Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10000

AEROSPACE MATERIAL SPECIFICATION

AMS 4164D
Superseding AMS 4164C
Issued 6-30-60
Revised 11-1-68

ALUMINUM ALLOY EXTRUSIONS
4.4Cu - 1.5Mg - 0.60Mn (2024-T3510)
Stress-Relief Stretched, Unstraightened

1. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

2. FORM: Bars, rods, shapes, and tubing.

3. APPLICATION: Primarily for parts subject to excessive warpage during machining due to residual stresses, and 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.

4. COMPOSITION:

	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
Chromium	--	0.10
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

5. CONDITION: Solution heat treated and stress-relieved by stretching.

5.1 Unless otherwise specified, 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 the dimensional tolerances.

5.2 Material shall be stretched in the solution heat treated condition to produce a nominal permanent set of 1.5% but not less than 1% nor more than 3%.

5.3 Material shall receive no straightening after stretching.

6. TECHNICAL REQUIREMENTS: The product shall conform to the following requirements; tensile properties shall be determined in accordance with the latest issue of AMS 2355.

6.1 Tensile Properties:

6.1.1 Bars, Rods, and Shapes:

Nominal Diameter or Thickness, and Area Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset or at Extension Indicated (E = 10,500,000) psi, min	Extension Under Load in. in 2 in.	Elongation % in 2 in. or 4D min
Up to 0.249, incl, all areas	57,000	42,000	0.0120	12
Over 0.249 to 0.749, incl, all areas	60,000	44,000	0.0124	12
Over 0.749 to 1.499, incl, all areas	65,000	46,000	0.0128	10
Over 1.499				
Area up to 25 sq in., incl	70,000	52,000	0.0139	10
Over 25 to 32 sq in., incl	68,000	48,000	0.0131	8

6.1.2 Round Tubing:

Nominal Wall Thickness and Area Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset or at Extension Indicated (E = 10,500,000) psi, min	Extension Under Load in. in 2 in.	Elongation % in 2 in. or 4D min
Up to 0.249, incl, all areas	57,000	42,000	0.0120	10
Over 0.249 to 0.749, incl, all areas	60,000	44,000	0.0124	10
Over 0.749 to 1.499, incl, all areas	65,000	46,000	0.0128	10
Over 1.499				
Area up to 25 sq in., incl	70,000	48,000	0.0131	10
Over 25 to 32 sq in., incl	68,000	46,000	0.0128	8

6.1.3 If sizes other than those shown are ordered, tensile property requirements shall be as agreed upon by purchaser and vendor.

6.1.4 When a dispute occurs between purchaser and vendor over the yield strength values, yield strength determined by the offset method shall apply.

6.2 Hardness: Material should have hardness not lower than Brinell 100 using 500 kg load and 10 mm ball or 1000 kg load and 9/16 in. ball or not lower than Brinell 106 using 1000 kg load and 10 mm ball, but shall not be rejected on the basis of hardness if the tensile property requirements are met.

7. QUALITY: Material shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts.

8. TOLERANCES: Unless otherwise specified, tolerances shall conform to all applicable requirements of the latest issue of AMS 2205.

9. REPORTS:

9.1 Unless otherwise specified, the vendor of the product shall furnish with each shipment three copies of a report stating that the product conforms to the chemical composition and 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.