G-24-11

SAE The Engineering Society For Advancing Mobility Land Sea Air and Space®
400 Commonwealth Dr., Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 4720D

Issued 3-13-40
Revised 10-1-89

Superseding AMS 4720C

WIRE, PHOSPHOR BRONZE
94Cu - 5.0Sn - 0.19P
Cold Drawn, Spring Temper (HO8)

UNS C51000

1. SCOPE:

1.1 Form: This specification covers one type of bronze in the form of round wire 0.500 inch (12.70 mm) and under in nominal diameter.

1.2 Application: Primarily for springs.

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 documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2224 - Tolerances, Copper and Copper Alloy Wire
MAM 2224 - Tolerances, Metric, Copper and Copper Alloy Wire
AMS 2350 - Standards and Test Methods

2.2 ASTM Publicatons: Available from ASTM, 1916 Race Street, Philiadelphia, PA 19103.

ASTM B250 - General Requirements for Wrought Copper-Alloy Wire
ASTM B250M - General Requirements for Wrought Copper-Alloy Wire (Metric)
ASTM E8 - Tension Testing of Metallic Materials
ASTM E8M - Tension Testing of Metallic Materials (Metric)
ASTM E54 - Chemical Analysis of Special Brasses and Bronzes
ASTM E290 - Semi-Guided Bend Test for Ductility of Metallic Materials

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

2.3.1 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, Ø determined by wet chemical methods in accordance with ASTM E54, by spectrochemical methods, or by other analytical methods acceptable to purchaser:

	min	max
Tin	4.2	5.8
Phosphorus	0.03	0.35
Zinc	--	0.30
Iron	--	0.10
Lead	--	0.05
Copper + Sum of Named Elements (3.1.2)	99.5	--
Copper (3.1.1)	remainder	

3.1.1 Applicable when copper is not determined by analysis. The reported Ø (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.

3.1.2 Applicable only when copper is determined by direct analysis. Ø

3.2 Condition: Cold-drawn, spring (H08) temper (See 8.2). Ø

3.3 Properties: Wire shall conform to the following requirements:

3.3.1 Tensile Properties: Shall be as specified in Table I, determined in accordance with ASTM E8 or ASTM E8M:

TABLE I

Nominal Diameter Inch	Tensile Strength psi, minimum	Elongation in 2 inches %, minimum
Up to 0.025, incl	145,000	--
Over 0.025 to 0.063, incl	135,000	--
Over 0.063 to 0.125, incl	130,000	--
Over 0.125 to 0.250, incl	125,000	--
Over 0.250 to 0.375, incl	120,000	5
Over 0.375 to 0.500, incl	105,000	9

TABLE I (SI)

Nominal Diameter Millimetres	Tensile Strength MPa, minimum	Elongation in 50.8 mm %, minimum
Up to 0.64, incl	1000	--
Over 0.64 to 1.60, incl	931	--
Over 1.60 to 3.18, incl	896	--
Over 3.18 to 6.35, incl	862	--
Over 6.35 to 9.52, incl	827	5
Over 9.52 to 12.70, incl	724	9

3.3.2 Bending: Wire 0.250 inch (6.35 mm) and under in nominal diameter shall withstand, without cracking, bending in accordance with ASTM E290 through an angle of 120 degrees around a diameter equal to twice the nominal diameter of the wire.

3.3.2.1 Bending requirements for wire over 0.250 to 0.500 inch (6.35 to 12.70 mm), incl, in nominal diameter shall be as agreed upon by purchaser and vendor.

3.4 Quality: Wire, 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 wire.

3.5 Tolerances: Shall conform to AMS 2224 or MAM 2224 as applicable to nonrefractory alloys.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of wire shall supply all samples Ø for vendor's tests 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 sample and to perform any confirmatory testing deemed necessary to ensure that the wire conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests and shall be performed on each lot.

4.3 Sampling: Shall be in accordance with ASTM B250 or ASTM B250M.

4.4 Reports: The vendor of wire shall furnish with each shipment a report showing the 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, AMS 4720D, 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 wire 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 wire represented and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Wire shall be supplied on spools or in coils except when straight lengths are ordered.

5.2 Identification:

5.2.1 Spools and Coils: Shall be marked with a durable tag or label showing not less than the manufacturer's identification, purchase order number, lot number, AMS 4720D, nominal size, and quantity; boxes or drums shall be marked with the same information.

5.2.2 Straight Lengths: Shall have attached to each bundle or enclosed in each box a durable tag or label marked with the information of 5.2.1; when boxed, the box shall be marked with the same information.

5.3 Packaging:

5.3.1 Spools and Coils: Coils shall be individually wrapped with waterproof paper or packed in waterproof drums. Spools, when ordered, shall be boxed.

5.3.2 Straight Lengths: Shall be bundled or boxed.

5.3.3 Packages of wire 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 wire to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.3.4 For direct U.S. Military procurement, packaging shall be in accordance with MIL-C-3993, Level A or Level C, as specified in the request for procurement. Commercial packaging as in 5.3.3 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. REJECTION: Wire not conforming to this specification, or to modifications authorized by purchaser, 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.