0020
	3/8	.375	1.500	7.5090
	13/32	.406	1.438	7.9960
	7/16	.438	1.375	8.4760
	1/2	.500	1.250	9.3450
	9/16	.563	1.124	10.1400
	5/8	.625	1.000	10.8500
	11/16	.688	.874	11.4800
	3/4	.750	.750	12.0200
	2-9/32"	9/64	.141	2.000
2-5/16"	11	.120	2.073	2.8110
	3/16	.188	1.937	4.2670
	7/32	.219	1.875	4.8980
	1/4	.250	1.813	5.5080
2-3/8"	20	.035	2.305	.8747
	18	.049	2.277	1.2170
	16	.065	2.245	1.6040
	14	.083	2.209	2.0320
	13	.095	2.185	2.3130
	11	.120	2.135	2.8900
	5/32	.156	2.062	3.6970
	3/16	.188	2.000	4.3910
	7/32	.291	1.937	5.0430
	1/4	.250	1.875	5.6740
	9/32	.281	1.813	6.2840
	5/16	.313	1.750	6.8930
	3/8	.375	1.625	8.0100
	7/16	.438	1.500	9.0600
	1/2	.500	1.375	10.0100
	9/16	.563	1.249	10.9000
	5/8	.625	1.125	11.6800
2-7/16"	1/4	.250	1.938	5.8420

CONTINUED

TUBING AND PIPE



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

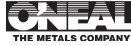
C.D. BUTTWELD ASTM A-512

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
2-1/2"	18	.049	2.402	1.2830
	16	.065	2.370	1.6900
	14	.083	2.334	2.1430
	13	.095	2.310	2.4400
	12	.109	2.282	2.7830
	11	.120	2.260	3.0500
	10	.134	2.232	3.3860
	5/32	.156	2.187	3.9050
	3/16	.188	2.125	4.6420
	7/32	.219	2.062	5.3350
	15/64	.234	2.032	5.6630
	1/4	.250	2.000	6.0080
	.260	.260	1.980	6.2200
	9/32	.281	1.937	6.6590
	5/16	.313	1.875	7.3110
	11/32	.344	1.812	7.9210
	3/8	.375	1.750	8.5110
	7/16	.438	1.625	9.6460
	1/2	.500	1.500	10.6800
	2-9/16"	9/16	.563	1.375
5/8		.625	1.250	12.5200
2-5/8"	3/4	.750	1.000	14.0200
	1/4	.250	2.062	6.1760
2-5/8"	16	.065	2.495	1.7770
	13	.095	2.435	2.5670
	11	.120	2.385	3.2100
	5/32	.156	2.312	4.1140
	3/16	.188	2.250	4.8930
	7/32	.219	2.187	5.6270
	1/4	.250	2.125	6.3410
	9/32	.281	2.063	7.0350
	5/16	.313	2.000	7.7290
	3/8	.375	1.875	9.0110
	7/16	.438	1.751	10.2300
	1/2	.500	1.625	11.3500
	9/16	.562	1.501	12.4000
	5/8	.625	1.375	13.3500

CONTINUED

TUBING AND PIPE



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
2-3/4"	18	.049	2.652	1.4130
	16	.065	2.620	1.8640
	14	.083	2.584	2.3640
	13	.095	2.560	2.6940
	12	.109	2.532	3.0740
	11	.120	2.510	3.3710
	10	.134	2.482	3.7440
	5/32	.156	2.437	4.3220
	3/16	.188	2.375	5.1440
	7/32	.219	2.312	5.9200
	1/4	.250	2.250	6.6750
	9/32	.281	2.187	7.4100
	5/16	.313	2.125	8.1470
	3/8	.375	2.000	9.5120
	7/16	.437	1.875	10.8200
	1/2	.500	1.750	12.0200
	9/16	.562	1.625	13.1500
	5/8	.625	1.500	14.1800
	11/16	.688	1.374	15.1500
	3/4	.750	1.250	16.0200
2-7/8	7/8	.875	1.000	17.5200
	1	1.000	.750	18.6900
	16	.065	2.745	1.9510
	13	.095	2.685	2.8210
	11	.120	2.635	3.5310
	5/32	.156	2.568	4.5300
	3/16	.188	2.500	5.3950
	7/32	.219	2.437	6.2120
	1/4	.250	2.375	7.0090
	9/32	.281	2.312	7.7850
	5/16	.313	2.250	8.5640
	3/8	.375	2.125	10.0100
	7/16	.438	2.000	11.4000
	1/2	.500	1.875	12.6800
	9/16	.562	1.751	13.9000
	5/8	.625	1.625	15.0200
	3/4	.750	1.375	17.0200

CONTINUED

TUBING AND PIPE



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

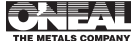
C.D. BUTTWELD ASTM A-512

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
3"	16	.065	2.870	2.0370
	14	.083	2.834	2.5860
	13	.095	2.810	2.9470
	12	.109	2.782	3.3650
	11	.120	2.760	3.6910
	10	.134	2.732	4.1020
	5/32	.156	2.687	4.7280
	3/16	.188	2.625	5.6480
	7/32	.219	2.562	6.5050
	1/4	.250	2.500	7.3430
	.260	.260	2.480	7.6080
	9/32	.281	2.437	8.1600
	5/16	.313	2.375	8.9820
	11/32	.344	2.312	9.7580
	3/8	.375	2.250	10.5100
	7/16	.437	2.125	11.9800
	1/2	.500	2.000	13.3500
	9/16	.563	1.875	14.6200
	5/8	.625	1.750	15.8500
	11/16	.687	1.625	16.9900
	3/4	.750	1.500	18.0200
	7/8	.875	1.250	19.8600
	1	1.000	1.000	21.3600
3-1/16"	1/4	.250	2.563	7.5110
	5/16	.312	2.438	9.1930
	3/8	.375	2.312	10.7700
3-1/8"	16	.065	2.995	2.1240
	13	.095	2.935	3.0740
	11	.120	2.885	3.8510
	3/16	.188	2.750	5.8970
	7/32	.218	2.687	6.7970
	1/4	.250	2.625	7.6760
	5/16	.313	2.499	9.4000
	3/8	.375	2.375	11.0100
	7/16	.438	2.250	12.5700
	1/2	.500	2.125	14.0200
	9/16	.563	2.000	15.4000
	5/8	.625	1.875	16.6900
	3/4	.750	1.625	19.0200
	7/8	.875	1.375	21.0300

CONTINUED

TUBING AND PIPE



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
3-1/4"	16	.065	3.120	2.2110
	14	.083	3.084	2.8070
	13	.095	3.060	3.2010
	11	.120	3.101	4.0110
	10	.134	2.982	4.4590
	5/32	.156	2.938	5.1550
	3/16	.188	2.875	6.1480
	7/32	.219	2.812	7.0890
	1/4	.250	2.750	8.0100
	9/32	.281	2.688	8.9100
	5/16	.313	2.625	9.8180
	11/32	.344	2.562	10.6800
	3/8	.375	2.500	11.5100
	13/32	.406	2.438	12.3300
	7/16	.438	2.375	13.1500
	1/2	.500	2.250	14.6900
	9/16	.563	2.125	16.1600
	5/8	.625	2.000	17.5200
	3/4	.750	1.750	20.0300
	7/8	.875	1.500	22.1900
1	1.000	1.250	24.0300	
3-3/8"	16	.065	3.245	2.2980
	13	.095	3.185	3.3280
	11	.120	3.135	4.1720
	3/16	.188	3.000	6.3990
	7/32	.219	2.937	7.3820
	1/4	.250	2.875	8.3440
	5/16	.313	2.749	10.2400
	3/8	.375	2.625	12.0200
	7/16	.438	2.501	13.7400
	1/2	.500	2.375	15.3500
	9/16	.563	2.249	16.9100
	5/8	.625	2.125	18.3600
	3/4	.750	1.875	21.0300
3-7/16"	3/8	.375	2.688	12.2700
3-1/2"	20	.035	3.430	1.2950
	16	.065	3.370	2.3850
	14	.083	3.334	3.0290

CONTINUED

TUBING AND PIPE



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
3-1/2"	13	.095	3.310	3.4550
	11	.120	3.260	4.3320
	10	.134	3.232	4.8170
	5/32	.156	3.188	5.5710
	3/16	.188	3.125	6.6500
	7/32	.219	3.063	7.6740
	1/4	.250	3.000	8.6780
	.260	.260	2.980	8.9970
	9/32	.281	2.938	9.6600
	5/16	.313	2.875	10.6500
	11/32	.344	2.812	11.5900
	3/8	.375	2.750	12.5200
	7/16	.438	2.625	14.3200
	1/2	.500	2.500	16.0200
	9/16	.563	2.374	17.6600
	19/32	.594	2.312	18.4400
	5/8	.625	2.250	19.1900
	3/4	.750	2.000	22.0300
	7/8	.875	1.750	24.5300
	1	1.000	1.500	26.7000
3-5/8"	16	.065	3.495	2.4710
	11	.120	3.385	4.4920
	3/16	.183	3.250	6.9010
	1/4	.250	3.125	9.0110
	5/16	.313	3.000	11.0700
	3/8	.375	2.875	13.0200
	7/16	.438	2.750	14.9100
	1/2	.500	2.625	16.6900
	9/16	.563	2.501	18.4100
	5/8	.625	2.375	20.0300
3/4	.750	2.125	23.0300	
3-3/4"	16	.065	3.620	2.5580
	13	.095	3.560	3.7080
	11	.120	3.510	4.6520
	10	.134	3.482	5.1750
	5/32	.156	3.437	5.9880
	3/16	.188	3.375	7.1520
	7/32	.219	3.312	8.2590
	1/4	.250	3.250	9.3450

CONTINUED

TUBING AND PIPE



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.	
	B.W. Ga.	Dec. Inches			
3-3/4"	9/32	.281	3.188	10.0400	
	5/16	.313	3.125	11.4900	
	11/32	.344	3.062	12.0500	
	3/8	.375	3.000	13.5200	
	7/16	.437	2.875	15.4900	
	1/2	.500	2.750	17.3600	
	9/16	.563	2.624	18.4100	
	5/8	.625	2.500	20.8600	
	3/4	.750	2.250	24.0300	
	7/8	.875	2.000	26.8700	
	1	1.000	1.750	29.3700	
3-7/8"	14	.083	3.709	3.3610	
	11	.120	3.635	4.8120	
	3/16	.188	3.500	7.4030	
	1/4	.250	3.375	9.6790	
	5/16	.313	3.249	11.9100	
	3/8	.375	3.125	14.0200	
	7/16	.438	3.000	16.0800	
	1/2	.500	2.875	18.0200	
	9/16	.563	2.749	19.9100	
	5/8	.625	2.625	21.6900	
	3/4	.750	2.375	25.0300	
	4"	16	.065	3.870	2.7320
		14	.083	3.834	3.4720
13		.095	3.810	3.9620	
11		.120	3.760	4.9730	
10		.134	3.732	5.5330	
5/32		.156	3.657	6.4040	
3/16		.188	3.625	7.6540	
7/32		.219	3.562	8.8430	
1/4		.250	3.500	10.0100	
.260		.260	3.480	10.3900	
9/32		.281	3.438	11.1600	
5/16		.313	3.375	12.3300	
3/8		.375	3.250	14.5200	
7/16		.437	3.126	16.6600	
1/2		.500	3.000	18.6900	
9/16		.563	2.875	20.6700	
5/8		.625	2.750	22.5300	

