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

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

SAE AMS 4845G

Issued DEC 1939
Revised SEP 1996

Superseding AMS 4845F

TIN BRONZE CASTINGS SAND AND CENTRIFUGAL
87.5Cu - 10Sn - 2Zn
As Cast

This specification has been declared “NONCURRENT” by the Aerospace Materials Division, SAE, as of September 1996. It is recommended, therefore, that this specification not be specified for new designs.

This cover sheet should be attached to the "F" revision of the subject specification.

"NONCURRENT” refers to those materials which have previously been widely used and which may be required on some existing designs in the future. The Aerospace Materials Division, however, does not recommend these as standard materials for future use in new designs. Each of these “NONCURRENT” specifications is available from SAE upon request.

PREPARED UNDER Tl-iE JURISDICTION OF AMS COMMlITEE “D”

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

AEROSPACE MATERIAL SPECIFICATION

an American National Standard

AMS 4845F

Issued 12-5-39
Revised 4-1-88

Superseding AMS 4845E

TIN BRONZE CASTINGS, SAND AND CENTRIFUGAL
87.5Cu - 10Sn - 2Zn
As Cast

UNS C90500

1. SCOPE:

1.1 Form: This specification covers a tin bronze in the form of sand and centrifugal castings.

1.2 Application: Primarily for bearings requiring a combination of strength, toughness, and resistance to wear. Alloy has good machinability and corrosion resistance to sea water.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications 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 2350 - Standards and Test Methods
AMS 2635 - Radiographic Inspection
AMS 2645 - Fluorescent Penetrant Inspection
AMS 2646 - Contrast Dye Penetrant Inspection
AMS 2694 - Repair Welding of Aerospace Castings
AMS 2804 - Identification, Castings

REAFFIRMED
APR '94

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 E18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E54 - Chemical Analysis of Special Brasses and Bronzes

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 Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing 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
Copper (3.1-1)	86.0	89.0
Tin	9.0	11.0
Zinc	1.0	3.0
Nickel	--	1.0
Lead	--	0.30
Antimony	--	0.20
Iron	--	0.20
Phosphorus	--	0.05
Sulfur	--	0.05
Aluminum	--	0.005
Silicon		0.005
Copper + Sum of Named Elements	99.4	--

3.1.1 In determining copper content, copper may be calculated as copper plus nickel.

3.2 Condition: As cast.

3.3 Casting: Castings shall be produced in 'lots from metal conforming to 3.1. A lot shall be all castings produced from one furnace melt or crucible melt. When two or more furnace melts or crucible melts or combination thereof are used to charge a ladle for pouring, the castings therefrom shall constitute a lot. A lot shall be not more than 2000 lb (900 kg) of castings.

3.4 Test Specimens:

3.4.1 Chemical Analysis Specimens: Shall be cast from each melt and be of any Ø convenient size, shape, and form.

3.4.2 Tensile Specimens: Shall conform to ASTM E8 and shall be poured from each Ø melt.

3.5 Properties: Castings shall conform to the following requirements:

3.5.1 Tensile Properties: Shall be as follows, determined in accordance with Ø ASTM E8 on separately-cast specimens produced as in 3.4.2:

Tensile Strength, minimum	40,000 psi (275 MPa)
Yield Strength at 0.2% Offset; minimum	18,000 psi (125 MPa)
Elongation in 4D, minimum	2%

3.5.2 Hardness: Shall be as follows, determined in accordance with ASTM E18:

3.5.2.1 Sand Castings: Not lower than 70 HRF, or equivalent.

3.5.2.2 Centrifugal Castings: Not lower than 80 HRF, or equivalent.

3.6 Quality:

3.6.1 Castings, 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 castings.

3.6.1.1 Castings shall have smooth surfaces and shall be well cleaned.

3.6.2 Castings, when specified, shall be produced under radiographic control. This control shall consist of radiographic examination of castings in accordance with AMS 2635 until proper foundry technique, which will produce castings free from harmful internal imperfections, is established for each part number and of production castings as necessary to ensure maintenance of satisfactory quality.

3.6.3 Castings, when specified, shall be subjected to fluorescent penetrant inspection in accordance with AMS 2645, to contrast dye penetrant inspection in accordance with AMS 2646, or to both.

3.6.4 Radiographic, fluorescent penetrant, contrast dye penetrant, and other quality standards shall be as agreed upon by purchaser and vendor.

3.6.5 Castings shall not be repaired by peening, plugging, welding, or other methods without written permission from purchaser.

3.6.5.1 When permitted in writing by purchaser, defects in castings may be repaired by welding in accordance with AMS 2694.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of castings shall supply all samples 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 4.5. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the castings conform 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 as preproduction tests and shall be performed prior to or on the first-article shipment of a casting to a purchaser, on each melt or lot, as applicable, when a change in material, processing, or both requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, contracting officer, or request for procurement.

4.3 Sampling: Shall be in accordance with the following:

4.3.1 One chemical analysis specimen in accordance with 3.4 from each melt or a casting from each lot.

4.3.2 Three separately-cast tensile specimens in accordance with 3.4.2 from each melt.

4.3.3 Two preproduction castings in accordance with 4.4.1 of each part number.

4.4 Approval:

4.4.1 Sample castings from new or reworked patterns or molds and the casting procedure shall be approved by purchaser before castings for production use are supplied, unless such approval be waived by purchaser.

4.4.2 Vendor shall establish, for production of sample castings of each part number, parameters for the process control factors which will produce acceptable castings; these shall constitute the approved casting procedure and shall be used for producing production castings. If necessary to make any change in parameters for the process control factors, vendor shall submit for reapproval a statement of the proposed changes in processing and, when requested, sample castings, test specimens, or both. Production castings incorporating the revised operations shall not be shipped prior to receipt of reapproval.

4.4.2.1 Control factors for producing castings include, but are not limited to, the following:

Type of furnace
Furnace atmosphere
Fluxing or deoxidation procedure
Gating and risering practices
Metal pouring temperature; variation of ±50°F (±30°C) from the established limit is permissible
Mold rotational speed for centrifugal castings
Solidification and cooling procedures
Cleaning operations
Methods of inspection

4.4.2.1.1 Any of the above process control factors for which parameters are considered proprietary by the vendor may be assigned a code designation. Each variation in such parameters shall be assigned a modified code designation.

4.5 Reports:

4.5.1 Ø The vendor of castings shall furnish with each shipment a report showing the results of tests for chemical composition of at least one casting or of separately-cast specimens from each melt and for tensile properties and hardness of each lot. This report shall include the purchase order number, lot number, AMS 4845F, part number, and quantity.

4.5.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 4845F, contractor or other direct supplier of castings, part number, and quantity. When castings for making parts are produced or purchased by the parts vendor, that vendor shall inspect each lot of castings to determine conformance to the requirements of this specification and shall include in the report either a statement that the castings conform or copies of laboratory reports showing the results of tests to determine conformance.

4.6 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the castings may be based on the results of testing two additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the castings represented and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Identification: Shall be in accordance with AMS 2804.

5.2 Packaging:

5.2.1 Castings 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 castings to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.2.2 For direct U.S. Military procurement, packaging shall be in accordance with MIL-STD-794, 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.