



Designation: B570 – 16

Standard Specification for Copper-Beryllium Alloy (UNS Nos. C17000 and C17200) Forgings and Extrusions¹

This standard is issued under the fixed designation B570; 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-beryllium alloy forgings and extrusions produced from the following alloys.

Copper Alloy UNS No.	Nominal % Composition Beryllium
C17000	1.7
C17200	1.9

NOTE 1—Requirements for copper-beryllium alloy rod and bar appear in Specification B196/B196M (Section 2).

1.2 Unless otherwise specified, Copper Alloy UNS No. C17200 shall be the alloy furnished whenever Specification B570 is specified without any alloy designation.

1.3 *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 which are provided for information only and are not considered standard.

1.4 The following safety hazard caveat pertains only to the test method(s) described in this specification:

1.4.1 *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 to determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*²

B194 Specification for Copper-Beryllium Alloy Plate, Sheet, Strip, and Rolled Bar

B196/B196M Specification for Copper-Beryllium Alloy Rod and Bar

¹ This specification is under the jurisdiction of ASTM Committee B05 on Copper and Copper Alloys and is the direct responsibility of Subcommittee B05.02 on Rod, Bar, Wire, Shapes and Forgings.

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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.

B249/B249M Specification for General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, Shapes and Forgings

B601 Classification for Temper Designations for Copper and Copper Alloys—Wrought and Cast

B846 Terminology for Copper and Copper Alloys

E8/E8M Test Methods for Tension Testing of Metallic Materials

E18 Test Methods for Rockwell Hardness of Metallic Materials

E112 Test Methods for Determining Average Grain Size

3. General Requirements

3.1 The following sections of Specification B249/B249M form 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 Sample Preparation,

3.1.6 Test Methods,

3.1.7 Significance of Numerical Limits,

3.1.8 Inspection,

3.1.9 Rejection and Reheating,

3.1.10 Certification,

3.1.11 Mill Test Report,

3.1.12 Packaging, Marking, Shipping and Preservation.

3.2 In addition, when a section with a title identical to that referenced in 3.1, above, appears in this specification, it contains additional requirements that supplement those appearing in Specification B249/B249M.

4. Terminology

4.1 *Definitions:*

4.1.1 For definitions of terms related to copper and copper alloys, refer to Terminology B846.

4.1.2 *forging, n*—a metal part worked to a predetermined shape by one or more such processes as hammering, upsetting, pressing, rolling, and so forth.

5. Ordering Information

5.1 Include the following specified choices when placing orders for products under this specification, as applicable:

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

- 5.1.1 ASTM designation and year of issue,
- 5.1.2 Copper [Alloy] UNS No. designation (Section 1),
- 5.1.3 Temper (Section 8) or condition (Section 12),
- 5.1.4 Drawing showing the shape, dimensions, and tolerances, if required,
- 5.1.5 Quantity—total weight, or length, or number of pieces of each size,
- 5.1.6 If an extrusion: the length (or mass) required, straightness as required,

5.2 The following options are available but may not be included unless specified at the time of placing of the order, when required:

- 5.2.1 Tension tests (Section 11),
- 5.2.2 Finish (see Section 15),
- 5.2.3 Grain size (see Section 9), and
- 5.2.4 If product is purchased for agencies of the U.S. Government (see the Supplementary Requirements section of this specification) for additional requirements, if specified.

6. Material and Manufacture

6.1 *Material:*

6.1.1 The material of manufacture shall be cast or wrought billet of Copper Alloy UNS No. C17000 or C17200 of such purity and soundness as to be suitable for processing into the products prescribed herein.

6.1.2 The product heat number shall appear on the certification or test report.

6.2 *Manufacture:*

6.2.1 The product shall be manufactured by hot working and heat treating, when required, to meet the temper properties specified.

7. Chemical Composition

7.1 The material shall conform to the chemical composition requirements in **Table 1** for the copper [alloy] UNS No. designation specified in the ordering information.

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 the elements given in **Table 1** are determined, the sum of the results shall be 99.5 % minimum.

TABLE 1 Chemical Requirements

Element	Composition, %	
	Copper Alloy UNS No. C17000	Copper Alloy UNS No. C17200
Beryllium	1.60–1.85	1.80–2.00
Additive elements:		
Nickel + cobalt, min	0.20	0.20
Nickel + cobalt + iron, max	0.6	0.6
Aluminum, max	0.20	0.20
Silicon, max	0.20	0.20
Copper	remainder	remainder

8. Temper

8.1 The standard tempers for products described in this specification are given in **Tables 2 and 3**.

8.1.1 The standard temper designations available under this specification and as prescribed in Classification **B601** are TB00 solution heat-treated (A) and TF00 precipitation heat-treated (AT).

9. Grain Size

9.1 The grain size, if required, shall be as agreed upon between the purchaser and the manufacturer and shall be determined in accordance with Test Methods **E112**.

10. Physical Property Requirements

10.1 *Microstructure:*

10.1.1 The product in the TF00 (precipitation-hardened (AT)) condition shall have a microstructure with a minimum of second phase (beta) constituents. When present, beta shall be fine and well dispersed.

11. Mechanical Property Requirements

11.1 *Hardness*—The product furnished under this specification shall conform to the hardness requirements prescribed in **Table 2** for the solution heat-treated condition and **Table 3** after precipitation heat treatment, unless tensile properties are required by the purchase order. Rockwell hardness shall be determined in accordance with Test Methods **E18**.

11.2 *Tensile*—When specified in the contract or purchase order, the tensile properties of the product furnished shall conform to the properties in **Table 2** or **Table 3** depending upon temper required. Tensile properties shall be determined in accordance with Test Methods **E8/E8M**.

12. Heat Treatment

12.1 *Solution Heat Treatment—Temper TB00 (A)*—The product shall be heated to a uniform temperature, nominally 1450°F (788°C) and quenched commensurate with the required property and structural integrity of the configuration.

12.2 *Precipitation Heat Treatment—Temper TF00 (AT)*—The product shall be heat treated to a uniform temperature in the range from 600 to 700°F (316 to 370°C) for a minimum of 2 to 3 h and then air cooled. This is the heat treatment for the acceptance tests shown in **Table 3**.

12.3 Special combinations of properties may be obtained by special precipitation heat treatments. The requirements for these special heat treatments shall be agreed upon by the manufacturer or supplier and purchaser.

13. Purchases for the U.S. Government

13.1 When specified in the contract or purchase order, product purchased for agencies of the U.S. government shall conform to the special government regulations specified in the Supplementary Requirements section.

14. Dimensions and Permissible Variations

14.1 The dimensions and tolerances for these product forms shall be those shown on the drawing that forms a part of each order or as agreed upon between the manufacturer and the purchaser.