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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 5894

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Submitted for recognition as an American National Standard

COBALT ALLOY, BARS, SHEET, AND PLATE
60Co - 28Cr - 4.5W - 1.15C
Solution Heat Treated

1. SCOPE:

1.1 Form:

This specification covers a cobalt alloy in the form of sheet and plate up to 1 inch (25 mm) in nominal thickness or round bars up to 3 1/2 inches (89 mm) in nominal diameter.

1.2 Application:

These products have been used typically for parts requiring wear resistance and minimum galling or seizing tendencies at room and elevated temperatures, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2261 Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Bars, Rods, and Wire
MAM 2261 Tolerances, Metric, Nickel, Nickel Alloy, and Cobalt Alloy Bars, Rods, and Wire
AMS 2269 Chemical Check Analysis Limits, Wrought Nickel Alloys and Cobalt Alloys

2.1 SAE Publications (Continued):

AMS 2371 Quality Assurance Sampling and Testing, Corrosion and Heat Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS 2750 Pyrometry
AMS 2806 Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Corrosion and Heat Resistant Steels and Alloys
AMS 2807 Identification, Carbon and Low-Alloy Steels, Corrosion and Heat Resistant Steels and Alloys, Sheet, Strip, Plate, and Aircraft Tubing
AS4194 Sheet and Strip Surface Finish Nomenclature

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM E 8 Tension Testing of Metallic Materials
ASTM E 8M Tension Testing of Metallic Materials (Metric)
ASTM E 18 Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E 354 Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel and Cobalt Alloys

2.3 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-STD-163 Steel Mill Products, Preparation for Shipment and Storage

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	0.90	1.40
Manganese	0.5	2.0
Silicon	0.2	2.0
Phosphorus	--	0.04
Sulfur	--	0.03
Chromium	28.00	32.00
Tungsten	3.50	5.50
Nickel	--	3.0
Molybdenum	--	1.50
Iron	--	3.0
Cobalt	remainder	

3.1.1 Check Analysis: Composition variations shall meet the requirements of AMS 2269.

3.2 Condition:

The product shall be supplied in the following condition:

3.2.1 Sheet and Plate: Hot rolled, solution heat treated and descaled with a No. 2D finish appearance as defined by AS4194.

3.2.2 Bar: Solution heat treated with a turned or ground finish.

3.3 Solution Heat Treatment:

The product shall be solution heat treated by heating to 2250 °F ± 25 (1232 °C ± 14), holding at heat for a time commensurate with cross-section but not less than 15 minutes, and cooling at a rate equivalent to a still air cool or faster. Pyrometry shall be in accordance with AMS 2750.

3.4 Properties:

The product shall conform to the following requirements:

3.4.1 Tensile Properties: Shall be as shown in Table 2; determined in accordance with ASTM E 8 or ASTM E 8M. Bars shall be tested in the longitudinal direction. Sheet and plate shall be tested in the transverse direction. Reduction in area is not applicable to plate or sheet under 0.5 inches (12.7 mm) in nominal thickness.

TABLE 2 - Minimum Tensile Properties

Property	Value
Tensile Strength	130 ksi (896 MPa)
Yield Strength at 0.2% Offset	70.0 ksi (483 MPa)
Elongation in 4D	5%
Reduction of Area	7%

3.4.2 Hardness: Shall be 33 - 43 HRC, determined in accordance with ASTM E 18.

3.5 Quality:

The product, 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 product.

3.6 Tolerances:

Shall conform to all applicable requirements of the following:

3.6.1 Bars: AMS 2261 or MAM 2261.

3.6.2 Sheet and Plate: Not applicable unless separately agreed upon.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection:

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

4.2 Classification of Tests:

Tests for 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 AMS 2371.