TUBING AND PIPE

CONTINUED



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

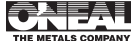
E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
4"	11/16	.688	2.624	24.3400
	3/4	.750	2.500	26.0300
	7/8	.875	2.250	29.2000
	1	1.000	2.000	32.0400
	1-1/4	1.250	1.500	36.7100
4-1/8"	11	.120	3.885	5.1330
	3/16	.188	3.749	7.9050
	1/4	.250	3.625	10.3500
	5/16	.313	3.500	12.7100
	3/8	.375	3.375	15.0200
	7/16	.438	3.249	17.2500
	1/2	.500	3.125	19.3600
	5/8	.625	2.875	23.3600
4-1/4"	13	.095	4.060	4.2160
	11	.120	4.010	5.2930
	10	.134	3.982	5.8900
	5/32	.156	3.937	6.8210
	3/16	.188	3.875	8.1560
	1/4	.250	3.750	10.6800
	5/16	.313	3.625	13.1600
	11/32	.344	3.562	14.3500
	3/8	.375	3.500	15.5200
	7/16	.437	3.375	17.8300
	1/2	.500	3.250	20.0300
	9/16	.563	3.124	22.1700
	5/8	.625	3.000	24.2000
	11/16	.688	2.875	26.1700
	3/4	.750	2.750	28.0400
	7/8	.875	2.500	31.5400
	1	1.000	2.250	34.7000
	1-1/8"	1.125	2.000	37.5500
	1-1/4	1.250	1.750	40.0500
	4-3/8"	11	.120	4.135
3/16		.188	4.001	8.4070
.195		.195	3.980	8.8110
1/4		.250	3.875	11.0100
5/16		.313	3.759	13.5800

CONTINUED



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
4-3/8"	3/8	.375	3.625	16.0200
	7/16	.438	3.500	18.4200
	1/2	.500	3.375	20.6900
	5/8	.625	3.125	25.0300
	3/4	.750	2.875	29.0400
4-1/2"	13	.095	4.310	4.4690
	11	.120	4.260	5.6130
	10	.134	4.232	6.2480
	5/32	.156	4.188	7.2370
	3/16	.188	4.125	8.6580
	7/32	.219	4.062	10.0100
	1/4	.250	4.000	11.3500
	.260	.260	3.980	11.7700
	9/32	.281	3.938	12.6600
	5/16	.313	3.875	14.0000
	3/8	.375	3.750	16.5200
	7/16	.438	3.625	19.0000
	1/2	.500	3.500	21.3600
	9/16	.562	3.375	23.6700
	5/8	.625	3.250	25.8700
	11/16	.687	3.125	28.0100
	3/4	.750	3.000	30.0400
	7/8	.875	2.750	33.8800
	1	1.000	2.500	37.3800
	1-1/4	1.250	2.000	43.3900
1-1/2	1.500	1.500	48.0600	
4-5/8	3/16	.187	4.251	8.9090
	1/4	.250	4.125	11.6800
	5/16	.313	4.000	14.4100
	3/8	.375	3.875	17.0200
	7/16	.438	3.749	19.5900
	1/2	.500	3.625	22.0300
	5/8	.625	3.375	26.7000
	3/4	.750	3.125	31.0400
4-3/4"	11	.120	4.510	5.9340
	3/16	.188	4.375	9.1600
	1/4	.250	4.250	12.0200

CONTINUED

TUBING AND PIPE



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

CONTINUED

C.D. BUTTWELD ASTM A-512

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
4-3/4"	5/16	.313	4.125	14.8300
	3/8	.375	4.000	17.5200
	.380	.380	3.990	17.7400
	7/16	.438	3.874	20.1700
	1/2	.500	3.750	22.7000
	9/16	.563	3.624	25.1800
	5/8	.625	3.500	27.5300
	3/4	.750	3.250	32.0400
	7/8	.875	3.000	36.2100
	1	1.000	2.750	40.0500
4-7/8"	3/16	.188	4.499	9.4110
	1/4	.250	4.375	12.3500
	3/8	.375	4.125	18.0200
	7/16	.438	3.999	20.7600
	1/2	.500	3.875	23.3600
	3/4	.750	3.375	33.0400
5"	11	.120	4.760	6.2540
	10	.134	4.732	6.9640
	5/32	.156	4.687	8.0700
	3/16	.188	4.625	9.6620
	1/4	.250	4.500	12.6800
	.260	.260	4.480	13.1600
	5/16	.313	4.375	15.6700
	3/8	.375	4.250	18.5200
	7/16	.438	4.125	21.3400
	1/2	.500	4.000	24.0300
	9/16	.562	3.876	26.6800
	5/8	.625	3.750	29.2000
	3/4	.750	3.500	34.0400
	7/8	.875	3.250	38.5500
	1	1.000	3.000	42.7200
	1-1/4	1.250	2.500	50.0600
	1-1/2	1.500	2.000	56.0700
5-1/8"	5/16	.313	4.501	16.0900
	3/8	.375	4.375	19.0200
	1/2	.500	4.125	24.7000
	5/8	.625	3.875	30.0400
	1	1.000	3.125	44.0600

CONTINUED

TUBING AND PIPE



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

CONTINUED

C.D. BUTTWELD ASTM A-512

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
5-1/4"	11	.120	5.010	6.5750
	5/32	.156	4.938	8.4870
	3/16	.187	4.875	10.1600
	1/4	.250	4.750	13.3500
	5/16	.313	4.624	16.5000
	3/8	.375	4.500	19.5200
	1/2	.500	4.250	25.3700
	5/8	.625	4.000	30.8700
	3/4	.750	3.750	36.0500
	7/8	.875	3.500	40.8800
	1	1.000	3.250	45.3900
5-3/8"	3/16	.188	5.000	10.4100
5-1/2"	11	.120	5.260	6.8950
	3/16	.187	5.125	10.6700
	1/4	.250	5.000	14.0200
6"	1-1/4	1.250	3.500	63.4100
	1-1/2	1.500	3.000	72.0900
6-1/4"	11	.120	6.010	7.8560
	3/16	.187	5.876	12.1700
	1/4	.250	5.750	16.0200
	5/16	.313	5.624	19.8500
	3/8	.375	5.500	23.5300
	1/2	.500	5.250	30.7100
	5/8	.625	5.000	37.5500
	3/4	.750	4.750	44.0600
	1	1.000	4.250	56.0700
	1-1/4	1.250	3.750	66.7500
	6-1/2"	3/16	.187	6.125
1/4		.250	6.000	16.6900
.260		.260	5.980	17.3300
3/8		.375	5.750	24.5300
1/2		.500	5.500	32.0400
5/8		.625	5.250	39.2200
3/4		.750	5.000	46.0600
7/8		.875	4.750	52.5700

CONTINUED

TUBING AND PIPE



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

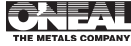
E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
6-1/2"	1	1.000	4.500	58.7400
	1-1/4	1.250	4.000	70.0900
	1-1/2	1.500	3.500	80.1000
6-5/8"	1/4	.250	6.125	17.0200
	.280	.280	6.065	18.9700
	3/8	.375	5.875	25.0300
	13/32	.406	5.813	26.9700
	1/2	.500	5.625	32.7100
	5/8	.625	5.375	40.0500
	3/4	.750	5.125	47.0600
	7/8	.875	4.875	53.7300
	1	1.000	4.625	60.0800
	6-3/4"	1/4	.250	6.250
3/8		.375	6.000	25.5300
1/2		.500	5.750	33.3800
5/8		.625	5.500	40.8800
3/4		.750	5.250	48.0600
1		1.000	4.750	61.4100
7"	3/16	.187	6.625	13.6800
	1/4	.250	6.500	18.0200
	3/8	.375	6.250	26.5300
	1/2	.500	6.000	34.7100
	5/8	.625	5.750	42.5500
	3/4	.750	5.500	50.0600
	1	1.000	5.000	64.0800
	1-1/4	1.250	4.500	76.7600
	1-1/2	1.500	4.000	88.1100
	7-1/4"	1/4	.250	6.750
3/8		.375	6.500	27.5300
1/2		.500	6.250	36.0500
5/8		.625	6.000	44.2200
3/4		.750	5.750	52.0700
1		1.000	5.250	66.7500
7-1/2"	1/4	.250	7.000	19.3600
	3/8	.375	6.750	28.5400

CONTINUED



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
7-1/2"	1/2	.500	6.500	37.3800
	5/8	.625	6.250	45.8900
	3/4	.750	6.000	54.0700
	1	1.000	5.500	69.4200
	1-1/4	1.250	5.000	83.4400
	1-1/2	1.500	4.500	96.1200
7-5/8"	5/16	.313	6.999	24.4400
	5/8	.625	6.375	46.7300
7-3/4	1/4	.250	7.250	20.0300
	3/8	.375	7.000	29.5400
	1/2	.500	6.750	38.7200
	3/4	.750	6.250	56.0700
	1	1.000	5.750	72.0900
8"	1/4	.250	7.500	20.6900
	3/8	.375	7.250	30.5400
	1/2	.500	7.000	40.0500
	3/4	.750	6.500	58.0700
	15/16	.938	6.124	70.7500
	1	1.000	6.000	74.7600
	1-1/4	1.250	5.500	90.1100
	1-1/2	1.500	5.000	104.1000
	8-1/4"	1/4	.250	7.750
1/2		.500	7.250	41.3900
1		1.000	6.250	77.4300
8-1/2"	1/4	.250	8.000	22.0300
	3/8	.375	7.750	32.5400
	1/2	.500	7.500	42.7200
	3/4	.750	7.000	62.0800
	1	1.000	6.500	60.1000
	1-1/4	1.250	6.000	96.7900
8-5/8"	1-1/2	1.500	5.500	112.1000
	.322	.322	7.981	28.5500
	1/2	.500	7.625	43.3900

CONTINUED

TUBING AND PIPE



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

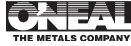
E.W.D.O.M. ASTM A-513

C.D. BUTTWELD ASTM A-512

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
8-3/4"	3/8	.375	8.000	33.5400
	1/2	.500	7.750	44.0600
	3/4	.750	7.250	64.0800
9"	1/4	.250	8.500	23.3600
	3/8	.375	8.250	34.5400
	1/2	.500	8.000	45.3900
	3/4	.750	7.500	66.0800
	1	1.000	7.000	85.4400
	1-1/2	1.500	6.000	120.2000
	9-1/4"	1/2	.500	8.250
9-1/2"	3/4	.750	7.750	68.0900
	1/4	.250	9.000	24.7000
9-3/4"	3/8	.375	8.750	36.5500
	1/2	.500	8.500	48.0600
	3/4	.750	8.000	70.0900
	1	1.000	7.500	90.7800
	1-1/8	1.125	7.250	100.6000
	1-1/2	1.500	6.500	128.2000
	10"	1/2	.500	8.750
10-1/4"	1/4	.250	9.500	26.0300
	3/8	.375	9.250	38.5500
	1/2	.500	9.000	50.7300
	3/4	.750	8.500	74.0900
	1	1.000	8.000	96.1200
	1-1/8	1.125	7.750	106.6000
	1-1/2	1.500	7.000	136.2000
10-1/2"	3/8	.375	9.500	39.5500
	1	1.000	8.250	98.7900
10-3/4"	1/4	.250	10.000	27.3700
	5/16	.313	9.874	34.0500
	1/2	.500	9.500	53.4000
	3/4	.750	9.000	78.1000
	1	1.000	8.500	101.5000
	1-1/2	1.500	7.500	144.2000

CONTINUED



MECHANICAL TUBING – CARBON & ALLOY

C.D. & H.F. ASTM A-519

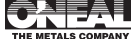
E.W.D.O.M. ASTM A-513

CONTINUED

C.D. BUTTWELD ASTM A-512

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
10-3/4"	3/8	.375	10.000	41.5500
	1/2	.500	9.750	54.7400
	9/16	.563	9.624	61.2500
	.843	.843	9.064	89.2000
	1	1.000	8.750	104.1000
	1-1/8	1.125	8.500	115.6000
	1-1/4	1.250	8.250	126.8000
	1-1/2	1.500	7.750	148.2000
11"	3/8	.375	10.250	42.5500
	1/2	.500	10.000	56.0700
	3/4	.750	9.500	82.1000
	1	1.000	9.000	106.8000
11-1/2"	1	1.000	9.500	112.1000
11-3/4"	.843	.843	10.064	98.2000
	1	1.000	9.750	114.8000
	1-1/4	1.250	9.250	140.2000
12"	1/4	.250	11.500	31.3700
	3/8	.375	11.250	46.5600
	1/2	.500	11.000	61.4100
	3/4	.750	10.500	90.1100
	1	1.000	10.000	117.5000
	1-1/2	1.500	9.000	168.2000

TUBING AND PIPE



**WELDED MECHANICAL
TUBING – ASTM A-513**
ELECTRIC RESISTANCE WELDED

AISI MT 1010

COLD ROLLED AND HOT ROLLED FINISH

Manufactured from MT 1010 strip steel with uniform wall thickness assured by the close strip tolerance. Outside welding flash is removed by cutting. Hot Rolled is formed from Hot Rolled MT 1010 strip and has a good finish suitable for painting. Cold Rolled is manufactured from Cold Rolled MT 1010 No. 2 Finish strip and is particularly adapted to applications requiring high finish. Both types can be formed, bent, swedged, flattened, etc. Call or write for descriptive material.

