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

AMS 5699B

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ALLOY WIRE, CORROSION AND HEAT RESISTANT
Nickel Base - 15.5Cr - 7Fe - 2.3Ti - 1(Cb+Ta) - 0.7Al
Spring Temper

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

Ø 2. FORM: Round, square, and flat wire.

Ø 3. APPLICATION: Primarily for helical springs used at elevated temperatures.

3.1 Direct precipitation hardening as in 6.3.1 after coiling, produces optimum stress and low relaxation at service temperatures up to 700 F (370 C).

3.2 Fully heat treated as in 6.3.2 after coiling, produces optimum resistance to relaxation combined with fairly fine and uniform grain size at service temperatures of 1000 - 1300 F (540 - 705 C).

4. COMPOSITION:

Carbon	0.08 max
Manganese	1.00 max
Silicon	0.50 max
Sulfur	0.015 max
Chromium	14.00 - 17.00
Nickel + Cobalt	70.00 min
Cobalt, if determined	1.00 max
Columbium + Tantalum	0.70 - 1.20
Titanium	2.00 - 2.75
Aluminum	0.40 - 1.00
Iron	5.00 - 9.00
Copper	0.50 max

4.1 Check Analysis: Composition variations shall meet the requirements of the latest issue of AMS 2269.

5. CONDITION: Unless otherwise specified, wire shall be cold worked from hot finished wire or rod that has been previously ground or has had surface preparation (other than by pickling) for removal of seams and other injurious surface imperfections. Wire shall be heat treated at 2100 F (1148 C) or higher before reducing to the size ordered. Sizes 0.250 in. and under in diameter or thickness shall be copper coated and reduced approximately 50 - 65%. Sizes over 0.250 in. in diameter or thickness shall be copper coated and reduced not less than 30%.

6. TECHNICAL REQUIREMENTS:

6.1 Tensile Properties:

Nominal Diameter or Thickness, Inch	Tensile Strength, psi, Min	
	Round Wire	Square or Flat Wire
Up to 0.250, incl	190,000	175,000
Over 0.250 to 0.500, incl	160,000	160,000

6.2 Wrapping: Wire shall withstand, without cracking, wrapping at room temperature 5 full, closely spaced turns around a diameter equal to the following:

Wire Shape	Wrapping Diameter
Round	4 x Nominal Diameter of Wire
Square	4 x Nominal Diagonal of Wire
Flat	4 x Nominal Width of Wire

6.3 Tensile Properties after Heat Treatment:

6.3.1 Wire when precipitation heat treated by heating to 1200 F ± 25 (648.9 C ± 14), holding at heat for 4 hr, and air cooling shall conform to the following requirements:

Nominal Diameter or Thickness, Inch	Tensile Strength psi, min
0.012 to 0.250, incl	220,000
Over 0.250 to 0.418, incl	200,000
Over 0.418 to 0.500, incl	180,000

6.3.2 Wire when solution and precipitation heat treated by heating to 2100 F ± 25 (1148.9 C ± 14), holding at heat for 2 hr, air cooling, reheating to 1550 F ± 25 (843.3 C ± 14), for 24 hr, air cooling, reheating to 1300 F ± 25 (704.4 C ± 14), holding at heat for 20 hr, and air cooling shall conform to the following requirements:

Nominal Diameter or Thickness, Inch	Tensile Strength psi, min
0.012 to 0.250, incl	150,000
Over 0.250 to 0.500, incl	145,000

7. QUALITY:

7.1 Wire shall be uniform in quality and condition, clean, and free from kinks, twists, scrapes, splits, pipes, cold shuts, and other injurious imperfections.

7.2 The surface shall have a smooth finish, free from pits, abrasions, and other injurious surface imperfections.

8. TOLERANCES: Unless otherwise specified, tolerances shall be as follows:

8.1 Round and Square Wire:

Nominal Diameter or Thickness Inch	Tolerance, Inch Plus and Minus
ø	
0.003 to 0.005, excl	0.0001
0.005 to 0.008, excl	0.0002
0.008 to 0.012, excl	0.0003
0.012 to 0.024, excl	0.0004
0.024 to 0.033, excl	0.0005
0.033 to 0.044, excl	0.0008
0.044 to 0.312, excl	0.0010
0.312 to 0.500, incl	0.0015

8.1.1 Out-of-Roundness: Round wire shall not be out-of-round by more than one-half the total permissible tolerance in 8.1.

8.2 Flat Wire (Widths 1/16 to 3/8 In., incl):

Nominal Thickness Inch	Tolerance, Inch Plus and Minus	
	Thickness	Width
Up to 0.029, excl	0.001	0.005
0.029 to 0.035, excl	0.0015	0.005
0.035 to 0.3125, incl	0.002	0.005

9. REPORTS:

9.1 Unless otherwise specified, the vendor of the product shall furnish with each shipment three copies of a report stating that the product conforms to the condition requirements and showing the results of tests to determine conformance to the chemical composition and technical requirements of this specification. This report shall include the purchase order number, material specification number, nominal size, and quantity.

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.