AEROSPACE MATERIAL SPECIFICATION

AMS4510™	REV. J

Issued 1939-12
Reaffirmed 2009-06
Revised 2021-01

Superseding AMS4510H

Phosphor Bronze, Sheet, Strip, and Plate
94.5Cu - 4.0Sn - 0.19P
Spring Temper (H08)

(Composition similar to C51000)

RATIONALE

AMS4510 prohibits unauthorized exceptions (3.6, 4.4.1, and 5.1.3) and reduces test samples required for a retest (4.5) and is the result of a Five-Year Review and update of this specification.

1. SCOPE

1.1 Form

This specification covers a copper alloy (phosphor bronze) in the form of sheet, strip, and plate.

1.2 Application

These products have been used typically for stampings and springs that need to be resistant to permanent deformation during use, 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

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/AMS4510J/

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 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 E8/E8M Tension Testing of Metallic Materials

ASTM E18 Rockwell Hardness of Metallic Materials

ASTM E478 Chemical Analysis of Copper Alloys

3. TECHNICAL REQUIREMENTS

3.1 Composition

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

Table 1 - Composition

Element (3.1.1)	Min	Max
Tin	4.2	5.8
Phosphorus	0.03	0.35
Zinc	--	0.30
Iron	--	0.10
Lead	--	0.05
Copper	--	(See 3.1.2)
Sum of Named Elements	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 analyzed elements and 100%, or as the result of direct analysis.

3.1.3 When all named elements in Table 1 are analyzed, the sum shall be minimum, but such determination is not required for routine acceptance of each lot.

3.2 Condition

Cold rolled, spring (H08) temper (see 8.2).

3.3 Properties

The product shall conform to the following requirements.

3.3.1 Tensile Properties

Shall be 91 to 105 ksi (627 to 724 MPa), determined in accordance with ASTM E8/E8M.

3.3.2 Hardness

Shall be as shown in Table 2, or equivalent hardness (see 8.3), determined in accordance with ASTM E18.

Table 2 - Hardness

Nominal Thickness Inches	Nominal Thickness Millimeters	Hardness
Over 0.003 to 0.029, incl	Over 0.08 to 0.74	76 to 80 HR30T
Over 0.029 to 0.039, incl	Over 0.74 to 0.99	92 to 97 HRB
Over 0.039	Over 0.99	94 to 98 HRB

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.

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 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 the 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 vendor of the product shall furnish with each shipment a report showing the results of tests for chemical composition, tensile properties, and hardness of each lot. This report shall include the purchase order number, lot number, AMS4510J, 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 AMS4510J(EXC) because of the following exceptions:" and the specific exceptions shall be listed (also 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 two 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 purchaser.

5.1.1 Each sheet, strip, and plate shall be legibly marked near one end, coils being marked near the outside end, with AMS4510J, 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 purchaser, each sheet, strip, and plate shall be legibly marked on one face, in the respective location indicated below, with AMS4510J, lot number, manufacturer's identification, and nominal thickness. The characters shall be applied using a suitable 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, 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 AMS4510J(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 vendor 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 purchaser, will be subject to rejection.

8. NOTES

8.1 Revision Indicator

A change bar (l) 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.