



AEROSPACE MATERIAL SPECIFICATION	AMS4845™	REV. J
	Issued 1939-12 Noncurrent 1996-09 Revised 2015-12 Superseding AMS4845H	
Tin Bronze Castings, Sand and Centrifugal 87.5Cu - 10Sn - 2Zn As Cast (Composition similar to UNS C90500)		

RATIONALE

AMS4845J corrects an error in the tensile elongation requirement (Table 2) and is a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

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

1.2 Application

These castings have been used typically for bearings requiring a combination of strength, toughness, and resistance to wear, but usage is not limited to such applications. The alloy has good machinability and corrosion resistance to sea water.

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.

2.1.1 Aerospace Material Specifications

AMS2694 In-Process Welding of Castings

AMS2804 Identification Castings

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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 E8/E8M	Tension Testing of Metallic Materials
ASTM E18	Rockwell Hardness of Metallic Materials
ASTM E478	Chemical Analysis of Copper Alloys
ASTM E1220	Visible Penetrant Testing Using Solvent-Removable Process
ASTM E1417/E1417M	Liquid Penetrant Testing
ASTM E1742/E1742M	Radiographic Examination

3. TECHNICAL REQUIREMENTS

Composition

Shall conform to the following percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E478, by spectrochemical methods, or by other analytical methods acceptable to purchaser:

Table 1 - Composition

Element	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 (3.1.1)	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 pounds (900 kg) of castings.

3.4 Test Specimens

3.4.1 Chemical Analysis Specimens

Shall be cast from each melt and be of any convenient size, shape, and form.

3.4.2 Tensile Specimens

Shall conform to ASTM E8/E8M and shall be poured from each melt.

3.5 Properties

Castings shall conform to the following requirements:

3.5.1 Tensile Properties

Shall be shown in Table 2, determined in accordance with ASTM E8/E8M on separately-cast specimens produced as in 3.4.2:

Table 2 - Minimum tensile properties

Property	Value
Tensile Strength	40.0 ksi (275 MPa)
Yield Strength at 0.2% Offset	18.0 ksi (125 MPa)
Elongation in 4D	20%

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 ASTM E1742/E1742M 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 testing in accordance with ASTM E1417/E1417M.

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

3.6.5 Castings shall not be peened, plugged, impregnated or welded unless authorized by purchaser.

3.6.5.1 When permitted in writing by purchaser, castings may be welded in accordance with AMS2694.

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 the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the castings conform to specified requirements.

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.

4.3 Sampling and Testing

4.3.1 One chemical analysis specimen in accordance with 3.4.1 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 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, AMS4845J, part number, and quantity.