In gauges lighter than 16 BWG, O'Neal welded tubing stock is manufactured from MT 1010 cold rolled strip – 16 BWG and heavier from MT 1010 hot rolled strip.

RANOM LENGTHS: 20' TO 24'

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
3/8"	20	.035	.305	.1271
	18	.049	.277	.1706
	17	.058	.259	.1964
1/2"	20	.035	.430	.1738
	19	.042	.416	.2054
	18	.049	.402	.2360
	16	.065	.370	.3020
5/8"	20	.035	.555	.2205
	18	.049	.527	.3014
	16	.065	.495	.3888

CONTINUED



**WELDED MECHANICAL
TUBING – ASTM A-513**
ELECTRIC RESISTANCE WELDED

AISI MT 1010

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
5/8"	14	.083	.459	.4805
	13	.095	.435	.5377
3/4"	20	.035	.680	.2673
	18	.049	.652	.3668
	16	.065	.620	.4755
	11	.120	.510	.8074
7/8"	20	.035	.085	.3140
	18	.049	.777	.4323
	16	.065	.745	.5623
	15	.072	.731	.6175
	14	.083	.709	.7021
1"	20	.035	.930	.3607
	18	.049	.902	.4977
	16	.065	.870	.6491
	14	.083	.834	.8129
	13	.095	.810	.9182
	11	.120	.760	1.1280
	9	.148	.704	1.3470
1-1/8"	20	.035	1.055	.4074
	18	.049	1.027	.5631
	16	.065	.995	.7359
	11	.120	.885	1.2880
1-1/4"	20	.035	1.180	.4542
	18	.049	1.152	.6285
	16	.065	1.120	.8226
	14	.083	1.084	1.0340
	13	.195	1.060	1.1720
	12	.109	1.032	1.3280
	11	.120	1.010	1.4480
	7	.180	.890	2.0570
1-3/8"	20	.035	1.305	.5009
	18	.049	1.277	.6939
	16	.065	1.245	.9094
	11	.120	1.135	1.6080

CONTINUED

TUBING AND PIPE



**WELDED MECHANICAL
TUBING – ASTM A-513**
ELECTRIC RESISTANCE WELDED

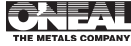
AISI MT 1010

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
1-1/2"	20	.035	1.430	.5476
	18	.049	1.402	.7593
	16	.065	1.370	.9962
	14	.083	1.334	1.2560
	11	.120	1.260	1.7690
	5	.220	1.060	3.0070
1-5/8"	20	.035	1.555	.5943
	18	.049	1.527	.8248
	16	.065	1.495	1.0830
	11	.120	1.385	1.9290
1-3/4"	20	.035	1.680	.6411
	18	.049	1.652	.8902
	16	.065	1.620	1.1700
	14	.083	1.584	1.4780
	11	.120	1.510	2.0890
1-7/8"	20	.035	1.805	.6878
	16	.065	1.745	1.2570
	14	.083	1.709	1.5890
	11	.120	1.635	2.2490
2"	20	.035	1.930	.7345
	18	.049	1.902	1.0210
	16	.065	1.870	1.3430
	14	.083	1.834	1.6990
	13	.095	1.810	1.9330
	11	.120	1.760	2.4090
	5/32	.156	1.687	2.0720
	7	.180	1.640	3.4990
	2-1/8"	18	.049	2.027
2-1/4"	18	.049	2.152	1.1520
	16	.065	2.120	1.5170
	14	.083	2.084	1.9210
	11	.120	2.010	2.7300
	7	.180	1.875	3.9790

CONTINUED

TUBING AND PIPE



**WELDED MECHANICAL
TUBING – ASTM A-513**
ELECTRIC RESISTANCE WELDED

AISI MT 1010

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
2-3/8"	14	.083	2.209	2.0320
	5/32	.156	2.062	3.6970
	7	.180	2.015	4.2200
2-1/2"	18	.049	2.402	1.2830
	16	.065	2.370	1.6900
	14	.083	2.334	2.1430
	11	.120	2.260	3.050
	7	.180	2.140	4.460
2-3/4"	16	.065	2.620	1.864
	14	.083	2.584	2.364
	13	.095	2.560	2.694
	11	.120	2.510	3.371
3"	18	.049	2.902	1.544
	16	.065	2.870	2.037
	14	.083	2.834	2.586
	13	.085	2.810	2.947
	11	.120	2.760	3.691
	7	.180	2.640	5.421
	1/4	.250	2.500	7.343
3-1/8"	16	.065	2.995	2.124
3-1/4"	16	.065	3.120	2.211
	13	.095	3.060	3.201
	11	.120	3.010	4.011
	7	.180	2.890	5.902
3-1/2"	16	.065	3.370	2.385
	14	.083	3.334	3.029
	11	.120	3.260	4.332
	7	.180	3.140	6.382
	1/4	.250	3.000	8.678
3-5/8"	16	.065	3.495	2.471
3-3/4"	16	.065	3.620	2.558

CONTINUED

TUBING AND PIPE



**WELDED MECHANICAL
TUBING – ASTM A-513**
ELECTRIC RESISTANCE WELDED

AISI MT 1010

CONTINUED

Size O.D.	Average Wall		Nominal I.D.	Wt. Per Ft. In lbs.
	B.W. Ga.	Dec. Inches		
4"	16	.065	3.870	2.732
	11	.120	3.760	4.973
	10	.134	3.732	5.533
	7	.180	3.640	7.344
	1/4	.250	3.500	10.010
4-1/4"	11	.120	4.010	5.293
4-1/2"	11	.120	4.260	5.613
	1/4	.250	4.000	11.350
5"	11	.120	4.760	6.254
	7	.180	4.640	9.266
	1/4	.250	4.500	12.680
5-1/2"	1/4	.250	5.000	14.020
6"	11	.120	5.760	7.536
	7	.180	5.640	11.190
	1/4	.250	5.500	15.350

1. Mill shipments of sizes not shown available upon request.

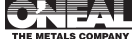


WELDED MECHANICAL – ASTM A-513
 SQUARE AND RECTANGULAR
 20' TO 24' RANDOM LENGTHS

Size in Inches	BWG Wall Thickness	Weight Per Foot Pounds
1/2 x 1/2	16	.384
	14	.470
5/8 x 5/8	16	.495
	14	.612
3/4 x 3/4	20	.340
	18	.467
	16	.605
	14	.753
1 x 1	20	.459
	18	.634
	16	.826
	15	.920
	14	1.035
	12	1.320
1-1/4 x 1-1/4	11	1.436
	20	.578
	18	.800
	16	1.047
	14	1.317
	12	1.691
1-1/2 x 1	11	1.844
	20	.519
	16	.937
	14	1.176
1-1/2 x 1-1/2	11	1.640
	20	.697
	18	.967
	16	1.268
	14	1.599
	12	2.062
1-5/8 x 1-5/8	11	2.252
	11	2.456

TUBING AND PIPE

CONTINUED



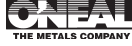
WELDED MECHANICAL – ASTM A-513

SQUARE AND RECTANGULAR
20' TO 24' RANDOM LENGTHS

CONTINUED

Size in Inches	BWG Wall Thickness	Weight Per Foot Pounds
1-5/8 x 1-5/8	16	1.489
	14	1.881
	11	2.660
1-1/2 x 1	14	1.317
2 x 1	16	1.268
	14	1.599
	11	2.252
2 x 1-1/2	16	1.489
	14	1.881
	11	2.660
2 x 2	18	1.300
	16	1.710
	14	2.164
2-1/2 x 1	16	1.489
	14	1.881
	11	2.660
2-1/2 x 1-1/2	16	1.710
	14	2.164
2-1/2 x 2-1/2	16	2.152
	14	2.728
3 x 1	16	1.710
	14	2.164
3 x 1-1/2	16	1.931
	14	2.445
3 x 2	16	2.152
	14	2.728
	12	3.544
3 x 3	16	2.594
	14	3.292
3-1/2 x 3-1/2	14	3.856

TUBING AND PIPE



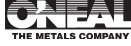
WELDED MECHANICAL – ASTM A-513

SQUARE AND RECTANGULAR
20' TO 24' RANDOM LENGTHS

CONTINUED

Size in Inches	BWG Wall Thickness	Weight Per Foot Pounds
4 x 2	16	2.594
	14	3.292
4 x 3	14	3.860
4 x 4	14	4.421

Mill shipments of sizes not shown, available upon request.



HOLLOW STRUCTURAL TUBING

ASTM A-500 Grade B (OTHER GRADES AVAILABLE)

Hot Rolled Finish

Can be subjected to most of the usual fabricating operations. Ductility is good. It bends well, flattens, cuts, punches, flares and flanges easily, and can be welded by the commonly-used techniques and practices.

Stock lengths of 20, 24, and 40 ft.

