SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS4555J

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Superseding AMS4555H

Leaded Brass, Seamless Tubing
66.5Cu - 32.5Zn - 0.48Pb
Light Annealed (050)

UNS C33000

RATIONALE

AMS4555J results from a 5 Year Review and update of this specification.

1. SCOPE

1.1 Form

This specification covers a copper alloy (leaded brass) in the form of seamless tubing.

1.2 Application

This tubing has been used typically for parts requiring moderate strength and fair ductility, 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.

AMS2223 Tolerances, Copper and Copper Alloy Seamless Tubing

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/AMS4555J

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 154 Mercurous Nitrate Test for Copper and Copper Alloys

ASTM B 251 General Requirements for Wrought Seamless Copper and CopperAlloy Tube

ASTM B 251M General Requirements for Wrought Seamless Copper and CopperAlloy Tube (Metric)

ASTM B 858 Determination of Susceptibility to Stress Corrosion Cracking in Copper Alloys Using an Ammonia Vapor Test

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

ASTM E 18 Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials

ASTM E 112 Determining Average Grain Size

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 (3.1.2)	min	max
Copper	65.0	68.0
Lead (3.1.1)	0.25	0.7
Iron	--	0.7
Zinc	--	(See 3.1.3)
Sum of Named Elements (3.1.4)	99.6	--

3.1.1 For tubing over 5 inches (127 mm) in OD, lead may be less than 0.25%.

3.1.2 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.

3.1.3 Zinc 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.

3.1.4 When all named elements in Table 1 are analyzed, the sum shall be 99.6% minimum, but such determination is not required for routine acceptance of each lot.

3.2 Condition

In light annealed (O50) temper (See 8.2). Tubing shall be either bright-annealed or acid-cleaned after final annealing operation.

3.3 Fabrication

Tubing shall be produced by a seamless process. The external and internal surface finishes shall be produced by any method which will result in surfaces free from laps, folds, tears, and extraneous materials and which show no oxide discoloration. Processing shall not affect limits of wall thickness or corrosion resistance.

3.4 Properties

Tubing shall conform to the following requirements:

3.4.1 Tensile Properties

Shall be as shown in Table 2, determined in accordance with ASTM E 8/E 8M:

TABLE 2 - MINIMUM TENSILE PROPERTIES

Property	Value
Tensile Strength	44.0 ksi (303 MPa)
Elongation in 2 Inches (50.8 mm)	35%

3.4.2 Average Grain Size

Grain size shall be not larger than 0.035 mm, determined in accordance with ASTM E 112.

3.4.3 Hardness

Shall be as shown in Table 3, or equivalent, determined in accordance with ASTM E 18, but tubing shall not be rejected on the basis of hardness if the tensile property and grain size requirements are met.

TABLE 3 - MAXIMUM HARDNESS

Nominal Wall Thickness Inch	Nominal Wall Thickness Millimeter	Hardness
Up to 0.030, incl	Up to 0.76, incl	60 HRB
Over 0.030	Over 0.76	90 HRF

3.4.4 Flarability

Tubing shall withstand flaring at room temperature, without formation of cracks or other visible defects, by being forced axially with steady pressure over a hardened and polished tapered steel pin having a 74degree included angle to produce a flare having a permanent expanded OD not less than specified in Table 4.

TABLE 4 - FLARING PARAMETERS

Nominal OD Inches	Nominal OD Millimeters	Permanent Expanded OD
Up to 0.750, incl	Up to 19.05, incl	1.20 X nominal OD
Over 0.750 to 4.000, incl	Over 19.05 to 101.60, incl	1.15 X nominal OD

3.4.5 Embrittlement

Specimens of tubing, approximately 6 inches (152 mm) in length, shall withstand, without cracking, immersion in mercurous nitrate in accordance with ASTM B 154, Procedure A, or the Ammonia Vapor Test in accordance with ASTM B 858.

3.5 Quality

Tubing, 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 tubing.

3.6 Tolerances

Shall conform to AMS2223 as applicable to nonrefractory alloys.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of tubing 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 tubing conforms to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (3.1), tensile properties (3.4.1), average grain size (3.4.2), hardness (3.4.3), flarability (3.4.4), and tolerances (3.6) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests

Embrittlement (3.4.5) is a periodic test and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing

Shall be in accordance with ASTM B 251 or ASTM B 251M and the following:

4.3.1 Specimens for flarability test (3.4.4) shall be full tubes or sections cut from a tube. The end of the specimen to be flared shall be cut square, with the cut end smooth and free from burrs, but not rounded.

4.4 Reports

The vendor of tubing shall furnish with each shipment a report showing the results of tests for chemical composition, tensile properties, average grain size, hardness, and flarability of each lot, and stating that the tubing conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS4555J, nominal 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 tubing 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 tubing represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY

5.1 Identification

Individual tubes or bundles shall have attached a durable tag legibly marked with not less than the purchase order number, AMS4555J, lot number, and nominal size or shall be boxed and the box marked with the same information.