



AEROSPACE MATERIAL SPECIFICATION	AMS4617™	REV. B
	Issued	2011-07
	Revised	2024-12
Superseding AMS4617A		
Aluminum Alloy, Extrusions, 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075-T73, 7075-T73511, 7075-T73510), Solution Heat Treated, Stress Relieved by Stretching when required, and Overaged (Composition similar to UNS A97075)		

RATIONALE

AMS4617B results from a Five-Year Review and update of this specification with changes to add AS6279 controls (see 3.7); update wording to prohibit unauthorized exceptions (see 3.3.1.4, 3.6, 4.4.1, 5.1.1, and 8.5); relocate Definitions (see 2.4); update Applicable Documents (see Section 2), Condition (see 3.2.1), Hardness (see 8.3), and Ordering Information (see 8.6); and allow the use of the immediate prior specification revision (see 8.4).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of extruded bars, rods, wire, shapes, and tubing 0.040 to 4.499 inches (1.01 to 114.27 mm), inclusive, in nominal diameter or least thickness and with areas up to 32 square inches (206 cm²), inclusive (see 8.6).

1.2 Application

These extrusions have been used typically for parts subject to excessive warpage during machining and for parts requiring high strength and resistance to stress-corrosion cracking, 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.

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

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For more information on this standard, visit
<https://www.sae.org/standards/content/AMS4617B/>

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 E10 Brinell Hardness of Metallic Materials

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 T73511 or T73510 temper (refer to ANSI H35.1/H35.1M). Heat treatments shall be performed in accordance with AMS2772.

3.2.1 The T73511 temper shall be supplied unless T73510 is specified. When T73 is specified, the stress relief by stretching may be omitted and the T73 temper supplied if the stretching is not practical due to the shape of the extrusion.

If T73 is specified, the product may be supplied in the T73511 or T73510 condition unless prohibited by the procurement document. If T73511 or T73510 is specified, T73 shall not be supplied without approval of the purchaser.

3.2.2 Extrusions supplied in the T73 or T73511 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 T73510 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 permissible provided such imperfections can be removed within the dimensional tolerances.

3.3 Properties

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

3.3.1 Tensile Properties

3.3.1.1 Longitudinal

Shall be as shown in Table 2.

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

Nominal Diameter or Least Thickness and Area (Bars, Rods, Wire, Shapes) or Nominal Wall Thickness and Area (Tubing) Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
0.040 to 0.061, incl Area up to 20 square inches, incl	67.0	59.0	8
0.062 to 0.249, incl Area up to 20 square inches, incl	68.0	58.0	7
Over 0.249 to 1.499, incl Area up to 25 square inches, incl	70.0	61.0	8
Over 1.499 to 2.999, incl Area up to 25 square inches, incl	69.0	59.0	8
Over 2.999 to 4.499, incl Area up to 20 square inches, incl	68.0	57.0	7
Area over 20 to 32 square inches, incl	65.0	55.0	7

Table 2B - Minimum longitudinal tensile properties, SI units

Nominal Diameter or Least Thickness and Area (Bars, Rods, Wire, Shapes) or Nominal Wall Thickness and Area (Tubing) Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
1.01 to 1.56, incl Area up to 129 cm ² , incl	462	407	8
1.57 to 6.32, incl Area up to 129 cm ² , incl	469	400	7
Over 6.32 to 38.07, incl Area up to 161 cm ² , incl	483	421	8
Over 38.07 to 76.17, incl Area up to 161 cm ² , incl	476	407	8
Over 76.17 to 114.27, incl Area up to 129 cm ² , incl	469	393	7
Area over 129 to 206 cm ² , incl	448	379	7

3.3.1.2 Long-Transverse

Rectangular bars and shapes, tested in the long-transverse direction, shall meet the requirements of Table 3.

Table 3A - Minimum long-transverse tensile properties, inch/pound units

Nominal Thickness and Area Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
0.062 to 0.249, incl Area up to 20 square inches, incl	65.0	55.0	3
Over 0.249 to 0.499, incl Area up to 20 square inches, incl	67.0	58.0	4
Over 0.499 to 0.749, incl Area up to 25 square inches, incl	66.0	57.0	4
Over 0.749 to 1.499, incl Area up to 25 square inches, incl	66.0	56.0	4
Over 1.499 to 2.999, incl Area up to 25 square inches, incl	63.0	52.0	4
Over 2.999 to 4.499, incl Area up to 20 square inches, incl	60.0	48.0	3
Area over 20 to 32 square inches, incl	57.0	46.0	3

