



AEROSPACE MATERIAL SPECIFICATION

AMS4331™**REV. B**

Issued 2003-10
Reaffirmed 2014-05
Revised 2025-04

Superseding AMS4331A

Aluminum Alloy Extrusions,
7.8Zn - 2.6Mg - 2.0Cu - 0.10Zr - (7068-T6511),
Solution Heat Treated, Stress Relieved, and Precipitation Heat Treated
(Composition similar to UNS A97068)

RATIONALE

AMS4331B results from a Five-Year Review and update of this specification with changes to update the Title to add UNS reference and standard language related to unauthorized exceptions (see 3.3.1.1, 4.4.2, and 8.4), relocate Definitions (see 2.4), and update Applicable Documents (see Section 2).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of extruded bars, rods, shapes (profiles), and tubing 0.250 to 3.000 inches (6.35 to 76.20 mm), inclusive, in nominal diameter, least thickness, or nominal wall thickness (see 8.5).

1.2 Application

These extrusions have been used typically for structural parts requiring a combination of high tensile strength and moderate fatigue strength, but usage is not limited to such applications.

1.2.1 Certain design and processing procedures may cause these products to become susceptible to stress-corrosion cracking; ARP823 recommends practices to minimize such conditions.

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.

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<https://www.sae.org/standards/content/AMS4331B/>

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.

AMS2355	Quality Assurance, Sampling and Testing, Aluminum Alloys and Magnesium Alloy, Wrought Products (Except Forging Stock), and Rolled, Forged, or Flash Welded Rings
AMS2772	Heat Treatment of Aluminum Alloy Raw Materials
ARP823	Minimizing Stress-Corrosion Cracking in Wrought High-Strength Aluminum Alloy Products
AS7766	Terms Used in Aerospace Metals Specifications

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 B594	Ultrasonic Inspection of Aluminum Alloy Wrought Products
ASTM B660	Packaging/Packing of Aluminum and Magnesium Products
ASTM B666/B666M	Identification Marking of Aluminum and Magnesium Products.

2.3 ANSI Accredited Publications

Copies of these documents are available online at <https://webstore.ansi.org/>.

ANSI H35.1/H35.1M	Standard Alloy and Temper Designation System For Aluminum
ANSI H35.2	Dimensional Tolerances for Aluminum Mill Products
ANSI H35.2M	Dimensional Tolerances for Aluminum Mill Products (Metric)

2.4 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS2355.

Table 1 - Composition

Element	Min	Max
Silicon	--	0.12
Iron	--	0.15
Copper	1.6	2.4
Manganese	--	0.10
Magnesium	2.2	3.0
Chromium	--	0.05
Zinc	7.3	8.3
Titanium	--	0.10
Zirconium	0.05	0.15
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

3.2 Condition

Extruded, solution heat treated, and stress relieved by stretching to produce a nominal permanent set of 1.5%, but not less than 1% nor more than 3%, and precipitation heat treated to the T6511 temper (refer to ANSI H35.1/H35.1M). Heat treatment shall be in accordance with AMS2772.

3.2.1 Extrusions may receive minor straightening, after stretching, of an amount necessary to meet the requirements of 3.5.

3.2.2 Extrusions shall be supplied with an as-extruded surface finish; light polishing to remove minor surface imperfections is permissible provided such imperfections can be removed within the dimensional tolerance.

3.3 Properties

Extrusions shall conform to the following requirements, determined in accordance with AMS2355 on the mill-produced size:

3.3.1 Longitudinal Tensile Properties

Shall be as shown in Table 2.

Table 2A - Minimum longitudinal tensile properties, inch/pound units

Nominal Diameter or Least Thickness (Bars, Rods, Wire, Shapes) or Nominal Wall Thickness (Tubing) Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
0.250 to 3.000, incl	99.0	95.0	5

Table 2B - Minimum longitudinal tensile properties, SI units

Nominal Diameter or Least Thickness (Bars, Rods, Wire, Shapes) or Nominal Wall Thickness (Tubing) Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
6.35 to 76.20, incl	683	655	5

3.3.1.1 Mechanical property requirements for product outside the range covered by 1.1 shall be agreed upon between the purchaser and producer and reported per 4.4.2 (see 8.5).

3.4 Quality

Extrusions, as received by the purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from conditions detrimental to usage of the extrusions. Any detrimental conditions found during the customer's manufacturing process are subject to rejection.

- 3.4.1 When specified, extrusions 0.500 inch (12.70 mm) and over in nominal diameter, or least distance between parallel sides, shall be subjected to ultrasonic inspection in accordance with ASTM B594. Standards for acceptance shall be as shown in Table 3 (see 8.5).

Table 3 - Ultrasonic class requirements

Nominal Thickness Inches	Nominal Thickness Millimeters	Ultrasonic Class
0.500 to 1.500, excl	12.70 to 38.10, excl	B
1.500 to 3.000, incl	38.10 to 76.20, incl	A

3.5 Tolerances

Shall conform to all applicable requirements of ANSI H35.2 or ANSI H35.2M.

3.6 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.2.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of extrusions shall supply all samples for the producer's tests and shall be responsible for the performance of all required tests. The purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the products conform to the specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (see 3.1), tensile properties (see 3.3.1), ultrasonic inspection when specified (see 3.4.1), and tolerances (see 3.5) are acceptance tests and, except for composition, shall be performed on each inspection lot.

4.3 Sampling and Testing

Shall be in accordance with AMS2355.

4.4 Reports

- 4.4.1 The producer of extrusions shall furnish with each shipment a report stating that the extrusions conform to the composition requirements and tolerances and showing the results of ultrasonic inspection (when specified) and the numerical results on each inspection lot to determine conformance to the other acceptance tests. This report shall include the purchase order number, inspection lot number, AMS4331B, size or section identification number, and quantity. The report shall also include the producer, product form, and size of the mill product.

- 4.4.2 When material produced to this specification is beyond the sizes allowed in the scope or tables, or other exceptions are taken to the technical requirements listed in Section 3, the report shall contain a statement "This material is certified as AMS4331B(EXC) because of the following exceptions:" and the specific exceptions shall be listed.