



AEROSPACE MATERIAL SPECIFICATION

AMS4288™

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Reaffirmed 2016-05

Aluminum Alloy Castings
7.0Si - 0.58Mg - 0.15Ti (E357.0-T6)
Solution and Precipitation Heat Treated

RATIONALE

AMS4288 has been reaffirmed to comply with the SAE five-year review policy.

1. SCOPE:

1.1 Form:

This specification covers an aluminum alloy in the form of castings.

1.2 Application:

These castings have been used typically for structural aircraft components, but usage is not limited to such applications.

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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org.

AMS 2360	Room Temperature Tensile Properties of Castings
AMS 2694	Repair Welding of Aerospace Castings
AMS 2771	Heat Treatment of Aluminum Alloy Castings

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Documents
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2.1 (Continued):

AMS 2804	Identification, Castings
AMS 4246	Aluminum Alloy Welding Wire, 7.0Si - 0.52Mg
AMS-STD-2175	Classification and Inspection of Castings
ARP1947	Dendrite Arm Spacing of Structural Aircraft Quality D357 Aluminum Alloy Castings, Determination and Acceptance of

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.

ASTM B 557	Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products
ASTM B 557M	Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products (Metric)
ASTM E 29	Using Significant Digits in Test Data to Determine Conformance with Specifications
ASTM E 34	Chemical Analysis of Aluminum and Aluminum Alloys
ASTM E 155	Reference Radiographs for Inspection of Aluminum and Magnesium Castings
ASTM E 227	Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique
ASTM E 607	Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique, Nitrogen Atmosphere
ASTM E 716	Sampling Aluminum and Aluminum Alloys for Spectrochemical Analysis
ASTM E 1251	Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Argon Atmosphere, Point-to-Plane, Unipolar Self-Initiating Capacitor Discharge
ASTM E 1417	Liquid Penetrant Examination
ASTM E 1742	Radiographic Examination

2.3 Aluminum Association Publications:

Available from the Aluminum Association, Inc., 900 19th Street, N.W., Washington, DC 20006 or www.aluminum.org.

AA-CS-E18	Cast Surface Smoothness
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3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 34, by spectrochemical methods in accordance with ASTM E 227, ASTM E 607, ASTM E 1251, or by other analytical methods acceptable to purchaser (See 3.4.1).

TABLE 1 - Composition

Element	min	max
Silicon	6.5	7.5
Iron	—	0.10
Manganese	—	0.10
Magnesium (See 8.3)	0.55	0.6
Titanium	0.10	0.20
Beryllium	—	0.002
Other Elements, each (See 8.4)	—	0.05
Other Elements, total	—	0.15
Aluminum	remainder	

3.1.1 Test results may be rounded by the “rounding off” method of ASTM E 29.

3.2 Condition:

Solution and precipitation heat treated to T6 condition.

3.3 Casting:

3.3.1 Castings shall be produced from metal conforming to 3.1, determined by analysis of a specimen (3.4.1) cast after the last melt addition.

3.3.2 Microstructure: Castings shall be produced using control of the solidification rate, as required to ensure specified properties. Validation shall be performed by measurement of dendrite arm spacing (DAS) in accordance with ARP1947 or by other method acceptable to purchaser.

3.4 Test Specimens:

3.4.1 Chemical Analysis Specimens: Shall be cast from each melt after the last melt addition and shall be tested to qualify the melt as in 3.1. The method for control of any subsequent additions prior to pouring (i.e., grain refining, correction for magnesium fade, etc.) shall be documented as a control factor (See 4.4.2). Spectrochemical sample shall be prepared in accordance with ASTM E 716.

3.4.2 Specimens Cut from Castings: Shall conform to ASTM B 557 or ASTM B 557M and shall be tested for tensile property determination as specified in 3.6.1.1. Location(s) and size of cut specimens shall be as agreed upon by purchaser and vendor.

3.4.3 Integrally Cast Coupons: Shall be integrally attached to castings and tested for tensile property determination as specified in 3.6.1.2. Unless otherwise specified by purchaser, the following shall apply:

- 3.4.3.1 One or more coupons shall be integrally cast with each casting and represent the thickest section of the highest strength designated area of the casting. Location(s) shall be as agreed upon by purchaser and vendor. Additional coupons may be added for retesting and for foundry purposes at the option of the foundry.
- 3.4.3.2 Coupons shall be flat and at least large enough to permit excision of sub-size round tensile specimens of 0.250 inch (6.35 mm) diameter conforming to ASTM B 557 or ASTM B 557M with a gage length of 1 inch (25.4 mm). When agreed upon by purchaser and vendor, specimens may be of rectangular configuration or cast to size.
- 3.4.3.3 Coupons shall remain attached to the casting until completion of heat treatment. When agreed upon by purchaser and vendor (e.g., to accommodate straightening, tooling fixtures, or other processing), coupons may be removed at an earlier operation, identified for traceability, and processed with the castings through all subsequent operations.
- 3.5 Heat Treatment:
- Shall be in accordance with AMS 2771.
- 3.6 Properties:
- 3.6.1 Tensile Properties: Castings and representative tensile specimens shall conform to the following requirements, determined in accordance with ASTM B 557 or ASTM B 557M:
- 3.6.1.1 Specimens Cut From Castings: Unless otherwise specified, specimens as in 4.3.1.2 shall have the properties shown in Table 2 and 3, as applicable.

TABLE 2 - Tensile Properties for Designated Areas of Casting and Integrally Cast Coupons

Property	Minimum Value
Tensile Strength	50.0 ksi (345 MPa)
Yield Strength at 0.2% Offset	40.0 ksi (276 MPa)
Elongation in 4D	3%

TABLE 3 - Tensile Properties for Casting Areas Other Than Designated Areas

Property	Minimum Value
Tensile Strength	45.0 ksi (310 MPa)
Yield Strength at 0.2% Offset	36.0 ksi (248 MPa)
Elongation in 4D	2%