



Designation: B936 – 13

# Standard Specification for Copper-Chromium-Iron-Titanium Alloy Plate, Sheet, Strip and Rolled Bar<sup>1</sup>

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 ( $\epsilon$ ) 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.

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,<sup>1</sup> 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 *ASTM Standards*:<sup>2</sup>

**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)

**B846** Terminology for Copper and Copper Alloys

**B950** 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Copper Alloys (Photometric Methods) (Withdrawn 2010)<sup>3</sup>

**E76** Test Methods for Chemical Analysis of Nickel-Copper Alloys (Withdrawn 2003)<sup>3</sup>

**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 Specifications **B248** and **B248M** constitute a part of this specification:

- 3.1.1 Terminology—Definitions,
- 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, 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 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 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,
- 5.1.2 Copper Alloy UNS No. designation,
- 5.1.3 Temper (Section 8),

<sup>3</sup>The last approved version of this historical standard is referenced on [www.astm.org](http://www.astm.org).

<sup>1</sup> 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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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

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

5.1.4 Dimensions, thickness, width, and edges (see Section 13),

5.1.5 How furnished: straight lengths or coils,

5.1.6 Quantity, 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).

## 6. Materials and Manufacture

### 6.1 Material:

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

6.1.2 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 or cold worked to the finished size and subsequently 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 in Table 1.

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

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 are determined, the sum of the results shall be 99.8 % min.

## 8. Temper

8.1 The standard tempers for products described in this specification are given in Table 2.

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 <sup>A</sup> (MPa <sup>B</sup> )			Rockwell B	Superficial 30T
	min.	max.	min.		
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

<sup>A</sup> ksi = 1000 psi.

<sup>B</sup> 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”.

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.”

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

## 9. Physical Property Requirements

### 9.1 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.

## 10. Mechanical Property Requirements

### 10.1 Yield Strength Requirements:

10.1.1 Product furnished under this specification will conform to the 0.2 % offset yield strength requirements prescribed in Table 2 when tested in accordance with Test Methods E8/E8M.

10.1.2 Acceptance or rejection based upon mechanical properties shall depend only on 0.2 % offset yield strength.

### 10.2 Tensile Strength Requirements:

10.2.1 The approximate Tensile Strength values given in Table 2 are for general information and assistance in testing, and shall not be used as a basis for product rejection.

### 10.3 Rockwell Hardness Requirements:

10.3.1 The approximate Rockwell hardness values given in Table 2 are for general information and assistance in testing, and shall not be used as a basis for product rejection.

NOTE 5—The Rockwell hardness test offers a quick and convenient method of checking for general conformity to the specification requirements for temper, tensile strength, and grain size.

## 11. Other Requirements

11.1 Purchases for U.S. Government Agencies—When identified in the contract or purchase order, product purchased for

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

TABLE 3 Electrical Resistivity

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