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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4555H

Issued SEP 1941
Revised APR 2001
Reaffirmed APR 2006

Superseding AMS 4555G

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

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 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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

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

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-7161 FAX: (724) 776-0243
TO PLACE A DOCUMENT ORDER: (724) 776-4970 FAX: (724) 776-0790
SAE WEB ADDRESS: http://www.sae.org

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

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

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 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.