



AEROSPACE MATERIAL SPECIFICATION

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AMS 2203G

Superseding AMS 2203F

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TOLERANCES Aluminum Alloy Drawn Tubing

1. **SCOPE:** This specification covers established manufacturing tolerances applicable to aluminum-base alloy drawn tubing. These tolerances apply to all conditions, unless otherwise noted. The term "excl" applies only to the higher figure of the specified range. Dimensions in U. S. conventional units are primary; dimensions in SI units are shown as the equivalent of the inch/foot/degree dimensions and are not to be construed as standard for product produced to SI dimensions.
2. **DIAMETER, WIDTH, OR DEPTH:**
 - 2.1 **Round:**

TABLE I

Tolerance, Inch, Plus and Minus (See Note 2)
Diameter at Any Point (Ovality)
(See Note 3)

Nominal OD or ID Inches (See Note 1)	Mean Diameter (See Note 4)	Non-Heat Treated Alloys (See Note 5)	Heat Treated Alloys (See Note 5)
Up to 0.500, incl	0.003	0.003	0.006
Over 0.500 to 1.000, incl	0.004	0.004	0.008
Over 1.000 to 2.000, incl	0.005	0.005	0.010
Over 2.000 to 3.000, incl	0.006	0.006	0.012
Over 3.000 to 5.000, incl	0.008	0.008	0.016
Over 5.000 to 6.000, incl	0.010	0.010	0.020
Over 6.000 to 8.000, incl	0.015	0.015	0.030
Over 8.000 to 10.000, incl	0.020	0.020	0.040
Over 10.000 to 12.000, incl	0.025	0.025	0.050

TABLE I (SI)

Tolerance, Millimeters, Plus and Minus (See Note 2)
Diameter at Any Point (Ovality)
(See Note 3)

Nominal OD or ID Millimeters (See Note 1)	Mean Diameter (See Note 4)	Non-Heat Treated Alloys (See Note 5)	Heat Treated Alloys (See Note 5)
Up to 12.70, incl	0.08	0.08	0.15
Over 12.70 to 25.40, incl	0.10	0.10	0.20
Over 25.40 to 50.80, incl	0.13	0.13	0.25
Over 50.80 to 76.20, incl	0.15	0.15	0.30
Over 76.20 to 127.00, incl	0.20	0.20	0.41
Over 127.00 to 152.40, incl	0.25	0.25	0.51
Over 152.40 to 203.20, incl	0.38	0.38	0.76
Over 203.20 to 254.00, incl	0.51	0.51	1.02
Over 254.00 to 304.80, incl	0.64	0.64	1.27

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2.2 Square, Rectangular, Hexagonal, and Octagonal:

TABLE II

Nominal Width or Depth Inches (See Note 1)	Tolerance, Inch, Plus and Minus (See Note 2)		
	At Corners	Not at Corners (See Note 3)	
	Square and Rectangular	Square, Hexagonal, and Octagonal	Rectangular
Up to 0.500, incl	0.003	0.006	The tolerance for the width is the value in the preceding column for a dimension equal to the depth, and conversely, but in no case less than that for its own dimension at the corners (See Note 6).
Over 0.500 to 1.000, incl	0.004	0.008	
Over 1.000 to 2.000, incl	0.005	0.010	
Over 2.000 to 3.000, incl	0.006	0.012	
Over 3.000 to 5.000, incl	0.008	0.016	
Over 5.000 to 6.000, incl	0.010	0.020	
Over 6.000 to 8.000, incl	0.015	0.030	
Over 8.000 to 10.000, incl	0.020	0.040	
Over 10.000 to 12.000, incl	0.025	0.050	

TABLE II (SI)

