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AEROSPACE MATERIAL SPECIFICATION

AMS 4845E
Superseding AMS 4845D

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UNS C90500

TIN BRONZE CASTINGS, SAND AND CENTRIFUGAL
87.5Cu - 10Sn - 2.0Zn
As Cast

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 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 (AMS) 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

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

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

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

	min	max
Copper (3.1.1, 3.1.2)	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
Other Elements, total	--	0.30

3.1.1 May be determined by difference.

3.1.2 In determining copper minimum, copper may be calculated as copper plus Ø 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 Ø 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 Chemical Analysis Specimens: Shall be cast from each melt and be of any Ø convenient size, shape, and form for vendor's tests; when chemical analysis specimens are required by purchaser, specimens shall be cast to a size, shape, and form agreed upon by purchaser and vendor.

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3.5 Properties: Castings shall conform to the following requirements:

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

3.5.1.1 Sand Castings: Not lower than 70 HRF or equivalent.

3.5.1.2 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
Ø condition, sound, and free from foreign materials and from internal and external 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
Ø 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
Ø inspection in accordance with AMS 2645 or to contrast dye penetrant inspection in accordance with AMS 2646.

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
Ø 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
Ø 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.

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4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests and as Ø 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 and/or processing 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 Ø requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, the contracting officer, or the 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 and/or Ø a casting from each lot.

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

4.4 Approval:

4.4.1 Sample castings from new or reworked patterns or molds and the casting Ø 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 control factors of processing which will produce acceptable castings; these shall constitute the approved casting procedure and shall be used for producing preproduction castings. If necessary to make any change in parameters for the control factors of processing, vendor shall submit for reapproval a statement of the proposed changes in processing and, when requested, sample test specimens, castings, 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:

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Type of furnace
Furnace atmosphere
Fluxing or deoxidation procedure
Gating and risering practices
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

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