SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4340 | REV. E

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Superseding AMS 4340D

Aluminum Alloy, Extrusions
6.2Zn - 2.3Cu - 2.2Mg - 0.12Zr (7050-T76511)
Solution Heat Treated, Stress Relieved, Straightened, and Overaged
(Composition similar to UNS A97050)

RATIONALE

This document has been reaffirmed to comply with the SAE five-year review policy.

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 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 724-776-4970 (outside USA), www.sae.org.

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

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
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SAE WEB ADDRESS: http://www.sae.org

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS4340E

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 B 594	Ultrasonic Inspection of Aluminum-Alloy Wrought Products for Aerospace Applications
ASTM B 660	Packaging/Packing of Aluminum and Magnesium Products
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)
ASTM G 47	Determining Susceptibility to Stress-Corrosion Cracking of 2xxx and 7xxx Aluminum Alloy Products

2.3 ANSI Publications

Available from ANSI American National Standards Institute, 25 West 43rd Street, New York, NY 10036, Tel: 212-642-4900, www.ansi.org.

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.

TABLE 1 - COMPOSITION

Element	min	max
Silicon	--	0.12
Iron	--	0.15
Copper	2.0	2.6
Manganese	--	0.10
Magnesium	1.9	2.6
Chromium	--	0.04
Zinc	5.7	6.7
Titanium	--	0.06
Zirconium	0.08	0.15
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 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: on the mill produced size.

3.3.1 Tensile Properties

Shall be as shown in Table 2A or 2B.

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.

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 × 21.8 MS/m) = 276, Unacceptable
510 MPa - (12 × 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 and tested per ASTM G 34 , shall not exhibit exfoliation corrosion, at a T/10 plane, greater than that illustrated by photograph B, Figure 2, of ASTM G 34.

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) per ASTM G 47.

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 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.

4.4 Reports

The vendor of extrusions shall furnish with each shipment a report stating that the extrusions conform to the 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 4340E, size or section identification number, and quantity. The report shall also identify the producer, the mill product form, and the mill produced size.

4.5 Resampling and Retesting

Shall be in accordance with AMS 2355.

5. PREPARATION FOR DELIVERY

5.1 Identification

Shall be in accordance with ASTM B 666/B 666M.