Nominal Width or Depth Millimeters (See Note 1)	Tolerance, Millimeters, Plus and Minus (See Note 2)		
	At Corners	Not at Corners (See Note 3)	
	Square and Rectangular	Square, Hexagonal, and Octagonal	Rectangular
Up to 12.70, incl	0.08	0.15	The tolerance for the width is the value in the preceding column for a dimension equal to the depth, and conversely, but in no case less than that for its own dimension at the corners (See Note 6).
Over 12.70 to 25.40, incl	0.10	0.20	
Over 25.40 to 50.80, incl	0.13	0.25	
Over 50.80 to 76.20, incl	0.15	0.30	
Over 76.20 to 127.00, incl	0.20	0.41	
Over 127.00 to 152.40, incl	0.25	0.51	
Over 152.40 to 203.20, incl	0.38	0.76	
Over 203.20 to 254.00, incl	0.51	1.02	
Over 254.00 to 304.80, incl	0.64	1.27	

2.3 Streamline, Oval, and Elliptical:

TABLE III

Nominal Equivalent Round Diameter Inches (See Notes 1 and 7)	Tolerance, Inch (See Note 2)			
	Major Axis		Minor Axis	
	Plus	Minus	Plus	Minus
Up to 2.500, incl	0.040	0.025	0.025	0.015
Over 2.500 to 4.250, incl	0.050	0.035	0.035	0.025
Over 4.250 to 6.000, incl	0.070	0.050	0.055	0.040
Over 6.000 to 8.000, incl	0.100	0.085	0.080	0.060
Over 8.000 to 10.000, incl	0.160	0.140	0.115	0.085

TABLE III (SI)

Nominal Equivalent Round Diameter Millimeters (See Notes 1 and 7)	Tolerance, Millimeters (See Note 2)			
	Major Axis		Minor Axis	
	Plus	Minus	Plus	Minus
Up to 63.50, incl	1.02	0.64	0.64	0.38
Over 63.50 to 107.95, incl	1.27	0.89	0.89	0.64
Over 107.95 to 152.40, incl	1.78	1.27	1.40	1.02
Over 152.40 to 203.20, incl	2.54	2.16	2.03	1.52
Over 203.20 to 254.00, incl	4.06	3.56	2.92	2.16

3. WALL THICKNESS:

TABLE IV

Nominal Wall Thickness Inch (See Notes 1 and 8)	Tolerance, Inch, Plus and Minus (See Note 2)		
	Wall Thickness at any Point from Nominal Wall Thickness (Eccentricity)		
	Mean Wall Thickness (See Note 9)	Round, Non-Heat Treatable (See Note 10)	Round, Heat Treatable; All Tubing Other Than Round; and All Coiled Tubing
0.010 to 0.035, incl	0.002	0.002	
Over 0.035 to 0.049, incl	0.003	0.003	
Over 0.049 to 0.083, incl	0.004	0.004	
Over 0.083 to 0.120, incl	0.005	0.006	10% of nominal
Over 0.120 to 0.203, incl	0.006	0.008	wall thickness;
Over 0.203 to 0.300, incl	0.008	0.012	0.003 in., min
Over 0.300 to 0.375, incl	0.015	0.020	
Over 0.375 to 0.500, incl	0.020	0.030	

TABLE IV (SI)

Nominal Wall Thickness Millimeters (See Notes 1 and 8)	Tolerance, Millimeters, Plus and Minus (See Note 2)		
	Wall Thickness at any Point From Nominal Wall Thickness (Eccentricity)		
	Mean Wall Thickness (See Note 9)	Round, Non-Heat Treatable (See Note 10)	Round, Heat Treatable; All Tubing Other Than Round; and All Coiled Tubing
0.25 to 0.89, incl	0.05	0.05	
Over 0.89 to 1.24, incl	0.08	0.08	
Over 1.24 to 2.11, incl	0.10	0.10	
Over 2.11 to 3.05, incl	0.13	0.15	10% of nominal
Over 3.05 to 5.16, incl	0.15	0.20	wall thickness;
Over 5.16 to 7.62, incl	0.20	0.30	0.08 mm, min
Over 7.62 to 9.52, incl	0.38	0.51	
Over 9.52 to 12.70, incl	0.51	0.76	

