

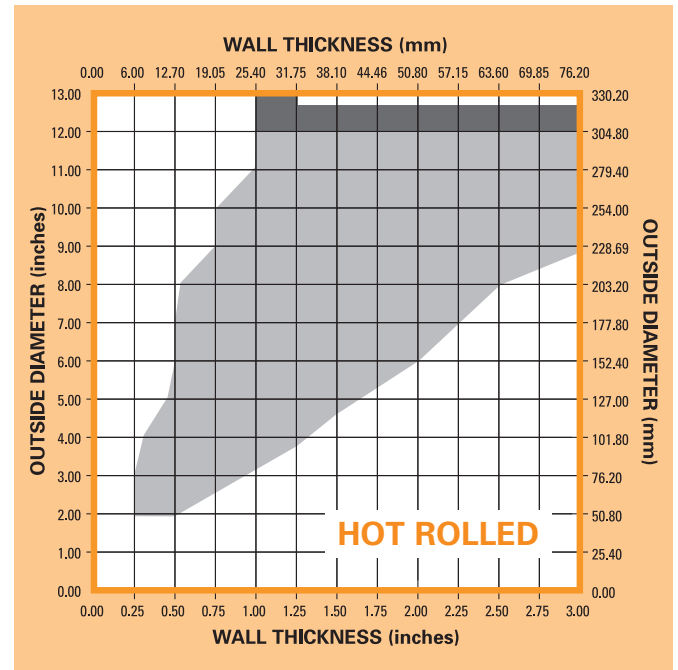
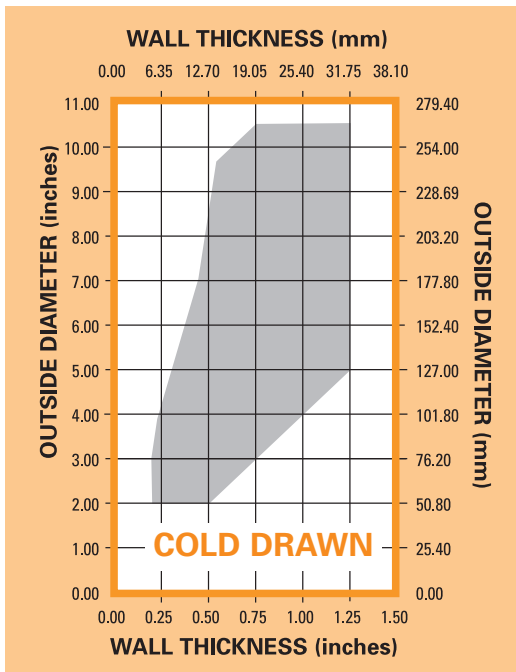
TIMKEN

Where You Turn

TIMKEN® MECHANICAL SEAMLESS STEEL TUBING

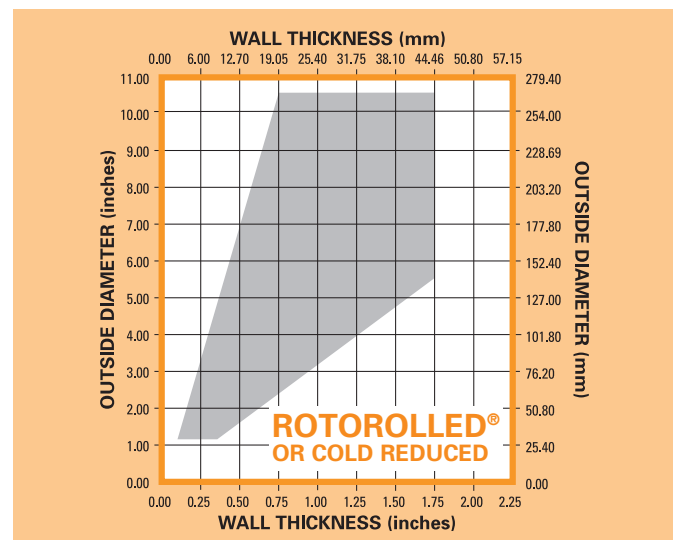
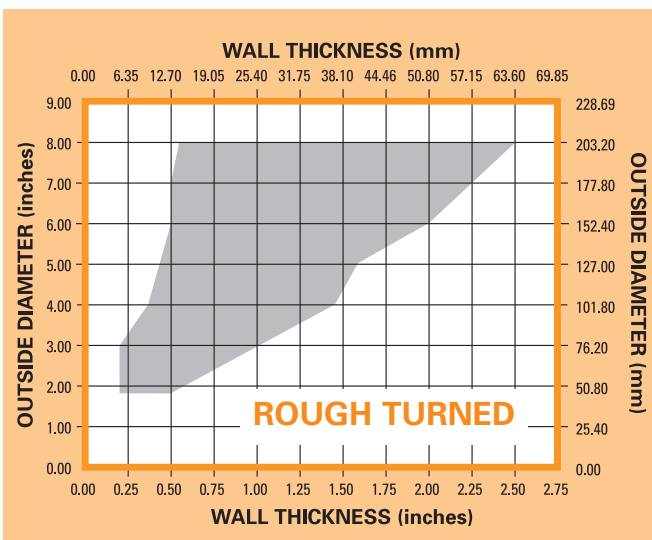
The Timken Company is a leading manufacturer of seamless mechanical tubing. The tubing is produced in most standard carbon, alloy and intermediate alloy grades, as well as non-standard grades. It may be purchased in sizes recommended to clean up at finished part dimensions. This allows for optimum material utilization.

To assist you, information on tube size capability, tolerances and steel pipe (not supplied by Timken) weights and dimensions, is provided in the following pages.



Sizes with tube ODs greater than 12 inches are available only in low- and medium-carbon grades and in OD increments of 1/4 inch [.250 inch or 6.35 millimeters] and with a wall tolerance of ± 20 percent.

These capability charts apply to common grades of carbon, alloy and bearing steels up to 1.00 percent carbon content. Our ability to produce higher carbon steels or special grades over 3.5 percent alloy content, alloy pressure tubing and stainless tubing is subject to review on an inquiry basis.



TOLERANCES

TIMKEN TUBING TOLERANCES	As Hot Rolled/Rough Turned or Single Thermal Treatment; As Cold Drawn As Rotorolled®	Cold Drawn and Single Thermal Treatment Rotorolled and Tempered or Normalized Rough Turned When Straightened and/or Tempered (Stress Relieved) After Rough Turning
HOT ROLLED ROUND*	inches $T_{OD} = \pm (.0045 \text{ OD} + .005) \text{ or } \pm .015 \text{ min.}$ mm $T_{OD} = \pm (.0045 \text{ OD} + .13) \text{ or } \pm .38 \text{ min.}$ Over 10.75 inches (273mm) to 12.0 inches (305mm) inches $T_{OD} = \pm .095$ mm $T_{OD} = 2.41$ Greater than 12.0 inches (305mm) - refer to mill	
COLD DRAWN, ROUND†	inches $T_{OD/ID} = \pm (.0023 \text{ OD} - .003) \text{ or } \pm .004 \text{ min.}$ mm $T_{OD} = \pm (.0023 \text{ OD} - .08) \text{ or } \pm .10 \text{ min.}$	inches $T_{OD/ID} = \pm 1.8 (.0023 \text{ OD} - .003) \text{ or } \pm .007 \text{ min.}$ mm $T_{OD} = \pm 1.8 (.0023 \text{ OD} - .08) \text{ or } \pm .18 \text{ min.}$
ROTOROLLED®, ROUND	inches $T_{OD/ID} = \pm (.0024 \text{ OD} + .0016) \text{ or } \pm .005 \text{ min. OD } \pm .010 \text{ min. ID}$ mm $T_{OD/ID} = \pm (.0024 \text{ OD} + .041) \text{ or } \pm .13 \text{ min.}$	inches $T_{OD/ID} = \pm (.0024 \text{ OD} + .007) \text{ or } \pm .010 \text{ min.}$ mm $T_{OD} = \pm (.0024 \text{ OD} + .18) \text{ or } \pm .25 \text{ min.}$
ROUGH TURNED, ROUND	Under 6.75 inches (171.5 mm) inches $T_{OD} = \pm .005$ mm $T_{OD} = \pm .13$ 6.75 inches (171.5mm) and over inches $T_{OD} = \pm .010$ mm $T_{OD} = \pm .25$	inches $T_{OD} = \pm .010$ mm $T_{OD} = \pm .25$

SPECIAL PROCESSED TUBING TOLERANCES

COLD DRAWN, SHAPED Square, Rectangular or Oval	inches $T_{OD/ID} = \pm .005 \text{ OD or } \pm .020 \text{ min.}$ mm $T_{OD/ID} = \pm .005 \text{ OD or } \pm .51 \text{ min.}$
COLD DRAWN, SHAPED‡ Dissimilar OD and ID Configuration	inches $T_{OD/ID} = \pm .005 \text{ OD or } \pm .010 \text{ min.}$ mm $T_{OD} = \pm .005 \text{ OD or } \pm .25 \text{ min.}$

OD - Outside Diameter

ID - Inside Diameter

T - Tolerance

W - Wall Thickness

* Hot rolled and rough turned tubes can be purchased to outside diameter (OD) and wall thickness (W) only.

