Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 4625E
Superseding AMS 4625D
Issued 11-15-46
Revised 10-16-78

UNS C51000

PHOSPHOR BRONZE BARS, RODS, AND TUBING
95Cu - 5Sn (CDA 510)
Hard Temper

1. SCOPE:

1.1 Form: This specification covers one type of bronze in the form of bars, rods, and tubing.

1.2 Application: Primarily for parts, such as bushings and bearings, requiring low coefficient of friction, moderate strength, and good electrical conductivity.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2221 - Tolerances, Copper and Copper Alloy Rods and Bars
AMS 2223 - Tolerances, Copper and Copper Alloy Seamless Tubing
AMS 2350 - Standards and Test Methods

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM B154 - Mercurous Nitrate Test for Copper and Copper Alloys
ASTM B249 - General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, and Shapes
ASTM B251 - General Requirements for Wrought Seamless Copper and Copper-Alloy Tube
ASTM E8 - Tension Testing of Metallic Materials
ASTM E54 - Chemical Analysis of Special Brasses and Bronzes

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

2.3.2 Military Specifications:

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

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E54, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other approved analytical methods:

	min	max
Copper (3.1.1, 3.1.2)	93.0	--
Tin (3.1.1)	3.50	5.80
Phosphorous (3.1.1)	0.03	0.35
Zinc	--	0.30
Iron (3.1.2)	--	0.10
Lead	--	0.05

3.1.1 The total of copper, tin, and phosphorus shall be not less than 99.50%.

3.1.2 For rounds and hexagons 1.25 in. (31.8 mm) and over in nominal diameter or distance between parallel sides, iron may be as high as 1.00% and manganese up to 0.50% may be added to the composition of 3.1; in such cases, manganese and iron shall both be considered named elements and the minimum copper requirement may be reduced to 92.0%.

3.2 Condition: Cold finished, hard temper.

3.3 Properties: The product shall conform to the following requirements:

3.3.1 Tensile Properties: Shall be as specified in Table I, determined in accordance with ASTM E8.

TABLE I

Nominal Diameter or Distance Between Parallel Sides Inches	Tensile Strength psi, min	Elongation in 4D %, min
Rounds		
Up to 0.25, excl	80,000	12
Rounds and Hexagons		
0.25 to 0.50, incl	70,000	13
Over 0.50 to 1.00, incl	60,000	20
Over 1.00	55,000	25
Squares and Rectangles		
Nominal Thickness		
Up to 0.375	60,000	10
Over 0.375	55,000	15
Tubing, Nominal OD		
Over 1.00	55,000	12

TABLE I (SI)

Nominal Diameter or Distance Between Parallel Sides Millimetres	Tensile Strength MPa, min	Elongation in 4D %, min
Rounds		
Up to 6.4, excl	552	12
Rounds and Hexagons		
6.4 to 12.7, incl	483	13
Over 12.7 to 25.4, incl	414	20
Over 25.4	379	25
Squares and Rectangles Nominal Thickness		
Up to 9.5, incl	414	10
Over 9.5	379	15
Tubing, Nominal OD		
Over 25.4	379	12

3.3.2 Embrittlement: Specimens as in 4.3.4 shall withstand, without cracking, immersion in mercurous nitrate solution in accordance with ASTM B154, Procedure A.

3.4 Quality: The product, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external imperfections detrimental to usage of the product.

3.5 Tolerances: Unless otherwise specified, tolerances shall conform to the following:

3.5.1 Bars and Rods: AMS 2221 as applicable to refractory alloys.

3.5.2 Tubing: AMS 2223 as applicable to refractory alloys.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the product conforms to the requirement of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests.

4.3 Sampling: Shall be in accordance with the following:

4.3.1 Bars and Rods: ASTM B249.

4.3.2 Tubing: ASTM B251.

4.3.3 The axis of tensile test specimens shall be located approximately midway between center and surface of bars and rods over 1.50 in. (38.1 mm) in nominal diameter or distance between parallel sides.

4.3.4 Specimens for embrittlement testing shall be full cross-section of the product and shall have
Ø length of approximately 6 in. (150 mm) or twice the diameter or least distance between parallel sides, whichever is greater.

4.4 Reports:

4.4.1 The vendor of the product shall furnish with each shipment three copies of a report showing the
Ø results of tests on each lot to determine conformance to the technical requirements of this specification. This report shall include the purchase order number, lot number, material specification number and its revision letter, size, and quantity from each lot.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified re-
Ø quirements, disposition of the product 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 product represented and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Identification: Individual pieces or bundles shall have attached a durable tag or label marked with the purchase order number, AMS 4625E, lot number, and nominal size, or shall be boxed and the box marked with the same information.

5.2 Packaging:

5.2.1 The product shall be prepared for shipment in accordance with commercial practice and in com-
Ø pliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.2.2 For direct U.S. Military procurement, packaging shall be in accordance with MIL-C-3993,
Ø Level A or Level C, as specified in the request for procurement. Commercial packaging as in 5.2.1 will be acceptable if it meets the requirements of Level C.

6. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS: Material not conforming to this specification or to authorized modifications will be subject to rejection.

8. NOTES:

8.1 Marginal Indicia: The phi (Ø) symbol is used to indicate technical changes from the previous issue of this specification.