



AEROSPACE MATERIAL SPECIFICATION

AMS5842™**REV. H**Issued 1977-03
Revised 2022-04

Superseding AMS5842G

Cobalt-Nickel Alloy, Corrosion- and Heat-Resistant, Bars
19Cr - 36Co - 25Ni - 7.0Mo - 0.50Cb (Nb) - 2.9Ti - 0.20Al - 9.0Fe
Vacuum Induction Plus Vacuum Consumable Electrode Melted
Solution Heat Treated and Work Strengthened
(Composition similar to UNS R30159)

RATIONALE

This revision is the result of a Five-Year Review and update of the document. The revision includes an update to include size (1.1), prohibits unauthorized exceptions (3.5.3, 3.8, 4.4.1, 5.2.1, 8.7), prohibits bar being cut from plate (3.3.1, 4.4.2), adds strain rate control (3.5.2.1.3), and allows prior revisions (8.6).

1. SCOPE

1.1 Form

This specification covers a high strength, corrosion- and heat-resistant cobalt-nickel-chromium alloy in the form of bars 1-3/4 inch (44 mm) nominal diameter thickness or for hexagons least distance between parallel sides (see 8.3).

1.2 Application

These bars have been used typically for applications requiring a combination of high strength up to 1100 °F (593 °C), good tension-tension fatigue strength, toughness, and ductility, but usage is not limited to such applications. This alloy exhibits exceptionally good resistance to corrosion, crevice-corrosion, stress-corrosion cracking, and elevated temperature relaxation (see 8.3).

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.

AMS2261 Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Bars, Rods, and Wire

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

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Full document details: SAE AMS5842H

For more information on this standard, visit
<https://www.sae.org/standards/content/AMS5842H/>

Documents

Document Sharing Hub

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	Tension Testing of Metallic Materials
ASTM E18	Rockwell Hardness of Metallic Materials
ASTM E21	Elevated Temperature Tension Tests of Metallic Materials
ASTM E112	Determining Average Grain Size
ASTM E139	Conducting Creep, Creep-Rupture, and Stress-Rupture Tests of Metallic Materials
ASTM E140	Hardness Conversion Tables for Metals Relationship Among Brinell Hardness, Vickers Hardness, Rockwell Hardness, Superficial Hardness, Knoop Hardness, Scleroscope Hardness, and Leeb Hardness
ASTM E292	Conducting Time-for-Rupture Notch Tension Tests of Materials
ASTM E354	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 in accordance with ASTM E354, or by other analytical methods acceptable to purchaser.

Table 1 - Composition

Element	Min	Max
Carbon	--	0.04
Manganese	--	0.20
Silicon	--	0.20
Phosphorus	--	0.020
Sulfur	--	0.010
Chromium	18.00	20.00
Cobalt	34.00	38.00
Molybdenum	6.00	8.00
Columbium (Niobium)	0.25	0.75
Titanium	2.50	3.25
Aluminum	0.10	0.30
Iron	8.00	10.00
Boron	--	0.03
Nickel	remainder	

3.1.1 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 melting practice.

3.3 Condition

Solution heat treated and cold drawn.

3.3.1 Bar shall not be cut from plate (also see 4.4.2).

3.4 Solution Heat Treatment

Bars shall be solution heat treated by heating to a temperature within the range 1900 to 1925 °F (1038 to 1052 °C), holding at the selected temperature within ± 25 °F (± 14 °C) for 4 to 8 hours, and quenching in water. Pyrometry shall be in accordance with AMS2750.

3.5 Properties

Bars shall conform to the following requirements:

3.5.1 As Solution Heat Treated and Cold Drawn

3.5.1.1 Hardness

Shall be not lower than 38 HRC, or equivalent (see 8.2), determined in accordance with ASTM E18.

3.5.1.2 Average Grain Size

Shall be ASTM No. 4 or finer, determined in accordance with ASTM E112.

3.5.2 Response to Heat Treatment - After Aging

Samples from bars, 1-3/4 inches (44 mm) and under in nominal diameter, solution heat treated as in 3.4 and suitably cold drawn, shall have the following properties after being aged by heating to a temperature within the range 1200 to 1250 °F (649 to 677 °C), holding at the selected temperature within ± 25 °F (± 14 °C) for 4 to 4-1/2 hours, and cooling at a rate equivalent to an air cool (see 8.3):

3.5.2.1 Tensile Properties

3.5.2.1.1 At Room Temperature

Shall be as shown in Table 2, determined in accordance with ASTM E8/E8M on specimens as in 4.3.1.

Table 2 - Minimum room temperature tensile properties

Property	Value
Tensile Strength	260 ksi (1793 MPa)
Yield Strength at 0.2% Offset	250 ksi (1724 MPa)
Elongation in 4D	6%
Reduction of Area	22%