

AERONAUTICAL MATERIAL SPECIFICATION

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29 West 39th Street
New York City

AMS 2223c

Issued 8-1-45

Revised 5-1-54

TOLERANCES

Copper and Copper Alloy Seamless Tubing

1. PURPOSE: To publish established manufacturing tolerances.
2. APPLICATION: Tolerances shown herein apply, unless otherwise agreed upon by purchaser and vendor. These tolerances apply to all conditions unless otherwise noted. The term "excl" is used to apply only to the higher figure of the specified range.
3. DIAMETER:

TABLE I

Nominal OD Inches	Tolerance Applies to	Mean Diameter Tolerance, Inch, Plus and Minus	
		Non-refractory	Refractory
0.125 and under	ID	0.002	0.003
0.125 and under	OD	0.002	0.0025
Over 0.125 to 0.625, incl	ID or OD	0.002	0.0025
Over 0.625 to 1, incl	ID or OD	0.0025	0.003
Over 1 to 2, incl	ID or OD	0.003	0.004
Over 2 to 3, incl	ID or OD	0.004	0.005
Over 3 to 4, incl	ID or OD	0.005	0.006
Over 4 to 5, incl	ID or OD	0.006	0.008
Over 5 to 6, incl	ID or OD	0.007	0.009
Over 6 to 8, incl	ID or OD	0.008	0.010
Over 8 to 10, incl	ID or OD	0.010	0.013

- 3.1 Out-of-roundness (difference between the major and the minor diameters) of unannealed tubing in straight lengths shall not exceed 2% of the nominal diameter.

4. WALL THICKNESS:4.1 Non-Refractory:

TABLE II

Wall Tolerance, Inch, Plus and Minus
OD Ranges, Inches

Nominal Wall Thickness Inch	0.031 to 0.125 incl	Over 0.125 to 0.625 incl	Over 0.625 to 1 incl	Over 1 to 2 incl	Over 2 to 4 incl	Over 4 to 7 incl	Over 7 to 10 incl
Under 0.018	0.002	0.001	0.0015	0.002	--	--	--
0.018 to 0.025, excl	0.003	0.002	0.002	0.0025	--	--	--
0.025 to 0.035, excl	0.003	0.0025	0.0025	0.003	0.004	--	--
0.035 to 0.058, excl	0.003	0.003	0.0035	0.0035	0.005	0.007	--
0.058 to 0.083, excl	--	0.0035	0.004	0.004	0.006	0.008	0.010
0.083 to 0.120, excl	--	0.004	0.005	0.005	0.007	0.009	0.011
0.120 to 0.165, excl	--	0.005	0.006	0.006	0.008	0.010	0.012
0.165 to 0.220, excl	--	0.007	0.0075	0.008	0.010	0.012	0.014
0.220 to 0.284, excl	--	--	0.009	0.010	0.012	0.014	0.016
0.284 to 0.380, excl	--	--	0.011	0.012	0.014	0.016	0.018
0.380 and over	--	--	--	5%	5%	6%	6%

4.2 Refractory:

TABLE III

Wall Tolerance, Inch, Plus and Minus
OD Ranges, Inches

Nominal Wall Thickness Inch	0.031 to 0.125 incl	Over 0.125 to 0.625 incl	Over 0.625 to 1 incl	Over 1 to 2 incl	Over 2 to 4 incl	Over 4 to 7 incl	Over 7 to 10 incl
Under 0.018	0.0025	0.0015	0.002	0.0025	--	--	--
0.018 to 0.025, excl	0.004	0.0025	0.0025	0.003	--	--	--
0.025 to 0.035, excl	0.004	0.003	0.003	0.004	0.005	--	--
0.035 to 0.058, excl	0.004	0.004	0.0045	0.0045	0.0065	0.009	--
0.058 to 0.083, excl	--	0.0045	0.005	0.005	0.0075	0.010	0.013
0.083 to 0.120, excl	--	0.005	0.0065	0.0065	0.009	0.011	0.014
0.120 to 0.165, excl	--	0.007	0.007	0.0075	0.010	0.013	0.015
0.165 to 0.220, excl	--	--	0.009	0.010	0.013	0.015	0.018
0.220 to 0.284, excl	--	--	0.012	0.013	0.015	0.018	0.020
0.284 to 0.380, excl	--	--	--	0.015	0.018	0.020	0.023
0.380 and over	--	--	--	6%	6%	8%	8%