EARLE M. JORGENSEN COMPANY

REFERENCE BOOK

ALLOY • ALUMINUM • BRASS • BRONZE
CARBON • CAST IRON • CHROME • NICKEL
STAINLESS • SUPER ALLOY • TITANIUM
BAR • PIPE • PLATE • SHEET • TUBE

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SECTION K

TUBING and PIPE

The various tubular products have been arranged in this section according to the primary end uses for which they are manufactured:

MECHANICAL TUBING

Commercial and Aircraft Quality.

PIPE —— Steel and Aluminum

STRUCTURAL STEEL TUBING

Square and Rectangular

AIRCRAFT STEEL TUBING

HYDRAULIC LINE TUBING

Refer to the index tabs following this page to locate information regarding the various classes of tubular products, including sizes, weights, and technical data.

This arrangement is presented to make it easy for you to determine the availability of tubing or pipe for a particular specification. However, it is often possible to substitute an item in one class for a similar item in another class when the latter is not available. For example, pipe and structural tubing may often be inter-changed, or a hydraulic tube may be used for a mechanical application. For critical applications, though, especially when governed by the specifications, care should be taken to insure that the tube ordered possesses the necessary properties.

Sizes listed herein are those normally available from stock at the time of publication. However, our stocks are continually being adjusted to reflect changing demands. The item you need may have been added to stock after this book went to press.

If the particular item you need cannot be supplied from stock immediately, we will endeavor to obtain it for you, either locally or from another part of the country. With our special knowledge of tubing sources and numerous contacts in the industry, we are in a good position to locate the hard-to-get items you need. Use this EMJ service and your time will be free for other things.

Also, as agents of all leading tubing mills, we can expedite production and delivery of material direct from the mill. This includes not only special sizes, but also special analyses and grades such as the following:

12 Chrome Series
A 286
N 155
19-9 DL
19-9 DX
17-4
17-7
Alloy 718
Alloy 400
Alloy K-500
Alloy 600
Alloy X-750
Leaded Steels
Resulphurized Steels
Alloy 20Cb-3

We invite your inquiries regarding all your tubing needs.

ROUND STEEL AND ALUMINUM MECHANICAL AND STRUCTURAL TUBING

Mechanical tubing is used for a wide variety of mechanical purposes as opposed to structural and pressure applications. It is generally produced to meet specific end use requirements which may be static or dynamic in nature.

It is available in a wide range of sizes, shapes, analyses, and mechanical properties. Compared with pipe, it is produced to closer tolerances and better finishes.

SIZES AND WEIGHTS OF MECHANICAL AND STRUCTURAL TUBING

DESCRIPTION OF INDIVIDUAL GRADES

KEY TO ABBREVIATIONS AND SYMBOLS USED ON THE FOLLOWING PAGES

Four-digit numbers (e.g., 1018, 4130) represent analysis designations of carbon and alloy seamless tubing. All such items are Cold Drawn except when prefixed HF.

Three-digit numbers (e.g., 304, 321) represent analysis designations of stainless steels. Stainless tubes are seamless except where the designation includes WD, in which case they are welded and drawn.

Four-digit number followed by temper designations (e.g., 3003-O, 2024-T3) represent alloy and temper of aluminum.

CDBW —— Cold Drawn Butt Welded
CREW —— Cold Rolled Electric Welded
HREW —— Hot Rolled Electric Welded
HF —— Hot Finished
HT —— Heat Treated
HB —— Hollow Bar
SSID —— Drawn Over Mandrel, Special Smooth ID
STRUCT —— Structural
WD —— Welded and Drawn, Stainless
DOM —— Drawn Over Mandrel, 520/1020/1026

NOTE REGARDING WEIGHTS

All weights shown herein are theoretical, and actual weight may vary according to tolerances and chemical composition. Therefore, weights should be used for estimating purposes only.

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
1/32	36	.004	.023	.0012	.0004			321	
	——	.006	.020	.0016	.0006			321 347	
	34	.007	.017	.0018	.0006			347	
	33	.008	.015	.0020	.0007			321	
	31	.010	.011	.0023	.0008			304 321	
1/16	——	.006	.051	.0036	.0013			321	
	33	.008	.047	.0047	.0017			304 321	
	31	.010	.043	.0057	.0020			304 316 321 347	
	30	.012	.038	.0065	.0023			304 321	
	28	.014	.035	.0073	.0026			304 321	
	27	.016	.031	.0080	.0028			304 316 321	
	26	.018	.027	.0087	.0031			321	
	25	.020	.023	.0092	.0032			304 316 321	
	24	.022	.019	.0096	.0034			321	
	22	.028	.006	.0105	.0037			304 316	
.065	22	.028	.008	.0111	.0039			304	
.083	31	.010	.063	.0078	.0027			321	
1/8	——	.006	.113	.0076	.0026			321	
	31	.010	.105	.0123	.0043			347	
	30	.012	.101	.0145	.0051			304	
	27	.016	.093	.0186	.0065			304 316	
	25	.020	.085	.0224	.0078			304 304WD 316 321	6061-T6
	24	.022	.081	.0242	.0085	1018/1026			
	22	.028	.069	.0290	.0101	1018/1026		304 304WD 316 321	3003-O
	21	.032	.061	.0318	.0112	1018/1026		321	
	20	.035	.055	.0336	.0115	1018/1026	4130	304 304WD 316	5052-O
	18	.049	.027	.0398	.0140	1018/1026		304 316	

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
5/32	27	.016	.124	.0240	.0084			304 321	
	22	.028	.100	.0384	.0135	1018/1026		304	
	20	.035	.086	.0452	.0159	1018/1026			
	18	.049	.058	.0560	.0197	1018/1026			
3/16	27	.016	.156	.0294	.0103			304 304WD	
	26	.018	.152	.0327	.0115	1018/1026			
	25	.020	.148	.0359	.0126			304 316WD	
	24	.022	.144	.0390	.0138	1018/1026			2024-T3 3003-H14
	23	.025	.138	.0433	.0150				6061-T6
	22	.028	.131	.0478	.0168	1018/1026	4130	304 304WD 316	2024-T3 3003-O 5052-O 6061-T6
	21	.032	.124	.0533	.0188	1018/1026			2024-T3
	20	.035	.118	.0572	.0201	1018/1026	4130	304 316	2024-T3 3003-H14 5052-O 6061-T6
	19	.042	.104	.0655	.0230	1018/1026			
	18	.049	.090	.0727	.0256	1018/1026	4130	304 316	2024-T3 6061-T6
	17	.058	.072	.0805	.0283	1018/1026			
	16	.065	.058	.0854	.0300	1018/1026	4130	304	
	14	.083	.022	.0929	.0326	1018/1026			
7/32	27	.016	.187	.0346	.0122			304WD	
	25	.020	.179	.0425	.0149			304WD 321	
	20	.035	.149	.0688	.0242	1018/1026			
	18	.049	.121	.0888	.0312	1018/1026			
1/4	——	.006	.238	.0156	.0055			304	
	31	.010	.230	.0256	.0090			347	
	27	.016	.218	.0400	.0140				6061-T6
	25	.020	.210	.0491	.0173			304 304WD 316	2024-T3 5052-O 6061-O 6061-T6
	24	.022	.206	.0536	.0189	1018/1026			3003-H14 5052-O
	23	.025	.200	.0598	.0210	1018/1026			
	22	.028	.194	.0664	.0235	1018/1026 DOM	4130	304 304WD 316	2024-T3 3003-H14 3003-O 5052-O 6061-T4 6061-T6
	21	.032	.186	.0745	.0263	1018/1026 DOM			2024-T3

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
1/4 (Cont.)	20	.035	.180	.0804	.0281	1018/1026 DOM	4130	304 304WD 316 316WD 321	2024-T3 3003-H14 3003-O 5052-O 6061-T4 6061-T6
	19	.042	.166	.0933	.0328	1018/1026			
	18	.049	.152	.1052	.0371	1018/1026 DOM	4130	304 304WD 316 316WD	2024-T3 5052-O 6061-T6
	17	.058	.134	.1189	.0419	1018/1026 DOM	4130		2024-T3 6061-T6
	——	.060	.130	.1218	.0429				2024-T3
	16	.065	.120	.1284	.0453	1018/1026 DOM	4130	304 304WD 316 347	2024-T3 6061-T6
	15	.072	.106	.1369	.0481	1018/1026	4130		
	14	.083	.084	.1480	.0523	1018/1026 DOM		304 316	2024-T3
	13	.095	.060	.1573	.0552	1018/1026		304 316	
	12	.109	.032	.1641	.0576	1018/1026			
9/32	18	.049	.183	.1214	.0426	1018/1026			
5/16	25	.020	.273	.0626	.0214			304 304WD 316	3003-H14 5052-O 6061-T4
	24	.022	.268	.0684	.0240	1018/1026			
	23	.025	.263	.0769	.0270	1018/1026	4130		
	22	.028	.257	.0852	.0300	1018/1026 DOM	4130	304WD 316WD 321WD 347	3003-H14 5052-O 6061-O 6061-T4 6061-T6
	21	.032	.249	.0960	.0337	1018/1026 DOM			
	20	.035	.243	.1039	.0366	1018/1026 DOM	4130	304 304WD 316 347	2024-O 2024-T3 3003-H14 3003-O 5052-O 6061-O 6061-T6
	19	.042	.229	.1216	.0427	1018/1026			
	18	.049	.215	.1382	.0487	1018/1026 DOM	4130	304WD 316	2024-T3 5052-O 6061-T6
	17	.058	.192	.1580	.0561	1018/1026 DOM	4130		2024-T3 6061-T6

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
5/16	1/6	.063	.188	.1677	.0583				6061-T6
(Cont.)	16	.065	.182	.1722	.0594	1018/1026 DOM	4130	304 304WD 316	
	——	.075	.163	.1906	.0674		4130		2024-T3
	14	.083	.147	.2039	.0716	1018/1026	4130		
	13	.095	.122	.2212	.0777	1018/1026	4130		
	12	.109	.095	.2375	.0834	1018/1026			
	11	.120	.073	.2473	.0869	1018/1026			
.322	——	.070	.182	.2242	.0787		4130HT		
11/32	21	.032	.280	.1066	.0374	1018/1026			
	18	.049	.246	.1544	.0542	1018/1026			
3/8	31	.010	.355	.0390	.0137			304 347	
	25	.020	.335	.0758	.0267			304WD 347WD	5052-O 6061-T6
	24	.022	.331	.0829	.0292	1018/1026 DOM			3003-H14 5052-O
	23	.025	.325	.0935	.0328	1018/1026		304WD	
	22	.028	.319	.1038	.0366	1018/1026 DOM	4130	304 304WD 316 316WD 321WD	2024-T3 3003-H14 5052-O 6061-T4 6061-T6
	21	.032	.311	.1172	.0413	1018/1026 DOM		316	3003-H14
	20	.035	.305	.1271	.0449	1018/1026	4130	304	2024-O
						DOM CREW		304WD 316 316WD 321	2024-T3 3003-H14 3003-O 5052-O 6061-O 6061-T4 6061-T6
	19	.042	.293	.1494	.0525	DOM	4130		
	18	.049	.277	.1706	.0602	1018/1026 DOM CREW STRUCT	4130	304 304WD 316 316WD	2024-T3 5052-O 6061-T6
	17	.058	.259	.1964	.0694	1018/1026 DOM	4130	304	2024-T3 6061-T6
	16	.065	.245	.2152	.0755	1018/1026 DOM CDBW STRUCT	4130	304 304WD 316 316WD 347	2024-T3 6061-T6
	15	.072	.231	.2330	.0818	1018/1026			
	14	.083	.209	.2588	.0918	1018/1026 DOM	4130	316	2024-T3 6061-T6
	——	.090	.195	.2739	.0968		4130		2024-T3
	13	.095	.185	.2841	.0998	1018/1026 DOM	4130	304 316	

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
3/8	12	.109	.157	.3097	.1088	1018/1026		304	6061-T6
(Cont.)	11	.120	.135	.3268	.1148	1018/1026	4130	304 316 321	
	10	.134	.107	.3449	.1211	1018/1026		304	
13/32	20	.035	.336	.1389	.0488	1018/1026			
	18	.049	.308	.1868	.0656	1018/1026			
	16	.065	.276	.2367	.0831	1018/1026			
	14	.083	.240	.2863	.1005	1018/1026			
	13	.095	.216	.3155	.1108	1018/1026			
	11	.120	.166	.3665	.1287	1018/1026			
.378	1/16	.062	.254	.2092	.0735		4130		
.385	15	.072	.242	.2407	.0854		4130		
	——	.100	.185	.3044	.1069		4130HT		
7/16	33	.008	.421	.0367	.0129			321	
	25	.020	.398	.0893	.0314			304WD	
	24	.022	.393	.0977	.0343	1018/1026			
	23	.025	.388	.1103	.0387	1018/1026		304WD	
	22	.028	.381	.1126	.0431	1018/1026 DOM	4130	304WD	6061-T6
	21	.032	.374	.1388	.0487	1018/1026 DOM			
	20	.035	.367	.1506	.0530	1018/1026 DOM	4130	304WD 316 347	2024-T3 3003-O 5052-O 6061-T6
	19	.042	.354	.1776	.0624	1018/1026	4130		
	18	.049	.340	.2036	.0714	1018/1026 DOM	4130	304 304WD 316	2024-T3 6061-T6
	17	.058	.322	.2354	.0826	1018/1026 DOM	4130		2024-T3
	16	.065	.307	.2589	.0908	1018/1026 DOM	4130	304 304WD 316	2024-T3 6061-T6
	15	.072	.294	.2814	.0988		4130		
	14	.083	.272	.3147	.1110	1018/1026 DOM	4130	304	2024-T3
	——	.088	.263	.3289	.1155		4130		
	——	.090	.258	.3345	.1178				2024-T3
	13	.095	.247	.3480	.1224	1018/1026 DOM	4130	304 321	2024-T3
	12	.109	.220	.3830	.1345	1018/1026			
	11	.120	.197	.4075	.1431	1018/1026	4130	321	6061-T6
	——	.129	.180	.4257	.1495		4130HT		
	10	.134	.169	.4351	.1528	1018/1026	4130		
	5/32	.156	.125	.4698	.1650	1018/1026			
.448	15	.072	.304	.2891	.1015		4130HT		
	——	.102	.245	.3769	.1324		4130HT		

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
1/2	25	.020	.460	.1025	.0356				3003-H14 6061-O
	24	.022	.456	.1123	.0394	1018/1026			3003-H14 5052-O 6061-T6
	22	.028	.444	.1411	.0496	1018/1026 DOM	4130	304 304WD 316 321 347	2024-T3 3003-H14 5052-O 6061-T4 6061-T6
	21	.032	.436	.1599	.0562	1018/1026 DOM			
	20	.035	.430	.1738	.0612	1018/1026 DOM CREW	4130	304 304WD 316 316WD	2024-T3 3003-H14 3003-O 5052-O 6061-O 6061-T4 6061-T6
	19	.042	.416	.2054	.0721	1018/1026		321WD	5052-O 6061-T4
	18	.049	.402	.2360	.0829	1018/1026 DOM CREW HREW	4130	304 304WD 316WD	2024-T3 3003-O 5052-O 6061-O 6061-T4 6061-T6
	17	.058	.384	.2738	.0962	1018/1026 DOM	4130		2024-T3 6061-O 6061-T6
	16	.065	.370	.3020	.1061	1018/1026 DOM CREW HREW	4130	304 304WD 316 316WD	2024-T3 3003-H14 5052-O 6061-T6
	15	.072	.356	.3291	.1156	1018/1026	4130	347	
	14	.083	.334	.3696	.1298	1018/1026 DOM	4130	304 316	2024-T3 6061-T6
	13	.095	.310	.4109	.1443	1018/1026 DOM	4130	304 316 347WD	2024-T3 6061-T6
	12	.109	.282	.4552	.1599	1018/1026	4130	304	
	11	.120	.260	.4870	.1710	1018/1026 DOM	4130	304 316	6061-T6
	——	.131	.238	.5163	.1813		4130HT		
	10	.134	.232	.5238	.1840	1018/1026	4130	304	
	5/32	.156	.187	.5731	.2013	1018/1026	4130	321	
	3/16	.188	.125	.6264	.2200	1018/1026	4130		
17/32	16	.065	.401	.3237	.1137	1018/1026			
	14	.083	.365	.3971	.1395	1018/1026			
	13	.095	.341	.4424	.1554	1018/1026			
	11	.120	.291	.5267	.1850	1018/1026			

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
9/16	24	.022	.519	.1271	.0446	1018/1026			
	23	.025	.512	.1436	.0504	1018/1026			
	22	.028	.506	.1600	.0562	1018/1026		304 304WD	
	21	.032	.499	.1815	.0637	1018/1026			
	20	.035	.492	.1974	.0696	1018/1026 DOM	4130	304 304WD 316	2024-T3
	19	.042	.479	.2337	.0821	1018/1026		321	
	18	.049	.464	.2690	.0948	1018/1026 DOM	4130	304WD 316	2024-T3
	17	.058	.447	.3128	.1099	1018/1026		321	
	16	.065	.432	.3457	.1218	1018/1026 DOM	4130	304WD 316	2024-T3
	14	.083	.396	.4255	.1494	1018/1026 DOM	4130	321	
	13	.095	.372	.4748	.1667	1018/1026 DOM	4130	304	
	12	.109	.344	.5285	.1856	1018/1026	4130		
	11	.120	.322	.5677	.1994	1018/1026	4130	304 321	
	1/8	.125	.313	.5847	.2060	1018/1026 DOM		304 321	2024-T3
	10	.134	.295	.6140	.2156	1018/1026	4130HT		
	5/32	.156	.250	.6781	.2381	1018/1026	4130	321	
	3/16	.188	.188	.7529	.2644	1018/1026		304 321	
	7/32	.219	.125	.8046	.2826		4130		
.572	——	.071	.429	.3799	.1334		4130HT		
	——	.101	.370	.5081	.1784		4130HT		

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
5/8	31	.010	.605	.0657	.0231			304WD	
	27	.016	.593	.1041	.0366				5052-O
	24	.022	.581	.1417	.0498	1018/1026			3003-H14
	23	.025	.575	.1602	.0563	1018/1026			
	22	.028	.569	.1785	.0627	1018/1026 DOM	4130	316WD	2024-T3 3003-H14 5052-O 6061-T6
	21	.032	.561	.2027	.0712	1018/1026			
	20	.035	.555	.2205	.0775	1018/1026 DOM CREW	4130	304 304WD 316	2024-T3 3003-H14 5052-O 6061-O 6061-T4 6061-T6
	19	.042	.541	.2615	.0918	1018/1026			5052-O
	18	.049	.527	.3014	.1060	1018/1026 DOM CREW HREW	4130 4340	304 304WD 316 316WD	2024-T3 3003-H14 5052-O 6061-T4 6061-T6
	17	.058	.509	.3512	.1234	1018/1026 DOM	4130		2024-T3 5052-O 6061-T6
	16	.065	.495	.3888	.1367	1018/1026 DOM CREW	4130	304 304WD 316 316WD 321	2024-T3 3003-H14 3003-O 5052-O 6061-T6
	15	.072	.471	.4252	.1493	1018/1026			
	14	.083	.459	.4805	.1693	1018/1026 DOM HREW	4130	304 316	2024-T3 6061-T6
	13	.095	.435	.5377	.1888	1018/1026 DOM	4130	304 304WD	6061-T6
	12	.109	.407	.6007	.2110	1018/1026 DOM			
	11	.120	.385	.6472	.2273	1018/1026 DOM	4130	304 316	
	1/8	.125	.375	.6675	.2344	DOM	4130		2024-T3 6061-T6
	10	.134	.357	.7027	.2468	1018/1026 DOM		304	
	5/32	.156	.312	.7814	.2744	1018/1026 DOM	4130		
	3/16	.188	.250	.8774	.3081	1018/1026 DOM	4130	304 316 321	
	7/32	.219	.187	.9496	.3335	1018/1026 DOM		321	
	1/4	.250	.125	1.001	.3516	1018/1026			

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
.635	15	.072	.492	.4329	.1520		4130HT		
11/16	25	.020	.648	.1427	.0501			304WD	
	22	.028	.631	.1974	.0693	1018/1026		304WD 321	
	20	.035	.617	.2441	.0857	1018/1026		304 304WD	
	18	.049	.589	.3344	.1174	1018/1026 DOM		304WD	
	17	.058	.571	.3902	.1370	1018/1026			
	16	.065	.557	.4325	.1519	1018/1026 DOM	4130	304WD	
	14	.083	.522	.5363	.1883	1018/1026 DOM		304	
	13	.095	.497	.6017	.2113	1018/1026 DOM		321	
	12	.109	.469	.6740	.2367	1018/1026			
	11	.120	.448	.7279	.2556	1018/1026	4130	304 321	
	1/8	.125	.438	.7508	.2594	1018/1026			
	10	.134	.419	.7928	.2784	1018/1026			
	5/32	.156	.375	.8864	.3113	1018/1026	4130		
	3/16	.188	.312	1.004	.3526	1018/1026	4130	321	
	7/32	.219	.250	1.097	.3853	1018/1026			
3/4	27	.016	.718	.1254	.0440				3003-H14
	25	.020	.710	.1559	.0548				5052-O 6061-O 6061-T6
	24	.022	.706	.1711	.0601	1018/1026			3003-H14
	23	.025	.700	.1936	.0680	1018/1026			
	22	.028	.694	.2159	.0758	1018/1026 DOM	4130	304 304WD	2024-T3 3003-H14 5052-O 6061-T6
	21	.032	.686	.2425	.0862	1018/1026			

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
3/4 (cont.)	20	.035	.680	.2673	.0938	1018/1026 DOM CREW	4130	304 304WD 316 316WD	2024-T3 3003-H14 3003-O 5052-O 6061-O 6061-T4 6061-T6
	19	.042	.666	.3176	.1115	1018/1026	4130		
	18	.049	.652	.3668	.1288	1018/1026 DOM CREW	4130	304 304WD 316 316WD 321 321WD 347WD	2024-T3 3003-H14 3003-O 5052-O 6061-O 6061-T4 6061-T6
	17	.058	.643	.4287	.1506	1018/1026 DOM	4130		2024-T3 3003-H14 6061-O 6061-T6
	1/16	.062	.626	.4556	.1600	CREW			3003-O
	16	.065	.620	.4755	.1670	1018/1026 DOM CREW HREW	4130	304 304WD 316 316WD 347	2024-T3 3003-H14 3003-O 5052-O 6061-O 6061-T6
	14	.083	.584	.5913	.2077	1018/1026 DOM HREW	4130	304 316 316WD	2024-T3 3003-H14 6061-T6
	13	.095	.560	.6646	.2334	1018/1026 DOM HREW	4130	304 316	2024-T3 6061-T6
	12	.109	.532	.7462	.2621	1018/1026 DOM		347	
	11	.120	.510	.8074	.2846	1018/1026 DOM HREW CDBW	4130	304 316 347	2024-T3
	1/8	.125	.500	.8344	.2930	DOM		321	6061-T6
	10	.134	.482	.8816	.3096	1018/1026 DOM	4130	304	
	5/32	.156	.437	.9897	.3476	1018/1026 DOM CDBW	4130	304 321	
	3/16	.188	.375	1.128	.3962	1018/1026 DOM CDBW	4130	304 316 321	
	7/32	.219	.313	1.242	.4362	1018/1026 DOM	4130		
	1/4	.250	.250	1.335	.4689	1018/1026	4130	321	

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
13/16	22	.028	.757	.2347	.0824	1018/1026			
	21	.032	.749	.2669	.0937	1018/1026			
	20	.035	.742	.2908	.1021	1018/1026			
	18	.049	.714	.3998	.1404	1018/1026 DOM		304	
	17	.058	.697	.4677	.1643	1018/1026			
	16	.065	.682	.5193	.1824	1018/1026 DOM	4130		
	14	.083	.647	.6471	.2273	1018/1026	4130		
	13	.095	.622	.7285	.2558	1018/1026 DOM	4130		
	12	.109	.594	.8195	.2878	1018/1026 DOM	4130		
	11	.120	.572	.8881	.3120	1018/1026 DOM	4130		
	10	.134	.544	.9717	.3413	1018/1026 DOM			
	5/32	.156	.500	1.095	.3846	1018/1026 DOM			
	3/16	.188	.437	1.255	.4408	1018/1026 DOM			
	7/32	.219	.375	1.389	.4878	1018/1026 DOM			
	1/4	.250	.312	1.503	.5279	1018/1026			
7/8	24	.022	.831	.2004	.0704	1018/1026			
	22	.028	.819	.2533	.0890	1018/1026 DOM	4130		5052-O
	21	.032	.811	.2881	.1012	1018/1026			6061-T6
	20	.035	.805	.3140	.1112	1018/1026 DOM CREW	4130	304 304WD 316	2024-T3 3003-H14 5052-O 6061-T4 6061-T6
	19	.042	.791	.3737	.1312	1018/1026			
	18	.049	.777	.4323	.1530	1018/1026 DOM CREW	4130 4130HT	304 316	2024-T3 3003-H14 5052-O 6061-T4
	17	.058	.759	.5061	.1777	1018/1026	4130		2024-T3 3003-H14 6061-O 6061T6
	16	.065	.745	.5623	.1979	1018/1026 DOM CREW HREW	4130	304 304WD 316 321WD	2024-T3 3003-H14 3003-O 6061-T6
	15	.072	.731	.6175	.2169	1018/1026			

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See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
7/8 (cont.)	14	.083	.709	.7021	.2466	1018/1026 DOM CREW HREW	4130	304 316	
	13	.095	.685	.7914	.2795	1018/1026 DOM CDBW	4130	304 316	2024-T3 6061-T6
	12	.109	.657	.8917	.3132	1018/1026 DOM		304	
	11	.120	.635	.9676	.3398	1018/1026 DOM HREW	4130	304 316 321	
	1/8	.125	.625	1.001	.3516	1018/1026 DOM CDBW			
	10	.134	.607	1.060	.3723	1018/1026 DOM			
	5/32	.156	.562	1.198	.4207	1018/1026 DOM CDBW	4130		
	3/16	.188	.500	1.379	.4843	1018/1026 DOM	4130	304 316 321	
	7/32	.219	.437	1.534	.5387	1018/1026	4130		
	1/4	.250	.375	1.669	.5862	1018/1026	4130		
	9/32	.281	.313	1.783	.6262	1018/1026			
	5/16	.313	.250	1.879	.6599	1018/1026			
15/16	22	.028	.881	.2721	.0956	1018/1026			
	21	.032	.874	.3096	.1087	1018/1026			
	20	.035	.867	.3375	.1185	1018/1026 DOM			
	19	.042	.541	.2615	.0918	1018/1026			5052-O
	18	.049	.839	.4652	.1634	1018/1026		321	
	17	.058	.822	.5451	.1914	1018/1026			
	16	.065	.807	.6060	.2128	1018/1026 DOM			
	14	.083	.772	.7579	.2662	1018/1026			
	13	.095	.748	.8553	.3004	1018/1026			
	12	.109	.719	.9651	.3389	1018/1026			
	11	.120	.697	1.048	.3681	1018/1026	4130		
	10	.134	.669	1.151	.4042	1018/1026			
	5/32	.156	.625	1.303	.4576	1018/1026 DOM			
	3/16	.188	.562	1.506	.5289	1018/1026			
	7/32	.219	.500	1.682	.5907	1018/1026	4130		
	5/16	.313	.313	2.089	.7337	1018/1026			

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
.953	——	.114	.725	1.021	.3586		4130HT		
1	27	.016	.968	.1681	.0590				6061-O 6061-T4
	25	.020	.960	.2093	.0735				6061-O 6061-T6
	24	.022	.956	.2298	.0807	1018/1026			5052-O 6061-T4
	23	.025	.950	.2603	.0914	1018/1026			6061-T6
	22	.028	.944	.2907	.1021	1018/1026	4130		3003-H14 5052-O 6061-T4
	21	.032	.936	.3308	.1162	1018/1026			
	20	.035	.930	.3607	.1275	1018/1026 DOM CREW	4130	304 304WD 316 316WD	2024-T3 3003-H14 5052-O 6061-T4 6061-T6
	19	.042	.916	.4297	.1509				6061-T4 6061-T6
	18	.049	.902	.4977	.1754	1018/1026 DOM CREW	4130	304 304WD 316	2024-T3 3003-H14 3003-O 5052-O 6061-O 6061-T4 6061-T6
	17	.058	.884	.5835	.2060	1018/1026 DOM	4130		2024-T3 3003-H14 6061-T6
	16	.065	.870	.6491	.2295	1018/1026 DOM CREW HREW	4130	304 304WD 316 316WD 347WD	2024-O 2024-T3 3003-H14 3003-O 5052-O 6061-O 6061-T4 6061-T6
	15	.072	.856	.7136	.2506	1018/1026			
	14	.083	.834	.8129	.2866	1018/1026 DOM CREW HREW	4130	304 304WD 316	2024-O 2024-T3 6061-T6
	13	.095	.810	.9182	.3244	1018/1026 DOM HREW	4130	304 316 321 347	2024-T3 6061-T6
	12	.109	.782	1.037	.3642	1018/1026 DOM		304	
	11	.120	.760	1.128	.3978	1018/1026 DOM CDBW HREW	4130	304 304WD 316 321 347	2024-T3 6061-O

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
1 (Cont.)	1/8	.125	.750	1.168	.4102	1018/1026 DOM CDBW			6061-O 6061-T6
	10	.134	.732	1.239	.4351	1018/1026 DOM	4130		
	5/32	.156	.687	1.406	.4961	1018/1026 DOM	4130		2024-T3
	3/16	.188	.625	1.630	.5752	1018/1026 DOM	4130	304 316 321	2024-T3 6061-T6
	7/32	.219	.562	1.827	.6416	1018/1026 DOM	4130	347	
	1/4	.250	.500	2.003	.7035	1018/1026 DOM	4130	304 316	6061-T6
	9/32	.281	.438	2.158	.7579	1018/1026 DOM			
	5/16	.313	.375	2.297	.8067	1018/1026 DOM		321	
	3/8	.375	.250	2.503	.8791	1018/1026		304	
1 1/16	22	.028	1.006	.3095	.1087	1018/1026			
	21	.032	.999	.3524	.1238	1018/1026			
	20	.035	.992	.3843	.1350	1018/1026		304	
	18	.049	.964	.5306	.1863	1018/1026 DOM		304WD	
	17	.058	.946	.6225	.2186	1018/1026 DOM			
	16	.065	.932	.6928	.2433	1018/1026 DOM	4130	316	
	14	.083	.897	.8687	.3051	1018/1026 DOM			
	13	.095	.872	.9821	.3449	1018/1026	4130		
	12	.109	.844	1.111	.3902	1018/1026 DOM			
	11	.120	.822	1.209	.4246	1018/1026 DOM CDBW	4130		
	10	.134	.795	1.330	.4671	1018/1026			
	5/32	.156	.750	1.511	.5307	1018/1026 DOM		304	
	3/16	.188	.687	1.757	.6171	1018/1026 DOM CDBW	4130		
	7/32	.219	.625	1.974	.6933	1018/1026 DOM	4130 4340		
	1/4	.250	.562	2.171	.7625	1018/1026 DOM			
	9/32	.281	.500	2.347	.8243	1018/1026	4130		
	5/16	.313	.437	2.507	.8805	1018/1026			
	3/8	.375	.312	2.755	.9676	1018/1026			

ROUND MECHANICAL TUBING

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
1 1/8	22	.028	1.069	.3280	.1152	1018/1026			
	21	.032	1.061	.3735	.1312	1018/1026			
	20	.035	1.055	.4074	.1438	1018/1026 DOM CREW	4130	304 304WD 316	2024-T3 6061-T6
	18	.049	1.027	.5631	.1989	1018/1026 DOM CREW	4130	304 304WD 316WD	2024-T3 6061-T6
	17	.058	1.009	.6609	.2321	1018/1026 DOM	4130		3003-H14 6061-T6
	16	.065	.995	.7359	.2601	1018/1026 DOM CREW	4130	304 304WD 316	2024-T3 3003-H14 3003-O 6061-T6
	15	.072	.981	.8097	.2844	1018/1026			
	14	.083	.959	.9237	.3264	1018/1026 DOM	4130	304 316	2024-T3
	13	.095	.935	1.045	.3670	1018/1026 DOM	4130	304 316	
	12	.109	.907	1.183	.4155	1018/1026 DOM			
	11	.120	.885	1.288	.4523	1018/1026 DOM	4130	304 316 321	
	1/8	.125	.875	1.335	.4712	1018/1026 DOM			2024-T3
	10	.134	.857	1.418	.4980	1018/1026 DOM			
	5/32	.156	.812	1.614	.5668	1018/1026 DOM	4130		
	3/16	.188	.750	1.881	.6606	1018/1026 DOM	4130 4340	304 321	
	7/32	.219	.688	2.119	.7442	1018/1026 DOM	4130		
	1/4	.250	.625	2.336	.8204	1018/1026 DOM	4130	304	
	9/32	.281	.563	2.533	.8896	1018/1026	4130		
	5/16	.313	.500	2.714	.9532	1018/1026 DOM	4130		
	3/8	.375	.375	3.004	1.055	1018/1026			

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
1 3/16	22	.028	1.131	.3469	.1218	1018/1026			
	21	.032	1.124	.3951	.1388	1018/1026			
	20	.035	1.118	.4310	.1514	1018/1026		304	
	18	.049	1.090	.5961	.2094	1018/1026 DOM			6061-T6
	17	.058	1.072	.7000	.2458	1018/1026			
	16	.065	1.057	.7796	.2738	1018/1026 DOM			
	14	.083	1.022	.9795	.3440	1018/1026 DOM	4130		
	13	.095	.997	1.109	.3895	1018/1026 DOM			
	12	.109	.970	1.256	.4411	1018/1026			
	11	.120	.947	1.369	.4808	1018/1026 DOM CDBW			
	10	.134	.920	1.508	.5296	1018/1026			
	5/32	.156	.875	1.719	.6037	1018/1026 DOM			
	3/16	.188	.812	2.008	.7052	1018/1026 DOM CDBW	4130		
	7/32	.219	.750	2.266	.7958	1018/1026 DOM			
	1/4	.250	.687	2.504	.8794	1018/1026			
	9/32	.281	.626	2.722	.9560	1018/1026			
	5/16	.313	.562	2.925	1.027	1018/1026	4340		
	3/8	.375	.438	3.256	1.144	1018/1026			
1 1/4	27	.016	1.218	.2109	.0741				3003-H14
	25	.020	1.210	.2627	.0923				6061-O 6061-T4
	24	.022	1.206	.2885	.1013				6061-T4 6061-T6
	23	.025	1.200	.3271	.1149				6061-T6
	22	.028	1.194	.3654	.1283	1018/1026			5052-O
	21	.032	1.186	.4163	.1462	1018/1026			
	20	.035	1.180	.4542	.1601	1018/1026 DOM CREW	4130	304 316WD	2024-T3 3003-H14 5052-O 6061-O 6061-T4 6061-T6

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See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
1 1/4 (cont.)	18	.049	1.152	.6285	.2213	1018/1026 DOM CREW	4130	304WD 316WD	3003-H14 5052-O 6061-O 6061-T6
	17	.058	1.134	.7384	.2601	1018/1026 DOM	4130	304	2024-T3 3003-H14 6061-T6
	16	.065	1.120	.8226	.2907	1018/1026 DOM CREW HREW	4130	304 304WD 316 316WD 347WD	2024-T3 3003-H14 5052-O 6061-T6
	14	.083	1.084	1.034	.3652	1018/1026 DOM CREW HREW	4130	304 304WD 316	2024-T3 6061-T6
	13	.095	1.060	1.172	.4131	1018/1026 DOM HREW	4130 4140	304 304WD 316 321	2024-T3 6061-T6
	12	.109	1.032	1.328	.4682	1018/1026 DOM	4130	316WD	2024-T3
	11	.120	1.010	1.448	.5100	1018/1026 DOM HREW	4130	304 304WD 316 321 347	2024-T3 6061-T6
	1/8	.125	1.000	1.502	.5275	1018/1026 DOM CDBW			6061-O
	10	.134	.982	1.597	.5609	1018/1026 DOM	4130	316WD	
	5/32	.156	.938	1.823	.6426	1018/1026 DOM	4130	304	2024-T3
	3/16	.188	.875	2.132	.7548	1018/1026 DOM CDBW	4130	304 316 321	2024-T3
	7/32	.219	.812	2.411	.8467	1018/1026 DOM	4130		
	15/64	.234	.782	2.539	.8917	1018/1026 DOM			
	1/4	.250	.750	2.670	.9384	1018/1026 DOM	4130	304 316 321	2024-T3 6061-T6
	9/32	.281	.687	2.908	1.021	1018/1026 DOM			
	5/16	.313	.625	3.132	1.100	1018/1026 DOM	4130	321	
	3/8	.375	.500	3.504	1.231	1018/1026 DOM	4130	321	
	7/16	.438	.375	3.798	1.334	1018/1026			

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
1 5/16	22	.028	1.257	.3843	.1350	1018/1026			
	21	.032	1.249	.4378	.1538	1018/1026			
	20	.035	1.242	.4777	.1678	1018/1026			
	18	.049	1.214	.6615	.2323	1018/1026			
	16	.065	1.182	.8664	.3043	1018/1026			
	14	.083	1.147	1.090	.3828	1018/1026 DOM			
	13	.095	1.122	1.236	.4341	1018/1026 DOM	4130		
	12	.109	1.094	1.402	.4924	1018/1026			
	11	.120	1.072	1.529	.5370	1018/1026 DOM			
	1/8	.125	1.063	1.586	.5570	1018/1026	4140		
	10	.134	1.044	1.687	.5925	1018/1026 DOM			
	5/32	.156	1.000	1.928	.6771	1018/1026 DOM			
	3/16	.188	.937	2.259	.7934	1018/1026 DOM CDBW	4130		
	7/32	.219	.875	2.559	.8987	1018/1026 DOM	4130		
	1/4	.250	.812	2.838	.9967	1018/1026			
	9/32	.281	.750	3.097	1.088	1018/1026 DOM			
	5/16	.313	.688	3.343	1.174				
	11/32	.344	.625	3.560	1.250	1018/1026			
	3/8	.375	.562	3.757	1.319	1018/1026			
1 3/8	22	.028	1.319	.4028	.1415	1018/1026			
	20	.035	1.305	.5009	.1759	1018/1026	4130	304	6061-T4 6061-T6
	18	.049	1.277	.6939	.2448	1018/1026 DOM CREW	4130	316	2024-T3 6061-T6
	17	.058	1.259	.8158	.2865	1018/1026	4130		3003-H14 6061-T6
	16	.065	1.245	.9094	.3213	1018/1026 DOM CREW	4130	304 316WD	2024-T3 6061-T6
	14	.083	1.209	1.145	.4039	1018/1026 DOM	4130	316	2024-T3
	13	.095	1.185	1.299	.4562	1018/1026 DOM	4130	321	

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
1 3/8 (Cont.)	12	**.109**	1.157	**1.474**	.5177	1018/1026 DOM			
	11	**.120**	1.135	**1.608**	.5647	1018/1026 DOM	4130	304 316	
	1/8	**.125**	1.125	**1.669**	.5862	DOM			6061-T6
	10	**.134**	1.107	**1.776**	.6237	1018/1026 DOM		321	
	5/32	**.156**	1.062	**2.031**	.7133	1018/1026 DOM	4130		
	3/16	**.188**	1.000	**2.383**	.8364	1018/1026 DOM	4130	304 321	2024-T3
	7/32	**.219**	.938	**2.704**	.9496	1018/1026 DOM	4130		
	1/4	**.250**	.875	**3.004**	1.061	1018/1026 DOM	4130	321	2024-T3
	9/32	**.281**	.813	**3.283**	1.153	1018/1026			
	5/16	**.313**	.750	**3.550**	1.247	1018/1026 DOM	4130		
	3/8	**.375**	.625	**4.005**	1.407	1018/1026		321	
	7/16	**.438**	.500	**4.383**	1.539	1018/1026			
	1/2	**.500**	.375	**4.673**	1.641	1018/1026			
1 7/16	20	**.035**	1.367	**.5244**	.1842	1018/1026			
	18	**.049**	1.339	**.7269**	.2553	1018/1026			
	16	**.065**	1.307	**.9531**	.3347	1018/1026 DOM			
	14	**.083**	1.271	**1.201**	.4218	1018/1026			
	13	**.095**	1.247	**1.363**	.4787	1018/1026 DOM			
	11	**.120**	1.198	**1.689**	.5932	1018/1026 DOM			
	10	**.134**	1.170	**1.866**	.6553	1018/1026 DOM			
	5/32	**.156**	1.125	**2.136**	.7502	1018/1026			
	3/16	**.188**	1.062	**2.510**	.8815	1018/1026 DOM			
	7/32	**.219**	1.000	**2.851**	1.001	1018/1026			
	1/4	**.250**	.938	**3.172**	1.114	1018/1026 DOM			
	5/16	**.313**	.812	**3.761**	1.321	1018/1026			
	3/8	**.375**	.688	**4.257**	1.495	1018/1026			
	1/2	**.500**	.438	**5.009**	1.759	1018/1026			