† Tubes with a nominal finish wall size greater than 1.250 inches (31.75 mm) will have a hot rolled ID and will be produced to cold drawn OD tolerances and hot rolled wall tolerances.

‡ When corner radii and twist are important, they must be reviewed by our mill before we accept the order.

ASTMA-519 tolerances are acceptable except for cold finished sizes smaller than 2.500 inches (63.50 mm) diameter, where Timken Company tolerances apply.

Timken Company guaranteed tube sizes are calculated using Timken Company tolerances.

Quenched and Tempered or Normalized and Tempered (OD & Wall or ID & Wall Dimensions Only)	Quenched and Tempered or Normalized and Tempered (OD & ID Dimensions Only)	Wall Tolerances All Thermal Conditions
inches $T_{OD} = \pm 1.5 (.0045 OD + .005) \text{ or } \pm .023 \text{ min.}$ mm $T_{OD} = \pm 1.5 (.0045 OD + .13) \text{ or } \pm .58 \text{ min.}$ over 10.75 inches (273 mm) and over inches $T_{OD} = \pm .113$ mm $T_{OD} = \pm 2.87$		OD to wall ratio over 10:1 or over 10.75 to 12.0 inch OD (all OD to wall ratios) ... $\pm 10\%$ OD to wall ratio of 10:1 or less ... $\pm 7.5\%$ Minimum wall tolerance is $\pm .020$ inch (.51 mm).
inches $T_{OD/ID} = \pm 2.5 (.0023 OD - .003) \text{ or } \pm .010 \text{ min.}$ mm $T_{OD/ID} = \pm 2.5 (.0023 OD - .08) \text{ or } \pm .25 \text{ min.}$	inches $T_{OD/ID} = \pm 3.75 (.0023 OD - .003) \text{ or } \pm .015 \text{ min.}$ mm $T_{OD/ID} = \pm 3.75 (.0023 OD - .08) \text{ or } \pm .38 \text{ min.}$	OD to wall ratio over 10:1 $\pm 7.5\%$ OD to wall ratio over 10:1 to 4:1 $\pm 6\%$ OD to wall ratio under 4:1 $\pm 7.5\%$ (1) Minimum wall tolerance is $\pm .012$ inch (.30 mm). (2) When ID is under 1.000 inch (25.4 mm), inquiry basis. (3) Walls 6% of OD and lighter, inquiry basis. (4) When OD & ID dimensions, use $\pm 7.5\%$ wall.
inches $T_{OD/ID} = \pm 2 (.0024 OD + .0016) \text{ or } \pm .010 \text{ min.}$ mm $T_{OD/ID} = \pm 2 (.0024 OD + .041) \text{ or } \pm .25 \text{ min.}$	inches $T_{OD/ID} = \pm 3 (.0024 OD + .0016) \text{ or } \pm .015$ mm $T_{OD/ID} = \pm 3 (.0024 OD + .041) \text{ or } \pm .38 \text{ min.}$	All wall thicknesses $\pm 5\%$ Minimum wall tolerance is $\pm .012$ inch (.30 mm).
Under 6.75 inches (171.5 mm) Heat Treated Before Rough Turned $T_{OD} = \pm .010$ Inches ($\pm .25$ mm) Heat Treated After Rough Turned $T_{OD} = \pm .015$ Inches ($\pm .38$ mm) 6.75 inches (171.5 mm) and over Heat Treated Before Rough Turned $T_{OD} = \pm .020$ Inches ($\pm .51$ mm) Heat Treated After Rough Turned $T_{OD} = \pm .030$ Inches ($\pm .76$ mm)		OD to wall ratio over 10:1 $\pm 12.5\%$ OD to wall ratio of 10:1 or less $\pm 10\%$ Minimum wall tolerance is $\pm .020$ inch (.51 mm).

inches $T_{OD/ID} = \pm .01 OD \pm .040 \text{ min.}$ mm $T_{OD/ID} = \pm .01 OD \pm 1.02 \text{ min.}$	All wall thicknesses $\pm 10\%$ at center of flats
inches $T_{OD/ID} = \pm .01 OD \pm .020 \text{ min.}$ mm $T_{OD/ID} = \pm .01 OD \pm .51 \text{ min.}$	All wall thicknesses $\pm 10\%$ at center of flats

