AEROSPACE MATERIAL SPECIFICATION

AMS5834	REV. D

Issued 1984-10
Reaffirmed 2008-05
Revised 2014-02

Superseding AMS5834C

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

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RATIONALE

AMS5834D results from a Five Year Review that revises Properties (3.5.2) and Reports (4.4).

1. SCOPE

1.1 Form

This specification covers a corrosion and heat-resistant cobalt alloy in the form of round wire 0.140 inch (3.56 mm) and under in nominal diameter supplied in straight lengths. (See 8.5.)

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 supplied 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 724-776-4970 (outside USA), www.sae.org.

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

AMS2371 Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock

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http://www.sae.org/technical/standards/AMS5834D

AMS2750 Pyrometry

AMS2806 Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Corrosion and Heat-Resistant Steels and Alloys

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 E 8/E 8M Tensile Testing of Metallic Materials

ASTM E 18 Rockwell Hardness of Metallic Materials

ASTM E 354 Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel and Cobalt Alloys

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined by wet chemical methods in accordance with ASTM E 354, by spectrochemical methods, or by other analytical methods acceptable to 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	

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3.1.1 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

Solution heat treated, cold drawn, and aged.

3.4 Heat Treatment

Wire shall be solution heat treated by heating to 2150 °F ± 25 (1177 °C ± 14), 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 ±25 °F (±14 °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.

3.5 Properties

Wire shall conform to the following requirements:

3.5.1 Tensile Properties

Shall be as specified in Table 2, determined in accordance with ASTM E 8/E 8M.

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 Millimeter	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

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

3.5.3 Hardness

Shall be not lower than 46 HRC, or equivalent (See 8.3), determined in accordance with ASTM E 18.

3.6 Quality

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.

3.7 Tolerances

Shall be as follows:

3.7.1 Diameter

In accordance with Table 3.

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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, Millimeter, 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

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3.7.2 Out of Round

Wire shall not be out-of-round by more than one-half of the total tolerance shown in Table 3.

3.7.3 Straightness

Wire shall be of such straightness that the maximum curvature (depth of arc) shall not exceed 0.016 inch (0.41 mm) in any 6-inch (152-mm) length.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of wire shall supply all samples for vendor's tests and shall be responsible for the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the wire conforms to specified requirements.

4.2 Classification of Tests

All technical requirements are acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling and Testing

Shall be in accordance with AMS2371.

4.4 Reports

The vendor of wire shall furnish with each shipment a report showing the vendor’s name and the country where the metal was melted (e.g., final melt in the case of metal processed by multiple melting operations) and the results of tests for composition of each heat and for tensile properties and hardness of each lot, and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, heat and lot numbers, AMS5834D, size, and quantity.