4. LENGTH:4.1 Straight Tubing:

TABLE V

Nominal OD, Width, or Major Axis Inches	Tolerance, Inch, Plus Only			
	Length Ranges, Feet			
	Up to 12, incl	Over 12 to 30, incl	Over 30 to 50, incl	Over 50
Up to 0.250, excl	1/4	3/8	1/2	-
0.250 to 3.000, excl	1/8	1/4	3/8	1
3.000 to 8.000, excl	3/16	5/16	7/16	1
8.000 and over	1/4	3/8	1/2	1

TABLE V (SI)

Nominal OD, Width, or Major Axis Millimeters	Tolerance, Millimeters, Plus Only			
	Length Ranges, Meters			
	Up to 3.66, incl	Over 3.66 to 9.14, incl	Over 9.14 to 15.24, incl	Over 15.24
Up to 6.35, excl	6.4	9.6	12.7	-
6.35 to 76.20, excl	3.2	6.4	9.6	25.4
76.20 to 203.20, excl	4.8	8.0	11.1	25.4
203.20 and over	6.4	9.6	12.7	25.4

4.2 Coiled Tubing:

TABLE VI

Nominal OD or Width Inches	Tolerance, %, Plus and Minus Except as Indicated			
	Length Ranges, Feet			
	Up to 100, incl	Over 100 to 250, excl	250 to 500, excl	500 and over
Up to 1.250, excl	-0, +5	10	15	20

TABLE VI (SI)

Nominal OD or Width Millimeters	Tolerance, %, Plus and Minus Except as Indicated			
	Length Ranges, Meters			
	Up to 30.48 incl	Over 30.48 to 76.20, excl	76.20 to 152.40, excl	152.40 and over
Up to 31.75, excl	-0, +5	10	15	20

5. STRAIGHTNESS:5.1 Straight Tubing:

TABLE VII

Nominal OD or Width Inches	Tolerance, Inches (See Notes 11 and 12)	
	In Any Foot or Less of Length	In Total Length (L in Ft) of Piece
Up to 0.375, excl	0.500	0.500L (See Note 13)
0.375 to 6.000, excl	0.010	0.010L
6.000 and over	0.020	0.020L

TABLE VII (SI)

Nominal OD or Width Millimeters	Tolerance, Millimeters (See Notes 11 & 12)	
	In Any 304.8 mm or Less of Length	In Total Length (L in mm) of Piece
Up to 9.53, excl	12.70	0.04 x L in mm
9.53 to 152.40, excl	0.25	0.008 x L in mm
152.40 and over	0.51	0.002 x L in mm

6. FLATNESS:

6.1 Square, Rectangular, Hexagonal, and Octagonal:

TABLE VIII

Nominal Width, Depth, or Distance Between Parallel Sides Inches	Tolerance, Inch (See Note 14)
Up to 0.500, incl	0.003
Over 0.500 to 1.000, incl	0.004
Over 1.000 to 2.000, incl	0.005
Over 2.000 to 3.000, incl	0.006
Over 3.000 to 5.000, incl	0.008
Over 5.000 to 6.000, incl	0.010
Over 6.000 to 8.000, incl	0.015
Over 8.000 to 10.000, incl	0.020
Over 10.000 to 12.000, incl	0.025

TABLE VIII (SI)

Nominal Width, Depth, or Distance Between Parallel Sides Millimeters	Tolerance, Millimeters (See Note 14)
Up to 12.70, incl	0.08
Over 12.70 to 25.40, incl	0.10
Over 25.40 to 50.80, incl	0.13
Over 50.80 to 76.20, incl	0.15
Over 76.20 to 127.00, incl	0.20
Over 127.00 to 152.40, incl	0.25
Over 152.40 to 203.20, incl	0.38
Over 203.20 to 254.00, incl	0.51
Over 254.00 to 304.80, incl	0.64

7. TWIST:

7.1 Square, Rectangular, Hexagonal, and Octagonal: