

TOLERANCES, METRIC
Copper and Copper Alloy Bars and Rods

THIS REVISION CONTAINS ONLY EDITORIAL CHANGES.

1. SCOPE: This specification covers established metric manufacturing tolerances applicable to bars and rods of copper and copper alloys ordered to metric dimensions. These tolerances apply to all conditions, unless otherwise noted. The term "excl" is used to apply only to the higher figure of a specified range. AMS 2221, specified in inch/pound units, is the equivalent of this MAM.

1.1 If the tolerance is expressed as a percentage of a specified dimension, the tolerance so calculated shall be rounded to the nearest 0.02 mm to obtain the permissible tolerance.

2. DIAMETER OR THICKNESS:

2.1 Cold Finished:

2.1.1 Rods; Rounds, Hexagons, and Octagons:

TABLE I

Specified Diameter or Distance Between Parallel Surfaces Millimetres	Tolerance, Millimetre, Plus and Minus			
	Non-Refractory		Refractory	
	Round	Hexagonal Octagonal	Round	Hexagonal Octagonal
Up to 3.8, incl	0.035	0.06	0.050	--
Over 3.8 to 12, incl	0.04	0.08	0.05	0.10
Over 12 to 25, incl	0.05	0.10	0.08	0.13
Over 25 to 50, incl	0.06	0.13	0.10	0.15
Over 50	0.15%	0.30%	0.20%	0.40%

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2.1.2 Bars; Squares and Rectangles:2.1.2.1 Copper:

TABLE II

Specified Thickness Millimetres	Up to 12, incl	Thickness Tolerance Millimetre, Plus and Minus Width Ranges, Millimetres				
		Over 12	Over 30	Over 50	Over 100	Over 200
		to 30, incl	to 50, incl	to 100, incl	to 200, incl	to 300, incl
Over 4.8 to 12, incl	0.08	0.08	0.09	0.10	0.11	0.13
Over 12 to 25, incl	--	0.10	0.10	0.11	0.13	0.15
Over 25 to 50, incl	--	0.11	0.11	0.13	0.15	--
Over 50 to 100, incl	--	--	--	0.30%	--	--

2.1.2.2 Non-Refractory Alloys:

TABLE III

Specified Thickness Millimetres	Up to 12, incl	Thickness Tolerance Millimetre, Plus and Minus Width Ranges, Millimetres				
		Over 12	Over 30	Over 50	Over 100	Over 200
		to 30, incl	to 50, incl	to 100, incl	to 200, incl	to 300, incl
Over 4.8 to 12, incl	0.08	0.10	0.11	0.11	0.13	0.20
Over 12 to 25, incl	--	0.11	0.13	0.13	0.18	0.23
Over 25 to 50, incl	--	0.13	0.13	0.15	0.20	--
Over 50 to 100, incl	--	--	--	0.30%	--	--

2.1.2.3 Refractory Alloys:

TABLE IV

Specified Thickness Millimetres	Up to 12, incl	Thickness Tolerance Millimetre, Plus and Minus Width Ranges, Millimetres				
		Over 12 to 30, incl	Over 30 to 50, incl	Over 50 to 100, incl	Over 100 to 200, incl	Over 200 to 300, incl
Over 4.8 to 12, incl	0.13	0.13	0.15	0.18	0.23	0.30
Over 12 to 25, incl	--	0.15	0.18	0.20	0.25	0.33
Over 25 to 50, incl	--	0.15	0.18	0.23	0.28	--
Over 50 to 100, incl	--	--	--	0.50	--	--

2.2 Extruded Round, Hexagonal, Octagonal, Square, and Rectangular Shapes:

TABLE V

Specified Diameter or Distance Between Parallel Surfaces Millimetres	Tolerance, Millimetres, Plus and Minus	
	Non Refractory	Refractory
Up to 25, incl	0.25	0.50
Over 25 to 50, incl	0.38	0.75
Over 50 to 75, incl	0.65	1.3
Over 75 to 90, incl	0.90	1.8
Over 90 to 100, incl	1.5	3.0

2.3 Hot Finished Rounds:

TABLE VI

Specified Diameter Millimetres	Tolerance, Millimetres	
	plus	minus
6.35 only	0.50	0.25
Over 6.35 to 20, incl	0.38	0.38
Over 20 to 30, incl	0.50	0.50
Over 30 to 38, incl	0.75	0.75
Over 38 to 75, incl	1.6	1.6
Over 75	3.2	3.2

3. WIDTH:

3.1 Rectangles, Not Including Squares:

TABLE VII

Specified Width Millimetres	Tolerance, Millimetre, Plus and Minus	
	Copper and Non-Refractory	Refractory
Over 4.8 to 12, incl	0.09	0.13
Over 12 to 30, incl	0.13	0.18
Over 30 to 50, incl	0.20	0.25
Over 50 to 100, incl	0.30	0.38
Over 100 to 300, incl	0.30%	0.50%

4. LENGTH: Cold finished bars and rods shall not vary from the ordered length by more than -0, +10 mm when specific lengths are ordered or by more than -0, +25 mm when specific lengths with ends or when stock lengths with or without ends are ordered. No length tolerances are established for extruded and hot rolled rod.

5. STRAIGHTNESS:5.1 Cold Finished Rods; Hexagons, Octagons:

TABLE VIII

Length Millimetres	Maximum Curvature (Depth of Arc) Millimetres
Up to 600, excl	0.80
600 to 1500, excl	0.80 in any 600 mm of total length
1500 to 3000, excl	3.0 in any 1500 mm of total length
3000 and Over	12 in any 3000 mm of total length

5.2 Bars; Squares and Rectangles: When supplied in straight lengths, in rolls, or on bucks, shall be of such straightness that the maximum edgewise curvature (depth of arc) shall be not greater than 12.5 mm in any 1800 mm or 2.0 mm x length in 300 mm for shorter lengths.

6. FLATNESS: None specified.

7. SPECIAL TOLERANCES:

7.1 If tolerances specified herein are plus and minus and if all plus or all minus are desired, use the sum of the plus and minus values specified, neglecting the signs.

7.2 If tolerances specified herein are all plus and if all minus are desired, use the same values specified.