SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS4520K

Issued 1940-01
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Superseding AMS4520J

Leaded Phosphor Bronze Strip
88.5Cu - 4.0Sn - 4.0Pb - 3.0Zn - 0.26P
Cold Rolled, Half Hard (HO2)

(Composition similar to UNS C54400)

RATIONALE

AMS4520K results from a 5 Year Review and update of this specification.

1. SCOPE

1.1 Form

This specification covers a copper alloy in the form of strip.

1.2 Application

This strip has been used typically for rolled, split bushings, 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 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: 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/AMS4520K

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 248/248M General Requirements for Wrought Copper and CopperAlloy Plate, Sheet, Strip, and Rolled Bar
ASTM E 8/8M Tension Testing 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 E 478, by spectrochemical methods, or by other analytical methods acceptable to purchaser.

TABLE 1 - COMPOSITION

Element	min	max
Tin	3.5	4.5
Lead	3.5	4.5
Zinc	1.5	4.5
Phosphorus	0.01	0.50
Iron	--	0.10
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 elements and 100%, or as the result of direct analysis.

3.1.3 When all 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

Cold rolled, half hard (H02) temper (See 8.3).

3.3 Properties

Strip shall conform to the following requirements:

3.3.1 Tensile Strength, Ultimate

Shall be 55.0 to 70.0 ksi (379 to 483 MPa).

3.3.2 Elongation

Shall not be lower than 16% in 2 inches (50.8 mm), determined in accordance with ASTM E 8/8M.

3.4 Quality

Strip, 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 strip.

3.5 Tolerances

Shall conform to AMS2222 as applicable to nonrefractory alloys.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of strip 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 strip 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 B 248/248M.

4.4 Reports

The vendor of strip shall furnish with each shipment a report showing the results of tests to determine conformance to the technical requirements. This report shall include the purchase order number, lot number, AMS4520K, size, and quantity.

4.5 Resampling and Retesting

If any specimen used in the above tests fails to meet the specified requirements, disposition of the strip 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 strip represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY

5.1 Identification

Each strip shall be identified as in 5.1.1 unless line marking as in 5.1.2 is specified by purchaser.

5.1.1 Each strip shall be legibly marked near one end, coils being marked near the outside end, with AMS4520K, lot number, 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 strip shall be legibly marked on one face, in the respective location indicated below, with AMS4520K, 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 strip 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 Strip Over 6 Inches (152 mm) in Width

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 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 strip is wound on cores, the tag or label may be attached to the core.

5.2 Packaging

Strip 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 strip to ensure carrier acceptance and safe delivery.

6. ACKNOWLEDGMENT

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

7. REJECTIONS

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

8. NOTES

8.1 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 Hardness should be as indicated in Table 2, determined in accordance with ASTM E 18. Hardness has been used to verify that product is properly processed, but an out-of-specification hardness number is not always indicative of product with out-of-specification tensile strength.

TABLE 2 - HARDNESS

Nominal Thickness Inch	Nominal Thickness Millimeters	Approximate Hardness
Over 0.010 to 0.029, incl	Over 0.25 to 0.74, incl	52-71 HR30T
Over 0.020 to 0.039, incl	Over 0.50 to 0.99, incl	53-78 HRB
Over 0.029	Over 0.74	57-73 HR30T
Over 0.039	Over 0.99	60-81 HRB

8.2.1 Further analysis including material composition verification, heat treat process parameter review, and/or tensile property measurement of product with out of range hardness may be necessary.

8.3 Copper temper designations are defined in ASTM B 601.

8.4 Terms used in AMS are clarified in ARP1917.

8.5 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.