



AEROSPACE MATERIAL SPECIFICATION

AMS5834™**REV. F**

Issued 1984-10
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Revised 2025-04

Superseding AMS5834E

Cobalt Alloy, Corrosion and Heat Resistant, Round Wire
20Cr - 15Ni - 40Co - 7.0Mo - 16Fe (Elgiloy®)
Vacuum Induction Melted Plus Vacuum Consumable Electrode or Electroslag Remelted,
Solution Heat Treated, Cold Drawn, and Aged
(Composition similar to UNS R30003)

RATIONALE

AMS5834F is the result of a Five-Year Review and update of the specification. The revision updates the Title to include the melt route (see 8.6), updates composition testing and reporting requirements (see 3.1 and 3.1.1), adds strain rate control to tensile testing (see 3.5.1.1), clarifies supply options by adding ordering information (see 5.1 and 8.7), and prohibits unauthorized exceptions (see 3.5.2, 4.4.1, and 8.5).

1. SCOPE

1.1 Form

This specification covers a corrosion- and heat-resistant cobalt alloy in the form of round wire 0.001 to 0.140 inch (0.025 to 3.56 mm), inclusive, in nominal diameter supplied in straight lengths or coils (see 8.7).

1.2 Application

This wire has been used typically for springs and torsion bars requiring a combination of high strength up to 800 °F (427 °C), excellent corrosion resistance, and good fatigue properties, but usage is not limited to such applications. The alloy is nonmagnetic.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (outside USA), www.sae.org.

AMS2269 Chemical Check Analysis Limits, Nickel, Nickel Alloys, and Cobalt Alloys

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AMS2283	Composition Testing Methods for Nickel- and Cobalt-Based Alloys
AMS2371	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS2750	Pyrometry
AMS2806	Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels, and Corrosion and Heat-Resistant Steels and Alloys
AS7766	Terms Used in Aerospace Metals Specifications

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM E8/E8M	Tensile Testing of Metallic Materials
ASTM E18	Rockwell Hardness of Metallic Materials
ASTM E140	Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness

2.3 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Composition shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS2283, or by other analytical methods acceptable to the purchaser.

Table 1 - Composition

Element	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	--	0.10
Other Elements, total	--	1.00
Iron	remainder	

3.1.1 The producer may test for any element not listed in Table 1 and include this analysis in the report of 4.4. Reporting of any element not listed in the composition table is not a basis for rejection unless limits of acceptability are specified by the purchaser.

3.1.2 Check Analysis

Composition variations shall meet the applicable requirements of AMS2269.

3.2 Melting Practice

The alloy shall be produced by multiple melting using vacuum induction followed by vacuum consumable electrode or electroslag remelting practices.

3.3 Condition

Wire shall be solution heat treated, cold drawn, and aged.

3.4 Heat Treatment

Wire shall be solution heat treated by heating to $2150^{\circ}\text{F} \pm 25^{\circ}\text{F}$ ($1177^{\circ}\text{C} \pm 14^{\circ}\text{C}$), holding at heat for a time commensurate with nominal diameter, and cooling as required. After cold drawing, the wire shall be aged by heating to a temperature within the range 900 to 1000 °F (482 to 538 °C), holding at the selected temperature within $\pm 25^{\circ}\text{F}$ ($\pm 14^{\circ}\text{C}$) for 5 to 5-1/2 hours, and cooling to room temperature at a rate equivalent to air cool. Pyrometry shall be in accordance with AMS2750.

3.4.1 Continuous Heat Treating of Wire

Process parameters (e.g., furnace temperature set points, heat input, travel rate, etc.) for continuous heat-treating lines shall be established by the material producer and validated by testing of product to the other requirements of this specification.

3.5 Properties

Wire shall conform to the following requirements:

3.5.1 Tensile Properties

Wire tensile properties shall be as specified in Table 2, determined in accordance with ASTM E8/E8M.

Table 2A - Minimum tensile strength, inch/pound units

Specified Diameter Inch	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi
0.001 to 0.005, incl	330	--
Over 0.005 to 0.040, incl	290	210
Over 0.040 to 0.060, incl	285	200
Over 0.060 to 0.080, incl	275	200
Over 0.080 to 0.100, incl	275	198
Over 0.100 to 0.120, incl	270	185
Over 0.120 to 0.140, incl	270	180

Table 2B - Minimum tensile strength, SI units

Specified Diameter Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa
0.03 to 0.13, incl	2275	--
Over 0.13 to 1.02, incl	1999	1448
Over 1.02 to 1.52, incl	1965	1379
Over 1.52 to 2.03, incl	1896	1379
Over 2.03 to 2.54, incl	1896	1344
Over 2.54 to 3.05, incl	1862	1276
Over 3.05 to 3.56, incl	1862	1241

3.5.1.1 Unless otherwise specified, the strain rate shall be set at 0.005 in/in/min (0.005 mm/mm/min) and maintained within a tolerance of ± 0.002 in/in/min (± 0.002 mm/mm/min) through 0.2% offset yield strain. After the yield strain, the speed of the testing machine shall be set between 0.05 and 0.5 in/in (0.05 and 0.5 mm/mm) of the length of the reduced parallel section (or distance between the grips for specimens not having a reduced section) per minute. Alternatively, an extensometer and strain rate indicator may be used to set the strain rate between 0.05 and 0.5 in/in/min (0.05 and 0.5 mm/mm/min). The requirement for compliance becomes effective for material produced 1 year after the publication date of this specification.

3.5.2 Tensile property requirements for product outside of the range covered by 1.1 shall be agreed upon between the purchaser and producer and reported as in 4.4.1.

3.5.3 Hardness

Hardness shall be not lower than 46 HRC, or equivalent (see 8.2), determined in accordance with ASTM E18.

3.5.3.1 When material thicknesses and/or forms preclude hardness testing to the hardness scale specified, hardness testing is not required as long as required tensile properties are met.

3.6 Quality

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

3.7 Tolerances

3.7.1 Diameter

Diameter tolerances shall be in accordance with Table 3.

Table 3A - Diameter tolerances, inch/pound units

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 3B - Diameter tolerances, SI units

Specified Diameter Millimeters	Tolerance Millimeters Plus and Minus
0.025 to 0.071, excl	0.0025
0.071 to 0.13, excl	0.0038
0.13 to 0.23, excl	0.005
0.23 to 0.41, excl	0.0064
0.41 to 0.53, excl	0.0089
0.53 to 0.97, excl	0.0114
0.97 to 1.30, excl	0.0140
1.30 to 2.51, excl	0.0165
2.51 to 3.56, incl	0.018