SQUARE HOLLOW STRUCTURALS

Size	Wall Thickness	Lbs. Per. Ft.
1-1/4	x 3/16	2.62
1-1/2	x 3/16	3.04
	1/4	4.11
2	x 11 ga.	3.067
	.145	3.51
	3/16	4.32
	1/4	5.41
2-1/4	x 1/4	7.01
2-1/2	x 1/8	3.88
	3/16	5.58
	1/4	7.11
3	x 1/8	4.75
	3/16	6.87
	1/4	8.81
	.320	10.70
	.375	12.34
3-1/2	x 1/8	5.61
	3/16	8.15
	1/4	10.51
4	x 1/8	6.53
	3/16	9.42
	1/4	12.21
	5/16	14.83
	3/8	17.27
	1/2	21.63
4-1/2	x 1/4	13.72
5	x 3/16	11.97
	1/4	15.62
	5/16	19.08
	3/8	22.37
	1/2	28.43

TUBING AND PIPE



HOLLOW STRUCTURAL TUBING

ASTM A-500 Grade B (OTHER GRADES AVAILABLE)

SQUARE HOLLOW STRUCTURALS

Size	Wall Thickness	Lbs. Per. Ft.
6	x 3/16	14.53
	1/4	19.02
	5/16	23.34
	3/8	27.48
	1/2	35.24
7	x 3/16	17.08
	1/4	22.42
	5/16	27.59
	3/8	32.58
	1/2	42.05
8	x 3/16	19.63
	1/4	25.82
	5/16	31.84
	3/8	37.69
	1/2	48.85
10	x 3/16	59.32
	1/4	24.73
	5/16	32.63
	3/8	40.35
	1/2	47.90
12	x 3/16	62.46
	1/4	76.33
	5/16	39.43
	3/8	48.86
	1/2	58.10
		76.07

TUBING AND PIPE



HOLLOW STRUCTURAL TUBING
 ASTM A-500 Grade B (OTHER GRADES AVAILABLE)

RECTANGULAR HOLLOW STRUCTURALS

Size	Wall Thickness	Lbs. Per. Ft.
2 x 1-1/2	x 3/16	4.32
2-1/2 x 1-1/2	x 11 ga.	3.05
3 x 1-1/2	x 3/16	4.97
3 x 1	x 11 ga.	3.05
3 x 1-1/2	x 11 ga.	3.48
3 x 2	x 1/8	3.98
	3/16	5.59
	1/4	7.11
4 x 2	x 1/8	4.83
	3/16	6.87
	1/4	8.81
4 x 3	x 1/8	5.68
	3/16	8.15
	1/4	10.51
5 x 2	x 1/8	5.68
	3/16	8.15
	1/4	10.51
5 x 2-1/2	x 3/16	8.88
5 x 3	x 1/8	6.53
	3/16	9.42
	1/4	12.21
	3/8	17.27
6 x 2	x 1/8	6.53
	3/16	9.42
	1/4	12.21
	3/8	19.82
6 x 3	x 1/8	7.15
	3/16	10.70
	1/4	13.91
	3/8	19.82
6 x 4	x 3/16	11.97
	1/4	15.62
	5/16	19.08
	3/8	22.37
7 x 4	1/2	28.43
	x 5/16	21.21
	3/8	24.93
7 x 5	x 1/4	19.02
	3/8	27.48
	1/2	35.24

TUBING AND PIPE



HOLLOW STRUCTURAL TUBING
 ASTM A-500 Grade B (OTHER GRADES AVAILABLE)

RECTANGULAR HOLLOW STRUCTURALS

Size	Wall Thickness	Lbs. Per. Ft.
8 x 2	x 3/16	11.97
	1/4	15.62
8 x 3	x 3/16	13.25
	1/4	17.32
8 x 4	x 3/16	14.53
	1/4	19.02
	5/16	23.34
	3/8	27.48
	1/2	35.24
8 x 6	x 3/16	17.08
	1/4	22.42
	5/16	27.59
	3/8	32.58
	1/2	42.05
10 x 2	x 1/4	19.02
	3/8	27.48
10 x 3	x 1/4	20.72
	5/16	25.46
10 x 4	x 3/16	17.08
	1/4	22.42
	5/16	27.59
	3/8	32.58
	1/2	42.05
10 x 5	x 1/4	24.12
	5/16	29.67
10 x 6	x 1/4	25.82
	3/8	37.69
	1/2	48.85
10 x 8	x 1/4	29.23
	3/8	42.79
	1/2	55.66
12 x 2	x 3/16	17.08
	1/4	22.42
12 x 3	x 1/4	24.12
12 x 4	x 3/16	19.63
	1/4	25.82
	3/8	37.69
12 x 6	x 1/4	29.23
	3/8	42.79
12 x 8	x 3/8	47.90

TUBING AND PIPE



GUIDE TO SELECTION Pipe

ASTM A-53F

This specification has replaced A120 pipe as a general use pipe in the transference of water, steam and gas. A-53F, produced by the butt weld (continuous weld) process, is furnished in bare, lacquer coated or galvanized condition. It is not intended for close coiling, bending or high temperature service. Other uses include, but are not limited to, braces, supports, posts, guard and hand rails. Sizes range from 1/8" through 12" nominal in standard and extra heavy walls.

ASTM A-53 Grade A & B

This pipe is produced by the ERW or Seamless methods. Designed for coiling, bending and flanging, it is suitable for welding. The grades denote certain chemical and mechanical properties and should be noted in selection. Both grades can be furnished in bare, lacquer coated and galvanized. This pipe is sometimes used in structural and other applications where definite chemical and mechanical properties are desired. The major use of this pipe is for line pipe in the transmission of liquids, gases and vapors. Sizes range from 1/8" to 24" nominal with a full range of wall schedules.

API 5-L is the American Petroleum Institute specification that corresponds most closely to A53. It is a line pipe specification and tends to be used in the same manner as A53.

ASTM A-106

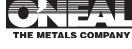
This pipe is always produced by the seamless method and is intended for use in high temperature applications. It can be bent, coiled and flanged. In sizes under 2" it is usually produced as a cold drawn product. 2" and up are usually hot finished.

HANDRAIL PIPE

Produced by the ERW method on a tubing mill. It is intended for structural uses and meets A500 Grade B. This pipe has had no pressure testing and is not intended for transmission purposes. Sizes are 1" through 6" nominal in schedule 10 and schedule 40. Not all sizes are available in both walls.

A500 Grade B and Grade C

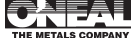
Produced by the ERW method on a tubing mill. Typically produced to A500 B for structural uses. Grade C physicals are available for most sizes upon request. Sizes are 2" through 12" schedule 40 and schedule 80. Not all sizes are available in both walls.



WEIGHTS AND DIMENSIONS OF SEAMLESS AND WELDED PIPE

Pipe Size	O.D. In Inches	5	10	20	30	40	STD	60	80	E.H.	100	120	140	160	Dbl E.H.
1/8	.405	.035 .1383	.049 .1863			.068 .2447	.068 .2447		.095 .3145	.095 .3145					
1/4	.540	.049 .3276	.065 .4235			.088 .4248	.088 .4248		.119 .5351	.119 .5351					
3/8	.675	.049 .3276	.065 .4235			.091 .5676	.091 .5676		.126 .7388	.126 .7388					
1/2	.840	.065 .5383	.083 .6710			.109 .8510	.091 .8510		.147 .1088	.147 .1088				.187 1.304	.294 1.714
3/4	1.050	.065 .6838	.083 .8572			.113 1.131	.113 1.131		.154 1.474	.154 1.474				.218 1.937	.308 2.441
1	1.315	.065 .8678	.109 1.404			.133 1.679	.133 1.679		.179 2.172	.179 2.172				.250 2.844	.358 3.659
1-1/4	1.660	.065 1.107	.109 1.806			.140 2.273	.140 2.273		.191 2.997	.191 2.997				.250 3.765	.382 5.214
1-1/2	1.900	.065 1.274	.109 2.085			.145 2.718	.145 2.718		.200 3.631	.200 3.631				.281 4.859	.400 6.408
2	2.375	.065 1.604	.109 2.638			.154 3.653	.154 3.653		.218 5.022	.218 5.022				.343 7.444	.436 9.029
2-1/2	2.875	.083 2.475	.120 3.531			.203 5.793	.203 5.793		.276 7.661	.276 7.661				.375 10.01	.552 13.70

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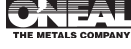


44 TUBING AND PIPE

WEIGHTS AND DIMENSIONS OF SEAMLESS AND WELDED PIPE

Pipe Size	O.D. Inches	5	10	20	30	40	STD	60	80	E.H.	100	120	140	160	DbI E.H.
3	3.500	.083 3.029	.120 4.332			.216 7.576	.216 7.576		.300 10.25	.300 10.25				.437 14.32	.600 18.58
3-1/2	4.000	.083 3.472	.120 4.973			.226 9.109	.226 9.109		.318 12.51	.318 12.51					.636 22.85
4	4.500	.083 3.915	.120 5.613			.237 10.79	.237 10.79	.281 12.66	.337 14.98	.337 14.98		.437 19.01		.531 22.51	.674 27.54
4-1/2	5.000						.247 12.53			.355 17.61					.710 32.53
5	5.563	.109 6.349	.134 7.770			.258 14.62	.258 14.62		.375 20.78	.375 20.78		.500 27.04		.625 32.96	.750 38.56
6	6.625	.109 7.585	.134 9.289			.280 18.97	.280 18.97		.432 28.57	.432 28.57		.562 36.39		.718 45.30	.864 53.16
7	7.625						.301 23.57			.500 38.05					.875 63.08
8	8.625	.109 9.914	.148 13.40	.250 22.36	.277 24.70	.322 28.55	.322 28.55	.406 35.64	.500 43.39	.500 43.39	.593 50.87	.718 60.93	.812 67.76	.906 74.69	.875 72.42
9	9.625						.342 33.90			.500 48.72					
10	10.750	.134 15.19	.165 18.70	.250 28.04	.307 34.24	.365 40.48	.365 40.48	.500 54.74	.5933 64.33	.500 54.74	.718 76.93	.843 89.20	1.000 104.1	1.125 115.7	

CONTINUED



WEIGHTS AND DIMENSIONS OF SEAMLESS AND WELDED PIPE

Pipe Size	O.D. In Inches	5	10	20	30	40	STD	60	80	E.H.	100	120	140	160	DbI E.H.
11	11.750						.375 45.55			.500 60.07					
12	12.750	.165 22.18	.180 24.20	.250 33.38	.330 43.77	.406 53.53	.375 49.56	.562 73.16	.687 88.51	.500 65.42	.843 107.2	1.000 125.5	1.125 139.7	1.312 160.3	
14	14.000		.250 36.71	.312 45.68	.375 54.57	.437 63.37	.375 54.57	.593 84.91	.750 106.1	.500 72.09	.937 130.7	1.093 150.7	1.250 170.2	1.406 189.1	
16	16.000		.250 42.05	.312 52.36	.375 62.58	.500 82.77	.375 62.58	.656 107.5	.843 136.5	.500 82.77	1.031 164.8	1.218 192.3	1.437 223.5	1.593 245.1	
18	18.000		.250 47.39	.312 59.03	.437 82.06	.562 104.8	.375 70.59	.750 138.2	.937 170.8	.500 93.45	1.156 208.0	1.375 244.1	1.562 274.2	1.781 308.5	
20	20.000		.250 52.73	.375 78.60	.500 104.1	.593 122.9	.375 78.60	.812 166.4	1.031 208.9	.500 104.1	1.280 256.1	1.500 296.4	1.750 341.1	1.968 379.0	
24	24.000		.250 63.41	.375 94.62	.562 140.8	.687 171.2	.375 94.62	.968 238.1	1.218 296.4	.500 125.5	1.531 367.4	1.812 429.4	2.062 483.1	2.343 541.9	



**C.D. SEAMLESS
MECHANICAL TUBING**
STANDARD MFG. TOLERANCES

ASTM A-519

- (c) Tubing having a wall thickness less than 3% of the outside diameter cannot be straightened properly without a certain amount of distortion. Consequently such tubes, while having an average outside diameter and inside diameter within the tolerances shown in the table, will require an ovality of tolerance of 1/2% over or under the nominal outside diameter and inside diameter in addition to the tolerances indicated in the table.

WAREHOUSE TOLERANCES LIMITED TO O.D.-AND WALL (except for Cylinder Tubing specially drawn to O.D.-I.D. dimensions.)

