



AEROSPACE MATERIAL SPECIFICATION	AMS4235	REV. C
	Issued 1980-04 Reaffirmed 2013-05 Revised 2015-06 Superseding AMS4235B	
Aluminum Alloy Castings 4.6Cu - 0.35Mn - 0.25Mg - 0.22Ti (A206.0-T7) Solution and Precipitation Heat Treated (Composition similar to UNS A12060)		

RATIONALE

AMS4235C results from a Limited Scope Ballot to revise the Title and Heat Treatment (3.4).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of sand, permanent mold, and composite mold castings.

1.2 Application

This product has been typically used for components requiring high strength and moderate ductility at both room and elevated temperatures, 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 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.

- AMS2175 Castings, Classification and Inspection of
- AMS2360 Room Temperature Tensile Properties of Castings
- AMS2694 In-Process Welding of Castings
- AMS2771 Heat Treatment of Aluminum Alloy Castings

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AMS2804 Identification, Castings

AS1990 Aluminum Alloy Tempers

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 B557 Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products

ASTM B660 Packaging/Packing of Aluminum and Magnesium Products

ASTM E29 Practice for Using Significant Digits in Test Data to Determine Conformance with Specifications

ASTM E34 Chemical Analysis of Aluminum and Aluminum-Base Alloys

ASTM E101 Spectroscopic Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique

ASTM E227 Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique

ASTM E607 Atomic Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by the Point-to-Plane Technique, Nitrogen Atmosphere

ASTM E716 Sampling of Aluminum and its Alloys for Spectrochemical Analysis

ASTM E1251 Optical Emission Spectrometric Analysis of Aluminum and Aluminum Alloys by Argon Atmosphere, Point-to-Plane, Unipolar Self-Initiating Capacitor Discharge

ASTM E1417 Liquid Penetrant Testing

ASTM E1742 Radiographic Examination

ASTM G44 Alternate Immersion Stress Corrosion Testing in 3.5% Sodium Chloride Solution

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the following percentages by weight as shown in Table 1, determined by wet chemical methods in accordance with ASTM E34 or by spectrochemical methods in accordance with ASTM E101, ASTM E227, ASTM E607, or ASTM E1251, or by other analytical methods acceptable to purchaser (See 3.3.1).

Table 1 - Composition

Element	min	max
Silicon	--	0.05
Copper	4.2	5.0
Manganese	0.20	0.50
Magnesium	0.15	0.35
Titanium	0.15	0.30
Iron	--	0.10
Zinc	--	0.10
Nickel	--	0.05
Tin	--	0.05
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

3.1.1 Test results may be rounded in accordance with the "rounding off" method of ASTM E29.

3.2 Condition

Solution and precipitation heat treated to the T71 temper (See AS1990).

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

Chemical analysis specimens, and tensile specimens shall be cast as follows:

3.3.1 Chemical Analysis Specimens

Shall be cast from each melt after the last melt addition and shall be tested to qualify the melt lot as in 3.1. Spectrochemical samples shall be prepared in accordance with ASTM E716.

3.3.2 Tensile Specimens shall be produced as follows:

3.3.2.1 Specimens Cut from Castings

Shall be removed after heat treatment and machined to conform to ASTM B557, and shall be either 0.500 inch (12.70 mm) diameter at the reduced parallel gage section, subsize specimens proportional to the standard, or standard sheet-type specimens, as required by 3.5.1.1.

3.3.2.2 Separately-Cast Specimens

Shall conform to ASTM B557 and shall be cast from each melt, after the last melt addition. Specimens shall be cast in molds representing the mold used for castings. Chills are not permitted on test specimen cavity except on the end face of the specimen when approved in accordance with 4.4.2.

3.4 Heat Treatment

Castings and representative tensile specimens shall be solution and precipitation heat treated in accordance with AMS2771, except as required by 3.4.1.1 and 3.4.1.2, to produce the properties specified in 3.5.1 and 3.5.2 (See 8.5 and 8.6). For specific castings, in lieu of the changes introduced by AMS4235C, it is permissible to continue using heat treating process parameters which were previously approved per 4.4.

3.4.1 Solution Heat Treatment

3.4.1.1 Soak at 910 °F ± 10 (488 °C ± 6) for 2 hours ± 0.25, raise temperature to 950 °F ± 10 (510 °C ± 6) and soak for 2 hours ± 0.25, raise temperature to 985 °F ± 10 (529 °C ± 6) and soak for not less than 12 hours, and quench and age at room temperature for not less than 72 hours.

3.4.1.2 When approved by the cognizant engineering organization, soak at 950 °F ± 10 (510 °C ± 6) for 2 hours ± 0.25, raise temperature to 985 °F ± 10 (529 °C ± 6), soak for not less than 8 hours, and quench and age at room temperature for not less than 72 hours.

3.4.2 Precipitation Heat Treatment

Soak at 390 °F ± 10 (199 °C ± 5) for 4 hours minimum, and cool in air.

3.5 Properties

Castings and representative tensile specimens produced in accordance with 3.3.2 shall conform to the following requirements (See 8.4):