



AEROSPACE MATERIAL SPECIFICATION

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TOLERANCES Titanium and Titanium-Base Alloy Tubing*

1. **SCOPE:** This specification covers established manufacturing tolerances applicable to titanium and titanium-base alloy tubing. 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.
 2. **DIAMETER:** When specified, OD tolerances shall apply to the ID but not both ID and OD of the same lot of tubing. Mean OD is the average of two measurements taken at right angles to each other. Diameter tolerances include ovality except for tubing having nominal wall thickness less than 4% of the nominal OD; for tubing with nominal wall thickness less than 4% of the nominal OD, the ovality tolerance shall be double the diameter tolerance.
- 2.1 Seamless, Cold Reduced, Annealed or Stress Relieved:

TABLE I

Nominal OD Inches	Standard Tolerance Inch plus and minus	Special Tolerance Inch plus only
Up to 0.093, excl	0.002	0.002
0.093 to 0.188, excl	0.003	0.003
0.188 to 0.500, excl	0.004	0.004
0.500 to 1.000, excl	0.005	0.005
1.000 to 1.500, excl	0.006	0.006
1.500 to 2.000, excl	0.007	0.007
2.000 to 3.000, excl	0.010	0.010
3.000 to 4.500, excl	0.015	0.015

TABLE I (SI)

Nominal OD Millimetres	Standard Tolerance Millimetre plus and minus	Special Tolerance Millimetre plus only
Up to 2.36, excl	0.05	0.05
2.36 to 4.78, excl	0.08	0.08
4.78 to 12.70, excl	0.10	0.10
12.70 to 25.40, excl	0.13	0.13
25.40 to 38.10, excl	0.15	0.15
38.10 to 50.80, excl	0.18	0.18
50.80 to 76.20, excl	0.25	0.25
76.20 to 114.30, excl	0.38	0.38

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2.2 Welded, Cold Reduced, Annealed or Stress Relieved:

2.2.1 Standard Tolerances:

TABLE II

Nominal OD Inches	Tolerance, Inch plus only
Up to 0.125, excl	0.002
0.125 to 0.188, excl	0.003
0.188 to 0.500, excl	0.004
0.500 and over	0.005

TABLE II (SI)

Nominal OD Millimetres	Tolerance, Millimetre plus only
Up to 3.18, excl	0.05
3.18 to 4.78, excl	0.08
4.78 to 12.70, excl	0.10
12.70 and over	0.13

2.2.2 Special Tolerances:

TABLE III

Nominal OD Inch	Tolerance, Inch plus only
Up to 0.250, excl	0.001
0.250 to 0.812, excl	0.002
0.812 to 1.000, excl	0.004

TABLE III (SI)

Nominal OD Millimetres	Tolerance, Millimetre plus only
Up to 6.35, excl	0.03
6.35 to 20.62, excl	0.05
20.62 to 25.40, excl	0.10

3. WALL THICKNESS: Shall not vary by more than $\pm 10\%$ for all sizes in both seamless and welded tubing, except that when special tolerances are specified, the variation shall be not greater than $\pm 7.5\%$.