

**AEROSPACE
MATERIAL
SPECIFICATION**

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Superseding AMS 5894A

**Cobalt Alloy, Bars, Sheet, and Plate
60Co - 28Cr - 4.5W - 1.15C
Solution Heat Treated**

(Composition similar to UNS R30016)

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 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, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org.

AMS 2261	Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Bars, Rods, and Wire
AMS 2269	Chemical Check Analysis Limits, Nickel, Nickel Alloys and Cobalt Alloys
AMS 2371	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock
AMS 2750	Pyrometry

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2.1 (Continued):

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, 100 Barr Harbor, West Conshohocken, PA 19428-2959 or www.astm.org.

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

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 applicable 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 ksi (483 MPa)
Elongation in 4D	5%
Reduction of Area	7%

- 3.4.2 Hardness: Shall be 33 to 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.
- 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 the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product 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 AMS 2371.

4.4 Reports:

The vendor of the product shall furnish with each shipment a report showing 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, AMS 5894B, size, and quantity.

4.5 Resampling and Retesting:

Shall be in accordance with AMS 2371.

5. PREPARATION FOR DELIVERY:

5.1 Identification:

Shall be as follows:

5.1.1 Bars: In accordance with AMS 2806.

5.1.2 Sheet and Plate: In accordance with AMS 2807.

5.2 Packaging:

The product shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery.