AEROSPACE MATERIAL SPECIFICATION

AMS5870™	REV. G

Issued 1972-05
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Superseding AMS5870F

Nickel Alloy, Corrosion- and Heat-Resistant, Sheet, Strip, and Plate
60.5Ni - 23Cr - 14Fe - 0.35Ti - 1.4Al (Alloy 601), Solution Heat Treated
(Composition similar to UNS N06601)

RATIONALE

AMS5870G is the result of a Five-Year Review and update of the specification. The revision updates the Title with the common name, updates composition testing and reporting (see 3.1 and 3.1.1), revises finish requirements (see 3.2.1), updates strain rate (see 3.3.1.1), clarifies bend testing (see 3.3.2) and prohibits unauthorized exceptions (see 3.3.1.2, 4.4.1, and 8.4).

1. SCOPE

1.1 Form

This specification covers a corrosion- and heat-resistant nickel alloy in the form of sheet, strip, and plate 0.010 to 2.000 inches (0.25 to 50.80 mm), inclusive, in nominal thickness.

1.2 Application

These products have been used typically for parts requiring corrosion and oxidation resistance up to 2200 °F (1204 °C), particularly where such parts may require welding during fabrication, 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 +1 724-776-4970 (outside USA), www.sae.org.

AMS2262 Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Sheet, Strip, and Plate

AMS2269 Chemical Check Analysis Limits, Nickel, Nickel Alloys, and Cobalt Alloys

AMS2283 Composition Testing Methods for Nickel and Cobalt Based 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**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS5870G/

AMS2371 Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steels and Alloys, Wrought Products and Forging Stock

AMS2807 Identification, Carbon and Low-Alloy Steels, Corrosion and Heat-Resistant Steels and Alloys Sheet, Strip, Plate, and Aircraft Tubing

AS7766 Terms Used in Aerospace Metals Specifications

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 E8/E8M Tension Testing of Metallic Materials

ASTM E290 Bend Testing of Material for Ductility

2.3 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

Composition shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS2283 or by other analytical methods acceptable to the purchaser.

Table 1 - Composition

Element	Min	Max
Carbon	--	0.10
Manganese	--	1.00
Silicon	--	0.50
Sulfur	--	0.015
Chromium	21.00	25.00
Nickel	58.00	63.00
Titanium	0.10	0.60
Aluminum	1.00	1.70
Boron	--	0.006
Copper	--	1.00
Iron	remainder	

3.1.1 The producer may test for any element not listed in Table 1 and include this analysis in the report of 4.4. Reporting of any element not listed in the composition table is not a basis for rejection unless limits of acceptability are specified by the purchaser.

3.1.2 Check Analysis

Composition variations shall meet the applicable requirements of AMS2269.

3.2 Condition

The product shall be supplied in the following condition:

3.2.1 Sheet and Strip

Sheet and strip shall be cold rolled, solution heat treated, and, unless solution heat treatment is performed in an atmosphere yielding a bright finish, descaled producing a uniform finish.

3.2.2 Plate

Plate shall be hot rolled and solution heat treated.

3.2.2.1 Surface finish shall be as hot rolled unless plate is ordered descaled.

3.3 Properties

The product shall conform to the following requirements:

3.3.1 Tensile Properties

Tensile properties shall be as shown in Table 2 for product 0.010 to 2.000 inches (0.25 to 50.80 mm), inclusive, in nominal thickness, determined in accordance with ASTM E8/E8M.

Table 2 - Minimum tensile properties

Property	Value
Tensile Strength	80 ksi (552 MPa)
Yield Strength at 0.2% Offset	30.0 ksi (207 MPa)
Elongation in 2 Inches (50 mm) or 4D	35%

3.3.1.1 Unless otherwise specified, the strain rate shall be set at 0.005 in/in/min (0.005 mm/mm/min) and maintained within a tolerance of ±0.002 in/in/min (±0.002 mm/mm/min) through 0.2% offset yield strain. After the yield strain, the speed of the testing machine shall be set between 0.05 in/in and 0.5 in/in (0.05 mm/mm and 0.5 mm/mm) of the length of the reduced parallel section (or distance between the grips for specimens not having a reduced section) per minute. Alternatively, an extensometer and strain rate indicator may be used to set the strain rate between 0.05 in/in/min and 0.5 in/in/min (0.05 mm/mm/min and 0.5 mm/mm/min).

3.3.1.2 Mechanical property requirements for product outside of the range covered by 1.1 shall be agreed upon between the producer and purchaser and reported per 4.4.1.

3.3.2 Bending

Product 0.250 inch (6.35mm) and under in nominal thickness shall be tested in accordance with ASTM E290 using a sample prepared nominally 0.75 inch (19.0 mm) in width with its axis of bending parallel to the direction of rolling Testing shall be performed at room temperature, through the angle and around a diameter equal to the bend factor times the nominal thickness of the product, in accordance with Table 4. The specimen shall exhibit no cracking, when visually examined. In case of dispute, the results of tests using the guided bend test of ASTM E290 shall govern.

Table 3 - Bending parameters

Nominal Thickness Inches	Nominal Thickness Millimeters	Bend Angle Degrees	Bend Diameter t= Nominal Thickness
Up to 0.050, incl	Up to 1.27, incl	180	1t
Over 0.050 to 0.250, incl	Over 1.27 to 6.35, incl	180	2t

3.4 Quality

The product, as received by the purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the product.

3.5 Tolerances

Tolerances shall conform to all applicable requirements of AMS2262.

3.6 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of the product shall supply all samples for the producer's tests and shall be responsible for the performance of all required tests. The purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.

4.2 Classification of Tests

All technical requirements are acceptance tests and shall be performed on each lot, except composition which shall be performed on each heat.

4.3 Sampling and Testing

Sampling and testing shall be in accordance with AMS2371.

4.4 Reports

The producer of the product shall furnish with each shipment a report showing the producer's name, the country where the metal was melted (e.g., final melt in the case of metal processed by multiple melting operations), the results of tests for composition of each heat, for tensile and bending properties of each lot, and state product conforms to other technical requirements of this specification. This report shall include the purchase order number, heat and lot numbers, AMS5870G, size, and quantity.

4.4.1 When material produced to this specification is beyond the sizes allowed in the scope or technical exceptions are taken to the technical requirements listed in Section 3, the report shall contain a statement "This material is certified as AMS5870G(EXC) because of the following exceptions:" and the specific exceptions shall be listed.

4.5 Resampling and Retesting

Resampling and retesting shall be in accordance with AMS2371.

5. PREPARATION FOR DELIVERY

5.1 Identification

Product shall be identified in accordance with AMS2807.

5.1.1 When technical exceptions are taken (see 4.4.1), the material shall be marked with AMS5870G(EXC).

5.2 Packaging

The product 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 product to ensure carrier acceptance and safe delivery.

6. ACKNOWLEDGMENT

A producer shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS

Product not conforming to this specification, or to modifications authorized by the purchaser, will be subject to rejection.