**HOT FINISHED SEAMLESS
MECHANICAL TUBING**
DIAMETER TOLERANCES-INCHES/MILLIMETERS

ASTM A-519

OD Size Range Inches Inclusive	As Rolled or Annealed OD, ± Inches	Quenched & Tempered OD & ID ± OD
2.000-2.499	.017	.027
2.500-2.999	.019	.029
3.000-3.499	.021	.032
3.500-3.999	.023	.035
4.000-4.499	.025	.038
4.500-4.999	.027	.041
5.000-5.499	.029	.044
5.500-5.999	.031	.047
6.000-6.499	.033	.050
6.500-6.999	.035	.053
7.000-7.499	.037	.056

OD Size Range Millimeters, Inclusive	As Rolled or Annealed OD, ± Millimeters	Quenched & Tempered OD & ID ± Millimeters
50.80-63.48	0.43	0.686
63.49-76.17	0.48	0.737
76.18-88.87	0.53	0.813
88.88-101.57	0.58	0.889
101.58-114.28	0.64	0.985
114.29-126.97	0.69	1.041
126.98-139.67	0.74	1.118
139.68-152.38	0.79	1.194
152.39-165.08	0.84	1.270
165.09-177.78	0.89	1.346
177.79-190.48	0.94	1.422

Tolerances do not apply to heat treated material or bearing quality tubing.

CONTINUED

TUBING AND PIPE



HOT FINISHED SEAMLESS MECHANICAL TUBING

ASTM A-519

WALL THICKNESS TOLERANCES-
INCHES/MILLIMETERS

Wall Thickness % of OD	Maximum Percent Over & Under Nominal	Wall Thickness % of OD	Maximum Percent Over & Under Nominal
	OD 2" and Over		OD 2" and Over
Under 10	10.0	Under 10	10.0
10 to 25	7.5	10 to 25	7.5

HOT FINISHED SEAMLESS MECHANICAL TUBING

ASTM A-519

STRAIGHTNESS TOLERANCES-INCHES/MILLIMETERS

OD Size Range Inches Inclusive	Wall Percent of OD	Maximum Deviation from Straight Total Inches in any 3 Feet
Up to 5.000	3% OD & Over	.030
5.001-7.500	4% OD & Over	.045

OD Size Range Inches Inclusive	Wall Percent of OD	Maximum Deviation from Straight Total Millimeters in any 3 Feet
Up to 127.00	3% OD & Over	0.83
127.01-190.50	4% OD & Over	1.14

Straightness, or camber, is measured for any 3 ft. or meter of length with a 3 ft. or meter straight edge and a feeler guage.



ERW DRAWN OVER MANDREL ROUND MECHANICAL STEEL TUBING • A-513

OD AND ID TOLERANCES
INCHES (MM)

OD Size Range	% of OD	OD, Inches		OD, Inches	
		Over	Under	Over	Under
0.625-1.699 (15.82-43.16)	All	.005(.13)	.000	.000	.005(.13)
1.700-2.099 (43.17-53.32)	All	.006(.15)	.000	.000	.006(.15)
2.100-2.499 (53.33-63.48)	All	.007(.18)	.000	.000	.007(.18)
2.500-2.899 (63.49-73.64)	All	.008(.20)	.000	.000	.008(.20)
2.900-3.299 (73.65-83.80)	All	.009(.23)	.000	.000	.009(.23)
3.300-3.699 (83.81-93.96)	All	.010(.25)	.000	.000	.010(.25)
3.700-4.099 (93.97-104.12)	All	.011(.28)	.000	.000	.011(.28)
4.100-4.499 (104.13-114.28)	All	.012(.30)	.000	.000	.012(.30)
4.500-4.899 (114.29-124.44)	All	.013(.33)	.000	.000	.013(.33)
4.900-5.299 (124.45-134.60)	All	.014(.36)	.000	.000	.014(.36)
5.300-5.549 (134.61-140.95)	All	.015(.38)	.000	.000	.015(.38)
5.550-5.999 (140.96-152.38)	Under 6 7 to 7-1/2 Over 7-1/2	.010(.25) .009(.23) .018(.46)	.010(.25) .009(.23) .000	.010(.25) .009(.23) .009(.23)	.010(.25) .009(.23) .009(.23)
6.000-6.499 (152.39-165.08)	Under 6 6 to 7-1/2 Over 7-1/2	.013(.33) .010(.25) .020(.51)	.013(.33) .010(.25) .000	.013(.33) .010(.25) .010(.25)	.013(.33) .010(.25) .010(.25)
6.550-6.999 (165.09-177.78)	Under 6 6 to 7-1/2 Over 7-1/2	.015(.38) .012(.30) .023(.58)	.015(.38) .012(.30) .000	.015(.38) .012(.30) .012(.30)	.015(.38) .012(.30) .012(.30)
7.000-7.499 (177.79-190.48)	Under 6 6 to 7-1/2 Over 7-1/2	.018(.46) .013(.33) .026(.66)	.018(.46) .013(.33) .000	.018(.46) .013(.33) .013(.33)	.018(.46) .013(.33) .013(.33)
7.500-7.999 (190.49-203.18)	Under 6 6 to 7-1/2 Over 7-1/2	.020(.51) .015(.38) .029(.74)	.020(.51) .015(.38) .000	.020(.51) .015(.38) .015(.38)	.020(.51) .015(.38) .015(.38)
8.000-8.499 (203.19-215.88)	Under 6 6 to 7-1/2 6 to 7-1/2 Over 7-1/2	.023(.58) .016(.41) .016(.41) .031(.79)	.023(.58) .016(.41) .016(.41) .000	.023(.58) .016(.41) .016(.41) .015(.38)	.023(.58) .016(.41) .016(.41) .016(.41)
8.500-8.999 (215.89-228.58)	Under 6 6 to 7-1/2 Over 7-1/2	.025(.64) .017(.43) .034(.86)	.025(.64) .017(.43) .000	.025(.64) .017(.43) .015(.38)	.025(.64) .017(.43) .019(.48)
9.000-9.499 (228.59-241.28)	Under 6 6 to 7-1/2 Over 7-1/2	.028(.71) .019(.48) .037(.94)	.028(.71) .019(.48) .000	.028(.71) .019(.48) .015(.38)	.028(.71) .019(.48) .022(.56)
9.500-9.999 (241.29-253.98)	Under 6 6 to 7-1/2 Over 7-1/2	.030(.76) .020(.51) .040(1.02)	.030(.76) .020(.51) .000	.030(.76) .020(.51) .015(.38)	.030(.76) .020(.51) .025(.64)
10.000-10.999 (253.99-279.38)	Under 6 6 to 7-1/2 Over 7-1/2	.034(.86) .022(.56) .044(1.12)	.034(.86) .022(.56) .000	.034(.86) .022(.56) .015(.38)	.034(.86) .022(.56) .029(.74)
11.000-11.999 (279.39-304.78)	Under 6 6 to 7-1/2 Over 7-1/2	.035(.89) .025(.64) .045(1.14)	.035(.89) .025(.64) .000	.035(.89) .025(.64) .015(.38)	.035(.89) .025(.64) .035(.89)
12.000-12.999 (304.79-330.18)	Under 6 7 to 7-1/2 Over 7-1/2	.036(.91) 7 to 7-1/2 Over 7-1/2	.036(.91) .027(.69) .000	.036(.91) .027(.69) .015(.38)	.036(.91) .027(.69) .037(.94)
13.000-13.999 (330.19-355.58)	Under 6 6 to 7-1/2 Over 7-1/2	Under 6 6 to 7-1/2 Over 7-1/2	.037(.94) .029(.74) .000	.037(.94) .029(.74) .015(.38)	.037(.94) .029(.74) .040(1.02)
14.000-15.000 (355.59-381.00)	Under 6 6 to 7-1/2 Over 7-1/2	Under 6 6 to 7-1/2 Over 7-1/2	.038(.97) .030(.76) .000	.038(.97) .030(.76) .015(.38)	.038(.97) .030(.76) .042(1.07)



E.W. DOM - ASTM A-513
WALL TOLERANCES

WALL THICKNESS, INCH	INCL. .375 to .875 OD	OVER .875 to 1.875 OD	OVER 1.875 to 3.750 OD	OVER 3.750 to 15,000 OD
0.28 & .035	+0.02 -0.02	+0.02 -0.02	+0.02 -0.02	
.049	+0.02 -0.02	+0.02 -0.03	+0.02 -0.03	
.065	+0.02 -0.02	+0.02 -0.03	+0.02 -0.03	+0.04 -0.04
.083	+0.02 -0.02	+0.02 -0.03	+0.03 -0.03	+0.04 -0.05
.095	+0.02 -0.02	+0.02 -0.03	+0.03 -0.03	+0.04 -0.05
.109	+0.02 -0.03	+0.02 -0.04	+0.03 -0.03	+0.05 -0.05
.120	+0.03 -0.03	+0.02 -0.04	+0.03 -0.03	+0.05 -0.05
.134		+0.02 -0.04	+0.02 -0.04	+0.05 -0.05
.148		+0.02 -0.04	+0.02 -0.04	+0.05 -0.05
.165		+0.03 -0.04	+0.03 -0.04	+0.05 -0.06
.180		+0.04 -0.04	+0.04 -0.04	+0.06 -0.06
.203		+0.04 -0.05	+0.04 -0.05	+0.06 -0.07
.220			+0.04 -0.06	+0.07 -0.07
.238			+0.05 -0.06	+0.07 -0.07
.259			+0.05 -0.06	+0.07 -0.07
.284			+0.05 -0.06	+0.07 -0.07
.300			+0.06 -0.06	+0.08 -0.08
.320			+0.07 -0.07	+0.08 -0.08
.344			+0.08 -0.08	+0.09 -0.09
.375			+0.09 -0.09	+0.09 -0.09
.400			+0.10 -0.10	+0.10 -0.10
.438			+0.11 -0.11	+0.11 -0.11
.480			+0.12 -0.12	+0.12 -0.12
.531			+0.13 -0.13	+0.13 -0.13
.563			+0.13 -0.13	+0.13 -0.13
.580				+0.14 -0.14
.600				+0.15 -0.15
.650				+0.17 -0.17

TUBING AND PIPE



COLD DRAWN BUTTWELDED STEEL TUBE DATA

Round Mandrel Drawn (CDBW) ASTM A-512

DIMENSIONAL TOLERANCES

O. D. SIZE RANGE INCHES	WALL THICKNESS RANGE INCHES	DIAMETER TOLERANCES				WALL TOLERANCES	
		O. D. INCHES		I. D. INCHES		Plus	Minus
		Plus	Minus	Plus	Minus		
Under .500	Under .156	.004	.000	.000	.010	12.5%	12.5%
.500 to 1.500	Under .156	.005	.000	.000	.005	10.0%	10.0%
.500 to 1.500	0.156 & over	.005	.000	.000	.005	7.0%	7.0%
1.500 & over	Under .156	.010	.000	.000	.010	10.0%	10.0%
1.500 & over	0.156 & over	.010	.000	.000	.010	7.0%	7.0%

Tolerances can be supplied to only two of three cross-sectional dimensions. Sunk drawn CDBW tube usually is specified OD x Wall. Most Kilsby-Roberts CDBW stock is Mandrel Drawn OD x ID stress relieved. Straightness tolerance is 0.030" in any 3 feet of length.

CHEMICAL COMPOSITION

GRADE DESIGNATION	CHEMISTRY			
	CARBON	MANGANESE	PHOSPHOROUS	SULFUR
AISI 1010	.05-.15%	.30-.60%	.040% max	.050% max
AISI 1012	.10-.15%	.30-.60%	.040% max	.050% max
AISI 1020	.15-.25%	.30-.60%	.040% max	.050% max

Percentage range heat analysis, Refer ASTM-A-512 for product analysis.

MECHANICAL PROPERTIES

GRADE DESIGNATION	TENSILE STRENGTH	YIELD STRENGTH	ELONGATION IN 2 INCHES	ROCKWELL HARDNESS
AISI 1010	62,000 psi	58,000 psi	15%	R70B-R90B
AISI 1012	62,000 psi	58,000 psi	15%	R70B-R90B
AISI 1020	71,000 psi	65,000 psi	13%	R75B-R99B

Properties are approximate typical values for round cold drawn stress relieved tube.



