

Submitted for recognition as an American National Standard

ALLOY SHEET, STRIP, AND PLATE, CORROSION AND HEAT RESISTANT  
62Ni - 21.5Cr - 9.0Mo - 3.7(Cb+Ta)  
Solution Heat Treated

UNS N06625

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 parts requiring resistance to corrosion, oxidation, creep and rupture 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 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.

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-2371 - Quality Assurance Sampling of Corrosion and Heat Resistant Steels and Alloys, Wrought Products Except Forgings and Forging Stock

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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 112 - Determining Average Grain Size  
 ASTM E 290 - Semi-Guided Bend Test for Ductility 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.

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, determined by wet chemical methods in accordance with ASTM E 354, by spectrochemical methods, or by other analytical methods acceptable to purchaser:

	min	max
Carbon	--	0.10
Manganese	--	0.50
Silicon	--	0.50
Phosphorus	--	0.015
Sulfur	--	0.015
Chromium	20.00 - 23.00	
Molybdenum	8.00 - 10.00	
Columbium + Tantalum	3.15 - 4.15	
Iron	--	5.00
Cobalt (3.1.1)	--	1.00
Titanium (3.1.2)	--	0.40
Aluminum (3.1.2)	--	0.40
Nickel		remainder

3.1.1 Determination not required for routine acceptance.

3.1.2 Shall be present but not in excess of specified maximum.

3.1.3 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 3.2.1.1 or 3.2.1.2 as applicable (See 8.1).

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 a temperature not lower than 2000°F (1093°C), holding at the selected temperature within ±25°F (±14°C) for a time commensurate with section thickness, and cooling at a rate equivalent to an air cool or faster.

3.3.1 Product may be given a subsequent stabilization treatment at a temperature not lower than 1800°F (982°C) to increase resistance to sensitization.

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

3.4.1 Tensile Properties: Shall be as follows for product up to 1.000 inch (25.40 mm) in nominal thickness, determined in accordance with ASTM E 8 or ASTM E 8M:

Tensile Strength, minimum	100,000 psi (689 MPa)
Yield Strength at 0.2% Offset, minimum	40,000 psi (276 MPa)
Elongation in 2 Inches (50.8 mm) or 4D, minimum	30%

3.4.1.1 Yield strength requirement does not apply to product under 0.020 inch, (0.51 mm) in nominal thickness.

3.4.1.2 Elongation requirement does not apply to product under 0.010 inch (0.25 mm) in nominal thickness.

3.4.2 Bending: Product 0.187 inch (4.75 mm) and under in nominal thickness shall withstand, without cracking, bending in accordance with ASTM E 290 through an angle of 180 degrees around a diameter equal to the bend factor times the nominal thickness of the product with axis of bend parallel to the direction of rolling.

<u>Nominal Thickness</u>		<u>Bend Factor</u>
<u>Inch</u>	<u>Millimetres</u>	
Up to 0.050, incl	Up to 1.27, incl	1
Over 0.050 to 0.187, incl	Over 1.27 to 4.75, incl	2

3.4.2.1 Bending requirements for product over 0.187 inch (4.75 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

3.4.3 Grain Size: Shall be as follows, determined by comparison of a polished and etched specimen with the chart in ASTM E 112:

3.4.3.1 Sheet and Strip: Not finer than the following:

Nominal Thickness		ASTM Grain Size No.
Inches	Millimetres	
Up to 0.050, incl	Up to 1.27, incl	7
Over 0.050 to 0.187, incl	Over 1.27 to 4.75, incl	6

3.4.3.2 Plate: Not finer than ASTM grain size number 6.

3.4.3.3 Sheet, Strip, and Plate: Not coarser than ASTM Grain Size No. 2.

3.4.4 Stress-Rupture Properties at 1500°F (816°C): A tensile specimen maintained at 1500°F ± 3 (816°C ± 2) while a load sufficient to produce an initial axial stress of 19,000 psi (131 MPa) is applied continuously, shall not rupture in less than 23 hours. The test shall be continued to rupture without change of load. Time to rupture and elongation after rupture shall be reported. Test shall be conducted in accordance with ASTM E 139.

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 19,000 psi (131 MPa) but load shall not be changed while test is in progress. Time to rupture requirement 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 19,000 psi (131 MPa) shall be used to rupture or for 23 hours, whichever occurs first. After the 23 hours and at intervals of 8 - 16 hours, preferably 8 - 10 hours thereafter, the stress shall be increased in increments of 2,000 psi (13.8 MPa). Time to rupture requirement shall be as specified in 3.4.4.

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 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. 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:

4.2.1 Acceptance Tests: Tests for composition (3.1), tensile properties (3.4.1), bending (3.4.2), grain size (3.4.3), and tolerances (3.6) are acceptance tests and shall be performed on each heat or lot as applicable.