Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 4152J
Superseding AMS 4152H
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UNS A92024

ALUMINUM ALLOY EXTRUSIONS
4.4Cu - 1.5Mg - 0.60Mn (2024-T3)

1. SCOPE:

1.1 Form: This specification covers an aluminum alloy in the form of extruded bars, rods, wire, shapes, and tubing.

1.2 Application: Primarily for parts requiring good strength and whose fabrication does not involve welding. Certain design and processing procedures may cause this material to be susceptible to stress-corrosion cracking; ARP 823 recommends practices to minimize such conditions.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) and Aerospace Recommended Practices (ARP) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2205 - Tolerances, Aluminum- and Magnesium-Base Alloy Extrusions
AMS 2350 - Standards and Test Methods
AMS 2355 - Quality Assurance Sampling and Testing of Aluminum- and Magnesium-Base Alloys, Wrought Products (Except Forgings and Forging Stock) and Flash Welded Rings
AMS 2630 - Ultrasonic Inspection

2.1.2 Aerospace Recommended Practices:

ARP 823 - Minimizing Stress Corrosion Cracking in Wrought Heat Treatable Aluminum Alloy Products

2.2 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.2.1 Military Specifications:

MIL-H-6088 - Heat Treatment of Aluminum Alloys

2.2.2 Military Standards:

MIL-STD-649 - Aluminum and Magnesium Products, Preparation for Shipment and Storage

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined in accordance with AMS 2355:

	min	max
Copper	3.8	4.9
Magnesium	1.2	1.8
Manganese	0.30	0.9
Iron	--	0.50
Silicon	--	0.50
Zinc	--	0.25
Zirconium + Titanium	--	0.20
Titanium	--	0.15
Chromium	--	0.10
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition: Extruded, and solution heat treated in accordance with MIL-H-6088.

3.2.1 Extrusions shall be supplied with an as-extruded surface finish, unless otherwise specified; light polishing to remove minor surface imperfections is permissible provided such imperfections can be removed within the dimensional tolerances.

3.3 Properties: Extrusions shall conform to the following requirements, determined in accordance with AMS 2355:

3.3.1 Tensile Properties: Shall be as specified in 3.3.1.1, 3.3.1.2, and 3.3.1.3.

3.3.1.1 Bars, Rods, Wire, and Shapes:

TABLE I

Nominal Diameter or Thickness, and Area Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 4D %, min
Up to 0.249, incl, all areas	57,000	42,000	12
Over 0.249 to 0.749, incl, all areas	60,000	44,000	12
Over 0.749 to 1.499, incl, all areas	65,000	46,000	10
Over 1.499			
Area up to 25 sq in., incl	70,000	52,000	10
Area over 25 to 30 sq in., incl	68,000	48,000	8

TABLE I (SI)

Nominal Diameter or Thickness, and Area Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset psi, min	Elongation in 4D %, min
Up to 6.35, incl, all areas	393	290	12
Over 6.35 to 19.05, incl, all areas	414	303	12
Over 19.05 to 38.10, incl, all areas	448	317	10
Over 38.10			
Area up to 161 cm^2, incl	483	359	10
Area over 161 to 194 cm^2, incl	469	331	8

3.3.1.2 Tubing:

TABLE II

Nominal Wall Thickness, and Area Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 2 in. or 4D %, min
Up to 0.249, incl, all areas	57,000	42,000	10
Over 0.249 to 0.749, incl, all areas	60,000	44,000	10
Over 0.749 to 1.499, incl, all areas	65,000	46,000	10
Over 1.499			
Area up to 25 sq in., incl	70,000	48,000	10
Area over 25 to 32 sq in., incl	68,000	46,000	8

TABLE II (SI)

Nominal Wall Thickness, and Area Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset psi, min	Elongation in 50 mm or 4D %, min
Up to 6.35, incl, all areas	393	290	10
Over 6.35 to 19.05, incl, all areas	414	303	10
Over 19.05 to 38.10, incl, all areas	448	317	10
Over 38.10			
Area up to 161 cm^2, incl	483	331	10
Area over 161 to 206 cm^2, incl	469	317	8

3.3.1.3 Tensile property requirements for sizes other than those shown in 3.3.1.1 and 3.3.1.2 shall be agreed upon by purchaser and vendor.

3.3.2 Hardness: Should be not lower than 100 HB/10/500, 100 HB/14.3/1000, or 106 HB/10/1000 or equivalent but extrusions shall not be rejected on the basis of hardness if the applicable tensile property requirements are met.

3.4 Quality: Extrusions, as received by purchaser, shall be uniform in quality and condition, sound, and ø free from foreign materials and from internal and external imperfections detrimental to usage of the extrusions.

3.4.1 When specified, extrusions shall be subjected to ultrasonic inspection in accordance with AMS 2630. ø Standards for acceptance shall be as agreed upon by purchaser and vendor.

3.5 Tolerance: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2205.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of extrusions shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the extrusions conform to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to composition (3.1), tensile property (3.3.1), ultrasonic inspection (3.4.1) when specified, and tolerance (3.5) requirements are classified as acceptance tests.

4.2.2 Periodic Tests: Tests to determine conformance to hardness (3.3.2) requirements are classified as periodic tests.

4.3 Sampling: Shall be in accordance with AMS 2355. Frequency and extent of sampling for periodic tests shall be as agreed upon by purchaser and vendor.

4.4 Reports:

4.4.1 The vendor of extrusions shall furnish with each shipment three copies of a report stating that the extrusions conform to the chemical composition and other technical requirements of this specification. This report shall include the purchase order number, material specification number and its revision letter, size or section identification number, and quantity.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number and its revision letter, contractor or other direct supplier of extrusions, part number, and quantity. When extrusions for making parts are produced by the parts vendor, that vendor shall inspect each lot of extrusions to determine conformance to the requirements of this specification, and shall include in the report a statement that the extrusions conform, or shall include copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting: Shall be in accordance with AMS 2355.

5. PREPARATION FOR DELIVERY:

5.1 Identification: Extrusions shall be identified as follows:

5.1.1 Each straight bar, rod, and tube 0.500 in. (12.70 mm) and over in nominal OD or least width of flat surface and each straight shape with configuration allowing access to a flat surface at least 0.500 in. (12.70 mm) wide recessed not more than 1/8 in. (3 mm) below the outline of the shape shall be marked in a row of characters recurring at intervals not greater than 3 ft (914 mm) with the alloy number and temper, AMS 4152 or applicable Federal or Military specification designation, and manufacturer's identification. The characters shall be of such size as to be clearly legible, shall be applied using a suitable marking fluid, and shall be sufficiently stable to withstand normal handling. The markings shall have no deleterious effect on the extrusions or their performance.