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AEROSPACE MATERIAL SPECIFICATION

AMS 5845C
Superseding AMS 5845B

Issued 11-15-72
Revised 4-1-84

ALLOY BARS, CORROSION RESISTANT
20Cr - 35Ni - 35Co - 10Mo
Vacuum Induction Plus Vacuum Consumable Electrode Melted
Solution Heat Treated, Work Strengthened, and Aged UNS R30035

1. SCOPE:

1.1 Form: This specification covers a work strengthened and aged, corrosion-resistant alloy in the form of bars (See 8.2).

1.2 Application: Primarily for applications requiring a combination of high strength, good tension-tension fatigue strength, toughness, ductility, and exceptionally good corrosion resistance.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) 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 2261 - Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Bars and Forging Stock
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
AMS 2806 - Identification, Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Heat and Corrosion Resistant Steels and Alloys

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM E8 - Tension Testing of Metallic Materials
ASTM E18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
ASTM E112 - Estimating the Average Grain Size of Metals
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 Federal Standards:

Federal Test Method Standard No. 151 - Metals; Test Methods

2.3.2 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, determined by wet chemical methods in accordance with ASTM E354, by spectrographic methods in accordance with Federal Test Method Standard No. 151, Method 112, or by other analytical methods approved by purchaser:

	min	max
Carbon	--	0.025
Manganese	--	0.15
Silicon	--	0.15
Phosphorus	--	0.015
Sulfur	--	0.010
Chromium	19.00	21.00
Nickel	33.00	37.00
Molybdenum	9.00	10.50
Titanium	--	1.00
Iron	--	1.00
Cobalt	remainder	

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

3.2 Condition: Solution heat treated, work strengthened, aged, and centerless ground.

3.3 Heat Treatment: Bars shall be solution heat treated by heating to a temperature within the range 1900° - 1925°F (1040° - 1050°C), holding at the selected temperature within ±25°F (±15°C) for 4 - 8 hr, and cooling in air ø to room temperature. After cold drawing, the bars shall be aged by heating to a temperature within the range 1000° - 1200°F (540° - 645°C), holding at the selected temperature within ±25°F (±15°C) for 4 - 4-1/2 hr, and cooling in air to room temperature.

3.4 Properties: Bars 1-3/4 in. (45 mm) and under in nominal diameter shall ø conform to the following requirements (See 8.2); properties of bars over 1-3/4 in. (45 mm) in nominal diameter shall be as agreed upon by purchaser and vendor:

3.4.1 Tensile Properties: Shall be as follows, determined in accordance with ASTM E8:

Tensile Strength, min	260,000 psi (1795 MPa)
Yield Strength at 2% Offset, min	230,000 psi (1585 MPa)
Elongation in 4D, min	8%
Reduction of Area, min	35%

3.4.2 Hardness: Should be not lower than 44 HRC, or equivalent, determined in ø accordance with ASTM E18 but bars shall not be rejected on the basis of hardness if the tensile property requirements of 3.4.1 are met.

3.4.3 Grain Size: Predominantly 4 or finer with occasional grains as large as 2 permissible, determined by comparison of a polished and etched specimen with the chart in ASTM E112.

3.5 Quality:

3.5.1 Alloy shall be produced by multiple melting using vacuum induction followed by vacuum consumable electrode melting practice.

3.5.2 Bars, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external imperfections detrimental to usage of the bars.

3.6 Sizes: Except when exact lengths or multiples of exact lengths are ordered, straight bars will be acceptable in mill lengths of 6 - 20 ft (2 - 6 m) but not more than 10% of any shipment shall be supplied in lengths shorter than 10 ft (3 m).

3.7 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2261.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of bars shall supply all samples for vendor's tests and shall be responsible for performing all required Ø 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 bars conform to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical Ø requirements of this specification are classified as acceptance tests and shall be performed on each heat or lot as applicable.

4.3 Sampling: Shall be in accordance with AMS 2371 and the following; a heat shall be the consumable electrode remelted ingots produced from alloy originally melted as a single furnace charge; a lot shall be all bars of one size from one heat produced at the same time:

4.3.1 Specimens for tensile testing shall be of standard proportions in accordance with ASTM E8 with either 0.250 in. (6.25 mm) diameter at the reduced parallel gage section or smaller specimens proportional to the standard when required. Specimens shall be machined from the center of bars 0.800 in. (20.00 mm) and under in nominal diameter or distance between parallel sides and from midradius of larger size bars.

4.4 Reports:

4.4.1 The vendor of bars shall furnish with each shipment three copies of a report showing the results of tests for chemical composition of each heat and for tensile properties, hardness, and grain size of each lot. This report shall include the purchase order number, heat number, AMS 5845B, size, and quantity from each heat, and a statement of record of specific temperature and time used in the age cycle.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, AMS 5845B, contractor or other direct supplier of bars, part number, and quantity. When bars for making parts are produced or purchased by the parts vendor, that vendor shall inspect each lot of bars to determine conformance to the requirements of this specification and shall include in the report either a statement that the bars conform or copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting: Shall be in accordance with AMS 2371.

5. PREPARATION FOR DELIVERY:

5.1 Identification: Bars shall be identified in accordance with AMS 2806.

5.2 Packaging: