



AEROSPACE MATERIAL SPECIFICATION	AMS4344™	REV. G
	Issued	1984-07
	Revised	2024-04
Superseding AMS4344F		
Aluminum Alloy, Extrusions 5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7175-T73511) Solution Heat Treated, Stress Relieved by Stretching, Straightened, and Overaged (Composition similar to UNS A97175)		

RATIONALE

AMS4344G results from a Five-Year Review and update of this specification with changes to update wording to prohibit unauthorized exceptions (see 3.4.1.1, 3.7, and 8.4), update Applicable Documents (see Section 2) and wording for Overaging Heat Treatment (see 3.3.2), relocate Definitions (see 2.4), and remove obsolete weight criteria for ultrasonic testing (see 3.5.1).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of extruded bars, rods, and profiles 0.250 to 2.000 inches (6.35 to 50.80 mm) in nominal thickness and up to 32 square inches (206 cm²), inclusive, in cross-sectional area (see 8.5).

1.2 Application

These extrusions have been used typically for structural applications requiring a combination of high tensile properties, moderate fatigue strength, stress-corrosion resistance, and good fracture toughness, 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.

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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

AS7766 Terms Used in Aerospace Metals Specifications

2.2 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 Systems For Aluminum

ANSI H35.2 Dimensional Tolerances for Aluminum Mill Products

ANSI H35.2M Dimensional Tolerances for Aluminum Mill Products (Metric)

2.3 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 E399 Linear-Elastic Plane-Strain Fracture Toughness of Metallic Materials

ASTM G47 Determining Susceptibility to Stress-Corrosion Cracking of 2XXX and 7XXX Aluminum Alloy Products

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		0.15
Iron		0.20
Copper	1.2	2.0
Manganese		0.10
Magnesium	2.1	2.9
Chromium	0.18	0.28
Zinc	5.1	6.1
Titanium	--	0.10
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

3.2 Condition

Extruded, 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 overaged to the T73511 (refer to ANSI H35.1/H35.1M) temper.

3.2.1 Extrusions may receive minor straightening, after stretching, of an amount necessary to meet the requirements of 3.6.

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 specified dimensional tolerances.

3.3 Heat Treatment

Heat treatment shall be performed in accordance with AMS2772 except as noted:

3.3.1 Solution Heat Treatment

Solution heat treat at 870 °F ± 10 °F (466 °C ± 6 °C).

3.3.2 Overaging Heat Treatment

Recommended practice is heating to 225 °F ± 10 °F (107 °C ± 6 °C), holding at heat for 6 to 8 hours, followed by further heating to 350 °F ± 10 °F (177 °C ± 6 °C), and holding at heat for 6 to 8 hours.

3.4 Properties

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

3.4.1 Tensile Properties

Shall be as specified in Tables 2A or 2B, determined on specimens from extrusions 0.250 to 2.000 inches (6.35 to 50.80 mm) in nominal thickness and up to 32 square inches (206 cm²), inclusive, in cross-sectional area.

Table 2A - Minimum tensile strength, inch/pound units

Specimen Orientation	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
Longitudinal	69.0	59.0	8
Long-Trans.	63.0	52.0	4

Table 2B - Minimum tensile strength, SI units

Specimen Orientation	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
Longitudinal	476	407	8
Long-Trans.	434	359	4

3.4.1.1 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).

3.4.2 Fracture Toughness

When specified, plane strain fracture toughness (K_{Ic}) in accordance with ASTM E399 shall be not lower than the values shown in Tables 3A or 3B.

Table 3A - Minimum fracture toughness, inch/pound units

Nominal Diameter or Least Thickness Inches	Specimen Orientation	$\frac{K_{Ic}}{\text{ksi}\sqrt{\text{inch}}}$
Over 0.749 to 1.800, incl	L-T	30
Over 0.749 to 1.800, incl	T-L	22

Table 3B - Minimum fracture toughness, SI units

Nominal Diameter or Least Thickness Millimeters	Specimen Orientation	$\frac{K_{Ic}}{\text{MPa}\sqrt{\text{m}}}$
Over 19.02 to 45.72, incl	L-T	33
Over 19.02 to 45.72, incl	T-L	24

3.4.3 Conductivity

3.4.3.1 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 extrusions are acceptable.

3.4.3.2 If the conductivity is 38.0 to 39.9% IACS (22.0 to 23.1 MS/m), the longitudinal tensile properties meet specified requirements, and the longitudinal yield strength does not exceed the specified minimum by more than 11.9 ksi (82.0 MPa), the extrusions are acceptable.

3.4.3.3 If the conductivity is lower than 40.0% IACS (23.2 MS/m), and the longitudinal yield strength exceeds the specified minimum by more than 11.9 ksi (82.0 MPa), the extrusions shall be given additional overaging heat treatment. If, after such treatment, the extrusions meet the requirements of 3.4.1, 3.4.2 (when specified), and 3.4.3.1 or 3.4.3.2, the extrusions are acceptable.

3.4.3.4 If the conductivity is below 38.0% IACS (22.0 MS/m), the extrusions are not acceptable.

3.4.3.4.1 Extrusions found to be unacceptable may be given additional overaging heat treatment, and if, upon completion of such treatment, they develop conductivity/property relationships conforming to 3.4.1, 3.4.2 (when specified), and 3.4.3.1 or 3.4.3.2, they shall be acceptable.

3.4.4 Stress-Corrosion Resistance

Specimens, cut from extrusions 0.750 inch (19.05 mm) and over in nominal diameter or section thickness, shall show no evidence of stress-corrosion cracking when tested in the short-transverse (perpendicular to grain flow) direction to 44.0 ksi (303 MPa) per ASTM G47.

3.5 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.

3.5.1 When specified, each bar, rod, and profile not exceeding a 10 to 1 width-to-thickness ratio shall be subjected to ultrasonic inspection in accordance with ASTM B594 and shall meet the requirements shown in Tables 4A or 4B.

Table 4A - Ultrasonic requirements, inch/pound units

Nominal Thickness Inches	Discontinuity Class
0.500 to 1.500, excl	B
1.500 to 5.000, incl	A

Table 4B - Ultrasonic requirements, SI units

Nominal Thickness Millimeters	Discontinuity Class
12.70 to 38.10, excl	B
38.10 to 127.00, incl	A

3.6 Tolerances

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

3.7 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.

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), tensile properties (see 3.4.1), fracture toughness (see 3.4.2) when specified, conductivity (see 3.4.3), ultrasonic inspection (see 3.5.1) when specified, and tolerances (see 3.6) are acceptance tests and, except for composition, shall be performed on each lot.