



Standard Specification for Copper Sheet, Strip, Plate, and Rolled Bar¹

This standard is issued under the fixed designation B 152/B 152M; 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 reappraisal. A superscript epsilon (ε) indicates an editorial change since the last revision or reappraisal.

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

1. Scope*

1.1 This specification² establishes the requirements for copper sheet, strip, plate, and rolled bar produced from the following coppers.

Copper UNS No.	Previous Designation ⁴	Type of Copper
C10100	OFE	Oxygen-free electronic
C10200 ^B	OF	Oxygen-free without residual deoxidants
C10300	...	Oxygen-free extra low phosphorus
C10400, C10500, C10700	OFS	Oxygen-free, silver bearing
C10800	...	Oxygen-free low phosphorus
C10910	...	Low oxygen
C11000 ^B	ETP	Electrolytic tough pitch
C11300, C11400, C11600 ^B	STP	Silver bearing tough pitch
C12000	DLP	Phosphorized, low residual phosphorus
C12200 ^B	DHP	Phosphorized, high residual phosphorus
C12300	DPS	Phosphorized, silver bearing
C14200	DPA	Phosphorus deoxidized, arsenical
C14420	...	Tin bearing tellurium copper
C14530	...	Tin tellurium bearing copper

⁴Except Copper UNS No. C10300 (oxygen-free extra low phosphorus), No. C10800 (oxygen-free low phosphorus), and C10910 (low oxygen), these types of copper are classified in Classification B 224.

^BSAE Specification CA101 conforms to Copper UNS No. C10100; SAE Specification CA102 conforms to the requirements for Copper UNS No. C10200; SAE Specification CA110 conforms to the requirements for Copper UNS No. C11000; SAE Specifications CA113, CA114, and CA116 conform to the requirements for Copper UNS Nos. C11300, C11400, and C11600; SAE Specification CA120 conforms to Copper UNS No. C12000; and SAE Specification CA122 conforms to the requirements for Copper UNS No. C12200.

NOTE 1—Each of the coppers listed has unique properties that can make it suitable for specific applications. The purchaser should consult with the supplier to determine which copper would be best suited for the intended application.

NOTE 2—Copper UNS Nos. C10400, C10500, C10700, C11300, C11400, and C11600 identify coppers with specific silver content (see Table 1).

¹ This specification is under the jurisdiction of 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 For ASME Boiler and Pressure Vessel Code applications see related Specification SB-152 in Section 10 of that Code.

NOTE 3—This specification is not intended to cover material rolled to ounce-weight thicknesses. Such material is covered by Specification B 370.

Plates for locomotive fireboxes are covered by Specification B 11.

Flat copper products with finished (rolled or drawn) edges (flat wire and strip) are also covered by Specification B 272.

1.1.1 When no specific copper is identified in the contract or purchase order, the supplier may furnish product from any of the listed coppers.

1.2 The values stated in inch-pound units are to be regarded as the standard. The SI values given in parentheses are provided for information only.

1.3 The following safety hazards caveat only pertains to the test method portion, Section 14 of this specification: *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:

- B 11 Specification for Copper Plates for Locomotive Fireboxes³
- B 170 Specification for Oxygen-Free Electrolytic Copper—Refinery Shapes⁴
- B 193 Test Method for Resistivity of Electrical Conductor Materials⁵
- B 216 Specification for Tough-Pitch Fire-Refined Copper—Refinery Shapes⁴
- B 224 Classification of Coppers⁴
- B 248 Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar⁴
- B 248M Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar [Metric]⁴
- B 272 Specification for Copper Flat Products with Finished (Rolled or Drawn) Edges (Flat Wire and Strip)⁴

³ Discontinued—see 1980 Annual Book of ASTM Standards, Part 6.

⁴ Annual Book of ASTM Standards, Vol 02.01.

⁵ Annual Book of ASTM Standards, Vol 02.03.

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

TABLE 1 Chemical Requirements

Element	Composition, %																	
	Copper UNS No.																	
	C10100 ^A	C10200	C10300	C10400 ^B	C10500 ^B	C10700 ^B	C10800	C10910	C11000	C11300 ^C	C11400 ^C	C11600 ^C	C12000	C12200	C12300 ^D	C14200	C14420 ^E	C14530 ^F
Copper (incl silver), min	99.99 ^G	99.95	99.95 ^H	99.95	99.95	99.95	99.95 ^H	99.95	99.90	99.90	99.90	99.90	99.90	99.9	99.90	99.4	99.90	99.90
Phosphorus	^A	...	0.001–0.005	...	...	...	0.005–0.012	...	...	...	...	0.004–0.012	0.015–0.040	0.015–0.040	0.015–0.040	...	0.001–0.010	...
Arsenic	^A	...	...	...	...	...	...	...	...	...	...	...	...	...	0.15–0.50	...	...	...
Oxygen, max	0.0005	0.0010	...	0.0010	0.0010	0.0010	...	0.0050	...	...	...	...	...	...	...	...	...	...
Silver	^A	...	...	8 ^I	10 ^I	25 ^I	...	...	...	8 ^I	10 ^I	25 ^I	...	...	4 ^I	...	...	...
Selenium + tellurium, max	^A	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.05	0.023
Tellurium	^A	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.005–0.05	0.003–0.023
Tin	^A	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	0.04–0.15	0.003–0.023

^AImpurity maximums in ppm of C10100 shall be: antimony 4, arsenic 5, bismuth 1.0, cadmium 1, iron 10, lead 5, manganese 0.5, nickel 10, oxygen 5, phosphorus 3, selenium 3, silver 25, sulfur 15, tellurium 2, tin 2, and zinc 1.

