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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4555G

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Superseding AMS 4555F

Submitted for recognition as an American National Standard

LEADED BRASS, SEAMLESS TUBING
66.5Cu - 32.5Zn - 0.48Pb
Light Annealed (O50)

UNS C33000

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 following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2223 Tolerances, Copper and Copper Alloy Seamless Tubing
MAM 2223 Tolerances, Metric, Copper and Copper Alloy Seamless Tubing

Printed in U.S.A.

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM B 154 Mercurous Nitrate Test for Copper and Copper Alloys
ASTM B 251 General Requirements for Wrought Seamless Copper and Copper-Alloy Tube
ASTM B 251M General Requirements for Wrought Seamless Copper and Copper-Alloy Tube (Metric)
ASTM E 8 Tension Testing of Metallic Materials
ASTM E 8M Tension Testing of Metallic Materials (Metric)
ASTM E 18 Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E 112 Determining the Average Grain Size
ASTM E 478 Chemical Analysis of Copper Alloys

2.3 U.S. Government Publications:

Available from DODSSP, Subscription Services Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-C-3993 Copper and Copper-Base Alloy Mill Products, Packaging of

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

(R)

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
Copper	65.0	68.0
Lead (3.1.1)	0.25	0.7
Iron	--	0.7
Copper + Sum of Named Elements (3.1.3)	99.6	--
Zinc (3.1.2)	remainder	

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

3.1.2 Applicable when zinc is not determined by analysis. The reported (certified) value is the difference between the sum of all other specified elements and 100% and will therefore include unnamed elements. Limits for unnamed elements may be established by agreement between purchaser and manufacturer or supplier.

3.1.3 Applicable only when copper is determined by direct analysis.
(R)

3.2 Condition:

In light annealed (050) 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 or ASTM 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
(R) 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 74-degree 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 (R) 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 other test method acceptable to purchaser.

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 AMS 2223 or MAM 2223 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 performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the tubing conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for composition (3.1), tensile properties (3.4.1), 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: Tests for embrittlement (3.4.5) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.