AEROSPACE MATERIAL SPECIFICATION

AMS7849	REV. E

Issued 1960-06
Reaffirmed 2010-05
Revised 2015-01

Superseding AMS7849D

Tantalum Sheet, Strip, and Plate
Annealed
(Composition similar to UNS R05210)

RATIONALE

AMS7849E is a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

This specification covers tantalum in the form of sheet, strip, plate, and foil up through 0.1875 inch (4.75 mm), inclusive.

1.2 Application

Primarily for parts requiring exposure to ultra-high temperatures. Applications in oxidizing atmospheres necessitate a protective coating.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA, www.sae.org.

AMS2242 Tolerances, Corrosion and Heat-Resistant Steel, Iron Alloy, Titanium, and Titanium Alloy Sheet, Strip, and Plate

AMS2350 Standards and Test Methods

AMS2809 Identification, Titanium and Titanium Alloy Wrought Products

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS7849E

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM E8 / E8M Tension Testing of Metallic Materials

ASTM E112 Determining Average Grain Size

ASTM E290 Bend Testing for Ductility of Materials

ASTM E384 Knoop and Vickers Hardness of Materials

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the following percentages by weight shown in Table 1, determined by analytical methods approved by purchaser (See 8.2):

3.1.1 Tantalum

Shall be not less than 99.85%.

3.1.2 Other Elements

Shall be not more than 0.15% (1500 ppm) total. Individual elements shall not exceed the following limits in parts per million (ppm):

Table 1 - Composition

Element	Nominal Thickness Up to 0.010 Inch (0.25 mm), excl	Nominal Thickness 0.010 Inch (0.25 mm) and Over
Columbium	1000	1000
Tungsten	300	300
Oxygen	150	100
Iron	100	100
Zirconium	100	100
Molybdenum	100	100
Carbon	75	50
Nitrogen	75	50
Titanium	50	50
Silicon	50	50
Nickel	50	50
Cobalt	20	20
Hydrogen	10	10

3.2 Condition

Cold rolled and annealed (See 8.3).

3.3 Annealing

The product shall be annealed under vacuum (less than 0.1 micron (1 μm) mercury) to produce a recrystallized microstructure, meeting the requirements of Table 2.

Table 2

Nominal Thickness Inch	Nominal Thickness Millimeters	Percent Recrystallization
Up to 0.060, excl	Up to 1.52, excl	95
0.060 to 0.1875, excl	1.52 to 4.76, excl	90
0.1875 and over	4.76 and over	85

3.4 Properties

The product shall conform to the following requirements (See 8.2 and 8.3):

3.4.1 Tensile Properties

Shall be as specified in Table 3, determined in accordance with ASTM E8 / E8M with the rate of strain set at 0.005 inch/inch/minute (0.005 mm/mm/minute) and maintained within a tolerance of ±0.002 inch/inch/minute (0.002 mm/mm/minute) through the 0.2% offset yield strain and 0.05 inch/inch/minute (0.05 mm/mm/minute) and maintained within a tolerance of ±0.02 inch/inch/minute (±0.02 mm/mm/minute) above the yield strain to fracture:

Table 3A – Inch/pound units

Nominal Thickness Inch	Tensile Strength ksi, min	Yield Strength at 0.2% Offset ksi, min	Elongation in 2 Inches or 4D %, min
Up to 0.005, incl	30	20	15
Over 0.005 to 0.016, incl	30	20	20
Over 0.016 to 0.1875, incl	30	20	25

Table 3B – SI units

Nominal Thickness Millimeters	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, minimum	Elongation in 50.8 mm or 4D %, minimum
Up to 0.13, incl	207	138	15
Over 0.13 to 0.41, incl	207	138	20
Over 0.41 to 4.76, incl	207	138	25

3.4.1.1 Tensile properties of product over 0.1875 inch (4.76 mm) in nominal thickness shall be as agreed upon by purchaser and producer.

3.4.2 Hardness

Should be not higher than 150 HV30, or equivalent, determined in accordance with ASTM E384, but the product shall not be rejected on the basis of hardness if the tensile property requirements are met.

3.4.3 Bending

The product 0.1875 inches (4.76 mm) and under shall withstand, without evidence of cracking when examined at 20X magnification, bending in accordance with ASTM E290 at room temperature through an angle of 180 degrees around a diameter equal to the nominal thickness of the product with axis of bend parallel to the direction of rolling. In case of dispute, results of bend tests using the end supported guided bend test shall govern.

3.4.4 Average Grain Size

Shall be not coarser than specified in Table 4, determined in accordance with ASTM E112.

Table 4

Nominal Thickness Inch			Nominal Thickness Millimeters			Average Grain Size
Up to	0.1875,	incl	Up to	4.76,	incl	5
Over	0.1875		Over	4.76		4

3.5 Quality

The product, as received by purchaser, shall be uniform in quality and condition, sound, smooth, and free from foreign materials and from imperfections detrimental to usage of the product.

3.6 Tolerances

Shall conform to all applicable requirements of AMS2242.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of the product shall supply all samples for producer's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

4.2 Classification of Tests

Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling

Shall be in accordance with the following; a lot shall be all product of the same nominal size from the same heat processed at the same time and presented for producer's inspection at one time.

4.3.1 Composition

One sample from each heat, except that for carbon, oxygen, nitrogen, and hydrogen determinations one sample from each lot.

4.3.2 Recrystallized Microstructure

One sample from each lot.

4.3.3 Tensile Properties, Hardness, Bending, and Average Grain Size

One sample from each lot.

4.3.3.1 Tensile specimens from widths 9 inches (229 mm) and over shall be taken with axis of specimen perpendicular to the direction of rolling; for widths under 9 inches (229 mm), specimens shall be taken with axis parallel to the direction of rolling.

4.3.3.2 For bend tests, minimum specimen width shall, when possible, be not less than 10 times the nominal thickness; maximum width need not be greater than 1 inch (25 mm).