ROUND MECHANICAL TUBING

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Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
1 1/2	25	.020	1.460	.3161	.1110				6061-T6
	24	.022	1.456	.3473	.1220				3003-H14 6061-O 6061-T4
	22	.028	1.444	.4402	.1546	1018/1026	4130		5052-O 6061-T4 6061-T6
	21	.032	1.436	.5018	.1762				6061-T6
	20	.035	1.430	.5476	.1928	1018/1026 CREW HREW	4130	304 304WD 316	2024-T3 3003-H14 5052-O 6061-O 6061-T4 6061-T6
	18	.049	1.402	.7593	.2683	1018/1026 DOM CREW	4130	304 304WD 316 316WD	2024-O 2024-T3 3003-H14 3003-O 5052-O 6061-O 6061-T4 6061-T6
	17	.058	1.384	.8932	.3137	1018/1026	4130		3003-H14 6061-T6
	1/16	.062	1.376	.9522	.3344		4130		
	16	.065	1.370	.9962	.3519	1018/1026 DOM CREW HREW	4130	304 304WD 316	2024-O 2024-T3 3003-H14 5052-O 6061-O 6061-T6
	15	.072	1.356	1.098	.3856	1018/1026	4130		
	14	.083	1.334	1.256	.4437	1018/1026 DOM CREW HREW	4130	304	2024-T3 6061-T6
	13	.095	1.310	1.426	.5029	1018/1026 DOM CREW HREW	4130	304 316 347	2024-T3 6061-T6
	12	.109	1.282	1.619	.5686	1018/1026 DOM			
	11	.120	1.260	1.769	.6222	1018/1026 DOM HREW	4130 4140	304 316 321 347	2024-T3
	1/8	.125	1.250	1.836	.6448	1018/1026 DOM SS			6061-O 6061-T6
	10	.134	1.232	1.955	.6866	1018/1026 DOM		304	
	5/32	.156	1.187	2.239	.7854	1018/1026 DOM	4130	321	2024-T3

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
1 1/2 (Cont.)	3/16	**.188**	1.125	**2.634**	.9282	1018/1026 DOM	4130	304 316	2024-T3 6061-T6
	7/32	**.219**	1.062	**2.996**	1.052	1018/1026 DOM			
	1/4	**.250**	1.000	**3.338**	1.173	1018/1026 DOM	4130 4140	304 316	2024-T3 6061-T6
	9/32	**.281**	.938	**3.658**	1.291	1018/1026			2024-T3
	5/16	**.313**	.875	**3.968**	1.394	1018/1026 DOM	4130	321	
	3/8	**.375**	.750	**4.506**	1.583	1018/1026 DOM	4140	316 321	6061-T6
	7/16	**.438**	.625	**4.968**	1.745	1018/1026			
	1/2	**.500**	.500	**5.340**	1.875	1018/1026	4140		
	9/16	**.563**	.375	**7.889**	2.770	1018/1026			
1 9/16	21	**.032**	1.499	**.5232**	.1837	1018/1026			
	20	**.035**	1.493	**.5712**	.2006	1018/1026			
	18	**.049**	1.465	**.7923**	.2783	1018/1026			
	16	**.065**	1.432	**1.040**	.3652	1018/1026			
	13	**.095**	1.373	**1.489**	.5229	1018/1026 DOM			
	11	**.120**	1.323	**1.849**	.6494	1018/1026 DOM			
	5/32	**.156**	1.250	**2.344**	.8232	1018/1026 DOM	4130		
	3/16	**.188**	1.187	**2.761**	.9697	1018/1026	4130		
	7/32	**.219**	1.125	**3.144**	1.104	1018/1026			
	1/4	**.250**	1.062	**3.506**	1.231	1018/1026 DOM			
	9/32	**.281**	1.000	**3.847**	1.351	1018/1026			
	11/32	**.344**	.875	**4.479**	1.573	1018/1026			
	3/8	**.375**	.812	**4.758**	1.671	1018/1026			
1 5/8	20	**.035**	1.555	**.5943**	.2101	1018/1026 DOM			2024-T3 6061-T6
	18	**.049**	1.527	**.8248**	.2907	1018/1026 DOM CREW	4130		2024-T3 6061-T6
	17	**.058**	1.509	**.9707**	.3409	1018/1026	4130		6061-T6
	16	**.065**	1.495	**1.083**	.3825	1018/1026 DOM CREW	4130	304 304WD	2024-T3 6061-T6
	14	**.083**	1.459	**1.367**	.4825	1018/1026 DOM HREW	4130	304 304WD	2024-T3

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
1 5/8 (Cont.)	13	.095	1.435	1.552	.5451	1018/1026 DOM HREW	4130	321	
	11	.120	1.385	1.929	.6775	1018/1026 DOM CREW HREW	4130	304	
	1/8	.125	1.375	2.003	.7035	DOM			6061-T6
	10	.134	1.357	2.134	.7495	1018/1026 DOM			
	5/32	.156	1.312	2.447	.8594	1018/1026 DOM	4130		
	3/16	.188	1.250	2.885	1.020	1018/1026 DOM	4130	321	2024-T3
	7/32	.219	1.187	3.289	1.156	1018/1026 DOM	4130		
	1/4	.250	1.125	3.671	1.295	1018/1026 DOM	4130	304 321	2024-T3
	9/32	.281	1.063	4.033	1.416	1018/1026 DOM			
	5/16	.313	1.000	4.386	1.540	1018/1026 DOM	4130 4140		
	3/8	.375	.875	5.006	1.758	1018/1026 DOM	4130 4140 4340	321	
	7/16	.438	.749	5.553	1.950	1018/1026	4140		
	1/2	.500	.625	6.008	2.110	1018/1026	4140		
1 11/16	18	.049	1.590	.8577	.3012	1018/1026			
	16	.065	1.558	1.127	.3958	1018/1026			
	14	.083	1.522	1.423	.4998	1018/1026 DOM			
	11	.120	1.447	2.010	.7059	1018/1026 DOM			
	5/32	.156	1.376	2.552	.8963	1018/1026 DOM			
	3/16	.188	1.312	3.012	1.058	1018/1026			
	7/32	.219	1.250	3.436	1.207	1018/1026			
	1/4	.250	1.188	3.839	1.348	1018/1026 DOM			
	5/16	.313	1.062	4.596	1.614	1018/1026			
1 3/4	25	.020	1.710	.3695	.1277				6061-T4
	20	.035	1.680	.6411	.2264	1018/1026 CREW		304WD 316 347	2024-T4 3003-H14 5052-O 6061-O 6061-T4 6061-T6
	18	.049	1.652	.8902	.3142	1018/1026 CREW	4130	304WD 316	2024-T3 3003-H14 5052-O 6061-T6

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
1 3/4 (Cont.)	17	.058	1.634	1.048	.3703	1018/1026 DOM	4130		2024-T3 6061-O 6061-T6
	16	.065	1.620	1.170	.4131	1018/1026 DOM CREW	4130	304 316	2024-T3 3003-H14 5052-O 6061-T6
	14	.083	1.584	1.478	.5202	1018/1026 DOM HREW	4130		2024-T3 6061-T6
	13	.095	1.560	1.679	.5916	1018/1026 DOM HREW	4130	321 347	2024-T3
	——	.105	1.540	1.775	.6234		4140		
	12	.109	1.532	1.910	.6708	1018/1026 DOM			
	11	.120	1.510	2.089	.7344	1018/1026 DOM HREW	4130	304 316 321 347	2024-T3
	1/8	.125	1.500	2.169	.7618	DOM SS	4140		6061-T6
	10	.134	1.482	2.313	.8123	1018/1026 DOM			
	5/32	.156	1.438	2.656	.9384	1018/1026 DOM	4130	321	2024-T3
	7	.180	1.390	2.899	1.018	HREW			
	3/16	.188	1.375	3.136	1.102	1018/1026 DOM HREW	4130	304 316 321	2024-T3 6061-T6
	7/32	.219	1.312	3.581	1.258	1018/1026 DOM	4130		
	1/4	.250	1.250	4.005	1.418	1018/1026 DOM	4130 4140	316 321	2024-T3 6061-T6
	9/32	.281	1.188	4.409	1.548	1018/1026 DOM			
	5/16	.313	1.125	4.804	1.687	1018/1026 DOM	4140 4340	321	
	——	.350	1.050	5.233	1.838	1018/1026			
	3/8	.375	1.000	5.507	1.934	1018/1026 DOM	4140	316 321	6061-T6
	7/16	.438	.875	6.137	2.155	1018/1026	4140		
	15/32	.469	.812	6.417	2.254	1018/1026			
	1/2	.500	.750	6.675	2.344	1018/1026		321	
	9/16	.563	.624	7.137	2.507	1018/1026			
	5/8	.625	.500	7.509	2.637	1018/1026			

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Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
1 13/16	16	**.065**	1.683	**1.213**	.4260	1018/1026			
	13	**.095**	1.623	**1.743**	.6121	1018/1026			
	11	**.120**	1.573	**2.170**	.7621	1018/1026			
	5/32	**.156**	1.500	**2.761**	.9697	1018/1026			
	3/16	**.188**	1.439	**3.263**	1.146	1018/1026			
	7/32	**.219**	1.375	**3.728**	1.309	1018/1026			
	1/4	**.250**	1.313	**4.173**	1.466	1018/1026			
1 7/8	22	**.028**	1.818	**.5523**	.1940			321	
	20	**.035**	1.805	**.6878**	.2416	1018/1026 CREW	4130	321	
	18	**.049**	1.777	**.9556**	.3356	1018/1026 CREW		304 321	
	17	**.058**	1.759	**1.126**	.3954		4130	321	6061-T6
	16	**.065**	1.745	**1.257**	.4415	1018/1026 DOM CREW	4130	304 316WD	2024-T3
	14	**.083**	1.709	**1.589**	.5581	1018/1026 DOM	4130	321	6061-T6
	13	**.095**	1.685	**1.806**	.6343	1018/1026 DOM HREW	4130	321	
	12	**.109**	1.657	**2.056**	.7221	1018/1026			
	11	**.120**	1.635	**2.249**	.7898	1018/1026 DOM HREW	4130		6061-T6
	1/8	**.125**	1.625	**2.336**	.8204	DOM		321	
	10	**.134**	1.607	**2.492**	.8752	1018/1026	4130		
	5/32	**.156**	1.563	**2.864**	1.006	1018/1026 DOM	4130	321	
	3/16	**.188**	1.500	**3.387**	1.190	1018/1026 DOM	4130	321	6061-T6
	7/32	**.219**	1.438	**3.873**	1.360	1018/1026 DOM			
	1/4	**.250**	1.375	**4.339**	1.524	1018/1026 DOM	4130	321	6061-T6
	9/32	**.281**	1.313	**4.784**	1.680	1018/1026	4130		
	5/16	**.313**	1.250	**5.222**	1.834	1018/1026	4130		
	3/8	**.375**	1.125	**6.008**	2.110	1018/1026 DOM		304 321	
	7/16	**.438**	1.000	**6.722**	2.361	1018/1026			
	1/2	**.500**	.875	**7.343**	2.579	1018/1026	4130	321	
	9/16	**.563**	.750	**7.889**	2.771	1018/1026			

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Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
1 15/16	5/32	.156	1.625	2.969	1.403	1018/1026 DOM	4130		
	7/32	.219	1.499	4.029	1.412	1018/1026	4340		
	1/4	.250	1.438	4.507	1.583	1018/1026			
2	24	.022	1.956	.4678	.1643				6061-O 6061-T4 6061-T6
	22	.028	1.944	.5897	.2097	1018/1026			5052-O 6061-T4 6061-T6
	20	.035	1.930	.7345	.2591	1018/1026 CREW		304 316 347	2424-T3 3003-H14 5052-O 6061-O 6061-T4 6061-T6
	19	.042	1.916	.8783	.3085				5052-O
	18	.049	1.902	1.021	.3601	1018/1026 DOM CREW	4130	304 304WD 316WD 347	2024-T3 3003-H14 5052-O 6061-O 6061-T6
	——	.050	1.900	1.041	.3656				5052-O 6063-T6
	17	.058	1.884	1.203	.4225	1018/1026			6061-T6
	16	.065	1.870	1.343	.4743	1018/1026 DOM CREW HREW	4130	304 304WD 316 316WD	2024-T3 3003-H14 3003-O 5052-O 6061-T6
	14	.083	1.834	1.699	.6018	1018/1026 DOM HREW	4130	304 304WD 316WD 321	2024-T3 6061-T6
	13	.095	1.810	1.933	.6834	1018/1026 DOM	4130	304 316 321	2024-T3
	12	.109	1.782	2.201	.7730	1018/1026 DOM HREW		304	
	11	.120	1.760	2.409	.8466	1018/1026 DOM HREW	4130 4140	304 316 321 347	2024-T3
	1/8	.125	1.750	2.503	.8874	1018/1026 DOM			2024-O 6061-T6

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
2 (Cont.)	10	**.134**	1.732	**2.670**	.9377	1018/1026 DOM HREW			
	5/32	**.156**	1.687	**3.072**	1.081	1018/1026 DOM	4130		2024-T3
	7	**.180**	1.640	**3.499**	1.229	HREW			
	3/16	**.188**	1.625	**3.638**	1.278	1018/1026 DOM HREW	4130	304 316 321	6061-T6
	7/32	**.219**	1.562	**4.166**	1.463	1018/1026 DOM			
	1/4	**.250**	1.500	**4.673**	1.652	1018/1026 DOM	4130	304 316 321	2024-T3 2024-T4 6061-T6
	9/32	**.281**	1.438	**5.159**	1.812	1018/1026 DOM			
	5/16	**.313**	1.375	**5.639**	1.980	1018/1026 DOM	4130 4140	321	
	11/32	**.344**	1.313	**6.084**	2.137	1018/1026			
	3/8	**.375**	1.250	**6.508**	2.295	1018/1026 DOM	4140 HF4140	304 316 321	2024-T3 2024-T4 6061-T6
	7/16	**.438**	1.125	**7.307**	2.566	1018/1026	4140		
	1/2	**.500**	1.000	**8.010**	2.826	1018/1026	4130	304 321	2024-T3 6061-T6
	9/16	**.563**	.874	**8.640**	3.034	1018/1026			
	5/8	**.625**	.750	**9.178**	3.223	1018/1026	4130 HF4140		
	3/4	**.750**	.500	**10.01**	3.516	1018/1026			
2 1/32	1/2	**.500**	1.031	**8.175**	2.871	1018/1026			
2 1/16	16	**.065**	1.933	**1.387**	.4871	1018/1026			
	11	**.120**	1.823	**2.490**	.8745	1018/1026			
	5/32	**.156**	1.750	**3.177**	1.101	DOM			
	3/16	**.188**	1.687	**3.765**	1.322	1018/1026			
	7/32	**.219**	1.625	**4.313**	1.515	1018/1026 DOM			
	1/4	**.250**	1.563	**4.841**	1.700	1018/1026			
	9/32	**.281**	1.501	**5.348**	1.878	1018/1026			
	5/16	**.313**	1.437	**5.850**	2.055	1018/1026			
2 1/8	20	**.035**	2.655	**.7812**	.2700				
	18	**.049**	2.027	**1.086**	.3814	1018/1026 CREW		304	
	16	**.065**	1.995	**1.430**	.5022	1018/1026 DOM CREW HREW	4130	304 321	
	14	**.083**	1.959	**1.810**	.6357	1018/1026 DOM			

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
2 1/8 (Cont.)	13	**.095**	1.935	**2.060**	.7235	1018/1026 DOM HREW		304	6061-T6
	12	**.109**	1.909	**2.347**	.8243	1018/1026			
	11	**.120**	1.885	**2.570**	.9026	1018/1026 DOM		321	
	1/8	**.125**	1.875	**2.670**	.9377	1018/1026 DOM			
	9	**.148**	1.829	**3.125**	1.080				
	5/32	**.156**	1.813	**3.281**	1.152	1018/1026 DOM	4130		
	7	**.180**	1.765	**3.739**	1.292				
	3/16	**.188**	1.749	**3.889**	1.366	1018/1026 DOM	4130	321	
	7/32	**.219**	1.687	**4.458**	1.566	1018/1026 DOM			
	1/4	**.250**	1.625	**5.006**	1.758	1018/1026 DOM	4130	321	
	9/32	**.281**	1.563	**5.534**	1.944	1018/1026 DOM			
	5/16	**.313**	1.500	**6.057**	2.127	1018/1026 DOM	4130 4340		
	3/8	**.375**	1.375	**7.009**	2.462	1018/1026 DOM	4130 HF4140 HF4140HT	321	
	7/16	**.438**	1.250	**7.892**	2.772	1018/1026	4140		
	1/2	**.500**	1.125	**8.678**	3.048	1018/1026	4130 4340	321	
	9/16	**.563**	1.000	**9.392**	3.298	1018/1026			
	5/8	**.375**	0.875	**10.01**	3.516	1018/1026	4140		
2 3/16	13	**.095**	1.998	**2.124**	.7459	1018/1026			
	11	**.120**	1.948	**2.650**	.9307	1018/1026			
	3/16	**.188**	1.812	**4.016**	1.410	1018/1026	4340		
	1/4	**.250**	1.688	**5.174**	1.817	1018/1026			
2.200	——	**.319**	1.562	**6.408**	2.250		4130		
2 1/4	25	**.020**	2.210	**.4763**	.1673				6061-O
	20	**.035**	2.180	**.8280**	.2917	CREW			2024-T3 5052-O
	18	**.049**	2.152	**1.152**	.4060	1018/1026 CREW		304	2024-T3 3003-H14 5052-O 6061-O 6061-T6
	17	**.058**	2.134	**1.358**	.4763				2024-T3
	16	**.065**	2.120	**1.517**	.5328	1018/1026 DOM CREW	4130	304	2024-T3 5052-O 6061-T6
	15	**.072**	2.106	**1.675**	.5883		4130		
	14	**.083**	2.084	**1.921**	.6746	1018/1026 DOM HREW	4140	304	2024-T3 6061-T6
	——	**.092**	2.066	**2.120**	.7445				

ROUND MECHANICAL TUBING

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
2 1/4 (Cont.)	13	**.095**	2.060	**2.186**	.7752	1018/1026 DOM	4140	304 321	2024-T3
	12	**.109**	2.032	**2.492**	.8752	1018/1026			
	11	**.120**	2.010	**2.730**	.9588	1018/1026 DOM	4130	304 321 347	2024-T3
	1/8	**.125**	2.000	**2.837**	.9996	1018/1026 DOM SS		347	2024-T3 6061-T6
	10	**.134**	1.982	**3.028**	1.063	1018/1026 DOM	4130		
	9	**.148**	1.952	**3.323**	1.148				
	5/32	**.156**	1.937	**3.489**	1.225	1018/1026 DOM	4130		
	7	**.180**	1.890	**3.979**	1.375				
	3/16	**.188**	1.875	**4.140**	1.469	1018/1026 DOM	4130 HF4140HT	304 321	2024-T3 6061-T6
	7/32	**.219**	1.813	**4.750**	1.668	1018/1026 DOM	4130		
	1/4	**.250**	1.750	**5.340**	1.887	1018/1026 DOM	4130 4140 4340	304 321	2024-T3 6061-T6
	9/32	**.281**	1.688	**5.909**	2.075	1018/1026	4140HF		
	5/16	**.313**	1.625	**6.475**	2.274	1018/1026 DOM	4140		2024-T4
	11/32	**.344**	1.562	**7.002**	2.459	1018/1026			
	3/8	**.375**	1.500	**7.509**	2.637	1018/1026 DOM	4130 HF4140 HF4140HT	321	6061-T6
	7/16	**.438**	1.375	**8.476**	2.977	1018/1026			
	1/2	**.500**	1.250	**9.345**	3.297	1018/1026	4130 4140 HF4140 HF4140HT	321	2024-T3 6061-T6
	9/16	**.563**	1.125	**10.14**	3.561	1018/1026			
	5/8	**.625**	1.000	**10.85**	3.811	1018/1026	4130		
	3/4	**.750**	.750	**12.02**	4.221	1018/1026	4140HT		
2.270	——	**.240**	1.790	**5.203**	1.827	DOM			
2.310	——	**.260**	1.790	**5.692**	1.999	DOM			
2 5/16	10	**.134**	2.045	**3.118**	1.095		4130		
	5/32	**.156**	2.001	**3.594**	1.262	1018/1026			
	3/16	**.188**	1.937	**4.267**	1.499	1018/1026 DOM			
	7/32	**.219**	1.875	**4.898**	1.720	1018/1026	4130		
	1/4	**.250**	1.813	**5.508**	1.934	1018/1026			
	9/32	**.281**	1.750	**6.154**	2.161		4140		
	3/8	**.375**	1.563	**7.762**	2.726	1018/1026	4130 4140		
	——	**.406**	1.500	**8.269**	2.904		4130		

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
2 3/8	18	**.049**	2.277	**1.217**	.4274	1018/1026 CREW			
	16	**.065**	2.245	**1.604**	.5633	1018/1026 DOM CREW			
	14	**.083**	2.209	**2.032**	.7136			321	
	13	**.095**	2.185	**2.313**	.8123	1018/1026 DOM		321	
	12	**.109**	2.157	**2.638**	.9115				
	11	**.120**	2.135	**2.890**	1.015	1018/1026 DOM HREW		321	
	1/8	**.125**	2.125	**3.004**	1.055	DOM			
	10	**.134**	2.107	**3.207**	1.108				
	9	**.148**	2.079	**3.520**	1.216				
	5/32	**.156**	2.062	**3.697**	1.298	1018/1026 DOM			
	7	**.180**	2.015	**4.220**	1.458				
	3/16	**.188**	2.000	**4.391**	1.542	1018/1026 DOM	4130		
	7/32	**.219**	1.938	**5.043**	1.771	1018/1026 DOM	4130		
	1/4	**.250**	1.875	**5.674**	1.993	1018/1026 DOM	4130 4140	321	
	9/32	**.281**	1.813	**6.284**	2.207	1018/1026 DOM			
	5/16	**.313**	1.750	**6.893**	2.421	1018/1026 DOM	4140		
	3/8	**.375**	1.625	**8.010**	2.813	1018/1026 DOM	4130 HF4140	321	
	7/16	**.438**	1.500	**9.061**	3.182	1018/1026	4130 HF4140		
	1/2	**.500**	1.375	**10.01**	3.516	1018/1026		321	
	9/16	**.563**	1.250	**10.90**	3.828	1018/1026			
	5/8	**.625**	1.125	**11.68**	4.102	1018/1026			
2 1/2	22	**.028**	2.444	**7.392**	.2596				5052-O 6061-O 6061-T4 6061-T6
	20	**.035**	2.430	**.9214**	.3254				2024-T3 3003-H14 5052-O 6061-O 6061-T6
	18	**.049**	2.402	**1.283**	.4506	1018/1026 CREW	4130	304 304WD 316	3003-H14 5052-O 6061-O 6061-T6
	16	**.065**	2.370	**1.690**	.5916	1018/1026 DOM CREW HREW	4130	304 304WD 316	2024-T3 3003-H14 5052-O 6061-O 6061-T6

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
2 1/2 (Cont.)	14	.083	2.334	2.143	.7548	1018/1026 DOM CREW HREW	4130	304 316	2024-T3 6061-T6
	13	.095	2.310	2.440	.8569	1018/1026 DOM HREW	4130 4140	316 347	
	12	.109	2.282	2.783	.9774	1018/1026 DOM			
	11	.120	2.260	3.050	1.081	1018/1026 DOM HREW	4130	304 316 321	2024-T3
	1/8	.125	2.250	3.171	1.114	1018/1026 DOM			6061-T6
	10	.134	2.232	3.386	1.189	1018/1026 DOM			
	5/32	.156	2.187	3.905	1.371	1018/1026 DOM	4130 4140		
	7	.180	2.140	4.460	1.541	HREW			
	3/16	.188	2.125	4.642	1.642	1018/1026 DOM	4130	316 321	2024-T3 6061-T6
	7/32	.219	2.063	5.335	1.874	1018/1026 DOM			
	1/4	.250	2.000	6.008	2.122	1018/1026 DOM CDBW	4130 4140	316 321	2024-T3 2024-T4 6061-T6
	9/32	.281	1.937	6.659	2.339	1018/1026 DOM			
	5/16	.313	1.875	7.311	2.570	1018/1026 DOM	4130 4140HT 4140	321	2024-T3
	11/32	.344	1.812	7.921	2.782	1018/1026 DOM			
	3/8	.375	1.750	8.511	3.000	1018/1026 DOM	4130 4130HT 4140	316 321	2024-T4 6061-T6
	7/16	.438	1.625	9.646	3.388	1018/1026 DOM			
	1/2	.500	1.500	10.68	3.764	1018/1026 DOM	4130 4140 HF4140 4340	321	2024-T3 6061-T6
	9/16	.563	1.375	11.65	4.091	1018/1026	4130		
	5/8	.625	1.250	12.52	4.397	1018/1026	4140		
	3/4	.750	1.000	14.02	4.924	1018/1026			
2.525	——	.271	1.981	6.524	2.291	DOM			
2 9/16	3/16	.188	2.187	4.769	1.648	DOM			
	1/4	.250	2.063	6.416	2.253	DOM			

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
2 5/8	18	**.049**	2.527	**1.348**	.4734	1018/1026 CREW			
	16	**.065**	2.495	**1.777**	.6241	1018/1026 DOM		304	
	13	**.095**	2.435	**2.567**	.9015	1018/1026 DOM		321	
	11	**.120**	2.385	**3.210**	1.127	1018/1026 DOM		321	
	1/8	**.125**	2.375	**3.338**	1.172	DOM			
	10	**.134**	2.407	**3.636**	1.257				
	9	**.148**	2.379	**3.994**	1.380				
	5/32	**.156**	2.313	**4.114**	1.445	1018/1026 DOM			
	3/16	**.188**	2.250	**4.893**	1.718	1018/1026 DOM		321	6061-T6
	7/32	**.219**	2.188	**5.627**	1.976	1018/1026			
	1/4	**.250**	2.125	**6.341**	2.227	1018/1026 DOM CDBW	4130 4140	321	
	9/32	**.281**	2.063	**7.035**	2.471	1018/1026 DOM			
	5/16	**.313**	2.000	**7.729**	2.714	1018/1026 DOM	4130 4140 HF4140	321	
	3/8	**.375**	1.875	**9.011**	3.180	1018/1026 DOM	4140 HF4140	321	2024-T3
	7/16	**.438**	1.750	**10.23**	3.593	1018/1026			
	1/2	**.500**	1.625	**11.35**	3.986	1018/1026	4140 HF4140 HF4140HT	321	
	9/16	**.563**	1.500	**12.40**	4.355	1018/1026			
	5/8	**.625**	1.375	**13.35**	4.689	1018/1026			
2 3/4	18	**.049**	2.652	**1.413**	.4962	1018/1026 CREW		304	6061-T6
	16	**.065**	2.620	**1.864**	.6528	1018/1026 DOM CREW		304	2024-T3 6061-T6
	14	**.083**	2.584	**2.364**	.8364	1018/1026 DOM HREW		321	2024-T3 6061-T6
	13	**.095**	2.560	**2.694**	.9486	1018/1026 DOM	4140	347	2024-T3
	12	**.109**	2.532	**3.074**	1.080	1018/1026			
	11	**.120**	2.510	**3.371**	1.193	1018/1026 DOM HREW	4130	304 316 321	2024-T3
	1/8	**.125**	2.500	**3.504**	1.234	1018/1026 DOM			

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
2 3/4 (Cont.)	10	.134	2.482	3.744	1.315		4130		
	9	.148	2.454	4.113	1.421				
	5/32	.156	2.438	4.322	1.518	1018/1026 DOM	4130 4140		
	3/16	.188	2.375	5.144	1.816	1018/1026 DOM HREW	4130	304	2024-T3
	7/32	.219	2.313	5.920	2.079	1018/1026 DOM			
	1/4	.250	2.250	6.675	2.365	1018/1026 DOM HREW	4130	304	2024-T3 2024-T4 6061-T6
	9/32	.281	2.188	7.410	2.602	1018/1026			
	5/16	.313	2.125	8.147	2.866	1018/1026 DOM	4130	321 347	2024-T3
	21/64	.328	2.094	8.484	2.980		4130HT		
	3/8	.375	2.000	9.512	3.356	1018/1026 DOM	4130 4140 HF4140 HF4140HT	304	2024-T4 6061-T6
	7/16	.438	1.875	10.82	3.780	1018/1026	4142 HF4140		
	1/2	.500	1.750	12.02	4.243	1018/1026 DOM	4140 HF4140 HF4140HT	321	2024-T4 6061-T6
	9/16	.563	1.625	13.15	4.618	1018/1026	4140		
	5/8	.625	1.500	14.18	4.980	1018/1026	4140 HF4140HT		
	11/16	.688	1.375	15.15	5.321	1018/1026			
	3/4	.750	1.250	16.02	5.626	1018/1026	4130 HF4130		
	7/8	.875	1.000	17.52	6.153	1018/1026			
	1	1.000	.750	18.69	6.564	1018/1026			
2 7/8	16	.065	2.749	1.951	.6852	1018/1026 DOM CREW	4130	304 316 321 347	
	13	.095	2.685	2.821	.9907	1018/1026			
	11	.120	2.635	3.531	1.240	1018/1026 DOM			
	1/8	.125	2.625	3.671	1.289	DOM			
	5/32	.156	2.563	4.530	1.591	1018/1026 DOM			
	3/16	.188	2.500	5.395	1.895	1018/1026 DOM SS		321	
	7/32	.219	2.438	6.212	2.182	1018/1026 DOM			
	1/4	.250	2.375	7.009	2.462	1018/1026 DOM		321	
	9/32	.281	2.313	7.785	2.734	1018/1026 DOM			

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Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
2 7/8 (Cont.)	5/16	.313	2.250	8.564	3.008	1018/1026 DOM			
	3/8	.375	2.125	10.01	3.533	1018/1026 DOM	4130 4140		2024-T3
	7/16	.438	2.000	11.40	4.004	1018/1026 DOM	4140 HF4140		
	1/2	.500	1.875	12.68	4.453	1018/1026	HF4140HT	321	6061-T6
	9/16	.563	1.750	13.90	4.882	1018/1026			
	5/8	.625	1.625	15.02	5.275	1018/1026			
	3/4	.750	1.375	17.02	5.977	1018/1026			
3	24	.022	2.956	.6997	.2457				3003-H14 5052-O 6061-T4 6061-T6
	22	.028	2.944	.8887	.3121				5052-O
	20	.035	2.930	1.108	.3891				3003-H14 5052-O 6061-O 6061-T6
	18	.049	2.902	1.544	.5423	1018/1026 CREW		304	3003-H14 5052-O 6061-O 6061-T6
	——	.050	2.900	1.575	.5531				6061-T4 6061-T6
	17	.058	2.884	1.822	.6426		4130		2024-O 5052-O
	16	.065	2.870	2.037	.7140	1018/1026 DOM CREW HREW	4130	304 316 321 347	2024-T3 3003-H14 5052-O 6061-O 6061-T6 6063-T6
	14	.083	2.834	2.586	.9078	1018/1026 DOM HREW	4130	304 316 321	2024-T3 6061-T6
	13	.095	2.810	2.947	1.040	1018/1026 DOM HREW	4130	304 316 321	2024-T3 6061-T6
	12	.109	2.782	3.365	1.182	1018/1026 HREW			
	11	.120	2.760	3.691	1.306	1018/1026 DOM HREW	4130 4140	304 316 321 347	2024-T3
	1/8	.125	2.750	3.838	1.348	1018/1026 DOM HREW			6061-T6
	10	.134	2.732	4.102	1.441	1018/1026 DOM			
	5/32	.156	2.687	4.738	1.664	1018/1026 DOM	4130		
	7	.180	2.640	5.421	1.904	HREW			

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
3 (Cont.)	3/16	**.188**	2.624	**5.646**	1.989	1018/1026 DOM HREW	4130	304 316 321	2024-T3 6061-T6
	7/32	**.219**	2.562	**6.505**	2.285	1018/1026 DOM			
	1/4	**.250**	2.500	**7.343**	2.591	1018/1026 DOM HREW	4130	304 316 321	2024-T3 2024-T4 3003-H14 6061-T6 7075-T6
	——	**.259**	2.482	**7.582**	2.663	DOM			
	9/32	**.281**	2.437	**8.160**	2.866	1018/1026 DOM			
	5/16	**.313**	2.375	**8.982**	3.169	1018/1026 DOM	4140	304 321	2024-T3 2024-T4
	3/8	**.375**	2.250	**10.51**	3.713	1018/1026 DOM	4140 HF4140 HF4140HT	304 316 321	2024-T4 6061-T6
	7/16	**.438**	2.125	**11.98**	4.233	1018/1026 DOM			2024-T4
	1/2	**.500**	2.000	**13.35**	4.712	1018/1026	4130 4140 HF4140 HF4140HT	304 321	2024-T4 6061-T6
	9/16	**.563**	1.875	**14.65**	5.145	1018/1026			
	5/8	**.625**	1.750	**15.85**	5.567	1018/1026	4140 HF4140 HF4140HT	321	
	3/4	**.750**	1.500	**18.02**	6.355	1018/1026 HF1018	4140 HF4140 HF4140HT	321	2024-T4 6061-T6
	13/16	**.813**	1.375	**18.99**	6.669	1018/1026			
	7/8	**.875**	1.250	**19.86**	6.975	1018/1026			
	15/16	**.938**	1.062	**20.66**	7.256	1018/1026			
	1	**1.000**	1.000	**21.36**	7.502	1018/1026	4140		
3 1/16	13	**.095**	2.875	**3.011**	1.057		4140		
	5/16	**.313**	2.438	**9.193**	3.229	1018/1026			
	——	**.343**	2.375	**9.964**	3.499		4140		
	3/8	**.375**	2.312	**10.77**	3.782	1018/1026			
	7/16	**.438**	2.188	**12.28**	4.313	1018/1026			
3 1/8	16	**.065**	2.995	**2.124**	.7459	1018/1026 DOM CREW		321	6061-T6
	13	**.095**	2.935	**3.074**	1.080	1018/1026 DOM			
	11	**.120**	2.885	**3.851**	1.352	1018/1026 DOM		321	
	1/8	**.125**	2.875	**4.005**	1.407	1018/1026 DOM		304 321	
	3/16	**.188**	2.750	**5.897**	2.071	1018/1026 DOM		321	
	7/32	**.219**	2.687	**6.797**	2.387	1018/1026 DOM			
	1/4	**.250**	2.625	**7.676**	2.696	1018/1026 DOM		321	

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Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
3 1/8 (Cont.)	9/32	**.281**	2.563	**8.535**	2.997	1018/1026			
	5/16	**.313**	2.499	**9.400**	3.301	1018/1026 DOM	4140 HF4140	321	
	3/8	**.375**	2.375	**11.01**	2.886	1018/1026 HF1018/1026 DOM	4140 HF4140	321	2024-T3
	7/16	**.438**	2.250	**12.57**	4.415	1018/1026	4140		
	1/2	**.500**	2.125	**14.02**	2.924	1018/1026		321	
	9/16	**.563**	2.000	**15.40**	5.408	1018/1026	4130HT		
	5/8	**.625**	1.875	**16.69**	5.862	1018/1026	4140HT HF4140HT		
	3/4	**.750**	1.625	**19.02**	6.680	1018/1026			
	7/8	**.875**	1.375	**21.03**	7.386	1018/1026			
3 1/4	16	**.065**	3.120	**2.211**	.7765	1018/1026 DOM CREW		304	
	14	**.083**	3.084	**2.807**	.9894	1018/1026 DOM		321	2024-T3
	13	**.095**	3.060	**3.201**	1.124	1018/1026 DOM HREW		321	
	11	**.120**	3.010	**4.011**	1.409	1018/1026 DOM HREW	4140	304 321 347	
	1/8	**.125**	3.000	**4.172**	1.465	1018/1026 DOM			6061-T6
	10	**.134**	2.982	**4.459**	1.566	1018/1026			
	9	**.148**	2.454	**4.903**	1.694				
	5/32	**.156**	2.938	**5.155**	1.810	1018/1026			
	7	**.180**	2.890	**5.902**	2.073	HREW			
	3/16	**.188**	2.875	**6.148**	2.159	1018/1026 DOM	4130	321	
	7/32	**.219**	2.812	**7.089**	2.490	1018/1026 DOM			
	1/4	**.250**	2.750	**8.010**	2.825	1018/1026 DOM	4130	321 347	2024-T3 6061-T6
	9/32	**.281**	2.688	**8.910**	3.129	1018/1026			
	5/16	**.313**	2.625	**9.818**	3.464	1018/1026 DOM	4140		2024-T3
	3/8	**.375**	2.500	**11.51**	4.060	1018/1026 DOM	4130 HF4140 HF4140HT	321	2024-T4 6061-T6
	7/16	**.438**	2.375	**13.15**	4.618	1018/1026	4130 HF4140HT	321	
	1/2	**.500**	2.250	**14.69**	5.182	1018/1026 DOM	4130 HF4140HT	304	2024-T4 6061-T6
	9/16	**.563**	2.125	**16.16**	5.675	1018/1026	4130HT 4140		

ROUND MECHANICAL TUBING

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Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
3 1/4 (Cont.)	5/8	.625	2.000	17.52	6.153	1018/1026	4130HT HF4140 HF4140HT		
	3/4	.750	1.750	20.03	7.035	1018/1026	4130 4140 HF4140 HF4140HT	321	6061-T6
	7/8	.875	1.500	22.19	7.793	1018/1026	HF4140HT		
	1	1.000	1.250	24.03	8.439	1018/1026	4140		
3 3/8	16	.065	3.245	2.298	.8071	1018/1026 CREW			
	14	.083	3.209	2.918	1.025	DOM			
	13	.095	3.185	3.328	1.169	1018/1026			
	11	.120	3.135	4.172	1.465	1018/1026			
	1/8	.125	3.125	4.339	1.524	1018/1026			
	5/32	.156	3.063	5.363	1.883	1018/1026			
	7	.180	3.015	6.142	2.157	DOM			
	3/16	.188	3.000	6.399	2.247	1018/1026 DOM SS			
	1/4	.250	2.285	8.344	2.930	1018/1026 DOM			
	5/16	.313	2.749	10.24	3.596	1018/1026 DOM	4130		
	3/8	.375	2.625	12.02	4.221	1018/1026 DOM	4140		
	7/16	.438	2.501	13.74	4.825	1018/1026 DOM			
	1/2	.500	2.375	15.35	5.391	1018/1026	HF4140HT		
	9/16	.563	2.249	16.91	5.939	1018/1026			
	5/8	.625	2.125	18.36	6.448	1018/1026			
	3/4	.750	1.875	21.03	7.386	1018/1026			
3 1/2	20	.035	3.430	1.295	.4548				5052-O
	18	.049	3.402	1.806	.6343	CREW HREW			5052-O 6061-T6
	——	.050	2.900	1.575	.5531				6061-T4 6061-T6
	16	.065	3.370	2.385	.8364	1018/1026 DOM CREW HREW		304 316 321	2024-T3 5052-O 6061-T6
	14	.083	3.334	3.029	1.064	1018/1026 DOM HREW	4130	304	6061-T6
	13	.095	3.310	3.455	1.224	1018/1026 DOM HREW		321	2024-T3
	12	.109	3.282	3.948	1.387	HREW			
	11	.120	3.260	4.322	1.530	1018/1026 DOM HREW	4130	304WD	2024-T3
	1/8	.125	3.250	4.506	1.583	1018/1026 DOM			6061-T6
	10	.134	3.232	4.817	1.692	1018/1026 DOM			

ROUND MECHANICAL TUBING

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
3 1/2 (Cont.)	5/32	.156	3.188	5.571	1.957	1018/1026 DOM HREW		304	
	7	.180	3.140	6.382	2.241	1020 HREW			
	3/16	.188	3.125	6.650	2.346	1018/1026 DOM HREW	4130	321	2024-T3 6061-T6
	7/32	.219	3.063	7.674	2.695	1018/1026 DOM			
	1/4	.250	3.000	8.678	3.060	1018/1026 DOM HREW	4130 HF4140	304 321	2024-T3 6061-T6
	——	.260	2.980	8.997	3.160	DOM			
	9/32	.281	2.938	9.660	3.393	1018/1026 DOM			
	5/16	.313	2.875	10.65	3.740	1018/1026 DOM	4130 4140		6061-T6
	11/32	.344	2.812	11.59	4.070	1018/1026			
	3/8	.375	2.750	12.52	4.397	1018/1026 DOM	HF4140 HF4140HT 4340	304 321	2024-T4 6061-T6
	7/16	.438	2.625	14.32	5.049	1018/1026	4130		2024-T4
	1/2	.500	2.500	16.02	5.651	1018/1026 DOM	4130 HF4140 HF4140HT	321	2024-T4 6061-T6
	9/16	.563	2.375	17.66	6.202	1018/1026	HF4140 HF4140HT		
	5/8	.625	2.250	19.19	6.740	1018/1026	4130 4140 HF4140HT 4340		
	11/16	.688	2.125	20.66	7.256	1018/1026	4130HT		
	3/4	.750	2.000	22.03	7.772	1018/1026	4140 HF4140 HF4140HT	321	2024-T4
	7/8	.875	1.750	24.53	8.615	1018/1026			
	1	1.000	1.500	26.70	9.377	1018/1026	HF4140		
3.530	——	.274	2.982	9.582	3.346	DOM			
3 5/8	16	.065	3.495	2.471	.8678	1018/1026			
	11	.120	3.385	4.492	1.578	1018/1026			
	3/16	.188	3.250	6.901	2.424	1018/1026 DOM			
	1/4	.250	3.125	9.011	3.165	1018/1026 DOM			
	5/16	.313	3.000	11.07	3.888	1018/1026 DOM			
	3/8	.375	2.875	13.02	4.573	1018/1026 DOM	4130 4140HT		
	7/16	.438	2.750	14.91	5.236	1018/1026	4140	304 321	
	1/2	.500	2.625	16.69	5.862	1018/1026 DOM	4140 HF4140 HF4340		
	9/16	.563	2.501	18.41	6.466	1018/1026			
	5/8	.625	2.375	20.03	7.035	1018/1026	HF4140HT		
	3/4	.750	1.875	21.03	7.386	1018/1026			
	1	1.000	1.625	28.04	9.848	1018/1026	HF4140		

