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

AMS 7819

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Revised

MOLYBDENUM ALLOY BARS
0.5Ti - 0.090Zr
Arc Cast, Stress Relieved

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

2. APPLICATION: Primarily for parts requiring high modulus and uniform strength characteristics up to at least 2100 F (1150 C). This material is not recommended for use in oxidizing atmospheres at 1000 F (540 C) and above unless protected by a suitable coating.

3. COMPOSITION:

	min	max	Check Analysis Under Min	Check Analysis Over Max
Molybdenum	99.25 (1)	--		
Titanium	0.40	0.55	0.05	0.05
Zirconium	0.06	0.12	0.02	0.02
Carbon	0.010	0.030	0.005	0.005
Iron	--	0.020	--	0.002
Silicon	--	0.010	--	0.002
Nickel	--	0.010	--	0.001
Oxygen	--	0.0030 (30 ppm) (2)	--	--
Nitrogen	--	0.0010 (10 ppm) (2)	--	0.0005 (5 ppm)

(1) Determination not required for routine acceptance.
(2) Pending establishment of approved methods of analysis, deviation from these limits alone shall not be cause for rejection.

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

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

5. TECHNICAL REQUIREMENTS:

5.1 The product shall conform to the following requirements and shall be capable of meeting these requirements after being heated to 2100 F ± 25 (1148.9 C ± 14), held at heat for 30 min. in a suitable, controlled atmosphere, and cooled rapidly.

5.1.1 Hardness:

Nominal Diameter Inches	Hardness, Vickers (10 kg) max
0.188 to 0.875, incl	320
Over 0.875 to 1.125, incl	310
Over 1.125 to 1.875, incl	300
Over 1.875 to 2.875, incl	290
Over 2.875 to 3.500, incl	285
Over 3.500 to 4.500, incl	280

5.1.2 Tensile Properties: Material 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 0.6% offset and 0.03 - 0.07 in. per in. per min. between this point and the ultimate.

Nominal Diameter Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset or at Extension Indicated (E = 46,000,000) psi, min	Extension Under Load in. in 2 in.	Elongation % in 2 in. or 4D min
0.188 to 0.875, incl	115,000	100,000	0.0083	18
Over 0.875 to 1.125, incl	110,000	95,000	0.0081	15
Over 1.125 to 1.875, incl	100,000	85,000	0.0077	10
Over 1.875 to 2.875, incl	90,000	80,000	0.0075	10
Over 2.875 to 3.500, incl	85,000	75,000	0.0073	5
Over 3.500 to 4.500, incl	80,000	70,000	0.0070	5

5.1.2.1 Hardness and tensile properties of round bars under 0.188 in. in diameter and bars other than round shall be as agreed upon by purchaser and vendor.

6. QUALITY: Material shall be vacuum arc melted using consumable electrode practice. The product shall be uniform in quality and condition, 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:

Nominal Diameter Inches	Tolerance, Inch Plus	Tolerance, Inch Minus	Out of Round Inch
0.062 to 0.281, incl	0.002	0.002	0.004
Over 0.281 to 0.406, incl	0.010	0.005	0.008
Over 0.406 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
Over 3.500 to 4.500, incl	0.062	0.062	0.050

7.2 Centerless Ground:

Nominal Diameter Inches	Tolerance, Inch Plus and Minus
0.0625 to 2.000, incl	0.002
Over 2.000	0.003

7.3 Bars Other than Round: Tolerances shall be as agreed upon by purchaser and vendor.

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

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.