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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4340D

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Superseding AMS 4340C

Submitted for recognition as an American National Standard

Aluminum Alloy, Extrusions
6.2Zn - 2.3Cu - 2.2Mg - 0.12Zr (7050-T76511)
Solution Heat Treated, Stress Relieved, Straightened, and Overaged

UNS A97050

1. SCOPE:

1.1 Form:

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

1.2 Application:

These products have been used typically for structural applications requiring high tensile properties and good exfoliation corrosion resistance, 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 and Magnesium Products
ASTM G 34	Exfoliation Corrosion Susceptibility in 2XXX and 7XXX Series Aluminum Alloys (EXCO Test)

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	5.7	6.7
Copper	2.0	2.6
Magnesium	1.9	2.6
Zirconium	0.08	0.15
Iron	--	0.15
Silicon	--	0.12
Manganese	--	0.10
Titanium	--	0.06
Chromium	--	0.04
Other Impurities, each	--	0.05
Other Impurities, 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 treated to the T76511 temper. Solution and precipitation heat treatments shall be performed in accordance with AMS 2772.

3.2.1 The product 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 specified dimensional tolerances.

3.3 Properties:

Product shall conform to the following requirements, determined in accordance with AMS 2355 or MAM 2355:

3.3.1 Tensile Properties: Shall be as shown in Table 2, determined on specimens as in 4.3.1 taken in the longitudinal direction.

TABLE 2A - Minimum Longitudinal Tensile Properties, Inch/Pound Units

Nominal Diameter or Least Thickness (Wall Thickness of Tubing) Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 4D %
Up to 0.499, incl	77.0	68.0	7
Over 0.499 to 5.000, incl	79.0	69.0	7

TABLE 2B - Minimum Longitudinal Tensile Properties, SI Units

Nominal Diameter or Least Thickness (Wall Thickness of Tubing) Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 4D %
Up to 12.67, incl	531	469	7
Over 12.67 to 127.00, incl	545	476	7

3.3.2 Corrosion Resistance: Resistance to stress-corrosion cracking and to exfoliation-corrosion shall be acceptable if extrusions conform to the requirements of 3.3.2.1 and 3.3.2.2.

3.3.2.1 Electrical Conductivity: Shall be 39.0% International Annealed Copper Standard (IACS) (22.6 MS/m) or greater, determined on specimens as in 4.3.2.

3.3.2.2 Stress-Corrosion Susceptibility Factor (SCF): If electrical conductivity is 37.0 to 38.9% IACS (21.5 to 22.6 MS/m), the SCF shall be not greater than 39.0 (270), determined by subtracting the electrical conductivity, AA.A IACS (12 times BB.B MS/m) from the longitudinal yield strength, XX.X ksi (YYY MPa).

Examples:

Inch/Pound Units: 78.0 ksi - 37.5% IACS = 40.5 - Unacceptable
74.0 ksi - 38.5% IACS = 35.5 - Acceptable

SI Units: 538 MPa - (12 x 21.8 MS/m) = 276 - Unacceptable
510 MPa - (12 x 22.3 MS/m) = 242 - Acceptable

3.3.2.3 Extrusions not conforming to 3.3.2.1 or 3.3.2.2 may be given additional precipitation heat treatment and retested to determine conformance to 3.3.1 and 3.3.2.1 or 3.3.2.2.

3.3.3 Exfoliation-Corrosion Resistance: Specimens, cut from extrusions, shall not exhibit exfoliation corrosion, at a T/10 plane, greater than that illustrated by photograph B, Figure 2, of ASTM G 34-72.

3.3.4 Stress-Corrosion Resistance: Specimens, cut from extrusions 0.750 inch (19.05 mm) and over in nominal diameter or least thickness, shall show no evidence of stress-corrosion cracking when stressed in the short-transverse direction at 17.0 ksi (117 MPa).

3.4 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.

3.4.1 When specified, bars, rods, and profiles shall be subjected to ultrasonic inspection in accordance with ASTM B 594. 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, or a 10 to 1 width-to-thickness ratio, shall meet ultrasonic class B. Extrusions, over 1.499 inches (38.07 mm) in nominal thickness not exceeding 600 pounds (272 kg) in weight per piece, or a 10 to 1 width-to-thickness ratio, shall meet ultrasonic class A.

3.5 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.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Composition (3.1), tensile properties (3.3.1), corrosion resistance (3.3.2), ultrasonic inspection when specified (3.4.1), and tolerances (3.5) are acceptance tests and, except for composition, shall be performed on each inspection lot.

4.2.2 Periodic Tests: Exfoliation-corrosion resistance (3.3.3) and stress-corrosion resistance (3.3.4) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing:

Shall be in accordance with AMS 2355 or MAM 2355 and the following.

4.3.1 For Tensile Properties: From extrusions having a nominal weight of less than 1 pound/linear foot (1.5 kg/m), one sample shall be selected from each lot weighing 1000 pounds (454 kg) or less; from lots weighing more than 1000 pounds (454 kg), one additional sample shall be taken from each 1000 pounds (454 kg) or fraction thereof in excess of the first 1000 pounds (454 kg). From extrusions having a nominal weight of 1 pound/linear foot (1.5 kg/m) or over, one sample shall be taken from each lot consisting of 1000 feet (305 m) or less; from lots consisting of more than 1000 feet (305 m), one additional sample shall be taken for each 1000 feet (305 m) or fraction thereof in excess of the first 1000 feet (305 m). Only one sample shall be taken from any one piece when more than one piece is available.

4.3.2 For Electrical Conductivity: Specimens for electrical conductivity testing (3.3.2.1) shall be the samples used for tensile testing. Electrical conductivity shall be determined on the surface of test specimens 0.100 inch (2.54 mm) and under in nominal diameter and subsurface on test specimens over 0.100 inch (2.54 mm) in nominal thickness after removal of approximately 10% of the sample thickness.

4.4 Reports:

The vendor of extrusions shall furnish with each shipment a report stating that the extrusions conform to the chemical composition, ultrasonic inspection when specified, and tolerances and showing the numerical results of tests on each inspection lot to determine conformance to the other acceptance test requirements. This report shall include the purchase order number, inspection lot number, AMS 4340D, size or section identification number, and quantity.