Designation: B927/B927M – 17

Standard Specification for Brass Rod, Bar, and Shapes[1]

This standard is issued under the fixed designation B927/B927M; 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.

1. Scope*

1.1 This specification establishes requirements for brass rod (round, hexagonal, and octagonal), bar (rectangular and square), and shapes of UNS Alloys C21000, C22000, C23000, C24000, C26000, C26800, C27000, C27400, C27450, C27451, C27453, and C28500.

1.2 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. 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.

1.3 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

B16/B16M Specification for Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines

B36/B36M Specification for Brass Plate, Sheet, Strip, And Rolled Bar

B121/B121M Specification for Leaded Brass Plate, Sheet, Strip, and Rolled Bar

B124/B124M Specification for Copper and Copper Alloy Forging Rod, Bar, and Shapes

B134/B134M Specification for Brass Wire

B135 Specification for Seamless Brass Tube

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

B587 Specification for Welded Brass Tube

E8/E8M Test Methods for Tension Testing of Metallic Materials

E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)[3]

E478 Test Methods for Chemical Analysis of Copper Alloys

3. General Requirements

3.1 The following sections of Specification B249/B249M 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 Retests,
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 Reports,
3.1.13 Product Marking,
3.1.14 Packaging and Package Marking, and
3.1.15 Supplementary Requirements.

3.2 In addition, when a section with a title identical to that referenced in 3.1, above, appears in this specification, it contains additional requirements that supplement those that appear in Specification B249/B249M.

4. Ordering Information

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

4.1.1 ASTM Designation and year of issue,
4.1.2 Copper Alloy UNS No. designation,
4.1.3 Temper,
4.1.4 Cross section (round, hexagonal, octagonal, rectangular, or square),
4.1.5 Quantity (total weight, footage, or number of pieces of each temper, cross section, and alloy),

[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.

[3] The last approved version of this historical standard is referenced on www.astm.org.

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

4.1.6 Dimensions (diameter or distance between parallel surfaces, width and thickness, length),

4.1.7 Type of edge (square corners, rounded edge, full-rounded edge),

4.1.8 How furnished (specific lengths with or without ends), and

4.1.9 If product is purchased for agencies of the U.S. Government (Specification B249/B249M).

4.2 The following requirements are available to this specification and should be specified in the contract or purchase order when required:

4.2.1 Certification (Specification B249/B249M), and

4.2.2 Mill Test Report (Specification B249/B249M).

5. Materials and Manufacture

5.1 *Materials:*

5.1.1 The material of manufacture shall be cast billets, logs, or rods of Copper Alloy UNS Nos. C21000, C22000, C23000, C24000, C26000, C26800, C27000, C27400, C27450, C27451, C27453, and C28500 of such purity, soundness, and structure as to be suitable for processing into the products prescribed herein.

5.2 *Manufacture:*

5.2.1 The products shall be manufactured by such hot working, cold working, and annealing processing as to produce a uniform wrought structure in the finished product.

6. Chemical Composition

6.1 The material shall conform to the chemical composition requirements in Table 1 for the copper alloy UNS No. designation specified in the ordering information.

6.2 These composition limits do not preclude the presence of other elements. By agreement between the manufacturer and the purchaser, limits may be established and analysis required for unnamed elements.

6.3 For alloys in which zinc is listed as "remainder," either copper or zinc may be taken as the difference between the sum of results of all other elements determined and 100 %.

6.4 When all elements specified for a given alloy in Table 1 are determined, the sum of the results shall be as shown in the following table:

Alloy UNS Nos.	Sum of Results, Percent, Minimum
C21000, C22000, C23000, C24000	99.8
C26000, C26800, C27000, C27400	99.7
C27450, C27451, C27453	99.5
C28500	99.1

7. Temper

7.1 The standard tempers for rod and bar described in this specification are given in Tables 2 and 3.

7.1.1 O60 (Soft Anneal),

7.1.2 H01 (¼ Hard),

7.1.3 H02 (½ Hard), and

7.1.4 H04 (Hard).

7.2 Other tempers, and temper for shapes, shall be subject to agreement between the manufacturer and the purchaser.

8. Mechanical Property Requirements

8.1 *Tensile Strength Requirements:*

8.1.1 Product furnished under this specification shall conform to the tensile requirements prescribed in Tables 2 and 3, when tested in accordance with Test Methods E8/E8M.

9. Purchases for U.S. Government

9.1 When specified in the contract or purchase order, product purchased for agencies of the U.S. government shall conform to the special government requirements stipulated in the Supplementary Requirements section of Specification B249/B249M.

10. Dimensions and Permissible Variations

10.1 The dimensions and tolerances for rod, bar, and shapes described by this specification shall be as specified in Specification B249/B249M with particular reference to the following tables and related paragraphs.

10.1.1 *Diameter or Distance Between Parallel Surfaces:*

10.1.1.1 *Rod*—Table 1.

10.1.1.2 *Bar*—Tables 8 and 10.

10.1.2 *Shapes*—Dimensional tolerances shall be subject to agreement between the manufacturer and the purchaser.

