

AEROSPACE MATERIAL SPECIFICATIONS

AMS 4020

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

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Revised

ALUMINUM ALLOY PLATE, ALCLAD
1.0Mg - 0.6Si - 0.25Cu - 0.25Cr (Alclad 6061-T651)

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

2. **APPLICATION:** Primarily for parts requiring moderate strength and for structural machined parts subject to warpage during machining due to residual stresses.

3. **COMPOSITION:**

	Core (6061)		Cladding (7072)	
	min	max		min max
Magnesium	0.8	- 1.2	Zinc	0.8 - 1.3
Silicon	0.40	- 0.8	Silicon & Iron	-- 0.7
Copper	0.15	- 0.40	Magnesium	-- 0.10
Chromium	0.15	- 0.35	Copper	-- 0.10
Iron	--	0.7	Manganese	-- 0.10
Zinc	--	0.25	Other Impurities, each	-- 0.05
Manganese	--	0.15	Other Impurities, total	-- 0.15
Titanium	--	0.15	Aluminum	remainder
Other Impurities, each	--	0.05		
Other Impurities, total	--	0.15		
Aluminum		remainder		

4. **CONDITION:** Solution heat treated, stretched to produce a nominal permanent set of 2%, but not less than 1-1/2% or more than 3%, and precipitation heat treated.

4.1 Material shall receive no further straightening operations after stretching.

5. **TECHNICAL REQUIREMENTS:** When ASTM methods are specified for determining conformance to the following requirements, tests shall be conducted in accordance with the issue of the ASTM method listed in the latest issue of AMS 2350.

5.1 **Cladding Thickness:** After rolling, the average cladding thickness shall be not less than 4% per side of the total composite thickness. Routine measurements are not required.

- 5.2 **Tensile Properties:** Test specimens shall conform to ASTM E8 and shall be taken across the direction of rolling from widths 9 in. and over and parallel to the direction of rolling from widths less than 9 inches. Sheet type specimens shall be used for material less than 0.5 in. thick and 0.75 in. and over in width. Round specimens shall be used for material 0.5 in. and over in thickness and 0.75 in. and over in width. Material under 0.75 in. wide and under 0.5 in. thick may be tested in full section or by use of round specimens; for such sizes, elongation requirements apply only when round specimens are used.

Nominal Thickness Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset or at Extension Indicated (See 5.2.1)		Elongation % in 2 in. or 4D, min
		psi, min	Extension Under Load in. in 2 in.	
0.250 to 0.499, incl	38,000	32,000	0.0105	10
Over 0.499 to 1.000, incl	42,000	35,000	0.0109	9
Over 1.000 to 2.000, incl	42,000	35,000	0.0109	8
Over 2.000 to 4.000, incl	42,000	35,000	0.0109	6
Over 4.000 to 5.000, incl	40,000	35,000	0.0109	6

- 5.2.1 Extension under load is based on the following values of E:

Nominal Thickness Inches	E
0.250 to 0.499, incl	9,900,000
Over 0.499 to 5.000, incl	10,100,000

- 5.2.2 When a dispute occurs between purchaser and vendor over the yield strength value, yield strength determined by the offset method shall apply.
- 5.2.3 Tensile properties of plate over 5.000 in. in thickness shall be as agreed upon by purchaser and vendor.
6. **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.
7. **TOLERANCES:** Unless otherwise specified, tolerances shall conform to all applicable requirements of the latest issue of AMS 2202.
8. **REPORTS:**
- 8.1 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, thickness, size, and quantity.