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
3 3/4	18	.049	3.652	1.937	.6803	CREW			
	16	.065	3.620	2.558	.8984	HREW			
	14	.083	3.584	3.251	1.142	DOM		321	
	13	.095	3.560	3.708	1.302	1018/1026 DOM		321	
	11	.120	3.510	4.652	1.642	1018/1026 DOM	4140	321	2024-T3
	1/8	.125	3.500	4.839	1.699	DOM			
	10	.134	3.482	5.175	1.817	1018/1026 DOM			
	5/32	.156	3.437	5.988	2.103	1018/1026			
	7	.180	3.390	6.863	2.410	HREW			
	3/16	.188	3.375	7.152	2.519	1018/1026 DOM		321	2024-T3
	7/32	.219	3.312	8.259	2.854	DOM			
	4	.238	3.274	8.927	3.135	HREW			
	1/4	.250	3.250	9.345	3.295	1018/1026 DOM	4130	321	2024-T3 2024-T4 6061-T6
	——	.255	3.241	9.518	3.343	DOM			
	17/64	.266	3.242	9.898	3.476	1018/1026			
	9/32	.281	3.188	10.41	3.656	1018/1026			
	5/16	.313	3.125	11.49	4.035	1018/1026 DOM	4140		2024-T3
	11/32	.344	3.062	12.51	4.394	1018/1026			
	3/8	.375	3.000	13.52	4.748	1018/1026 DOM	4140 HF4140 HF4140HT	321	
	7/16	.438	2.875	15.49	5.440	1018/1026	4140		
	1/2	.500	2.750	17.36	6.120	1018/1026 DOM	4130 4140 HF4140HT	321	2024-T4 6061-T6
	9/16	.563	2.625	19.16	6.729	1018/1026	HF4140HT		
	5/8	.625	2.500	20.86	7.326	1018/1026	4130 4140 HF4140 HF4140HT	321	
	11/16	.688	2.374	22.50	7.902	1018/1026	4140 HF4140HT		
	3/4	.750	2.250	24.03	8.439	1018/1026 DOM	4140 HF4140 HF4140HT 4340	304	6061-T6
	7/8	.875	2.000	26.87	9.437	1018/1026	HF4140HT		
	1	1.000	1.750	29.37	10.31	1018/1026	4140		
	1 1/8	1.125	1.500	31.54	11.08		4140		
3.760	——	.380	3.000	13.72	4.818	DOM			

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See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
3 7/8	11	.120	3.635	4.812	1.691	1018/1026			
	1/8	.125	3.625	5.006	1.730	DOM			
	3/16	.188	3.500	7.403	2.599	1018/1026 DOM SS			
	——	.196	3.463	7.701	2.705	DOM			
	1/4	.250	3.375	9.679	3.399	1018/1026 DOM			
	5/16	.313	3.249	11.91	4.183	1018/1026 DOM			
	3/8	.375	3.125	14.02	4.924	1018/1026			
	7/16	.438	3.000	16.08	5.648	1018/1026 DOM			
	1/2	.500	2.875	18.02	6.329	1018/1026	HF4140HT		
	9/16	.563	2.750	19.91	6.992	1018/1026			
	5/8	.625	2.625	21.69	7.618	1018/1026	HF4140HT		
	11/16	.688	2.499	23.42	8.225	1018/1026			
	13/16	.813	2.249	26.59	9.338	1018/1026			
4	20	.035	3.930	1.482	.5205				5052-O 6061-T4 6061-T6
	19	.042	3.916	1.775	.6234				5052-O
	18	.049	3.402	2.068	.7263	HREW			5052-O 6061-0 6061-T4 6061-T6
	——	.050	3.900	2.109	.7407				5052-O 6063-T6
	16	.065	3.870	2.732	.9595	1018/1026 DOM CREW HREW		304 316 321	5052-O 6061-O 6061-T6
	15	.072	3.856	3.020	1.061				5052-O 6063-T6
	14	.083	3.834	3.472	1.224	1018/1026 DOM HREW			2024-T3 6061-O 6061-T6
	13	.095	3.810	3.962	1.397	1018/1026 DOM HREW		304	2024-T3
	12	.109	3.782	4.530	1.591	HREW			
	11	.120	3.760	4.973	1.754	1018/1026 DOM HREW		321	2024-T3
	1/8	.125	3.750	5.173	1.817	1018/1026 DOM			5052-O 6061-T6
	10	.134	3.732	5.533	1.943	1018/1026 DOM HREW			
	5/32	.156	3.687	6.404	2.249	1018/1026 DOM			
	7	.180	3.640	7.344	2.579	HREW			

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Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
4 (Cont.)	3/16	**.188**	3.625	**7.654**	2.703	1018/1026 DOM HREW	4130	304 316 321	2024-T3 6061-T6
	7/32	**.219**	3.563	**8.843**	3.105	1018/1026 DOM			
	5	**.220**	3.560	**8.881**	3.069	DOM			
	4	**.238**	3.524	**9.562**	3.358	HREW			
	1/4	**.250**	3.500	**10.01**	3.529	1018/1026 1025 DOM HREW	4130	304 321	2024-T3 6061-T6
	——	**.258**	3.485	**10.31**	3.621	DOM			
	9/32	**.281**	3.438	**11.16**	3.919	1018/1026 DOM	4140		
	5/16	**.313**	3.375	**12.33**	4.330	1018/1026 DOM	4130		
	11/32	**.344**	3.313	**13.43**	4.717		4130 4140		
	3/8	**.375**	3.250	**14.52**	5.120	1018/1026 DOM	4140 HF4140 HF4140HT 4340	304 316 321	2024-T3 2024-T4 6061-T6
	7/16	**.438**	3.125	**16.66**	5.875	1018/1026 DOM		304	2024-T4
	15/32	**.469**	3.062	**17.68**	6.209	1018/1026			
	1/2	**.500**	3.000	**18.69**	6.599	1018/1026 HF1018/1026 DOM	4130 4140 HF4140 HF4140HT	304 321	2024-T4 6061-T6
	9/16	**.563**	2.875	**20.67**	7.259	1018/1026 HF1018/1026			
	5/8	**.625**	2.750	**22.53**	7.946	1018/1026 HF1018/1026	4130 4140 HF4140 HF4140HT 4340	321	2024-T4
	3/4	**.750**	2.500	**26.03**	9.190	1018/1026 HF1018/1026	4140 HF4140 HF4140HT 4340	321	2024-T4
	13/16	**.813**	2.375	**27.67**	9.718		4130 4140		
	7/8	**.875**	2.250	**29.20**	10.26	1018/1026 HF1018/1026	HF4140HT	321	
	1	**1.000**	2.000	**32.04**	11.25	1018/1026 HF1018/1026	4130 4140 HF4140HT		6061-T6
	1 1/4	**1.250**	1.500	**36.71**	12.89	1018/1026 HF1018/1026			
	1 1/2	**1.500**	1.000	**40.05**	13.84	HF1018/1026			
4 1/16	9/32	**.281**	3.501	**11.35**	3.922	DOM			
	5/16	**.313**	3.437	**12.54**	4.332	DOM			

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
4 1/8	11	**.120**	3.885	**5.133**	1.803	1018/1026			
	——	**.185**	3.755	**7.755**	2.724	DOM			
	3/16	**.188**	3.749	**7.905**	2.776	1018/1026 DOM			
	1/4	**.250**	3.625	**10.35**	3.635	1018/1026 DOM			
	5/16	**.313**	3.500	**12.74**	4.474	1018/1026 DOM	4140		
	3/8	**.375**	3.375	**15.02**	5.275	1018/1026 DOM	4130 4140		
	7/16	**.438**	3.249	**17.25**	6.058	1018/1026 DOM			
	1/2	**.500**	3.125	**19.36**	6.799	1018/1026 DOM	4340		
	9/16	**.563**	3.000	**21.42**	7.523	1018/1026 HF1018/1026			
	5/8	**.625**	2.875	**23.36**	8.204	1018/1026 HF1018/1026			
	3/4	**.750**	2.625	**27.03**	9.493	1018/1026 HF1018/1026			
	1	**1.000**	2.125	**33.38**	11.72	1018/1026 HF1018/1026			
4 1/4	16	**.065**	4.120	**2.905**	1.004	CREW			
	14	**.083**	4.084	**3.694**	1.276				
	13	**.095**	4.060	**4.216**	1.481	1018/1026 DOM HREW			
	12	**.109**	4.032	**4.821**	1.666				
	11	**.120**	4.010	**5.293**	1.859	1018/1026 DOM HREW		304 321	
	1/8	**.125**	4.000	**5.507**	1.934	1018/1026 DOM			6061-T6
	10	**.134**	3.982	**5.890**	2.069	1018/1026 DOM			
	9	**.148**	3.954	**6.484**	2.240				
	5/32	**.156**	3.937	**6.821**	2.396	1018/1026 DOM			
	7	**.180**	3.890	**7.344**	2.579	HREW			
	3/16	**.188**	3.875	**8.156**	2.864	1018/1026 DOM	4130	321	
	6	**.203**	3.844	**8.774**	3.032				
	5	**.220**	3.810	**9.469**	3.272				
	1/4	**.250**	3.750	**10.68**	3.764	1018/1026 HF1018/1026 DOM HREW		321	2024-T3 2024-T4
	——	**.255**	3.740	**10.88**	3.821	DOM			

ROUND MECHANICAL TUBING

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Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
4 1/4 (Cont.)	5/16	**.313**	3.625	**13.16**	4.622	1018/1026 DOM	4140	304 321	
	——	**.344**	3.562	**14.35**	4.959	DOM			
	3/8	**.375**	3.500	**15.52**	5.477	1018/1026 DOM	4140	321	2024-T3 6061-T6
	7/16	**.438**	3.375	**17.83**	6.262	1018/1026 DOM		321	
	1/2	**.500**	3.250	**20.03**	7.069	1018/1026 HF1018/1026 DOM	4130 4140 HF4140 HF4140HT	321	2024-T4
	9/16	**.563**	3.125	**22.17**	7.786	1018/1026 HF1018/1026			
	5/8	**.625**	3.000	**24.20**	8.499	1018/1026 HF1018/1026	4140 HF4140 HF4140HT		
	11/16	**.688**	2.875	**26.17**	9.191	1018/1026 HF1018/1026	HF4140HT		
	3/4	**.750**	2.750	**28.04**	9.848	1018/1026 HF1018/1026	4130 4140 HF4140 HF4140HT	304	
	7/8	**.875**	2.500	**31.54**	11.08	1018/1026 HF1018/1026	HF4140HT		7075-T6
	15/16	**.938**	2.374	**33.18**	11.47		HF4140HT		
	1	**1.000**	2.250	**34.71**	12.25	1018/1026 HF1018/1026	HF4140 HF4140HT		2024-T4
	1 1/8	**1.125**	2.000	**37.55**	13.09		HF4140HT		
	1 1/4	**1.250**	1.750	**40.05**	14.07		HF4140HT		
4 3/8	3/16	**.188**	4.000	**8.407**	2.953	1018/1026 DOM			
	1/4	**.250**	3.875	**11.01**	3.867	1018/1026 DOM			
	9/32	**.281**	3.813	**12.29**	4.316	DOM			
	5/16	**.313**	3.749	**13.58**	4.769	1018/1026 DOM			
	3/8	**.375**	3.625	**16.02**	5.626	1018/1026 DOM	4140		
	7/16	**.438**	3.500	**18.42**	6.469	1018/1026			
	1/2	**.500**	3.375	**20.69**	7.266	1018/1026 DOM	4140		
	9/16	**.563**	3.250	**22.92**	8.050	1018/1026			
	5/8	**.625**	3.125	**25.03**	8.791	1018/1026 HF1018/1026			
	11/16	**.688**	3.000	**27.09**	9.514		4130HT		
	3/4	**.750**	2.875	**29.04**	10.20	1018/1026 HF1018/1026			
	7/8	**.875**	2.625	**32.71**	11.49		4340		
	1	**1.000**	2.375	**36.05**	12.46	HF1018/1026			
4.385	9/32	**.281**	3.823	**12.32**	4.256	DOM			

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
4 1/2	20	**.035**	4.430	**1.669**	.5862				5052-O 6061-O 6061-T6
	18	**.049**	4.402	**2.329**	.8179			304	5052-O 6061-0 6061-T6
	16	**.065**	4.370	**3.079**	1.081	CREW HREW		304 316	6061-O 6061-T6
	15	**.072**	3.856	**3.020**	1.061				5052-O 6063-T6
	14	**.083**	4.334	**3.915**	1.375	HREW			6061-O
	13	**.095**	4.310	**4.469**	1.570	1018/1026 DOM		321 347	
	11	**.120**	4.260	**5.613**	1.979	1018/1026 DOM HREW			2024-T3
	1/8	**.125**	4.250	**5.841**	2.051	1018/1026 DOM			6061-T6
	10	**.134**	4.232	**6.248**	2.159	DOM HREW			
	5/32	**.156**	4.188	**7.237**	2.542	1018/1026 DOM			
	7	**.180**	3.640	**7.344**	2.579	HREW			
	3/16	**.188**	4.125	**8.658**	3.050	1018/1026 DOM		321	2024-T4
	7/32	**.219**	4.062	**10.01**	3.516	1018/1026			
	5	**.220**	4.060	**10.06**	3.475	DOM CREW HREW			
	1/4	**.250**	4.000	**11.35**	4.009	1018/1026 HF1018/1026 DOM HREW		304 321	2024-T3 2024-T4 6061-T6
	——	**.260**	3.980	**11.77**	4.134	DOM			
	5/16	**.313**	3.875	**14.00**	4.939	1018/1026 DOM	HF4140		2024-T4
	3/8	**.375**	3.750	**16.52**	5.824	1018/1026 DOM	4130 HF4140HT	321	2024-T3 2024-T3 6061-T6
	7/16	**.438**	3.625	**19.00**	6.701	1018/1026 DOM	4140		2024-T4
	1/2	**.500**	3.500	**21.36**	7.538	1018/1026 HF1018/1026 DOM	4130 4140 HF4140 HF4140HT	321	2024-T4 6061-T6
	9/16	**.563**	3.375	**23.67**	8.313	1018/1026			
	5/8	**.625**	3.250	**25.87**	9.129	1018/1026 HF1018/1026	4140 HF4140 HF4140HT	321	2024-T4

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
4 1/2 (Cont.)	11/16	**.688**	3.125	**28.01**	9.837	1018/1026 HF1018/1026			
	3/4	**.750**	3.000	**30.04**	10.60	1018/1026 HF1018/1026	4140 HF4140 HF4140HT	304 321	2024-T4 6061-T6
	7/8	**.875**	2.750	**33.88**	11.90	1018/1026 HF1018/1026	HF4140HT		
	1	**1.000**	2.500	**37.38**	13.13	1018/1026 HF1018/1026 1040 DOM	HF4140 HF4140HT		6061-T6
	1 1/8	**1.125**	2.250	**40.55**	14.01		HF4140HT		
	1 1/4	**1.250**	2.000	**43.39**	15.24	1018/1026 HF1018/1026	HF4140HT		
	1 1/2	**1.500**	1.500	**48.06**	16.88	HF1018/1026	HF4140HT		
4.524	——	**.325**	3.874	**14.57**	5.117	DOM			
4.530	——	**.275**	3.980	**12.50**	4.390	DOM			
4-5/8	3/16	**.188**	4.251	**8.909**	3.129	1018/1026 DOM			
	1/4	**.250**	4.125	**11.68**	4.102	1018/1026			
	5/16	**.313**	4.000	**14.41**	5.061	1018/1026 DOM			
	3/8	**.375**	3.875	**17.02**	5.977	1018/1026 DOM		321	
	1/2	**.500**	3.625	**22.03**	7.737	1018/1026 HF1018/1026		347	
	9/16	**.563**	3.500	**24.42**	8.576		4140		
	5/8	**.625**	3.375	**26.70**	9.377	1018/1026 HF1018/1026			
	3/4	**.750**	3.125	**31.04**	10.90	1018/1026			
	13/16	**.813**	2.999	**33.10**	11.62	1018/1026			
	7/8	**.875**	2.875	**35.04**	12.31	1018/1026	4140		
	15/16	**.938**	2.749	**36.94**	12.97	1018/1026			
	1	**1.000**	2.625	**38.72**	13.60	1018/1026 HF1018/1026			
4 3/4	14	**.083**	4.584	**4.137**	1.430				
	13	**.095**	4.560	**4.723**	1.659	1018/1026			
	11	**.120**	4.510	**5.934**	2.084	1018/1026 DOM		321	
	1/8	**.125**	4.500	**6.174**	2.168	1018/1026 DOM			
	7	**.180**	4.390	**8.785**	3.085	HREW			
	3/16	**.188**	4.375	**9.160**	3.217	1018/1026 DOM		321	
	4	**.238**	4.274	**11.47**	4.028	HREW			
	1/4	**.250**	4.250	**12.02**	4.243	1018/1026 DOM		321	2024-T4

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
4 3/4 (Cont.)	5/16	**.313**	4.125	**14.83**	5.208	1018/1026 DOM			
	3/8	**.375**	4.000	**17.52**	6.153	1018/1026 DOM	HF4140HT	321	6061-T6
	7/16	**.438**	3.875	**20.17**	7.100	1018/1026		321	2024-T4
	1/2	**.500**	3.750	**22.70**	7.972	1018/1026 HF1018/1026 DOM	4130 HF4140 HF4140HT	321	6061-T6
	9/16	**.563**	3.624	**25.18**	8.843	1018/1026 HF1018/1026			
	5/8	**.625**	3.500	**27.53**	9.721	1018/1026 HF1018/1026	4140 HF4140 HF4140HT	304 321	2024-T4
	11/16	**.687**	3.375	**29.81**	10.47				
	3/4	**.750**	3.250	**32.04**	11.25	1018/1026 HF1018/1026	HF4140 HF4140HT		7075-T6
	7/8	**.875**	3.000	**36.21**	12.72	1018/1026 HF1018/1026	HF4140 HF4140HT	321	
	1	**1.000**	2.750	**40.05**	14.07	1018/1026 HF1018/1026	4130 4140 HF4140 HF4140HT		
	1 1/16	**1.063**	2.625	**41.86**	14.70		4140		
	1 1/8	**1.125**	2.500	**43.50**	15.29	1018/1026 HF1018/1026	HF4140HT		
	1 1/4	**1.250**	2.250	**46.73**	16.41	HF1018/1026	HF4140 HF4140HT		
4 7/8	5/16	**.313**	4.249	**15.25**	5.356	1018/1026			
	7/16	**.438**	3.999	**20.76**	7.291	1018/1026 HF1018/1026			
	1/2	**.500**	3.875	**23.36**	8.204	1018/1026 HF1018/1026			
	9/16	**.563**	3.750	**25.93**	9.107	1018/1026			
	3/4	**.750**	3.375	**33.04**	11.77	HF1018/1026			
	1	**1.000**	2.875	**41.39**	14.76	HF1018/1026			
	1 9/32	**1.281**	2.313	**49.17**	17.27		4340		
5	20	**.035**	4.930	**1.856**	.6518				6061-T6
	19	**.042**	4.916	**2.224**	.7811				5052-O
	18	**.049**	4.902	**2.591**	.9100				6061-T6
	16	**.065**	4.870	**3.426**	1.203	CREW HREW		304	6061-O
	14	**.083**	4.834	**4.359**	1.506	HREW			
	13	**.095**	4.810	**4.977**	1.754	HREW			
	12	**.109**	4.782	**5.694**	1.967	HREW			
	11	**.120**	4.760	**6.254**	2.203	1018/1026 DOM HREW		304	2024-T3

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
5 (Cont.)	1/8	**.125**	4.750	**6.508**	2.286	1018/1026 DOM			6061-T6
	10	**.134**	4.732	**6.954**	2.442	1018/1026 DOM			
	9	**.148**	4.704	**7.669**	2.650				
	5/32	**.156**	4.687	**8.070**	2.834	1018/1026 DOM			
	7	**.180**	4.640	**9.266**	3.254	HREW			
	3/16	**.188**	4.625	**9.662**	3.393	1018/1026 DOM HREW		321	6061-T6
	6	**.203**	4.594	**10.40**	3.594				
	5	**.220**	4.560	**11.23**	3.881				
	1/4	**.250**	4.500	**12.68**	4.478	1018/1026 DOM HREW	4130	304 321	2024-T3 2024-T4 6061-T6
	5/16	**.313**	4.375	**15.67**	5.503	1018/1026 DOM			
	3/8	**.375**	4.250	**18.52**	6.538	1018/1026 DOM	HF4140	304	2024-T4 6061-T4
	7/16	**.438**	4.125	**21.34**	7.495	1018/1026 DOM	4140		
	1/2	**.500**	4.000	**24.03**	8.475	1018/1026 HF1018/1026 DOM	4130 4140 HF4140 HF4140HT	321	2024-T4 6061-T6 7075-T6
	9/16	**.563**	3.876	**26.68**	9.370	1018/1026 HF1018/1026			
	5/8	**.625**	3.750	**29.20**	10.30	1018/1026 HF1018/1026	HF4140 HF4140HT 4340	321	2024-T4
	3/4	**.750**	3.500	**34.04**	12.02	1018/1026 HF1018/1026	4140 HF4140 HF4140HT 4340	321	2024-T4 6061-T6
	7/8	**.875**	3.250	**38.55**	13.54	1018/1026 HF1018/1026	HF4140HT		
	1	**1.000**	3.000	**42.72**	15.08	1018/1026 HF1018/1026	4130 4140 HF4140 HF4140HT		2024-T4 6061-T6
	1 1/8	**1.125**	2.750	**46.56**	16.35	1018/1026	HF4140 HF4140HT		
	1 1/4	**1.250**	2.500	**50.06**	17.58	1018/1026 HF1018/1026	4140 HF4140HT 4340		
	1 5/16	**1.313**	2.375	**51.70**	18.16		4340		
	1 1/2	**1.500**	2.000	**56.07**	19.69	HF1018/1026	HF4140 HF4140HT		

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
5 1/8	3/16	**.188**	4.749	**9.913**	3.481	1018/1026			
	5/16	**.313**	4.501	**16.09**	5.561	1018/1026 DOM			
	3/8	**.375**	4.375	**19.02**	6.680	1018/1026 DOM			
	1/2	**.500**	4.125	**24.70**	8.675	1018/1026 HF1018/1026			2024-T3
	5/8	**.625**	3.875	**30.04**	10.55	1018/1026 HF1018/1026	4140		
	3/4	**.750**	3.625	**35.04**	12.31	1018/1026			
	1	**1.000**	3.125	**44.06**	15.47	1018/1026 HF1018/1026			
	1 3/16	**1.188**	2.749	**49.95**	17.26		HF4140		
	1 1/4	**1.250**	2.625	**51.73**	18.17		HF4140		
5 1/4	14	**.083**	5.084	**4.580**	1.583				
	13	**.095**	5.060	**5.230**	1.807				
	12	**.109**	5.032	**5.985**	2.068				
	11	**.120**	5.010	**6.575**	2.309	1018/1026 DOM			
	1/8	**.125**	5.000	**6.842**	2.403	DOM			
	10	**.134**	4.982	**7.322**	2.530				
	9	**.148**	4.954	**8.064**	2.787				
	7	**.180**	4.890	**9.747**	3.368				
	3/16	**.188**	4.875	**10.16**	3.568	1018/1026 DOM			
	1/4	**.250**	4.750	**13.35**	4.689	1018/1026 DOM	4130		
	5/16	**.313**	4.625	**16.50**	5.796	1018/1026 DOM	4140		
	3/8	**.375**	4.500	**19.52**	6.855	1018/1026 DOM	4130 HF4140HT		
	7/16	**.438**	4.374	**22.51**	7.906	1018/1026			
	1/2	**.500**	4.250	**25.37**	8.910	1018/1026 HF1018/1026 DOM	HF4140HT	321	
	9/16	**.563**	4.125	**28.18**	9.897		HF4140HT		
	5/8	**.625**	4.000	**30.87**	10.89	1018/1026 HF1018/1026	4140 HF4140 HF4140HT		2024-T4
	3/4	**.750**	3.750	**36.05**	12.72	1018/1026 HF1018/1026	HF4140 HF4140HT		2024-T4
	7/8	**.875**	3.500	**40.88**	14.36	1018/1026 HF1018/1026	HF4140HT		
	1	**1.000**	3.250	**45.39**	15.94	1018/1026 HF1018/1026	4130HT HF4140 HF4140HT		
	1 1/8	**1.125**	3.000	**49.56**	17.41	1018/1026	HF4140HT		
	1 1/4	**1.250**	2.750	**53.40**	18.75	1018/1026 HF1018/1026	4130 HF4140 HF4140HT		
5 3/8	3/16	**.188**	5.000	**10.41**	3.656	1018/1026 DOM			
	17/32	**.531**	4.313	**27.47**	9.647	1018/1026			
	9/16	**.563**	4.249	**28.93**	10.16	1018/1026	4130		

ROUND MECHANICAL TUBING

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Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
5 1/2	16	**.065**	5.370	**3.773**	1.325	CREW			
	14	**.083**	5.334	**4.802**	1.659	HREW			
	13	**.095**	5.310	**5.484**	1.895	HREW			
	12	**.109**	5.282	**6.276**	2.169				
	11	**.120**	5.260	**6.895**	2.422	1018/1026 DOM HREW			
	10	**.134**	5.232	**7.679**	2.654				
	9	**.148**	5.204	**8.460**	2.923				
	7	**.180**	5.140	**10.23**	3.534				
	3/16	**.188**	5.125	**10.67**	3.751	1018/1026 DOM			
	6	**.203**	5.094	**11.48**	3.968				
	5	**.220**	5.060	**12.41**	4.287				
	1/4	**.250**	5.000	**14.02**	4.947	1018/1026 DOM HREW		304 321 347	2024-T4 6061-T6
	——	**.258**	4.985	**14.44**	5.071	DOM			
	5/16	**.313**	4.875	**17.34**	6.090	1018/1026 DOM			
	3/8	**.375**	4.750	**20.53**	7.210	1018/1026 DOM	4130		2024-T3 6061-T6
	1/2	**.500**	4.500	**26.70**	9.425	1018/1026 HF1018/1026 DOM	HF4140HT 4340		2024-T4 6061-T6
	9/16	**.563**	4.375	**29.69**	10.43	1018/1026	HF4140HT		
	5/8	**.625**	4.250	**32.54**	11.43	1018/1026 HF1018/1026	4130 HF4140 HF4140HT		2024-T4
	3/4	**.750**	4.000	**38.05**	13.42	1018/1026 HF1018/1026	HF4140 HF4140HT		2024-T4
	13/16	**.813**	3.875	**40.70**	14.29		HF4140HT		
	7/8	**.875**	3.750	**43.22**	15.18	1018/1026 HF1018/1026	HF4140HT	321	6061-T6 7075-T6
	1	**1.000**	3.500	**48.06**	16.87	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 1/8	**1.125**	3.250	**52.57**	18.46	1018/1026	HF4140 HF4140HT		
	1 1/4	**1.250**	3.000	**56.74**	19.93	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 1/2	**1.500**	2.500	**64.08**	22.50	1018/1026 HF1018/1026	4140 HF4140 HF4140HT		
5.535	——	**.278**	4.979	**15.61**	5.482	DOM			
5 5/8	5/16	**.313**	5.000	**17.76**	6.237	1018/1026 DOM			
	3/8	**.375**	4.875	**21.03**	7.386	1018/1026			
	5/8	**.625**	4.375	**33.38**	11.72	1018/1026			
	1 7/16	**1.438**	2.749	**64.30**	22.22	1018/1026			

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
5 3/4	14	**.083**	5.584	**5.023**	1.736				
	13	**.095**	5.560	**5.738**	1.983				
	12	**.109**	5.532	**6.567**	2.269				
	11	**.120**	5.510	**7.215**	2.534	1018/1026			
	10	**.134**	5.482	**8.421**	2.910				
	9	**.148**	5.454	**8.255**	3.060				
	7	**.180**	5.390	**10.61**	3.667				
	3/16	**.188**	5.375	**11.17**	3.923	1018/1026 DOM			
	7/32	**.219**	5.312	**12.94**	4.545	1018/1026			
	5	**.220**	5.310	**12.99**	4.490				
	1/4	**.250**	5.250	**14.69**	5.182	1018/1026 DOM			2024-T4
	5/16	**.313**	5.125	**18.18**	6.385	1018/1026			
	3/8	**.375**	5.000	**21.53**	7.561	1018/1026 DOM			
	25/64	**.391**	4.968	**22.38**	7.860	DOM			
	1/2	**.500**	4.750	**28.04**	9.848	1018/1026 HF1018/1026 DOM	4130 HF4140 HF4140HT		
	5/8	**.625**	4.500	**34.21**	12.01	1018/1026 HF1018/1026	HF4140HT		
	3/4	**.750**	4.250	**40.05**	14.07	1018/1026 HF1018/1026	4130HT HF4140 HF4140HT		
	7/8	**.875**	4.000	**45.56**	16.00	1018/1026 HF1018/1026	HF4140HT 4340		
	1	**1.000**	3.750	**50.73**	17.82	1018/1026 HF1018/1026	4140 HF4140 HF4140HT		
	1 1/8	**1.125**	3.500	**55.57**	19.52		HF4140		
	1 1/4	**1.250**	3.250	**60.08**	21.10	1018/1026 HF1018/1026			2024-T4
	1 3/8	**1.375**	3.000	**64.25**	22.56	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 1/2	**1.500**	2.750	**68.09**	23.91		HF4130 HF4140		
	1 3/4	**1.750**	2.250	**74.76**	26.26		HF4140HT		
	1 7/8	**1.875**	2.000	**77.60**	27.25		HF4140HT		
5 7/8	1/4	**.250**	5.375	**15.02**	5.275	1018/1026			
	1/2	**.500**	4.875	**28.70**	10.08	1018/1026			
6	16	**.065**	5.870	**4.120**	1.445	HREW CREW		304	
	14	**.083**	5.834	**5.245**	1.842			304	6063-T6
	13	**.095**	5.810	**5.991**	2.070				
	12	**.109**	5.782	**6.858**	2.370	HREW			
	11	**.120**	5.760	**7.536**	2.647	1018/1026 HREW		304	
	1/8	**.125**	5.750	**7.843**	2.754	1018/1026 DOM			6061-T6
	10	**.134**	5.732	**8.395**	2.948	1018/1026			

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
6	9	**.148**	5.704	**9.718**	3.358				
(Cont.)	5/32	**.156**	5.688	**9.737**	3.420	1018/1026			
	7	**.180**	5.640	**11.19**	3.866				
	3/16	**.188**	5.625	**11.67**	4.121	1018/1026 DOM HREW		304 321	2024-T3 6061-T6
	6	**.203**	5.594	**12.57**	4.343				
	5	**.220**	5.560	**13.58**	4.693				
	1/4	**.250**	5.500	**15.35**	5.416	1018/1026 HF1018/1026 DOM		304 321	2024-T4 6061-T6
	5/16	**.313**	5.375	**19.01**	6.676	1018/1026 DOM		321	
	3/8	**.375**	5.250	**22.53**	7.946	1018/1026 DOM	HF4140HT	321	2024-T4 6061-T6
	7/16	**.438**	5.125	**26.02**	9.138	1018/1026 HF1018/1026			
	1/2	**.500**	5.000	**29.37**	10.36	1018/1026 HF1018/1026 DOM	HF4140 HF4140HT 4340	321	2024-T4 6061-T6
	9/16	**.563**	4.876	**32.69**	11.48	1018/1026 HF1018/1026			
	5/8	**.625**	4.750	**35.88**	12.60	1018/1026 HF1018/1026	HF4140 HF4140HT	321	
	3/4	**.750**	4.500	**42.05**	14.48	1018/1026 HF1018/1026 1030	HF4140 HF4140HT	321	2024-T4 6061-T6
	7/8	**.875**	4.250	**47.89**	16.82	1018/1026 HF1018/1026	HF4140HT	321	
	1	**1.000**	4.000	**53.40**	18.84	1018/1026 HF1018/1026	4130 HF4140 HF4140HT		2024-T4 6061-T6 7075-T6
	1 1/8	**1.125**	3.750	**58.57**	20.57	1018/1026			
	1 1/4	**1.250**	3.500	**63.41**	22.27	1018/1026 HF1018/1026	HF4140HT		
	1 3/8	**1.375**	3.250	**67.92**	23.85		HF4140 HF4140HT		
	1 1/2	**1.500**	3.000	**72.09**	25.32	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 3/4	**1.750**	2.500	**79.43**	27.44		HF4140HT		
6 1/8	5/16	**.313**	5.510	**19.43**	6.824	1018/1026			
	3/8	**.375**	5.375	**23.03**	8.008	1018/1026			
	1/2	**.500**	5.125	**30.04**	10.55	1018/1026	4340		
6 1/4	11	**.120**	6.010	**7.856**	2.759	1018/1026 DOM			
	1/8	**.125**	6.000	**8.177**	2.872	1018/1026 DOM			
	3/16	**.188**	5.875	**12.17**	4.274	1018/1026 DOM			
	1/4	**.250**	5.750	**16.02**	5.626	1018/1026 DOM			

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
6 1/4	5/16	**.313**	5.625	**19.85**	6.971	1018/1026			
(Cont.)	3/8	**.375**	5.500	**23.53**	8.264	1018/1026 DOM			
	1/2	**.500**	5.250	**30.71**	10.79	1018/1026 HF1018/1026 DOM	4140 HF4140 HF4140HT		
	5/8	**.625**	5.000	**37.55**	13.19	1018/1026 HF1018/1026	4140 HF4140HT		
	3/4	**.750**	4.750	**44.06**	15.47	1018/1026 HF1018/1026	HF4140 HF4140HT		
	7/8	**.875**	4.500	**50.23**	17.36	1018/1026	HF4140HT		
	1	**1.000**	4.250	**56.07**	19.79	1018/1026 HF1018/1026	HF4140 HF4140HT		2024-T4
	1 1/8	**1.125**	4.000	**61.58**	21.63	1018/1026			
	1 1/4	**1.250**	3.750	**66.75**	23.44	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 1/2	**1.500**	3.250	**76.10**	26.73	HF1018/1026	HF4140 HF4140HT		
	1 5/8	**1.625**	3.000	**80.27**	28.19		HF4140HT		
	2	**2.000**	2.250	**90.78**	31.88		HF4140HT		
6 3/8	3/16	**.188**	5.999	**12.42**	4.362	1018/1026 DOM			
6 1/2	3/16	**.188**	6.124	**12.67**	4.450	1018/1026 DOM			
	1/4	**.250**	6.000	**16.69**	5.862	1018/1026 DOM		316	6061-T6
	3/8	**.375**	5.750	**24.53**	8.615	1018/1026 HF1018/1026 DOM	HF4140HT		6061-T6
	1/2	**.500**	5.500	**32.04**	11.25	1018/1026 HF1018/1026 DOM	HF4140 HF4140HT		6061-T6
	9/16	**.563**	5.375	**35.70**	12.34	HF1018/1026			
	5/8	**.625**	5.250	**39.22**	13.84	1018/1026 HF1018/1026	HF4140 HF4140HT		2024-T4
	3/4	**.750**	5.000	**46.06**	16.18	1018/1026 HF1018/1026	HF4140HT		
	7/8	**.875**	4.750	**52.57**	18.46	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1	**1.000**	4.500	**58.74**	20.48	1018/1026 HF1018/1026	HF4140 HF4140HT		2024-T4 6061-T6
	1 1/8	**1.125**	4.250	**64.58**	22.32	HF1018/1026	HF4140HT		
	1 1/4	**1.250**	4.000	**70.09**	24.62	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 3/8	**1.375**	3.750	**75.26**	26.43		HF4140 HF4140HT		
	1 1/2	**1.500**	3.500	**80.10**	28.13	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 5/8	**1.625**	3.250	**84.61**	29.72		HF4140HT		
	1 3/4	**1.750**	3.000	**88.78**	31.18	HF1018/1026	HF4140		
	2	**2.000**	2.500	**96.12**	33.76		HF4140		
	2 1/8	**2.125**	2.250	**99.29**	34.87		HF4140HT		
	2 1/4	**2.250**	2.000	**102.1**	35.86		HF4140		

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
6 5/8	7/32	**.219**	6.187	**14.98**	5.261	1018/1026			
	5/16	**.313**	6.000	**21.10**	7.410	1018/1026 DOM			
	——	**.320**	5.985	**21.55**	7.568	DOM			
	7/16	**.438**	5.750	**28.94**	10.16	1018/1026			
	1/2	**.500**	5.625	**32.71**	11.49	1018/1026			
	7/8	**.875**	4.875	**53.73**	18.87	1018/1026			
	1	**1.000**	4.625	**60.08**	21.10	1018/1026 HF1018/1026			
	1 1/4	**1.250**	4.125	**71.76**	24.80	HF1018/1026			
6 3/4	3/16	**.188**	6.375	**13.18**	4.629	1018/1026			
	1/4	**.250**	6.250	**17.36**	6.097	1018/1026 DOM			
	3/8	**.375**	6.000	**25.53**	8.966	1018/1026 DOM	HF4140	304	
	1/2	**.500**	5.750	**33.38**	11.72	1018/1026 DOM	HF4140HT		
	5/8	**.625**	5.500	**40.88**	14.36	1018/1026 HF1018/1026			
	3/4	**.750**	5.250	**48.06**	16.88	1018/1026 HF1018/1026	HF4140 HF4140HT		
	7/8	**.875**	5.000	**54.90**	18.97	1018/1026 HF1018/1026			
	1	**1.000**	4.750	**61.41**	21.57	1018/1026 HF1018/1026	HF4140		
	1 1/8	**1.125**	4.250	**67.58**	23.35		HF4140HT		
	1 1/4	**1.250**	4.250	**73.43**	25.79	HF1018/1026			
	1 3/8	**1.375**	4.000	**78.93**	27.27		HF4140HT		
	1 5/8	**1.625**	3.500	**88.49**	31.24		HF4140		
7	3/16	**.188**	6.625	**13.68**	4.804	1018/1026 DOM			
	1/4	**.250**	6.500	**18.02**	6.329	1018/1026 DOM			
	5/16	**.313**	6.374	**22.35**	7.849	1018/1026			
	3/8	**.375**	6.250	**26.53**	9.317	1018/1026 DOM			
	1/2	**.500**	6.000	**34.71**	12.19	1018/1026 HF1018/1026 DOM	HF4140 HF4140HT	321	
	9/16	**.563**	5.874	**38.70**	13.59		HF4140		
	5/8	**.625**	5.750	**42.55**	14.94	1018/1026 HF1018/1026	HF4140 HF4140HT		7075-T6
	3/4	**.750**	5.500	**50.06**	17.58	1018/1026 HF1018/1026	HF4140 HF4140HT		6061-T6
	7/8	**.875**	5.250	**57.24**	20.10	1018/1026			
	15/16	**.938**	5.125	**60.73**	21.33				
	1	**1.000**	5.000	**64.08**	22.50	1018/1026 HF1018/1026	HF4140 HF4140HT		2024-T3
	1 1/4	**1.250**	4.500	**76.76**	29.69	1018/1026 HF1018/1026	HF4140HT		
	1 1/2	**1.500**	4.000	**88.11**	30.94	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 5/8	**1.625**	3.750	**93.28**	32.75		HF4140HT		
	2	**2.000**	3.000	**106.8**	37.51		HF4140		

