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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4344B

Issued JUL 1984
Revised MAR 1998

Superseding AMS 4344A

Submitted for recognition as an American National Standard

Aluminum Alloy, Extrusions
5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7175-T73511)
Solution Heat Treated, Stress Relieved by Stretching, Straightened, and Overaged

UNS A97175

1. SCOPE:

1.1 Form:

This specification covers an aluminum alloy in the form of extruded bars, rods, and profiles.

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 following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2355	Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings
MAM 2355	Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings, Metric (SI) Units
AMS 2772	Heat Treatment of Aluminum Alloy Raw Materials

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-7154 FAX: (724) 776-0243
TO PLACE A DOCUMENT ORDER: (724) 776-4970 FAX: (724) 776-0790
SAE WEB ADDRESS: http://www.sae.org

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 594 Ultrasonic Inspection of Aluminum-Alloy Wrought Products for Aerospace Applications
ASTM B 666/B 666M Identification Marking of Aluminum Products

2.3 ANSI Publications:

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

ANSI H 35.2 Dimensional Tolerances for Aluminum Mill Products
ANSI H 35.2M Dimensional Tolerances for Aluminum Mill Products (Metric)

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS 2355 or MAM 2355.

TABLE 1 - Composition

Element	min	max
Zinc	5.1	6.1
Magnesium	2.1	2.9
Copper	1.2	2.0
Chromium	0.18	0.28
Iron	--	0.20
Silicon	--	0.15
Manganese	--	0.10
Titanium	--	0.10
Other Impurities, each	--	0.05
Other Impurities, 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 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 AMS 2772 and as follows, except overaging shall be performed at a temperature, for a time, and cooling as required to meet the requirements of 3.4.

3.3.1 Solution Heat Treatment: Heat to 870 °F ± 10 (466 °C ± 6); soaking times and quenching conditions should conform to AMS 2772.

3.4 Properties:

Extrusions shall conform to the following requirements, determined in accordance with AMS 2355 or MAM 2355 and as specified in 3.4.2:

3.4.1 Tensile Properties: Shall be as specified in Table 2, 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 cm^2), 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-Transverse	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 5D %
Longitudinal	476	407	8
Long-Transverse	434	359	4

3.4.2 Fracture Toughness: When specified, plane strain fracture toughness (K_{Ic}) shall be not lower than the values shown in Table 3.

TABLE 3A - Minimum Fracture Toughness, Inch/Pound Units

Nominal Diameter or Least Thickness Inches	Specimen Orientation (See 8.2)	$\frac{K_{Ic}}{ksi\sqrt{inch}}$
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 (See 8.2)	$\frac{K_{Ic}}{MPa\sqrt{m}}$
Over 19.02 to 45.72, incl	L-T	33
Over 19.02 to 45.72, incl	T-L	24

3.4.2.1 When agreed upon by purchaser and vendor, alternate fracture toughness tests may be employed in lieu of the plane-strain fracture toughness test.

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, extrusion 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 stressed in the short-transverse (perpendicular to grain flow) direction to 44.0 ksi (303 MPa).

3.5 Quality:

Extrusions, as received by 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, extrusions shall be subjected to ultrasonic inspection in accordance with ASTM B 594 or other techniques acceptable to purchaser. Extrusions 0.500 to 1.499 inches (12.70 to 38.07 mm), inclusive, in nominal thickness, not exceeding 600 pounds (272 kg) in weight per piece, and not exceeding a 10 to 1 width-to-thickness ratio shall meet discontinuity class B. Extrusions 1.500 inches (38.10 mm) and over in nominal thickness not exceeding 600 pounds in weight (272 kg) per piece, and not exceeding a 10 to 1 width-to-thickness ratio shall meet discontinuity class A.

3.6 Tolerances:

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

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

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