WELDED MECHANICAL STEEL TUBE TOLERANCES As-Welded Round Hot Rolled Electric Weld (HREW)

DIAMETER TOLERANCES

OUTSIDE DIAMETER SIZE RANGE INCHES	WALL THICKNESS		OUTSIDE DIAMETER TOLERANCE, INCHES	
	BWG	INCHES	PLUS	MINUS
3/4 TO 1-1/8 INCH	16 to 10	.065 to .134	.0035	.0035
Over 1-1/8 to 2, incl	16 to 7	.065 to .180	.005	.005
Over 1-1/8 to 2, incl	6 to 3	.203 to .259	.005	.005
Over 2 to 2-1/2, incl	16 to 3	.065 to .259	.006	.006
Over 2-1/2 to 3, incl	16 to 3	.065 to .259	.008	.008
Over 2-1/2 to 3, incl	2 to .320	.284 to .320	.010	.010
Over 3 to 3-1/2, incl	16 to 3	.065 to .259	.009	.009
Over 3 to 3-1/2, inc.	2 to .360	.284 to .360	.012	.012
Over 3-1/2 to 3, incl	16 to 3	.065 to .259	.010	.010
Over 3-1/2 to 4, incl	2 to .500	.284 to .500	.015	.015
Over 4 to 5, incl	16 to 3	.065 to .259	.020	.020
Over 4 to 5, incl	2 to .500	.284 to .500	.020	.020
Over 5 to 6, incl	16 to 3	.065 to .259	.020	.020
Over 5 to 6, incl	2 to .500	.120 to .259	.025	.025
Over 6 to 8, incl	11 to 3	.120 to .259	.025	.025
Over 6 to 8, incl	2 to .500	.284 to .500	.025	.025

NOTE 1 - Measurements for diameter are to be taken at least 2 inches from the ends of the tubes.

NOTE 2 - OVALITY shall be within the above tolerances except when the wall thickness is less than 3% of the outside diameter, in such cases the ovality may be 50 percent greater than the outside tolerances but the mean outside diameter shall be within the specified tolerances.

WALL TOLERANCES

WALL THICKNESS		OUTSIDE DIAMETER, INCHES									
INCHES	BWG	3/4 to 1, incl		OVER 1 to 1-15/16 incl		OVER 1-15/16 to 3-3/4 incl		OVER 3-3/4 to 4-1/2, incl		OVER 4-1/2 to 8, incl	
		WALL THICKNESS TOLERANCES, INCHES									
		Plus	Minus	Plus	Minus	Plus	Minus	Plus	Minus	Plus	Minus
.065	16	.005	.009	.004	.010	.003	.011	.002	.012	.002	.012
.072	15	.005	.009	.004	.010	.003	.011	.002	.012	.002	.012
.083	14	.006	.010	.005	.011	.004	.012	.003	.013	.003	.013
.095	13	.006	.010	.005	.011	.004	.012	.003	.013	.003	.013
.109	12	.006	.010	.005	.011	.004	.012	.003	.013	.003	.013
.120	11	.006	.010	.005	.011	.004	.012	.003	.013	.003	.013
.134	10	.006	.010	.005	.011	.004	.012	.003	.013	.003	.013
.148	9	-	-	.006	.012	.005	.013	.004	.014	.004	.014
.165	8	-	-	.006	.012	.005	.013	.004	.014	.004	.014
.180	7	-	-	.006	.012	.005	.013	.004	.014	.004	.014
.203	6	-	-	-	-	.007	.015	.006	.016	.005	.017
.220	5	-	-	-	-	.007	.015	.006	.016	.005	.017
.238	4	-	-	-	-	.012	.020	.011	.021	.010	.022
.259	3	-	-	-	-	.013	.021	.012	.022	.011	.023
.284	2	-	-	-	-	.014	.022	.013	.023	.012	.024
.300	1	-	-	-	-	.015	.023	.014	.024	.013	.025
.320	-	-	-	-	-	.016	.024	.015	.025	.014	.026
.344	-	-	-	-	-	.017	.025	.016	.026	.015	.027
.360	-	-	-	-	-	.017	.025	.016	.026	.015	.027
.375	-	-	-	-	-	-	-	.016	.026	.015	.027
.406	-	-	-	-	-	-	-	.017	.027	.016	.028
.438	-	-	-	-	-	-	-	.017	.027	.016	.028
.469	-	-	-	-	-	-	-	-	-	.016	.028
.500	-	-	-	-	-	-	-	-	-	.016	.028

TUBING AND PIPE



**TOLERANCES A-513 Type 2
WELDED MECHANICAL STEEL TUBE
As-Welded Round Cold Rolled Electric Weld (CREW)**

DIAMETER TOLERANCES

OUTSIDE DIAMETER SIZE RANGE INCHES	WALL THICKNESS		OUTSIDE DIAMETER TOLERANCE, INCHES	
	BWG	INCHES	PLUS	MINUS
1/4 TO 3/8 INCH	22 to 14	.028 to .083	.0025	.0025
Over 3/8 to 5/8, incl	22 to 16	.028 to .065	.003	.003
Over 3/8 to 5/8, incl	14 to 12	.083 to .109	.003	.003
Over 5/8 to 1-1/8, incl	22 to 14	.028 to .083	.0035	.0035
Over 5/8 to 1-1/8, incl	13 to 11	.095 to .120	.0035	.0035
Over 1-1/8 to 2, incl	22 to 14	.028 to .083	.005	.005
Over 1-1/8 to 2, incl	13 to 9	.095 to .148	.005	.005
Over 2 to 2-1/2, inc.	20 to 14	.035 to .083	.006	.006
Over 2 to 2-1/2, incl	13 to 9	.095 to .148	.006	.006
Over 2-1/2 to 3, incl	20 to 18	.035 to .049	.008	.008
Over 2-1/2 to 3, incl	16 to 9	.065 to .148	.008	.008
Over 3 to 3-1/2, incl	20 to 9	.035 to .148	.009	.009
Over 3-1/2 to 4, incl	20 to 8	.035 to .165	.010	.010
Over 4 to 5, incl	16 to 14	.065 to .083	.020	.020
Over 4 to 5, incl	13 to 8	.095 to .165	.015	.015
Over 5 to 6, incl	16 to 8	.065 to .165	.020	.020

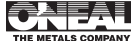
NOTE 1 - Measurements for diameter are to be taken at least 2 inches from the ends of the tubes.

NOTE 2 - OVALITY shall be within the above tolerances except when the wall thickness is less than 3% of the outside diameter, in such cases the ovality may be 50 percent greater than the outside tolerances but the mean outside diameter shall be within the specified tolerances.

WALL TOLERANCES

WALL THICKNESS		OUTSIDE DIAMETER, INCHES									
INCHES	BWG	3/4 to 1, incl		OVER 1 to 1-15/16 incl		OVER 1-15/16 to 3-3/4 incl		OVER 3-3/4 to 4-1/2, incl		OVER 4-1/2 to 8, incl	
		WALL THICKNESS TOLERANCES, INCHES									
		Plus	Minus	Plus	Minus	Plus	Minus	Plus	Minus	Plus	Minus
.028	22	.001	.005	.001	.005	-	-	-	-	-	-
.035	20	.002	.005	.001	.005	.001	.005	-	-	-	-
.049	18	.003	.006	.002	.006	.002	.006	-	-	-	-
.065	16	.005	.007	.004	.007	.004	.007	.004	.007	.004	.007
.083	14	.006	.007	.005	.007	.004	.007	.004	.007	.004	.007
.095	13	.006	.007	.005	.007	.004	.007	.004	.007	.004	.008
.109	12	-	-	.006	.008	.005	.008	.005	.008	.005	.009
.120	11	-	-	.007	.008	.006	.008	.005	.008	.005	.009
.134	10	-	-	.007	.008	.006	.008	.005	.008	.005	.009

TUBING AND PIPE



HOLLOW STRUCTURALS

ASTM A-500

TOLERANCES FOR OUTSIDE DIMENSIONS and WALL THICKNESS

Largest outside dimension across flats, inches	2-1/2 3-1/2	Over 3-1/2 5-1/2 incl.	Over 5-1/2
Tolerance for outside dimensions including convexity or concavity	± .025"	±.030"	±1%
Wall thickness tolerance*	± 10%	± 10%	±10%

* Note: The allowable variation in wall thickness does not apply at corners.

MAXIMUM TWIST*

Longer outside dimensions, inches	2-1/2 to 4 incl.	Over 4 to 5-1/2 incl.	Over 5-1/2 to 8 incl.	Over 8
Maximum twist per 3 feet of length, inches	.075	.087	.100	.112

*Twist is measured by holding down the edge of one end of a square of rectangular hollow structural on a surface plate with the bottom side of the tube parallel to the surface plate and noting the height that either corner on the opposite end of the bottom side is above the surface plate.

LENGTHS AND PERMISSIBLE VARIATION

Tube lengths	2'0"/12'0"	12'0"/20'0"	20'0"/32'0"
Permissible variation in length	± 3/32"	±1/8"	±1/4"

SQUARENESS OF SIDES . . . Adjacent sides of hollow structural may deviate from 90 degrees by plus or minus one degree.

VARIATIONS FROM EXACT STRAIGHTNESS
Permissible variations, inches (inches camber & sweep)

$$\frac{1}{8} \times \text{number of feet of total length}$$

$$5$$



CARBON STEEL STRUCTURAL TUBING

ASTM A-500

COLD-FORMED WELDED AND SEAMLESS
ROUNDS AND SHAPES

This specification covers cold-formed welded and seamless carbon steel round, square, rectangular, or special shape structural tubing for welded, riveted, or bolted construction of bridges and buildings, and for general structural purposes.

This tubing is produced with a maximum periphery of 64 in. and a maximum wall of .625 in.

CHEMICAL REQUIREMENTS FOR GRADES A AND B

	Ladie Analysis	Check Analysis
Carbon, max, percent	0.26	0.30
Phosphorus, max, percent	0.04	0.05
Sulfur, max, percent	0.05	0.063
Copper, when copper steel is specified, min, percent	0.20	0.18

TENSILE REQUIREMENTS

Round Structural Tubing

	Grade A	Grade B
Tensile strength, min, psi	45 000	58 000
Yield point, min, psi	33 000	42 000
Elongation in 2 in., min, percent	25a	23b

Shaped Structural Tubing

Tensile strength, min, psi	45 000	58 000
Yield point, min, psi	39 000	46 000
Elongation in 2 in., min, percent	25a	23b

- a. Applies to specified wall thicknesses 0.120 in. and over. For wall thicknesses under 0.120 in., the minimum elongation shall be calculated by the formula: per cent elongation in 2 in. = $56 t + 17.5$.
- b. Applies to specified wall thicknesses 0.180 in. and over. For wall thicknesses under 0.180 in., the minimum elongation shall be calculated by the formula: per cent elongation in 2 in. = $61 t + 12$.



CARBON STEEL STRUCTURAL TUBING

ASTM A 501

HOT-FORMED WELDED AND SEAMLESS

This specification covers hot-formed welded and seamless carbon steel square, rectangular, or special shape structural tubing for welded, riveted or bolted construction of bridges and buildings, and for general structural purposes.