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
7 1/4	3/16	**.188**	6.974	**14.18**	4.980	1018/1026			
	1/4	**.250**	6.750	**18.69**	6.564	1018/1026 DOM			
	5/16	**.313**	6.625	**23.19**	8.144	1018/1026			
	3/8	**.375**	6.500	**27.53**	9.669	1018/1026 DOM			
	7/16	**.438**	6.374	**31.87**	11.19	1018/1026			
	1/2	**.500**	6.250	**36.05**	12.66	1018/1026 HF1018/1026	HF4140 HF4140HT		
	5/8	**.625**	6.000	**44.22**	15.53	1018/1026 HF1018/1026	HF4140HT		
	3/4	**.750**	5.750	**52.07**	18.29	1018/1026 HF1018/1026	HF4140 HF4140HT		
	7/8	**.875**	5.500	**59.57**	20.92	1018/1026	4340		
	1	**1.000**	5.250	**66.75**	23.44	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 1/4	**1.250**	4.750	**80.10**	28.13		HF4140HT		
	1 1/2	**1.500**	4.250	**92.11**	31.83		HF4140HT		
	1 5/8	**1.625**	4.000	**97.62**	33.73	HF1018/1026			
7 1/2	1/4	**.250**	7.000	**19.36**	6.799	1018/1026 DOM			6061-T6
	5/16	**.313**	6.874	**24.02**	8.436	1018/1026			
	3/8	**.375**	6.750	**28.54**	10.02	1018/1026 DOM	4130		
	1/2	**.500**	6.500	**37.38**	13.13	1018/1026 HF1018/1026 DOM	4130 HF4140HT	321	6061-T6
	5/8	**.625**	6.250	**45.89**	16.12	1018/1026 HF1018/1026	HF4140HT		
	3/4	**.750**	6.000	**54.07**	18.99	1018/1026 HF1018/1026	HF4140 HF4140HT		7075-T6
	7/8	**.875**	5.750	**61.91**	21.74	1018/1026	HF4140HT		
	1	**1.000**	5.500	**69.42**	24.38	1018/1026 HF1018/1026	HF4140HT		6061-T6
	1 1/4	**1.250**	5.000	**83.44**	29.30	1018/1026 HF1018/1026	HF4140HT		
	1 1/2	**1.500**	4.500	**96.12**	33.76	1018/1026 HF1018/1026	HF4140HT		
	1 3/4	**1.750**	4.000	**107.5**	37.13		HF4140HT		
7 5/8	1/4	**.250**	7.125	**19.69**	6.915	1018/1026			
	5/16	**.313**	7.000	**24.44**	8.583	1018/1026			
	3/8	**.375**	6.875	**29.04**	10.20	1018/1026			
	1/2	**.500**	6.625	**38.05**	13.36	1018/1026 HF1018/1026			
	5/8	**.625**	6.375	**46.73**	16.41	1018/1026 HF1018/1026			
	3/4	**.750**	6.125	**55.07**	19.34	1018/1026 HF1018/1026			
	7/8	**.875**	5.875	**63.08**	22.15	1018/1026 HF1018/1026			
	1	**1.000**	5.625	**70.76**	24.85	1018/1026			

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
7 3/4	3/16	**.188**	7.374	**15.18**	5.331	1018/1026			
	1/4	**.250**	7.250	**20.03**	7.035	1018/1026 DOM			
	3/8	**.375**	7.000	**29.54**	10.37	1018/1026			
	1/2	**.500**	6.750	**38.72**	13.60	1018/1026 DOM	HF4140 HF4140HT		
	5/8	**.625**	6.500	**47.56**	16.70	HF1018/1026	HF4140HT		
	3/4	**.750**	6.250	**56.07**	19.69	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1	**1.000**	5.750	**72.09**	24.91	1018/1026 HF1018/1026	4130HT HF4140HT		
	1 1/4	**1.250**	5.250	**86.78**	30.48	HF1018/1026			
	1 3/8	**1.375**	5.000	**93.62**	32.88	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 1/2	**1.500**	4.750	**100.1**	34.60		HF4140HT		
	1 3/4	**1.750**	4.250	**112.1**	38.75		HF4140		
8	3/16	**.188**	7.625	**15.69**	5.510	1018/1026		304	
	1/4	**.250**	7.500	**20.69**	7.303	1018/1026 DOM		316 321	2024-T4
	3/8	**.375**	7.250	**30.54**	10.73	1018/1026 HF1018/1026 DOM		321	
	1/2	**.500**	7.000	**40.05**	14.07	1018/1026 HF1018/1026 DOM	HF4140	321	6061-T6
	5/8	**.625**	6.750	**49.23**	17.29	1018/1026 HF1018/1026	HF4140 HF4140HT	304	
	3/4	**.750**	6.500	**58.07**	20.39	1018/1026 HF1018/1026	HF4140 HF4140HT	304	6061-T6 7075-T6
	7/8	**.875**	6.250	**66.58**	23.38	1018/1026	HF4140HT		
	1	**1.000**	6.000	**74.76**	26.38	1018/1026 HF1018/1026	HF4140 HF4140HT		2024-T4 6061-T6
	1 3/16	**1.188**	5.625	**86.43**	30.35		HF4140		
	1 1/4	**1.250**	5.500	**90.11**	31.65	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 1/2	**1.500**	5.000	**104.1**	36.56	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 3/4	**1.750**	4.500	**116.8**	41.02	HF1018/1026	HF4140HT		
	2	**2.000**	4.000	**128.2**	44.28	HF1018/1026			
8 1/4	1/4	**.250**	7.750	**21.36**	7.502	1018/1026			
	3/8	**.375**	7.500	**31.54**	10.90	1018/1026			
	1/2	**.500**	7.250	**41.39**	14.54	1018/1026 HF1018/1026	HF4140 HF4140HT		
	5/8	**.625**	7.000	**50.60**	17.59	1018/1026	HF4140HT		
	3/4	**.750**	6.750	**60.08**	21.10	1018/1026 HF1018/1026	HF4140HT		
	7/8	**.875**	6.500	**68.92**	24.20	1018/1026 HF1018/1026			
	1	**1.000**	6.250	**77.43**	27.19	1018/1026 HF1018/1026	HF4140HT		
	1 1/8	**1.125**	6.000	**85.61**	30.07		4130 HF4140 HF4140HT		
	1 1/4	**1.250**	5.750	**93.45**	32.82		HF4140 HF4140HT		
	1 1/2	**1.500**	5.250	**108.1**	37.37	HF1018/1026	HF4140HT		
	1 9/16	**1.625**	5.000	**115.0**	39.73		HF4140HT		

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
8 1/2	1/4	**.250**	8.000	**22.03**	7.737	1018/1026 DOM			
	5/16	**.313**	7.875	**27.37**	1018				
	3/8	**.375**	7.750	**32.54**	11.43	1018/1026 HF1018/1026 DOM			
	1/2	**.500**	7.5000	**42.72**	15.05	1018/1026 HF1018/1026 DOM	HF4140 HF4140HT		
	5/8	**.625**	7.250	**52.57**	18.46	HF1018/1026	HF4140HT		
	3/4	**.750**	7.000	**62.08**	21.80	1018/1026 HF1018/1026	HF4140 HF4140HT		
	7/8	**.875**	6.750	**71.26**	25.03	HF1018/1026	HF4140 HF4140HT		
	1	**1.000**	6.500	**80.10**	28.13	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 1/8	**1.125**	6.250	**88.61**	30.62		HF4140HT		
	1 1/4	**1.250**	6.000	**96.79**	33.99	HF1018/1026	HF4140 HF4140HT		
	1 3/8	**1.375**	5.750	**104.6**	36.15		HF4140HT		
	1 1/2	**1.500**	5.500	**112.1**	38.75	HF1018/1026	HF4140 HF4140HT		
	2	**2.000**	4.500	**138.8**	47.98	HF1018/1026	HF4140HT		
	2 1/4	**2.250**	4.000	**150.2**	51.90		HF4140		
8 5/8	1/4	**.250**	8.125	**22.26**	7.818	1018/1026			
	3/8	**.375**	7.875	**33.04**	11.60	1018/1026			
	1/2	**.500**	7.625	**43.39**	15.24	1018/1026			
	5/8	**.625**	7.375	**53.40**	18.75	1018/1026			
	1	**1.000**	6.625	**81.44**	28.60	1018/1026 HF1018/1026			
	1 1/4	**1.250**	6.125	**98.46**	34.58	1018/1026			
	1 1/2	**1.500**	5.625	**114.1**	40.07	1018/1026			
	1 5/8	**1.625**	5.375	**112.5**	41.98	HF1018/1026			
	2	**2.000**	4.625	**141.5**	49.69	HF1018/1026			
8 3/4	3/8	**.375**	8.000	**33.54**	11.78	1018/1026			
	1/2	**.500**	7.750	**44.06**	15.47	1018/1026 HF1018/1026	HF4140 HF4140		
	5/8	**.625**	7.500	**54.23**	19.05	1018/1026 HF1018/1026	HF4140 HF4140HT		
	3/4	**.750**	7.250	**64.08**	22.50	1018/1026 HF1018/1026			
	1	**1.000**	6.750	**82.77**	29.07	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 1/4	**1.250**	6.250	**100.1**	34.60	HF1018/1026	HF4140 HF4140HT		
	2	**2.000**	4.750	**144.2**	49.82		HF4140		

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
9	1/4	**.250**	8.500	**23.36**	8.073	1018/1026 DOM			
	3/8	**.375**	8.250	**34.54**	12.13	1018/1026 DOM			
	1/2	**.500**	8.000	**45.39**	15.94	1018/1026 HF1018/1026 DOM	HF4140		
	5/8	**.625**	7.750	**55.90**	19.63	1018/1026 HF1018/1026	HF4140		
	3/4	**.750**	7.500	**66.08**	23.21	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1	**1.000**	7.000	**85.44**	30.01	1018/1026 HF1018/1026	HF4140		
	1 1/8	**1.125**	6.750	**94.62**	32.69	HF1018/1026			
	1 1/4	**1.250**	6.500	**103.5**	35.75	HF1018/1026	HF4140		
	1 1/2	**1.500**	6.000	**120.2**	42.21	HF1018/1026			
	2	**2.000**	5.000	**149.5**	52.50	HF1018/1026	HF4140 HF4140HT		
	3	**3.000**	3.000	**192.2**	66.43	HF1018/1026			
9 1/4	1/4	**.250**	8.750	**24.03**	8.439	1018/1026			
	3/8	**.375**	8.500	**35.54**	12.48	1018/1026 DOM			
	1/2	**.500**	8.250	**46.73**	16.41	1018/1026 HF1018/1026	HF4140		
	3/4	**.750**	7.750	**68.09**	23.91	1018/1026 HF1018/1026	HF4140		
	1	**1.000**	7.250	**88.11**	30.94	1018/1026 HF1018/1026	HF4140		
	1 1/4	**1.250**	6.750	**106.8**	37.51		HF4140		
	1 1/2	**1.500**	6.250	**124.2**	43.62	1018/1026 HF1018/1026			
	2	**2.000**	5.250	**154.9**	53.51		HF4140		
9 1/2	1/4	**.250**	9.000	**24.70**	8.675	1018/1026 DOM			
	3/8	**.375**	8.750	**36.55**	12.84	1018/1026 DOM			
	1/2	**.500**	8.500	**48.06**	16.88	1018/1026 HF1018/1026 DOM			
	5/8	**.625**	8.250	**59.24**	20.81	1018/1026			
	3/4	**.750**	8.000	**70.09**	24.62	1018/1026 HF1018/1026	HF4140		
	7/8	**.875**	7.750	**80.60**	28.31	1018/1026			
	1	**1.000**	7.500	**90.78**	31.88	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 1/8	**1.125**	7.250	**100.6**	34.77	HF1018/1026			
	1 1/4	**1.250**	7.000	**110.1**	38.67	1018/1026 HF1018/1026	HF4140HT		
	1 3/8	**1.375**	6.750	**119.3**	41.90		HF4140 HF4140		
	1 1/2	**1.500**	6.500	**128.2**	44.29	HF1018/1026			
	2	**2.000**	5.500	**160.2**	56.26	1018/1026 HF1018/1026	HF4140		

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
9 5/8	5/16	**.313**	9.00	**31.13**	10.93	1018/1026			
	1/2	**.500**	8.625	**48.73**	16.84	1018/1026 HF1018/1026			
	1 1/16	**1.063**	7.500	**97.16**	34.12	1018/1026			
9 3/4	1/4	**.250**	9.250	**25.37**	8.910	1018/1026			
	3/8	**.375**	9.000	**37.55**	13.18	1018/1026			
	1/2	**.500**	8.750	**49.40**	17.35	1018/1026 HF1018/1026			
	5/8	**.625**	8.500	**60.91**	21.39	1018/1026			
	3/4	**.750**	8.250	**72.09**	25.32	1018/1026 HF1018/1026			
	1	**1.000**	7.750	**93.45**	32.82	1018/1026 HF1018/1026			
	1 1/2	**1.500**	6.750	**132.2**	45.67	HF1018/1026			
10	1/4	**.250**	9.500	**26.03**	9.142	1018/1026 DOM		321	
	3/8	**.375**	9.250	**38.55**	13.54	1018/1026 DOM			
	1/2	**.500**	9.000	**50.73**	17.81	1018/1026 HF1018/1026 DOM		321	6061-T6
	5/8	**.625**	8.750	**62.58**	21.98	1018/1026 HF1018/1026			
	3/4	**.750**	8.500	**74.09**	26.02	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1	**1.000**	8.000	**96.12**	33.75	1018/1026 HF1018/1026	HF4140HT		
	1 1/8	**1.125**	7.750	**106.6**	37.44	HF1018/1026			
	1 3/16	**1.188**	7.624	**111.8**	39.26		HF4140		
	1 1/4	**1.250**	7.500	**116.8**	41.02	1018/1026 HF1018/1026	4140 HF4140		
	1 1/2	**1.500**	7.000	**136.2**	47.83	HF1018/1026	HF4140		
	1 3/4	**1.750**	6.500	**154.2**	53.28	HF1018/1026	HF4140		
	2	**2.000**	6.000	**170.9**	60.02	HF1018/1026	4130 HF4140		
	3	**3.000**	4.000	**224.3**	77.50	HF1018/1026	4130		
10 1/4	1/4	**.250**	9.750	**26.70**	9.377	1018/1026			
	3/8	**.375**	9.500	**39.55**	13.89	1018/1026			
	1/2	**.500**	9.250	**52.07**	18.29	1018/1026 HF1018/1026			
	5/8	**.625**	9.000	**64.25**	22.56	1018/1026			
	3/4	**.750**	8.750	**76.10**	26.73	HF1018/1026	HF4140		
	1	**1.000**	8.250	**98.79**	34.14	HF1018/1026			
	1 1/4	**1.250**	7.750	**120.2**	42.21	HF1018/1026			
	1 1/2	**1.500**	7.250	**140.2**	48.44	HF1018/1026			
	2	**2.000**	6.250	**176.2**	60.89	HF1018/1026	HF4140		
	2 1/8	**2.125**	6.000	**184.4**	64.76		HF4140		

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
10 1/2	1/4	**.250**	10.00	**27.37**	9.612	1018/1026			
	3/8	**.375**	9.750	**40.55**	14.24	1018/1026			
	1/2	**.500**	9.500	**53.40**	18.75	1018/1026 HF1018/1026			
	5/8	**.625**	9.250	**65.91**	22.78	1018/1026			
	3/4	**.750**	9.000	**78.10**	27.43	1018/1026 HF1018/1026			
	1	**1.000**	8.500	**101.5**	35.65	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 1/4	**1.250**	8.000	**123.5**	42.67	HF1018/1026			
	1 1/2	**1.500**	7.500	**144.2**	49.82	HF1018/1026	HF4140		
	1 3/4	**1.750**	7.000	**163.5**	56.51	HF1018/1026			
	2	**2.000**	6.500	**181.6**	62.74	HF1018/1026			
10 3/4	1/4	**.250**	10.25	**28.04**	9.848	1018/1026			
	3/8	**.375**	10.00	**41.55**	14.59	1018/1026			
	1/2	**.500**	9.750	**54.74**	19.22	1018/1026			
	5/8	**.625**	9.500	**67.58**	23.73	1018/1026			
	3/4	**.750**	9.250	**80.10**	28.13	1018/1026			
	1	**1.000**	8.750	**104.1**	36.52	1018/1026			
	1 1/4	**1.250**	8.250	**126.8**	43.82	HF1018/1026			
	1 1/2	**1.500**	7.750	**148.2**	51.20	HF1018/1026			
	2	**2.000**	6.750	**186.9**	64.58	HF1018/1026			
11	3/8	**.375**	10.25	**42.55**	14.94	DOM			
	1/2	**.500**	10.00	**56.07**	19.69	1018/1026 HF1018/1026 DOM	HF4140		
	3/4	**.750**	9.500	**82.10**	28.83	1018/1026 HF1018/1026	HF4140		
	1	**1.000**	9.000	**106.8**	37.51	1018/1026 HF1018/1026	HF4140 HF4140HT		
	1 1/4	**1.250**	8.500	**130.2**	44.98	HF1018/1026			
	1 1/2	**1.500**	8.000	**152.2**	52.59	HF1018/1026	HF4140		
	1 3/4	**1.750**	7.500	**172.9**	59.74	HF1018/1026			
	2	**2.000**	7.000	**192.2**	66.43	HF1018/1026			
	2 1/2	**2.500**	6.000	**227.0**	79.72	HF1018/1026	HF4140 HF4140HT		
11 1/4	3/8	**.375**	10.50	**43.55**	15.29	1018/1026 HF1018/1026			
	1/2	**.500**	10.25	**57.41**	20.16	1018/1026 HF1018/1026			
	5/8	**.625**	10.00	**70.27**	24.68	1018/1026			
	3/4	**.750**	9.750	**84.11**	29.06	HF1018/1026			
	1	**1.000**	9.250	**109.5**	38.46	1018/1026 HF1018/1026			
	1 1/2	**1.500**	8.250	**156.2**	53.97	HF1018/1026			
	2	**2.000**	7.250	**197.6**	68.27	HF1018/1026			

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Aluminum
11 1/2	1/4	**.250**	11.00	**30.04**	10.55	1018/1026			
	3/8	**.375**	10.75	**44.56**	15.65	1018/1026 HF1018/1026			
	1/2	**.500**	10.50	**58.74**	20.63	1018/1026 HF1018/1026			
	5/8	**.625**	10.25	**72.59**	25.49	1018/1026			
	3/4	**.750**	10.00	**86.11**	30.24	1018/1026 HF1018/1026			
	1	**1.000**	9.500	**112.1**	39.37	1018/1026 HF1018/1026	HF4140		
	1 1/4	**1.250**	9.000	**136.8**	47.29	HF1018/1026			
	1 1/2	**1.500**	8.500	**160.2**	55.36	HF1018/1026	HF4140		
	2	**2.000**	7.500	**202.9**	70.12	HF1018/1026			
11 3/4	1/4	**.250**	11.25	**30.71**	10.79	1018/1026			
	3/8	**.375**	11.00	**45.56**	16.00	1018/1026			
	1/2	**.500**	10.75	**60.08**	21.12	1018/1026			
	3/4	**.750**	10.25	**88.11**	30.94	1018/1026			
	7/8	**.875**	10.00	**101.6**	36.03	HF1018/1026			
	1	**1.000**	9.750	**114.8**	39.67	1018/1026 HF1018/1026			
	1 1/8	**1.125**	9.500	**127.7**	44.85	HF1018/1026	HF4140		
	1 1/4	**1.250**	9.250	**140.2**	48.44	HF1018/1026			
	1 1/2	**1.500**	8.750	**164.2**	56.74	HF1018/1026	HF4140		
	1 5/8	**1.625**	8.500	**175.7**	60.72	HF1018/1026			
	2	**2.000**	7.750	**208.3**	73.15		HF4140		
12	1/4	**.250**	11.50	**31.37**	11.02	1018/1026 HF1018/1026		321	
	3/8	**.375**	11.25	**46.56**	16.35	1018/1026 HF1018/1026 DOM			
	1/2	**.500**	11.00	**61.41**	21.57	1018/1026 HF1018/1026 DOM			6061-T6
	3/4	**.750**	10.50	**90.11**	31.65	1018/1026 HF1018/1026			
	1	**1.000**	10.00	**117.5**	41.27	1018/1026 HF1018/1026	HF4140		
	1 1/8	**1.125**	9.750	**130.7**	45.15	HF1018/1026			
	1 1/4	**1.250**	9.500	**143.5**	49.59	HF1018/1026	HF4140		
	1 1/2	**1.500**	9.000	**168.2**	59.07	HF1018/1026	HF4140		
	1 3/4	**1.750**	8.500	**191.6**	66.20	HF1018/1026			
	1 7/8	**1.875**	8.250	**202.8**	70.06	HF1018/1026			
	2	**2.000**	8.000	**213.6**	75.02	HF1018/1026			
	2 1/2	**2.500**	7.000	**253.7**	87.65	HF1018/1026 HF4142			
	3	**3.000**	6.000	**288.4**	99.64	HF1018/1026			

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Decimal Fraction	Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
12 1/4	1/4	**.250**	11.75	**32.06**	11.25	1018/1026			
	1/2	**.500**	11.25	**62.75**	22.04	1018/1026 HF1018/1026			
	3/4	**.750**	10.75	**92.12**	32.35	1018/1026 HF1018/1026			
	1	**1.000**	10.25	**120.2**	42.21	1018/1026 HF1018/1026			
	1 1/4	**1.250**	9.750	**146.9**	50.73	HF1018/1026			
	1 1/2	**1.500**	9.250	**172.2**	59.51	HF1018/1026			
	1 3/4	**1.750**	8.750	**196.2**	67.81	HF1018/1026			
	2	**2.000**	8.250	**218.9**	75.65	HF1018/1026			
12 1/2	1/2	**.500**	11.50	**64.08**	22.14	HF1018/1026			
	3/4	**.750**	11.00	**94.12**	32.52	HF1018/1026			
	1	**1.000**	10.50	**122.8**	42.44	HF1018/1026	HF4140		
	1 1/4	**1.250**	10.00	**150.2**	51.90	HF1018/1026	HF4140		
	1 1/2	**1.500**	9.500	**176.2**	60.89	HF1018/1026	HF4140		
	1 3/4	**1.750**	9.000	**200.9**	69.43	HF1018/1026			
	2	**2.000**	8.500	**224.3**	77.50	HF1018/1026			
	2 1/4	**2.250**	8.000	**246.3**	85.11		HF4140		
12 3/4	1	**1.000**	10.75	**125.5**	43.36		HF4140		
	1 1/2	**1.500**	9.750	**180.2**	62.28	HF1018/1026			
	2 3/8	**2.375**	8.000	**263.2**	90.93	HF1018/1026			
13	1	**1.000**	11.00	**128.2**	44.29	HF1018/1026			
	1 1/2	**1.500**	10.00	**184.2**	63.66	HF1018/1026			
	2	**2.000**	9.000	**235.0**	81.19	HF1018/1026			
	2 1/2	**2.500**	8.000	**280.4**	96.87	HF1018/1026			
	3	**3.000**	7.000	**320.4**	110.7	HF1018/1026			
14	1	**1.000**	12.000	**138.8**	48.00	HF1018/1026			
	1 1/2	**1.500**	11.00	**200.3**	75.35	HF1018/1026			
	2	**2.000**	10.00	**256.3**	90.01	HF1018/1026			
	2 1/4	**2.250**	9.500	**282.4**	97.57	HF1018/1026	HF4140		
	2 1/2	**2.500**	9.000	**307.1**	106.1	HF1018/1026	HF4140		
	3	**3.000**	8.000	**352.4**	121.8	HF1018/1026			
14 1/2	1	**1.000**	12.50	**144.2**	49.82	HF1018/1026			
	2	**2.000**	10.50	**267.0**	92.26	HF1018/1026			
	3	**3.000**	8.500	**368.5**	127.3	HF1018/1026			
15	1	**1.000**	13.00	**149.5**	52.50	HF1018/1026			
	1 1/2	**1.500**	12.00	**216.3**	75.96	HF1018/1026			
	1 3/4	**1.750**	11.50	**247.6**	85.57	HF1018/1026			
	2	**2.000**	11.00	**277.7**	97.53	HF1018/1026			
	2 1/2	**2.500**	10.00	**333.8**	117.2	HF1018/1026			
	3	**3.000**	9.000	**384.5**	135.0	HF1018/1026			
16	1	**1.000**	14.00	**160.2**	55.36	HF1018/1026			
	1 1/2	**1.500**	13.00	**232.2**	80.27	HF1018/1026	HF4140		
	2	**2.000**	12.00	**299.0**	105.0	HF1018/1026			
	2 1/2	**2.500**	11.00	**360.5**	126.6	HF1018/1026	HF4140		
	3 1/2	**3.500**	9.000	**467.3**	161.5				
	4	**4.000**	8.000	**512.6**	177.1				

ROUND MECHANICAL TUBING

See Page 3 of this section for index to descriptions and key to abbreviations.

Outside Diameter (Inches)	Wall Thickness BWG or Fraction	Wall Thickness Decimal Inches	Inside Diameter (Inches)	Wt. per Foot Steel	Wt. per Foot Alum.	Carbon Steel	Alloy Steel	Stainless Steel	Alum-inum
16 1/2	1	**1.000**	14.500	**165.5**	57.20	HF1018/1026			
	1 1/2	**1.500**	13.500	**240.3**	83.03	HF1018/1026			
	2	**2.000**	12.500	**309.7**	107.0	HF1018/1026			
	3	**3.000**	10.500	**432.5**	149.5	HF1018/1026			
17	1	**1.000**	15.000	**170.9**	60.02	HF1018/1026			
	1 1/2	**1.500**	14.000	**248.3**	87.20	HF1018/1026			
	2	**2.000**	13.000	**320.4**	112.5	HF1018/1026			
	2 1/2	**2.500**	12.000	**387.2**	136.0	HF1018/1026			
	3	**3.000**	11.000	**448.6**	157.5	HF1018/1026			
18	1	**1.000**	16.000	**181.6**	62.74	HF1018/1026			
	1 1/2	**1.500**	15.000	**264.3**	91.34	HF1018/1026			
	1 9/16	**1.562**	14.875	**274.2**	94.76	HF1018/1026			
	2	**2.000**	14.000	**341.8**	120.0	HF1018/1026			
	2 1/2	**2.500**	13.000	**411.2**	144.4	HF1018/1026			
	3	**3.000**	12.000	**480.6**	168.8	HF1018/1026			
	3 1/2	**3.500**	11.000	**542.0**	187.3				
18 1/2	1	**1.000**	16.500	**186.9**	64.58	HF1018/1026			
	1 1/2	**1.500**	15.500	**272.3**	94.11	HF1018/1026			
	2	**2.000**	14.500	**352.4**	121.8	HF1018/1026			
	2 3/4	**2.750**	13.000	**462.6**	159.8	HF1018/1026			
	3	**3.000**	12.500	**496.6**	171.6	HF1018/1026			
20	1	**1.000**	18.000	**202.9**	70.12	HF1018/1026			
	1 1/2	**1.500**	17.000	**296.4**	104.1	HF1018/1026			
	1 3/4	**1.750**	16.500	**341.1**	117.9	HF1018/1026			
	1 31/32	**1.968**	16.063	**379.0**	131.0	HF1018/1026			
	2	**2.000**	16.000	**384.5**	132.9	HF1018/1026			
	2 1/2	**2.500**	15.000	**467.3**	164.1	HF1018/1026			
	3	**3.000**	14.000	**544.7**	188.2	HF1018/1026			
	5	**5.000**	10.000	**801.0**	276.8				
20 1/2	2	**2.000**	16.500	**395.2**	136.5	HF1018/1026			
	3	**3.000**	14.500	**560.7**	193.7	HF1018/1026			
21	2	**2.000**	17.000	**405.8**	140.2	HF1018/1026			
21 3/4	2 9/16	**2.593**	16.625	**525.2**	181.5				
	4 7/8	**4.875**	12.000	**878.6**	303.6				
22	1	**1.000**	20.000	**224.3**	78.77	HF1018/1026			
	1 1/2	**1.500**	19.000	**328.4**	115.3	HF1018/1026			
	2	**2.000**	18.000	**427.2**	149.9	HF1018/1026			
	2 1/2	**2.500**	17.000	**560.7**	196.9	HF1018/1026			
	3	**3.000**	16.000	**608.8**	213.8	HF1018/1026			
23	——	**1.417**	20.166	**326.**6	112.9	HF1018/1026			
24	1	**1.000**	22.000	**245.6**	84.88	HF1018/1026			
	1 1/2	**1.500**	21.000	**360.5**	124.6	HF1018/1026			
	1 17/32	**1.531**	20.938	**367.4**	127.0	HF1018/1026			
	2	**2.000**	20.000	**469.9**	162.4	HF1018/1026			
	2 1/16	**2.063**	19.875	**483.3**	167.0	HF1018/1026			
	2 1/2	**2.500**	19.000	**574.1**	198.4	HF1018/1026			
	3	**3.000**	18.000	**672.8**	246.3	HF1018/1026			

SEAMLESS CARBON STEEL MECHANICAL TUBING
ASTM A 519 UNS G10180, 10260

These grades are low carbon steels intended for mechanical parts which may be carburized and are available both Hot Finished and Cold Drawn.

ANALYSIS

	Carbon	Manganese	Phosphorus (Max.)	Sulphur (Max.)
1018	.15/.20	.60/.90	.04	.05
1026	.22/.28	.60/.90	.04	.05

APPLICATIONS — These grades are used for mechanical applications such as bushings, spacers, or other parts where mechanical properties are not specified or required.

MECHANICAL PROPERTIES — The following may be typical for the grade and condition listed.

	Tensile Strength (psi)	Yield Strength (psi)	Elongation in 2"	Brinell Hardness
1018 Cold Drawn	85,000	70,000	10%	RB88
1018 Hot Finished	60,000	35,000	30%	RB70
1026 Cold Drawn	87,000	72,000	10%	RB89
1026 Hot Finished	70,000	47,000	28%	RB78

MACHINABILITY — These grades have machinability ratings Cold Drawn of 78% and Hot Finished of 65% respectively based on 1212.

WELDABILITY — These grades are easily welded by all common welding processes and the resultant welds and joints would be of high quality.

HARDENING — These grades have effectively been carburized.

DIMENSIONAL TOLERANCES FOR SEAMLESS MECHANICAL TUBING CARBON AND ALLOY STEEL

Dimensional tolerances are the acceptable variations — over and under–from the desired, or nominal dimensions as specified. Manufacturing limitations make it necessary that the producer of tubing has a certain amount of leeway in meeting the specifications which give nominal dimensions.

Maximum variations are shown in the Tolerance Tables on Pages 67 through 69. It should be recognized that any lot of tubing manufactured at the same time will rarely show this much variation.

However, a substantial proportion of all seamless mechanical tubing produced–especially hot finished–has some form of machine work performed upon it after delivery to the purchaser. This additional work is done to convert the tubing into component parts of finished pieces made by the tube purchaser, and it is this machining which makes close adherence to the limits imposed by the dimensional tolerances mandatory.

The dimension given by the purchaser are known as “nominal” dimensions, to which the tolerances are added to give the “over” limit, or maximum value, and subtracted from to give the “under” limit, or minimum value. When a sufficient number of micrometer readings are made to insure that all parts of a tube are within the specified dimensional limits, the average of all the readings is the “average” dimension.

All round seamless mechanical tubing cross-sections have three dimensions — Outside Diameter (OD), Inside Diameter (ID), and Wall Thickness (sometimes called “gauge”)–any or all of which may vary independently from the others. When seamless tubing is ordered, only the nominal dimensions for these three are given.

Tolerences, except for length, should be specified to only two dimensions: i.e., to Outside Diameter (OD) and Wall Thickness, to Inside Diameter (ID) and Wall Thickness, or to Outside Diameter and Inside Diameter. Thus, if Outside Diameter (OD) and Wall Thickness are specified, the Inside Diameter (ID) may not conform to the established tolerances shown in Tables 3 and 4. If OD and ID are specified, the average wall thickness (taking into account the OD and ID tolerances) will not vary more than indicated in Table 5.

The dimensions of seamless mechanical tubing for which tolerance tables have been set up are: (A) Outside Diameter (OD); (B) Inside Diameter (ID); (C) Wall Thickness; (D) Camber (straightness); (E) Length; and (F) Multiple Lengths.

Tolerances are shown on pages 67-69.

SEAMLESS MECHANICAL STEEL TUBE

Hot rolled round — outside diameter[1,2,3]

	Outside diameter tolerance, in inches (mm)	
Outside diameter size range, in inches (mm)	**Over**	**Under**
Up to 2,999 (76.17)	.020 (.51)	.020 (.51)
3,0000 — 4,499 (76.20-114.27)	.025 (.64)	.025 (.64)
4,500 — 5,999 (114.30 — 152.37)	.031 (.79)	.031 (.79)
6,000 — 7,499 (152.40 — 190.47)	.037 (.94)	.037 (.94)
7,500 — 8,999 (190.50 — 228.57)	.045 (1.14)	.045 (1.14)
9,000 — 10,750 (228.60 — 273.05)	.050 (1.27)	.050 (1.27)

1 Diameter tolerances are not applicable to normalized & tempered or quenched & tempered conditions.

2 The common range of sizes of hot finished tubes in $1\frac{1}{2}$ in. (38.1 mm) to $10\frac{3}{4}$ in. (273.0 mm) outside diameter with wall thickness at least 3% or more of outside diameter, but not less than .095 in. (2.41 mm).

3 Larger sizes are available; consult manufacturer for sizes and tolerances.

Hot rolled round — wall thickness

	Wall thickness tolerance[1], percent over and under nominal		
Wall thickness range as percent of outside diameter	**Outside diameter 2,999 in (76.17 mm) and smaller**	**Outside diameter 3.0000 in (.76.20 mm) to 5.999 in (152.37 mm)**	**Outside diameter 6.000 in (152.40 mm) to 10.750 in (273.05 mm)**
Under 15	12.5	10.0	10.0
15 and over	10.0	7.5	10.0

1 Wall thickness tolerances may not be applicable to walls .199 in (5.05 mm) and less; consult manufacturer for wall tolerances on such tube sizes.

Hot rolled round — straightness

Size Limits	Maximum curvature in any 3 ft/in (mm/m)	Maximum curvature in total lengths, in inches (mm)	Maximum curvature for lengths under 3 ft or 1m
OD 5 in [127.0 mm] & smaller. Wall thickness, over 3% of OD.	.030 [.83]	.030 x (no. of ft of length/3) [.83 x no. of m of length]	Ratio of .010 in/ft or .83 mm/m
OD over 5-8 in [127.0-203.2 mm], include. Wall thickness, over 4% of OD.	.045 [1.25]	.45 x (no. of ft of length/3) [1.25 x no. of m of length]	Ratio of .015 in/ft or 1.25 mm/m
OD over 8-$12\frac{3}{4}$" [203.2-323.8mm], include Wall thickness, over 4% of OD.	.060 [1.67]	.060 x (no. of ft of length/s) [1.67 x no. of m of length]	Ratio of .020 in/ft or 16.7 mm/m

The straightness variation for any 3 ft. (0.9M) of length is determined by measuring the concavity between the tube and a straightedge with a feeler gage. The total variation, that is the maximum curvature at any point in the total length of tube, is determined by rolling the tube on a surface place and measuring the concavity with a feeler gage.

The tolerances apply generally to unannealed, finish-annealed, and medium-annealed cold-finished or hot-finished tubes. When straightening stress would interfere with the use of the end product, the straightness tolerances shown do not apply when tube is specified “not to be straightened after furnace treatment.” These straightness tolerances do not apply to soft-annealed or quenched and tempered tubes.

SEAMLESS MECHANICAL STEEL TUBE
COLD DRAWN ROUND CARBON AND ALLOY STEEL

Cold worked round - diameter

Outside Diameter size range (in.)	Wall Thickness as percent Of OD	Thermal treatment after final cold work producing size None, or not exceeding 1100°F nominal temperature				Heated above 1100°F nominal temperature without accelerated cooling				Quenched and Tempered			
		OD (in)		ID (in)		OD (in)		ID (in)		OD (in)		ID (in)	
		Over	Under	Over	Under	Over	Under	Over	Under	Over	Under	Over	Under
Up to .499	All	.044	.000			.005	.002			.010	.010	.010	.010
.055-1.699	All	.005	.000	.000	.005	.007	.002	.002	.007	.015	.015	.015	.015
1.700-2.099	All	.006	.000	.000	.006	.006	.005	.005	.006	.020	.020	.020	.020
2.100-2.499	All	.007	.000	.000	.007	.008	.005	.005	.008	.023	.023	.023	.023
2.500-2.899	All	.008	.000	.000	.008	.009	.005	.005	.009	.025	.025	.025	.025
2.900-3.299	All	.009	.000	.000	.009	.011	.005	.005	.011	.028	.028	.028	.028
3.300-3.699	All	.010	.000	.000	.010	.013	.005	.005	.013	.030	.030	.030	.030
3.700-4.099	All	.011	.000	.000	.011	.013	.007	.010	.010	.033	.033	.033	.033
4.100-4.499	All	.012	.000	.000	.012	.014	.007	.011	.011	.036	.036	.036	.036
4.500-4.899	All	.013	.000	.000	.013	.016	.001	.012	.012	.038	.038	.038	.038
4.900-5.299	All	.014	.000	.000	.014	.018	.007	.013	.013	.041	.041	.041	.041
5.300-5.549	All	.015	.000	.000	.015	.020	.007	.014	.014	.044	.044	.044	.044
5.550-5.999	Under 6	.010	.010	.010	.010	.018	.018	.018	.018				
	6 to 7½	.009	.009	.009	.009	.016	.016	.016	.016				
	Over 7½	.018	.000	.009	.009	.017	.015	.016	.016				
6.000-6.499	Under 6	.013	.013	.013	.013	.023	.023	.023	.023				
	6 to 7½	.010	.010	.010	.010	.018	.018	.018	.018				
	Over 7½	.020	.000	.010	.010	.020	.015	.018	.018				
6.500-6.999	Under 6	.015	.015	.015	.015	.027	.027	.027	.027				
	6 to 7½	.012	.012	.012	.012	.021	.021	.021	.021				
	Over 7½	.023	.000	.012	.012	.026	.015	.021	.021				
7.000-7.499	Under 6	.018	.018	.018	.018	.032	.032	.032	.032				
	6 to 7½	.013	.013	.013	.013	.023	.023	.023	.023				
	Over 7½	.026	.000	.013	.013	.031	0.15	.023	.023				
7.500-7.999	Under 6	.020	.020	.020	.020	.035	.035	.035	.035				
	6 to 7½	.015	.015	.015	.015	.026	.026	.026	.026				
	Over 7½	.029	.000	.015	.015	.036	.015	.026	.026				
8.000-8.499	Under 6	.023	.023	.023	.023	.041	.041	.041	.041				
	6 to 7½	.016	.016	.016	.016	.028	.028	.028	.028				
	Over 7½	.031	.000	.015	.016	.033	.022	.028	.028				
8.500-8.999	Under 6	.025	.025	.025	.025	.044	.044	.044	.044				
	6 to 7½	.017	.017	.017	.017	.030	.030	.030	.030				
	Over 7½	.034	.000	.015	.019	.038	.022	.030	.030				
9.000-9.499	Under 6	.028	.028	.028	.028	.045	.045	.045	.045				
	6 to 7½	.019	.019	.019	.019	.033	.033	.033	.033				
	Over 7½	.037	.000	.015	.022	.043	.022	.033	.033				
9.500-9.999	Under 6	.030	.030	.030	.030	.045	.045	.043	.053				
	6 to 7½	.020	.020	.020	.020	.035	.035	.035	.035				
	Over 7½	.040	.000	.015	.025	.048	.022	.035	.035				
10.000-10.999	Under 6	.034	.034	.034	.034	.045	.045	.060	.060				
	6 to 7½	.022	.022	.022	.022	.039	.039	.039	.039				
	Over 7½	.044	.000	.015	.029	.055	.022	.039	.039				
11.000-12.000	Under 6	.035	.035	.035	.035	.050	.050	.065	.065				
	6 to 7½	.025	.025	.025	.045	.045	.045	.045	.045				
	Over 7½	.045	.000	.015	.035	.060	.022	.045	.045				

Many tubes with inside diameter less than 50% of outside diameter or with wall thickness more than 25% of outside diameter, or with wall thickness over 1 1/4 in., or weighing more than 90 lb/ft. are difficult to draw over a mandrel. Therefore, the inside diameter can vary over or under by an amount equal to 10% of wall thickness.

For those tubes with inside diameter less than 1/2 in. (or less than 5/8 in. when the wall thickness is more than 20% of the outside diameter), which are not commonly drawn over a mandrel, the footnote above is not applicable. Therefore, for those tubes, the inside diameter is governed by the outside diameter tolerance shown in this table and the wall thickness tolerances shown in the table on the following page.

Tube 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 this table, require an ovality tolerance of 1/2% over and under nominal outside diameter, this being in addition to the tolerances indicated in this table.

Cold worked round — wall thickness

	Wall thickness tolerance over and under nominal (%) (mm)	
Wall thickness range as a percent of outside diameter	**Up to 1.499 in. ID**	**1.500 in. ID and over**
25 and under	10.0	7.5
Over 25	12.5	10.0

Cold drawn round — straightness

Size limits	Maximum curvature in any 3 ft/in (mm/m)
OD 5 in. (127.0 mm) and smaller Wall thickness, over 3% of OD.	.030 (.83)
OD over 5-8 in. (127.0-203.2 m) incl. Wall thickness, over 4% of OD.	.045 (1.25)
OD over 8-12 3/4" (203.2-323.8 mm) incl. Wall thickness over 4% of OD.	.060 (1.67)

DOM
ELECTRIC RESISTANCE WELDED MANDREL DRAWN CARBON STEEL MECHANICAL TUBING

ASTM A 513 TYPE 5 STRESS RELIEVED, NON-DESTRUCTIVE TESTED (SUPPLEMENT S-8) UNS G10200, G10260, DOM 520 (ST 52.3)

DOM is commonly specified when surface finish and concentricity are important to the production of the part.

ANALYSIS

	C	Mn	P(Max.)	S(Max.)	Si	Al
1020	.17/.12	.30/.60	.035	.035	N/A	N/A
1026	.22/.28	.60/.90	.040	.050	N/A	N/A
DOM 520	.18 Max.	1.20/1.50	.025	.010	.15/.35	.020 Min.

APPLICATIONS — Mechanical parts such as bushings and spacers, hydraulic or pneumatic cyclinders.

