AEROSPACE MATERIAL SPECIFICATION

AMS5875™	REV. E

Issued 1984-10
Reaffirmed 2012-12
Revised 2025-01

Superseding AMS5875D

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

RATIONALE

AMS5875E is the result of a Five-Year Review and update of the specification. The revision updates composition testing and reporting (see 3.1 and 3.1.1), adds finish (see 3.3), pyrometry (see 3.4), and strain rate control requirements (see 3.5.2), deletes reference to ASTM E140 and adds clause to provide for agreement on hardness testing (see 3.5.5 and 8.2, Rev. D), and updates the prohibition of exceptions requirements (see 1.1, 3.5.4, 8.4, and 8.5).

1. SCOPE

1.1 Form

This specification covers a corrosion- and heat-resistant cobalt alloy in the form of strip up to 0.100-inch (2.54-mm) thick.

1.2 Application

This strip has been used typically for springs 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

AMS2283 Composition Testing Methods for Nickel- and Cobalt-Based Alloys

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS5875E/

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

AMS2750 Pyrometry

AMS2807 Identification, Carbon and Low-Alloy Steels, Corrosion- and Heat-Resistant Steels and Alloys, Sheet, Strip, Plate, and Aircraft Tubing

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 Tension Testing of Metallic Materials

ASTM E18 Rockwell Hardness of Metallic Materials

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

Alloy shall be produced by multiple melting using vacuum induction followed by vacuum consumable electrode or electroslag remelt practices.

3.3 Condition

Strip shall be solution heat treated, cold rolled, and aged. Unless heat treatment is performed in an atmosphere yielding a bright finish, descaled producing a uniform finish.

3.4 Heat Treatment

Except as specified in 3.4.1, strip shall be solution heat treated by heating to 2150 °F ± 25 °F (1177 °C ± 14 °C), holding at heat for a time commensurate with section thickness, and cooling as required. After cold rolling, the strip shall be aged by heating to a temperature within the range 850 to 950 °F (454 to 510 °C), holding at the selected temperature within ±25 °F (±14 °C) for 5 to 5-1/2 hours, and cooling in air to room temperature. Pyrometry shall be in accordance with AMS2750.

3.4.1 Continuous Heat Treatment

When continuous heat treatment is used, 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 requirements of 3.5.

3.5 Properties

Strip shall conform to the following requirements:

3.5.1 Tensile Properties

Tensile properties shall be as shown in Table 2, determined in accordance with ASTM E8/E8M.

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

Specified Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
Up to 0.0043, incl	325	250	--
Over 0.0043 to 0.01875, incl	315	225	--
Over 0.01875 to 0.025, incl	300	225	1
Over 0.025 to 0.047, incl	275	225	1
Over 0.047 to 0.075, incl	225	160	3
Over 0.075 to 0.100, incl	170	100	17

Table 2B - Minimum tensile properties, SI units

Specified Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50 mm or 4D %
Up to 0.109, incl	2241	1724	--
Over 0.109 to 0.4762, incl	2172	1551	--
Over 0.4762 to 0.64, incl	2068	1551	1
Over 0.64 to 1.19, incl	1896	1551	1
Over 1.19 to 1.90, incl	1551	1103	3
Over 1.90 to 2.54, incl	1172	689	17

3.5.2 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.

3.5.3 Elongation requirements do not apply to strip 0.01875 inch (0.4762 mm) and under in specified thickness.

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

3.5.5 Hardness

Hardness shall be not lower than 46 HRC, or equivalent (see 3.5.5.1), determined in accordance with ASTM E18, but strip shall not be rejected on the basis of hardness if the tensile property requirements are acceptable, determined on specimens taken from the same sample as that with nonconforming hardness or from another sample with similar nonconforming hardness.

3.5.5.1 Hardness conversions, when required, shall be agreed upon between the producer and purchaser.

3.6 Quality

Strip, 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 strip.

3.7 Tolerances

Width and thickness tolerances shall be in accordance with Tables 3 and 4, respectively.

3.7.1 Width

Width shall be as shown in Table 3.

Table 3A - Width tolerances, inch/pound units

Specified Width Inches	Tolerance, Inches Plus and Minus
Up to 0.3755, incl	0.0030
Over 0.3755 to 0.4999, incl	0.0040
Over 0.4999 to 4.0000, incl	0.0050

Table 3B - Width tolerances, SI units

Specified Width Millimeters	Tolerance, Millimeters Plus and Minus
Up to 9.538, incl	0.076
Over 9.538 to 12.697, incl	0.102
Over 12.697 to 101.600, incl	0.127

3.7.2 Thickness

Thickness shall be as shown in Table 4.

Table 4A - Thickness tolerances, inch/pound units

Specified Thickness Inches	Tolerance, Inches Plus and Minus
0.001 to 0.002, incl	0.00015
Over 0.002 to 0.004, incl	0.0002
Over 0.004 to 0.006, incl	0.0003
Over 0.006 to 0.009, incl	0.0004
Over 0.009 to 0.012, incl	0.0005
Over 0.012 to 0.015, incl	0.00065
Over 0.015 to 0.020, incl	0.00075
Over 0.020 to 0.025, incl	0.0010
Over 0.025 to 0.030, incl	0.00125
Over 0.030 to 0.050, incl	0.0015
Over 0.050 to 0.070, incl	0.00175
Over 0.070 to 0.100, incl	0.002

Table 4B - Thickness tolerances, SI units

Specified Thickness Millimeters	Tolerance, Millimeters Plus and Minus
0.02 to 0.05, incl	0.0038
Over 0.05 to 0.10, incl	0.005
Over 0.10 to 0.15, incl	0.008
Over 0.15 to 0.23, incl	0.010
Over 0.23 to 0.30, incl	0.013
Over 0.30 to 0.38, incl	0.0165
Over 0.38 to 0.51, incl	0.0190
Over 0.51 to 0.64, incl	0.025
Over 0.64 to 0.76, incl	0.0318
Over 0.76 to 1.27, incl	0.038
Over 1.27 to 1.78, incl	0.0444
Over 1.78 to 2.54, incl	0.051

3.8 Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

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