



AEROSPACE MATERIAL SPECIFICATION

AMS4511™**REV. B**

Issued 1989-10
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Revised 2025-05

Superseding AMS4511A

Copper-Beryllium Alloy Castings
97Cu - 2.1Be - 0.52(Co + Ni) - 0.28Si
Solution and Precipitation Heat Treated (TF00)
(Composition similar to UNS C82500)

RATIONALE

AMS4511B results from a Five-Year Review and update of this specification with changes to clarify that casting approval and reapproval actions are to be carried out by the cognizant engineering organization (see 4.2.2 and 4.4), revise maximum Cr level to match industry practice (see Table 1), correct temper designation (see Title), update wording to prohibit unauthorized exceptions (see 3.8, 4.5.1, and 8.6), update Applicable Documents (see Section 2), Tensile Specimens (see 3.4.2), Heat Treatment (see 3.5), units used for Solution Heat Treatment (see 3.5.1), section titles (see 3.6.1 and 3.6.2), Quality (see 3.7.3), and Ordering Information (see 8.7), relocate Definitions (see 2.3), and restrict use of the immediate prior revision of this specification (see 8.5).

1. SCOPE

1.1 Form

This specification covers a copper-beryllium alloy in the form of sand, investment, or centrifugal castings (see 8.7).

1.2 Application

These products have been used typically for small parts of intricate design requiring good corrosion resistance and high strength, but usage is not limited to such applications.

1.3 Safety - Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards that may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

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2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2175	Castings, Classification and Inspection of
AMS2360	Room Temperature Tensile Properties of Castings
AMS2750	Pyrometry
AMS2804	Identification, Castings
AS7766	Terms Used in Aerospace Metals Specifications

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B194	Copper-Beryllium Alloy Plate, Sheet, Strip and Rolled Bar
ASTM B208	Preparing Tension Test Specimens for Copper Alloy Sand, Permanent Mold, Centrifugal and Continuous Castings
ASTM B601	Temper Designations for Copper and Copper Alloys - Wrought and Cast
ASTM E8/E8M	Tension Testing of Metallic Materials
ASTM E18	Rockwell Hardness of Metallic Materials
ASTM E272	Reference Radiographs for High-Strength Copper-Base and Nickel-Copper Alloy Castings
ASTM E478	Chemical Analysis of Copper Alloys
ASTM E1417	Liquid Penetrant Testing
ASTM E1742	Radiographic Inspection

2.3 Definitions

Terms used in AMS are defined in AS7766.

2.3.1 Copper temper designations are defined in ASTM B601.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined in accordance with ASTM B194, ASTM E478, or by other analytical methods acceptable to the purchaser.

Table 1 - Composition

Element (see 3.1.1)	Min	Max
Beryllium	1.90	2.25
Cobalt + Nickel	0.35	0.70
Silicon	0.20	0.35
Iron	--	0.25
Nickel	--	0.20
Aluminum	--	0.15
Chromium	--	0.09
Tin	--	0.10
Zinc	--	0.10
Lead	--	0.02
Copper (see 3.1.2)	remainder	
Sum of named elements (see 3.1.3)	99.5	

- 3.1.1 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 or supplier and the purchaser.
- 3.1.2 Copper may be reported as "remainder," or as the difference between the sum of results for all elements and 100%, or as the result of direct analysis.
- 3.1.3 When all of the elements in the table are analyzed, the sum shall be 99.5% minimum, but such determination is not required for routine acceptance of each lot.

3.2 Condition

Solution and precipitation heat treated to the TF00 Temper (formerly AT) (see 2.3.1).

3.3 Casting

Castings shall be poured from a single furnace charge of not more than 2000 pounds (907 kg). The furnace charge may consist of virgin material, gates, sprues, risers, or other recycled material. Final composition shall be certifiable to the composition referenced in 3.1.

3.4 Heat Qualification

Each heat shall be qualified by chemical analysis and tensile specimens conforming to 3.4.1 and 3.4.2, respectively. Heat identity shall be maintained with all specimens and parts through all operations.

3.4.1 Chemical Analysis Specimens

Shall be cast from each heat and shall be of any convenient size, shape, and form.

3.4.2 Tensile Specimens

Shall be of standard dimensions in accordance with ASTM E8/E8M. Subsize specimens proportional to the standard specimens may be used. Specimens shall be prepared from at least one casting from each lot from the most representative measure of the condition of the casting if specimen location is not shown on the part drawing. Tensile specimens shall be prepared in accordance with ASTM B208 or with a 0.250-inch (6.35-mm) diameter at the reduced gauge section, whichever is more representative of the casting as directed by the purchaser. Normally, bars are cast oversize and machined to size. Castings and separately cast tensile specimens must be solution heat treated and precipitation heat treated together.