



Designation: B248 – 22

Standard Specification for General Requirements for Wrought Copper and Copper- Alloy Plate, Sheet, Strip, and Rolled Bar¹

This standard is issued under the fixed designation B248; 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 U.S. Department of Defense.

1. Scope*

1.1 This specification establishes the general requirements common to several wrought product specifications. Unless otherwise specified in the purchase order or in an individual specification, these general requirements shall apply to copper and copper-alloy plate, sheet, strip, and rolled bar supplied under each of the following product specifications issued by ASTM: **B19**, **B36/B36M**, **B96/B96M**, **B101**, **B103/B103M**, **B121/B121M**, **B122/B122M**, **B130**, **B152/B152M**, **B169/B169M**, **B194**, **B370**, **B422/B422M**, **B465**, **B534**, **B591**, **B592**, **B694**, **B740**, **B747**, **B768**, **B888/B888M**, and **B936**.²

1.2 *Units*—This specification is the companion specification to SI Specification **B248M**; therefore, no SI equivalents are shown in this specification.

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 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*:³

¹ This specification is under the jurisdiction of the ASTM Committee **B05** on Copper and Copper Alloys and is the direct responsibility of Subcommittee **B05.01** on Plate, Sheet, and Strip.

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² The UNS system for copper and copper alloys (see Practice **E527**) is a simple expansion of the former standard designation system accomplished by the addition of a prefix “C” and a suffix “00.” The suffix can be used to accommodate composition variations of the base alloy.

³ 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.

- B19** Specification for Cartridge Brass Sheet, Strip, Plate, Bar, and Disks
- B36/B36M** Specification for Brass Plate, Sheet, Strip, And Rolled Bar
- B96/B96M** Specification for Copper-Silicon Alloy Plate, Sheet, Strip, and Rolled Bar for General Purposes and Pressure Vessels
- B100** Specification for Wrought Copper-Alloy Bearing and Expansion Plates and Sheets for Bridge and Other Structural Use
- B101** Specification for Lead-Coated Copper Sheet and Strip for Building Construction
- B103/B103M** Specification for Phosphor Bronze Plate, Sheet, Strip, and Rolled Bar
- B121/B121M** Specification for Leaded Brass Plate, Sheet, Strip, and Rolled Bar
- B122/B122M** Specification for Copper-Nickel-Tin Alloy, Copper-Nickel-Zinc Alloy (Nickel Silver), and Copper-Nickel Alloy Plate, Sheet, Strip, and Rolled Bar
- B130** Specification for Commercial Bronze Strip for Bullet Jackets
- B152/B152M** Specification for Copper Sheet, Strip, Plate, and Rolled Bar
- B169/B169M** Specification for Aluminum Bronze Sheet, Strip, and Rolled Bar
- B193** Test Method for Resistivity of Electrical Conductor Materials
- B194** Specification for Copper-Beryllium Alloy Plate, Sheet, Strip, and Rolled Bar
- B248M** Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar (Metric)
- B370** Specification for Copper Sheet and Strip for Building Construction
- B422/B422M** Specification for Copper-Aluminum-Silicon-Cobalt Alloy, Copper-Nickel-Silicon-Magnesium Alloy, Copper-Nickel-Silicon Alloy, Copper-Nickel-Aluminum-Magnesium Alloy, and Copper-Nickel-Tin Alloy Sheet and Strip

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

B465 Specification for Copper-Iron Alloy Plate, Sheet, Strip, and Rolled Bar

B534 Specification for Copper-Cobalt-Beryllium Alloy and Copper-Nickel-Beryllium Alloy Plate, Sheet, Strip, and Rolled Bar

B591 Specification for Copper-Zinc-Tin and Copper-Zinc-Tin-Iron-Nickel Alloys Plate, Sheet, Strip, and Rolled Bar

B592 Specification for Copper-Zinc-Aluminum-Cobalt Alloy, Copper-Zinc-Tin-Iron Alloy Plate, Sheet, Strip, and Rolled Bar

B694 Specification for Copper, Copper-Alloy, Copper-Clad Bronze (CCB), Copper-Clad Stainless Steel (CCS), and Copper-Clad Alloy Steel (CAS) Sheet and Strip for Electrical Cable Shielding

B740 Specification for Copper-Nickel-Tin Spinodal Alloy Strip

B747 Specification for Copper-Zirconium Alloy Sheet and Strip

B768 Specification for Copper-Cobalt-Beryllium Alloy and Copper-Nickel-Beryllium Alloy Strip and Sheet

B820 Test Method for Bend Test for Determining the Formability of Copper and Copper Alloy Strip

B846 Terminology for Copper and Copper Alloys

B888/B888M Specification for Copper Alloy Strip for Use in Manufacture of Electrical Connectors or Spring Contacts

B936 Specification for Copper-Chromium-Iron-Titanium Alloy Plate, Sheet, Strip and Rolled Bar

E8/E8M Test Methods for Tension Testing of Metallic Materials

E18 Test Methods for Rockwell Hardness of Metallic Materials

E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

E50 Practices for Apparatus, Reagents, and Safety Considerations for Chemical Analysis of Metals, Ores, and Related Materials

