SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS4530 REV. J

Issued 1946-01
Revised 2011-09

Superseding AMS4530H

Copper-Beryllium Alloy Sheet, Strip, and Plate
98Cu - 1.9Be
Solution Heat Treated (TB00)
(Composition similar to UNS C17200)

RATIONALE

AMS4530J corrects an error in temperature conversion (3.3.4).

1. SCOPE

1.1 Form

This specification covers one type of copper-beryllium alloy in the form of sheet, strip, and plate.

1.2 Application

This product has been used typically for parts requiring high strength with good electrical conductivity or lack of magnetic susceptibility, 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 which 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.

2.1 SAE Publications

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

AMS2222 Tolerances, Copper and Copper Alloy Sheet, Strip, and Plate

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: http://www.sae.org

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS4530J

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 B 194 Copper-Beryllium Alloy Plate, Sheet, Strip, and Rolled Bar

ASTM B 194 Annex - Chemical Analysis of Copper-Beryllium Alloys

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

ASTM B 601 Temper Designations of Copper and Copper Alloys - Wrought and Cast

ASTM E 3 Preparation of Metallographic Specimens

ASTM E 8/E 8M Tension Testing of Metallic Materials

ASTM E 18 Rockwell Hardness of Metallic Materials

ASTM E 478 Chemical Analysis of Copper Alloys

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM B 194 and/or ASTM E 478, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - COMPOSITION

Element	min	max
Beryllium	1.80	2.00
Nickel + Cobalt	0.20	--
Nickel + Cobalt + Iron	--	0.6
Aluminum	--	0.20
Silicon	--	0.20
Copper (3.1.2)	remainder	
Sum of Named Elements (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 purchaser.

3.1.2 Copper may be reported as ‘remainder’, or as the difference between the sum of results for all listed elements and 100%, or as the result of direct analysis.

3.1.3 When all the elements in Table 1 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 heat treated (Temper TB00).

3.3 Properties

3.3.1 Tensile Properties

Shall be as shown in Table 2, determined in accordance with ASTM E 8/E 8M; elongation requirements apply only to product 0.004 inch (0.10 mm) and over in nominal thickness.

TABLE 2 - TENSILE PROPERTIES

Property	Value
Tensile Strength	60.0 to 78.0 ksi (414 to 538 MPa)
Elongation	35% minimum

3.3.2 Microstructure

Product shall contain not more than 6% beta phase constituent, determined at 100X magnification on specimens prepared in accordance with ASTM E 3. Product may be precipitation heat treated before examination.

3.3.3 Grain Count and Grain Size

Shall be as specified in Table 2, determined in accordance with ASTM B 194. Product may be precipitation heat treated as in 3.4 prior to examination.

TABLE 3A - GRAIN COUNT/SIZE, INCH/POUND UNITS

Nominal Thickness Inches	Grain Count Minimum	Average Grain Size mm, max
Over 0.004 to 0.006, incl	6	--
Over 0.006 to 0.008, incl	7	--
Over 0.008 to 0.010, incl	8	--
Over 0.010 to 0.030, incl	--	0.035
Over 0.030 to 0.090, incl	--	0.045
Over 0.090 to 0.188, incl	--	0.060

TABLE 3B - GRAIN COUNT/SIZE, SI UNITS

Nominal Thickness Millimeters	Grain Count Minimum	Average Grain Size mm, max
Over 0.10 to 0.15, incl	6	--
Over 0.15 to 0.20, incl	7	--
Over 0.20 to 0.25, incl	8	--
Over 0.25 to 0.76, incl	--	0.035
Over 0.76 to 2.29, incl	--	0.045
Over 2.29 to 4.78, incl	--	0.060

3.3.4 Response to Precipitation Heat Treatment

Product shall have the following properties after being precipitation heat treated by heating to 600 to 675 °F (315 to 357 °C), holding at heat for 2 to 3 hours and cooling in air.

3.3.4.1 Tensile Properties

Shall be as specified in Table 4, determined in accordance with ASTM E 8/E 8M.

TABLE 4A - TENSILE PROPERTIES, INCH/POUND UNITS

Nominal Thickness Inches	Tensile Strength ksi, min	Tensile Strength ksi, max	Yield Strength at 0.2% Offset ksi, min	Elongation in 2 Inches or 4D %, min
Up to 0.004, incl	165	--	140	--
Over 0.004 to 0.020, incl	165	--	140	3
Over 0.020	165	190	140	3

TABLE 4B - TENSILE PROPERTIES, SI UNITS

Nominal Thickness Inches	Tensile Strength MPa, min	Tensile Strength MPa, max	Yield Strength at 0.2% Offset MPa, min	Elongation in 50.8 mm or 4D %, min
Up to 0.10, incl	1138	--	965	--
Over 0.10 to 0.51, incl	1138	--	965	3
Over 0.51	1138	1310	965	3

3.4 Quality

The product, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the product.

3.5 Tolerances

Shall conform to AMS2222 as applicable to refractory alloys.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of the product shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

4.2 Classification of Tests

All technical requirements are acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling and Testing

Shall be in accordance with ASTM B 248/B 248M and the following:

4.3.1 Specimens for tensile tests of widths 9 inches (229 mm) and over shall be taken with the axis of the specimen perpendicular to the direction of rolling; for widths less than 9 inches (229 mm), specimens shall be taken with the axis parallel to the direction of rolling.

4.4 Reports

The vendor of the product shall furnish with each shipment a report showing the results of tests for composition, and the numerical results of tensile properties, and grain count or grain size for sheet or strip of each lot of sheet or strip, and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS4530J, size and quantity.