AEROSPACE MATERIAL SPECIFICATION

AMS4500™	REV. L

Issued 1940-01
Reaffirmed 2017-09
Revised 2024-05

Superseding AMS4500K

Copper, Sheet, Strip, and Plate
Soft Annealed
(Composition similar to UNS C11000)

RATIONALE

AMS4500L results from a limited scope revision to correct an error in the units called out for resistivity (see 3.3.3) to make the requirement match the Ω · g/m2 output of the test method.

1. SCOPE

1.1 Form

This specification covers unalloyed copper in the form of sheet, strip, and plate at least 0.015 inch (0.38 mm) in nominal thickness.

1.2 Application

These products have been used typically for electrical components and for formed and drawn parts, such as gaskets and washers, but usage is not limited to such applications.

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 +1 724-776-4970 (outside USA), www.sae.org.

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

AS7766 Terms Used in Aerospace Metals Specifications

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**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS4500L

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 B193 Resistivity of Electrical Conductor Materials

ASTM B248 General Requirements for Wrought Copper and Copper-Alloy Plate, Sheet, Strip, and Rolled Bar

ASTM B248M General Requirements for Wrought Copper and Copper-Alloy Plate Sheet, Strip, and Rolled Bar (Metric)

ASTM B601 Temper Designations for Copper and Copper Alloys - Wrought and Cast

ASTM E18 Rockwell Hardness of Metallic Materials

ASTM E290 Bend Testing of Material for Ductility

ASTM E478 Chemical Analysis of Copper Alloys

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 Material

Shall be electrolytic tough pitch or oxygen-free copper containing not less than 99.90% by weight copper (including silver), determined with ASTM E478, or by other analytical methods acceptable to the purchaser.

3.2 Condition

Cold rolled and fully recrystallized, in soft (O60), bright-annealed temper (see 2.3.1).

3.3 Properties

The product shall conform to the following requirements:

3.3.1 Bending

The product shall withstand, without cracking, bending in accordance with ASTM E290 at room temperature flat on itself with axis of bend parallel to the direction of rolling.

3.3.2 Hardness

Shall be not higher than shown in Table 1, determined in accordance with ASTM E18.

Table 1 - Maximum hardness

Nominal Thickness Inches	Nominal Thickness Millimeters	Hardness
0.015 to 0.030, excl	0.38 to 0.76, excl	68 HR15T
0.030 and over	0.76 and over	65 HRF

3.3.3 Electrical Resistivity

Shall be not greater than 0.15328 Ω · g/m2 at 20 °C ± 2 °C (68 °F ± 4 °F), determined in accordance with ASTM B193.

3.4 Quality

The product, as received by the 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.

3.6 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of the product shall supply all samples for the producer's tests and shall be responsible for the performance of all required tests. The 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 lot.

4.3 Sampling and Testing

Shall be in accordance with ASTM B248 or ASTM B248M.

4.4 Reports

The producer of the product shall furnish with each shipment a report stating that the product conforms to the composition and tolerances and showing the results of tests to determine conformance to the other technical requirements. This report shall include the purchase order number, lot number, AMS4500L, size, and quantity.

4.4.1 When material produced to this specification has exceptions taken to the technical requirements listed in Section 3, the report shall contain a statement "This material is certified as AMS4500L(EXC) because of the following exceptions:" and the specific exceptions shall be listed (see 5.1.3).

4.5 Resampling and Retesting

If any specimen used in the above tests fails to meet the specified requirements, disposition of the product may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the product represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY

5.1 Identification

The product shall be identified as in 5.1.1 unless line marking as in 5.1.2 is specified by the purchaser.

5.1.1 Each sheet, strip, and plate shall be legibly marked near one end, coils being marked near the outside end, with AMS4500L, lot number, the manufacturer's identification, and nominal thickness, using any suitable marking fluid. As an alternate method, individual pieces or bundles shall have attached a durable tag marked with the above information or shall be boxed and the box marked with the same information.

5.1.2 When specified by the purchaser, each sheet, strip, and plate shall be legibly marked on one face, in the respective location indicated below, with AMS4500L, lot number, the manufacturer's identification, and nominal thickness. The characters shall be applied using a marking fluid removable in hot alkaline cleaning solution without rubbing. The markings shall have no deleterious effect on the product or its performance and shall be sufficiently stable to withstand normal handling. The specification number, the manufacturer's identification, and nominal thickness shall be continuously line marked; the lot number may be included in the line marking or may be marked at one location on each piece.

5.1.2.1 Flat Strip 6 Inches (152 mm) and Under in Width

Shall be marked in one or more lengthwise rows of characters recurring at intervals not greater than 3 feet (914 mm).

5.1.2.2 Flat Sheet, Flat Strip Over 6 Inches (152 mm) in Width, and Plate

Shall be marked in lengthwise rows of characters recurring at intervals not greater than 3 feet (914 mm), the rows being spaced not more than 6 inches (152 mm) apart and alternately staggered.

5.1.2.3 Coiled Sheet and Strip

Shall be marked near both the outside and inside ends of the coil; the markings shall be applied as in 5.1.2 or shall appear on a durable tag or label attached to the coil and marked with the information of 5.1.2. When the product is wound on cores, the tag or label may be attached to the core.

5.1.3 When technical exceptions are taken (see 4.4.1), the material shall be identified with AMS4500L(EXC).

5.2 Packaging

The product shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery.

6. ACKNOWLEDGMENT

A producer shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS

Product not conforming to this specification, or to modifications authorized by the purchaser, will be subject to rejection.

8. NOTES

8.1 Revision Indicator

A change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. Change bars and (R) are not used in original publications, nor in documents that contain editorial changes only.

8.2 Dimensions and properties in inch/pound units and the Fahrenheit temperatures are primary; dimensions and properties in SI units and the Celsius temperatures are shown as the approximate equivalents of the primary units and are presented only for information.