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AEROSPACE MATERIAL SPECIFICATION

MAM 2245

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Revised

TOLERANCES, METRIC
Titanium and Titanium Alloy Extruded Bars, Rods, and Shapes

1. SCOPE: This specification covers established metric manufacturing tolerances applicable to titanium and titanium alloy extruded bars, rods, and shapes ordered to metric dimensions. These tolerances apply to all conditions unless otherwise noted. The term "excl" applies only to the higher figure of the specified range.

2. DIAMETER OR THICKNESS:

TABLE I

Specified Diameter or Distance Between Parallel Sides Millimetres	Tolerance, Millimetres, Plus and Minus (See 11.1)
Up to 12.50, excl	0.50
12.50 to 25.00, excl	0.75
25.00 to 50.00, excl	1.00
50.00 to 75.00, excl	1.25
75.00 to 125.00, excl	1.50
125.00 and over	3.20

3. CORNER AND FILLET RADII:

3.1 Bars and Shapes (See Fig. 1):

TABLE II

Specified Radius Millimetres	Tolerance, Millimetres, Plus and Minus: Difference Between Specified Radius and Corner Radius (A)	Tolerance, Millimetres, Plus and Minus: Difference Between Specified Radius and Fillet Radius (B)
All	0.80	1.60

4. ANGULARITY (See 11.2):

4.1 Shapes (See Fig. 2):

TABLE III

Specified Nominal Leg or Metal Thickness	Tolerance (Allowable Deviation from Specified Angle) Degrees, Plus and Minus (Ratio: Leg or surface length shall not exceed 14 times the leg or metal thickness.)
All	2

5. TRANSVERSE FLATNESS:

5.1 Bars and Shapes (See Fig. 3):

TABLE IV

Surface Width (W) Millimetres	Tolerance (Allowable Deviation from Flat) Millimetres
Up to 25.00, excl	0.25
25.00 and over	0.25 x W
In any 25.00 mm of width	0.25

6. STRAIGHTNESS (See Fig. 4):

TABLE V

Specified Diameter (Rod) Specified Width (Bar) Circumscribing Circle Diameter (See 11.4) Millimetres	Tolerance, Millimetres (See 11.3)	
	In any 300 mm or Less of Length	In Total Length Of Piece
All	0.65	0.65 per 300 mm of length

7. TWIST (See 11.5):

7.1 Bars and Shapes (See Fig. 5):

TABLE VI

Specified Width (Bars) Circumscribing Circle Diameter (See 11.4) Millimetres	Minimum Thickness Millimetres	Tolerance, Degrees	
		In Any 300 mm or Less of Length	In Total Length of Piece
All	All	1	1 per 300 mm of length; 3 max

8. LENGTH:

TABLE VII

Circumscribing Circle Diameter (Shapes); Specified Diameter (Rod); Specified Width (Bar) Millimetres (See 11.4)	Tolerance, Millimetres, Plus Only Length Ranges, Meters		
	Up to 3.0, Incl	Over 3.0 to 6.0, Incl	Over 6.0
Up to 75.00, excl	6.2	7.8	9.4
75.00 to 125.00, excl	7.8	10.9	12.5
125.00 to 225.00, excl	9.4	12.5	15.6

9. SQUARENESS OF CUT ENDS: Ends shall not deviate from square by more than 3 degrees.

10. SURFACE ROUGHNESS:

TABLE VIII

Specified Section Thickness Millimetres	Depth of Imperfection Millimetre, Maximum (See 11.6, 11.7)
Up to 6.25, incl	0.20
Over 6.25 to 12.50, incl	0.25
Over 12.50	0.38

11. NOTES:

11.1 Allowable deviation from specified dimension when diameter of circumscribing circle is less than 175 mm.

11.2 Angles are measured with protractors or with gauges. As illustrated, a four point contact system is used, two contact points being as close to the angle vertex as practical, and the others near the ends of the respective surfaces forming the angle. Between these points of measurement, surface flatness is the controlling tolerance.

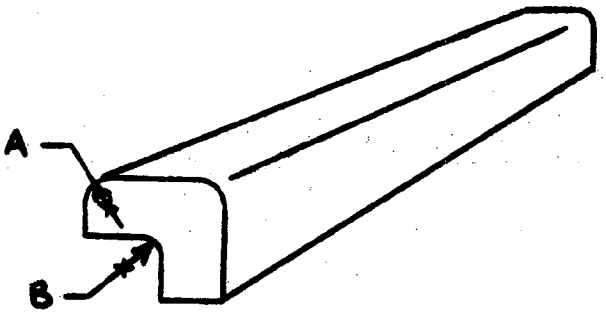
11.3 When weight of piece on flat surface minimizes deviation.

11.4 The circumscribing circle diameter is the smallest circle that will completely enclose the cross-section of the extruded product.

11.5 Twist is normally measured by placing the extruded section on a flat surface and measuring the maximum distance at any point along its length between the bottom surface of the section and the flat surface. From this measurement, the deviation from true straightness of the section is subtracted. The remainder is the twist. To convert the standard twist tolerance to an equivalent linear value, the tangent of the standard tolerance is multipled by the width of the surface of the section that is on the flat surface.

11.6 The depth of local defects, such as gouges, dents, die lines, laps, and handling marks shall be included within the minimum dimensions permitted by the tolerances of Table I.

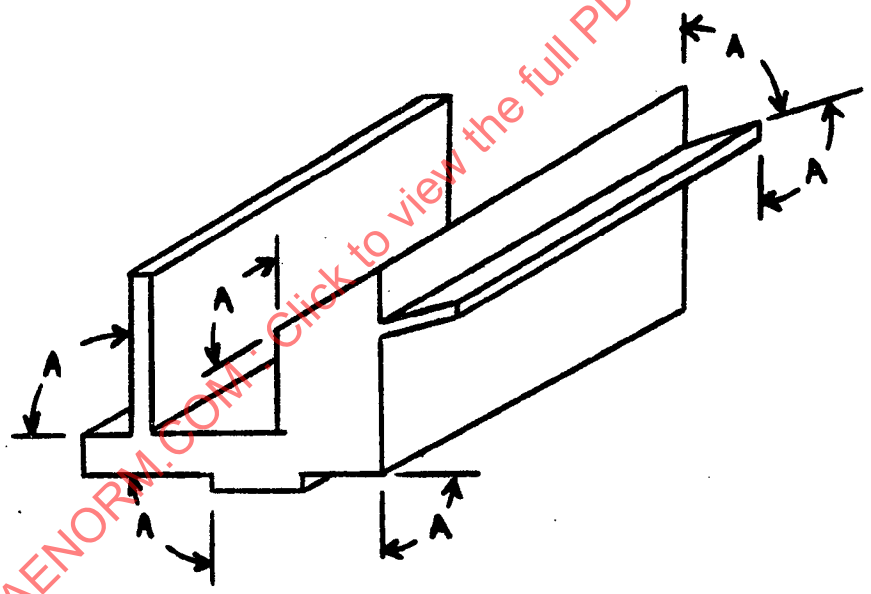
11.7 A maximum roughness equivalent approximately to 6.2 μm will be permitted. This value should be used as a guide only because surface texture standards are established primarily for machined surfaces. The surface texture standard may not be directly applicable in all respects to extruded surfaces.



A: Corner Radius
B: Fillet Radius

CORNER AND FILLET RADII DIMENSIONS

FIGURE 1



ANGULARITY OF SHAPED SECTION

FIGURE 2