MECHANICAL PROPERTIES — The following are the typical properties for each grade as ordered by EMJ.
1020/1026/DOM 520
85,000 psi Tensile 75,000 psi Yield 15% Elongation RB80 Hardness

MACHINABILITY — These grades have a machinability rating of 78% based on 1212.

WELDABILITY — These grades are easily welded using most all welding processes. DOM 520 has a carbon equivalency equal to 1026.

HARDENING — These grades have effectively been carburized.

DRAWN OVER MANDREL HONING ALLOWANCES

Minimum ID stock allowances for the removal of inside surface imperfections by a honing operation

Outside Diameter	Wall Thickness						
	.065" and less	Over .065" to .125"	Over .125" to .180"	Over .180" to .230"	Over .230" to .360"	Over .360" to .460"	Over .460" to .563"
1½" and under	.010	.011	.013	.015	X	X	X
Over 1½" to 3"	.010	.012	.014	.016	.018	X	X
Over 3" to 4"	.011	.013	.015	.017	.019	.021	.023
Over 4" to 4¾"	X	.014	.016	.018	.020	.022	.024
Over 4¾" to 6"	X	.015	.017	.019	.021	.023	.025
Over 6" to 8"	X	.016	.018	.020	.022	.024	.026
Over 8 o 10½"	X	X	X	X	.023	.025	.027
Over 10½" to 12½"	X	X	X	X	.024	.026	.028

EXAMPLE: 4" OD tube which will clean up by honing to 3.498/3.500" ID:

(1) 4.000 OD — 3.498 = .502 /2 = .251 nominal wall. Minimum cleanup allowance or removal of ID surface imperfections from table above is .019".

(2) Minimum honed size 3.498

Less .019 cleanup allowance

3.479

3.479 is the maximum ordered ID size.

(3) Standard tolerance for size involved is .011.
Therefore ordered ID size will be 3.479 + .000 - .011.

CENTERLESS GRINDING ALLOWANCES

Minimum OD cleanup allowances for the removal of outside surface imperfections by centerless grinding

Outside Diameter	Wall Thickness					
	.125" and less	Over .125" to .180"	Over .180" to .230"	Over .230" to .360"	Over .360" to .460"	Over .460" to .580"
3" and under	.012	.014	.016	.020	X	X
Over 3" to 4¾"	.016	.018	.020	.022	.024	.026
Over 4¾" to 6"	.018	.020	.022	.024	.026	.028
Over 6" to 7"	.020	.022	.024	.026	.028	.030
Over 7" to 8"	X	X	X	.027	.029	.031
Over 8" to 10½"	X	X	X	.028	.030	.032
Over 10½" to 12½"	X	X	X	.030	.032	.034

Example: Tube to finish 3.250" OD x .150" wall:

Outside Diameter

Final ground size	3.250
Plus allowance (above)	.018
	3.268

3.268 is minimum ordered OD size
Drawn OD tolerance is + .009 - .003 for this OD
Therefore ordered size should be 3.268 + .009 - .000.

Wall Thickness

Nominal OD Size	3.268
Final grind Size	3.250
Difference	.018
Final wall	.015
Plus ½ of difference	.009
Ordered wall	.159

Size to Order — 3.268 OD x .159 wall

NOTE: On sizes 5½" OD and larger, the minus portion of the OD tolerance must be added to the grinding allowance to assure the necessary minimum stock allowance.

DRAWN OVER MANDREL MACHINE ALLOWANCES

Minimum OD and ID clean-up allowances by machining.

Outside Diameter	Wall Thickness			
	.187" and under	Over .187" to .230"	Over .230" to .460"	Over .460" to .580"
1 1/2" and under	.015	.020	.025	X
Over 1 1/2" to 3"	.020	.025	.030	X
Over 3" to 4 3/4"	.025	.030	.035	.040
Over 4 3/4" to 6"	.030	.035	.040	.045
Over 6" to 7"	.035	.040	.045	.050
Over 7" to 8"	X	X	.048	.053
Over 8" to 10 1/2"	X	X	.050	.055
Over 10 1/2" to 12 1/2"	X	X	.055	.060

Camber: For every foot or fraction thereof over one foot of length, add .010" for camber. For sizes over 7 1/2" OD, add .020" for camber.

EXAMPLE: Tube to finish 3.250" OD x 3.000" ID x 4" long:

3.250 OD	3.000 ID
+ .025 OD allow.	-- .025 ID allow.
3.275	2.975

Size to Order: 3.275 OD +.009 -.000 x 2.975 ID +.000 -.009

If the length were 26" in the example above, an additional allowance of .020" for camber would be added to both OD an ID, making the size to order 3.295 OD x 2.955 ID.

DIAMETER TOLERANCES

FOR TYPES 3, 4, 5, AND 6 (S.D.H.R., S.D.C.R., M.D. AND S.S.I.D) ROUND TUBING

Note 1 — Measurements for diameter are to be taken at least 2 in. from the ends of the tubes.

		Outside Diameter		Inside Diameter	
OD Size Range	Wall % of OD	Over	Under	Over	Under
Up to 0.499	All	0.004	0.000	---	---
0.500 to 1.699	All	0.005	0.000	0.000	0.005
1.700 to 2.099	All	0.006	0.000	0.000	0.006
2.100 to 2.499	All	0.007	0.000	0.000	0.007
2.500 to 2.899	All	0.008	0.000	0.000	0.008
2.900 to 3.299	All	0.009	0.000	0.000	0.009
3.300 to 3.699	All	0.010	0.000	0.000	0.010
3.700 to 4.099	All	0.011	0.000	0.000	0.011
4.100 to 4.499	All	0.012	0.000	0.000	0.012
4.500 to 4.899	All	0.013	0.000	0.000	0.013
4.900 to 5.299	All	0.014	0.000	0.000	0.014
5.300 to 5.549	All	0.015	0.000	0.000	0.015
5.550 to 5.999	Under 6	0.010	0.010	0.010	0.010
	6 and over	0.009	0.009	0.009	0.009
6.000 to 6.499	Under 6	0.013	0.013	0.013	0.013
	6 and over	0.010	0.010	0.010	0.010
6.500 to 6.999	Under 6	0.015	0.015	0.015	0.015
	6 and over	0.012	0.012	0.012	0.012
7.000 to 7.499	Under 6	0.018	0.018	0.018	0.018
	6 and over	0.013	0.013	0.013	0.013
7.500 to 7.999	Under 6	0.020	0.020	0.020	0.020
	6 and over	0.015	0.015	0.015	0.015
8.000 to 8.499	Under 6	0.023	0.023	0.023	0.023
	6 and over	0.016	0.016	0.016	0.016
8.500 to 8.999	Under 6	0.025	0.025	0.025	0.025
	6 and over	0.017	0.017	0.017	0.017
9.000 to 9.499	Under 6	0.028	0.028	0.028	0.028
	6 and over	0.019	0.019	0.019	0.019
9.500 to 9.999	Under 6	0.030	0.030	0.030	0.030
	6 and over	0.020	0.020	0.020	0.020
10.000 to 10.999	All	0.034	0.034	0.034	0.034
11.000 to 11.999	All	0.035	0.035	0.035	0.035
12.000 to 12.999	All	0.036	0.036	0.036	0.036
13.000 to 13.999	All	0.037	0.037	0.037	0.037
14.000 to 14.999	All	0.038	0.038	0.038	0.038

The ovality shall be within the above tolerances except when the wall thickness is less than 3% of the outside diameter.

DRAWN OVER MANDREL
WALL THICKNESS TOLERANCES

Outside Diameter [A]									
Wall Thickness		3/8 to 7/8, incl		Over 7/8 to 1 7/8, include		Over 1 7/8 to 3 3/4 include		Over 3/4 to 15, incl.	
In.[A]	Bwg.[B]	Wall Thickness Tolerances, in., A,C +/-							
		+	-	+	-	+	-	+	-
0.035	20	0.002	0.002	0.002	0.002	0.002	0.002	---	
0.049	18	0.002	0.002	0.002	0.003	0.002	0.003	---	---
0.065	16	0.002	0.002	0.002	0.003	0.002	0.003	0.004	0.004
0.083	14	0.002	0.002	0.002	0.003	0.003	0.003	0.004	0.005
0.095	13	0.002	0.002	0.002	0.003	0.003	0.003	0.004	0.005
0.109	12	0.002	0.003	0.002	0.004	0.003	0.003	0.005	0.005
0.120	11	0.003	0.003	0.002	0.004	0.003	0.003	0.005	0.005
0.134	10	---	---	0.002	0.004	0.003	0.003	0.005	0.005
0.148	9	---	---	0.002	0.004	0.003	0.003	0.005	0.005
0.165	8	---	---	0.003	0.004	0.003	0.004	0.005	0.006
0.180	7	---	---	0.004	0.004	0.003	0.005	0.006	0.006
0.203	6	---	---	0.004	0.005	0.004	0.005	0.006	0.007
0.220	5	----	---	0.004	0.006	0.004	0.006	0.007	0.007
0.238	4	---	---	0.005	0.006	0.005	0.006	0.007	0.007
0.259	3	---	---	0.005	0.006	0.005	0.006	0.007	0.007
0.284	2	---	---	0.005	0.006	0.005	0.006	0.007	0.007
0.300	1	---	---	0.006	0.006	0.006	0.006	0.008	0.008
0.320		---	---	0.007	0.007	0.007	0.007	0.008	0.008
0.344		---	---	0.008	0.008	0.008	0.008	0.009	0.009
0.375		---	---	---	---	0.009	0.009	0.009	0.009
0.400		---	---	---	---	0.010	0.010	0.010	0.010
0.438		---	---	---	---	0.011	0.011	0.011	0.011
0.460		---	---	---	---	0.012	0.012	0.012	0.012
0.480		---	---	---	---	0.012	0.012	0.012	0.012
0.531		---	---	---	---	0.013	0.013	0.013	0.013
0.563		---	---	---	---	0.013	0.013	0.013	0.013
0.580		---	---	---	---	0.014	0.014	0.014	0.014
0.600		---	---	---	---	0.015	0.015	0.015	0.015
0.625		---	---	---	---	0.016	0.016	0.016	0.016
0.650		---	---	---	0.017	0.017	0.017	0.017	

Straightness refer to page 69

[A] 1 in. = 25.4 mm.

[B] Birmingham Wire Gage

[C] Where the ellipsis (---) appears in this table, the tolerance is not addressed.

DRAWN OVER MANDREL

Special Smooth ID Hydraulic Cylinder Tubing

Special Smooth ID Tubing is a welded steel tubing that has been specially processed to produce an extra fine inside finish. Flat-rolled steel with its closely controlled tolerances is formed and electric-resistance welded into a tube. The welding flash is trimmed and the tube is normalized to insure a uniform and ductile structure. A final drawing over a highly polished mandrel produces the fine finish on the inside surface as well as uniform tolerances. Each length of tubing is subjected to nondestructive testing to insure quality of product.

Special Smooth ID Tubing can in many applications eliminate such costly operations as honing and boring. It is furnished to meet the following maximum average micro-inch finish:

Maximum Average Microinch Readings on Inside Surface

Wall Thickness	Outside Diameter			
	1" to 2½"	Over 2½" to 4½"	Over 4½" to 7"	Over 7" to 11"
.065" and under	40	40	---	---
Over .065" to .150"	45	50	55	---
Over .150" to .187"	50	60	70	---
Over .187" to .225"	55	70	80	90
Over .225" to .312"	70	80	90	100
Over .312" to .400"	---	90	100	110
Over .400" to .480"	---	100	110	120
Over .480" to .580"	---	110	120	130

TOLERANCES — Special Smooth ID is ordered to one-half standard ID Tolerances shown in the Diameter Tolerance table shown on Page 72 of this section. Straightness tolerances are shown on Page 69 of ths section.

STOCK SIZES

Refer to listing on Pages 4-64 of this section, where availability of this material is indicated in the CARBON column by the abbreviation SS.

1010/1020 COLD DRAWN BUTT WELDED TUBING

ASTM A 512 CONDITION -- CDSR

This tubing is cold drawn to size from hot rolled, continuous welded material. The cold drawing operations is identical in every respect with the method used in producing seamless mechanical tubing. Material in regular stock is mandrel drawn. However, Butt Welded Tubing is available drawn on the outside only for use where the inside dimension is not important; information on such material will be furnished upon request.

ANALYSIS

Carbon	Manganese	Phosphorus	Sulphur
.05/.15	.30/.60	.040 Max.	.050 Max.

MECHANICAL PROPERTIES — Cold Drawn Butt Welded Tubing is usually furnished in a finish annealed condition. The data in the following table indicate approximate properties and represent average values, since individual cases are affected by the amount of reduction of outside diameter and wall thickness in the cold drawing process.

Tensile Strength (psi)	Yield Strength (psi)	Elongation	Rockwell B
65,000	50,000	20%	76

Size (OD) Inches	Outside Diameter		Inside Diameter		Wall Thickness	
	Over	Under	Over	Under	Over	Under
Under 1/2	.004	.000	.000	.010	12 1/2%	12 1/2%
Walls under .156						
1/2 to 1 1/2"	.005	.000	.000	.005	10%	10%
Walls under .156						
Walls .156 & over	.005	.000	.000	.005	7%	7%
1 1/2" and Over	.010	.000	---	.010	10%	10%
Walls under .156						
Walls .156 & over	.010	.000	.000	.010	7%	7%

Straightness tolerances are shown on Page 69 of this section.

STOCK SIZES

Refer to listing on Pages 4-64 of this section, where availability of Cold Drawn Butt Welded Tubing is indicated in the CARBON column by the abbreviation CDBW.

This product is made in over 600 sizes, and sizes not regularly carried in stock can be furnished promptly from the mill. Also, other analyses are available, including 1018, 1020, 1025, 1030, 1110, 1115 and 1117.

Although stocks consist mainly of round tubing, this product is also made in Squares, Rectangles, Ovals, and other shapes. We invite your inquiries for such special sections.

1008/10/20 ELECTRIC RESISTANCE WELDED MECHANICAL TUBING

ASTM A 513, TYPES 1 & 2

Electric Resistance Welded Mechanical Tubing is available generally in the 1008 and 1020 analyses. It is manufactured by forming flat rolled steel into a tubular shape and welding the edges. The flash is always removed from the outside of the tube. Round tubing 1 1/4" OD and over is carried with inside flash controlled to a maximum height of .010. Round tubing smaller than 1 1/4" OD is generally carried flash in.

Electric Resistance Welded Mechanical Tubing is available in a wide range of diameters but is confined to relatively thin walls. Tubes with walls .065" and thinner are generally produced from Cold Rolled Strip. Tubes with walls heavier than .065" are generally produced from Hot Rolled and Pickled Strip.

This tubing responds to the common fabrication techniques used for low carbon steels, such as bending, swaging, welding, machining, etc.

ANALYSIS

	Carbon	Manganese	Phosphorus (Max.)	Sulphur (Max.)
1008	.010 Max	.50 Max.	.030	.035
1010	.05/.15	.30/.60	.040	.050
1020	.015/.25	.30/.60	.040	.050

MECHANICAL PROPERTIES — The following typical properties apply:

OD	Wall	Tensile Strength (psi)	Yield Strength (psi)	Elongation	Rockwell B
1010 Cold Rolled					
3/4" and smaller	All	48,000	40,000	15%	65
Over 3/4"	20-16 Ga.	45,000	35,000	25%	63
Over 3/4"	15 Ga. And hvr.	45,000	35,000	30%	60
1010 Hot Rolled					
3/4" and smaller	16-14 Ga.	48,000	40,000	12%	65
Over 3/4"	16-14 Ga.	48,000	35,000	25%	63
Over 3/4"	13 Ga. And hvr.	45,000	32,000	35%	60
1020 Cold Rolled					
3/4" and smaller	All	55,000	40,000	15%	70
Over 3/4"	20-16 Ga.	50,000	38,000	20%	68
Over 3/4"	15 Ga. And hvr.	50,000	38,000	30%	65
1020 Hot Rolled					
3/4" and smaller	All	55,000	40,000	12%	70
Over 3/4"	16-14 Ga.	52,000	38,000	20%	68
Over 3/4"	13 Ga. and hvr.	50,000	36,000	30%	65

TOLERANCES — Refer to Pages 77-78 of this section.

STOCK SIZES

Refer to listing on Pages 4-64 of this section, where availability is indicated in the CARBON column by the abbreviations **CREW** (Cold Rolled Electric Welded) and **HREW** (Hot Rolled Electric Welded).

TOLERANCES FOR WELDED ROUND MECHANICAL TUBING

DIAMETER TOLERANCES FOR TYPE 2 (A.W.C.R.) ROUND TUBING

Note 1–Measurements for diameter are to be taken at least 2 in. from the ends of the tub

Outside Diameter Range in [A]	Wall Thickness		Flash-in -Tubing[B]	Flash Controlled to 0.010 in. max Tubing[C]	Flash Controlled[D] to 0.005 in. max Tubing	
			Outside Diameter	Inside +/— Diameter	Outside Diameter	Inside +/— Diameter
	BWG	In.	Tolerances in.			
5/8 to 1 1/8", inc,	24 to 16	0.022 to 0.065	0.003	---	---	---
Over 5/8 to 1 1/8", inc,	24 to 19	0.022 to 0.042	0.0035	0.0035	0.0035	0.013
Over 5/8 to 1 1/8", inc,	18	0.049	0.0035	0.0035	0.0035	0.015
Over 5/8 to 1 1/8", inc,	16 to 14	0.065 to 0.083	0.0035	0.0035	0.0035	0.019
Over 3/4 to 1 1/8", inc,	13	0.095	0.0035	0.0035	0.0035	0.019
Over 7/8 to 1 1/8", inc,	12 to 11	0.109 to 0.120	0.0035	0.0035	0.0035	0.021
Over 1 1/8" to 2, include	22 to 18	0.028 to 0.049	0.005	0.005	0.005	0.015
Over 1 1/8" to 2, include	16 to 13	0.065 to 0.095	0.005	0.005	0.005	0.019
Over 1 1/8" to 2, include	12 to 10	0.109 to 0.134	0.005	0.005	0.005	0.022
Over 2 to 2 1/2", include	20 to 18	0.035 to 0.049	0.006	0.006	0.006	0.016
Over 2 to 2 1/2", include	16 to 13	0.065 to 0.095	0.006	0.006	0.006	0.020
Over 2 to 2 1/2", include	12 to 10	0.109 to 0.134	0.006	0.006	0.006	0.023
Over 2 1/2" to 3, inc	20 to 18	0.035 to 0.049	0.008	0.008	0.008	0.018
Over 2 1/2" to 3, inc	16 to 13	0.065 to 0.095	0.008	0.008	0.008	0.022
Over 2 1/2" to 3, inc	12 to 10	0.190 to 0.134	0.008	0.008	0.008	0.025
Over 3 to 3 1/2", inc	20 to 18	0.035 to 0.049	0.009	0.009	0.009	0.019
Over 3 to 3 1/2", inc	16 to 13	0.065 to 0.095	0.009	0.009	0.009	0.023
Over 3 to 3 1/2", inc	12 to 10	0.109 to 0.134	0.009	0.009	0.009	0.026
Over 3 1/2" to 4, inc	20 to 18	0.035 to 0.049	0.010	0.010	0.010	0.020
Over 3 1/2" to 4, inc	16 to 13	0.065 to 0.095	0.010	0.010	0.010	0.024
Over 3 1/2" to 4, inc	12 to 10	0.109 to 0.134	0.010	0.010	0.010	0.027
Over 4 to 6, inc	16 to 13	0.065 to 0.095	0.020	0.020	0.020	0.034
Over 4 to 6, inc	12 to 10	0.109 to 0.134	0.020	0.020	0.020	0.037
Over 8 to 10, inc	16 to 13	0.065 to 0.095	0.030	0.030	0.030	0.044
Over 8 to 10, inc	12 to 10	1.109 to 0.134	0.030	0.030	0.030	0.049
Over 10 to 12, inc	14 to 13	0.083 to 0.095	0.035	0.035	0.035	0.049
Over 10 to 12, inc	12 to 10	0.109 to 0.134	0.035	0.035	0.035	0.054

(1) **Flash-in Tubing:** The maximum height of the inside welding flash does not customarily exceed the wall thickness or in any case 3/32 in.

(2) **Flash Controlled to .010 in. max. Tubing** comprises tubing over 1 1/8 in. OD which is commonly produced only to OD tolerances and wall thickness tolerances in which the height of the remaining welding flash is controlled not to exceed .010 in.

(3) **Flash Controlled to .005 in. max. Tubing** is produced to OD tolerances and wall thickness tolerances, ID tolerances, and wall thickness tolerances, or OD tolerances and ID tolerances, in which the height of the remaining flash in controlled not to exceed .005 in.; any remaining flash is considered to be part of the applicable ID tolerances.

(4) **No Flash Tubing** is processed for closer tolerances with mandrel-tubing produced to outside diameter and wall, inside diameter and wall, or outside diameter and inside diameter to tolerances with no dimensional indication of inside flash.

Ovality Tolerances do not exceed 50% greater than the OD tolerances.

TOLERANCES FOR WELDED ROUND MECHANICAL TUBING

DIAMETER TOLERANCES FOR TYPE I (A.W.H.R.) ROUND TUBING

Note 1–Measurements for diameter are to be taken at least 2 inches from the ends of the tub

Outside Diameter Range in [A]	Wall Thickness		Flash-in -Tubing[1][4]	Flash Controlled to 0.010 in. max. Tubing[2][4]	Flash Controlled to 0.005 in. max. Tubing[3][4]	
			Outside Diameter	Inside +/— Diameter	Outside Diameter	Inside +/— Diameter
	BWG[F]	In.[A]	Tolerances in.			
1/2 to 1 1/8, include	16 to 10	0.065 to 0.134	0.0035	0.0035	0.0035	0.020
Over 1 1/8 to 2, inc	16 to 14	0.065 to 0.083	0.005	0.005	0.005	0.021
Over 1 1/8 to 2, inc	13 to 7	0.095 to 0.180	0.005	0.005	0.005	0.025
Over 1 1/8 to 2, inc	6 to 5	0.203 to 0.220	0.005	0.005	0.005	0.029
Over 1 1/8 to 2, inc	4 to 3	0.238 to 0.259	0.005	0.005	0.005	0.039
Over 2 to 2 1/2, inc	16 to 14	0.065 to 0.083	0.006	0.006	0.006	0.022
Over 2 to 2 1/2, inc	13 to 5	0.095 to 0.220	0.006	0.006	0.006	0.024
Over 2 to 2 1/2, inc	4 to 3	0.238 to 0.259	0.006	0.006	0.006	0.040
Over 2 1/2 to3, inc	16 to 14	0.065 to 0.083	0.008	0.008	0.008	0.024
Over 2 1/2 to3, inc	13 to 5	0.095 to 0.220	0.008	0.008	0.008	0.026
Over 2 1/2 to3, inc	4 to 3	0.238 to 0.259	0.008	0.008	0.008	0.040.
Over 2 1/2 to3, inc	2 to 0.320	0.284 to 0.320	0.010	0.010	0.010	0.048
Over 3 to 3 1/2, inc	16 to 14	0.065 to 0.083	0.009	0.009	0.009	0.025
Over 3 to 3 1/2, inc	13 to 5	0.095 to 0.220	0.009	0.009	0.009	0.027
Over 3 to 3 1/2, inc	4 to 3	0.238 to 0.259	0.009	0.009	0.009	0.043
Over 3 to 3 1/2, inc	2 to 0.0360	0.284 to 0.360	0.012	0.012	0.012	0.050
Over 3 1/2 to 4, inc	16 to 14	0.065 to 0.083	0.010	0.010	0.010	0.026
Over 3 1/2 to 4, inc	13 to 5	0.095 to 0.220	0.010	0.010	0.010	0.028
Over 3 1/2 to 4, inc	4 to 3	0.238 to 0.259	0.010	0.010	0.010	0.044
Over 3 1/2 to 4, inc	2 to 0.500	0.284 to 0.500	0.015	0.015	0.015	0.053
Over 4 to 5, inc.	16 to 14	0.065 to 0.083	0.020	0.020	0.020	0.036
Over 4 to 5, inc.	13 to 5	0.095 to 0.220	0.020	0.020	0.020	0.045
Over 4 to 5, inc.	4 to 3	0.238 to 0.259	0.020	0.020	0.020	0.054
Over 4 to 5, inc.	2 to 0.500	0.284 to 0.500	0.020	0.020	0.020	0.058
Over 5 to 6, inc.	16 to 10	0.065 to 0.134	0.020	0.020	0.020	0.036
Over 5 to 6, inc.	9 to 5	0.148 to 0.220	0.020	0.020	0.020	0.040
Over 5 to 6, inc.	4 to 3	0.238 to 0.259	0.020	0.020	0.020	0.054
Over 5 to 6, inc.	2 to 0.500	0.284 to 0.500	0.020	0.020	0.020	0.058
Over 6 to 8, include	11 to 10	0.120 to 0.134	0.025	0.025	0.025	0.043
Over 6 to 8, include	9 to 5	0.148 to 0.220	0.025	0.025	0.025	0.045
Over 6 to 8, include	4 to 3	0.238 to 0.259	0.025	0.025	0.025	0.059
Over 6 to 8, include	2 to 0.500	0.284 to 0.500	0.025	0.025	0.025	0.063
Over 8 to 10, inc.	14 to 12	0.083 to 0.109	0.030	0.030	0.030	0.041
Over 8 to 10, inc.	11 to 10	0.120 to 0.134	0.030	0.030	0.030	0.043
Over 8 to 10, inc.	9 to 5	0.148 to 0.220	0.030	0.030	0.030	0.045
Over 8 to 10, inc.	4 to 3	0.238 to 0.259	0.030	0.030	0.030	0.059
Over 8 to 10, inc.	2 to 0.500	0.248 to 0.500	0.030	0.030	0.030	0.063
Over 10 to 12, inc	14 to 12	0.083 to 0.109	0.035	0.035	0.035	0.041
Over 10 to 12, inc	11 to 10	0.120 to 0.134	0.035	0.035	0.035	0.043
Over 10 to 12, inc	9 to 5	0.148 to 0.220	0.035	0.035	0.035	0.045
Over 10 to 12, inc	4 to 3	0.238 to 0.259	0.035	0.035	0.035	0.059
Over 10 to 12, inc	2 to 0.500	0.248 to 0.500	0.035	0.035	0.035	0.063

See (1) (2) (3) (4) at bottom of page 77.

TOLERANCES FOR WELDED ROUND MECHNICAL TUBING
Wall Thickness Tolerances

COLD ROLLED

	OUTSIDE DIAMETER OF TUBE IN INCHES									
Wall (BMG)	3/8 to 7/8		Over 7/8 to 1 7/8"		Over 1 7/8" to 3 3/4"		Over 3 3/4" to 5		Over 5 to 6	
	Over*	Under	Over*	Under	Over*	Under	Over*	Under	Over*	Under
22	.000	.003	.000	.003						
20	.000	.004	.000	.004	.000	.004				
18	.000	.004	.000	.005	.000	.005				
16	.000	.004	.000	.005	.000	.005	.002	.006	.002	.007
13-14	.000	.004	.000	.005	.000	.006	.002	.007	.002	.007
9-12			.000	.006	.000	.006	.003	.007	.003	.007
8			.000	.007	.000	.007	.003	.008	.003	.0100

*The following additional tolerances apply to the over limits shown above due to the crown of the flat rolled steel:

Outside Diameter	Wall Thickness	Plus Tolerance
3/8 to 1 7/8"	.025 to .064	.0015
Over .064 to .016,	Incl.	.002
Over 1 7/8" to 3 3/4"	.025 to .064	.002
Over .064 to .165,	Incl.	.0025
Over 3 3/4" to 6 3/4"	Over .064 to .165, include	.003

HOT ROLLED

	OUTSIDE DIAMETER OF TUBE IN INCHES									
Wall (BWG)	3/8 to 1		Over 1 to 1 15/16"		Over 1 15/16" to 3 3/4"		Over 3 3/4" to 4 1/2"		Over 4 1/2" to 6	
	Over*	Under	Over*	Under	Over*	Under	Over*	Under	Over*	Under
16	.002	.006	.002	.008	.002	.008	.002	.010	.002	.010
13-14	.002	.006	.002	.008	.002	.008	.003	.010	.002	.012
12	.002	.006	.002	.008	.002	.008	.005	.010	.004	.012
10-11	.002	.008	.002	.008	.002	.008	.005	.010	.004	.012
7-9			.002	.008	.002	.008	.005	.011	.005	.012
6			.002	.010	.002	.010	.005	.012	.005	.013
5			.005	.012	.002	.010	.005	.012	.005	.013
4					.010	.018	.010	.018	.010	.018

*The following additional tolerances apply to the over limits shown above due to the crown of the flat rolled steel:

Outside Diameter	Plus Tolerance
3/4 to 1, inc.	.002
Over 1 to 1 15/16", include.	.003
Over 1 15/16" to 3 3/4", include.	.004

STRAIGHTNESS TOLERANCES

Straightness tolerance is customarily .030 inch per three feet of length. The straightness variation is determined by placing the tube on a surface plate with both ends touching the plate. The point of maximum deflection of the tube from the surface plate should be not more than .030 inch per three feet of length when measured with a feeler gauge. For lengths above one foot, the straightness tolerance is .010 in.

4130 ALLOY STEEL SEAMLESS MECHANICAL TUBING
(Aircraft)
AMS 6371

4130 is a chromium-molybdenum general purpose alloy steel tubing that is weldable and is capable of developing good strength. For years it has been the standard of the aircraft industry. It is manufactured to meet the rigid standards of aircraft quality and is suitable for the fabrication of parts which may be subjected to magnetic particle (magnaflux) inspection.

ANALYSIS

C	Mn	P (Max.)	S (Max.)	Si	Cr	Mo
.28/.33	.40/.60	.025	.025	.15/.35	.80/1.10	.15/.25

APPLICATIONS — It is used for parts with section thicknesses of 1/2" or less at the time of heat treatment which require a through hardening steel capable of developing hardness as high as Rockwell C 35 when properly hardened and tempered. It may be used for parts of greater section thickness where proportionately lower hardness or strength levels are required.

HARDENABILITY — This grade has a hardenability of Rockwell C 35 minimum at 5/16 and Rockwell C 28 minimum at 8/16 when normalized at 1700ºF and austenitized at 1600ºF.

TOLERANCES — Refer to pages 67-69 of this section.

STOCK SIZES

Refer to listing on Pages 4-64 of this section, where availability of this product is indicated in the ALLOY column by the number **4130.**

4135 ALLOY STEEL SEAMLESS MECHANICAL TUBING
(Aircraft)
AMS 6372

4135 is a chromium-molybdenum alloy steel tubing, capable of developing higher strength than 4130. It is manufactured by the electric furnace process to meet the rigid standards of the aircraft industry, and it is suitable for the fabrication of parts which may be subjected to magnetic particle (magnaflux) inspection.

ANALYSIS

C	Mn	P (Max.)	S (Max.)	Si	Cr	Mo
.33/.38	.70/.90	.025	.025	.20/.35	.80/1.10	.15/.25

APPLICATIONS — It is used for parts with section thicknesses of 3/4" or less at the time of heat treatment which require a through hardening steel that will develop a hardness as high as Rockwell C 40 when properly hardened and tempered. It may be used for parts of greater section thickness where proportionately lower hardness or strength levels are required.

HARDENABILITY — this grade has a hardenability of Rockwell C 45 minimum at 6/16 and Rockwell C 40 minimum at 9/16 when normalized at 1700ºF and austenitized at 1600ºF.

TOLERANCES — Refer to pages 67-69 of this section.

4140 ALLOY STEEL
SEAMLESS MECHANICAL TUBING
(Aircraft)
AMS 6381

4140 is a medium carbon chromium-molybdenum alloy steel tubing. It is manufactured by the electric furnace process to meet the rigid standards of the aircraft industry, and it is suitable for the fabrication of parts which may be subjected to magnetic particle (magnaflux) inspection. It responds readily to heat treatment and is capable of developing a higher hardness than 4130 and 4135.

ANALYSIS

C	Mn	P (Max.)	S (Max.)	Si	Cr	Mo
.38/.43	.75/1.00	.025	.025	.20/.35	.80/1.10	.15/.25

APPLICATIONS — It is used for parts with section thicknesses of 1/2" or less at the time of heat treatment which require a through hardening steel capable of developing hardness as high as Rockwell C 50 when properly hardened and tempered. It may be used for parts of greater section thickness where proportionately lower hardness or strength levels are required.

HARDENABILITY — This grade has a hardenability of Rockwell C 50 minimum at 6/16 and Rockwell C 44 minimum at 9/16 when normalized at 1700ºF and austenitized at 1550ºF.

TOLERANCES — Refer to pages 67-69 of this section.

STOCK SIZES

Refer to listing on Pages 4-64 of this section, where availability of this product is indicated in the ALLOY column by the number **4140.**

4340 ALLOY STEEL
SEAMLESS MECHANICAL TUBING
(Aircraft)
AMS 6415

4340 is a chromium-nickel-molybdenum alloy steel manufactured by the electric furnace process to meet the rigid standards of the aircraft industry, and it is suitable for the fabrication of parts which may be subjected to magnetic particle (magnaflux) inspection. With its high alloy content, it possesses greater hardenability than the 4100 series alloys, and this advantage is realized where high strength is required in heavy sections.

ANALYSIS

C	Mn	P (Max.)	S (Max.)	Si	Cr	N	Mo
.38/.43	.65/.85	.025	.025	.15/.35	.70/.90	1.65/2.00	.20/.30

APPLICATIONS — It is used for parts with section thicknesses of 3 1/2" or less at the time of heat treatment which require a through hardening steel capable of developing hardness as high as Rockwell C 30 when properly hardened and tempered. It may be used for parts of greater section thickness where proportionately lower hardness or strength levels are required.

HARDENABILITY — This grade has a hardenability of Rockwell C 50 minimum at 20/16 when normalized at 1700ºF and austenitized at 1525ºF.

TOLERANCES — Refer to pages 67-69 of this section.

STOCK SIZES

Refer to listing on Pages 4-64 of this section, where availability of this product is indicated in the ALLOY column by the number **4130.**

4130/4140
CHROME-MOLYBDENUM
MECHANICAL TUBES

ASTM A 519 UNS G41300/G41400

These grades are commonly used in the Stress Relieved or annealed condition for mechanical parts which are to heat treated after machining. The heat treated materials are intended for use in oilfield applications where strength combined with ductility is required.

ANALYSIS

	C	Mn	P(Max.)*	S(Max.)*	Si	Cr	Mo
4130	.28/.33	.40/.60	.040	.040	.15/.35	.80/1.10	.15/.25
4140	.38/.43	.75/1.10	.040	.040	.15/.35	.80/1.10	.15/.25

*Special grades may require reduced levels of these elements.

MECHANICAL PROPERTIES — Stress Relieved/Annealed (Typical Only)

	Tensile Strength (Ksi)	Yield Strength (Ksi)	Elongation 2″ Min.	BHN
4130 Cold Drawn	110	95	15%	228
4130 Hot Finish	90	70	20%	187
4140 Cold Drawn	120	100	10%	245
4140 Hot Finish	120	90	20%	245

Heat Treated Condition (both grades) NACE MRO175

L-80 Properties: 95 ksi minimum tensile, 80-110 ksi yield, 15% minimum elongation, 237 maximum BHN
P-110 Properties: 125 ksi minimum tensile, 110-140 ksi yield, 12% minimum elongation, 341 maximum BHN

MACHINABILITY — These grades have a machinability rating of approximately 70% of 1212 in the SR or Annealed condition. The machinability of these grades in the HT condition is approximately 60%.

WELDABILITY — These grades require preheating and postheating treatments to avoid cracking.

NORMALIZING — Heat to 1600-1700ºF. Cool in air. Average Brinell Hardness is 167.

ANNEALING — Heat to 1500-1600ºF. Cool slowly in furnace. Average Brinell Hardness is 149.

HARDENING — Hardening range 1550-1700ºF. 4130 for water quench and 4140 for oil or polymer quench. Tempering temperature is dependent on desired properties. Tempering range is 400-1300ºF.

4340 ALLOY STEEL
ANNEALED SEAMLESS MECHANICAL TUBING
(Commercial Quality)

ASTM A 519
UNS G43400

This grade is a nickel-chromium molybdenum alloy steel. It is richer in alloy content than the 4100 series, and thus possesses deeper hardenability characteristics. This advantage is realized where high strength is required in heavy sections. Such high hardenability insures maximum toughness and ductility at the required strength level, making it ideal for highly stressed parts. It maintains its strength and ductility at relatively high temperatures. Thus, for high strength in heavy section or for highly stressed parts operating under severe conditions, this is the analysis to use.

ANALYSIS

C	Mn	P (Max.)	S	Si	Cr	Ni	Mo
.38/.43	.60/.80	.035	.040	.15/.35	.70/.90	1.65/2.00	.20/.30

APPLICATIONS — It is used for such applications as oil well fishing tools, perforating gun bodies, bushings, high-pressure fittings, as well as miscellaneous machining parts requiring high strength and toughness.

TOLERANCES — Refer to Pages 66-69 of this section.

MECHANICAL PROPERTIES — (Typical)

	Tensile Strength (psi)	Yield Strength (psi)	Elongation 2" Min.	Reduction of Area	Brinell of Area	Izod of Area
Annealed	110,000	66,000	23%	49%	197	25

STOCK SIZES

Refer to listing on Pages 4-64 of this section, where availability of this product is indicated in the ALLOY column by the number 4340.

TYPE 304 STAINLESS STEEL TUBING

AMS 5639
ASTM A 511
ASTM A 269

Type 304 is a low carbon "18-8" chromium-nickel stainless steel. It combines excellent physical properties with remarkable resistance to many corrosive agents encountered in domestic and industrial use. The low carbon content provides good corrosion resistance in welded construction where subsequent solution heat treatment is not practical. It has good heat resistance and maintains its strength at elevated temperatures up to 800º F. It is non-magnetic in the annealed condition and not hardenable by heat treatment. Both hardness and tensile strength can be increased by cold working.

ANALYSIS

C (Max.)	Mn (Max.)	P (Max.)	S (Max.)	Si (Max.)	Cr	Ni	Mo (Max.)	Cu (Max.)
.08	2.00	.040	.030	.75	18.00/20.00	8.00/11.00	.75	.75

APPLICATIONS — It is used in the fabrication of parts where corrosion resistance and good physical properties and heat resistance up to 800ºF are required. It is widely used in such industries as dairy, beverage, and other food products, where the highest degree of sanitation and cleanliness is of prime importance. Parts for handling acetic, nitric, and citric acids, organic and inorganic chemicals, dyestuffs, crude and refined oils, etc., are fabricated from this material. Because of its lack of magnetism it is highly desirable for instruments.

CORROSION RESISTANCE — Maximum corrosion resistance is obtained in the annealed condition. Intergranular corrosion may occur when material is heated within or cooled through the range of 800º to 1500ºF.

RESISTANCE TO SCALING — Excellent scale resistance at temperatures up to 1600ºF in continuous service. Chromium-nickel grades have a high coefficient of expansion, which should be considered in designing.

PHYSICAL PROPERTIES — The following may be considered as representative of this grade:

Tensile Strength (psi)	Yield Strength (psi)	Elongation 2" Min.	Reduction of Area	Rockwell B
85,000	35,000	60%	70%	90 Max.

TOLERANCES — Refer to Pages 89-90 of this section.

STOCK SIZES

Refer to listing on Page 4-64 of this section, where availability of this product is indicated in the STAINLESS column by the number 304.

TYPE 316 STAINLESS STEEL TUBING

AMS 5648
ASTM A 511
ASTM A 269

Type 316 is "18-8" chromium-nickel stainless steel modified by the addition of molybdenum, which greatly increases its corrosion resistance as well as its physical properties at elevated temperatures. At elevated temperatures it has strength which is slightly higher than the basic 18-8 grades. It is non-magnetic in the annealed condition and not hardenable by heat treatment. Both hardness and strength are increased by cold working.

ANALYSIS

C (Max.)	Mn	P (Max.)	S (Max.)	Si (Max.)	Cr	Ni	Mo	Cu (Max.)
.08	1.25/2.00	.040	.030	.75	17.00/18.00	11.00/14.00	2.00/3.00	.75

APPLICATIONS — Type 316 is used in the fabrication of parts where corrosion resistance and heat resistance up to 1600º F are required. Because it possesses the highest creep and tensile strength at elevated temperatures of any of the more commonly used stainless steels, it finds extensive use where the combination of high strength and good corrosion resistance at elevated temperatures is required. In aircraft applications, Type 316 is used for parts requiring good corrosion resistance and low magnetic permeability.

CORROSION RESISTANCE — Type 316 is more resistant to atmospheric and general corrosive conditions than any of the other standard stainless steels. It has good resistance to the corrosive effects of sulphates, phosphates, and other salts, as well as reducing acids such as sulphuric, sulphurous, and phosphoric. It is less susceptible to pitting in applications where acetic acid vapors or solutions of chlorides, bromides, or iodides are encountered. When heated to the temperature range 800º-1500ºF, or when slowly cooled through this range, this grade is subjected to intergranular corrosion.

RESISTANCE TO SCALING — Excellent scale resistance to temperatures up to 1600ºF in continuous service.

PHYSICAL PROPERTIES — The following may be considered as representative of this grade:

Tensile Strength (psi)	Yield Strength (psi)	Elongation 2" Min.	Reduction of Area	Rockwell B
80,000	35,000	60%	70%	90 Max.

TOLERANCES — Refer to Pages 89-90 of this section.

STOCK SIZES

Refer to listing in Pages 4-64 of this section, where availability of this product is indicated in the STAINLESS column by the number **316.**

TYPE 321 STAINLESS STEEL TUBING

AMS 5645
ASTM A 269
MIL-T-6737

Type 321 is an "18-8" chromium-nickel stainless steel modified with the addition of titanium. It is designed to overcome the susceptibility to carbide precipitation with resulting intergranular corrosion that is common to the other austenitic stainless steels after exposure to temperatures of 800º to 1500ºF. It is non-magnetic in the annealed condition and not hardenable by heat treatment.

ANALYSIS

C (Max.)	Mn (Max.)	P (Max.)	S (Max.)	Si (Max.)	Cr	Ni	Ti	Mo (Max.)	Cu (Max.)
.08	2.00	.040	.030	1.00	17.00/20.00	9.00/13.00	6xC Min/.070 Max	.75	.50

APPLICATIONS — It is used for parts and assemblies requiring good corrosion, heat, and oxidation resistance up to approximately 1500ºF, particularly where processing is by welding. At elevated temperatures its use is limited to low stress applications.

CORROSION RESISTANCE — Maximum corrosion resistance is obtained in the annealed condition. It is resistant to intergranular corrosion. Its general corrosion resistance is somewhat less than that of Type 304.

RESISTANCE TO SCALING — Type 321 has excellent scale resistance at temperatures of up to 1650ºF in continuous service and 1500ºF in intermittent service.

PHYSICAL PROPERTIES — The following may be considered as representative of this grade:

Tensile Strength (psi)	Yield Strength (psi)	Elongation 2" Min.	Reduction of Area	Rockwell B
85,000	35,000	55%	65%	90 Max.

TOLERANCES — Refer to Pages 89-90 of this section.

STOCK SIZES

Refer to listing in Pages 4-64 of this section, where availability of this product is indicated in the STAINLESS column by the number **321.**

TYPE 347 STAINLESS STEEL TUBING

AMS 5646
ASTM A 269

Type 347 is an "18-8" chromium-nickel stainless steel modified with the addition of columbium or columbium-tantalum. Like 321, it is designed to overcome the dangers of intergranular corrosion common to other austenite stainless steels during and after exposure to temperatures of 800º to 1500ºF. It is non-magnetic in the annealed condition and not hardenable by heat treatment.

ANALYSIS

C (Max.)	Mn (Max.)	P (Max.)	S (Max.)	Si (Max.)	Cr	Ni	Cb+Ta	Mo (Max.)	Cu (Max.)
.08	2.00	.040	.030	.75	17.00/19.00	9.00/12.00	10xC Min./1.00 Max.	.75	.50

APPLICATIONS — It is used for heavy welded assemblies which cannot be annealed after welding. It is applied where operating conditions cause exposure within the temperature range of 800º to 1500ºF, and where corrosive conditions are severe. It is used to advantage in combatting corrosive cracking resulting from stress in corrosive media due to vibrations or other causes.

CORROSION RESISTANCE — Maximum corrosion resistance of Type 347 is obtained in the annealed condition. Its general corrosion resistance is somewhat less than for Type 304.

RESISTANCE TO SCALING — Type 347 has excellent scale resistance at temperatures of up to 1700ºF in continuous service and 1550ºF in intermittent service.

PHYSICAL PROPERTIES — The following may be considered as representative of this grade:

Tensile Strength (psi)	Yield Strength (psi)	Elongation 2" Min.	Reduction of Area	Rockwell B
90,000	35,000	50%	65%	90 Max.

TOLERANCES — Refer to Pages 89-90 of this section.

STOCK SIZES

Refer to listing in Pages 4-64 of this section, where availability of this product is indicated in the STAINLESS column by the number **347.**

TOLERANCES FOR STAINLESS STEEL COLD FINISHED ROUND TUBING — SEAMLESS

Outside Diameter, Ovality, Wall Thickness

(1) Outside Diameter in Inches	(2)* OD Tolerance in Inches Plus and Minus	(3)* Ovality, Double CD Tolerance in Inches when wall is:	(4) Wall Thickness per cent See Notes a,b,c	
			Plus	Minus
Under 1/2	0.005	Lighter than 0.005	15	15
1/2 to 1 1/2" excel.	0.005	Lighter than 0.065	10	10
1 1/2" to 3 1/2" excel.	0.010	Lighter than 0.095	10	10
3 1/2" to 5 1/2" excel.	0.015	Lighter than 0.150	10	10
5 1/2" to 8 excel.	0.030	Lighter than 0.240	10	10
8 to 8 1/2" excel.	0.045	Lighter than 0.300	10	10

* For ovality values in column (3) the tolerance for average outside diameter at any one cross section does not exceed the value in column (2) for the size given in column (1).

NOTE (a) Many tubes with wall thicknesses more than 25 percent of outside diameter or with wall thickness over 1 3/4" or weighing more than 90 pounds per foot, are difficult to draw over a mandrel. Unless otherwise agreed upon by the purchaser and producer, the wall thickness may vary 12 1/2 percent over and under that specified. See also Note (b).

NOTE (b) For those tubes with inside diameter less than 1/2" (or less than 5/8" when the wall thickness is more than 20 percent of the outside diameter) which are not commonly drawn over a mandrel, note (a) is not applicable. Unless otherwise agreed upon by the purchaser and producer, the wall thickness may vary 15 percent over and under that specified, and the inside diameter is governed by the outside diameter and wall thickness tolerances shown in the above table.

NOTE (c) For tubes with inside diameter less than 1/2" (or less than 5/8" when the wall thickness is more than 20 percent of the outside diameter), which can be produced by the rod or bar mandrel process, the tolerances are as shown in the above table, except that the wall thickness tolerances are 10 percent over and under the specified wall thickness.

TOLERANCES FOR STAINLESS STEEL ROUND TUBING — ELECTRIC WELDED

Outside Diameter, Ovality, Straightness

Outside Diameter in Inches	OD Tolerance in Inches Plus and Minus	ID Tolerance, in Inches Plus and Minus
Up to 3/32 excl.	.001	.001
3/32 to 3/16 excl.	.0015	.0015
3/16 to 1/2 excl.	.003	.005
1/2 to 1 excl.	.004	.006
1 to 1 1/2" excl.	.005	.007
1 1/2 to 2 excl.	.006	.008
2 to 2 1/2" excl.	.007	.010
2 1/2" to 3 1/2" excl.	.010	.014
3 1/2" to 5 excl.	.015	.020

NOTE 1. As applied to welded stainless steel tubing, ovality is the difference between maximum and minimum outside diameters measured at any one cross section. There is no additional tolerance for ovality on tubes having a nominal wall thickness of more than 3 percent of the OD.

NOTE 2. An ovality allowance of twice the OD tolerance, shown in the above table, is applied one-half plus and one-half minus to the OD, for tubes having a nominal wall thickness of 3 percent or less of the OD. The average of the maximum and minimum OD readings should fall within the OD tolerances as shown in the above table.

NOTE 3. For tolerances closer than those shown in the above table, the producer should be consulted.

NOTE 4. The **straightness** tolerance is 0.030" in 3 feet.

Wall Thickness Plus and Minus

Wall Thickness*		3/16" to	1" to Under	2" to Under	4" to 5" OD
Inch	BWG**	Under 1" OD	2" OD	4" OD	
.025	23	.002	.003	--	--
.028	22	.003	.003	--	--
.023	21	.003	.003	.004	--
.035	20	.003	.003	.005	.005
.042	19	.003	.003	.005	.005
.049	18	.003	.003	.005	.005
.058	17	.004	.005	.005	.006
.065	16	.005	.005	.005	.006
.072	15	.005	.005	.006	.007
.083	14	.005	.005	.006	.007
.095	13	.005	.005	.006	.007
.109	12	.005	.006	.007	.007
.120	11	.005	.006	.007	.007
.134	10	--	--	.007	.007
.149	9	--	--	.008	.008
.165	8	--	--	.008	.008

* For intermediate wall thicknesses use the tolerances for the next heavier gauge.
**Birmingham Wire Gauge.

3003 ALUMINUM

DRAWN SEAMLESS MECHANICAL TUBING

AMS WW-T-700/2 AMS 4065 ASTM B 210

3003 is the best known and the most widely used of all aluminum alloys. It is used where formability and weldability are both required, and where more strength is desired than is found in commercially pure aluminum. It is used for food and chemical handling equipment, gasoline and oil tanks, etc.

MECHANICAL PROPERTIES

Temper	Tensile Strength (psi)	Yield Strength (psi)
0	19,000 max.	16,000 average
H14	20,000 min.	21,500 average

TOLERANCES — Refer to page 94-96 of this section.

STOCK SIZES

Refer to listing on Pages 4-64 of this section, where availability of this product is indicated in the ALUMINUM column by the symbols **3003-O** (annealed) and **3003-H14** (1/2 hard).

2024 ALUMINUM
DRAWN AND EXTRUDED
SEAMLESS MECHANICAL TUBING

Drawn
AMS WW-T-700/3
ASTM B 210
AMS 4088

Extruded
AMS QQ-A-200/3
(Formerly QQ-A-267)
ASTM B 235
AMS 4152

2024 is one of the most commonly used heat treatable aluminum alloys. It is used where high strength is required and no welding is involved. Such applications include aircraft structures and hardware, screw machine products, aircraft fittings, etc.

MECHANICAL PROPERTIES

Temper	Nominal Diameter	Tensile Strength (psi)	Yield Strength (psi)	Elongation 2″ Min.
T3	All sizes	64,000	42,000	10%-16%
T4	Up to 0.249 include.	57,000	42,000	12%
	.0250 to .0749 include.	60,000	44,000	12%
	0.750 to 1.499 include.	65,000	46,000	10%
	1.500 and over:			10%
	Up to 23 sq. in. include.	70,000	52,000	
	Over 25 to 32 sq. in. include	68,000	48,000	8%

TOLERANCES — Refer to Pages 94-96 of this section.

STOCK SIZES

Refer to listing on Pages 4-64 of this section, where availability of this product is indicated in the ALUMINUM column by the symbols **2024-T4** (heat treated) and **2024-T3** (heat treated and cold worked).

5052 ALUMINUM
DRAWN SEAMLESS MECHANICAL TUBING
AMS WW-T-700/4 AMS 4070 ASTM B 210

5052 is one of the strongest of the non-heat-treatable aluminum alloys. It is used where good workability, resistance to corrosion, high fatigue strength, and moderate static strength are required. Such applications include aircraft fuel and oil lines, fuel tank fittings, miscellaneous marine and transportation applications, as well as miscellaneous applications, in home appliances, and sheet metal components.

MECHANICAL PROPERTIES — The following mechanical properties apply in the "O" (annealed) temper:

Tensile Strength (psi)	Yield Strength (psi)
35,000 maximum 27,000 average	20,000 average

TOLERANCES — Refer to Page 94-96 of this section.

STOCK SIZES

Refer to listing on Pages 4-64 of this section, where availability of this product is indicated in the ALUMINUM column by the symbol **5052-O.**

6061 ALUMINUM
DRAWN AND EXTRUDED
SEAMLESS MECHANICAL TUBING

Drawn	Extruded
AMS WW-T-700/6	AMS QQ-A-200/8
ASTM B 210	ASTM B 241
AMS 4082	AMS 4150

6061 is the most versatile and one of the least expensive of the heat-treatable aluminum alloys. It is used where good strength and very good resistance to corrosion are required, and it is used to advantage where the method of fabrication is welding. Such applications include welded assemblies for marine and transportation equipment, aircraft components, etc.

MECHANICAL PROPERTIES

Temper	Tensile Strength (psi)	Yield Strength (psi)	Elongation 2" Min.
O	22,000 max.	16,000 max.	16% min.
T4	30,000 min.	16,000 min.	18% min.
T6	38,000 min.	35,000 min.	10% min.

TOLERANCES — Refer to Page 94-96 of this section.

STOCK SIZES

Refer to listing on Pages 4-64 of this section, where availability of this product is indicated in the ALUMINUM column by the symbols **6061-O** (annealed), **6061-T4** (heat treated and naturally aged), and **6061-T6** (heat treated and artificially aged).

6063 ALUMINUM
EXTRUDED SEAMLESS MECHANICAL TUBING

ASTM B 221

6063 is a hardenable alloy that is designed for extrusions. The as-extruded finish is bright, similar to 1100, relatively free from die lines and pick-up, and is satisfactory for many applications without further work.

It has excellent corrosion resistance to industrial and marine environments. For further protection, a variety of coatings may be applied successfully.

This alloy is readily weldable by all methods commonly used for aluminum, especially by the inert-gas shielded-arc fusion process, and is easily machined particularly in the hardened tempers.

APPLICATIONS — It is used where good surface appearance is required as well as good strength and corrosion resistance. Such uses include architectural applications an irrigation systems.

MECHANICAL PROPERTIES — The following mechanical properties apply:

Temper	Tensile Strength (psi)	Yield Strength (psi)	Elongation 2" Min.
T5	27,000 average	21,000 average	12% average

TOLERANCES — Refer to Page 94-96 of this section.

SQUARE ALUMINUM TUBING — EXTRUDED

Outside Dimension (Inches)	Wall Thickness (Inches)	Weight Per Foot	Alloy
1/2 x 1/2	.058	.116	6061-T6
3/4 x 3/4	.028	.093	2024-T3
	.049	.161	6061-T6
	.062	.200	6061-T6
	.125	.373	6061-T6
	.125	.373	6063-T5
7/8 x 7/8	.049	.184	6061-T6
	.058	.198	6061-T6
	.062	.236	6063-T5
	.094	.354	6061-T6
1 x 1	.047	.231	6061-T6
	.060	.264	6063-T5
	.065	.288	2024-T3
	.094	.370	6061-T6
	.125	.552	6063-T5
1 1/8" x 1 1/8"	.049	.259	2024-T3
1 1/4" x 1 1/4"	.065	.356	6061-T6
	.125	.671	2024-T3
	.125	.671	6036-T5
1 1/2" x 1 1/2"	.058	.392	2024-T3
	.065	.536	6061-T6
	.125	.821	6063-T5
	.140	.843	6061-T6
1 3/4" x 1 3/4"	.125	.970	6063-T5
	.156	1.165	6061-T6
2 x 2	.062	.541	6061-T6
	.125	1.120	6061-T6
	.125	1.120	6063-T5
	.188	1.638	6061-T6
2 1/2" x 2 1/2"	.094	1.019	6061-T6
	.250	2.507	6061-T6
3 x 3	.062	.817	6061-T6
	.140	1.877	2024-T3
4 x 4	.125	2.326	6063-T5

RECTANGULAR ALUMINUM TUBING -- EXTRUDED

Outside Dimension (Inches)	Wall Thickness (Inches)	Weight Per Foot	Alloy
3/4 X 3/8	.047	.116	6061-T6
1 X 1/2	.035	.119	6061-T6
	.125	.373	6063-T5
1 1/2" X 3/4	.125	.598	6063-T5
1 1/2" X 1	.078	.451	6063-T5
	.125	.671	6061-T6
	.125	.671	6063-T5
2 x 1	.064	.436	6061-T6
	.083	.528	6061-T6
	.125	.821	6063-T5
2 x 1 1/2	.125	.970	6063-T5
2 x 1 1/4	.125	.970	6063-T5
3 x 1	.083	.775	6061-T6
3 x 1 1/4	.125	1.200	6061-T6
3 x 1 3/4	.125	1.345	6063-T5
3 x 2	.125	1.402	6063-T5
3 1/2 x 1 3/4	.125	1.494	6063-T5
4 x 1 1/2	.065	.837	2024-T3
4 x 1 3/4	.125	1.643	6063-T5
4 1/2 x 1 3/4	.125	1.793	6063-T5
5 x 1 1/4	.125	1.780	6061-T6
5 x 1 3/4	.125	1.942	6063-T5
5 x 2	.125	2.017	6063-T5

TOLERANCES FOR SQUARE AND RECTANGULAR ALUMINUM TUBING — EXTRUDED

WIDTH and DEPTH TOLERANCES[2]
INCHES — Plus and Minus

Specified Width or Depth[1] (Inches)	Allowable Deviation of Width or Depth at Corners from Specified Width or Depth	Allowable Deviation of Width or Depth Not at Corners from Specified Width or Depth[6]	
	Square and Rectangular	Square	Rectangular
0.500-0.749	.012	.020	The tolerance for the width is the value shown in Square column for a dimension equal to the depth, and conversely, but in no case is the tolerance less than at the corners.[7]
0.750-.0999	.014	.020	
1.000-1.999	.018	.025	
2.000-3.999	.025	.035	
4.000-4.999	.035	.045	
5.000-5.999	.045	.055	

WALL THICKNESS TOLERANCES[1,2]
Inches — Plus and Minus

CIRCUMSCRIBING CIRCLE DIAMETER[5] -- Inches

Specified Width or Depth[1] (Inches)	Allowable Deviation of Mean[3] Wall Thickness from Specified Wall Thickness		Allowable Deviation of Wall Thickness of any point from Mean Wall Thickness[3] (Eccentricity)	
	Under 5,000	5,000 & over	Under 5,000	5,000 & Over
Under 0.047	.005	.008	.005	Plus and Minus 10% of Mean Wall Thickness Max. +/- 0.060 Min. +/- 0.010
0.047-0.061	.006	.009	.007	
0.062-0.124	.007	.010	.010	
0.125-0.249	.008	.015	.015	
0.250-0.374	.011	.020	.025	
0.375-0.499	.014	.030	.030	
0.500-0.749	.025	.040	.040	
0.750-0.999	.035	.050	.050	
1.000-1.499	.045	.060	.060	
1.500-2.000	---	.070	---	

NOTE: See next page for explanatory notes pertaining to above tolerances

STRAIGHTNESS TOLERANCES — Refer to Page 95 of this section.

EXPLANATION OF NOTES PERTAINING TO TOLERANCES FOR SQUARE AND RECTANGULAR ALUMINUM TUBING — EXTRUDED

1. When outside diameter, inside diameter, and wall thickness (or their equivalent dimensions in an other-than-round tube) are specified, standard tolerances are applicable to any two of these dimensions, but not to all three.

2. When a dimension tolerance is specified other than as an equal bilateral tolerance, the value of the standard tolerance is that which would apply to the mean of the maximum and minimum dimension permissible under the tolerance.

3. The mean wall thickness is the average of two measurements taken opposite each other at approximate center line of the tube and perpendicular to the longitudinal axis of the cross section.

4. When dimensions specified outside and inside, rather than wall thickness itself, allowable deviation at any point (eccentricity) is plus and minus 10 percent of the mean wall thickness; maximum +/- .060 inch, minimum +/- .010 inch.

5. The circumscribing circle diameter is the diameter of the smallest circle that will completely enclose the tube.

6. Not applicable in the annealed (-O) temper or if the wall thickness is less than 2 1/2 percent of the outside diameter or equivalent round diameter.

7. Example: The width tolerances of 1 x 3 inch rectangular tube is +/- .025 inch and the depth tolerance is +/- .035 inch.

TOLERANCES FOR ROUND ALUMINUM TUBING — EXTRUDED

(All alloys except 5083, 5086, 5456)

DIAMETER and OVALITY TOLERANCES[2]

Inches — Plus and Minus

Specified Outside or Inside Diameter[2] Inches	Allowable Deviation of Mean Diameter[3] from Specified Diameter	Allowable Deviation of Diameter at Any Point from Specified Diameter[4] (Ovality)
0.500-0.999	.010	.020
1.000-1.999	.012	.025
2.000-3.999	.015	.030
4.000-5.999	.025	.050
6.000-7.999	.035	.075
8.000-9.999	.045	.100
10.000-11.999	.055	.125
12.000-13.999	.065	.150
14.000-15.999	.075	.175
16.000-17.999	.085	.200

WALL THICKNESS TOLERANCES[1,2]

Inches — Plus and Minus

Specified Wall Thickness[6] Inches	Allowable Deviation of Mean Wall Thickness[5] from Specified Wall Thickness				Allowable Deviation of Wall Thickness of any Point from Mean Wall Thickness[5] (Eccentricity)
	Under 1.250" Outside Diameter	1.250"-2.999" Outside Diameter	3.000"-4.999" Outside Diameter	5.000" & Over Outside Diameter	
Under 0.047	.006	---	---	---	Plus and Minus 10% of Mean Wall Thickness Max. +/- 0.060 Min. +/-0.010
0.047-0.061	.007	.008	.008	.010	
0.062-0.077	.008	.008	.009	.012	
0.078-0.124	.009	.009	.010	.015	
0.125-0.249	.009	.009	.013	.020	
0.250-0.374	.011	.011	.016	.025	
0.375-0.499	---	.015	.021	.035	
0.500-0.749	---	.020	.028	.045	
0.750-0.999	---	---	.035	.055	
1.000-1.499	---	---	.045	.065	
1.500-2.000	---	---	---	.075	
2.001-2.499	---	---	---	.085	
2.500-2.999	---	---	---	.095	
3.000-3.499	---	---	---	.105	+/- 0.120
3.500-4.000	---	---	---	.115	

STRAIGHTNESS TOLERANCES

Not applicable in Annealed (-0) Temper

Allowable Deviation from Straight

Specified Outside Diameter	In Each Foot of Length	In Total Length of Piece
0.500-5.999	.010	.010 x length, feet
6.000 and over	.020	.020 x length, feet

1 When outside diameter, inside diameter, and wall thickness are all specified, standard tolerances are applicable to any two of these dimensions, but not to all three.

2 When a dimension tolerance is specified other than as an equal bilateral tolerance, the value of the standard tolerance is that which would apply to the mean of the maximum and minimum dimensions permissible under the tolerance.

3 Mean diameter is the average of two diameter measurements taken at right angles to each other at any point along the length.

4 Not applicable in the annealed (-0) temper or if wall thickness is less than $2^1/_2$ per cent of the outside diameter.

5 The mean wall thickness of round tube is the average of two measurements taken opposite each other.

6 When dimensions specified are outside and inside, rather than wall thickness itself, allowable deviation at any point (eccentricity) applies to mean wall thickness.

TOLERANCES FOR ROUND ALUMINUM TUBING — DRAWN

DIAMETER AND OVALITY TOLERANCES[1,2]

Inches — Plus and Minus

Specified Outside and Inside Diameter[2] Inches	Allowable Deviation of Mean Diameter[3] from Specified Diameter	Allowable Deviation of Diameter at any point from Specified Diameter[6] (Ovality)	
		Non-Heat Treated	Heat Treated
Under 0.501	.003	.003	.006
0.501-1.000	.004	.004	.008
1.000-2.000	.005	.005	.010
2.001-3.000	.006	.006	.012
3.001-5.000	.008	.008	.016
5.001-6.000	.010	.010	.020
6.001-8.000	.015	.015	.030
8.001-10.000	.020	.020	.040
10.001-12.000	.025	.025	.050

WALL THICKNESS TOLERANCES[1,2]

Inches — Plus and Minus

Specified Wall Thickness Inches	Allowable Deviation of Mean Wall[5] Thickness from Specified Wall Thickness	Allowable Deviation of Wall at any point from Specified Wall Thickness (Eccentricity)	
		Non-Heat Treated	Heat Treated
0.010-0.035	.002	.002	Plus and Minus 10% of Specified Wall Thickness Min. +/- 0.003
0.036-0.049	.003	.003	
0.050-0.083	.004	.004	
0.084-0.120	.005	.006	
0.121-0.203	.006	.008	
0.204-0.300	.008	.012	
0.301-0.375	.015	.020	
0.376-0.500	.020	.030	

STRAIGHTNESS TOLERANCES[7]

Not applicable in Annealed (-0) Temper

Specified Outside Diameter Inches	Allowable Deviation from Straight	
	In Each Foot of Length	In Total Length of Piece
Under 0.375	.500	.500 x length, feet[8]
0.375-5.999	.010	.010 x length, feet
6.000 and over	.020	.020 x length, feet

1 When outside diameter, inside diameter, and wall thickness are all specified, standard tolerances are applicable to any of these dimensions, but not to all three.

2 When a dimension tolerance is specified other than as an equal bilateral tolerance, the value of the standard tolerance is that which would apply to the mean of the maximum and minimum dimensions permissible under the tolerance.

3 Mean diameter is the average of two diameter measurements taken at right angles to each other at any point along the length.

4 Not applicable in the annealed (-0) temper tube, or tube having a wall thickness less than 0.020 inch or less than $2\frac{1}{2}$ per cent of the outside diameter.

5 The mean wall thickness of round tube is the average of two measurements taken opposite each other.

6 When dimensions specified are outside and inside, rather than wall thickness itself, allowable deviation at any point (eccentricity) is plus and minus 10 percent of the mean wall thickness but not less than +/- 0.003 inch.

7 For round tube under 0.375" diameter, tolerance is applicable when weight of tube on flat surface minimizes deviation.

8 Not applicable to length under 10 feet.

STEEL AND ALUMINUM PIPE

Pipe is a tubular product intended primarily for such purposes as the conveying of water, fuel, gas, air, steam, etc. It has also been found to be a convenient form for use as structural members such as columns and railings. It is produced from steel and aluminum in a variety of analyses by the welded, seamless, and extrusion methods.

As distinguished from tubing, pipe is commonly produced in greater quantities and in relatively few standard sizes. It is generally made to less exacting specifications for dimensions, finish, chemical composition, and mechanical properties than tubing.

Sizes and wall thicknesses of pipe were originally standardized to permit threading the end for joining lengths with couplings or other connectors. A large proportion of the product is also used without screw threads (plain end), where lengths are joined together, or fittings attached, by welding or other means.

STANDARD PIPE SIZES AND WEIGHTS —

(For descriptions and properties of various grades. See Pages 99-101.

Standard sizes for steel pipe are established in American National Standards Institute (ANSI) B36.10 and B36.19 of the American National Standards Institute (ANSI). These standards set up a number of “schedules” which specify various wall thicknesses for given standard diameters.

ANSI B36.10 refers to wrought-steel and wrought-iron pipe and includes schedules 10, 20, 30, 40, 60, 80, 100, 120, 140, and 160. ANSI B36.19 refers to stainless steel pipe and includes schedules 5S, 10S, 40S, and 80S.

Aluminum Pipe also is produced in sizes according to ANSI B36.10.

The table on the following three pages indicates standard sizes and gives each the nominal size, actual outside diameter, wall thickness, and weights per foot for Steel and Aluminum.

.049	**Wall thickness in inches**
S .1863	**Weight per foot for Carbon Steel**
A .0645	**Weight per foot for Aluminum**

Weights shown are for plain-end carbon steel pipe. For threaded and coupled pipe, weights are slightly higher. For stainless steel pipe, weights are about 2% higher.

Pipe is generally referred to by **nominal** size, but it would be noted that on sizes up to 12” the actual outside diameter is somewhat greater than the nominal size.

Besides being classified as ANSI Schedule Numbers, **certain** wall thicknesses are also shown by the following commonly used designations:

Standard Weight (abbreviated **STD** in the following table, and identical with ANSI Schedule 40 in sizes through 10”).

Extra Strong (abbreviated **XS** in the following table, and identical with ANSI Schedule 80 in sizes through 8”).

Double Extra Strong (abbreviated **XXS** in the following table, and not identical with any ANSI Schedule).

STANDARD PIPE SIZES AND WEIGHTS (Continued)

(See page 97 for Explanation)

		WALL THICKNESSES AND WEIGHTS PER FOOT					
Nominal Pipe Size	Outside Diameter (Inches)	Schedule 5S	Schedule 10S	Schedule 40 & 40S STD	Schedule 80 & 80S XS	Schedule 160	XXS
1/8	.405		.049	.068	.095		
			S .1863	S .2447	S .3145		
			A .0645	A .0847	A .1008		
1/4	.540		.065	.088	.119		
			S .3297	S .4248	S .5351		
			A .1141	A .1470	A .1851		
3/8	.675		.065	.091	.126		
			S .4225	S .5650	S .7388		
			A .1465	A .1955	A .2556		
1/2	.840	.065	.083	.109	.147	.187	.294
		S .5380	S .6710	S .8510	S 1.088	S 1.304	S 1.714
		A .1861	A .2321	A .2944	A .3764	A .4511	A .5930
3/4	1.050	.065	.083	.113	.154	.218	.308
		S .6838	S .8572	S 1.131	S 1.474	S 1.937	S 2.441
		A .2366	A 2.966	A .3913	A .5100	A .6702	A .8445
1	1.315	.065	.109	.133	.179	.250	.358
		S .8678	S 1.404	S 1.679	S 2.172	S 2.844	S 3.659
		A .3002	A .4857	A .5809	A .7515	A .9839	A 1.266
1 1/4	1.660	.065	.109	.140	.191	.250	.382
		S 1.107	S 1.806	S 2.273	S 2.997	S 3.765	S 5.214
		A .3830	A .6248	A .7864	A 1.037	A 1.302	A 1.804
1 1/2	1.900	.065	.109	.147	.200	.281	.400
		S 1.274	S 2.085	S 2.718	S 3.631	S 4.859	S 6.408
		A .4408	A .7214	A .9404	A 1.256	A 1.681	A 2.217
2	2.375	.065	.109	.154	.218	.343	.436
		S 1.604	S 2.638	S 3.653	S 5.022	S 7.444	S 9.029
		A .5549	A .9127	A 1.264	A 1.737	A 2.575	A 3.124
2 1/2	2.875	.083	.120	.203	.276	.375	.552
		S 2.475	S 3.531	S 5.793	S 7.661	S 10.01	S 13.70
		A .8563	A 1.221	A 2.004	A 2.650	A 3.464	A 4.740
3	3.500	.083	.120	.216	.300	.438	.600
		S 3.029	S 4.332	S 7.576	S 10.25	S 14.32	S 18.58
		A 1.048	A 1.498	A 2.621	A 3.547	A 4.945	A 6.428
3 1/2	4.000	.083	.120	.226	.318		
		S 3.472	S 4.973	S 9.109	S 12.51		
		A 1.201	A 1.720	A 3.151	A 4.326		

(Continued on next page)

STANDARD PIPE SIZES AND WEIGHTS (cont.)

(See page 97 for explanation)

WALL THICKNESSES AND WEIGHTS PER FOOT								
Nominal Pipe Size	Outside Diameter (Inches)	Schedule 5S	Schedule 10S	Schedule 10	Schedule 20	Schedule 30	STD (Standard Wall)	Schedule 40
4	4.500	.083	.120				.237	.237
		S 3.915	S 5.613				S 10.79	S 10.79
		A 1.354	A 1.942				A 3.733	A 3.733
5	5.563	.109	.134				.258	.258
		S 6.349	S 7.770				S 14.62	S 14.62
		A 2.196	A 2.668				A 5.057	A 5.057
6	6.625	.109	.134				.280	.280
		S 7.585	S 9.289				S 18.97	S 18.97
		A 2.624	A 3.213				A 6.564	A 6.564
8	8.625	.109	.148		.250	.277	.322	.322
		S 9.715	S 13.40		S 22.36	S 24.70	S 28.55	S 28.55
		A 3.429	A 4.635		A 7.735	A 8.543	A 9.878	A 9.878
10	10.750	.134	.165		.250	.307	.365	.365
		S 15.19	S 18.65		S 28.04	S 34.24	S 40.48	S 40.48
		A 5.256	A 6.453		A 9.698	A 11.84	A 14.00	A 14.00
12	12.750	.156	.180		.250	.330	.375	.406
		S 20.98	S 24.16		S 33.38	S 43.77	S 49,56	S 53.52
		A 7.258	A 8.359		A 11.55	A 15.14	A 17.15	A 18.52
14	14.000			.250	.312	.375	.375	.438
				S 36.71	S 45.61	S 54.57	S 54.57	S 63.44
				A 12.70	A 15.78	A 18.88	A 18.88	A 21.95
16	16.000			.250	.312	.375	.375	.500
				S 42.05	S 52.27	S 62.58	S 62.58	S 82.77
				A 14.55	A 18.08	A 21.65	A 21.65	A 28.64
18	18.00			.250	.312	.438		.562
				S 47.39	S 58.94	S 82.15		S 104.7
				A 16.40	A 20.39	A 28.42		A 36.21
20	20.000			.250	.375	.500		.593
				S 52.73	S 78.60	S 104.1		S 122.9
				A 18.24	A 27.19	A 36.03		A 42.52
24	24.000			.250	.375	.562		.687
				S 63.41	S 94.62	S 140.7		S 171.1
				A 21.94	A 32.74	A 48.67		A 59.18
30	30.000			.312	.500	.625		
				S 98.93	S 157.5	S 196.1		
				A 34.23	A 54.50	A 67.84		

STANDARD PIPE SIZES AND WEIGHTS (cont.)

(See page 97 for explanation)

WALL THICKNESSES AND WEIGHTS PER FOOT											
Nominal Pipe Size	Outside Diameter (Inches)	Schedule 40S	Schedule 60	XS (Extra Strong)	Schedule 80	Schedule 80S	Schedule 100	Schedule 120	Schedule 140	Schedule 160	XXS Double Extra Strong
4	4 1/2	.237		.337	.337	.337		.438		.531	.674
		S 10.79		S 14.98	S 14.98	S 14.98		S 19.00		S 22.51	S 27.54
		A 3.733		A 5.183	A 5.183	A 5.183		A 6.560		A 7.786	A 9,528
5	5 9/16	.258		.375	.375	.375		.500		.625	.750
		S 14.62		S 20.78	S 20.78	S 20.78		S 27,.04		S 32.96	S 38.55
		A 5.057		A 7.188	A 7.188	A 7.188		A 9.353		A 11.40	A 13.34
6	6 5/8	.280		.432	.432	.432		.562		.718	.864
		S 18.97		S 28.57	S 28.57	S 28.57		S 36.39		S 45.35	S 53.16
		A 6.564		A 9.884	A 9.884	A 9.884		A 12.59		A 15.67	A 18.39
8	8 5/8	.322	.406	.500	.500	.500	.593	.718	.812	.906	.875
		S 28.55	S 35.64	S 43.39	S 43.39	S 43.39	S 50.87	S 60.63	S 67.76	S 74.69	S 72.42
		A 9.878	A 12.33	A 15.01	A 15.01	A 15.01	A 17.60	A 20.97	A 23.44	A 25.84	A 24.06
10	10 1/4	.365	.500	.500	.593	.500	.718	.843	1.000	1.125	1.000
		S 40.48	S 54.74	S 54.74	S64.33	S54.74	S 76.93	S 89.20	S 104.1	S 115.6	S 104.1
		A 14.00	A 18.93	A 18.93	A 22.25	A 18.93	A 26.61	A 30.86	A 36.03	A 40.01	A 36.03
12	12 3/4	.375	.562	.500	.687	.500	.843	1.000	1.125	1.312	1.000
		S 49.56	S 73.15	S 65.42	S 88.51	S 65.42	S 107.2	S 125.5	S 139.7	S 160.3	S 125.5
		A 17.15	A 25.31	A 22.63	A 30.62	A 22.63	A 37.09	A 43.42	A 48.32	A 55.45	A 43.42
14	14		.593	.500	.750		.937	1.093	1.250	1.406	
			S 84.91	S 72.00	S 106.1		S 130.7	S 150.7	S 170.2	S 189.1	
			A 29.38	A 24.94	A 36.71		A 45.23	A 52.13	A 58.89	A 65.43	
16	16		.656	.500	.843		1.031	1.218	1.438	1.593	
			S 107.5	S 82.77	S 136.5		S 164.8	S 192.3	S 223.6	S 245.1	
			A 37.19	A 28.64	A 47.21		A 57.20	A 66.53	A 77.73	A 84.80	
18	18		.750		.937		1.156	1.375	1.562	1.781	
			S 138.2		S 170.8		S 208.0	S244.1	S274.2	S 308.5	
			A 47.80		A 59.08		A 71.95	A 84.47	A 94.87	A 106.7	
20	20		.812		1.031		1.281	1.500	1.750	1.968	
			S 166.4		S 208.9		S 256.1	S 296.4	S 341.1	S 379.0	
			A 57.57		A 72.26		A 88.60	A 102.5	A 118.0	A 131.1	
24	24		.968		1.218		1.531	1.812	2.062	2.343	
			S 238.1		S295.9		S 367.4	S 429.4	S483.1	S 541.9	
			A 82.38		A 102.4		A 127.1	A 148.6	A 167.2	A 187.5	

SUMMARY OF SPECIFICATIONS APPLYING TO CARBON STEEL PIPE

	ASTM A 53				
WALL TOLERANCES	**Same as ASTM A 106**				
CHEMISTRY		Carbon % Max.	Ma. % Max.	Phos. % Max.	S % Max.
	SEAMLESS (Type S) Open hearth, electric furnace, or basic oxygen				
	Grade A	0.25	0.95	0.05	0.06
	Grade B	0.30	1.20	0.05	0.06
	ELECTRIC WELDED (Type E) Open hearth, electric furnace, or basic oxygen				
	Grade A	0.25	0.95	0.05	0.06
	Grade B	0.30	1.20	0.05	0.06
	BUTT WELDED (Type F) Open hearth, electric furnace, or basic oxygen	—	—	0.08	0.06
PHYSICAL PROPERTIES	**FURNACE WELDED** (Butt Welded)			Open hearth Basic Oxygen or Electric Furnace	
	Tensile Strength Min. psi			45,000	
	Yield Strength Min. psi			25,000	
	SEAMLESS or ELECTRIC WELDED				
		Grade A		Grade B	
	Tensile Strength Min. psi	48,000		60,000	
	Yield Strength Min. psi	30,000		35,000	

SUMMARY OF SPECIFICATIONS
APPLYING TO CARBON STEEL PIPE

ASTM A 106	API 5L				
Minimum wall thickness at any point shall be not more than 12.5% under nominal wall specified.	**SEAMLESS**				
		Plus		Minus	
	2 7/8" and smaller	20%		12 1/2%	
	3 1/2"		18%		12 1/2%
	4" and larger	15%		12 1/2%	
	WELDED				
	2 7/8" and smaller	20%		12 1/2%	
	3 1/2"		18%		12 1/2%
	4" thru 18"	15%		12 1/2%	
	20" and larger		17 1/2%		10%

	Grade A	Grade B	Grade C
Carbon, Max.	0.25%	0.30%	0.30%
Manganese	0.27/ 0.93%	0.29/ 1.06%	0.29/ 1.06%
Phosp., Max	0.048%	0.048%	0.048%
Sulphur, Max	0.058%	0.058%	0.058%
Silicon, Min.	0.01.%	0.10%	0.10%

	C	Mn	P		S	
	% Max.	% Max.	% Max.	% Max.	% Max.	% Max.
SEAMLESS						
Grade A	0.22	—	0.90	—	0.040	0.05
Grade B	0.27	—	1.15	—	0.040	0.05
Grade C	0.27	—	1.15	—	0.040	0.05
ELECTRIC WELDED						
Grade A	0.21	—	0.90	—	0.040	0.05
Grade B	0.26	—	1.15	—	0.040	0.05

	SEAMLESS			**SEAMLESS OR ELECTRIC WELDED**	
	Grade A	Grade B	Grade C	Tensile Strength	Yield Strength
				Min. psi	Min. psi
Tensile Strength	48,000	60,000	70,000	Grade A 48,000	30,000
Min. psi Yield Strength Min. psi	30,000	35,000	40,000	Grade B 60,000	35,000

CARBON STEEL PIPE

SEAMLESS AND WELDED
ASTM A 53, Grade A and Grade B: ASME Boiler and Pressure Vessel Code Specifications SA 53, Grade B (Seamless Type S or Welded Type E)

API Standard 5L (Seamless or Welded)

ASTM A 106, Grade B; ASME Boiler and Pressure Vessel Code specification SA 106, Grade B (Seamless–For High Temperature Service)

This pipe is produced from basic oxygen process steel in low carbon analysis.

Seamless pipe is produced from pierced billets. The severity of the piercing operation dictates that the material must have a good surface and above average internal soundness. The result is a product that has a uniform and refined grain structure as well as good strength and ductility.

Welded pipe is produced by the butt welding or electric resistance welding method. In the butt welding process, also known as continuous welding (CW), skelp is heated to the welding temperature and drawn through a die or welding rolls where the material is bent into tubular form. The edges became welded as they are pressed together. In the electric resistance welding (EW) process, strip is formed continuously by a series of rolls into a round shape and the welding is a accomplished by pressure from heat generated by the resistance of current flowing across the seam.

Most sizes are available in both single and double random lengths.

APPLICATIONS — This pipe is used for a variety of applications ranging from conveying gas and liquids to mechanical applications such as conveyors, rolls, and structural applications such as fence posts, railings, and columns.

Line pipe is used principally for the conveying of gas, oil, or water and is produced with ends plain, threaded, grooved, beveled, flanged, or expanded as required, as well as various types of mechanical couplers or welded joints.

Pressure pipe is used for conveying fluids at normal or elevated temperatures or both, but it is not subjected to external heat.

Galvanized pipe is used where resistance to corrosion is desired.

TOLERANCES

Outside Diameter:

Nominal Sizes	
1 1/2" and under	Plus 1/64", Minus 1/32"
Over 1 1/2" to 4", include	Plus or minus 1/32"
Over 4" to 8", include	Plus 1/16", Minus 1/32"
Over 8" to 18", include	Plus 3/32", Minus 1/32"
Over 18"	Plus 1/8", Minus 1/32"

STANDARD SIZES — Refer to Pages 99-101 of this section.

TYPE 304 STAINLESS STEEL PIPE
Seamless and Welded

MIL-P-24691/3 ASTM A 312
ASME Boiler & Pressure Vessel Code Specification SA 312

Type 304 is the basic low carbon "18-8" chromium-nickel stainless steel. It offers excellent mechanical properties for both room and high temperature service, and has excellent resistance to corrosion. It is made by the seamless or automatic welding process in which no addition of filler metal is employed in the welding operation. It is clean and free from scale.

Type 304 is available in an extra low carbon grade, designated 304L. This grade is designed to minimize the danger of intergranular corrosion where welded fabrication is used and where subsequent heat treating is not practical.

ANALYSIS

	C (Max.)	Mn (Max.)	P (Max.)	S (Max.)	Si (Max.)	Cr	Ni	Mo (Max.)	Cu (Max.)
304	.08	2.00	.040	.030	.75	18.00/20.00	8.00/11.00	--	--
304L	.035	2.00	.040	.030	.75	18.00/20.00	8.00/13.00	.50	.05

APPLICATIONS — It is used in high temperature and general corrosion service conditions. It is used in general hydraulic and pressure services where atmospheric and general corrosive conditions are encountered. It is not intended for salt water systems or use in high pressure main steam lines.

For further data on applications, corrosion resistance, and resistance to scaling, refer to Type 304 Stainless Steel Tubing on Page 85 of this section.

MECHANICAL PROPERTIES—The following minimum mechanical properties apply:

	Tensile Strength (psi)	Yield Strength (psi)	Elongation 2" Min.
304	75,000	30,000	28%
304L	70,000	25,000	28%

TOLERANCES — Refer to next page.

TYPE 316 STAINLESS STEEL PIPE
Seamless and Welded

MIL-P-24691/3 ASTM A 312
ASME Boiler & Pressure Vessel Code Specification SA 312

Type 316 is an "18-8"chromium-nickel stainless steel modified by the addition of molybdenum, which serves to increase its general corrosion resistance as well as improve its mechanical properties at elevated temperatures. It is made by the seamless or automatic welding process in which no addition of filler metal is employed in the welding operation. It is clean and free from scale.

ANALYSIS

C (Max.)	Mn (Max.)	P (Max.)	S (Max.)	Si (Max.)	Cr	Ni	Mo	Cu (Max.)
.08	2.00	.040	.030	.75	16.00/18.00	11.00/14.00	2.00/3.00	.50

APPLICATIONS — It is used in high temperature service as well as general hydraulic or pressure service. It is for general corrosion service where more resistance to corrosion is required than may be obtained by Type 304.

For further data on applications, corrosion resistance, and resistance to scaling, refer to Type 316 Stainless Steel Tubing on Page 85 of this section.

MECHANICAL PROPERTIES—The following minimum mechanical properties apply:

Tensile Strength (psi)	Yield Strength (psi)	Elongation 2" Min.
75,000	30,000	28%

TOLERANCES — Refer to next page.

STANDARD SIZES
Refer to Pages 99-101 of this section.

TYPE 321 & 347 STAINLESS STEEL PIPE
SEAMLESS AND WELDED

MIL-P-24691/3 ASTM A 312
ASME Boiler & Pressure Vessel Code Specification SA 312

Types 321 and 347 are stabilized "18-8" chromium-nickel stainless steels. Both are designed to overcome susceptibility to carbide precipitation with resulting intergranular corrosion. They are made by the seamless or automatic welding process in which no addition of filler metal is employed in the welding operation. It is clean and free from scale.

Type 321 is stabilized with the addition of titanium, and Type 347 is stabilized with columbium. Type 347 has slightly better creep resistance at high temperatures than Type 321. Compared with Type 321, its fine grain structure limits slightly its workability.

ANALYSIS

	C (Max.)	Mn (Max.)	P (Max.)	S (Max.)	Si (Max.)	CR	Ni	Ti
321	.08	2.00	.040	.030	.75	17.00/20.00	9.00/13.00	5xC/.60
347	.08	2.00	.040	.030	.75	17.00/20.00	9.00/13.00	Cb-Ta 10xC/1.00

APPLICATIONS — These grades are used in high temperature and general corrosion service conditions where fabrication includes welding. They are used in general hydraulic and pressure services where atmospheric and general corrosion are encountered. They are not intended for salt water systems or use in high pressure main steam lines.

For further data on applications, corrosion resistance, and resistance to scaling, refer to Type 321 and 347 Stainless Steel Tubing on Pages 86 and 87 of this section.

MECHANICAL PROPERTIES—The following minimum mechanical properties apply:

	Tensile Strength (psi)	Yield Strength (psi)	Elongation 2" Min.
321	75,000	30,000	28%
347	70,000	25,000	28%

TOLERANCES — See below.

STANDARD SIZES

Refer to Pages 99-101 of this section.

STAINLESS STEEL PIPE TOLERANCES —

Outside Diameter:

Nominal Sizes	
1 1/2" and under	Plus 1/64", Minus 1/32"
Over 1 1/2" to 4"	Plus 1/31", Minus 1/32"
Over 4" to 8"	Plus 1/16", Minus 1/32"
Over 8" to 12"	Plus 3/32", Minus 1/32"

Wall Thickness: The minimum wall thickness at any point shall not be more than 12 1/2% under the nominal wall thickness specified.

6061-T6
ALUMINUM EXTRUDED PIPE

6061 is one of the least expensive and yet most versatile of the heat treatable aluminum alloys, with magnesium and silicon as its principal alloying elements. It has good resistance to corrosion. It may be fusion welded in the heat treated condition, and is capable of moderate forming.

APPLICATIONS — This grade is used where light weight, strength, and good resistance to corrosion are required.

MECHANICAL PROPERTIES—The following typical mechanical properties apply:

	Tensile Strength (psi)	Yield Strength (psi)	Elongation 2″ Min.
Under 1”	42,000	35,000	12%
1” & over	38,000	35,000	10%

TOLERANCES — See below.

6036-T6
ALUMINUM EXTRUDED PIPE

6063 is a heat treatable alloy with manganese and silicon as its principal alloying elements. It has not quite the strength of 6061, but good resistance to atmospheric corrosion. It is readily workable and has excellent finishing characteristics.

APPLICATIONS — This alloy is used in many interior and exterior architectural applications such as doors, store fronts, primary and secondary windows, etc. it is used for lawn furniture, irrigation pipe, railings, and builders' hardware.

MECHANICAL PROPERTIES—The following typical mechanical properties apply:

Tensile Strength (psi)	Yield Strength (psi)	Elongation 2″ Min.
30,000	25,000	8%

TOLERANCES — See below.

STANDARD SIZES
Refer to Pages 98-100 of this section.

ALUMINUM PIPE TOLERANCES —
Outside Diameter:

Nominal Size	Schedules 5 and 10	Schedules 20 and Greater
Under 2	+.015, --.031	+.015, --.031
2 to 4	+.031, --.031	+ 1%, --1%
4-1/2 to 7	+.062, --.031	+ 1%, --1%
8 to 12	+.093, --.031	+ 1%, --1%

Wall Thickness: The minimum wall thickness at any point shall not be more than 12-1/2% under the nominal wall thickness specified.

SQUARE AND RECTANGULAR STEEL STRUCTURAL TUBING

Structural Tubing is available in steel and aluminum in a wide range of sizes in round, square and rectangular shapes. It has become a most important basic section for structural applications because of its adaptability to such varied uses. For stock sizes of Square and Rectangle Steel Structural Tubing, refer to Pages 109-112 and Square and Rectangular Aluminum Tubing, refer to Pages 92-93 of this section.

Structural tubing is an efficient structural member with many inherent advantages, including strength and lightness. For example, for a given weight the round section distributes stresses in compression and vertical loading equally and in all directions. In torsion it is capable of carrying a greater load than any other structural member of equal weight. Where there is uneven loading, rectangular sections may be used.

STRUCTURAL STEEL TUBING

Structural Steel Tubing is made from flat rolled basic oxygen steel, which is formed into a tubular shape and then welded by the electric resistance process. In this continuous welding process there is no loss of properties, and no irregularity that may be observed in the structure. Over the years, tests and service have demonstrated that the tube weld is as strong as the base metal. Structural Steel Tubing is available in two grades. **Standard** Structural Steel Tubing is the more common grade that is used for a variety of applications in many different industries. **High Strength** Structural is a higher strength grade that is used in more limited applications where further weight reduction is advantageous.

STANDARD STRUCTURAL STEEL TUBING

Standard Structural Steel Tubing conforms to ASTM A 500. This specification covers cold formed welded and seamless carbon steel structural tubing respectively. Following are minimum mechanical properties:

MECHANICAL PROPERTIES—The following minimum mechanical properties apply:

	Tensile Strength (psi)	Yield Strength (psi)	Elongation 2″ Min.
ASTM A 500			
Grade A	45,000	33,000	25%
Grade B	58,000	42,000	23%
Grade C	62,000	46,000	21%

Standard Structural Steel Tubing has the advantage of ease of fabrication, and all the standard fabrication techniques may be employed. it may be expanded or swaged, flattened or flared, bent or drawn. It may be mechanically joined or welded by all the commonly used techniques and practices.

HIGH STRENGTH STRUCTURAL STEEL TUBING

High Strength Structural Steel Tubing is higher in strength than the structural grade, allowing substantial weight reductions in design. With a minimum yield strength of 50,000 psi, this tubing has a high torque value. For many applications, its use results in lower cost than other tubing and structural shapes.

High Strength Structural Tubing may be fabricated by all the standard techniques. It is easy to saw cut and drill. Flattening or flaring are best accomplished after heating. Welding may be performed with the ordinary techniques.

TOLERANCES FOR SQUARE AND RECTANGULAR STRUCTURAL TUBING

OUTSIDE DIMENSIONS TOLERANCES

Largest Outside Dimension Across Flats, Inches	[a] Tolerance, plus and minus in Inches
2 1/2 and under	0.020
Over 2 1/2 to 3 1/2 include	0.025
Over 3 1/2 to 5 1/2 include	0.030
Over 5 1/2	1%

[a]Tolerances include allowance for convexity or concavity. Tolerance may be increased 50% when applied to the smaller dimension of rectangular sections whose ratio of the cross-sectional dimensions is between 1.5 and 3, and 100 percent when the ratio exceed 3.

WALL THICKNESS TOLERANCE

The tolerance for wall thickness exclusive of weld are shall be plus or minus 10% of the nominal wall thickness specified. The wall thickness is to be measured at the center of the flat.

SPECIFIED MILL LENGTH TOLERANCES

Length Tolerance for Specified Mill Length	22 Feet and Under		Over 22 Feet to 44 Feet include.	
	Over	Under	Over	Under
Inches	1/2	1/4	3/4	1/4

STRAIGHTNESS TOLERANCE

The permissible variation for straightness shall be 1/8" times the number of feet of the total length divided by 5.

SQUARENESS OF SIDES

Adjacent sides may deviate from 90º by a tolerance of plus or minus 2º maximum.

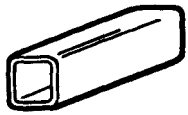
RADIUS OF CORNERS

The radius of the outside corner of the section shall not exceed three times the specified wall thickness.

TWIST TOLERANCES

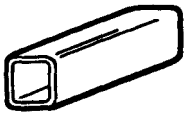
Specified Dimension of Longest Side Inches	Maximum Twist in 3 Feet
1 1/2 and under	0.050"
Over 1 1/2 to 2 1/2 include	0.062"
Over 2 1/2 to 4 include	0.075"
Over 4 to 6 include	0.087"
Over 6 to 8 include	0.100"
Over 8	0.112"

Twist is measured by holding down one end of square or rectangular tube on a flat surface plate with the bottom side of the tube parallel to the surface plate and noting the height that either corner, at the opposite end of the bottom side of the tube, extends above the surface plate.



SQUARE STEEL TUBING

Outside Dimensions	Wall Thickness	Weight Per Foot
3/8 x 3/8	.049	.2172
	.065	.2740
1/2 x 1/2	.035	.2213
	.049	.3005
	.065	.3845
5/8 x 5/8	.028	.2273
	.035	.2808
	.049	.3838
	.065	.4950
	.083	.6118
3/4 x 3/4	.028	.2749
	.035	.3403
	.049	.4671
	.065	.6055
	.083	.7530
	.120	1.028
7/8 x 7/8	.028	.3225
	.035	.3998
	.049	.5504
	.065	.7160
	.083	.8940
	.095	1.008
1 x 1	.028	.3701
	.035	.4593
	.049	.6337
	.065	.8265
	.072	.9090
	.083	1.035
	.095	1.169
	.109	1.321
	.120	1.436
1 1/8 x 1 1/8	.035	.5188
	.049	.7170
	.065	.9370
	.083	1.176
	.095	1.331
	.109	1.506
	.120	1.640
1 1/4 x 1 1/4	.035	.5780
	.049	.8000
	.065	1.047
	.083	1.317
	.095	1.492
	.109	1.691
	.120	1.844
	.188	2.610
1 1/2 x 1 1/2	.035	.6977
	.049	.9670
	.065	1.268
	.083	1.599
	.095	1.815
	.109	2.062
	.120	2.252
	.134	2.489
	.188	3.350
1 3/4 x 1 3/4	.035	.8163
	.049	1.134
	.065	1.490
	.083	1.882
	.095	2.138
	.109	2.432
	.120	2.660
	.134	2.945
2 x 2	.065	1.710
	.083	2.164
	.095	2.461
	.109	2.830
	.120	3.060
	.134	3.401
	.148	3.728
	.188	4.320
	.220	5.326
	.250	5.410
2 1/4 x 2 1/4	.065	1.932
	.083	2.446
	.095	2.784
	.109	3.174
	.120	3.476
	.134	3.856
	.148	4.231
	.180	5.067
2 1/2 x 2 1/2	.065	2.152
	.083	2.728
	.095	3.107
	.109	3.580
	.120	3.910
	.134	4.312
	.148	4.734
	.188	5.610
	.250	7.110



SQUARE STEEL TUBING

(Cont.)

Outside Dimensions	Wall Thickness	Weight Per Foot
3 x 3	.065	2.594
	.083	3.292
	.095	3.753
	.109	4.286
	.120	4.700
	.134	5.223
	.188	6.870
	.203	7.722
	.250	8.810
	.313	10.58
3 1/4 x 3 1/4	.083	3.575
	.095	4.076
	.109	4.656
	.120	5.108
	.134	5.679
	.180	7.515
3 1/2 x 3 1/2	.083	3.857
	.095	4.399
	.109	5.027
	.120	5.516
	.125	5.610
	.134	6.134
	.148	6.747
	.188	8.150
	.250	10.51
	.313	12.70
4 x 4	.083	4.422
	.120	6.330
	.188	9.450
	.250	12.21
	.313	14.83
	.375	17.27
	.500	21.63
4 1/2 x 4 1/2	.188	10.70
	.250	13.91
5 x 5	.188	11.97
5 x 5	.250	15.62
	.313	19.08
	.375	22.37
	.500	28.43
5 1/2 x 5 1/2	.188	13.25
	.250	17.32
	.313	21.21
	.375	24.93
6 x 6	.188	14.56
	.350	19.02
	.313	23.34
	.375	27.48
	.500	35.24
7 x 7	.188	17.13
	.250	22.42
	.313	27.63
	.375	32.58
	.500	42.05
8 x 8	.188	19.63
	.250	25.82
	.313	31.84
	.375	37.69
	.500	48.85
9 x 9	.188	22.18
	.250	29.23
	.313	36.10
	.375	55.66
	.500	55.66
10 x 10	.188	24.73
	.250	32.63
	.375	47.90
	.500	62.46
12 x 12	.188	29.84
	.250	39.43
	.375	58.10
	.500	76.07

RECTANGULAR STEEL TUBING

Outside Dimensions	Wall Thickness s	Weight Per Foot
3/4 x 1/2	.065	.4950
1 x 1/2	.065	.6055
1 1/4 x 1/2	.065	.7160
1 1/2 x 3/4	.065	.9370
	.120	1.640
1 1/2 x 1	.049	.8000
	.065	1.048
	.083	1.317
	.095	1.492
	.109	1.691
	.120	1.844
2 x 1	.065	1.269
	.083	1.600
	.095	1.815
	.109	2.062
	.120	2.252
2 x 1 1/4	.065	1.379
	.083	1.741
	.095	1.977
	.109	2.247
	.120	2.456
2 x 1 1/2	.065	1.490
	.083	1.882
	.095	2.138
	.109	2.433
	.120	2.660
2 1/2 x 1	.065	1.490
	.083	1.882
	.095	2.138
	.109	2.443
	.120	2.660
2 1/2 x 1 1/2	.065	1.711
	.083	2.164
	.095	2.461
	.109	2.803
	.120	3.068
	.134	3.401
	.180	4.454
	.188	4.490
	.250	5.400

Outside Dimensions	Wall Thickness s	Weight Per Foot
3 x 1	.065	1.711
	.083	2.164
	.095	2.461
	.109	2.830
	.120	3.060
3 x 1 1/2	.065	1.932
	.083	2.446
	.095	2.784
	.109	3.174
	.120	3.476
	.134	3.856
	.148	4.231
	.180	5.067
	.188	5.070
3 x 2	.065	2.153
	.083	2.728
	.095	3.107
	.109	3.544
	.120	3.884
	.134	4.312
	.148	4.734
	.188	5.590
	.250	7.110
3 x 2 1/2	.065	2.374
	.083	3.011
	.095	3.430
	.109	3.915
	.120	4.292
	.134	4.767
	.148	5.237
	.180	6.291
3 1/2 x 1	.065	1.932
	.083	2.446
	.095	2.784
	.109	3.174
	.120	3.476

Outside Dimensions	Wall Thickness s	Weight Per Foot
3 1/2 x 1 1/2	.065	2.153
	.083	2.728
	.095	3.107
	.109	3.544
	.120	3.884
3 1/2 x 2 1/2	.065	2.595
	.083	3.293
	.095	3.753
	.109	4.286
	.120	4.700
	.134	5.223
	.148	5.741
	.188	6.903
4 x 1 1/2	.065	2.374
	.083	3.011
	.095	3.430
	.109	3.915
	.120	4.292
	.134	4.767
	.148	5.237
	.180	6.291
4 x 2	.065	2.595
	.083	3.293
	.095	3.753
	.109	4.286
	.120	4.700
	.134	5.223
	.148	5.741
	.188	6.870
	.250	8.810
4 x 2 1/2	.083	3.575
	.095	4.076
	.109	4.656
	.120	5.108
	.134	5.679
	.148	6.244
	.180	7.515

RECTANGULAR STEEL TUBING (cont.)

Outside Dimensions	Wall Thickness	Weight Per Foot
4 x 3	.083	3.857
	.095	4.399
	.109	5.027
	.120	5.516
	.134	6.134
	.148	6.747
	.188	8.150
	.250	10.51
	.313	12.70
5 x 2	.109	5.027
	.120	5.516
	.134	6.134
	.148	6.747
	.188	8.150
	.250	10.51
5 x 2 1/2	.109	5.397
	.120	5.924
	.134	6.590
	.148	7.250
	.180	8.739
5 x 3	.120	6.330
	.188	9.420
	.250	12.21
	.313	14.83
	.375	17.27
	.500	21.63
5 x 4	.188	10.70
	.250	13.91
6 x 2	.188	9.420
	.250	12.21
	.313	14.83
6 x 3	.120	7.150
	.188	10.70
	.250	13.91
	.375	19.82
6 x 4	.188	11.97
	.250	15.62
	.313	19.08
	.375	22.37
	.500	28.43
7 X 3	.188	12.30
	.250	15.62
	.313	19.08
	.375	22.37
7 x 4	.188	13.25
	.250	17.32
	.313	21.21
	.375	24.93
7 x 5	.188	14.53
	.250	19.02
	.313	23.34
	.375	27.48
	.500	35.24
8 x 2	.188	11.97
	.250	15.62
	.313	19.08
	.375	22.37
8 x 3	.188	13.25
	.250	17.32
	.313	21.22
	.375	24.93
8 x 4	.188	14.53
	.250	19.02
	.313	23.34
	.375	27.48
	.500	35.24
8 x 6	.188	17.08
	.250	22.42
	.313	27.59
	.375	32.58
	.500	42.05
9 x 3	.188	14.53
	.250	19.02
	.313	23.34
	.375	27.48
9 x 5	.188	17.08
	.250	22.42
	.313	27.59
	.375	32.58
9 x 7	.188	19.63
	.250	25.82
	.313	31.84
	.375	37.69
10 x 2	.188	14.53
	.250	19.02
	.313	23.34
	.375	27.48
10 x 3	.250	20.72
10 x 4	.188	17.08
	.250	22.42
	.313	27.59
	.375	32.58
10 x 5	.188	18.35
	.250	24.12
10 x 6	.188	19.63
	.250	25.82
	.313	31.84
	.375	37.69
	.500	48.85
10 x 8	.375	42.79
	.500	55.66
12 x 2	.188	17.08
12 x 4	.188	19.63
	.250	25.82
	.313	31.84
	.375	37.69
12 x 6	.188	22.18
	.250	29.23
	.313	36.10
	.375	42.79
	.500	55.66

AIRFRAME TUBING

For Aircraft Mechanical Tubing, refer to Pages 4-64 and 80-81 of this section.

Aircraft Airframe Tubing is a tubular product that is primarily applied to structural, as opposed to mechanical, applications. It is most commonly used in airborne components or structures, but may also be applied with equal advantage to equipment that is used exclusively on the ground.

Aircraft Airframe Tubing is generally used in the as-received condition utilizing the mechanical properties that exist in the material. It is usually used without any surface stock removal by machining or other methods. Light surface defects or imperfections may be present, but they are not considered detrimental as long as their depth does not exceed the standard tolerances of the outside diameter or wall.

COLD DRAWN SEAMLESS ASI 4130 AIRFRAME TUBING

AMS-T-6736
UNS G41300

This material was intended to be used in the as received or near as received condition. A cold worked, burnished surface finish is a prerequisite. Material is Aircraft Quality.

ANALYSIS

C	Mn	P (Max.)	S (Max.)	Si	Cr	Mo
.27/.33	.40/.60	.025	.025	.20/.35	.80/1.10	.15/.25

APPLICATIONS — This material is commonly used for aircraft frames, race cars, ultra-lights, racing bicycles and other sport uses where strength combined with ductility for bending (Condition N.) is required.

MECHANICAL PROPERTIES (psi)

	Tensile Strength (psi)	Yield Strength (psi)	Elongation
Condition N*			
Up to .035 incl.	95,000 min.	75,000 min.	10% min.
Over .035 to .187 incl.	95,000 min.	75,000 min.	12% min.
Over .187	90,000 min.	70,000 min.	15% min.
Condition A	95.000 max.		
Condition HT-125	125,000 min.	100,000 min.	12% min.
Condition HT-150	150,000 min.	135,000 min.	10% min.
Condition HT-180	180,000 min.	165,000 min.	8% min.

*Condition N requires normalize or stress relieve at mills option.

MACHINABILITY — This grade has a machinability rating of 78% of 1212.

WELDABILITY — This grade is weldable using most processes when proper pre and post heating techniques are used.

HARDENING — This grade (Conditions A and N) can be hardened by heating to 1600º-1700º F and water quenching followed by tempering at 800º-1300º F to the required hardness.

4130 AIRFRAME TUBING
AMS-T-6736 — CONDITION N

O.D. (Inches)	Wall Thickness	Weight Per Foot	O.D. (Inches)	Wall Thickness	Weight Per Foot	O.D. (Inches)	Wall Thickness	Weight Per Foot	O.D. (Inches)	Wall Thickness	Weight Per Foot
1/8	.035	.0336	7/16	.028	.1226	9/16	.035	.1974	3/4	.028	.2159
3/16	.022	.0390		.035	.1506		.049	.2690		.035	.2673
	.028	.0478		.042	.1776		.058	.3128		.049	.3668
	.035	.0572		.049	.2036		.065	.3457		.058	.4287
	.049	.0727		.058	.2354		.083	.4255		.065	.4755
1/4	.028	.0664		.065	.2589		.095	.4748		.072	.5214
	.035	.0804		.072	.2814		.109	.5285		.083	.5913
	.049	.1052		.083	.3147		.120	.5677		.095	.6646
	.058	.1189		.088	.3289		.134	.6140		.120	.8074
	.065	.1284		.095	.3480		.156	.6781		.134	.8816
	.072	.1369		.120	.4075		.219	.8034		.156	.9897
5/16	.028	.0852		.129	.4257	5/8	.028	.1785		.188	1.128
	.035	.1039		.134	.4351		.035	.2205		.219	1.242
	.049	.1382	1/2	.028	.1411		.042	.2615		.250	1.335
	.058	.1580		.035	.1738		.049	.3014	13/16	.065	.5193
	.065	.1722		.049	.2360		.058	.3512		.083	.6471
	.075	.1906		.058	.2738		.065	.3888		.095	.7285
	.083	.2039		.065	.3020		.083	.4805		.109	.8195
	.095	.2212		.083	.3696		.095	.5377		.120	.8881
3/8	.028	.1038		.095	.4109		.120	.6472	7/8	.028	.2533
	.032	.1172		.109	.4552		.125	.6675		.035	.3140
	.035	.1271		.120	.4870		.133	.6989		.049	.4323
	.049	.1706		.131	.5163		.156	.7814		.058	.5061
	.058	.1964		.134	.5238		.188	.8774		.065	.5623
	.065	.2152		.156	.5731	11/16	.049	.3344		.083	.7021
	.083	.2588		.183	.6196		.065	.4325		.095	.7914
	.090	.2739		.188	.6264		.083	.5363		.120	.9676
	.095	.2841					.095	.6017		.156	1.198
	.109	.3097					.120	.7279		.188	1.379
	.120	.3268					.156	.8864		.219	1.534
							.188	1.004		.250	1.669

O.D. (Inches)	Wall Thickness	Weight Per Foot
15/16	.120	1.048
1	.028	.2907
	.035	.3607
	.049	.4977
	.058	.5835
	.065	.6491
	.083	.8129
	.095	.9182
	.109	1.037
	.120	1.128
	.134	1.239
	.156	1.406
	.188	1.630
	.219	1.827
	.250	2.003
1 1/16	.095	.9821
	.120	1.209
	.188	1.757
	.281	2.347
1 1/8	.035	.4074
	.049	.5631
	.058	.6609
	.065	.7359
	.083	.9237
	.095	1.045
	.120	1.288
	.156	1.614
	.188	1.881
	.219	2.119
	.250	2.336
	.281	2.533
	.313	2.714
1 3/16	.065	.7796
	.083	.9795
	.120	.1369
	.188	2.008
1 1/4	.035	.4542
	.049	.6285
	.058	.7384
	.065	.8226
	.083	1.034
	.095	1.172
	.120	1.448
	.134	1.597
	.156	1.823
	.188	2.132
	.219	2.411
	.250	2.670
	.313	3.132
	.375	3.504
1 5/16	.095	1.236
	.188	2.259

O.D. (Inches)	Wall Thickness	Weight Per Foot
1 3/8	.035	.5009
	.049	.6939
	.058	.8158
	.065	.9094
	.083	1.145
	.095	1.299
	.120	1.608
	.156	2.031
	.188	2.383
	.219	2.704
	.250	3.004
	.313	3.550
	.375	4.005
17/16	.219	2.851
1 1/2	.028	.4402
	.035	.5476
	.049	.7593
	.058	.8932
	.065	.9962
	.072	1.098
	.083	1.256
	.095	1.426
	.120	1.769
	.156	2.239
	.188	2.634
	.219	2.996
	.250	3.338
1 9/16	.156	2.344
	.188	2.761
1 5/8	.049	.8248
	.058	.9707
	.065	1.083
	.083	1.367
	.095	1.552
	.120	1.929
	.156	2.447
	.188	2.885
	.219	3.289
	.250	3.671
	.313	4.386
	.375	5.006
	.438	5.553
1 3/4	.049	.8902
	.058	1.048
	.065	1.170
	.083	1.478
	.095	1.679
	.120	2.089
	.156	2.656
	.188	3.136
	.219	3.581
	.250	4.005
	.313	4.804

O.D. (Inches)	Wall Thickness	Weight Per Foot
1 7/8	.035	.6878
	.049	.9556
	.058	1.126
	.065	1.257
	.083	1.589
	.095	1.806
	.120	2.249
	.156	2.864
	.188	3.387
	.250	4.339
	.313	5.222
2	.035	.7345
	.049	1.021
	.058	1.203
	.065	1.343
	.083	1.699
	.095	1.933
	.120	2.409
	.134	2.670
	.156	3.072
	.188	3.638
	.250	4.673
	.313	5.639
2 1/8	.065	1.430
	.156	3.281
	.188	3.889
	.250	5.006
	.313	6.057
	.375	7.009
2 1/4	.065	1.517
	.083	1.921
	.095	2.186
	.120	2.730
	.134	3.028
	.156	3.489
	.188	4.140
	.219	4.750
	.250	5.340
2 5/16	.375	7.762
2 3/8	.156	3.697
	.188	4.391
	.250	5.674
	.375	8.010
2 1/2	.049	1.283
	.058	1.513
	.065	1.690
	.083	2.143
	.095	2.440
	.120	3.050
	.134	3.386
	.156	3.905

O.D. (Inches)	Wall Thickness	Weight Per Foot
2 1/2	.188	4.642
(Cont.)	.219	5.335
	.250	6.008
	.313	7.311
	.375	8.511
	.500	10.68
2 5/8	.250	6.341
2 3/4	.065	1.864
	.083	2.364
	.095	2.694
	.120	3.371
	.134	3.744
	.156	4.322
	.188	5.144
	.250	6.675
	.375	9.512
2 7/8	.058	1.745
3	.058	1.822
	.065	2.037
	.083	2.586
	.095	2.947
	.120	3.791
	.156	4.738
	.188	5.646
	.250	7.343
	.375	10.51
3 1/8	.313	9.400
3 1/4	.125	4.172
	.188	6.148
	.250	8.010
	.375	11.51
	.438	13.15
	.500	14.69
3 3/8	.188	6.399
	.313	10.24
3 1/2	.095	3.455
	.120	4.332
	.188	6.650
	.250	8.678
	.313	10.65
3 5/8	.375	13.02
3 3/4	.250	9.345
	.500	17.36
4	.188	7.654
	.250	10.01
	.500	18.69
	1.000	32.04
4 1/4	.188	8.156
4 1/2	.500	21.36
4 3/4	.500	22.70
5 3/4	.500	28.04

4130 SQUARE TUBING

AMS-T-6736 CONDITION N

Outside Dimensions	Wall Thickness	Weight Per Foot	Outside Dimensions	Wall Thickness	Weight Per Foot
3/8 x 3/8	.049	.2172	7/8 x 7/8	.035	.3998
1/2 x 1/2	.035	.2213		.049	.5504
	.065	.3845	1 x 1	.035	.4593
5/8 x 5/8	.035	.2808		.049	.6337
	.049	.3670		.083	1.035
	.058	.4472		.125	1.488
	.065	.4950	1 1/4 x 1 1/4	.065	1.048
3/4 x 3/4	.035	.3403	1 3/8 x 1 3/8	.058	1.039
	.049	.4671	1 1/2 x 1 1/2	.065	1.163
	.058	.5454		.125	2.338
	.065	.6055			

4130 AIRCRAFT RECTANGULAR TUBING

AMST-6736 CONDITION N

Outside Dimensions	Wall Thickness	Weight Per Foot	Outside Dimensions	Wall Thickness	Weight Per Foot
1 x 1/2	.049	.4671	1 3/4 x 1	.065	1.158
	.065	.6055	2 x 1 1/2	.049	1.134
1 1/2 x 3/4	.049	.7170			

CDS 4130 STREAMLINE TUBE

CONDITION N AMS-T-6736

SIZE	WALL	WT/FT
1.012 MAJOR X .428 MINOR X .035	WALL	.2680#/FT
1.180 MAJOR X .500 MINOR X .035	WALL	.3140#/FT
1.349 MAJOR X .571 MINOR X .049	WALL	.3610#/FT
1.685 MAJOR X .714 MINOR X .049	WALL	.6290#/FT
2.023 MAJOR X .857 MINOR X .049	WALL	.7593#/FT
2.023 MAJOR X 1.429 MINOR X .049	WALL	1.2830#/FT

HYDRAULIC LINE TUBING

Hydraulic tubing has emerged as a special and separate tubular product as a result of the importance of automation with increased use of hydraulic systems. Low carbon seamless condenser or mechanical tubing has been produced for years. Although it was satisfactory for many requirements, it failed to meet many of the main requisites for a steel hydraulic tubing.

A Joint Industries Council was formed and in 1949 published standards to be applied to this product. Provision was made for ductility to allow for consistent bending and flaring. Cleanliness standards were established to prevent contamination of the hydraulic fluid and damage to valves and cylinders. Uniformity of sizes was established to allow for use of standard fittings.

The J.I.C. Hydraulic Standards for Industrial Equipment, as well as more recent SAE Standards, recommend use of low carbon seamless tubing in all pressure ranges. Selection of the proper tubing depends on a number of factors such as pressure velocity and flow.

HYDRAULIC LINE TUBING (CONTINUED)

For product description and specifications
See Pages 118 - 123 of this section.

S=Seamless W=Welded and Drawn

Outside Diameter (Inches)	Wall Thickness (Inches)	Inside Diameter (Inches)	Wt. per Ft. Steel	Wt. per Ft. Alum.	CARBON STEEL	STAINLESS STEEL Type 304 1/8 Hard	STAINLESS STEEL Type 304 Ann.	STAINLESS STEEL Type 321 Ann.	STAINLESS STEEL Type 347 Ann.	ALUMINUM 6061-T6
1/8	.008	.109	.0100	.0035				S		
	.010	.105	.0123	.0043				S		
	.012	.101	.0145	.0051		SW		SW		
	.016	.093	.0186	.0065		S	SW	S		
	.020	.085	.0224	.0078		SW	SW	SW	SW	S
	.028	.069	.0290	.0101	SW	S	SW	SW	S	
	.032	.061	.0318	.0112			S	S		
	.035	.055	.0336	.0115		SW	S	SW	SW	
	.042	.041	.0372	.0131				S		
	.049	.027	.0398	.0140				S		
5/32	.006	.144	.0963	.0034				S		
	.008	.140	.0127	.0045					S	
	.012	.132	.0185	.0065				S		
	.016	.124	.0240	.0084				S		
	.020	.116	.0291	.0102			S	S		
	.028	.100	.0384	.0135				S		
	.035	.086	.0452	.0159				S		
	.049	.058	.0560	.0197			S	S		
3/16	.005	.178	.0975	.0034			S			
	.006	.176	.0116	.0041				S		
	.008	.172	.0153	.0054					S	
	.010	.168	.0190	.0067			S	S		
	.012	.164	.0225	.0079				S		
	.016	.156	.0294	.0103		SW	S	SW	W	
	.020	.148	.0359	.0126		SW	SW	S		S
	.022	.144	.0390	.0138			S	S		
	.025	.138	.0433	.0150				S		
	.028	.131	.0478	.0168	SW	SW	SW	SW		S
	.035	.118	.0572	.0201	SW	SW	SW	SW	S	S
	.042	.104	.0655	.0230			S	S		
	.049	.090	.0727	.0256	SW	S	S	SW	S	
	.058	.072	.0805	.0283				S		
	.065	.058	.0854	.0300			S	S		
7/32	.006	.207	.0136	.0048				S		
	.010	.199	.0223	.0078				S		
	.028	.163	.0570	.0200				S		
	.035	.149	.0688	.0242				S		
	.049	.121	.0888	.0312	SW					
1/4	.006	.238	.0156	.0055				S		
	.010	.230	.0256	.0090				S		
	.012	.226	.0307	.0108		S	S	S		
	.016	.218	.0400	.0140		SW	S	SW		S
	.018	.214	.0446	.0156					S	
	.020	.210	.0491	.0173		SW	SW	SW	SW	S
	.022	.206	.0536	.0189			S	S		
	.028	.194	.0664	.0235	SW	SW	SW	SW	SW	S
	.035	.180	.0804	.0281	SW	SW	SW	SW	SW	S
	.042	.166	.0933	.0328				S		
	.049	.152	.1052	.0371	SW	SW	SW	SW	SW	S
	.058	.134	.1189	.0419		S	S	S		
	.065	.120	.1284	.0453	SW	S	S	S	S	
	.078	.094	.1433	.0503		S				
	.083	.084	.1480	.0523	SW	S		S		

HYDRAULIC LINE TUBING (CONTINUED)

For product description and specifications
See Pages 118 - 123 of this section.

S=Seamless W=Welded and Drawn

Outside Diameter (Inches)	Wall Thickness (Inches)	Inside Diameter (Inches)	Wt. per Ft. Steel	Wt. per Ft. Alum.	CARBON STEEL	STAINLESS STEEL Type 304 1/8 Hard	STAINLESS STEEL Type 304 Ann.	STAINLESS STEEL Type 321 Ann.	STAINLESS STEEL Type 347 Ann.	ALUMINUM 6061-T6
9/32	.035	.211	.0920	.0323				S		
5/16	.006	.301	.0196	.0069				S		
	.008	.297	.0260	.0091				S		
	.010	.293	.0323	.0113				S		
	.012	.289	.0385	.0135				S		
	.016	.281	.0507	.0178		SW	S	S	W	
	.020	.273	.0626	.0214		SW	SW	SW	SW	
	.025	.262	.0769	.0270				S		
	.028	.257	.0852	.0300	SW	SW	SW	SW	S	S
	.035	.243	.1039	.0366	SW	SW	SW	SW	SW	S
	.042	.229	.1216	.0427			S			
	.049	.215	.1382	.0487	SW	S	S	SW	S	S
	.058	.197	.1580	.0561	SW			S		S
	.095	.122	.2212	.0777	SW					
3/8	.008	.359	.0314	.0110				S		
	.010	.355	.0390	.0137				S		
	.012	.351	.0465	.0163				S		
	.016	.343	.0613	.0215		S	S	SW	SW	
	.020	.335	.0758	.0267		SW	S	SW	SW	
	.022	.331	.0829	0.282		SW	SW	S		
	.025	.325	.0935	.0328		S		S		
	.028	.319	.1038	.0366		SW	SW	SW	SW	S
	.035	.305	.1271	.0449	SW	SW	SW	SW	SW	S
	.042	.293	.1494	.0525			S	S		S
	.049	.277	.1706	.0602	SW	SW	SW	W	S	S
	.058	.259	.1964	.0694	SW	W	S	S	SW	S
	.065	.245	.2152	.0755	SW	SW		SW	S	S
	.072	.231	.2230	.0818					S	
	.083	.209	.2588	.0918		S	S	S		S
	.095	.185	.2841	.0998		S	S	S		
	.120	.135	.3268	.1148				S		
7/16	.010	.418	.0457	.0160					W	
	.012	.414	.0545	.0191				S		
	.016	.406	.0720	.0253				S		
	.020	.398	.0893	.0314				S		
	.028	.381	.1226	.0431				S		
	.035	.367	.1506	.0530	SW	S	S	S	S	
	.049	.340	.2036	.0714	SW	W	SW	SW	S	
	.058	.322	.2354	.0826				S		
	.065	.307	.2589	.0908	SW	S		S		S
	.083	.272	.3147	.1110					S	
	.095	.247	.3480	.1224				S		
1/2	.005	.490	.0264	.0092				S	S	
	.006	.488	.0317	.0111				S		
	.010	.480	.0523	.0184				S		
	.012	.476	.0625	.0220				S		
	.016	.468	.0827	.0290		S	SW	SW		
	.020	.460	.1025	.0356				S		
	.025	.450	.1268	.0445				S		
	.028	.444	.1411	.0496		SW	SW	SW	SW	S
	.032	.436	.1599	.0562	SW					

HYDRAULIC LINE TUBING (CONTINUED)

For product description and specifications
See Pages 118 - 123 of this section.

