AEROSPACE
MATERIAL SPECIFICATIONS

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York, N.Y. 10017

AMS 5597

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Revised

ALLOY SHEET, STRIP, AND PLATE, CORROSION AND HEAT RESISTANT
Nickel Base - 19Cr - 3.1Mo - 5.1(Cb + Ta) - 0.90Ti - 0.50Al
Consumable Electrode Melted, Solution Treated at 1950 F (1065.6 C)

1. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.

2. APPLICATION: Primarily for parts, such as cases and ducts requiring high strength at cryogenic temperatures and for short time use up to 1000 F (538 C), which may require welding during fabrication.

3. COMPOSITION:

	min	max
Carbon	--	0.08
Manganese	--	0.35
Silicon	--	0.35
Phosphorus	--	0.015
Sulfur	--	0.015
Chromium	17.00	21.00
Nickel	50.00	55.00
Cobalt	--	1.00
Molybdenum	2.80	3.30
Columbium + Tantalum	4.75	5.50
Titanium	0.65	1.15
Aluminum	0.20	0.80
Boron	--	0.006
Copper	--	0.10
Iron	remainder	

3.1 Check Analysis: Composition variations shall meet the requirements of the latest issue of AMS 2269.

4. CONDITION: Unless otherwise specified, material shall be supplied in the following condition:

4.1 Sheet and Strip: Cold rolled, solution heat treated as in 5.1, and descaled having a surface appearance as close as possible to a commercial corrosion resistant steel No. 2D finish.

4.2 Plate: Hot rolled, solution heat treated as in 5.1, and descaled.

5. TECHNICAL REQUIREMENTS:

5.1 Solution Heat Treatment: Unless otherwise permitted, the product shall be solution heat treated by heating to 1950 F ± 25 (1065.6 C ± 14) in a suitable protective atmosphere, holding at heat for a time commensurate with the thickness, and cooled at a rate equivalent to air cool or faster.

5.2 Tensile Properties:

Tensile Strength, psi	140,000 max
Yield Strength at 0.2% Offset or at 0.0091 in. in 2 in. Extension Under Load (E = 29,600,000), psi	75,000 max
Elongation, % in 2 in. or 4D	30 min

5.2.1 For widths 9 in. and over, tensile test specimens shall be taken with the axis perpendicular to the direction of rolling. For widths less than 9 in., tensile test specimens shall be taken with the axis parallel to the direction of rolling.

5.3 Hardness: Should be not higher than Rockwell C 25 or equivalent but the product shall not be rejected on the basis of hardness if the tensile property requirements are met.

5.4 Bending: Material shall withstand, without cracking, bending at room temperature through an angle of 180 deg around a diameter equal to the bend factor times the nominal thickness of the material, with axis of bend parallel to the direction of rolling.

Nominal Thickness Inch	Bend Factor
Up to 0.050, incl	1
Over 0.050 to 0.187, incl	2

5.5 Grain Size: Shall be predominantly 3 or finer with occasional grains as large as 2 permissible, as determined by comparison of a polished and etched specimen with the chart in the issue of ASTM E112 listed in the latest issue of AMS 2350.

5.6 Properties After Precipitation Heat Treatment: The product shall conform to the following requirements after being precipitation heat treated by heating to 1400 F ± 15 (760 C ± 8.3), holding at heat for 10 hr, furnace cooling to 1200 F ± 15 (648.9 C ± 8.3), holding at 1200 F ± 15 (648.9 C ± 8.3) until a total precipitation heat treatment time of 20 hr has been reached, and cooled.

5.6.1 Tensile Properties:

Tensile Strength, psi	180,000 min
Yield Strength at 0.2% Offset or at 0.0141 in. in 2 in. Extension Under Load (E = 29,600,000), psi	150,000 min
Elongation, % in 2 in. or 4D	15 min

5.6.1.1 For widths 9 in. and over, tensile test specimens shall be taken with the axis perpendicular to the direction of rolling. For widths less than 9 in., tensile test specimens shall be taken with the axis parallel to the direction of rolling.

5.6.2 Hardness: Should be not lower than Rockwell C 38 or equivalent, but the product shall not be rejected on the basis of hardness if the tensile property requirements are met.

6. QUALITY: Material shall be produced by multiple melting using consumable electrode melting practice in the remelt cycle unless otherwise permitted. If consumable electrode remelting is not performed in vacuum, electrodes which have been produced by vacuum induction melting shall be used The product shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts.

7. TOLERANCES: Unless otherwise specified, tolerances shall conform to all applicable requirements of the latest issue of AMS 2262.

8. REPORTS:

8.1 Unless otherwise specified, the vendor of the product shall furnish with each shipment three copies of a report of the results of tests for chemical composition of each heat in the shipment and the results of tests on each thickness from each heat to determine conformance to the technical requirements of this specification. This report shall include the purchase order number, heat number, material specification number, thickness, size, and quantity from each heat.