DIMENSIONS AND WEIGHTS OF SEAMLESS STEEL PIPE

A.S.A PIPE SCHEDULES

PIPE SIZE	OD (INCHES)	5	10	20	30	40	STANDARD	60	80	EXTRA HEAVY	100	120	140	160	DOUBLE EXTRA HEAVY
1/8	.405	.035 .1383	.049 .1863			.068 .2447	.068 .2447		.095 .3145	.095 .3145					
1/4	.540	.049 .2570	.065 .3297			.088 .4248	.088 .4248		.119 .5351	.119 .5351					
3/8	.675	.049 .3276	.065 .4235			.091 .5676	.091 .5676		.126 .7388	.126 .7388					
1/2	.840	.065 .5383	.083 .6710			.109 .8510	.109 .8510		.147 1.088	.147 1.088				.187 1.304	.294 1.714
3/4	1.050	.065 .6838	.083 .8572			.113 1.131	.113 1.131		.154 1.474	.154 1.474				.218 1.937	.308 2.441
1	1.315	.065 .8678	.109 1.404			.133 1.679	.133 1.679		.179 2.172	.179 2.172				.250 2.844	.358 3.659
1 1/4	1.660	.065 1.107	.109 1.806			.140 2.273	.140 2.273		.191 2.997	.191 2.997				.250 3.765	.382 5.214
1 1/2	1.900	.065 1.274	.109 2.085			.145 2.718	.145 2.718		.200 3.631	.200 3.631				.281 4.859	.400 6.408
2	2.375	.065 1.604	.109 2.638			.154 3.653	.154 3.653		.218 5.022	.218 5.022				.344 7.444	.436 9.029
2 1/2	2.875	.083 2.475	.120 3.531			.203 5.793	.203 5.793		.276 7.661	.276 7.661				.375 10.01	.552 13.70
3	3.500	.083 3.029	.120 4.332			.216 7.576	.216 7.576		.300 10.25	.300 10.25				.438 14.32	.600 18.58
3 1/2	4.000	.083 3.472	.120 4.973			.226 9.109	.226 9.109		.318 12.51	.318 12.51					.636 22.85
4	4.500	.083 3.915	.120 5.613			.237 10.79	.237 10.79	.281 12.66	.337 14.98	.337 14.98		.438 19.01		.531 22.51	.674 27.54
4 1/2	5.000					.247 12.53			.355 17.61						.710 32.53
5	5.563	.109 6.349	.134 7.770			.258 14.62	.258 14.62		.375 20.78	.375 20.78		.500 27.04		.625 32.96	.750 38.55
6	6.625	.109 7.585	.134 9.289			.280 18.97	.280 18.97		.432 28.57	.432 28.57		.562 36.39		.719 45.30	.864 53.16
7	7.625					.301 23.57			.500 38.05						.875 63.08
8	8.625	.109 9.914	.148 13.40	.250 22.36	.277 24.70	.322 28.55	.322 28.55	.406 35.64	.500 43.39	.500 43.39	.594 50.87	.719 60.63	.812 67.76	.906 74.69	.875 72.42
9	9.625					.342 33.90			.500 60.07						
10	10.750	.134 15.19	.165 18.70	.250 28.04	.307 34.24	.365 40.48	.365 40.48	.500 54.74	.594 64.33	.500 54.74	.719 76.93	.844 89.20	1.000 104.1	1.125 115.7	
11	11.750					.375 45.55			.500 48.72						
12	12.750	.165 22.18	.180 24.20	.250 33.38	.330 43.77	.406 53.53	.375 49.56	.562 73.16	.688 88.51	.500 65.42	.844 107.2	1.000 125.5	1.125 139.7	1.312 160.3	
14	14.000		.250 36.71	.312 45.68	.375 54.57	.438 63.37	.375 54.57	.594 84.91	.750 106.1	.500 72.09	.938 130.7	1.094 150.7	1.250 170.2	1.406 189.1	
16	16.000		.250 42.05	.312 52.36	.375 62.58	.500 82.77	.375 62.58	.656 107.5	.844 136.5	.500 82.77	1.031 164.8	1.219 192.3	1.438 223.5	1.594 245.1	
18	18.000		.250 47.39	.312 59.03	.438 82.06	.562 104.8	.375 70.59	.750 138.2	.938 170.8	.500 93.45	1.156 208.0	1.375 244.1	1.562 247.2	1.781 308.5	
20	20.000		.250 52.73	.375 78.06	.500 104.1	.594 122.9	.375 78.60	.812 166.4	1.031 208.9	.500 104.1	1.281 256.1	1.500 296.4	1.750 341.1	1.964 379.0	
24	24.000		.250 63.41	.375 94.62	.562 140.8	.688 171.2	.375 94.62	.969 238.1	1.219 296.4	.500 125.5	1.531 367.4	1.812 429.4	2.062 483.1	2.344 541.9	

BOLD FIGURES: Wall thickness in inches **LIGHT FIGURES:** Weight per foot in pounds

For additional information call 1.866.284.6536, fax 330.471.7032
or visit www.timken.com/products/alloysteel.

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