



~~Designation: B16/B16M-05~~ Designation: B16/B16M – 10

Standard Specification for Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines¹

This standard is issued under the fixed designation B16/B16M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope*

1.1 This specification establishes the requirements for free-cutting brass rod, bar, wire, and shapes of any specified cross section produced from Copper Alloy UNS Nos. C36000 or C36010 suitable for high-speed screw machining applications and moderate thread rolling.

1.2 *Units*—Values stated in either ~~inch-pound~~ SI units or ~~SI~~ inch-pound units are to be regarded separately as standard. ~~Within the text, SI units are shown in brackets.~~ The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other. Combining values from the two systems may result in non-conformance with the standard.

1.2.1 Within the text, SI units are shown in brackets.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

B249/B249M Specification for General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, Shapes and Forgings

B250/B250M Specification for General Requirements for Wrought Copper Alloy Wire

B601 Classification for Temper Designations for Copper and Copper Alloys Wrought and Cast

E8 Test Methods for Tension Testing of Metallic Materials

E8M Test Methods for Tension Testing of Metallic Materials [Metric]

E18 Test Methods for Rockwell Hardness of Metallic Materials

E478 Test Methods for Chemical Analysis of Copper Alloys

3. General Requirements

3.1 The following sections of Specifications B249/B249M (rod, bar, and shapes), and B250/B250M (wrought copper alloy wire) constitute a part of this specification.

3.1.1 Terminology,

3.1.2 Materials and Manufacture,

3.1.3 Workmanship, Finish, and Appearance,

3.1.4 Sampling,

3.1.5 Number of Tests and Retest,

3.1.6 Specimen Preparation,

3.1.7 Test Methods,

3.1.8 Significance of Numerical Limits,

3.1.9 Inspection,

3.1.10 Rejection and Rehearing,

3.1.11 Certification,

3.1.12 Mill Test Report,

¹ This specification is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.02 on Rod, Bar, Wire, Shapes and Forgings.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

*A Summary of Changes section appears at the end of this standard.

- 3.1.13 Packaging and Package Marking, and
- 3.1.14 Supplementary Requirements.

3.2 In addition, when a section with a title identical to those referenced in 3.1 appears in this specification, it contains additional requirements that supplement those appearing in Specifications B249/B249M and B250/B250M.

4. Ordering Information

4.1 Include the following information when placing orders for product under this specification, as applicable:

4.1.1 ASTM specification designation and year of issue (B16/B16M – XX).

4.1.2 ~~Copper Alloy UNS No. designation (C36000, see Section~~

4.1.2 Copper Alloy UNS No. designations (C36000 or C36010, see Section 6 and Table 1). Unless otherwise specified, the alloy

**TABLE 1 Chemical Requirements
Copper Alloy UNS No. C36000 and C36010**

Element	Composition, %	
	Copper Alloy UNS No.	
	C36000	C36010
Copper	60.0–63.0	
Copper	60.0 - 63.0	60.0 – 63.0
Lead	2.5 - 3.0	3.1 – 3.7
Iron, max	0.35	
Iron, max	0.35	0.35
Zinc	f	remainder
Zinc	Remainder	Remainder

supplied will be C36000.

4.1.3 Temper (see Section 7 and Tables 2-5).

4.1.4 Product cross section form (for example, round, hexagonal, square, etc.).

4.1.5 Dimensions (see Section 9).

TABLE 2 Tensile Requirements, inch-pound

NOTE—See Table 3 for SI values.

Temper Designation Standard Name		Diameter or Distance Between Parallel Surfaces, in.	Tensile Strength, min, ksi	Yield Strength at 0.5 % Extension under Load, min, ksi	Elongation, ^A min, %	
Rod and Wire						
O60	soft anneal	1 and under	48	20	15	
		over 1 to 2, incl.	44	18	20	
		over 2	40	15	25	
H02	half-hard	½ and under	57	25	7 ^B	
		over ½ to 1, incl.	55 ^C	25	10	
		over 1 to 2, incl.	50	20	15	
		over 2 to 4, incl., and	45	15	20	
		over 4	40	15	20	
H04	hard	⅛ to ⅜, incl.	80	45		
		over ⅜ to ½, incl.	70	35	4	
		over ½ to ¾, incl.	65	30	6	
Bar						
Standard Name		Thickness, in.	Width, in.			
O60	soft anneal	1 and under	6 and under	44	18	20
		over 1	6 and under	40	15	25
H02	half-hard	½ and under	1 and under	50	25	10
		½ and under	over 1 to 6, incl.	45	17	15
		over ½ to 2, incl.	2 and under	45	17	15
		over ½ to 2, incl.	over 2 to 6, incl.	40	15	20
		over 2	over 2 to 4, incl.	40	15	20

