

AERONAUTICAL MATERIAL SPECIFICATIONS

AMS 4913

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

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Revised

TITANIUM ALLOY SHEET 4Al - 3Mo - 1V Solution and Precipitation Treated

1. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.
2. FORM: Sheet and strip.
3. APPLICATION: Primarily for parts requiring strength up to 600 F. This material may be characterized by poor crack propagation resistance.
4. COMPOSITION: The product shall conform to the following:

Aluminum	3.75	- 4.75
Molybdenum	2.50	- 3.50
Vanadium	0.75	- 1.25
Iron	0.35	max
Oxygen	0.20	max
Carbon	0.10	max
Nitrogen	0.05	max
Hydrogen	0.015	max
Other Elements, each	0.10	max (1)
Other Elements, total	0.40	max (1)
Titanium		remainder

(1) Need not be reported.

- 4.1 Check Analysis: Composition variations shall meet the requirements of the latest issue of AMS 2249.
5. CONDITION: Unless otherwise specified, hot rolled, with or without subsequent cold reduction, solution heat treated, descaled, leveled, precipitation heat treated, and descaled, having a surface appearance comparable to a commercial corrosion resistant steel No. 2D finish.
6. TECHNICAL REQUIREMENTS:
 - 6.1 Heat Treatment: Unless otherwise specified, material shall be solution heat treated by heating to $1640\text{ F} \pm 15$, holding at heat for 15 - 30 min., and rapidly quenching in oil or water at room temperature, and then shall be precipitation heat treated by heating to $925\text{ F} \pm 15$, holding at heat for 10 - 14 hr, and cooling.

- 6.2 Tensile Properties: These properties apply when the rate of strain is maintained at 0.003 - 0.007 in. per in. per min. through the yield strength and then is increased so as to produce failure in approximately one additional minute. When a dispute occurs between purchaser and vendor over the yield strength value, a referee test shall be performed on a machine having a strain rate pacer, using a rate of 0.005 in. per in. per min. through the yield strength.

Tensile Strength, psi	180,000 min
Yield Strength at 0.2% Offset or at 0.0229 in. in 2 in. Extension Under Load (E = 16,400,000), psi	155,000 min
Elongation, % in 2 in.	
Nominal Thickness, Inches	
0.032 and under	3 min
Over 0.032 to 0.049, incl.	4 min
Over 0.049	5 min

7. QUALITY: Material shall be produced by multiple melting under vacuum using consumable electrode practice, unless otherwise permitted. The product shall be uniform in quality and condition, clean, sound, and free from "oil cans" of depth in excess of the flatness tolerance, ripples, and foreign materials, and from internal and external imperfections detrimental to fabrication or to performance of parts.

Note. An "oil can" is defined as an excess of material in a localized area of a sheet which causes the sheet to buckle in that area. When the sheet is placed on a flat surface and hand pressure applied to the buckle, the buckle will spring back through the opposite surface or spring up in another area on the sheet.

8. TOLERANCES: Material shall conform to the thickness (Tables I and II), width, length, and straightness tolerances shown in the latest issue of AMS 2242. Up to and including 36 in. in width, sheets shall be flat within 3% of the distance between contact points of a straight edge laid in any direction upon the material. Flatness of sheets over 36 in. in width shall be as agreed upon by purchaser and vendor. The amount of variation from flat shall be determined by measuring the distance from the straight edge to the material at the point of greatest deviation.

9. REPORTS:

- 9.1 Unless otherwise specified, the vendor of the product shall furnish with each shipment three copies of a report of the results of tests for chemical composition of each heat in the shipment and the results of tests on each thickness from each heat to determine conformance to the tensile requirements of this specification. This report shall include the purchase order number, heat number, material specification number, thickness, size, and quantity from each heat.
- 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.