Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 5698C
Superseding AMS 5698B
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UNS NO7750

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

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 (540°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 Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

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

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM E8 - Tension Testing of Metallic Materials
ASTM E354 - Chemical Analysis of High-Temperature, Electrical, Magnetic, and other Similar Iron, Nickel, and Cobalt-Base Alloys

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

2.3.1 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

2.3.2 Military Standards:

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

3. TECHNICAL REQUIREMENTS:

Printed in U.S.A.

3.1 Composition: Shall conform to the following percentages by weight, determined by wet chemical methods in accordance with ASTM E354, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other approved analytical methods:

	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 (3.1.1)	--	1.00
Copper	--	0.50

3.1.1 Determination not required for routine acceptance.

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

3.2 Condition: Cold drawn from hot finished wire or rod which has been previously ground or has had surface preparation (other than by pickling) for removal of seams and other injurious surface imperfections and solution heat treated.

2.3.1 Wire over 0.025 in. (0.64 mm) in nominal diameter or thickness shall be copper coated and cold reduced approximately 15% following solution heat treatment.

3.3 Heat Treatment: Wire shall be solution heat treated by heating to a temperature not lower than 2100°F (1150°C) holding at heat for not more than 15 min., and cooling as required.

3.4 Properties: Wire shall conform to the following requirements; tensile testing shall be performed in accordance with ASTM E8:

3.4.1 As Received:

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

TABLE I

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

3.4.1.2 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

3.4.2 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 ± 15), holding at heat for 16 hr ± 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

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

3.5 Quality: Wire, as received by the purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external imperfections detrimental to usage of the wire.

3.6 Tolerances: Unless otherwise specified, tolerances shall be as follows:

3.6.1 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, Millimetres 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, excl	0.038

3.6.2 Out-of-Roundness: Round wire shall not be out-of-round by more than one-half the total permissible tolerance in 3.5.1.

3.6.3 Flat Wire 0.062 to 0.375 in. (1.57 to 9.52 mm), Incl, in Nominal Width:

TABLE IV

Nominal Thickness Inch	Tolerance, Inch plus and minus	
	Thickness	Width
Up to 0.029, excl	0.0010	0.005
0.029 to 0.035, excl	0.0015	0.005
0.035 to 0.3125, incl	0.0020	0.005

TABLE IV (SI)

Nominal Thickness Millimetres	Tolerance, Millimetre plus and minus	
Up to 0.74, excl	0.025	0.13
0.74 to 0.89, excl	0.038	0.13
0.89 to 7.938, incl	0.051	0.13

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of wire shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the wire conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance tests.

4.3 Sampling: Shall be in accordance with AMS 2371. Sampling for wrapping test shall be as specified in AMS 2371 for bend testing.

4.4 Reports:

4.4.1 The vendor of wire shall furnish with each shipment three copies of a report showing the results of tests for chemical composition of each heat and the results of tests on each size from each heat to determine conformance to the other technical requirements of this specification. This report shall include the purchase order number, heat number, material specification number and its revision letter, size, and quantity from each heat.