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

AEROSPACE MATERIAL SPECIFICATION

AMS 4619C
Superseding AMS 4619B
Issued 10-15-40
Revised 1-15-77

MANGANESE BRONZE FORGINGS
58Cu - 39.8Zn - 1.05Fe - 0.95Al - 0.25Mn

1. SCOPE:

1.1 Form: This specification covers one type of manganese bronze in the form of forgings and forging stock.

1.2 Application: Primarily for parts, such as counterweights, requiring wear resistance and high specific gravity.

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 2350 - Standards and Test Methods
AMS 2808 - Identification, Forgings

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

ASTM E8 - Tension Testing of Metallic Materials
ASTM E10 - Brinell Hardness of Metallic Materials
ASTM E478 - Chemical Analysis of Copper-Base Alloys

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 E478, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other approved analytical methods:

	min	max
Copper	56.00	60.00
Iron	0.80	1.30
Aluminum	0.70	1.20
Manganese	--	0.50
Other Elements, each	--	0.05
Other Elements, total	--	0.30
Zinc	remainder	

3.2 Condition: The product shall be supplied in the following condition:

3.2.1 Forgings: Stress relieved sufficiently to minimize distortion during machining.

3.2.2 Forging Stock: As ordered by the forging manufacturer.

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

3.3.1 Forgings:

3.3.1.1 Tensile Properties: Shall be as follows, determined in accordance with ASTM E8:

Tensile Strength, min	70,000 psi (483 MPa)
Yield Strength at 0.2% Offset, min	25,000 psi (172 MPa)
Elongation in 2 in. (50.8 mm) or 4D, min	20%

3.3.1.2 Hardness: Should be 120 - 140 HB/10/1000 or equivalent, determined in accordance with ASTM E10, but forgings shall not be rejected on the basis of hardness if the tensile property requirements are met.

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

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 internal and external imperfections detrimental to usage of the product.

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 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.

4.3 Sampling: Shall be as follows; a lot shall be not more than 10,000 lb (4540 kg) of product of the same size and shape produced in a continuous run and presented for vendor's inspection at one time:

4.3.1 Composition: One sample from each lot.

4.3.2 Tensile Properties: One sample from each lot.

Ø 4.3.3 Hardness: 10% of the pieces in each lot.

4.4 Reports:

4.4.1 Ø The vendor of forgings shall furnish with each shipment three copies of a report showing the results of tests for chemical composition, tensile properties, and hardness of each lot. This report shall include the purchase order number, lot number, material specification number and its revision letter, size or part number, and quantity.

4.4.2 Ø The vendor of forging stock shall furnish with each shipment three copies of a report showing the results of tests for chemical composition of the stock. This report shall include the purchase order number, lot number, material specification number and its revision letter, size, and quantity.

4.4.3 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 forgings, part number, and quantity. When forgings for making parts are produced or purchased by the parts vendor, that vendor shall inspect each lot of forgings to determine conformance to the requirements of this specification, and shall include in the report a statement that the forgings conform, or shall include copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting: Ø 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 and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Identification: The product shall be identified as follows:

5.1.1 Forgings: In accordance with AMS 2808.

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

5.2 Packaging:

5.2.1 Ø The product shall be prepared for shipment in accordance with commercial practice to ensure carrier acceptance and safe transportation to the point of delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.2.2 Ø 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 5.2.1 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.