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

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4612H

Issued SEP 1941
Revised DEC 1997

superseding AMS 4612G

Submitted for recognition as an American National Standard

Brass, Naval, Bars and Rods
60.5Cu - 38.5Zn - 0.75Sn
Hard Temper (H04)

UNS C46400

1. SCOPE:

1.1 Form:

This specification covers a copper alloy (naval brass) in the form of bars and rods.

1.2 Application:

These products have been used typically for automatic screw machine parts, but usage is not limited to such applications. This material has slightly higher strength and lower ductility than AMS 4611. It also has better corrosion resistance than AMS 4610 but is less readily machinable.

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 2221	Tolerances, Copper and Copper Alloy Bars and Rods
MAM 2221	Tolerances, Metric, Copper and Copper Alloy Bars and Rods
AMS 4610	Brass, Free-Cutting Bars and Rods, 61.5Cu - 35Zn - 3.1Pb, Half Hard (H02)
AMS 4611	Brass, Naval, Bars and Rods, 60.5Cu - 38.7Zn - 0.8Sn, Half Hard (H02)

QUESTIONS REGARDING THIS DOCUMENT: (412) 772-7154 FAX: (412) 776-0243
TO PLACE A DOCUMENT ORDER: (412) 776-4970 FAX: (412) 776-0790

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 249	General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, and Shapes
ASTM B 249M	General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, and Shapes (Metric)
ASTM B 858M	Determination of Susceptibility to Stress Corrosion Cracking in Copper Alloys using an Ammonia Vapor Test (Metric)
ASTM E 8	Tension Testing of Metallic Materials
ASTM E 8M	Tension Testing of Metallic Materials (Metric)
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 (3.1.1)	min	max
Copper	59.0	62.0
Tin	0.50	1.00
Lead	--	0.20
Iron	--	0.10
Sum of Named Elements (3.1.3)	99.6	--
Zinc (See 3.1.2)	Remainder	--

3.1.1 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.

3.1.2 Zinc may be reported as “remainder”, as the difference between the sum of results for all elements and 100%, or as the result of direct analysis.

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

3.2 Condition:

Cold finished, hard (H04) temper (See 8.3).

3.3 Properties:

The product shall conform to the following requirements:

3.3.1 Tensile Properties: Shall be as shown in Table 2, determined in accordance with ASTM E 8 or ASTM E 8M.

TABLE 2A - Minimum Tensile Properties, Inch/Pound Units

Nominal Diameter or Distance Between Parallel Sides Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
Up to 1.000, incl	67.0	45.0	13
Over 1.000 to 2.500, incl	62.0	37.0	18
Over 2.500 to 3.500, incl	54.0	25.0	27
Over 3.500	54.0	22.0	30

TABLE 2B - Minimum Tensile Properties, SI Units

Nominal Diameter or Distance Between Parallel Sides Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
Up to 25.40, incl	462	310	13
Over 25.40 to 63.50, incl	427	255	18
Over 63.50 to 88.90, incl	372	172	27
Over 88.90	372	152	30

3.3.2 Embrittlement: Specimens as in 4.3.2 shall withstand, without cracking, the mercurous nitrate test performed in accordance with ASTM B 154, Procedure A, or the Ammonia Vapor Test in accordance with AMS B 858M.

3.4 Quality:

The product, 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 product.

3.5 Tolerances:

Shall conform to AMS 2221 or MAM 2221 as applicable to nonrefractory alloys.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

The vendor of the product 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 product conforms to specified requirements.

4.2 Classification of Tests:

All technical requirements are acceptance tests and shall be performed on each lot.

4.3 Sampling and Testing:

Shall be in accordance with ASTM B 249 or ASTM B 249M and the following:

4.3.1 The axis of tensile specimens shall be parallel to grain flow. For product 1.500 inches (38.10 mm) and under in nominal diameter or distance between parallel sides, the axis of specimens shall be located at the center of the product; for product over 1.500 inches (38.10 mm) in nominal diameter or distance between parallel sides, the axis of specimens shall be located midway between surface and center.

4.3.2 Embrittlement: One sample from each lot, unless otherwise agreed upon by purchaser and vendor. Specimens for embrittlement test shall be full cross-section of the product and shall have length of approximately 6 inches (152 mm) or twice the diameter or least distance between parallel sides, whichever is greater.

4.4 Reports:

The vendor of the product shall furnish with each shipment a report showing the results of tests for chemical composition, tensile properties, and embrittlement and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS 4612H, size, and quantity.