

AERONAUTICAL MATERIAL SPECIFICATIONS

AMS 4169_A

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

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ALUMINUM ALLOY EXTRUSIONS
5.6Zn - 2.5Mg - 1.6Cu - 0.3Cr (7075-T6511)
Stress-Relief Stretched and Straightened

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, and shapes.
3. **APPLICATION:** Primarily for parts subject to excessive warpage during machining due to residual stresses, and for parts requiring high strength and whose fabrication does not involve welding or forming.
4. **COMPOSITION:**

Zinc	5.1 - 6.1
Magnesium	2.1 - 2.9
Copper	1.2 - 2.0
Chromium	0.18 - 0.40
Iron	0.7 max
Silicon	0.50 max
Manganese	0.30 max
Titanium	0.20 max
Other Impurities, each	0.05 max
Other Impurities, total	0.15 max
Aluminum	remainder

5. **CONDITION:** Solution heat treated, stress-relieved by stretching, and precipitation heat treated.
 - 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 1-1/2%, but not less than 1% nor more than 3%.
 - 5.3 Material may receive minor straightening after stretching of an amount necessary to meet the requirements of Section 8.

6. **TECHNICAL REQUIREMENTS:**

6.1 **Tensile Properties:**

Nominal Diameter or Least Thickness or Area Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset or at Extension Indicated (E = 10,300,000)		Elongation % in 2 in. or 4D min
		psi, min	in. in 2 in.	
Under 0.250, all areas	78,000	70,000	0.0176	7
0.250 to 0.500, excl, all areas	81,000	73,000	0.0182	7
0.500 to 3.000, excl, all areas	81,000	72,000	0.0180	7
3.000 to 4.500, excl,				
Area 20 sq in. and under	81,000	71,000	0.0178	7
Area over 20 to 32 sq in., incl	78,000	70,000	0.0176	6
4.500 to 5.000, incl,				
Area 32 sq in. and under	78,000	68,000	0.0172	6

Section 8.3 of the SAE Technical Board rules provides that: "All technical reports, including standards approved and practices recommended, are advisory only. Their use by anyone engaged in industry or trade is entirely voluntary. There is no requirement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report in formulating and issuing technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the reports are responsible for protecting themselves against liability for infringement of patents."

- 6.1.1 For material of such thickness that a standard specimen cannot be taken, or for material thinner than 0.062 in., the test for elongation is not required.
- 6.1.2 When a dispute occurs between purchaser and vendor over the yield strength value, yield strength determined by the offset method shall apply.
- 6.1.3 The tensile property requirements shall be based on the thickness of the portion of the extrusion from which the tensile test specimens are taken.
- 6.1.4 If sizes other than those shown are ordered, tensile property requirements shall be as agreed upon by purchaser and vendor.
- 6.2 **Hardness:** Not lower than Brinell 135 using 500 kg load and 10 mm ball or 1000 kg load and 9/16 in. ball or not lower than Brinell 140 using 1000 kg load and 10 mm ball, but the product shall not be rejected on the basis of hardness if the requirements for tensile properties are met.
7. **QUALITY:** Material shall be uniform in quality and condition, clean, sound, smooth, 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 the latest issue of AMS 2205 as applicable.
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, size or section identification number, and quantity.
- 9.2 Unless otherwise specified, 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, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.