AEROSPACE MATERIAL SPECIFICATION

AMS4317™	REV. C
Issued 2005-07 Revised 2025-04 Superseding AMS4317B	

Aluminum Alloy, Extruded Bar, Rod, and Shapes,
5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075-T76(51X)),
Solution Heat Treated and Overaged
(Composition similar to UNS R97075)

RATIONALE

AMS4317C results from a Five-Year Review and update of this specification with changes to add provisions for use of AS6279 (see 3.7), remove obsolete weight criteria for Ultrasonic Testing (see Table 3), update wording to prohibit unauthorized exceptions (see 3.3.1.2 and 8.4), relocate Definitions (see 2.4) and note regarding statistical analysis of properties (see 3.3.1.3), and update Applicable Documents (see Section 2), options for tempers (see 3.2.1), and Ordering Information (see 8.5).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of extruded bars, rods, and shapes up to 4.000 inches (101.60 mm), inclusive, in nominal diameter or least thickness and having a nominal cross-sectional area up to 20 square inches (129 cm^2) (see 8.5).

1.2 Application

This product has been used typically for structural applications requiring material with high strength and resistance to exfoliation corrosion, 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.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
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For more information on this standard, visit
https://www.sae.org/standards/content/AMS4317C/

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
AS6279	Standard Practice for Production, Distribution, and Procurement of Metal Stock
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
ASTM G34	Exfoliation Corrosion Susceptibility in 2XXX and 7XXX Series Aluminum Alloys (EXCO Test)
ASTM G47	Determining Susceptibility to Stress-Corrosion Cracking of 2XXX and 7XXX Aluminum Alloy 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	--	0.40
Iron	--	0.50
Copper	1.2	2.0
Manganese	--	0.30
Magnesium	2.1	2.9
Chromium	0.18	0.28
Zinc	5.1	6.1
Titanium	--	0.20
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

3.2 Condition

Solution heat treated, 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 T76511 or T76510 temper, as specified (see 8.5) (refer to ANSI H35.1/H35.1M). Heat treatments shall be performed in accordance with AMS2772.

3.2.1 When T76 is specified, T76511 or T76510 are acceptable, unless prohibited by the procurement document. If T76511 or T76510 are specified, T76 may not be supplied without approval of the purchaser.

3.2.2 Extrusions supplied in the T76 or T76511 temper may receive minor straightening, after stretching, of an amount necessary to meet the requirements of 3.5.

3.2.3 Extrusions supplied in the T76510 temper shall receive no straightening after stretching.

3.2.4 Extrusions shall be supplied with an as-extruded surface finish; light polishing to remove minor surface imperfections is acceptable provided such imperfections can be removed within specified dimensional tolerances.

3.3 Properties

Extrusions shall conform to the following requirements, determined in accordance with AMS2355 on the mill-produced size (see 8.2):

3.3.1 Tensile Properties

3.3.1.1 Longitudinal

Shall be as shown in Table 2 for all tempers.

Table 2A - Minimum longitudinal tensile properties, inch/pound units (see 3.3.1.3)

Nominal Diameter or Least Thickness Inches	Nominal Cross-Sectional Area Square Inches	Tensile Strength ksi	Yield Strength at 2% Offset ksi	Elongation in 2 Inches or 4D %
Up to 0.049, incl	All	73.0	63.0	7
Over 0.049 to 0.124, incl	All	74.0	64.0	7
Over 0.124 to 0.249, incl	Up to 20	74.0	64.0	7
Over 0.249 to 2.000, incl	Up to 20	75.0	65.0	7
Over 2.000 to 3.000, incl	Up to 20	74.0	64.0	7
Over 3.000 to 4.000, incl	Up to 20	74.0	63.0	7

Table 2B - Minimum longitudinal tensile properties, SI units (see 3.3.1.3)

Nominal Diameter or Least Thickness Millimeters	Nominal Cross-Sectional Area Square Centimeters	Tensile Strength MPa	Yield Strength at 2% Offset MPa	Elongation in 50.8 mm or 4D %
Up to 1.24, incl	All	503	434	7
Over 1.24 to 3.15, incl	All	510	441	7
Over 3.15 to 6.32, incl	Up to 129	510	441	7
Over 6.32 to 50.80, incl	Up to 129	517	448	7
Over 50.80 to 76.20, incl	Up to 129	510	441	7
Over 76.20 to 101.60, incl	Up to 129	510	434	7

3.3.1.2 Mechanical property requirements for product outside of the range covered by 1.1 shall be agreed upon between the purchaser and producer and reported per 4.4.1 (see 8.5).