E53 Test Method for Determination of Copper in Unalloyed Copper by Gravimetry (Withdrawn 2022)⁴

E54 Test Methods for Chemical Analysis of Special Brasses and Bronzes (Withdrawn 2002)⁴

E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)⁴

E75 Test Methods for Chemical Analysis of Copper-Nickel and Copper-Nickel-Zinc Alloys (Withdrawn 2010)⁴

E106 Test Methods for Chemical Analysis of Copper-Beryllium Alloys (Withdrawn 2011)⁴

E112 Test Methods for Determining Average Grain Size

E118 Test Methods for Chemical Analysis of Copper-Chromium Alloys (Withdrawn 2010)⁴

E121 Test Methods for Chemical Analysis of Copper-Tellurium Alloys (Withdrawn 2010)⁴

E255 Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition

E478 Test Methods for Chemical Analysis of Copper Alloys

E527 Practice for Numbering Metals and Alloys in the Unified Numbering System (UNS)

E1004 Test Method for Determining Electrical Conductivity Using the Electromagnetic (Eddy Current) Method

2.3 *ASME Code*:⁵

ASME Boiler and Pressure Vessel Code

3. Terminology

3.1 For definitions of terms related to copper and copper alloys, see Terminology **B846**.

3.2 *Definitions of Terms Specific to This Standard:*

3.2.1 *lengths, mill, n*—straight lengths, including ends, that can be conveniently manufactured in the mills. Full-length pieces are usually 8 ft, 10 ft, or 12 ft and subject to established length tolerances.

3.2.2 *lengths, stock, n*—straight lengths that are mill cut and stored in advance of orders. They are usually 8 ft, 10 ft, or 12 ft and subject to established length tolerances.

3.2.3 *rolled bar, n*—a rolled flat product over 0.188 in. thick and up to and including 12 in. wide, with sheared, sawed, or machined edges, in straight lengths or coils (rolls).

4. Materials and Manufacture

4.1 *Materials:*

4.1.1 The material of manufacture shall be a cast bar, cake, or slab of such purity and soundness as to be suitable for processing into the products to the product specification listed in Section 1.

4.1.2 When specified in the contract or purchase order that heat identification or traceability is required, the purchaser shall specify the details desired.

4.2 *Manufacture:*

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

4.2.2 The product shall be hot- or cold-worked to the finished size and subsequently annealed, when required, to meet the temper properties specified.

4.3 *Edges*—The edges shall be slit, sheared, sawed, or rolled edges, as specified. Slit edges shall be furnished unless otherwise specified in the contract or purchase order. See **5.6** for edge descriptions and corresponding tables for tolerances.

5. Dimensions, Weights, and Permissible Variations

5.1 *General*—For the purpose of determining conformance with the dimensional requirements prescribed in this specification, any measured value outside the specified limiting values for any dimension may be cause for rejection.

NOTE 1—Blank spaces in the tolerance tables indicate either that the material is not available or that no tolerances have been established.

5.2 *Thickness*—The standard method of specifying thickness shall be in decimal fractions of an inch. For material

⁴ The last approved version of this historical standard is referenced on www.astm.org.

⁵ Available from American Society of Mechanical Engineers (ASME), ASME International Headquarters, Two Park Ave., New York, NY 10016-5990, <http://www.asme.org>.

0.021 in. and under in thickness, it is recommended that the nominal thicknesses be stated not closer than the nearest half-thousandth. (For example, specify 0.006 in. or 0.0065 in., but not 0.0063 in.) For material over 0.021 in. in thickness, it is recommended that the nominal thicknesses be stated not closer than the nearest thousandth. (For example, specify 0.128 in. or 0.129 in., but not 0.1285 in.) A list of preferred thicknesses is shown in **Appendix X1**. The thickness tolerances shall be those shown in **Tables 1-3** for the product specification indicated:

5.2.1 **Table 1**—Thickness tolerances applicable to Specifications **B36/B36M**, **B103/B103M**, **B121/B121M**, **B152/B152M**, **B465**, **B591**, **B592**, **B747**, and **B888/B888M**.

5.2.2 **Table 2**—Thickness tolerances applicable to Specifications **B96/B96M**, **B122/B122M**, **B169/B169M**, **B194**, **B422/B422M**, **B534**, **B740**, and **B768**.

5.2.3 **Table 3**—Special thickness tolerances applicable to Copper Alloy UNS No. C72500 when ordered to Specification **B122/B122M**, and to Specifications **B194**, **B534**, **B740**, and **B768** as noted in the table.

5.3 **Width**—The width tolerances shall be those shown in **Tables 4-6**, depending on the type of edge required (see **5.3.1**, **5.3.2**, and **5.3.3**):

5.3.1 **Table 4**—Width tolerances for slit metal and slit metal with rolled edges.

5.3.2 **Table 5**—Width tolerances for square-sheared metal.

5.3.3 **Table 6**—Width tolerances for sawed metal.

