Designation: B 927 – 08

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

This standard is issued under the fixed designation B 927; 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, and C27400.

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.

2. Referenced Documents

2.1 *ASTM Standards:* [2]

B 16/B 16M Specification for Free-Cutting Brass Rod, Bar and Shapes for Use in Screw Machines

B 36/B 36M Specification for Brass Plate, Sheet, Strip, And Rolled Bar

B 121/B 121M Specification for Leaded Brass Plate, Sheet, Strip, and Rolled Bar

B 124/B 124M Specification for Copper and Copper Alloy Forging Rod, Bar, and Shapes

B 134/B 134M Specification for Brass Wire

B 135 Specification for Seamless Brass Tube

B 249/B 249M Specification for General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, Shapes and Forgings

B 587 Specification for Welded Brass Tube

E 8 Test Methods for Tension Testing of Metallic Materials

E 8M Test Methods for Tension Testing of Metallic Materials [Metric][3]

E 478 Test Methods for Chemical Analysis of Copper Alloys

3. General Requirements

3.1 The following sections of Specification B 249/B 249M 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 appears in this specification, it contains additional requirements that supplement those that appear in Specification B 249/B 249M.

4. Ordering Information

4.1 Include the following information in orders for product:

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),
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 When material is purchased for agencies of the U.S. government (Specification B 249/B 249M).

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

[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.

Current edition approved April 15, 2008. Published May 2008. Originally approved in 2003. Last previous edition approved in 2003 as B 927 – 03.

[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] Withdrawn.

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

4.2.1 Certification (Specification B 249/B 249M), and
4.2.2 Mill Test Report (Specification B 249/B 249M).

5. Materials and Manufacture

5.1 *Material*:

5.1.1 The material shall be made from cast billets, logs, or rods of Copper Alloy UNS Nos. C21000, C22000, C23000, C24000, C26000, C26800, C27000, or C274000 of such purity, soundness, and structure to be suitable for processing into the desired product.

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 compositional requirements specified in Table 1 for the copper alloy specified in the ordering information.

6.1.1 When all elements specified for a given alloy in Table 1 are determined, their sum shall be as follows:

Alloy UNS Nos.	Sum, Percent, Minimum
C21000, C22000, C23000, C24000	99.8
C26000, C26800, C27000, C27400	99.7

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

6.3 Zinc, listed as the "remainder," is the difference between the sum of results for all elements determined and 100 %.

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).

TABLE 1 Chemical Requirements

Copper Alloy UNS No.	Composition, %			
	Copper	Lead, max	Iron, max	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

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

8. Mechanical Property Requirement

8.1 *Tensile Strength Requirements*:

8.1.1 Product shall conform to the requirements of Tables 2 and 3 when tested in accordance with Test Methods E 8 or E 8M.

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 B 249/B 249M.

10. Dimensions, Mass, and Permissible Variations

10.1 The dimensions and tolerances for rod, bar, and shapes described by this specification shall be as specified in Specification B 249/B 249M with particular reference to the following tables in that specification:

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 *Angles*—All regular polygonal sections shall have substantially exact angles and, unless otherwise specified, sharp corners.

11. Test Methods

11.1 *Chemical Analysis*:

11.1.1 Composition shall be determined, in case of disagreement, as follows:

Element	Test Method
Copper	E 478
Lead	E 478 (AA)
Iron	E 478
Zinc	E 478 (Titrametric)

11.1.2 Test methods to be followed for the determination of elements resulting from contractual or purchase order agreement shall be as agreed upon between the manufacturer or supplier and the purchaser.

12. Keywords

12.1 brass bar; brass rod; brass shape; copper-alloy rod; C21000; C22000; C23000; C24000; C26000; C26800; C27000; C27400

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