AEROSPACE
MATERIAL SPECIFICATIONS

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York, N.Y. 10017

AMS 7855

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Revised

COLUMBIUM ALLOY BARS, RODS, AND WIRE
10W - 2.5Zr
Recrystallized

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
Tungsten	9.0	11.0
Zirconium	2.0	3.0
Tantalum	--	0.15
Carbon	--	0.030
Silicon	--	0.02
Iron	--	0.02
Oxygen	--	0.020 (200 ppm)
Titanium	--	0.01
Nitrogen	--	0.010 (100 ppm)
Hydrogen	--	0.001 (10 ppm)
Columbium	remainder	

4. CONDITION: Hot-cold worked, descaled, and recrystallized or, if so specified, hot-cold worked, descaled, centerless ground, and recrystallized.

4.1 The surface finish of centerless ground bars shall be 90 microinches or smoother.

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 Heat Treatment: Material shall be recrystallized at a temperature between 2200 and 2400 F (1204.4 and 1315.5 C) under vacuum (less than 0.1 micron mercury) or inert atmosphere or as agreed upon by purchaser and vendor.

5.2 Room Temperature Tensile Properties: Material 0.050 - 0.500 in., incl, in diameter shall conform to the following requirements when tested at room temperature using strain rates of 0.003 - 0.007 in. per in. per min. through the yield strength and 0.03 - 0.07 in. per in. per min. above the yield strength.

Tensile Strength, psi	75,000 min
Yield Strength at 0.2% Offset, psi	60,000 min
Elongation, % in 1 in.	20 min
Reduction of Area, %	30 min

5.2.1 Properties of round bars under 0.050 in. and over 0.500 in. in diameter and of all bars other than round shall be as agreed upon by purchaser and vendor.

5.3 Hardness: Shall be not higher than Vickers 225 or equivalent.

5.4 Microstructure: Material recrystallized as in 5.1 shall show a structure consisting essentially of recrystallized grains; standards for acceptance shall be as agreed upon by purchaser and vendor.

5.5 Tensile Properties at 2200 F (1204.4 C): Material 0.050 - 0.500 in., incl, in diameter shall be capable of meeting the following requirements. Tensile test specimens shall be heated to 2200 F ± 10 (1204.4 C ± 5.6) under vacuum (less than 0.1 micron mercury) or an inert atmosphere, held at heat for 15 min. before testing, and tested at 2200 F ± 10 (1204.4 C ± 5.6) at a strain rate of 0.03 - 0.07 in. per in. per min. in accordance with ASTM E21.

Tensile Strength, psi	25,000 min
Yield Strength at 0.2% Offset, psi	20,000 min
Elongation, % in 1 in.	20 min

5.5.1 Properties of round bars under 0.050 in. and over 0.500 in. in diameter and of all bars other than round 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:

7.1 Hot-Cold Worked and Descaled:

7.1.1 Round Rod and Wire:

Nominal Diameter Inches	Tolerance, Inch Plus	Tolerance, Inch Minus	Out of Round Inch
0.016 to 0.030, incl	0.0005	0.0005	--
Over 0.030 to 0.062, incl	0.001	0.001	--
Over 0.062 to 0.281, incl	0.002	0.002	0.004
Over 0.281 to 0.422, incl	0.010	0.005	0.008
Over 0.422 to 0.625, incl	0.010	0.005	0.012
Over 0.625 to 0.875, incl	0.015	0.005	0.015
Over 0.875 to 1.000, incl	0.020	0.005	0.015
Over 1.000 to 1.375, incl	0.020	0.010	0.018
Over 1.375 to 1.500, incl	0.020	0.015	0.020
Over 1.500 to 1.625, incl	0.025	0.015	0.020
Over 1.625 to 2.000, incl	0.030	0.020	0.025
Over 2.000 to 2.500, incl	0.032	0.032	0.025
Over 2.500 to 3.250, incl	0.032	0.032	0.027
Over 3.250 to 3.500, incl	0.045	0.045	0.040

7.1.2 Square and Rectangular Bar:

Nominal Thickness (T) Inches	Thickness Tolerance, Inch Plus and Minus	Width Tolerance, Inch Plus	Width Tolerance, Inch Minus
0.187 to 0.500, incl	0.10T	10%	0
Over 0.500	0.062	10%	0