5.4 **Length**—The material shall be furnished in coils or straight lengths of plate, sheet, strip, or rolled bar as specified. The length tolerances for straight lengths shall be those shown in **Tables 7-10**, depending on the method of cutting required

(see **5.4.1 – 5.4.4**). When ends are permitted, the length and quantity of the ends shall be in accordance with the schedule in **Table 8**.

5.4.1 **Table 7**—Length tolerances, for straight lengths.

5.4.2 **Table 8**—Schedule of minimum length and maximum weight of ends for mill lengths specific lengths with ends, and stock lengths with ends.

5.4.3 **Table 9**—Length tolerances for square-sheared metal in all widths 120 in. and under.

5.4.4 **Table 10**—Length tolerances for sawed metal.

5.5 **Straightness**—The straightness tolerances, which are the maximum edgewise curvature (depth of arc) in any 72-in. portion of the total length, shall be those shown in **Tables 11-13**, depending on the type of edge required.

5.5.1 **Table 11**—Straightness tolerances for metal as slit, or as slit and straightened, or as slit and edge-rolled, or metal with drawn edges.

5.5.2 **Table 12**—Straightness tolerances for square-sheared metal.

5.5.3 **Table 13**—Straightness tolerances for sawed metal.

5.6 **Edges**—When rolled edges are required, they may be produced by either rolling or drawing to one of the following specified edge contours:

5.6.1 **Square Edges (Square Corners)**—Edges shall have commercially squared corners and with a maximum corner radius as prescribed in **Table 14**.

5.6.2 **Rounded Corners**—Edges shall have rounded corners as shown in **Fig. 1** with a radius as prescribed in **Table 15**.

5.6.3 **Rounded Edges**—Edges shall be rounded as shown in **Fig. 2** with a radius as prescribed in **Table 16**.

TABLE 1 Thickness Tolerances

(Applicable to Specifications **B36/B36M**, **B103/B103M**, **B121/B121M**, **B152/B152M**, **B465**, **B591**, **B592**, **B747**, **B888/B888M**, and **B936**)

Thickness, in.	Thickness Tolerances, plus and minus, ^A in.								
	Strip					Sheet			
	8 in. and Under in Width	Over 8 to 12 in., incl, in Width	Over 12 to 14 in., incl, in Width	Over 14 to 20 in., incl, in Width	Over 20 to 24 in., incl, in Width	Over 24 to 28 in., incl, in Width	Over 28 to 36 in., incl, in Width	Over 36 to 48 in., incl, in Width	Over 48 to 60 in., incl, in Width
0.004 and under	0.0003	0.0006	0.0006	...	...	...	...	...	...
Over 0.004 to 0.006, incl	0.0004	0.0008	0.0008	0.0013	...	...	...	...	...
Over 0.006 to 0.009, incl	0.0006	0.0010	0.0010	0.0015	...	...	...	...	...
Over 0.009 to 0.013, incl	0.0008	0.0013	0.0013	0.0018	0.0025	0.0025	0.003	0.0035	0.004
Over 0.013 to 0.017, incl	0.0010	0.0015	0.0015	0.002	0.0025	0.0025	0.003	0.0035	0.0045
Over 0.017 to 0.021, incl	0.0013	0.0018	0.0018	0.002	0.003	0.003	0.0035	0.004	0.005
Over 0.021 to 0.026, incl	0.0015	0.002	0.002	0.0025	0.003	0.003	0.0035	0.004	0.005
Over 0.026 to 0.037, incl	0.002	0.002	0.002	0.0025	0.0035	0.0035	0.004	0.005	0.006
Over 0.037 to 0.050, incl	0.002	0.0025	0.0025	0.003	0.004	0.004	0.005	0.006	0.007
Over 0.050 to 0.073, incl	0.0025	0.003	0.003	0.0035	0.005	0.005	0.006	0.007	0.008
Over 0.073 to 0.130, incl	0.003	0.0035	0.0035	0.004	0.006	0.006	0.007	0.008	0.010
Over 0.130 to 0.188, incl	0.0035	0.004	0.004	0.0045	0.007	0.007	0.008	0.010	0.012
		Rolled Bar				Plate			
Over 0.188 to 0.205, incl	0.0035	0.004	0.004	0.0045	0.007	0.007	0.008	0.010	0.012
Over 0.205 to 0.300, incl	0.004	0.0045	0.0045	0.005	0.009	0.009	0.010	0.012	0.014
Over 0.300 to 0.500, incl	0.0045	0.005	0.005	0.006	0.012	0.012	0.013	0.015	0.018
Over 0.500 to 0.750, incl	0.0055	0.007	0.007	0.009	0.015	0.015	0.017	0.019	0.023
Over 0.750 to 1.00, incl	0.007	0.009	0.009	0.011	0.018	0.018	0.021	0.024	0.029
Over 1.00 to 1.50, incl	0.022	0.022	0.022	0.022	0.022	0.022	0.025	0.029	0.036
Over 1.50 to 2.00, incl	0.026	0.026	0.026	0.026	0.026	0.026	0.030	0.036	0.044

^A When tolerances are specified as all plus or all minus, double the values given.