



Designation: **B936—08 B936 – 13**

Standard Specification for Copper-Chromium-Iron-Titanium Alloy Plate, Sheet, Strip and Rolled Bar¹

This standard is issued under the fixed designation B936; 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 the requirements for Copper Alloy UNS No. C18080 for plate, sheet, strip, and rolled bar in alloy bar.

NOTE 1—Since Copper Alloy UNS No. C18080 is frequently used in a variety of applications where yield strength and stress-corrosion resistance may be critical, it is recommended that drawings or samples of the part to be fabricated and details of application be submitted for use in establishing temper and treatment of material.

NOTE 2—Copper Alloy UNS No. C18080 is covered by a patent. Interested parties are invited to submit information regarding the identification of an alternative(s) to this patented item to ASTM International headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

1.2 *Units*—The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

2. Referenced Documents

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

2.1 *ASTM Standards:*²

B248 Specification for General Requirements for Wrought Copper and Copper-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)

B601B846 Classification for Temper Designations for Terminology for Copper and Copper Alloys—Wrought and Cast Alloys

B846B950 Terminology for Guide for Editorial Procedures and Form of Product Specifications for Copper and Copper Alloys

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E62 Test Methods for Chemical Analysis of Copper and Copper Alloys (Photometric Methods) (Withdrawn 2010)³~~6-13~~

E76 Test Methods for Chemical Analysis of Nickel-Copper Alloys (Withdrawn 2003)³

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

E478 Test Methods for Chemical Analysis of Copper Alloys

E1473 Test Methods for Chemical Analysis of Nickel, Cobalt, and High-Temperature Alloys

3. General Requirements

3.1 The following sections of Specification Specifications **B248** and **B248M** constitute a part of this specification:

3.1.1 Terminology—Definitions,

3.1.2 Materials and Manufacturing, ~~Manufacture,~~

3.1.3 Workmanship, Finish, and Appearance,

3.1.4 Sampling, ~~except for chemical analysis,~~

3.1.5 Number of Tests and Retests,

3.1.6 Specimen Preparation,

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 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

- 3.1.7 Test Methods, except for chemical analysis,
- 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 (Mill) Report,~~
- 3.1.13 Packaging and Package Marking, and
- 3.1.14 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 which supplement those appearing in ~~Specification~~ Specifications B248 and B248M.

4. Terminology

- 4.1 *Definitions*—For definitions of terms used in this specification, refer to Terminology **B846.**

5. Ordering Information

5.1 Contracts or purchase orders for product under this specification should include the following information:

- 5.1.1 ASTM designation and year of issue ~~(for example, issue, B936 – XX);~~
- 5.1.2 Copper Alloy UNS No. designation ~~(for example, C18080);~~ designation,
- 5.1.3 Temper ~~(see Section (Section 8),~~
- 5.1.4 Dimensions, ~~that is, thickness, width, length, and so forth edges (see Section 13),~~
- 5.1.5 ~~Form, that is, plate, sheet, strip, or rolled bar,~~
- 5.1.5 How furnished, ~~that is, coils, specific lengths or stock lengths, with or without ends, furnished: straight lengths or coils,~~
- 5.1.6 Quantity, ~~that is, total weight each form, temper, and total weight or total length or number of pieces of each size, and~~
- 5.1.7 Whether material is purchased for agencies of the U.S. government (see Section 12).

5.2 ~~The following options are available under this specification and should be specified in the contract or purchase order when required:~~

- 5.2.1 ~~Type of edge, that is, slit, sheared, sawed, square corners, round corners, rounded edges, or full rounded edges, and~~
- 5.2.2 ~~Width and straightness tolerances (see Section 13).~~

6. Materials and Manufacture

6.1 *Material:*

6.1.1 The material of manufacture shall be a ~~east form (cast bar, cake, slab, and so forth, etc.)~~ of Copper Alloy UNS No. C18080 of such purity and soundness as to be suitable for ~~process in to~~ processing into the products prescribed herein.

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

NOTE 3—Due to the discontinuous nature of the processing of castings into wrought products, it is not always practical to identify a specific casting analysis with a specific quantity of finished material.

6.2 *Manufacture:*

6.2.1 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.

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

6.2.3 *Edges*—Slit edges shall be furnished unless otherwise specified in the contract or purchase order.

7. Chemical Composition

7.1 The material shall conform to the chemical composition requirements ~~specified in~~ **Table 1.**

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

7.3 For alloys in which copper is listed as “Remainder,” copper is the difference between the sum of results of all elements determined and 100 %. When all elements in ~~Table 1~~ **Table 1** are determined, the sum of the results shall ~~equal at least 99.8 %.~~ be 99.8 % min.

8. Temper

8.1 ~~Products fabricated from these alloys are available in the tempers listed~~ The standard tempers for products described in this specification are given in Table 2 as defined in Classification B601.

TABLE 1 Chemical Requirements

Element	Composition, % Copper Alloy UNS No. C18080
Copper	Remainder
Chromium	0.20-0.7
Silicon	0.01-0.10
Titanium	0.01-0.15
Silver	0.01-0.30
Iron	0.02-0.20

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Iron	0.02-0.20

**TABLE 2 Yield Strength Requirements for Copper Alloy
UNS No. C18080**

Temper Designation	Approximate Tensile Strength		Yield Strength at 0.2 % Offset	Approximate Rockwell Hardness	
	Ksi ^A (MPa ^B)		Ksi ^A (MPa ^B) min.	Rockwell B	Superficial Rockwell B
	min.	max			30T
TM04	70 (480)	81 (560)	65 (450)	76-86	67-74
TM08	78 (540)	91 (630)	75 (520)	80-89	70-76
TR08	75 (520)	91 (630)	72 (500)	78-89	69-76

^A ksi = 1000 psi.

^B See Appendix X1.

8.1.1 *Mill Hardened (TM)*—The standard tempers for mill-hardened material are as designated in Table 2 with the prefix “TM”. Former designations and the standard designations as defined in Classification B601 are shown.

8.1.2 *Precipitation Heat Treated, Cold Worked, and Thermal Stress Relieved (TR)*—The standard tempers for precipitation heat treated, cold worked, and thermal stress relieved material are designated in Table 2 with the prefix “TR.” Former designations and the standard designations as defined in Classification B601 are shown.

NOTE 4—The properties for product in special or nonstandard tempers are subject to negotiation between the manufacturer and the purchaser.

9. Physical PropertiesProperty Requirements

9.1 The electrical resistivity and conductivity of Copper Alloy UNS No. C18080 is listed in Table 3 for information only.*Electrical Resistivity Requirement:*

9.1.1 The electrical resistivity and conductivity of Copper Alloy UNS No. C18080 is listed in Table 3 for information only.

9.2 The density of Copper Alloy UNS No. C18080 is given in Specifications B248 and B248M.

10. Mechanical PropertiesProperty Requirements

10.1 *Yield Strength Requirements*—*Requirements:*

TABLE 3 Electrical Resistivity

Temper	Copper Alloy UNS No. C18080	
	Electrical Resistivity at 20°C (68° F);	Equivalent Conductivity at 20°C (68° F);
	Electrical Resistivity at 68°F (20°C),	Equivalent Conductivity at 68°F (20°C),
	-g/m-	% IACS
	Ω-g/m	% IACS
TM04, TM08, TR08	0.19165 nominal	80 nominal