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AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 5698E

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Superseding AMS 5698D

ALLOY WIRE, CORROSION AND HEAT RESISTANT
72Ni - 15.5Cr - 0.95(Cb+Ta) - 2.5Ti - 0.70Al - 7.0Fe
No. 1 Temper, Precipitation Hardenable

UNS N07750

1. SCOPE:

1.1 Form: This specification covers a corrosion and heat resistant nickel alloy in the form of round, square, and flat wire.

1.2 Application: Primarily for helical springs requiring optimum resistance to relaxation up to 1000°F (538°C) with moderate or relatively low stresses.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2269 - Chemical Check Analysis Limits, Wrought Nickel Alloys and Cobalt Alloys
AMS 2350 - Standards and Test Methods
AMS 2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Wrought Products Except Forgings and Forging Stock

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2.2 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103.

ASTM E 8 - Tension Testing of Metallic Materials
ASTM E 8M - Tension Testing of Metallic Materials (Metric)
ASTM E 354 - Chemical Analysis of High-Temperature, Electrical, Magnetic, and other Similar Iron, Nickel, and Cobalt Alloys

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Standards:

MIL-STD-163 - Steel Mill Products, Preparation for Shipment and Storage

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, Ø determined by wet chemical methods in accordance with ASTM E354, by spectrochemical methods, or by other analytical methods acceptable to purchaser:

	min	max
Carbon	--	0.08
Manganese	--	1.00
Silicon	--	0.50
Sulfur	--	0.010
Chromium	14.00	17.00
Nickel + Cobalt	70.00	--
Columbium + Tantalum	0.70	1.20
Titanium	2.25	2.75
Aluminum	0.40	1.00
Iron	5.00	9.00
Cobalt	--	1.00
Copper	--	0.50

3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2269.

3.2 Condition: Cold drawn from hot finished wire or rod which has had suitable Ø surface preparation for removal of scale, seams, and other injurious surface imperfections. Wire shall be solution heat treated by heating within the range 2000° - 2200°F (1093° - 1204°C), and then suitably lubricated before reducing to the size ordered.

3.2.1 Wire over 0.025 inch (0.64 mm) in nominal diameter or thickness shall be Ø cold reduced approximately 15% following solution heat treatment.

3.2.2 All traces of lubricant shall be removed after cold reduction. Ø

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3.3 Properties: Wire shall conform to the following requirements; tensile testing shall be performed in accordance with ASTM E 8 or ASTM E 8M:

3.3.1 As Received:

3.3.1.1 Tensile Properties: Shall be as specified in Table I.

TABLE I

Nominal Diameter or Thickness Inch	Tensile Strength psi min	Tensile Strength psi max
Up to 0.025, incl	--	150,000
Over 0.025 to 0.500, incl	130,000	165,000

TABLE I (SI)

Nominal Diameter or Thickness Millimetres	Tensile Strength MPa min	Tensile Strength MPa max
Up to 0.64, incl	--	1034
Over 0.64 to 12.70, incl	896	1138

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

Wire Shape	Wrapping Diameter
Round	Nominal diameter of wire
Square	Nominal diagonal of wire
Flat	Nominal width of wire

3.3.2 After Precipitation Heat Treatment: Wire shall have tensile properties as specified in Table II after being precipitation heat treated by heating to 1350°F ± 25 (732°C ± 14), holding at heat for 16 hours ± 0.5, and cooling in air.

TABLE II

Nominal Diameter or Thickness Inch	Tensile Strength psi, min
Up to 0.025, incl	155,000
Over 0.025 to 0.500, incl	165,000

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TABLE II (SI)

Nominal Diameter or Thickness Millimetres	Tensile Strength MPa, min
Up to 0.64, incl	1069
Over 0.64 to 12.70, incl	1138

3.4 Quality: Wire, as received by purchaser, shall be uniform in quality and condition and free from kinks, twists, scrapes, splits, cold shuts, and other imperfections detrimental to usage of the wire. The surface of the wire shall be free from lubricant and have a bright, smooth finish free from pits, abrasions, and other defects.

3.5 Tolerances: Shall be as follows:

3.5.1 Round Wire and Square Wire:

TABLE III

Nominal Diameter or Thickness Inch	Tolerance, Inch plus and minus
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

TABLE III (SI)

Nominal Diameter or Thickness Millimetres	Tolerance, Millimetre plus and minus
0.08 to 0.13, excl	0.003
0.13 to 0.20, excl	0.005
0.20 to 0.30, excl	0.008
0.30 to 0.61, excl	0.010
0.61 to 0.84, excl	0.013
0.84 to 1.12, excl	0.020
1.12 to 7.92, excl	0.025
7.92 to 12.70, incl	0.038

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