SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4324

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Aluminum Alloy, Extruded Rod, Bar and Profiles (7055-T74511)
8.0Zn - 2.3Cu - 2.0Mg - 0.16Zr
Solution Heat Treated, Stress-Relieved, and Overaged

(Composition similar to UNS A97055)

RATIONALE

This document has been reaffirmed to comply with the SAE 5-year Review policy.

1. SCOPE:

1.1 Form:

This specification covers an aluminum alloy in the form of extruded bars, rods, and profiles (shapes) produced with a cross sectional area of 24 square inches (155 cm^2) maximum and a circumscribing circle diameter (circle size) of 10.5 inches (267 mm) maximum. See 8.3 for a definition of circumscribing circle diameter.

1.2 Application:

These extrusions have been used typically for machined parts requiring a combination of high mechanical properties and good resistance to exfoliation corrosion, 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.

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

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001, or 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
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 Material
AS1990	Aluminum Alloy Tempers

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959, or 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 E 1004	Determine Electrical Conductivity using the Electromagnetic (Eddy Current) Method
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 High-Strength Aluminum Alloy Products

2.3 ANSI Publications:

Available from ANSI, 25 West 43rd Street, 4th Floor, New York, NY 10036-7406.

ANSI H35.2	Dimensional Tolerances for Aluminum Mill Products
ANSI H35.2M	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
Silicon	--	0.10
Iron	--	0.15
Copper	2.0	2.6
Manganese	--	0.05
Magnesium	1.8	2.3
Chromium	--	0.04
Zinc	7.6	8.4
Titanium	--	0.06
Zirconium	0.08	0.25
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

3.2 Condition:

Extruded, solution heat-treated and 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 T74511 temper (see AS1990).

3.2.1 Product shall be supplied with an as-extruded surface finish; light polishing to remove minor surface conditions is permissible provided such conditions can be removed within specified dimensional tolerances

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

3.3 Heat Treatment:

Extrusions shall conform to the following requirements, determined on the mill produced size, in accordance with AMS 2355 or MAM 2355 and as specified herein:

3.3.1 Solution Heat Treatment shall be in accordance with the requirements of AMS 2772.

3.3.2 Overaging Heat Treatment: Heat to 250 °F ± 10 °F (121 °C ± 6 °C), hold at heat for a time of 4 to 6 hours, then heat to 320 °F ± 10 °F (160 °C ± 6 °C), hold at heat for a time of 11 to 12 hours, and air cool. Alternate temperatures and times may be used provided the aged materials meet the specified requirements of 3.4.

3.4 Properties:

Product shall conform to the following requirements, determined in accordance with AMS 2355 or MAM 2355 on the mill produced size.

3.4.1 Longitudinal Tensile Properties shall be as shown in Table 2A and 2B.

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

Nominal Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
Up to 0.249, incl	83.0	76.0	8
Over 0.249 to 0.499, incl	84.0	77.0	8
Over 0.499 to 3.000, incl	85.0	78.0	8

TABLE 2B - Minimum Longitudinal Tensile Properties, SI Units

Nominal Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
Up to 6.34, incl	572	524	8
Over 6.34 to 12.68, incl	579	531	8
Over 12.68 to 76.20, incl	586	538	8

3.4.2 Longitudinal compressive yield strength, when specified, shall be as shown in Table 3A and 3B.

TABLE 3A - Minimum Longitudinal Compressive Yield Strength, Inch/Pound Units

Nominal Thickness Inches	Compressive Yield Strength ksi
Over 0.499 to 3.00, incl	79.0

TABLE 3B - Minimum Longitudinal Compressive Yield Strength, SI Units

Nominal Thickness Millimeters	Compressive Yield Strength MPa
Over 12.68 to 76.20, incl	545

3.4.3 Electrical Conductivity: Shall be not lower than 37.5% IACS (International Annealed Copper Standard) (20.9 MS/m), determined on the surface of the test coupon prior to turning.

3.4.4 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.

3.4.5 Stress Corrosion Cracking: When specified, specimens from extrusions with section thickness 0.750 inches (19.05 mm) and greater tested in accordance with ASTM G 47, shall show no evidence of stress corrosion cracking when stressed in the short transverse direction (perpendicular to grain flow) to 35 ksi (241 MPa).

3.5 Quality:

Products, as received by purchaser, shall be uniform in quality and condition, sound and free from foreign materials and from conditions detrimental to usage of the extrusions. Any detrimental conditions found during the customer's manufacturing process are subject to rejection.

3.5.1 When specified, each extrusion shall be subjected to ultrasonic inspection in accordance with ASTM B 594. Extrusions, 0.500 inch (12.7 mm) and over in nominal diameter or least distance between parallel sides, weighing 600 pounds (272 kg) and under, shall meet ultrasonic Class B requirements, as described in ASTM B 594.

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 the products 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 products conform to specified requirements

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Composition (3.1), tensile properties (3.4.1), electrical conductivity (3.4.3), tolerances (3.6), compressive yield properties, when specified, (3.4.2), and ultrasonic inspection, when specified, (3.5.1) are acceptance tests and, except for composition, shall be performed on each inspection lot.

4.2.2 Periodic Tests: Exfoliation corrosion resistance (3.4.4) and stress corrosion cracking (3.4.5) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.