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

AEROSPACE MATERIAL SPECIFICATION

AMS 4291D
Superseding AMS 4291C

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UNS A13800

ALUMINUM ALLOY CASTINGS, DIE
8.5Si - 3.5Cu (A380.0)
As Cast

1. SCOPE:

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

1.2 Application: Primarily for components of intricate shape, but not having thin sections, produced by cold-chamber die casting. This alloy has good casting characteristics and fair resistance to corrosion.

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 E34 - Chemical Analysis of Aluminum and Aluminum Alloys
ASTM E505 - Reference Radiographs for Inspection of Aluminum and Magnesium Die Castings

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:

3.1 Composition: Shall conform to the following percentages by weight (See 8.2), 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
Silicon	7.5	9.5
Copper	3.0	4.0
Zinc	--	3.0
Iron	--	1.3
Nickel	--	0.50
Manganese	--	0.50
Tin	--	0.35
Magnesium	--	0.10
Other Impurities, total	--	0.50
Aluminum	remainder	

3.2 Condition: As cast.

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 be all castings poured from a single melt in not more than 8 consecutive hours.

3.4 Chemical Analysis Specimens: Shall be cast from each melt, shall be of a size and shape agreed upon by purchaser and vendor, and, when requested, shall be supplied with the castings.

3.5 Quality:

3.5.1 Castings, as received by 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.

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

3.5.2 Castings shall be produced under radiographic control, when 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.

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

3.5.4 Radiographic, fluorescent penetrant, contrast dye penetrant, and other quality standards shall be as agreed upon by purchaser and vendor. ASTM E505 may be used to define radiographic acceptance standards.

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

3.5.5.1 When permitted in writing by purchaser, defects in castings may be removed and the castings 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. Repair welding shall be performed prior to any nondestructive testing specified herein.

3.5.6 Castings shall not be impregnated, chemically treated, or coated to prevent leakage, 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 specification are classified as acceptance tests and as preproduction tests and shall be performed on each lot of castings.

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, the contracting officer, or the request for procurement.

4.3 Sampling: Shall be in accordance with the following:

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

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

4.4.2 Vendor shall use the same foundry practices for production castings as for approved sample castings. If necessary to make any change in 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.

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 separately-cast specimens from each melt and stating that the castings conform to the other technical requirements of this specification. This report shall include the purchase order number, lot number, material specification number and its revision letter, part number, and quantity.