AEROSPACE MATERIAL SPECIFICATION

AMS5845	REV. J

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Superseding AMS5845H

Alloy, Corrosion-Resistant, Round Bars 20Cr - 35Ni - 35Co - 10Mo Vacuum Induction Plus Consumable Electrode Vacuum Remelted Solution Heat Treated, Work Strengthened, and Aged (Composition similar to UNS R30035)

RATIONALE

AMS5845J revises Condition (3.3.1), Properties (3.5.1) and Reports (4.4, 4.4.5, 4.4.6) and is a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

This specification covers a high-strength, corrosion-resistant alloy in the form of bar up to 1.75 inch (44.4 mm) in diameter (See 8.2).

1.2 Application

These bars have been used typically for parts requiring a combination of high strength, good tension-tension fatigue strength, toughness, ductility, and exceptionally good corrosion resistance (See 8.2), 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 International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 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

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS5845J

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

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 E 8/E 8M Tension Testing of Metallic Materials

ASTM E 18 Rockwell Hardness of Metallic Materials

ASTM E 112 Determining Average Grain Size

ASTM E 354 Chemical Analysis of High-Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, andCobalt 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	--	0.025
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 applicable requirements of AMS2269.

3.2 Melting Practice

Alloy shall be multiple melted using vacuum induction melting followed by consumable electrode vacuum remelting.

3.3 Condition

Solution heat treated, work strengthened, aged, and centerless ground.

3.3.1 Bars shall not be cut from plate (Also see 4.4.5)

3.4 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 cooling in air to room temperature. Pyrometry for solution heat treatment shall be in accordance with AMS2750. After work strengthening, the bars shall be aged by heating to a temperature within the range 1000 to 1200 °F (538 to 649 °C), holding at the selected temperature within ±25° F (±14 °C) for 4 to 4-1/2 hours, and cooling in air to room temperature.

3.5 Properties

Bars shall conform to the following requirements (See 8.2):

3.5.1 Tensile Properties

Properties for bars up to 1.75 inches (44.4 mm) shall be as shown in Table 2, determined in accordance with ASTM E 8/E 8M. Properties for larger sizes shall be as agreed upon between producer and purchaser.

TABLE 2 - MINIMUM TENSILE PROPERTIES

Property	Value
Tensile Strength	260 ksi (1793 MPa)
Yield Strength at 0.2% Offset	230 ksi (1586 MPa)
Elongation in 4D	8%
Reduction of Area	35%

3.5.2 Hardness

Shall be not lower than 44 HRC, or equivalent (See 8.3), determined in accordance with ASTM E 18. Product shall not be rejected on the basis of hardness if the tensile properties of 3.5.1 are acceptable, determined on specimens taken from the same sample as that with nonconforming hardness or from another sample with similar nonconforming hardness.

3.5.3 Average Grain Size

Shall be ASTM No. 4 or finer, determined in accordance with ASTM E 112.

3.6 Quality

Bars, 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 bars.

3.7 Tolerances

Shall conform to all applicable requirements of AMS2261.

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 the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the bars conform 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 AMS2371 and the following:

In testing round bars, specimens for tensile testing (3.5.1) shall be of standard proportions in accordance with ASTM E 8/E 8M with either 0.250-inch (6.35-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 inch (20.32 mm) and under in nominal diameter and from mid-radius of larger size bars.

4.4 Reports

The vendor of the product shall furnish with each shipment a report showing the vendor's name and country where the metal was melted (e.g., final melt in the case of metal processed by multiple melting operations) and the following results of tests and relevant information:

4.4.1 For each heat
Composition.

4.4.2 For each lot
Tensile properties
Hardness
Average grain size.

4.4.3 A statement that the product conforms to the other technical requirements.

4.4.4 Purchase order number
Heat and lot numbers
AMS5845J
Size
Quantity.

4.4.5 If the ship size/shape is cut from a larger cross section, report the nominal metallurgically worked size (See 3.3.1).

4.4.6 When the product size is outside the size range covered by 3.5.1, the report shall contain a statement to that effect.

4.5 Resampling and Retesting

Shall be in accordance with AMS2371.

5. PREPARATION FOR DELIVERY

5.1 Sizes

Except when exact lengths or multiples of exact lengths are ordered, straight bars will be acceptable in mill lengths of 6 to 24 feet (1.8 to 7.3 m) but not more than 25% of any shipment shall be supplied in lengths of 6 to 9 feet (1.8 to 2.7 m), except that for bars weighing over 25 pounds per foot (37 kg/m), short lengths down to 2 feet (610 mm) may be supplied.

5.2 Identification

Shall be in accordance with AMS2806.

5.3 Packaging

Bars 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 bars to ensure carrier acceptance and safe delivery.