^A In any case, a minimum gage length of 1 in. shall be used.

^B For product furnished in coils the elongation shall be 4 % min.

^C If product is specified for thread rolling applications, the minimum tensile strength shall be 52 ksi.

TABLE 3 Tensile Requirements, SI

NOTE—See Table 2 for inch–pound values.

Temper Designation Standard Name		Diameter or Distance Between Parallel Surfaces, mm	Tensile Strength, min, MPa	Yield Strength at 0.5 % Extension under Load, min, MPa	Elongation, ^A min, %	
Rod and Wire						
O60	soft anneal	25 and under	330	140	15	
		over 25 to 50, incl.	305	125	20	
		over 50	275	105	25	
H02	half-hard	12 and under	395	170	7 ^B	
		over 12 to 25, incl.	380 ^C	170	10	
		over 25 to 50, incl.	345	140	15	
		over 50 to 100, incl., and over 100	310	105	20	
			275	105	20	
H04	hard	1.6 to 4, incl.	550	310		
		over 4 to 12, incl.	480	240	4	
		over 12 to 18, incl.	450	205	6	
Bar						
Standard Name		Thickness, mm	Width, mm			
O60	soft anneal	25 and under	150 and under	305	125	20
		over 25	150 and under	275	105	25
H02	half-hard	12 and under	25 and under	345	170	10
		12 and under	over 25 to 150, incl.	310	115	15
		over 12 to 50, incl.	50 and under	310	115	15
		over 12 to 50, incl.	over 50 to 150, incl.	275	105	20
		over 50	over 50 to 100, incl.	275	105	20

^A In any case, a minimum gage length of 25 mm shall be used. SI elongation values are based on a gage length of 5.65 times the square root of the area for dimensions greater than 2.5 mm.

^B For product furnished in coils the elongation shall be 4 % min.

^C If product is specified for thread rolling applications, the minimum tensile strength shall be 350 MPa.

TABLE 4 Rockwell Hardness Requirements, inch-pound

NOTE 1—See Table 5 for SI values.

NOTE 2—Rockwell hardness requirements are not established for diameters less than ½ in.

Temper Designation		Diameter of Distance Between Parallel Surfaces, in.	Rockwell B Hardness Determined on the Cross Section Midway Between Surface and Center	
Rod and Wire				
Standard Name			Round	Hexagonal and Octagonal
O60	soft anneal	½ and over	10 - 45	10 - 45
H02	half-hard	½ to 1, incl.	60 - 80 ^A	55 - 80
		over 1 to 2, incl.	55 - 75	45 - 80
		over 2 to 3, incl.	45 - 70	40 - 65
		over 3 to 4, incl.	40 - 65	35 - 60
		over 4	25 min	25 min
Bar				
		Thickness, in.	Width, in.	
O60	soft anneal	½ and over	½ and over	10 - 35
H02	half-hard	½ and under	1 and under	45 - 85
		½ and under	over 1 to 6, incl.	35 - 70
		over ½ to 2, incl.	2 and under	40 - 80
			over 2 to 6, incl.	35 - 70
		over 2	over 2 to 4, incl.	35 - 70

^A If product is specified for thread rolling application, the Rockwell B hardness shall be 55–75.

4.1.6 How furnished: straight lengths or coils (see 5.2).

4.1.7 Edge contours (see Section 9).

4.1.8 Quantity; total weight, footage, or number of pieces for each size.

4.1.9 When product is purchased for applications requiring thread rolling (see 1.1, Tables 2-5).