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400 COMMONWEALTH DRIVE WARRENDALE PA 15096

AEROSPACE MATERIAL SPECIFICATION

AMS 5834

Issued 10-1-84
Revised

WIRE, CORROSION AND HEAT RESISTANT
40Co - 20Cr - 15Ni - 7.0Mo - 0.06Be - 16Fe
Solution Heat Treated, Cold Drawn, and Aged UNS R30003

1. SCOPE:

1.1 Form: This specification covers a corrosion and heat resistant cobalt alloy in the form of round wire.

1.2 Application: Primarily for springs and torsion bars requiring a combination of high strength up to 800°F (425°C), excellent corrosion resistance, and good fatigue properties. Alloy is nonmagnetic.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications 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
AMS 2806 - Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Heat and Corrosion Resistant Steels and Alloys

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

ASTM E8 - Tensile Testing of Metallic Materials
ASTM E18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E354 - 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 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:

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 analytical methods approved by purchaser:

	min	max
Carbon	--	0.15
Manganese	1.5	2.5
Silicon	--	1.20
Phosphorus	--	0.015
Sulfur	--	0.015
Chromium	19.0	21.0
Nickel	14.0	16.0
Cobalt	39.0	41.0
Molybdenum	6.0	8.0
Beryllium	0.03	0.10
Other Elements, total	--	1.00
Iron	remainder	

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

3.2 Condition: Solution heat treated, cold drawn, and aged, in straight lengths.

3.3 Heat Treatment: Wire shall be solution heat treated by heating to 2150°F ± 25 (1175°C ± 15), holding at heat for a suitable time, and cooling in water to room temperature. After cold drawing, the wire shall be aged by heating to a temperature within the range 900° - 1000°F (480° - 540°C), holding at the selected temperature within ±25°F (±15°C) for 5 - 5 1/2 hr, and cooling in air to room temperature.

3.4 Properties: Wire shall conform to the following requirements:

3.4.1 Tensile Properties: Shall be as specified in Table I, determined in accordance with ASTM E8.

TABLE I

Specified Diameter Inch	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min
0.001 to 0.005, incl	330,000	--
Over 0.005 to 0.040, incl	290,000	210,000
Over 0.040 to 0.060, incl	285,000	200,000
Over 0.060 to 0.080, incl	275,000	200,000
Over 0.080 to 0.100, incl	275,000	195,000
Over 0.100 to 0.120, incl	270,000	185,000
Over 0.120 to 0.140, incl	270,000	180,000

TABLE I (SI)

Specified Diameter Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min
0.02 to 0.12, incl	2275	--
Over 0.12 to 1.00, incl	2000	1450
Over 1.00 to 1.50, incl	1965	1380
Over 1.50 to 2.00, incl	1895	1380
Over 2.00 to 2.50, incl	1895	1345
Over 2.50 to 3.00, incl	1860	1275
Over 3.00 to 3.50, incl	1860	1240

3.4.2 Hardness: Should be not lower than 46 HRC, or equivalent, determined in accordance with ASTM E18, but wire shall not be rejected on the basis of hardness if the tensile property requirements are met.

3.5 Quality:

3.5.1 Alloy shall be produced by multiple melting using vacuum induction followed by vacuum consumable electrode melting practices.

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

3.6 Tolerances: Shall be as follows:

3.6.1 Diameter: In accordance with Table II.

TABLE II

Specified Diameter Inch	Tolerance, Inch, plus and minus
0.001 to 0.0028, excl	0.0001
0.0028 to 0.005 , excl	0.00015
0.005 to 0.009 , excl	0.0002
0.009 to 0.016 , excl	0.00025
0.016 to 0.021 , excl	0.00035
0.021 to 0.038 , excl	0.00045
0.038 to 0.051 , excl	0.00055
0.051 to 0.099 , excl	0.00065
0.099 to 0.140 , incl	0.0007

TABLE II (SI)

Specified Diameter Millimetres	Tolerance, Millimetre, plus and minus
0.02 to 0.070, excl	0.002
0.070 to 0.12 , excl	0.0038
0.12 to 0.22 , excl	0.005
0.22 to 0.40 , excl	0.0062
0.40 to 0.52 , excl	0.0088
0.52 to 0.95 , excl	0.0112
0.95 to 1.28 , excl	0.0138
1.28 to 2.48 , excl	0.0162
2.48 to 3.50 , incl	0.018

3.6.2 Out of Round: Wire shall not be out-of-round by more than one-half of the total tolerance shown in Table II.

3.6.3 Straightness: Wire shall be of such straightness that the maximum curvature (depth of arc) shall not exceed 0.016 in. (0.04 mm) in any 6 in. (150 mm) of length.