3.3.1.3 The mechanical properties in Table 2 have been taken from QQ-A-200/15 and have not been substantiated by AMS statistical procedures.

3.3.2 Electrical Conductivity

Conductivity shall be measured on the same specimens used for mechanical property tests and shall be measured prior to testing for mechanical properties.

3.3.2.1 If the conductivity is 38% IACS (International Annealed Copper Standard) (22 MS/m) or higher, and the tensile properties meet the minimum limits specified herein, the material is acceptable.

3.3.2.2 If the conductivity is at least 36% IACS (20.9 MS/m) but less than 38% IACS (22 MS/m), the material, 0.750 inch (19.05 mm) and over in nominal thickness, may be tested as specified in 3.3.3 and 3.3.4 and accepted if it passes these tests. As alternatives, the product may be given an additional precipitation heat treatment or reheat treated and retested.

3.3.2.3 If the conductivity is lower than 36.0% IACS (20.9 MS/m), the product is not acceptable and may be given an additional precipitation heat treatment or entirely reheat treated and retested.

3.3.3 Exfoliation-Corrosion Resistance

The product shall not exhibit exfoliation corrosion at the T/10 plane greater than that illustrated by Photo EB, Figure 2, of ASTM G34.

3.3.4 Stress-Corrosion Test

Specimens, cut from material 0.750 inch (19.05 mm) and over in nominal thickness, shall show no evidence of stress-corrosion cracking when tested in accordance with ASTM G47 and stressed in the short-transverse direction to 25.0 ksi (172 MPa).

3.4 Quality

Extrusions, as received by the purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the extrusions.

3.4.1 When specified, rod, bar, and shapes shall be ultrasonically inspected in accordance with ASTM B594 to the acceptance limits specified in Table 3. All extrusions in the inspection lot shall be inspected (see 8.5).

Table 3 - Ultrasonic acceptance limits

Nominal Diameter or Least Thickness Inches (Millimeters)	Maximum Thickness-to-Width Ratio	Discontinuity Class
0.500 (12.7) to 1.499 (38.1), incl	10 to 1	B
Over 1.499 (38.1)	10 to 1	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 4.4.1.

3.7 Production, distribution, and procurement of metal stock shall comply with AS6279. This requirement becomes effective 18 months after publication of AMS4317C.

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 extrusions conform to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (see 3.1), longitudinal tensile properties (see 3.3.1.1), electrical conductivity (see 3.3.2), quality (see 3.4), tolerances (see 3.5), and ultrasonic testing when specified (see 3.4.1) are acceptance tests and, except for composition, shall be performed on each inspection lot.

4.2.2 Periodic Tests

Exfoliation-corrosion resistance (see 3.3.3) and stress-corrosion resistance (see 3.3.4) are periodic tests and shall be performed on at least one sample per month of the applicable tempers for each thickness or diameter range listed in the table of minimum mechanical properties in the detailed specification produced during the month and for shapes with thickness-to-width ratios of up through 6 and over 6 within the thickness ranges produced during the month, unless frequency of testing is specified by the purchaser.

4.3 Sampling and Testing

Shall be in accordance with AMS2355.

4.4 Reports

The producer of the product shall furnish with each shipment a report stating that the product conforms to the chemical composition, tolerances, and ultrasonic testing when specified and showing the numerical results of tests on each inspection lot to determine conformance to the other acceptance test requirements. The report shall state that the product conforms to the other specified requirements and shall include the purchase order number, inspection lot number, AMS4317C, size, temper, and quantity. The report shall also identify the producer, the mill product form, and the mill-produced size.