



Designation: B 936 – 04<sup>ε1</sup>

# 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 B 936; 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.

<sup>ε1</sup> NOTE—Editorial changes were made throughout in November 2005.

## 1. Scope

1.1 This specification establishes the requirements for Copper Alloy UNS No. C18080 for plate, sheet, strip, and rolled bar in alloy.

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*—Values stated in inch-pound units are to be regarded as the standard. Values given in parentheses are mathematical conversions to SI units, which are provided for information only.

## 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:

2.2 *ASTM Standards*:<sup>2</sup>

**B 248** Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar

**B 248M** Specification for General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar [Metric]

**B 601** Classification for Temper Designations for Copper and Copper Alloys—Wrought and Cast

<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, 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.

**B 846** Terminology for Copper and Copper Alloys

**E 8** Test Methods for Tension Testing of Metallic Materials

**E 62** Test Method for Chemical Analysis of Copper and Copper Alloys (Photometric Method)

**E 76** Test Methods for Chemical Analysis of Nickel-Copper Alloys

**E 255** Practice for Sampling Copper and Copper Alloys for the Determination of Chemical Composition

**E 478** Test Methods for Chemical Analysis of Copper Alloys

**E 1473** Test Method for Chemical Analysis of Nickel, Cobalt and High Temperature Alloys

## 3. General Requirements

3.1 The following sections of Specification **B 248** constitute a part of this specification:

3.1.1 Terminology—Definitions,

3.1.2 Materials and Manufacturing,

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,

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 Test Reports (Mill),

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 **B 248**.

## 4. Terminology

4.1 *Definitions*—For definitions of terms used in this specification, refer to Terminology **B 846 846**.

4.2 *Definitions of Terms Specific to This Standard*:

4.2.1 *capable of*—having the properties necessary for conformance to specification requirements when subjected to a referenced test method.

**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, B 936 – XX),

5.1.2 Copper Alloy UNS No. designation (for example, C18080),

5.1.3 Temper (see Section 8),

5.1.4 Dimensions, that is, thickness, width, length, and so forth (see Section 13),

5.1.5 Form, that is, plate, sheet, strip, or rolled bar,

5.1.6 How furnished, that is, coils, specific lengths or stock lengths, with or without ends,

5.1.7 Quantity, that is, total weight each form, temper, and size, and

5.1.8 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 cast bar, cake, slab, and so forth, of Copper Alloy UNS No. C18080 of such purity and soundness as to be suitable for process in to the products prescribed herein.

6.1.2 In the event 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 *Manufacturer:*

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 specified in Table 1.

7.2 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.

7.3 For alloys in which copper is listed as “Remainder,” copper is the difference between the sum of results of all

**TABLE 1 Chemical Requirements**

Element	Composition, % Copper Alloy UNS No. C18080
Copper + Silver	Remainder
Chromium	0.20-0.70
Silicon	0.01-0.10
Titanium	0.01-0.15
Silver	0.01 0.30
Iron	0.02-0.20

elements determined and 100 %. When all elements in Table 1 are determined, the sum of the results shall equal at least 99.8 %.

**8. Temper**

8.1 Products fabricated from these alloys are available in the tempers listed in Table 2 as defined in Classification B 601.

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 B 601 are shown.

**9. Physical Properties**

9.1 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 B 248 and B 248M.

**10. Mechanical Properties**

10.1 *Tensile Strength Requirements:*

10.1.1 Product furnished under this specification will conform to the tensile requirements prescribed in Table 2 when tested in accordance with Test Methods E 8.

10.1.2 Acceptance or rejection based upon mechanical properties shall depend only on tensile strength.

**11. Other Requirements**

11.1 *Purchases for U.S. Government Agencies*—When identified in the contract or purchase order, product purchased for agencies of the U.S. government shall conform to the special government requirements stipulated in the supplemental requirements given in Specification B 248.

**TABLE 2 Tensile Strength Requirements for Copper Alloy UNS No. C18080<sup>A,B,C</sup>**

Temper Designation	Tensile Strength		Approximate Rockwell Hardness	
	ksi (MPa)		Rockwell B	Superficial 30T
	min.	max		
TM04	70 (485)	80 (550)	76-86	67-74
TM08	78 (540)	89 (610)	80-89	70-76

<sup>A</sup> Standard designation defined in Classification B 601.

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

<sup>C</sup> See Appendix X1.