10.1.3 *Length*—Tables 13 and 14.

10.1.4 *Straightness*—Table 16—General Use section.

10.1.5 *Edge contours*—Paragraph 6.5.

TABLE 1 Chemical Requirements

Copper Alloy UNS No.	Composition, %						
	Copper	Lead, max	Iron, max	Tin, max	Phosphorous	Arsenic	Zinc
C21000	94.0-96.0	0.05	0.05	...	...	...	remainder
C22000	89.0-91.0	0.05	0.05	...	...	...	remainder
C23000	84.0-86.0	0.05	0.05	...	...	...	remainder
C24000	78.5-81.5	0.05	0.05	...	...	...	remainder
C26000	68.5-71.5	0.07	0.05	...	...	...	remainder
C26800	64.0-68.5	0.09	0.05	...	...	...	remainder
C27000	63.0-68.5	0.09	0.07	...	...	...	remainder
C27400	61.0-64.0	0.09	0.05	...	...	...	remainder
C27450	60.0-65.0	0.25	0.35	...	...	...	remainder
C27451	61.0-65.0	0.25	0.35	...	0.05-0.20	...	remainder
C27453	61.5–63.5	0.25	0.15	0.15	...	0.02–0.15	remainder
C28500	57.0–59.0	0.25	0.35	...	...	...	remainder

TABLE 2 Tensile Requirements (Inch-Pound Units)

Temper		Diameter or Distance Between Parallel Surfaces, in.	Tensile Strength, min	Yield Strength at 0.5 % Extension Under Load, min	Elongation[A] in 4× diameter or 4× thickness, min
Code	Name		ksi	ksi	%
Copper Alloy UNS No. C21000 Rod (round, hexagonal, octagonal)					
O60	Soft Anneal	All sizes	30	10	25
H01	¼ Hard	Under ½	36	16	15
		½ to 1, incl	34	14	17
		over 1	32	12	19
H02	½ Hard	Under ½	42	25	8
		½ to 1, incl	40	23	9
		over 1	37	20	11
H04	Hard	Under ½	52	40	5
		½ to 1, incl	48	37	7
		over 1 to 2 incl	45	35	9
Copper Alloy UNS No. C21000 Bar[B]					
O60	Soft Anneal	All sizes	30	10	25
H01	¼ Hard	Under ½	34	14	17
		½ to 2, incl	32	12	19
Copper Alloy UNS No. C22000 Rod (round, hexagonal, octagonal)					
060	Soft Anneal	All sizes	32	10	25
H01	¼ Hard	Under ½	39	20	15
		½ to 1, incl	37	17	17
		over 1	34	15	19
H02	½ Hard	Under ½	50	30	7
		½ to 1, incl	45	27	10
		over 1	40	25	12
H04	Hard	Under ½	57	40	5
		½ to 1, incl	55	37	7
		over 1 to 2 incl	50	35	9
Copper Alloy UNS No. C22000 Bar[B]					
O60	Soft Anneal	All sizes	32	10	25
H01	¼ Hard	Under ½	35	16	17
		½ to 2, incl	34	15	19
Copper Alloy UNS No. C23000 Rod (round, hexagonal, octagonal)					
O60	Soft Anneal	All sizes	35	10	25
H01	¼ Hard	Under ½	44	20	15
		½ to 1, incl	42	17	17
		over 1	40	15	19
H02	½ Hard	Under ½	50	30	7
		½ to 1, incl	45	27	10
		over 1	40	25	12
H04	Hard	Under ½	63	40	5
		½ to 1, incl	60	37	7
		over 1 to 2 incl	58	35	9
Copper Alloy UNS No. C23000 Bar[B]					
O60	Soft Anneal	All sizes	35	10	25
H01	¼ Hard	Under ½	40	15	19
		½ to 1, incl	38	13	22
		over 1 to 2 incl	36	11	25
H02	½ Hard	Under ½	44	20	15
		½ to 1, incl	42	17	17
		over 1 to 2 incl	40	15	19
Copper Alloy UNS No. C24000 Rod (round, hexagonal, octagonal)					
O60	Soft Anneal	All sizes	40	10	30
H01	¼ Hard	Under ½	47	25	18
		½ to 1, incl	45	20	20
		over 1	43	18	22
H02	½ Hard	Under ½	53	33	10
		½ to 1, incl	48	30	13
		over 1	43	28	15
H04	Hard	Under ½	68	45	8
		½ to 1, incl	65	40	10
		over 1 to 2 incl	60	35	12
Copper Alloy UNS No. C24000 Bar[B]					
O60	Soft Anneal	All sizes	40	10	30
H01	¼ Hard	Under ½	45	20	20
		½ to 1, incl	43	18	22
		over 1 to 2 incl	41	16	25
Copper Alloy UNS No. C26000 Rod (round, hexagonal, octagonal)					
O60	Soft Anneal	All sizes	40	12	30
H01	¼ Hard	Under ½	50	30	20
		½ to 1, incl	48	25	24
		over 1	46	20	28