Note – When round hot-formed tubular sections are required for structural uses, such material may be ordered in accordance with either the Specification for Welded and Seamless Steel Pipe (ASTM Designation: A 53) or the Specification for Black and Hot-Dipped Zinc-Coated (Galvanized) Welded and Seamless Steel Pipe for Ordinary Uses (ASTM Designation: A 120) and in addition by specifying those processes included in 3. Process and 4. Manufacture of this specification

CHEMICAL REQUIREMENTS

	Ladle Analysis	Check Analysis
Carbon, max, percent	0.26	0.30
Phosphorus, max, percent	0.04	0.05
Sulfur, max, percent	0.05	0.063
Copper, when copper steel is specified, min, percent	0.20	0.18

TENSILE REQUIREMENTS

Shaped Structural Tubing

Tensile strength, min, psi	58 000 ^a
Yield point, min, psi	36 000
Elongation in 2 in. min, percent ^c	23
Elongation in 8 in. min, percent ^c	20 ^b

- ^a The maximum tensile strength shall be 80,000 psi.
- ^b For material under 5/16 in. in thickness, a deduction from the percentage elongation of 1.25 per cent in 8 in. specified in Table 2 shall be made for each decrease of 1/32 in. of the specified thickness under 5/16 in.
- ^c Elongation may be determined in a gauge length of either 2 in. or 8 in. at the manufacturer's option.

TUBING AND PIPE



WELDED AND SEAMLESS STEEL PIPE

ASTM A-53

This specification covers seamless and welded black and hot dipped galvanized steel pipe furnished in the following types and grades:

- Type F. - Furnace - butt welded
- Type E. - Electric - resistance welded, Grades A, B, and C.
- Type S. - Seamless, Grades A, B, and C.

Pipe ordered under this specification is nominal (average) wall thickness, suitable for welding, and suitable for forming operations involving coiling, bending and flanging, subject to the following qualifications:

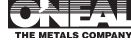
- (1) Type F is not intended for flanging.
- (2) When Types S and E are required for close coiling or cold bending. Grade A should be specified. This provision is not intended to prohibit the cold bending of Grade B pipe.
- (3) When pipe is required for close coiling, this should be so specified on the order.

CHEMICAL REQUIREMENTS

		Phosphorus max, percent
Type S (Seamless Pipe)	open-hearth or basic-Oxygen.	0.048
	bessemer	0.11
Type F (Furnace-welded pipe)	Open-Hearth, basic-oxygen,	0.08
	electric furnace, or acid oxygen- steam, bessemer	0.13
Type E (electric-resistance- welded)	open-hearth or basic-oxygen	0.050

WELDED AND SEAMLESS STEEL PIPE ASTM A-53

TENSILE REQUIREMENTS



	Type F		Types E and S	
	Acid-Bessemer	Open-Hearth Basic Oxygen, or Electric-Furnace	Grade A	Grade B
Tensile strength, min, psi	50 000	45 000	48 000	60 000
Yield point, min, psi	30 000	25 000	30 000	35 000
Elongation in 8 in., min, percent	18	20		
Elongation in 2 in., min, percent: Basic minimum elongation for walls $\frac{5}{16}$ in. and over in thickness, strip tests, and for all small sizes tested in full sections		30	35	30
When standard round 2 in. gage length test specimen is used.			28	22
For strip tests the width of the gage section shall be $1\frac{1}{2}$ in. and a deduction for each $\frac{1}{32}$ in. decrease in wall thickness below $\frac{5}{16}$ in. from the basic minimum elongation of the following percentage.			1.75	1.50



SEAMLESS CARBON STEEL PIPE

ASTM A106

FOR HIGH-TEMPERATURE SERVICE

These specifications cover seamless carbon steel pipe for high-temperature service. Pipe ordered under these specifications is nominal (average) wall and shall be suitable for bending, flanging, and similar forming operations.

Supplementary requirements of an optional nature are provided for seamless pipe intended for use in central stations having steam service pressures of 400 psi and over and high temperatures or other applications where a superior grade of pipe is required. These supplementary requirements call for additional tests to be made and when desired shall be so stated in the order.

When these products are to be used in applications conforming to ISO Recommendations for Boiler Construction, the requirements of ASTM Specification A 520, for Supplementary Requirements for Seamless and Electric-Resistance-Welded Carbon Steel Tubular Products for High Temperature Service Conforming to ISO Recommendations for Boiler Construction, shall supplement and supersede the requirements of this specification.

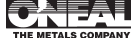
CHEMICAL REQUIREMENTS

	Grade A	Grade B	Grade C ^a
Carbon, max, percent	0.25	0.30	0.35
Manganese, percent	0.27 to 0.93	0.29 to 1.06	0.29 to 1.06
Phosphorus, max, percent	0.048	0.048	0.048
Sulfur, max, percent	0.058	0.058	0.058
Silicon, min, percent	0.10	0.10	0.10

^a Grade C is a special product supplied only on agreement between the manufacturer and the purchaser.

SEAMLESS CARBON STEEL PIPE
FOR HIGH-TEMPERATURE SERVICE

ASTM A106
CONTINUED



TENSILE REQUIREMENTS

	Grade A		Grade B		Grade C	
	Longitudinal	Transverse	Longitudinal	Transverse	Longitudinal	Transverse
Tensile strength, min, psi	48 000		60 000		70 000	
Yield point, min, psi	30 000		35 000		40 000	
Elongation in 2 in., min, percent: Basic minimum elongation for walls $\frac{5}{16}$ in. and over in thickness, strip tests, and for all small sizes tested in full section	35	25	30	16.5	30	16.5
When standard round 2-in. gauge length test specimen is used	28	20	22	12	20	12
For strip tests, the width of the gauge section shall be $1\frac{1}{2}$ in. and a deduction for each $\frac{1}{32}$ in. decrease in wall thickness below $\frac{5}{16}$ in. from the basic minimum elongation of the following percentage	1.75 ^a	1.25 ^a	1.50 ^a	1.00 ^a	1.50 ^a	1.00 ^a

^a The following table gives the computed minimum values:

TUBING AND PIPE



SEAMLESS CARBON STEEL PIPE FOR HIGH-TEMPERATURE SERVICE

ASTM A106
CONTINUED



Wall Thickness, in.	Elongation in 2 in. min, per cent					
	Grade A		Grade B and C			
	Longitudinal	Transverse	Longitudinal	Transverse	Longitudinal	Transverse
5/16 (0.312)	35.00	25.00	30.00	16.50		
3/8 (0.281)	33.25	23.75	28.50	15.50		
1/4 (0.250)	31.50	22.50	27.00	14.50		
1/2 (0.219)	29.75		25.50			
3/16 (0.188)	28.00		24.00			
5/32 (0.156)	26.25		25.50			
1/8 (0.125)	24.50		21.00			
3/32 (0.094)	22.75		19.50			
1/16 (0.062)	21.00		18.00			

Note – The above table gives the computed minimum elongation values for each 1/32-in. decrease in wall thickness. Where the wall thickness lies between two values shown above, the minimum elongation value is determined by the following formula:

Grade	Direction of Test	Formula
A	Longitudinal	$E = 56t + 17.50$
A	Transverse	$E = 40t + 12.50$
B and C	Longitudinal	$E = 48t + 15.00$
B and C	Transverse	$E = 32t + 6.50$

Where:
E = elongation in 2 in. in per cent, and
actual thickness of specimen, in inches.

STEEL PIPE SPECIFICATIONS

Specification	A53 – NPS 1/8 – 26 STD, XS and XXS, ANSI Schedules 10 through 160					
Scope	Covers Seamless and Welded, Black and hot-dipped galvanized nominal (average) wall pipe for coiling, bending, flanging and other special purposes and is suitable for welding. Continuous-Welded pipe is not intended for flanging. Purpose for which pipe is intended should be stated on order.					
Permissible Variations in Wall Thickness	The minimum wall thickness at any point shall not be more than 12.5% under the nominal wall thickness specified.					
Chemical Requirements		C max %	Mn max %	P max %	S max %	
Seamless or ERW		0.25	0.95	0.05	0.06	
Grade A		0.30	1.20	0.05	0.06	
Grade B				0.08	0.06	
Continuous-weld						
Tensile Requirements			Continuous-Welded	Seamless and Electric-resistance-welded		Type
			Grade A	Grade B	F-CW	
Tensile Strength, min., psi			45,000	48,000	60,000	E-ERW
Yield Strength, min., psi			25,000	30,000	35,000	S-Smis

NOTE: This is summarized information from ASTM Standards and API Specification 5L. Please refer to the specific Standard or Specification for more details.

STEEL PIPE SPECIFICATIONS

Specification	A53 – NPS 1/8 – 26 STD, XS and XXS, ANSI Schedules 10 through 160 – continued
Permissible Variations in Weights Per Foot	Plus or Minus 10%
Permissible Variations in Outside Diameter	Outside Diameter at any point shall not vary from standard specified more than – <hr/> For NPS 1-1/2 and Smaller Sizes 1/32" under For NPS 2 and Larger Sizes 1% over 1% under
Lengths	Standard Weight Single Random – 16'-22': 5% may be jointers. If plain Ends – 5% may be 12'-16'. Double Random – Shortest Length – 22', minimum average for order – 35'. Extra Strong and Double Extra Strong Single Random – 12'-22': 5% may be 6'-12'. Double Random (XS and lighter) – Shortest Length 22', minimum aver for order – 35'. Lengths longer than single random with wall thickness heavier than XS subject to negotiation.

NOTE: This is summarized information from ASTM Standards and API Specification 5L. Please refer to the specific Standard or Specification for more details.



STEEL PIPE SPECIFICATIONS

Specification	A106 – NPS 1/8 – 48 ANSI Schedules to 160		
Scope	Covers SEAMLESS carbon steel nominal wall pipe for high-temperature service, suitable for bending, flanging and similar forming operations. NPS 1-1/2 and under may be either hot finished or cold drawn. NPS 2 and larger shall be hot finished unless otherwise specified. The minimum wall thickness at any point shall not be more than 12.5% under the nominal wall thickness specified.		
Permissible Variations in Wall Thickness			
Chemical Requirements	Grade A	Grade B	Grade C
Carbon, max. %	0.25	0.30	0.35
Manganese %	0.27 to 0.93	0.29 to 1.06	0.29 to 1.06
Phosphorus, max. %	0.025	0.025	0.025
Sulfur, max %	0.025	0.025	0.025
Silicon, min %	0.10	0.10	0.10
Tensile Requirements	Grade A	Grade B	Grade C
Tensile Strength, min., psi	48,000	60,000	70,000
Yield Strength, min., psi	30,000	35,000	40,000

NOTE: This is summarized information from ASTM Standards and API Specification 5L. Please refer to the specific Standard of Specification for more details.

STEEL PIPE SPECIFICATIONS

Specification	A106 – NPS 1/8 – 48 ANSI Schedules to 160 – continued																		
Hydrostatic Testing	Inspection test pressures produce a stress in the pipe wall equal to 60% of specified medium yield strength (SMYS) at room temperature. Maximum Pressures are not to exceed 2500 psi for NPS 3 and under, and 2800 psi for the larger sizes. Pressure is maintained for not less than 5 seconds.																		
Permissible Variations in Weights Per Foot	Weight of any length shall not vary more than 10% over and 3.5% under that specified. NOTE – NPS 4 and smaller – weighed in lots. Larger sizes – by length.																		
Permissible Variations in Outside Diameter	Outside Diameter at any point shall not vary from standard specified more than – <table border="1" data-bbox="476 680 631 1236"> <thead> <tr> <th>NPS</th> <th>Over</th> <th>Under</th> </tr> </thead> <tbody> <tr> <td>1-1/2 and smaller</td> <td>1/64"</td> <td>1/32"</td> </tr> <tr> <td>2-4</td> <td>1/32"</td> <td>1/32"</td> </tr> <tr> <td>5-8</td> <td>1/16"</td> <td>1/32"</td> </tr> <tr> <td>10-18</td> <td>3/32"</td> <td>1/32"</td> </tr> <tr> <td>20-26</td> <td>1/8"</td> <td>1/32"</td> </tr> </tbody> </table>	NPS	Over	Under	1-1/2 and smaller	1/64"	1/32"	2-4	1/32"	1/32"	5-8	1/16"	1/32"	10-18	3/32"	1/32"	20-26	1/8"	1/32"
NPS	Over	Under																	
1-1/2 and smaller	1/64"	1/32"																	
2-4	1/32"	1/32"																	
5-8	1/16"	1/32"																	
10-18	3/32"	1/32"																	
20-26	1/8"	1/32"																	
Lengths	Lengths required shall be specified on order. No "jointers", permitted unless otherwise specified. If no definite lengths are required, following practice applies: Single Random – 16' – 22'. 5% may be 12' – 16' Double Random – Minimum length 22', Minimum average 35'. 5% may be 16' – 22'.																		

