



400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION



AMS 4635E

Issued NOV 1941
Revised APR 2001
Reaffirmed APR 2006

Superseding AMS 4635D

Aluminum Bronze Bars, Rods, and Forgings
87Cu - 9Al - 3Fe
Stress Relieved

(Composition similar to UNS C62300)

1. SCOPE:

1.1 Form:

This specification covers one type of aluminum bronze in the form of bars, rods, forgings, and forging stock.

1.2 Application:

These products have been used typically for parts requiring strength and corrosion resistance at moderate temperatures, 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 2221 Tolerances, Copper and Copper Alloy Bars and Rods
MAM 2221 Tolerances, Metric, Copper and Copper Alloy Bars and Rods
AMS 2808 Identification, Forgings

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2.2 ASTM Publications:

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

ASTM B 249	General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, Shapes, and Forgings
ASTM B 249M	General Requirements for Wrought Copper and Copper-Alloy Rod, Bar, Shapes, and Forgings (Metric)
ASTM E 10	Brinell Hardness of Metallic Materials
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
Aluminum	8.5	10.0
Iron	2.0	4.0
Nickel (including Cobalt)	--	1.0
Tin	--	0.6
Manganese	--	0.50
Silicon	--	0.25
Copper (including Silver)	(See 3.1.2)	
Sum of Named Elements (3.1.3)	99.5	--

- 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 Copper 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.
- 3.1.3 When all named elements in Table 1 are analyzed, the sum shall be 99.5% minimum, but such determination is not required for routine acceptance of each lot.

3.2 Condition:

The product shall be supplied in the following condition:

3.2.1 Bars and Rods: As rolled or extruded and stress relieved.

3.2.2 forgings: Stress relieved (M12) (See 8.2).

3.2.3 Forging Stock: As ordered by the forging manufacturer.

3.3 Properties:

The product shall conform to the following requirements:

3.3.1 Bars, Rods and forgings:

3.3.1.1 Hardness: Shall be 155 to 190 HB/10/1000, or equivalent, determined in accordance with ASTM E 10 on the surface except on rounds where a flat, as necessary for accuracy, may be made.

3.3.2 Forging Stock: As agreed upon by purchaser and vendor.

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 Tolerance:

Bars and rods shall conform to AMS 2221 or MAM 2221 as applicable to refractory 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 the 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 the following:

4.3.1 Bars and Rods: ASTM B 249 or ASTM B 249M.

4.3.2 forgings and Forging Stock: As agreed upon by purchaser and vendor.

4.4 Reports:

- 4.4.1 The vendor of bars, rods, and forgings shall furnish with each shipment a report showing the results of tests for chemical composition and hardness of each lot. This report shall include the purchase order number, lot number, AMS 4635E, size, and quantity. If forgings are supplied, the part number and the size and melt source of stock used to make the forgings shall also be included.
- 4.4.2 The vendor of forging stock shall furnish with each shipment a report showing the results of tests for chemical composition of each lot. This report shall include the purchase order number, lot number, AMS 4635E, 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 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. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:**5.1 Identification:**

Shall be as follows:

- 5.1.1 Bars and Rods: Individual pieces or bundles shall have attached a durable tag or label marked with the purchase order number, AMS 4635E, lot number, and nominal size or shall be boxed and the box marked with the same information.
- 5.1.2 forgings: In accordance with AMS 2808.
- 5.1.3 Forging Stock: As agreed upon by purchaser and vendor.

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 endure carrier acceptance and safe delivery.

6. ACKNOWLEDGMENT:

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