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

AMS 7898

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Revised

TUNGSTEN SHEET, STRIP, PLATE, AND FOIL
Sintered Powder

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

2. APPLICATION: Primarily for parts and assemblies requiring exposure at ultra high temperatures. Applications in oxidizing atmospheres necessitate a protective coating.

3. COMPOSITION:

	min	max
Molybdenum	--	0.020
Carbon	--	0.008
Nickel	--	0.005
Silicon	--	0.005
Iron	--	0.005
Aluminum	--	0.005
Oxygen	--	0.005 (50 ppm)
Nitrogen	--	0.002 (20 ppm)
Hydrogen	--	0.001 (10 ppm)
Tungsten	remainder	

3.1 Unless otherwise specified, metallic elements shall be determined spectrographically, carbon shall be determined conductometrically, oxygen shall be determined by the vacuum fusion or conductometric method, nitrogen shall be determined by the Kjeldahl method, and hydrogen shall be determined by the vacuum extraction method.

4. CONDITION: Hot-cold rolled, stress relieved, and descaled having a surface roughness not greater than 125 microinches.

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 Tensile Properties at 1000 F (537.8 C): Material shall conform to the following requirements. Tensile test specimens taken with the axis parallel to the direction of rolling shall be heated to 1000 F ± 15 (537.8 C ± 8.3) in an inert atmosphere, held at heat for 10 min. before testing, and tested at 1000 F ± 15 (537.8 C ± 8.3) at a strain rate of 0.05 in. per in. per min. in accordance with ASTM E21.

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Nominal Thickness Inch	Tensile Strength psi, min	Yield Strength at 0.2% Offset or at Extension Indicated (E = 60,000,000) psi, min	Extension Under Load in. in 2 in.	Elongation % in 2 in. min
Over 0.010 to 0.060, incl	84,000	75,000	0.0065	3.0
Over 0.060 to 0.100, incl	82,000	73,000	0.0064	3.0
Over 0.100 to 0.150, incl	80,000	71,000	0.0064	3.0
Over 0.150 to 0.200, incl	78,000	69,000	0.0063	3.0
Over 0.200 to 0.250, incl	76,000	67,000	0.0062	3.0

5.1.1 Properties of specimens taken with the axis perpendicular to the direction of rolling shall be as agreed upon by purchaser and vendor.

5.2 Hardness: Shall be not lower than DPH (Vickers) 400 or equivalent and the average of five readings shall be not lower than DPH (Vickers) 440.

5.3 Specific Gravity: The specific gravity of material up to 0.150 in., incl, in thickness shall be not less than 19.20 and for thicknesses over 0.150 in. it shall be not less than 19.15.

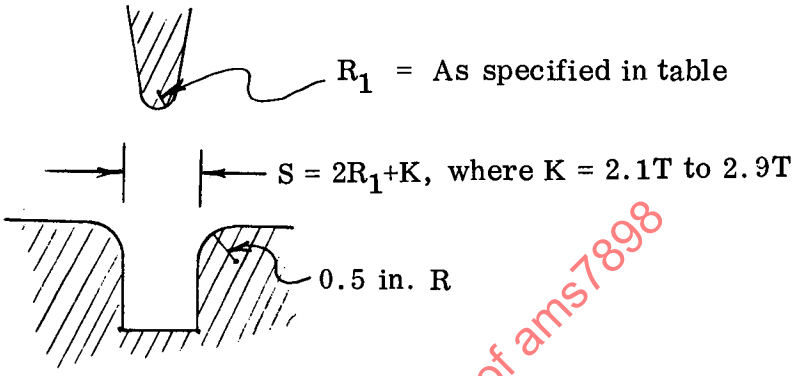
5.4 Microstructure: The microstructure shall exhibit a completely worked structure with no evidence of recrystallization. Material shall not have a mixed grain or duplex structure. Standards shall be as agreed upon by purchaser and vendor.

5.5 Recrystallization: Unless otherwise specified, specimens when heated to 1850 F ± 25 (1010 C ± 14) in an inert atmosphere for 30 min. and cooled shall show no recrystallization as evidenced by a change in average Vickers hardness of more than 20 points from the original hardness for thicknesses 0.030 in. and over and 50 points for thicknesses under 0.030 inch.

5.6 Bend Ductility: Material shall withstand, without cracking, bending in accordance with the following table. Axis of bend shall be perpendicular to the direction of rolling. The speed of the bending stroke shall be 0.5 to 0.7 in. per minute. Specimens shall be bent to a 90 deg included angle after springback.

Nominal Thickness (T)	Bend Radius (R_1)	Bend Temperature +0 F (+0 C), -25 F (-14 C)
Over 0.010 to 0.060 incl	1T	400 F (204.4 C)
Over 0.060 to 0.100 incl	2T	425 F (218.3 C)
Over 0.100 to 0.150 incl	2T	450 F (232.2 C)
Over 0.150 to 0.200 incl	4T	475 F (246.1 C)
Over 0.200 to 0.250 incl	4T	500 F (260.0 C)

5.6.1 Three bend specimens representative of each lot shall be tested. The width of the bend specimens shall be 1.0 in. up to a thickness of 0.100 in., incl, and 2.5 in. for thicknesses greater than 0.100 inch. Specimens may have as-cut edges or may be hand polished with emery cloth. Bend specimens shall not be electropolished. Specimens shall be bent in dies having the dimensions shown in Fig. 1.



Bend Test Apparatus

FIGURE 1

6. QUALITY:

6.1 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. It shall be free from scale and injurious imperfections such as cracks, seams, tears, grooves, laminations, blisters, voids, non-metallic inclusions, and edge chips and burrs.

6.2 Unless otherwise specified, each piece shall be fluorescent penetrant inspected in accordance with the latest issue of AMS 2645 and ultrasonically inspected in accordance with the latest issue of AMS 2630 to determine conformance to 6.1.

6.2.1 Minor surface imperfections which are removable within 1/2 of the thickness tolerance will not be considered objectionable if removed and smoothly blended into adjacent surface area.

7. TOLERANCES: Unless otherwise specified, the following tolerances shall apply.

7.1 Thickness:

Nominal Thickness Inch	Tolerance, Inch Plus and Minus
Up to 0.005, incl	0.0007
Over 0.005 to 0.007, incl	0.0008
Over 0.007 to 0.010, incl	0.0012
Over 0.010 to 0.015, incl	0.0015
Over 0.015 to 0.020, incl	0.0020
Over 0.020 to 0.030, incl	0.0025
Over 0.030 to 0.040, incl	0.0032
Over 0.040 to 0.060, incl	0.0050
Over 0.060 to 0.100, incl	0.0080
Over 0.100 to 0.125, incl	0.0100
Over 0.125 to 0.150, incl	0.0110
Over 0.150 to 0.200, incl	0.0130
Over 0.200 to 0.250, incl	0.0150

7.2 Length: Edges shall be sheared, machined, or ground straight, with the corners square. Length, width, and camber shall conform to the requirements of the latest issue of AMS 2242.

7.3 Flatness: When measured using a straight-edge touching the sheet at 2 points, the perpendicular distance from the straight-edge to the sheet shall not exceed 0.015xL in. at any point between the two points of contact, where "L" is the distance in in. between the two points of contact. The distance from a 12 in. straight-edge to the sheet shall not exceed 0.125 inch.

8. REPORTS:

8.1 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 batch in the shipment and the results of tests on each thickness from each batch to determine conformance to the technical requirements of this specification. This report shall include the purchase order number, batch number, specification number, thickness, size, and quantity from each batch.

8.2 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.