NOTE: This is summarized information from ASTM Standards and API Specification 5L. Please refer to the specific Standard of Specification for more details.

STEEL PIPE SPECIFICATIONS

Specification	A252 – Piling Pipe												
Scope	Covers nominal (average) wall steel pipe piles of cylindrical shape and applies to pipe piles in which the steel cylinder acts as a permanent load-carrying member or as a shell to form cast-in-place concrete piles.												
Permissible Variations in Wall Thickness	Not more than 12.5% under the nominal wall thickness specified.												
Chemical Requirements	<p>Seamless and Welded Pipe:</p> <p>Open-hearth, Electric-furnace or Basic-oxygen</p> <p>Phosphorus Max. % 0.050</p>												
Tensile Requirements	<table border="1"> <thead> <tr> <th></th> <th>Grade 1</th> <th>Grade 2</th> <th>Grade 3</th> </tr> </thead> <tbody> <tr> <td>Tensile Strength, min., psi</td> <td>50,000</td> <td>60,000</td> <td>66,000</td> </tr> <tr> <td>Yield Point, min., psi</td> <td>30,000</td> <td>35,000</td> <td>45,000</td> </tr> </tbody> </table>		Grade 1	Grade 2	Grade 3	Tensile Strength, min., psi	50,000	60,000	66,000	Yield Point, min., psi	30,000	35,000	45,000
	Grade 1	Grade 2	Grade 3										
Tensile Strength, min., psi	50,000	60,000	66,000										
Yield Point, min., psi	30,000	35,000	45,000										
Hydrostatic Testing	None specified												

NOTE: This is summarized information from ASTM Standards and API Specification 5L. Please refer to the specific Standard of Specification for more details.

STEEL PIPE SPECIFICATIONS

Specification	A252 – Piling Pipe – continued						
Scope	Covers nominal (average) wall steel pipe piles of cylindrical shape and applies to pipe piles in which the steel cylinder acts as a permanent load-carrying member or as a shell to form cast-in-place concrete piles.						
Permissible Variations in Weights Per Foot	The weight of any length shall not vary more than 15% over or 5% under the weight specified. Each length shall be weighed specifically						
Permissible Variations in Outside Diameter	Shall not vary more than plus or minus 1% from the diameter specified.						
Lengths	<p>May be ordered in single or double random lengths or in uniform lengths:</p> <table border="0"> <tr> <td data-bbox="550 1071 570 1234">Single Random</td> <td data-bbox="550 897 570 1028">16' – 25', incl.</td> </tr> <tr> <td data-bbox="570 1071 591 1234">Double Random</td> <td data-bbox="570 777 591 1028">Over 25' (min. avg. of 35').</td> </tr> <tr> <td data-bbox="591 1071 612 1234">Uniform</td> <td data-bbox="591 682 612 1028">Plus or minus 1" on length specified.</td> </tr> </table>	Single Random	16' – 25', incl.	Double Random	Over 25' (min. avg. of 35').	Uniform	Plus or minus 1" on length specified.
Single Random	16' – 25', incl.						
Double Random	Over 25' (min. avg. of 35').						
Uniform	Plus or minus 1" on length specified.						

NOTE: This is summarized information from ASTM Standards and API Specification 5L. Please refer to the specific Standard of Specification for more details.

STEEL PIPE SPECIFICATIONS

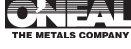
Specification	API 5L – NPS 1/8 – 26																		
Scope	Covers WELDED and SEAMLESS pipe suitable for use in conveying gas, water, and oil in both the oil and natural gas industries.																		
Permissible Variations in Wall Thickness	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 40%;"></th> <th style="width: 20%; text-align: center;">Grade A, B, A25</th> <th style="width: 20%; text-align: center;">X42 through X80</th> </tr> </thead> <tbody> <tr> <td>NPS 2-1/2 and smaller – Seamless and welded, %</td> <td style="text-align: center;">+20, -12.5</td> <td style="text-align: center;">+15, -12.5</td> </tr> <tr> <td>NPS 3 – Seamless and welded, %</td> <td style="text-align: center;">+18, -12.5</td> <td style="text-align: center;">+15, -12.5</td> </tr> <tr> <td>NPS 4 through 18 – Seamless and welded, %</td> <td style="text-align: center;">+15, -12.5</td> <td style="text-align: center;">+15, -12.5</td> </tr> <tr> <td>NPS 20 and larger – Welded, %</td> <td style="text-align: center;">+17.5, -10.0</td> <td style="text-align: center;">+19.5, -8.0</td> </tr> <tr> <td>NPS 20 and larger – Seamless, %</td> <td style="text-align: center;">+15.0, -12.5</td> <td style="text-align: center;">+17.5, -10.0</td> </tr> </tbody> </table>		Grade A, B, A25	X42 through X80	NPS 2-1/2 and smaller – Seamless and welded, %	+20, -12.5	+15, -12.5	NPS 3 – Seamless and welded, %	+18, -12.5	+15, -12.5	NPS 4 through 18 – Seamless and welded, %	+15, -12.5	+15, -12.5	NPS 20 and larger – Welded, %	+17.5, -10.0	+19.5, -8.0	NPS 20 and larger – Seamless, %	+15.0, -12.5	+17.5, -10.0
	Grade A, B, A25	X42 through X80																	
NPS 2-1/2 and smaller – Seamless and welded, %	+20, -12.5	+15, -12.5																	
NPS 3 – Seamless and welded, %	+18, -12.5	+15, -12.5																	
NPS 4 through 18 – Seamless and welded, %	+15, -12.5	+15, -12.5																	
NPS 20 and larger – Welded, %	+17.5, -10.0	+19.5, -8.0																	
NPS 20 and larger – Seamless, %	+15.0, -12.5	+17.5, -10.0																	
Chemical Requirements	Outlines chemical requirements for seamless and welded non-expanded and cold-expanded grades A25, A, B, X42, X46, X52, X56, X60, X65, X70 and X80.																		
Tensile Requirements	Lists minimum yield and tensile strength for all grades as well as a maximum tensile strength for X80. Maximum yield-to-tensile ratios outlined for cold-expanded pipe – may be waived when a fracture toughness requirement is specified.																		

NOTE: This is summarized information from ASTM Standards and API Specification 5L. Please refer to the specific Standard of Specification for more details.

STEEL PIPE SPECIFICATIONS

Specification	API 5L – NPS 1/8 – 26 – continued																			
Permissible Variations in Weights Per Foot	For each length of Standard Weight, Regular Weight, Extra Strong, and Double Extra Strong – Not more than plus 10%, minus 3.5%	For Special Plain End – Not more than plus 10% minus 5%. For Carload Lots – Not more than minus 1.75%																		
Permissible Variations in Outside Diameter	Outside Diameter at any point shall not vary from standard specified More than:	<table border="0"> <tr> <td>Sizes</td> <td>Over</td> <td>Under</td> </tr> <tr> <td>NPS 1-1/2 and smaller</td> <td>1/64"</td> <td>1/32"</td> </tr> <tr> <td>NPS 2 through 4</td> <td>1%</td> <td>1% (Buttweld Only)</td> </tr> <tr> <td>NPS 2 through 18</td> <td>.75%</td> <td>.75%</td> </tr> <tr> <td>NPS 20 through 26</td> <td>1%</td> <td>1%</td> </tr> <tr> <td>Non-expanded</td> <td></td> <td></td> </tr> </table>	Sizes	Over	Under	NPS 1-1/2 and smaller	1/64"	1/32"	NPS 2 through 4	1%	1% (Buttweld Only)	NPS 2 through 18	.75%	.75%	NPS 20 through 26	1%	1%	Non-expanded		
Sizes	Over	Under																		
NPS 1-1/2 and smaller	1/64"	1/32"																		
NPS 2 through 4	1%	1% (Buttweld Only)																		
NPS 2 through 18	.75%	.75%																		
NPS 20 through 26	1%	1%																		
Non-expanded																				
Lengths	<table border="0"> <tr> <td>Threaded & Coupled Pipe</td> <td>Shortest Length in Entire Shipment</td> <td>Shortest Length in 95% of Entire Shipment</td> <td>Minimum Average Length Entire Shipment</td> </tr> <tr> <td>Single Random</td> <td>16'-0"</td> <td>18'-0"</td> <td></td> </tr> <tr> <td>Double Random</td> <td>22'-0"</td> <td></td> <td>35'0"</td> </tr> </table>	Threaded & Coupled Pipe	Shortest Length in Entire Shipment	Shortest Length in 95% of Entire Shipment	Minimum Average Length Entire Shipment	Single Random	16'-0"	18'-0"		Double Random	22'-0"		35'0"							
Threaded & Coupled Pipe	Shortest Length in Entire Shipment	Shortest Length in 95% of Entire Shipment	Minimum Average Length Entire Shipment																	
Single Random	16'-0"	18'-0"																		
Double Random	22'-0"		35'0"																	

NOTE: This is summarized information from ASTM Standards and API Specification 5L. Please refer to the specific Standard of Specification for more details.



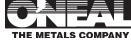
STAINLESS AND HEAT RESISTING STEELS

Ladle Chemical Ranges and Limits

Chemical Composition, percent, Maximum unless otherwise shown

Type Number	C	Mn	P	S	Si	Cr	Ni	Mo	Other Elements
201	0.15	5.50/7.50	0.060	0.060	1.00	16.00/18.00	3.50/5.50		N 0.25
202	0.15	7.50/10.00	0.060	0.030	1.00	17.00/19.00	4.00/6.00		N 0.25
205	.012/0.25	14.00/15.50	0.060	0.030	1.00	16.50/18.00	1.00/1.75		N 0.32/0.40
301	0.15	2.00	0.045	0.030	1.00	16.00/18.00	6.00/8.00		
302	0.15	2.00	0.045	0.030	1.00	17.00/19.00	8.00/10.00		
302Cu	0.08	2.00	0.045	0.030	1.00	17.00/19.00	8.00/10.00		Cu 3.00/4.00
302B	0.15	2.00	0.045	0.030	2.00/3.00	17.00/19.00	8.00/810.00		
303	0.15	2.00	0.20	0.15 min.	1.00	17.00/19.00	8.00/10.00	0.060*	
303 Se	0.15	2.00	0.20	0.060	1.00	17.00/19.00	8.00/10.00		Se 0.15 min.
304	0.08	2.00	0.045	0.030	1.00	18.00/20.00	8.00/10.50		
304L	0.030	2.00	0.045	0.030	1.00	18.00/20.00	8.00/12.00		
304N	0.08	2.00	0.045	0.030	1.00	18.00/20.00	8.00/10.50		
305	0.12	2.00	0.045	0.030	1.00	17.00/19.00	10.50/13.00		N 0.10/0.16*
308	0.08	2.00	0.045	0.030	1.00	19.00/51.00	10.00/12.00		
309	0.20	2.00	0.045	0.030	1.00	22.00/24.00	12.00/15.00		
309S	0.08	2.00	0.045	0.030	1.00	22.00/24.00	12.00/15.00		

*Also available with .16/.30N



TUBING AND PIPE

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