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

AEROSPACE MATERIAL SPECIFICATION

AMS 4275C
Superseding AMS 4275B
Issued 5-1-48
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ALUMINUM ALLOY CASTINGS, PERMANENT MOLD
6.2Sn - 1.0Cu - 1.0Ni (850.0-T5)
Stress Relieved

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1. SCOPE:

1.1 Form: This specification covers an aluminum alloy in the form of permanent mold castings.

1.2 Application: Primarily for bearings.

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 2635 - Radiographic Inspection
AMS 2645 - Fluorescent Penetrant Inspection
AMS 2646 - Contrast Dye Penetrant Inspection
AMS 2804 - Identification, Castings

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

ASTM E10 - Brinell Hardness of Metallic Materials
ASTM E34 - Chemical Analysis of Aluminum and Aluminum-Base Alloys
ASTM E155 - Reference Radiographs for Inspection of Aluminum and Magnesium Castings, Series III

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 Standards:

MIL-STD-649 - Aluminum and Magnesium Products, Preparation for Shipment and Storage

3. TECHNICAL REQUIREMENTS:

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3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E34, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other approved analytical methods:

	min	max
Tin	5.5	7.0
Copper	0.7	1.3
Nickel	0.7	1.3
Iron	--	0.7
Silicon	--	0.7
Titanium	--	0.20
Manganese	--	0.10
Magnesium	--	0.10
Other Impurities, total	--	0.30
Aluminum	remainder	

3.2 Condition: Stress-relieved.

3.3 Casting: Castings shall be produced in lots from metal conforming to 3.1. Metal remelted from previously analyzed ingot may be poured directly into castings. Furnace or ladle additions of grain refining elements or alloys are permissible. Unless otherwise agreed upon by purchaser and vendor, molten metal taken from alloying furnaces, with or without additions of foundry operating scrap (gates, sprues, risers, and rejected castings), shall not be poured into castings unless first converted to ingot, analyzed and remelted or unless the composition of a sample taken after the last addition to the melt has been found to conform to 3.1.

3.3.1 A melt shall be the metal withdrawn from a batch furnace charge of 2000 lb (908 kg) or less as melted for pouring castings or, when permitted by purchaser, a melt shall be 4000 lb (1816 kg) or less of metal withdrawn from one continuous furnace in not more than 8 consecutive hours.

3.3.2 A lot shall consist of castings poured from a single melt in not more than 8 consecutive hours.

3.4 Cast Test Specimens: When chemical analysis specimens are required they shall be cast as follows and, when requested, shall be supplied with the castings:

3.4.1 Chemical Analysis Specimens: Shall be cast from each melt and shall be of the size and shape agreed upon by purchaser and vendor.

3.5 Heat Treatment: Castings shall be stress-relieved by heating uniformly to 420° - 440°F (216° - 227°C), holding at heat for not less than 5 hr, and cooling in air.

3.6 Properties:

3.6.1 Hardness: Castings, except at sprue and riser locations, shall have hardness of 35 - 50 HB/10/500, 35 - 50 HB/14.3/1000, or 40 - 55 HB/10/1000, determined in accordance with ASTM E10.

3.7 Quality:

3.7.1 Castings, 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 castings.

3.7.2 Castings shall be produced under radiographic control, unless otherwise specified. 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.

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3.7.3 When specified, castings shall be subject to fluorescent penetrant inspection in accordance with Ø AMS 2645 or to contrast dye penetrant inspection in accordance with AMS 2646.

3.7.4 Radiographic, fluorescent penetrant, contrast dye penetrant, and other quality standards shall be as Ø agreed upon by purchaser and vendor. ASTM E155 may be used to define radiographic acceptance standards.

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

3.7.5.1 When permitted in writing by purchaser, defects in castings may be removed and the castings Ø repaired by welding provided the weld repair area has properties comparable to those of the parent metal. Repair welds shall be subjected to the same inspection procedures and acceptance standards required of the castings. Weld repair areas shall be suitably marked to facilitate inspection. Heat treatment and nondestructive testing specified herein.

3.7.6 Castings shall not be impregnated, chemically treated, or coated to prevent leaking, unless specified or allowed by written permission of purchaser, designating the method to be used.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of castings 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 4.5. Purchaser reserves the right to perform such confirmatory testing as he deems 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 specifica- Ø tion are classified as acceptance tests and as preproduction tests.

4.2.1 For direct U.S. Military procurement, substantiating test data and, when requested, preproduction Ø test castings 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:

Ø 4.3.1 Two chemical analysis specimens in accordance with 3.4.1 or a casting from each lot.

Ø 4.3.2 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 molds and the casting procedure shall be approved by purchaser Ø before castings for production use are supplied, unless such approval be waived.

4.4.2 Vendor shall establish for production of sample castings of each part number the control factors of Ø processing 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 control factors of processing, vendor shall submit for reapproval a statement of the proposed changes in processing and, when requested, sample castings. Production castings incorporating the revised operations shall not be shipped prior to receipt of reapproval.

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4.4.2.1 Control factors for producing castings include, but are not limited to, the following:
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Type of furnace and its capacity
Size of furnace charge
Furnace atmosphere
Mold material
Gating and risering practices
Fluxing or deoxidation procedure
Pouring temperature (variation of ±50°F (±30°C) from the established limit is permissible)
Solidification and cooling procedures
Cleaning operations
Stress-relieving cycle
Methods of routine inspection

4.4.2.1.1 Any of the above control factors of processing considered proprietary by the vendor may be assigned a code designation. Each variation in such factors shall be assigned a modified code designation.
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4.5 Reports:

4.5.1 The vendor of castings shall furnish with each shipment three copies of a report showing the results of tests for chemical composition of at least one casting or of a separately-cast test specimen from each melt and the results of tests on castings from each lot to determine conformance to the hardness requirements. This report shall include the purchase order number, lot number, material specification number and its revision letter, part number, and quantity.
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4.5.2 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 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 a statement that the castings conform, or shall include 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.
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5. PREPARATION FOR DELIVERY:

5.1 Identification: Shall be in accordance with AMS 2804, including the lot number and heat treatment batch number.

5.1.1 Impregnated castings shall be marked IMP.

5.2 Packaging:

5.2.1 Castings 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.
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