



AEROSPACE MATERIAL SPECIFICATION	AMS4611™	REV. K
	Issued 1942-12 Reaffirmed 2014-04 Revised 2024-09	
Superseding AMS4611J		
Brass, Naval, Bars, and Rods, 60.5Cu - 38.7Zn - 0.8Sn, Half Hard (H02) (Composition similar to UNS C46400)		

RATIONALE

AMS4611K results from a Five-Year Review and update of this specification with changes to update general agreement language to prohibit unauthorized exceptions (see 5.1.1 and 8.4), relocate Definitions (see 2.3), and update Applications (see 1.2), Applicable Documents (see Section 2), Composition (see 3.1), and Ordering Information (see 8.5).

1. SCOPE

1.1 Form

This specification covers a copper alloy (naval brass) in the form of bars and rods (see 8.5).

1.2 Applications

These products have been used typically for automatic screw machine parts, but usage is not limited to such applications. These products have better corrosion resistance than AMS4610 free-cutting brass bars and rods but are less readily machinable.

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

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2221 Tolerances, Copper and Copper Alloy Bars and Rods

AS7766 Terms Used in Aerospace Metals Specifications

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For more information on this standard, visit <https://www.sae.org/standards/content/AMS4611K/>

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM B154	Mercurous Nitrate Test for Copper and Copper Alloys
ASTM B249/B249M	General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, Shapes, and Forgings
ASTM B601	Temper Designations for Copper and Copper Alloys-Wrought and Cast
ASTM B858	Ammonia Vapor Test for Determination of Susceptibility to Stress Corrosion Cracking in Copper Alloys
ASTM E8/E8M	Tension Testing of Metallic Materials
ASTM E478	Chemical Analysis of Copper Alloys

2.3 Definitions

Terms used in AMS are defined in AS7766.

2.3.1 Copper temper designations are defined in ASTM B601.

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 E478 or by other analytical methods acceptable to the purchaser (see 8.5).

Table 1 - Composition

Element (see 3.1.1)	Min	Max
Copper	59.0	62.0
Tin	0.50	1.0
Lead	--	0.20
Iron	--	0.10
Sum of Named Elements (see 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 (see 8.5).

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 99.6% minimum, but such determination is not required for routine acceptance of each lot.

3.2 Condition

Cold finished, half-hard (H02) temper (see 2.3.1).

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 E8/E8M except as specified in 4.3.2.1.

Table 2A - Minimum tensile properties, inch/pound units

Nominal Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %, Min
Up to 0.500, incl	60.0	27.0	22 (see 3.3.1.1)
Over 0.500 to 1.000, incl	60.0	27.0	25
Over 1.000 to 2.500, incl	58.0	26.0	25
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 Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %, Min
Up to 12.70, incl	414	186	22 (see 3.3.1.1)
Over 12.70 to 25.40, incl	414	186	25
Over 25.40 to 63.50, incl	400	179	25
Over 63.50 to 88.90, incl	372	172	27
Over 88.90	372	152	30

3.3.1.1 In no case shall the gage length be less than 1 inch (25 mm).

3.3.2 Residual Stress Test

Specimens as in 4.3.3.1 shall withstand, without cracking, immersion in mercurous nitrate solution in accordance with ASTM B154, procedure A, or the ammonia vapor test in accordance with ASTM B858.

3.4 Quality

The product, as received by the 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 AMS2221 as applicable to nonrefractory alloys.

3.6 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of the product shall supply all samples for the producer's tests and shall be responsible for the performance of all required tests. The 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 B249/B249M and the following:

4.3.1 Composition

One sample from each lot.

4.3.2 Tensile Properties

One sample from each lot.

4.3.2.1 Tensile tests shall be performed on full-section specimens when practicable. When machined specimens are required, the axis of the specimen shall coincide with the central axis of the piece, except that for bars and rods over 1.50 inches (38.1 mm) in nominal diameter or distance between parallel sides, the axis shall be midway between the center and surface of the piece. The longitudinal axis of the tensile specimen shall be parallel to the direction of rolling or drawing.

4.3.3 Residual Stress Test

One sample from each lot, unless otherwise agreed upon by the purchaser and producer.

4.3.3.1 Specimens for residual stress test shall be full cross sections of the product and shall have length of approximately 6 inches (152 mm) or twice the nominal diameter or least distance between parallel sides, whichever is greater.

4.4 Reports

The producer of the product shall furnish with each shipment a report showing the results of tests for chemical composition, tensile properties, and residual stress of each lot and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, lot number, AMS4611K, size, and quantity.

4.4.1 When material produced to this specification is beyond the sizes allowed in the scope or tables, or exceptions authorized by the purchaser are taken to the technical requirements listed in Section 3, the report shall contain a statement "This material is certified as AMS4611K(EXC) because of the following exceptions:" and the specific exceptions shall be listed.

4.5 Resampling and Retesting

If any specimen used in the above tests fails to meet specified requirements, disposition of the product may be based on the results of testing two additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet specified requirements shall be cause for rejection of the product represented. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY

5.1 Identification

Individual pieces or bundles shall have attached a durable tag legibly marked with not less than the purchase order number, AMS4611K, lot number, and nominal size or shall be boxed and the box marked with the same information.

5.1.1 When technical exceptions are taken (see 4.4.1), the material shall be identified with AMS4611K(EXC).

5.2 Packaging

The product 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 product to ensure carrier acceptance and safe delivery.