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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 5876A

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Superseding AMS 5876

ALLOY STRIP, CORROSION AND HEAT RESISTANT
20Cr - 15Ni - 40Co - 7.0Mo - 16Fe
Solution Heat Treated and Cold Rolled

UNS R30003

1. SCOPE:

1.1 Form: This specification covers a high-strength, corrosion and heat resistant cobalt alloy in the form of strip 0.100 in. (2.50 mm) and under in specified thickness and 4.000 in. (100.00 mm) and under in specified width.

1.2 Application: Primarily for springs requiring a combination of high strength up to 800°F (425°C) after aging, 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

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 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, Ø determined by wet chemical methods in accordance with ASTM E354 or by spectrochemical or 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	--	0.10
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 and cold rolled.

3.2.1 Solution Heat Treatment: Strip shall be solution heat treated by heating Ø to 2150°F + 25 (1175°C + 15), holding at heat for a time commensurate with section thickness, and cooling as required.

3.3 Properties: Strip shall conform to the following requirements:

3.3.1 As Solution Heat Treated and Cold Rolled:

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

TABLE I

Specified Thickness Inch	Tensile Strength psi, min
Up to 0.0043 , incl	260,000
Over 0.0043 to 0.01875, incl	250,000
Over 0.01875 to 0.025 , incl	240,000
Over 0.025 to 0.047 , incl	220,000
Over 0.047 to 0.075 , incl	180,000
Over 0.075 to 0.100 , incl	130,000

TABLE I (SI)

Specified Thickness Millimetres	Tensile Strength MPa, min
Up to 0.110 , incl	1795
Over 0.110 to 0.4688, incl	1725
Over 0.4688 to 0.62 , incl	1655
Over 0.62 to 1.18 , incl	1515
Over 1.18 to 1.88 , incl	1240
Over 1.88 to 2.50 , incl	895

3.3.2 After Aging: Strip shall meet the requirements of 3.3.2.1 and 3.3.2.2 after being aged by heating to a temperature within the range 850° - 950°F (455°- 510°C), holding at the selected temperature within ±25°F (±15°C) for 5 - 5-1/2 hr, and cooling in air to room temperature.

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

TABLE II

Specified Thickness Inch	Tensile Strength psi, min	Yield Strength at 0.2% Offset, psi, min	Elongation in 2 in. %, min
Up to 0.0043 , incl	325,000	250,000	--
Over 0.0043 to 0.01875, incl	315,000	225,000	--
Over 0.01875 to 0.025 , incl	300,000	225,000	1
Over 0.025 to 0.047 , incl	275,000	225,000	1
Over 0.047 to 0.075 , incl	225,000	160,000	3
Over 0.075 to 0.100 , incl	170,000	100,000	17

TABLE II (SI)

Specified Thickness Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset, MPa, min	Elongation in 50 mm %, min
Up to 0.110 , incl	2240	1725	--
Over 0.110 to 0.4688, incl	2170	1550	--
Over 0.4688 to 0.62 , incl	2070	1550	1
Over 0.62 to 1.18 , incl	1895	1550	1
Over 1.18 to 1.88 , incl	1550	1105	3
Over 1.88 to 2.50 , incl	1170	690	17

3.3.2.1.1 Elongation requirements do not apply to strip 0.01875 in. (0.4688 mm) and under in specified thickness.

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

3.4 Quality:

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

3.4.2 Strip, 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 strip.

3.5 Tolerances: Width and thickness tolerances shall be in accordance with Tables III and IV, respectively.

3.5.1 Width:

TABLE III

Specified Width Inches	Tolerance, Inch 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 III (SI)

Specified Width Millimetres	Tolerance, Millimetre plus and minus
Up to 9.500, incl	0.075
Over 9.500 to 12.500, incl	0.100
Over 12.500 to 100.000, incl	0.120

3.5.2 Thickness:

TABLE IV

Specified Thickness Inch	Tolerance, Inch 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 IV (SI)

Specified Thickness Millimetres	Tolerance, Millimetre 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 0.22, incl	0.010
Over 0.22 to 0.30, incl	0.012
Over 0.30 to 0.38, incl	0.0162
Over 0.38 to 0.50, incl	0.0188
Over 0.50 to 0.62, incl	0.025
Over 0.62 to 0.75, incl	0.0312
Over 0.75 to 1.25, incl	0.038
Over 1.25 to 1.75, incl	0.0438
Over 1.75 to 2.50, incl	0.050

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of strip shall supply all samples for vendor's tests 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 sample and to perform any confirmatory testing deemed necessary to ensure that the strip 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 and shall be performed on each heat or lot as applicable.