S=Seamless W=Welded and Drawn

Outside Diameter (Inches)	Wall Thickness (Inches)	Inside Diameter (Inches)	Wt. per Ft. Steel	Wt. per Ft. Alum.	CARBON STEEL	STAINLESS STEEL Type 304 1/8 Hard	STAINLESS STEEL Type 304 Ann.	STAINLESS STEEL Type 321 Ann.	STAINLESS STEEL Type 347 Ann.	ALUMINUM 6061-T6
1/2	.035	.420	.1738	.0612	SW	SW	SW	SW	SW	S
(Cont.)	.042	.416	.2054	.0721		S	S	S		
	.049	.402	.2360	.0829	SW	SW	S	SW	SW	S
	.058	.384	.2738	.0962	SW		S	S		S
	.065	.370	.3020	.1061	SW	SW		SW	SW	S
	.083	.334	.3969	.1298	SW	S		S		S
	.095	.310	.4109	.1443		S		S	S	
	.109	.282	.4552	.1599				S		
	.120	.260	.4870	.1710				S	S	S
9/16	.010	.543	.0590	.0207				S		
	.016	.531	.0934	.0328				S		
	.020	.523	.1159	.0407				S		
	.028	.506	.1600	.0562				SW		
	.042	.479	.2337	.0821				S		
	.049	.464	.2690	.0948	SW			S		
	.065	.432	.3457	.1218	SW			S		
	.109	.344	.5285	.1856				S		
	.120	.322	.5677	.1994		S				
5/8	.010	.605	.0657	.0231				S		
	.012	.601	.0786	.0276				S		
	.016	.593	.1041	.0366				S	SW	
	.020	.585	.1292	.0454		SW	SW	SW	SW	S
	.028	.569	.1785	.0627		SW	SW	SW	SW	S
	.035	.555	.2205	.0775	SW	SW	SW	SW	SW	
	.042	.541	.2615	.0918		SW	SW	S		
	.049	.527	.3014	.1060	SW	SW	SW	SW	S	S
	.058	.509	.3512	.1234		S	SW	S	S	S
	.065	.495	.3888	.1367	SW	S		SW	S	S
	.072	.471	.4252	.1493						
	.083	.459	.4805	.1693	SW	S		S	S	S
	.095	.435	.5377	.1888				S		S
	.107	.411	.5919	.2079				S		
	.120	.385	.6472	.2273				S		
	.156	.312	.7814	.2744			S	S	S	
11/16	.010	.668	.0724	.0254				S		
	.028	.631	.1974	.0693				S		
	.035	.617	.2441	.0857			S	S		
	.049	.589	.3344	.1174	SW			S		
	.065	.557	.4325	.1519				S		
3/4	.010	.730	.0790	.0277				S	S	
	.012	.726	.0958	.0336				S		
	.016	.718	.1254	.0440		S	S	SW	S	
	.020	.710	.1559	.0548		SW	S	SW	S	S
	.025	.700	.1936	.0680		S	W	W		
	.028	.694	.2159	.0758		SW	S	SW	S	
	.035	.680	.2673	.0938	SW	SW	SW	SW	S	S
	.042	.666	.3176	.1115		SW	W	S	S	
	.049	.652	.3668	.1288	SW	SW	SW	SW	S	S
	.058	.643	.4287	.1506		SW		S	S	S

HYDRAULIC LINE TUBING (CONTINUED)

For product description and specifications
See Pages 118 - 123 of this section.

S=Seamless W=Welded and Drawn

Outside Diameter (Inches)	Wall Thickness (Inches)	Inside Diameter (Inches)	Wt. per Ft. Steel	Wt. per Ft. Alum.	CARBON STEEL	STAINLESS STEEL Type 304 1/8 Hard	STAINLESS STEEL Type 304 Ann.	STAINLESS STEEL Type 321 Ann.	Type 347 Ann.	ALUMINUM 6061-T6
3/4	.065	.620	.4755	.1670	SW	SW	SW	SW	S	S
(Cont.)	.072	.606	.5214	.1831			S			
	.083	.584	.5913	.2077	SW	S	S	S	S	S
	.095	.560	.6646	.2234	SW	S	S	S		S
	.109	.532	.7462	.2621				S		
	.134	.482	.8816	.3096				S		
13/16	.028	.757	.2347	.0824				S		
	.035	.742	.2908	.1021				S		
	.049	.714	.3998	.1404				S		
	.065	.682	.5193	.1824			S	S		
7/8	.010	.855	.0924	.0325				S		
	.016	.843	.1468	.0516				S		
	.020	.835	.1826	.0641				S		
	.028	.819	.2533	.0890			S	S		
	.035	.805	.3140	.1112	SW			SW	S	S
	.042	.791	.3737	.1312				S		
	.049	.777	.4323	.1530	SW		S	S		S
	.058	.759	.5061	.1777				S	S	
	.065	.745	.5623	.1979	SW		S	S		S
	.095	.685	.7914	.2795	SW			S		
15/16	.035	.867	.3375	.1185				S		
	.065	.807	.6060	.2128				S		
1	.010	.980	.1057	.0371				W	S	
	.012	.976	.1128	.0396				S		
	.016	.968	.1681	.0590				SW	S	
	.020	.960	.2093	.0735		SW	SW	SW	S	
	.028	.944	.2907	.1021		S	SW	SW	S	
	.032	.936	.3308	.1162				S		
	.035	.930	.3607	.1275		SW	SW	W	SW	S
	.042	.916	.4297	.1509		S	S		W	S
	.049	.902	.4977	.1754	SW	S	SW	SW	W	S
	.058	.884	.5835	.2060		S		S		S
	.065	.870	.6491	.2295	SW	S	S	SW	S	S
	.083	.834	.8129	.2866	SW	S	S	SW	S	S
	.095	.810	.9182	.3244	SW	S	S		S	
	.109	.782	1.037	.3642	SW					
	.120	.760	1.128	.3978	SW	S				
	.125	.750	1.168	.4102				S		S
1 1/16	.049	.964	.5306	.1863				S		
	.065	.932	.6928	.2433				S		
1 1/8	.012	1.101	.1426	.0501				W		
	.020	1.085	.2360	.0829				SW		
	.035	1.055	.4074	.1438			S	S		
	.049	1.027	.5631	.1989			S	S		S
	.058	1.009	.6609	.2321				S		S
	.065	.995	.7359	.2601			S	S		
	.083	.959	.9237	.3264				S		
	.095	.935	1.045	.3670	SW			S		

HYDRAULIC LINE TUBING (CONTINUED)

For product description and specifications
See Pages 118 - 123 of this section.

S=Seamless W=Welded and Drawn

Outside Diameter (Inches)	Wall Thickness (Inches)	Inside Diameter (Inches)	Wt. per Ft. Steel	Wt. per Ft. Alum.	CARBON STEEL	STAINLESS STEEL Type 304 1/8 Hard	Type 304 Ann.	Type 321 Ann.	Type 347 Ann.	ALUMINUM 6061-T6
1 1/4	.012	1.226	.1587	.0557				S		
	.016	1.218	.2109	.0741				SW	S	
	.020	1.210	.2627	.0923				SW	S	
	.022	1.206	.2885	.1013						S
	.025	1.200	.3271	.1149				S		
	.028	1.194	.3654	.1283		SW	S	SW	S	S
	.035	1.180	.4542	.1601		SW	SW	SW	S	S
	.042	1.166	.5419	.1903						S
	.049	1.152	.6285	.2213		S	SW	SW	S	S
	.058	1.134	.7384	.2601						S
	.065	1.120	.8266	.2907	SW	S	S	SW	S	S
	.083	1.084	1.034	.3652		S				S
	.095	1.060	1.172	.4131	SW	S			S	
	.109	1.032	1.328	.4682	SW		S			
	.120	1.010	1.448	.5100	SW					
1 3/8	.020	1.335	.2894	.1016				S		
	.028	1.319	.4028	.1415				S		
	.035	1.305	.5009	.1759				S		
	.049	1.277	.6939	.2448				S		
	.058	1.259	.8158	.2865				S		S
	.065	1.245	.9094	.3213				S	S	
1 1/2	.010	1.480	.1591	.0559					S	
	.012	1.476	.1907	.0670				S		
	.016	1.468	.2536	.0891				S	S	
	.020	1.460	.3161	.1110				SW	S	
	.022	1.456	.3473	.1220						S
	.025	1.450	.3938	.1383				S		
	.028	1.444	.4402	.1546		S	S	SW	S	S
	.032	1.436	.5018	.1762						S
	.035	1.430	.5476	.1928		S	SW	SW	S	S
	.049	1.402	.7593	.2683		SW	S	SW	S	S
	.058	1.384	.8932	.3137				S		
	.065	1.370	.9962	.3519	SW	S	S	S	S	S
	.083	1.334	1.256	.4437		SW		S		
	.095	1.310	1.426	.5029	SW	S		S		
	.120	1.260	1.769	.6222	SW	S	S	S		
	.250	1.000	3.338	1.173						S
1 5/8	.020	1.585	.3428	.1204				S		
	.028	1.569	.4776	.1677				S		
	.035	1.555	.5943	.2101				SW		
	.049	1.527	.8248	.2907			S	S		
	.058	1.509	.9707	.3409				S		
	.065	1.495	1.083	.3825				S		
1 3/4	.012	1.726	.2227	.0782				W		
	.016	1.718	.2963	.0141				S		
	.020	1.710	.3695	.1298				SW		
	.028	1.694	.5149	.1808			S	S		
	.035	1.680	.6411	.2264			SW	SW	S	
	.049	1.652	.8902	.3142			S	S		
	.058	1.634	1.048	.3703				S		
	.065	1.620	1.170	.4131				S		
	.083	1.584	1.478	.5202				S		
	.156	1.438	2.656	.9384				S		
	.203	1.344	3.354	1.159	SW					

HYDRAULIC LINE TUBING (CONTINUED)

For product description and specifications
See Pages 118 - 123 of this section.

S=Seamless W=Welded and Drawn

Outside Diameter (Inches)	Wall Thickness (Inches)	Inside Diameter (Inches)	Wt. per Ft.		STAINLESS STEEL			
			Steel	Alum.	Type 304 1/8 Hard	Type 304 Ann.	Type 321 Ann.	Type 347 Ann.
1 7/8	.028	1.819	.5523	.1940			S	
	.049	1.777	.9556	.3356	S		S	
	.056	1.759	1.126	.3954			S	
	.065	1.745	1.257	.4415			S	
	.095	1.685	1.806	.6343			S	
2	.016	1.968	.3390	.1191			S	
	.020	1.960	.4229	.1485			SW	S
	.025	1.950	.5273	.1852			SW	
	.028	1.944	.5897	.2071			SW	
	.035	1.930	.7345	.2591	S	SW	SW	W
	.049	1.902	1.021	.3601	S	S	SW	S
	.065	1.870	1.343	.4743	S	S	S	S
	.083	1.834	1.699	.6018			SW	
	.095	1.810	1.933	.6834		S	S	S
	.120	1.760	2.409	.8466			S	
	.250	1.500	4.673	1.652		S		
2 1/8	.028	2.069	.6271	.2202			S	
	.035	2.055	.7812	.2744				S
	.049	2.027	1.086	.3814			S	
	.065	1.995	1.430	.5022			S	
2 1/4	.020	2.210	.4763	.1673			S	S
	.028	2.194	.6645	.2334			S	S
	.035	2.180	.8280	.2917			S	S
	.049	2.152	1.152	.4060		S	S	
	.065	2.120	1.517	.5328			S	
	.083	2.084	1.921	.6746			S	
2 3/8	.049	2.277	1.271	.4274			S	
	.065	2.245	1.604	.5633			S	
2 1/2	.020	2.460	.5297	.1860			S	
	.022	2.456	.5822	.2045				S
	.028	2.444	.7392	.2596			S	S
	.035	2.430	.9214	.3245	S	S	SW	S
	.049	2.402	1.283	.4506		S	S	S
	.065	2.370	1.690	.5916	SW		S	S
2 5/8	.035	2.805	.9681	.3400			S	
	.049	2.527	1.348	.4784			S	
2 3/4	.016	2.718	.4672	.1641			S	S
	.065	2.620	1.864	.6528	SW			S
	.120	2.510	3.371	1.193				S
3	.010	2.976	1.057	.3712			W	
	.035	2.930	1.108	.3891			S	
	.049	2.902	1.544	.5423			S	
	.065	2.870	2.037	.7140	W			
	.095	2.810	2.947	1.040			W	

LOW CARBON STEEL PRESSURE TUBING

SEAMLESS SAE J524 ASTM A 179(AVG. WALL)
WELDED AND DRAWN SAE J525 ASTM A 214(AVG. WALL)

This tubing is especially processed for the transmission of fluids under pressure. It may also serve as a heat exchanger since it is produced for maximum ductility to allow for bending and flaring. The inside diameter is clean to prevent contamination of fluids.

ANALYSIS

	C	Mn	P (Max.)	S (Max.)
A179	.06-.08	.27-.63	.035	.035
A214	.18 max	.27-.63	.035	.035
J524	.18 max	.30-.60	.040	.050
J525	.18 max	.30-.60	.040	.050

MECHANICAL PROPERTIES—The following minimum mechanical properties apply:

	Tensile Strength Minimum (psi)	Yield Strength Minimum (psi)	Elongation	Brindell Hardness
A179				RB 72 max
A214				RB 72 max
J524	45,000	25,000	35%	RB 65 max
J525	45,000	25,000	35%	RB 65 max

APPLICATIONS — It may be used to convey hydraulic fluids to pressures up to 300 psi.

LOW CARBON PRESSURE TUBE — Heat Exchanger, Hydraulic Line

Heat Exchanger		Tolerance			
		OD		Wall	
Specification	Size OD range (in)	Plus	Minus	Plus	Minus
ASTM A179	Under 1.000	.004”	.004”	20%	0%
ASME SA-179	1.000 - 1.500	.006”	.006”	20%	0%
Cold Drawn Seamless	1.501 - 1.999	.008”	.008”	22%	0%
Heat Exchanger Tube	2.000 - 2.499	.010”	.010”	22%	0%
Minimum Wall	2.000 — 2.499	.010”	.010”	22%	0%
	2.500 — 2.999	.012”	.012”	22%	0%
	3.000 — 4.000	.015”	.015”	22%	0%
ASTM A214	Under 1.000	.004”	.004”	18%	0%
ASME SA-214	1.000 - 1.500	.006”	.006”	18%	0%
ERW Welded	1.501 - 1.999	.008”	.008”	18%	0%
Heat Exchanger Tube	2.000 — 2.499	.010”	.010”	18%	0%
Minimum Wall	2.500 — 2.999	.012”	.012”	18%	0%
	3.000 — 4.000	.015”	.015”	18%	0%

Also available in average wall ± 10% tolerance.
Tubes over 2” OD x .135” wall, ID weld flash controlled .010” max. height.
Tubes 2” OD x .135” wall and under, ID weld flash controlled .006” max. height.

Hydraulic line		Tolerance			
		OD		Wall	
Specification	Size OD range (in)	Plus	Minus	Plus	Minus
	Up to .375	.003”	.003”	15%	15%
SAE-J524	.0376 - .500	.003”	.003”	10%	10%
	.501 — 1.500	.005”	.005”	10%	10%
Cold Drawn Seamless	1.500 — 2.500	.010”	.010”	10%	10%
JIC Hydraulic Line					
ASTM A179	2.501-3.000	.010”	.010”	10%	10%
(Avg. wall)	3.001 — 3.500	.010”	.010”	10%	10%
	Up to .375	.002”	.002”	15%	15%
SAE_J525	.0376 - .625	.0025”	.0025”	10%	10%
Welded and Drawn	.625 — 2.000	.003”	.003”	10%	10%
HC Hydraulic Line	2.001 — 2.500	.004”	.004”	10%	10%
ASTM A214	2.501 — 3.00	.005”	.005”	10%	10%
(Avg. Wall)	3.001 — 4.000	.006”	.006”	10%	10%

SEAMLESS 6061 ALUMINUM ALLOY COLD DRAWN AIRCRAFT HYDRAULIC QUALITY

AMS-T-7081 AMS 4081(T4) AMS 4083(T6)

This material is intended for use as hydraulic lines with relatively low pressure and severe flares.

ANALYSIS

Cu	Si	Fe (Max.)	Mn (Max.)	Mg	Zn (Max.)	Cr	Ti (Max.)	Al
.15/.40	.40/.80	.70	.15	.80/1.2	.25	.04/.35	.15	Rem.

MECHANICAL PROPERTIES

	Walls	Tensile Strength Minimum (psi)	Yield Strength Minimum (psi)	Elongation Elongation
T4 (Solution Treated)	.025 thru .049	30,000	16,000	16% min.
	.050 thru .259	30,000	16,000	18% min.
T6 (Solution Treated and Artificially Aged)	.025 thru .049	42,000	35,000	10% min.
	.050 thru .259	42,000	35,000	12% min.

APPLICATION — Low pressure aircraft hydraulic lines with pressures calculated using the values shown above. Material is non destructive electric tested, pressure tested and double flare tested.

HARDENING — Material is supplied in the treated condition as shown above.

WELDING — This material is intended to be joined by flared fittings.

TYPE 304 STAINLESS HYDRAULIC LINE TUBING

SEAMLESS — WELDED AND DRAWN

Annealed:	**1/8 Hard:**
MIL-T-8504	**AMS-T-6845**
AMS 5560 (Seamless)	**AMS 5566**
AMS 5565 (Welded & Drawn)	

Type 304 is the low carbon "18-8" chromium-nickel stainless steel in seamless or welded and drawn hydraulic tubing. It is produced by the electric furnace process conforming to the best practices for high quality aircraft material. Both OD and ID are free from scale, pickling, residues, heat discoloration, and severe surface defects. Slight surface imperfections such as handling marks, straightening marks, shallow seams, and the like are not to be considered as injurious provided these imperfections are removed within the diameter and wall thickness tolerances. This product is free from grease, metallic flakes, or particles which will tend to contaminate the hydraulic fluid.

ANALYSIS

C (Max.)	Mn (Max.)	Si (Max.)	P (Max.)	S (Max.)	Cr	Ni	Mo (Max.)	Cu (Max.)
.08	2.00	.75	.030	.030	18.00/20.00	8.00/11.00	.50	.50

APPLICATIONS — It is intended for use in high pressure hydraulic and pneumatic systems up to 3000 psi pressure in which a corrosion resistant material is required. It is not suitable in those applications assembled by welding or brazing nor for those applications in which temperature is higher than 800ºF because of lessening in the resistance to corrosion. Where dual ductility and lower strength are required, tubing should meet AMS-T-6845, but heavier wall thicknesses must be used.

MECHANICAL PROPERTIES —

	Tensile Strength (psi)	Yield Strength (psi)	Elongation in 2" minimum Strip	Elongation in 2" minimum Tube
Annealed	75,000/100,000	30,000 min.	35%	40%
1/8 Hard: 3/16 OD and less, Wall .016 and Over	95,000/130.000	60,000/90,000	---	25%
1/4 OD and over	105,000/140,000	75,000/110,000	--	20%

STOCK SIZES

Refer to listing on Pages 118-123 of this section, where availability of this product is indicated in the TYPE 304 1/8 Hard and TYPE 304 Annealed columns by the symbols S (for seamless) and W (for welded and drawn).

TYPES 321 & 347 STAINLESS HYDRAULIC LINE TUBING

SEAMLESS — WELDED AND DRAWN

MIL-T-8808
AMS 5556 (TYPE 347)
AMS 5557 (TYPE 321)
AMS-T-8506

Types 321 and 347 are the stabilized "18-8" chromium-nickel stainless steels. They are designed to overcome susceptibility to carbide precipitation with resulting intergranular corrosion that may occur in the austenite stainless steels during exposure to temperatures of 800º to 1500º F.

Type 321 is stabilized with the addition of Titanium and 347 is stabilized with the addition of Columbium or Columbium-Tantalum.

Both grades are manufactured by the electric furnace process conforming to the best practices for high quality aircraft material. Both outside and inside surfaces are free from scale, pickling residues, heat discoloration, carburization, or metallic particles which would serve to contaminate the hydraulic fluid. Slight surface imperfections such as handling marks, shallow pits or seams are not considered detrimental so long as they are removable within the specific tolerances for diameter and wall thickness.

ANALYSIS

	C (Max.)	Mn (Max.)	P (Max.)	S	Si	Cr	Ni	Cu (Max.)	Mo (Max.)	N (Max.)
321	.08	2.00	.040	.030	.40/1.00	17.00/20.00	9.00/12.00	.50	.50	.10
Titanium 6x(C+N)/.70										
347	.08	2.00	.040	.030	.50/1.00	17.00/19.00	9.00/13.00	.50	.50	—
Columbium or Cb+Ta 10xC/1.00										

APPLICATIONS — This tubing is used in high pressure hydraulic and pneumatic systems where corrosion and heat resistance are required. It is particularly adaptable to parts and assemblies that are welded or brazed during fabrication. It offers oxidation resistance up to approximately 1500ºF, but should be used at that temperature only when stresses are low.

MECHANICAL PROPERTIES —

OD	Wall Thickness	Tensile Strength (psi)	Yield Strength (psi)	Elongation 2" Min. Strip	Elongation 2" Min. Tube
.188 and under	.016 and under	75,000/120,000	30,000 Min.	--	33%
	Over .016	75,000/105,000	30,000 Min.	--	35%
Over .188 to .500	010 and under	75,000/115,000	30,000 Min.	30%	35%
	.010 and over	75,000/115,000	30,000 Min.	30%	35%
Over .500	Over .010	75,000/105,000	30,000 Min.	30%	35%

STOCK SIZES

Refer to listing on Pages 118-123 of this section, where availability of this product is indicated in the TYPE 321 and TYPE 347 columns by the symbols S (for seamless) and W (for welded and drawn).

AIRCRAFT HYDRAULIC LINE QUALITY TUBING

WELDED AND DRAWN 21-6-9
UNS S21900
AMS 5561 CLASS 1, CLASS 2
BMS 7-185

This grade is provided in the 1/2 hard condition only for use in high pressure aircraft hydraulic lines. Material is welded and redrawn to size.

ANALYSIS

C (Max.)	Mn	Si (Max.)	P (Max.)	S (Max.)	Cr	Ni	N	Mo (Max.)	Cu (Max.)
.04	8.0/10.0	1.00	.030	.030	19.0/21.5	5.5/7.5	.15/.40	.75	.75

MECHANICAL PROPERTIES

142,000 psi (979 Mpa) - 162,000 psi (1117 Mpa) Tensile
120,000 psi (827 Mpa) min. Yield
20% min. Elongation

ULTRASONIC TEST

Class 1 .125" length Ultrasonic Calibration
Class 2 .060" length Ultrasonic Calibration
BMS 7-185 Notch same as Class 2
Class 3 Not Ultrasonic Tested

TOLERANCES — Reference AMS 2243

WELDING — Material is intended to be joined by flared fittings.

OD Fraction	OD	Wall	ID Reference only	Wt/Ft
3/16"	0.187	0.020	0.147	0.036
1/4"	0.250	0.016	0.218	0.040
	0.250	0.020	0.210	0.049
	0.250	0.022	0.206	0.054
	0.250	0.028	0.194	0.066
	0.250	0.035	0.180	0.080
5/16"	0.313	0.016	0.281	0.051
	0.313	0.020	0.273	0.063
	0.313	0.035	0.243	0.104
	0.375	0.016	0.343	0.061
3/8"	0.375	0.020	0.335	0.076
	0.375	0.028	0.319	0.104
	0.375	0.032	0.311	0.117
	0.375	0.035	0.305	0.127
	0.375	0.049	0.277	0.171
1/2"	0.500	0.016	0.468	0.083
	0.500	0.020	0.460	0.103
	0.500	0.026	0.448	0.132
	0.500	0.035	0.430	0.174
	0.500	0.049	0.402	0.236
	0.500	0.065	0.370	0.302
5/8"	0.625	0.016	0.593	0.104
	0.625	0.020	0.585	0.129
	0.625	0.033	0.559	0.209
	0.625	0.054	0.517	0.329
3/4"	0.750	0.016	0.718	0.125
	0.750	0.028	0.694	0.216
	0.750	0.035	0.680	0.267
	0.750	0.049	0.652	0.367
	0.750	0.065	0.620	0.476
	0.750	0.083	0.584	0.591
1"	1.000	0.028	0.944	0.291
	1.000	0.049	0.902	0.498
	1.000	0.052	0.896	0.526
	1.000	0.095	0.810	0.918
1 1/4"	1.250	0.024	1.202	0.314
	1.250	0.032	1.186	0.416
	1.250	0.049	1.152	0.629
	1.250	0.058	1.134	0.738
1 1/2"	1.500	0.049	1.402	0.759
1 3/4"	1.750	0.049	1.652	0.890

COLD FINISHED SEAMLESS 3 A1-2-1/2V TITANIUM ALLOY AIRCRAFT HYDRAULIC LINE QUALITY

AMS 4945
AMS 4944
MMS1205
DMS 2241
BMS 7-234
SIMILAR TO UNS R56320

ANALYSIS

AL	V	Fe (Max.)	O (Max.)	C (Max.)	N (Max.)	H (Max.)	Y (Max.)	Res (Max.)	Ti
2.50/3.50	2.0/3.0	.30	.12	.05	.02	.015	.005	.50	Remainder

MECHANICAL PROPERTIES

AMS 4944 up to .016" Wall include:

Tensile (psi)	Yield (psi)	Elongation
125,000 Min	105,000 Min.	8% Min.

Over .016" Wall:

Tensile (psi)	Yield (psi)	Elongation
125,000 Min.	105,000 Min.	10% Min.

AMS 4945 — **Same**

	Tensile (psi)	Yield (psi)	Elongation
MMS 1205 CWSR 70	85,000/102,000 (psi)	70,000 (psi) Min.	15% Min.
MMS 1205 CWSR 70	100,000/126,000 (psi)	95,000 (psi) Min.	13% Min.
MMS 1205 CWSR 105	125,000/142,000 (psi)	105,000 (psi) Min.	14% Min.*
BMS 7-234 Grade I	Same as AMS 4945 Except Maximum Tensile 145 psi		
BMS 7-234 Grade II	100,000/133,000 (psi)	95,000 (psi) Min.	13% Min.

*.250" OD 10% Min

PRESSURE TEST — This material will receive pressure testing on a periodic basis.

APPLICATION — These materials are intended for use on high pressure aircraft hydraulic systems with pressures calculated from values shown above.

WELDING — These materials are intended to be joined with flared fittings.

COLD FINISHED SEAMLESS COMMERCIALLY PURE TITANIUM AIRCRAFT HYDRAULIC LINE QUALITY

DMS 1897

ANALYSIS

Fe (Max.)	O (Max.)	C (Max.)	N (Max.)	H (Max.)	Res (Max.)	Ti
.30	.25	.10	.03	.015	.30	Remainder

MECHANICAL PROPERTIES

Cold Worked and Stress Relieved

Tensile (psi)	Yield (psi)	Elongation
80,000 Min.	65,000 Min.	10% Min.

TOLERANCES

.095OD - .624OD	+ .003/-.000	Wall +/-10% -5%
.625OD - .999OD	+ .004/-.000	Wall +/-10% -5%
1.00)D-1.499OD	+ .005/-.000	Wall +/-10% -5%

HYDROSTATIC TEST — 2 samples from each lot shall be subjected to internal pressure equal to two times internal pressure calculated or 15,000 psi whichever is less.

ULTRASONIC TEST — 100% ultrasonic tested with notch length:

up to .045" Wall	0.46-.060" Wall
.060	.125

APPLICATION — This material is intended for a low pressure hydraulic system.

WELDING — This material is intended to be joined by flared fittings.

WELDED COMMERCIALLY PURE TITANIUM DUCTING

DMS 1872 DMS 1878

This material is intended for thin wall tubing ducts for aircraft parts.

ANALYSIS

C (Max.)	H (Max.)	Other Elements (Max.)	Ti
0.020	0.015	0.6	Remainder

Quality Level — Material produced under these specification shall be melted under a vacuum.

MECHANICAL PROPERTIES — (taken from raw materials)

	Tensile (psi)	Yield (psi)	Elongation
DMS 1872	50,000 Min.	40,000/60,000	24%
DMS 1878	65,000 Min.	55,000/80,000	20%

SPECIAL TEST REQUIREMENT — Material produced to these specifications shall be 100% X-ray inspected in the weld area. X-ray films shall accompany shipment.

WELD BEAD — This material may be furnished with weld bead cold reduced. In no case shall the weld height exceed .0025" and the sum of outside and inside beads shall not exceed .004".

		Coml Pure		3AL-2 1/2V
OD	WALL	ID	Wt./Ft.	Wt./Ft.
0.250	0.016	0.218	0.0230	0.0229
0.250	0.020	0.210	0.0283	0.0281
0.250	0.022	0.206	0.0308	0.0306
0.250	0.028	0.194	0.0382	0.0380
0.250	0.035	0.180	0.0462	0.0460
0.275	0.020	0.235	0.0313	0.0311
0.312	0.020	0.272	0.0359	0.0357
0.312	0.035	0.242	0.0596	0.0592
0.375	0.019	0.337	0.0416	0.0413
0.375	0.020	0.335	0.0436	0.0434
0.375	0.022	0.331	0.0477	0.0474
0.375	0.028	0.319	0.0597	0.0593
0.375	0.032	0.311	0.0674	0.0670
0.375	0.035	0.305	0.0731	0.0727
0.375	0.042	0.291	0.0859	0.0854
0.500	0.020	0.460	0.0590	0.0586
0.500	0.026	0.448	0.0757	0.0753
0.500	0.028	0.444	0.0812	0.0807
0.500	0.035	0.430	0.1000	0.0994
0.500	0.056	0.388	0.1528	0.1519
0.500	0.065	0.370	0.1737	0.1727
0.625	0.020	0.585	0.0744	0.0739
0.625	0.023	0.579	0.0851	0.0846
0.625	0.027	0.571	0.0992	0.0986
0.625	0.032	0.561	0.1166	0.1159
0.625	0.044	0.537	0.1571	0.1561
0.625	0.071	0.483	0.2417	0.2402
0.750	0.020	0.710	0.0897	0.0892
0.750	0.027	0.696	0.1200	0.1192
0.750	0.035	0.680	0.1538	0.1528
0.750	0.030	0.690	0.1327	0.1319
0.750	0.052	0.646	0.2230	0.2217
0.875	0.061	0.753	0.3051	0.3033
1.000	0.028	0.944	0.1672	0.1662
1.000	0.035	0.930	0.2075	0.2063
1.000	0.036	0.928	0.2133	0.2119
1.000	0.051	0.898	0.2974	0.2956
1.250	0.035	1.180	0.2613	0.2597
1.250	0.045	1.160	0.3332	0.3312
1.250	0.065	1.120	0.4733	0.4704
1.500	0.020	1.460	0.1819	0.1808
1.500	0.025	1.450	0.226	0.2252
1.500	0.028	1.444	0.2533	0.2517
1.500	0.035	1.430	0.3151	0.3132
1.500	0.049	1.402	0.4369	0.4342
1.500	0.054	1.392	0.4798	0.4769
2.500	0.035	2.430	0.5302	0.5269
3.000	0.020	2.960	0.3662	0.3640
3.000	0.025	2.950	0.4570	0.4542
3.000	0.035	2.930	0.6377	0.6338
3.000	0.040	2.920	0.7276	0.7231
3.000	0.049	2.902	0.8886	0.8831
3.000	0.065	2.870	1.1723	1.1651
3.500	0.035	3.430	0.7452	0.7407
3.500	0.040	3.420	0.8505	0.8453
4.000	0.032	3.936	0.7803	0.7755
4.000	0.035	3.930	0.8528	0.8475
4.000	0.040	3.920	0.9734	0.9674
4.000	0.049	3.902	1.1897	1.1824
4.500	0.040	4.420	1.0963	1.0895
4.500	0.050	4.400	1.3673	1.3589
4.500	0.065	4.370	1.7714	1.7606
4.750	0.040	4.670	1.1577	1.1506
5.000	0.025	4.950	0.7643	0.7596
5.000	0.028	4.944	0.8555	0.8502
5.000	0.032	4.936	0.9769	0.9709
5.000	0.035	4.930	1.0678	1.0613
5.000	0.040	4.920	1.2192	1.2117
5.000	0.050	4.900	1.5209	1.5116
5.000	0.065	4.870	1.9712	1.9591
6.000	0.050	5.900	1.8281	1.8169

BULGING AND BURSTING PRESSURES

BARLOW'S FORMULA

There are several formulas for calculating the bursting pressures of tubes. The most widely used is Barlow's formula, which is as follows:

$$P = \frac{2St}{D}$$

where P =Bursting pressure in psi
S =Tensile strength of tube material, or fiber stress in the wall
t =Wall Thickness in inches
D =Outside diameter in inches

EXAMPLE:
To find bursting pressure of a tube 4" OD x .250" wall, with tensile strength of 80,000 psi:

$$P = \frac{2 \times 80{,}000 \times .250}{4} = \frac{40{,}000}{4} = 10{,}000 \text{ bursting pressure}$$

The formula may be rearranged to determine necessary dimensions or tensile strength to produce a desired bursting pressure, as follows:

$$t = \frac{DP}{2S} \qquad D = \frac{2St}{P} \qquad S = \frac{DP}{2t}$$

EXAMPLES:
To find wall thickness necessary to withstand a pressure of 10,000 psi in a 4" OD tube with 80,000 psi tensile strength:

$$t = \frac{4 \times 10{,}000}{2 \times 80{,}000} = \frac{40{,}000}{160{,}000} = \textbf{.250" wall thickness}$$

To find necessary OD to withstand a pressure of 10,000 psi in a tube with .250" wall and tensile strength of 80,000 psi:

$$D = \frac{2 \times 80{,}000 \times .250}{10{,}000} = \frac{40{,}000}{10{,}000} = \textbf{4" outside diameter}$$

To find the tensile strength of material necessary to withstand a pressure of 10,000 psi in a tube 4" OD x .250" wall:

$$S = \frac{4 \times 10{,}000}{2 \times .250} = \frac{40{,}000}{.500} = \textbf{80,000 psi tensile strength}$$

Actual bursting tests have shown the formula to be conservative, but consideration should be given to allowance for safety factors based on the particular design.

	Wall Thickness (inches)																	
	BWG Equivalent							Fractional Equivalent										
Outside Diameter (in)	.020 25	.028 22	.035 20	.049 18	.065 16	.095 13	.120 11	.156 5/32"	.187 3/16"	.210 7/32"	.250 1/4"	.313 5/16"	.375 3/8"	.500 1/2"	.625 5/8"	.750 3/4"	.875 7/8"	1.00 1"
1/8	3200	5200	5600	7840														
3/16	2133	2987	3933	5227														
1/4	1600	2240	2800	3920	5200	7600												
5/16	1280	1798	2240	3136	4160	6100												
3/8	1067	1493	1867	2613	3467	5067	6400											
1/2	800	1120	1400	1960	2600	3800	4800	6240	7480									
5/8	640	869	1120	1568	2080	3040	3840	4992	5984	7008								
3/4	533	747	933	1307	1733	2533	3200	4160	4987	5840	6667							
7/8	457	640	800	1120	1486	2171	2743	3566	4274	5006	5714	7154						
1	400	560	700	980	1300	1900	2400	3120	3740	4380	5000	6260	7500					
1 1/8	355	498	622	871	1156	1685	2133	2773	3324	3893	4444	5564	6667					
1 1/4	320	448	560	784	1040	1520	1920	2496	2992	3504	4000	5008	6000	8000				
1 3/8	290	407	509	713	945	1382	1745	2269	2720	3185	3636	4553	5455	7273				
1 1/2	267	393	467	653	867	1267	1600	2080	2493	2920	3333	4173	5000	6667	8333			
1 3/4	299	318	400	560	743	1086	1371	1783	2137	2503	2857	3577	4286	5714	7143			
2	200	280	350	490	650	950	1200	1560	1870	2190	2500	3130	3750	5000	6250	7500		
2 1/4	178	250	311	436	578	844	1067	1387	1662	1947	2222	2782	3333	4444	5556	6667		
2 1/2			280	392	520	760	960	1248	1496	1752	2000	2504	3000	4000	5000	6000	7000	
2 3/4			255	356	473	691	873	1135	1360	1593	1818	2276	2727	3636	4545	5455	6364	7273
3				327	433	633	800	1040	1247	1460	1667	2087	2500	3333	4167	5000	5833	6667
3 1/4				302	400	585	738	960	1151	1348	1538	1926	2308	3077	3846	4615	5385	6154
3 1/2				280	371	543	686	891	1069	1251	1429	1789	2413	2857	3571	4286	5000	5714
3 3/4				261	347	507	640	832	997	1168	1333	1669	2000	2667	3333	4000	4667	5333
4				245	325	475	600	780	935	1095	1250	1565	1875	2500	3125	3750	4375	5000
4 1/4					306	447	565	734	880	1031	1176	1473	1765	2353	2941	3529	4118	4706
4 1/2					289	412	533	693	831	973	1111	1391	1667	2222	2778	3333	3889	4444
4 3/4					274	400	505	657	787	922	1053	1318	1579	2105	2632	3158	3684	4211
5					260	380	480	624	748	876	1000	1252	1500	2000	2500	3000	3500	4000
5 1/2						345	436	567	680	796	909	1138	1364	1818	2273	2727	3182	3636
6						317	400	520	623	730	833	1043	1250	1667	2083	2500	2917	3333
6 1/2							369	480	575	674	769	963	1154	1538	1923	2308	2692	3007
7								446	534	626	714	894	1071	1429	1789	2143	2500	2857
7 1/2								416	499	584	667	835	1000	1333	1667	2000	2333	2667
8									468	548	625	783	938	1250	1563	1875	2188	2500
8 1/2										515	588	736	882	1176	1471	1765	2059	2353
9											556	696	833	1111	1389	1667	1944	2222
9 1/2											526	659	789	1053	1316	1579	1842	2105
10											500	626	750	1000	1250	1500	1750	2000
10 1/2											473	596	714	952	1190	1429	1667	1905

The above table is based on the best known and most widely used formula for calculating the bursting press of tubes, namely, Barlow's:

$$P = \frac{2St}{D}$$

where P = *Bursting pressure in psi*
S = *Tensile strength of tube materials or fiber stress in the wall*
T = *Wall thickness in inches*
D = *Outside diameter in inches*

The table (S=10,000) afford easy calculations with appropriate multipliers shown below. For theoretical bursting pressures, use tensile values. For theoretical bulging pressures, use yield values. Working pressures will vary depending upon safety factors required for environmental conditions involved , as determined by your design engineer and appropriate codes.

Material	*Tensile (multiplier)*	*Yield (multiplier)*
6061-T6 Aluminum	*42,000 psi (x 4.2)*	*35,000 psi (x 3.5)*
Annealed Low Carbon Steel	*55,000 psi (x 5.5)*	*25,000 psi (x 2.5)*
Annealed 18-8 Stainless	*75,000 psi (x 7.5)*	*30,000 psi (x 3.0)*
1/8 Hard 18-8 Stainless	*105,000 psi (x10.5)*	*75,000 psi (x 7.5)*
Cold Dr. 21-6-9 Stainless	*142,000 psi (x 14.2)*	*120,000 psi (x12.0)*

THEORETICAL BURSTING AND BULGING PRESSURES FOR PIPE
Stainless Steel (ASTM A312)

Nominal size (in)	Schedule Number	Outside Diameter (in)	Wall Thickness (in)	Inside Diameter (in)	Internal pressure (psi) bursting	External pressure (psi) collapsing
1/8	10	0.405	0.049	0.307	18,150	7,468
	40	0.405	0.068	0.269	25,185	10,761
	80	0.405	0.095	0.215	35,185	15,441
1/4	10	0.540	0.065	0.541	18,055	7,425
	40	0.540	0.088	0.364	24,444	10,415
	80	0.540	0.119	0.302	33,055	14,445
3/8	10	0.678	0.065	0.545	14,380	5,705
	40	0.678	0.091	0.493	20,132	8,397
	80	0.678	0.126	0.423	27,878	12,021
1/2	5	0.840	0.065	0.710	11,607	4,407
	10	0.840	0.083	0.674	14,821	5,911
	40	0.840	0.109	0.622	19,464	8,084
	80	0.840	0.147	0.546	24,250	11,260
3/4	5	1.050	0.065	0.920	9,285	3,295
	10	1.050	0.083	0.884	11,857	4,524
	40	1.050	0.113	0.824	16,142	6,529
	80	1.050	0.154	0.742	22,000	9,271
1	5	1.315	0.065	1.185	7,414	2,445
	10	1.315	0.109	1.097	12,433	4,795
	40	1.315	0.133	1.049	15,171	6,075
	80	1.315	0.179	0.957	20,418	8,530
1 1/4	5	1.660	0.065	1.530	5,873	1,725
	10	1.660	0.109	1.442	9,849	3,585
	40	1.660	0.140	1.380	12,650	3,895
	80	1.660	0.191	1.078	17.259	7.052
1 1/2	5	1.900	0.065	1.770	5,131	1,376
	10	1.900	0.109	1.682	8,605	3,002
	40	1.900	0.145	1.610	11,447	4,332
	80	1.900	0.200	1.500	15,789	6,364
2	5	2.375	0.065	2.245	4,105	896
	10	2.375	0.109	2.157	6,884	2,196
	40	2.375	0.154	2.067	9,726	3,526
	80	2.375	0.218	1.939	13,768	5,418
2 1/2	5	2.875	0.083	2.709	4,330	1,001
	10	2.875	0.120	2.635	6,260	1,905
	40	2.875	.0203	2.469	10,591	3,931
3	5	3.500	0.083	3.334	3,557	639
	10	3.500	0.120	3.260	5,142	1,375
	40	3.500	0.216	3.068	9,257	3,307
3 1/2	5	4.000	0.083	3.834	3,112	431
	10	4.000	0.120	3.760	4,500	1,081
4	5	4.500	0.083	4.334	2,766	315
	10	4.500	0.120	4.260	4,000	845
	40	4.500	0.237	4.026	7,900	2,672
5	5	5.563	0.109	5.345	2,949	650
	10	5.563	0.134	5.295	3,643	665
6	5	6.625	0.109	6.407	2,467	129
	10	6.625	0.134	6.357	3,033	394

Burst pressures for stainless steel in the above chart were calculated using the specified minimum tensile strength, 75 ksi. To convert to other materials multiply by the factor of the relationship of tensile strengths, as follows:

	Material	Tensile strength (ksi)	Multiply by
Carbon	ASTM A106 Grade B	60	.80
	ASTM A53 Grade B	60	.80
Aluminum	ASTM A241 6061-T6	42 (under 1")	.56
	ASTM B241 6061-T6	38 (1" over)	.507
	ASTM B241 6063 T6	30	.40
	ASTM B241 3003-H112	14	.18
	FED WW-T-700 5086-H32	40	.533

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