Designation: B98/B98M – 08

StandardSpecification for Copper-Silicon Alloy Rod, Bar and Shapes[1]

This standard is issued under the fixed designation B98/B98M; 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 requirements for copper-silicon rod, bar, and shapes for UNS Alloys C65100, C65500, and C66100.

NOTE 1—Material for hot forging is covered by Specification B124/B124M.

NOTE 2—For ASME Boiler and Pressure Vessel Code applications, see Specification SB-98 in Section II of that code.

1.2 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 The following documents of the issue in effect on date of material purchase form a part of this specification to the extent referenced herein:

2.2 *ASTM Standards:*[2]

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

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

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E8M Test Methods for Tension Testing of Metallic Materials [Metric] (Withdrawn 2008)[3]

E18 Test Methods for Rockwell Hardness 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E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)[3]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 Test Report (Mill),
3.1.13 Packaging and Package Marking, and
3.1.14 Supplemental Requirements.

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

4. Ordering Information

4.1 Include the following information in orders for product under this specification:

4.1.1 ASTM Designation and year of issue,
4.1.2 Copper Alloy UNS No. designation,
4.1.3 Temper designation,
4.1.4 Quantity; total weight or length, or number of pieces of each temper, form, or alloy,
4.1.5 Dimensions; diameter or distance between parallel surfaces,
4.1.6 Type of edge; edge contours,
4.1.7 How furnished; specific lengths with or without ends, and

[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

4.1.8 When material is purchased for agencies of the U.S. Government (see Specification B249/B249M).

4.2 The following options are available under 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).

4.2.3 Tensile test required for alloys in Table 4 or Table 5 (see 8.1.1.1).

5. Material and Manufacture

5.1 *Materials*—The starting material shall be cast billets or rods of Copper Alloy UNS Nos. C65100, C65500, or C66100, and shall be of such soundness and structure as to enable them to be processed into the product specified in the contract or purchase order.

5.2 *Manufacture*—The product shall be manufactured by such hot-working, cold-working, straightening, and annealing processing as to produce a uniform wrought structure and obtain the required finish properties.

6. Chemical Composition

6.1 The product shall conform to the chemical requirements specified in Table 1 for the Copper Alloy UNS No. designated in the ordering information.

6.1.1 For alloys in which copper is listed as "remainder," copper is the difference between the sum of the results of all elements determined and 100 %.

6.1.2 When all elements listed in Table 1 are determined for the designated alloy, the sum of results shall be 99.5 % min.

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.

7. Temper

7.1 The standard tempers, as defined in Classification B601, for products described in this specification are given in Tables 2-5.

7.1.1 Soft annealed O60,

7.1.2 ¼-hard H01,

7.1.3 ½-hard H02,

7.1.4 Hard H04,

7.1.5 Extra-hard H06,

7.1.6 As hot rolled M20, and

7.1.7 As hot extruded M30.

7.2 Product of bars and shapes in the temper H06 is normally not produced.

TABLE 1 Chemical Requirements

	Composition, % Maximum (Unless Shown as a Range or Minimum)		
	Copper Alloy UNS No.		
	C65100	C65500	C66100
Copper (Includes silver)	remainder	remainder	remainder
Lead	0.05	0.05	0.20–0.8
Iron	0.8	0.8	0.25
Zinc	1.5	1.5	1.5
Manganese	0.7	0.50–1.3	1.5
Silicon	0.8–2.0	2.8–3.8	2.8–3.5
Nickel (includes cobalt)	. . .	0.6	. . .

8. Mechanical Property Requirements

8.1 The product shall conform to the mechanical property requirements given in Tables 2-5 for the Copper Alloy UNS No. designation specified in the ordering information.

8.1.1 *Rockwell Hardness*—For the alloys and tempers listed, product 0.5 in. (12 mm) and over in diameter or distance between parallel surfaces shall conform with the requirements given in Table 4 and Table 5, when tested in accordance with Test Methods E18.

8.1.1.1 For the alloys and tempers listed in Table 4 and Table 5, Rockwell hardness shall be the basis of acceptance or rejection for mechanical properties except when the tensile test is specified in the contract or purchase order.

8.1.2 *Tensile Strength*— The product shall conform with the requirements of Table 2 and Table 3 when tested in accordance with Test Methods E8 or E8M.

8.1.2.1 The tensile requirements for all alloys and forms of M20 and M30 tempers shall be as agreed upon between the manufacturer and purchaser at time of order.

9. Dimensions, Mass and Permissible Variations

9.1 Refer to the appropriate paragraphs in Specification B249/B249M with particular reference to the following tables:

9.2 *Diameter or Distance Between Parallel Surfaces:*

9.2.1 *Rod: Round, Hexagonal, Octagonal*—Refer to Table 1for Alloy C65100 and to Table 2 for Alloys C65500 and C66100.

9.2.2 *Rod: Round M20 Temper*—Refer to Table 6.

9.2.3 *Rod: Round, Hexagonal, Octagonal, M30 Temper*—Refer to Table 5.

9.2.4 *Bar: Rectangular and Square*—Refer to Tables 8 and 10 for Alloy C65100, and Tables 9 and 11 for Alloys C65500 and C66100.

9.2.5 *Bar: M30 Temper*— Refer to Table 5 for thickness and width tolerances.

9.3 *Shapes*—The dimensional tolerance for shapes shall be as agreed upon between the manufacturer and the purchaser, and shall be specified in the order.

9.4 *Length:*

9.4.1 *Rod, Bar and Shapes*—Refer to Tables 13 and 15.

9.5 *Straightness:*

9.5.1 *Rod and Bar*— Refer to Table 16.

9.6 *Edge Contours:*

9.6.1 *Rod and Bar*— Refer to the section entitled, "Edge Contours" and to Figs. 1, 2, and 3.