^BC10400, C10500, and C10700 are oxygen-free coppers with the addition of a specified amount of silver. The compositions of these alloys are equivalent to C10200 plus the intentional addition of silver.

^CC11300, C11400, C11500, and C11600 are electrolytic tough-pitch copper with silver additions. The compositions of these alloys are equivalent to C11000 plus the intentional addition of silver.

^DCopper UNS No. C12300 is produced by the addition of silver to phosphorus-deoxidized copper.

^EIncludes Te + Sn.

^FIncludes Cu + Ag + Sn + Te + Se.

^GCopper shall be determined by difference between impurity total and 100 %.

^HCopper + silver + phosphorus, min.

^IValues are minimum silver Troy oz/Avoirdupois ton (1 oz/ton is equivalent to 0.0034 %).

ASTM B152/B152M-00
<https://standards.iteh.ai/catalog/standards/sist/db964109-84ac-7c47043efefl/astm-b152-b152m-00>

B 370 Specification for Copper Sheet and Strip for Building Construction⁴

B 577 Test Methods for Detection of Cuprous Oxide Hydrogen Embrittlement Susceptibility in Copper⁴

B 601 Practice for Temper Designations for Copper and Copper Alloys—Wrought and Cast⁶

B 846 Terminology for Copper and Copper Alloys⁴

E 3 Practice for Preparation of Metallographic Specimens⁶

E 8 Test Methods for Tension Testing of Metallic Materials⁶

E 8M Test Methods for Tension Testing of Metallic Materials [Metric]⁶

E 53 Test Method for Determination of Copper in Unalloyed Copper by Gravimetry⁷

E 62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods)⁷

E 112 Test Methods for Determining Average Grain Size⁶

E 478 Test Methods for Chemical Analysis of Copper Alloys⁸

E 527 Practice for Numbering Metals and Alloys (UNS)⁹

2.2 *ASME Standard:*

ASME Boiler Pressure Vessel Code¹⁰

3. General Requirements

3.1 The following sections of Specification **B 248/B 248M** constitute a part of this specification.

3.1.1 Terminology.

3.1.2 Materials and Manufacture.

3.1.3 Sampling.

3.1.4 Number of Tests and Retests.

3.1.5 Specimen Preparation.

3.1.6 Test Methods.

3.1.7 Packaging and Package Marking.

3.1.8 Workmanship, Finish, and Appearance.

3.1.9 Significance of Numerical Limits.

3.1.10 Rejection and Reheating.

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 which supplement those appearing in Specification **B 248/B 248M**.

4. Terminology

4.1 *Definitions*—Terms used in this specification are in accordance with Terminology B 846 and Specifications **B 248** and **B 248M**.

4.2 *Definitions of Terms Specific to This Standard:*

4.2.1 *capable of*—the test need not be performed by the producer of the material. However, should subsequent testing by the purchaser establish that the material does not meet these requirements the material shall be subject to rejection.

5. Ordering Information

5.1 Orders for products under this specification shall include the following:

5.1.1 ASTM specification designation and year of issue,

5.1.2 Quantity,

5.1.3 Copper UNS No. (Section 1). When Alloys C10400, C10500, C10700, C11300, C11400, C11600, or C12300, the amount of silver in ounces per ton,

5.1.4 Temper (Section 7),

5.1.5 Dimensions: thickness, width, and weight (Section 13),

5.1.6 How furnished (straight lengths or coils),

5.1.7 Length (Section 13),

5.1.8 Weight of coils: coil weights or coil size limitations, if required,

5.1.9 When the product is purchased for agencies of the U.S. Government,

5.2 The following requirements shall be specified if applicable:

5.2.1 Certification, if required (Section 16),

5.2.2 Mill test report, if required (Section 17),

5.2.3 Resistivity test for Copper UNS Nos. C10100, C10200, C10300, C11000, or C12000 (Section 12),

5.2.4 Embrittlement test for C10100, C10200, C10300, C11000, C12000 (Section 11),

5.2.5 Type of edge, if other than slit,

5.2.6 Supplemental requirements for agencies of the U.S. Government as given in Specification **B 248/B 248M**.

6. Chemical Composition

6.1 The materials shall conform to the chemical requirements prescribed in **Table 1**.

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

7. Temper

7.1 *Rolled Material (H)*—The standard tempers of cold-rolled sheet, strip, plate, and rolled bar copper of all types are designated as follows (see Practice **B 601**):

⁶ *Annual Book of ASTM Standards*, Vol 03.01.

⁷ *Annual Book of ASTM Standards*, Vol 03.05.

⁸ *Annual Book of ASTM Standards*, Vol 03.06.

⁹ *Annual Book of ASTM Standards*, Vol 01.01.

¹⁰ American Society of Mechanical Engineering, Headquarters, Three Park Ave., New York, NY 10016-5990.