Table 3B - Minimum long-transverse tensile properties, SI units

Nominal Thickness and Area Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
1.57 to 6.32, incl Area up to 129 cm ² , incl	448	379	3
Over 6.32 to 12.67, incl Area up to 129 cm ² , incl	462	400	4
Over 12.67 to 19.02, incl Area up to 161 cm ² , incl	455	393	4
Over 19.02 to 38.07, incl Area up to 161 cm ² , incl	455	386	4
Over 38.07 to 76.17, incl Area up to 161 cm ² , incl	434	358	4
Over 76.17 to 114.27, incl Area up to 129 cm ² , incl	414	331	3
Area over 129 to 206 cm ² , incl	393	317	3

3.3.1.3 Short-Transverse

Bars, rods, and shapes, tested in the short-transverse direction, shall meet the requirements of Table 4.

Table 4A - Minimum short-transverse tensile properties, inch/pound units

Nominal Diameter or Least Thickness and Area Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
1.500 to 2.999, incl Area up to 25 square inches, incl	60.0	48.0	2
Over 2.999 to 4.499, incl Area up to 20 square inches, incl	57.0	44.0	2
Area over 20 to 32 square inches, incl	54.0	41.0	2

Table 4B - Minimum short-transverse tensile properties, SI units

Nominal Thickness and Area Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
38.10 to 76.17, incl Area up to 161 cm ² , incl	414	331	2
Over 76.17 to 114.27, incl Area up to 161 cm ² , incl	393	303	2
Area over 129 to 206 cm ² , incl	372	283	2

3.3.1.4 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 8.6).

3.3.2 Conductivity

Shall be as follows, determined on the surface of the sample:

3.3.2.1 If the conductivity is 40.0% IACS (International Annealed Copper Standard) (23.2 ms/m) or higher and the longitudinal tensile properties meet specified requirements, the product is acceptable.

3.3.2.2 If the conductivity is 38.0 to 39.9% IACS (22.0 to 23.1 ms/m), if the longitudinal tensile properties meet specified requirements, and if the longitudinal yield strength does not exceed the specified minimum by more than 11.9 ksi (82 MPa), the product is acceptable.

3.3.2.3 If the conductivity is below 40.0% IACS (23.2 ms/m) and the longitudinal yield strength exceeds the specified minimum by more than 11.9 ksi (82 MPa), the product shall be given additional overaging heat treatment. If, after such treatment, the product meets the requirements of 3.3.1 and 3.3.2.1 or 3.3.2.2, the product is acceptable.

3.3.2.4 If the conductivity is below 38.0% IACS (22.0 ms/m), the product is not acceptable and shall be reprocessed regardless of property level.

3.3.3 Stress-Corrosion Cracking Resistance

Specimens, cut from product 0.750 inch (19.05 mm) and over in nominal thickness, shall show no evidence of stress-corrosion cracking when stressed in the short-transverse (perpendicular to grain flow) direction to 75% of the specified minimum longitudinal (parallel to grain flow) yield strength.

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, extrusions shall be subjected to ultrasonic inspection in accordance with ASTM B594 and shall meet the following requirements:

3.4.1.1 Extrusions 0.500 to 1.499 inches (12.70 to 38.07 mm), inclusive, in nominal thickness and with a maximum width-to-thickness ratio of 10 to 1 shall meet discontinuity Class B.

3.4.1.2 Extrusions over 1.499 inches (38.07 mm) in nominal thickness and with a maximum width-to-thickness ratio of 10 to 1 shall meet discontinuity Class 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

Production, distribution, and procurement of metal stock shall comply with AS6279. This requirement becomes effective 18 months after publication of AMS4617B.

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), conductivity (see 3.3.2), ultrasonic inspection (see 3.4.1) when specified, and tolerances (see 3.5) are acceptance tests and, except for composition, shall be performed on each lot.

4.2.2 Periodic Tests

Transverse tensile properties (see 3.3.1.2 and 3.3.1.3) and stress-corrosion cracking resistance (see 3.3.3) are periodic tests and shall be performed at a frequency selected by the producer 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 extrusions shall furnish with each shipment a report stating that the extrusions conform to the composition and showing the results of tests to determine conformance to the other acceptance test requirements and, when performed, to the periodic test requirements. This report shall include the purchase order number, lot number, AMS4617B, size or section identification number, and quantity. The report shall also identify the mill producer and the size of the mill product.