SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS4325

Issued 2003-01
Reaffirmed 2013-05

Aluminum Alloy, Extruded Wide Panel Profiles (7150-T77511)
6.4Zn - 2.4Mg - 2.2Cu - 0.12Zr
Solution Heat Treated, Stress-Relieved, Straightened and Overaged
(Composition similar to UNS A97150)

RATIONALE

AMS4325 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 wide panel profiles (shapes) and rod and bars produced with cross sectional area of 14 to 30 square inches (90 to 194 square cm) from circumscribing circle diameters (See 8.3) of 14 to 22 inches (356 to 559 mm).

1.1.1 For product with circumscribing circle diameters (See 8.3) 10 inches (254 mm) and under, use AMS 4345.

1.2 Application:

These extrusions have been used typically for structural applications requiring a combination of high tensile strength and good corrosion resistance, but usage of these extrusions 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)
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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/AMS4325

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 Materials
AMS 4345	Aluminum Alloy Extrusions, 6.4Zn - 2.4Mg - 2.2Cu - 0.12Zr, Solution Heat Treated, Stress-Relieved, Straightened, and Overaged
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 645	Plane-Strain Fracture Toughness Testing of Aluminum Alloys
ASTM B 660	Packaging/Packing of Aluminum and Magnesium Products
ASTM B 666/B 666M	Identification Marking of Aluminum and Magnesium Products
ASTM E 399	Plane-Strain Fracture Toughness of Metallic Materials
ASTM E 1004	Determining 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 2XXX and 7XXX Aluminum Alloy Products

2.3 ANSI Publications:

Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002 or www.ansi.org.

ANSI H35.2	Dimensional Tolerances for Aluminum Mill Products
ANSI H35.2(M)	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	--	0.12
Iron	--	0.15
Copper	1.9	2.5
Manganese	--	0.10
Magnesium	2.0	2.7
Chromium	--	0.04
Zinc	5.9	6.9
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 2%, but not less than 1% or more than 3%, and overaged to the -T77511 temper (See AS1990).

3.2.1 Product 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.

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

3.3 Solution heat treatment shall be in accordance with the requirements of AMS 2772. Overaging shall be performed at a specific temperature, for a time, as required to meet the requirements of 3.4 (See 8.2).

3.4 Properties:

Extrusions shall conform to the following requirements, determined in accordance with AMS 2355 or MAM 2355 on the mill product.

3.4.1 Tensile and Compressive Yield Strength: Shall be as shown in Table 2A and 2B.

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

Nominal Thickness Inch	Circumscribing Circle Diameter, inch	Cross Sectional Area Inch^2	Specimen Orientation	Tensile Strength ksi	Tensile Yield Strength at 0.2% Offset ksi	Elongation in 2 inches or 4D %	Compressive Yield Strength at 0.2% Offset ksi
0.500 to 1.000, incl.	14 - 22	14 - 30	Longitudinal	86.0	80.0	8	80.0
			Long-Transverse	84.0	79.0	--	--

TABLE 2B - Minimum Tensile and Compressive Properties, SI Units

Nominal Thickness mm	Circumscribing Circle Diameter, mm	Cross Sectional Area cm^2	Specimen Orientation	Tensile Strength MPa	Tensile Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %	Compressive Yield Strength at 0.2% Offset MPa
12.7 to 25.4, incl.	356 - 559	90 - 194	Longitudinal	593	552	8	552
			Long-Transverse	579	545	--	--

3.4.2 Electrical Conductivity (EC): Shall be no lower than 36% IACS (International Annealed Copper Standard) (20.88 MS/m) in accordance with ASTM E 1004, determined on the extruded surface of the test coupon prior to turning.

3.4.3 Corrosion Resistance:

3.4.3.1 Exfoliation corrosion resistance shall be determined in accordance with ASTM G 34 and material shall not exhibit exfoliation corrosion greater than that illustrated by Photo B, Figure 2. The sample plane for testing shall be as follows:

0.500-0.749 inch (12.7-19.0 mm) thickness: Test at the T/10 plane
0.750 inch (19.05 mm) and greater thickness: Test at the T/2 and T/10 plane.

3.4.3.2 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 to 25 ksi (172 MPa) for a minimum 20 day exposure.

3.4.4 Fracture Toughness: When specified, plane-strain fracture toughness (K_{IC}) for the thickness range 0.750 to 1.000 inches (19.05 to 25.4 mm) tested in accordance with ASTM E 399, shall be as specified in Table 3.

TABLE 3A - Fracture Toughness, Inch/Pound Units

Nominal Thickness Inch	Circle Size, Inch	Area, Inch^2	Test Orientation	K_{IC} (ksi$\sqrt{in}$)
0.750 to 1.000, incl.	14.0 - 22	14.0 - 30	L-T T-L	24 20

TABLE 3B - Fracture Toughness, SI Units

Nominal Thickness (mm)	Circle Size, (mm)	Area, (cm^2)	Test Orientation	K_{IC} (MPa$\sqrt{m}$)
19.1 to 25.4, incl.	356 - 559	90 - 194	L-T T-L	26 22

3.4.4.1 If an invalid K_{IC} result is obtained from testing to ASTM E 399, it should be interpreted according to ASTM B 645. A meaningful K_Q value as defined by ASTM B 645 is acceptable when K_Q value equals or exceeds the minimum K_{IC} requirement.

3.5 Quality:

The product, as received by the purchaser, shall be uniform in quality and condition, sound, and free from foreign material and from imperfections detrimental to usage of the product.

3.5.1 When specified, each extruded profile (shape) shall be subjected to ultrasonic inspection in accordance with ASTM B 594. Such extrusions, with nominal thickness 0.500 to 1.0 inches (12.70 to 25.4 mm), inclusive, and weighing 600 pounds (272 kg) and under and having a maximum width-to-thickness ratio of 10:1, shall meet ultrasonic Class B requirements, as described in ASTM B 594.

3.6 Tolerances:

Shall conform to 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.