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400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 5873B

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Superseding 5873A

ALLOY SHEET, STRIP, AND PLATE, CORROSION AND HEAT RESISTANT
65Ni - 15.8Cr - 15.2Mo - 0.30Al - 0.05La
Consumable Electrode Melted, Solution Heat Treated

UNS N06635

1. SCOPE:

1.1 Form: This specification covers a corrosion and heat resistant nickel alloy in the form of sheet, strip, and plate.

1.2 Application: Primarily for formed and drawn parts, such as turbine seals, burner liners, exhaust cone assemblies, and nozzle diaphragm vanes, requiring relatively high strength up to 1800°F (980°C) and oxidation resistance up to 2000°F (1095°C).

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications 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 2262 - Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Sheet, Strip, and Plate
MAM 2262 - Tolerances, Metric, Nickel, Nickel Alloy, and Cobalt Alloy Sheet, Strip, and Plate
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

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 E112 - Determining Average Grain Size
ASTM E139 - Conducting Creep, Creep-Rupture, and Stress-Rupture Tests of Metallic Materials
ASTM E290 - Semi-Guided Bend Test for Ductility of Metallic Materials
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 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, Ø determined by wet chemical methods in accordance with ASTM E354 or by spectrochemical or other analytical methods approved by purchaser:

	min	max
Carbon	--	0.02
Manganese	0.30	1.00
Silicon	0.20	0.75
Phosphorus	--	0.020
Sulfur	--	0.015
Chromium	14.50	17.00
Molybdenum	14.00	16.50
Aluminum	0.10	0.50
Lanthanum	0.01	0.10
Cobalt	--	2.00
Tungsten	--	1.00
Boron	--	0.015
Iron	--	3.00
Copper	--	0.35
Nickel	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 Strip: Hot or cold rolled, solution heat treated, and, unless solution heat treatment is performed in an atmosphere yielding a bright finish, descaled having a surface appearance comparable to the following commercial corrosion-resistant steel finishes as applicable:

3.2.1.1 Sheet: No. 2D finish.

3.2.1.2 Strip: No. 1 strip finish.

3.2.2 Plate: Hot rolled, solution heat treated, and descaled.

3.3 Heat Treatment: The product shall be solution heat treated by heating to 1950°F ± 25 (1065°C ± 15) holding at heat for a time commensurate with section thickness, and cooling rapidly in air.

3.4 Properties: The product shall conform to the following requirements:

3.4.1 Grain Size: Shall be 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.

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

Tensile Strength, min	105,000 psi (725 MPa)
Yield Strength at 0.2% Offset, min	45,000 psi (310 MPa)
Elongation in 2 in. (50 mm) or 4D, min	40%

3.4.3 Bending: Product 0.1875 in. (4.75 mm) and under in nominal thickness shall withstand, without cracking, bending in accordance with ASTM E290 through an angle of 180 deg around a diameter equal to two times the nominal thickness of the product with axis of bend parallel to the direction of rolling. Bending requirements for product over 0.1875 in. (4.75 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

3.4.4 Stress-Rupture Properties at 1500°F (815°C): A tensile specimen, maintained at 1500°F ± 3 (815°C ± 2) while a load sufficient to produce an initial axial stress of 15,000 psi (105 MPa) is applied continuously, shall not rupture in less than 23 hours. The test shall be continued to rupture without change of load. Elongation after rupture, measured at room temperature, shall be not less than 10% in 4D. Tests shall be conducted in accordance with ASTM E139.

3.4.4.1 The test of 3.4.4 may be conducted using a load higher than required to produce an initial axial stress of 15,000 psi (105 MPa) but load shall not be changed while test is in progress. Time to rupture and elongation requirements shall be as specified in 3.4.4.

3.4.4.2 When permitted by purchaser, the test of 3.4.4 may be conducted using incremental loading. In such case, the load required to produce an initial axial stress of 15,000 psi (105 MPa) shall be used to rupture or for 23 hr, whichever occurs first. After the 23 hr and at intervals of 8 - 16 hr, preferably 8 - 10 hr, thereafter, the stress shall be increased in increments of 2,000 psi (15 MPa). Time to rupture and elongation requirements shall be as specified in 3.4.4.

3.5 Quality:

3.5.1 Alloy shall be produced by multiple melting using consumable electrode practice in the remelt cycle.

3.5.2 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 AMS 2262 or MAM 2262.

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. 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 product conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical 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; a heat shall be the consumable electrode remelted ingots produced from alloy originally melted as a single furnace charge.

4.4 Reports:

4.4.1 The vendor of the product shall furnish with each shipment a report showing the results of tests for chemical composition of each heat and the results of tests on each lot to determine conformance to the other technical requirements of this specification. This report shall include the purchase order number, heat number, AMS 5873B, size, and quantity.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 5873B, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification and shall include in the report either a statement that the material conforms 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: Each sheet, strip, and plate shall be marked on one face, in the respective location indicated below, with AMS 5873B, heat number, manufacturer's identification, and nominal thickness. The characters shall be of such size as to be legible, shall be applied using a suitable marking fluid, and shall be removable in hot alkaline cleaning solution without rubbing. The markings shall have no deleterious effect on the product or its performance and shall be sufficiently stable to withstand normal handling.