

# AEROSPACE MATERIAL SPECIFICATION

**SAE** AMS5540

REV. N

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Revised 2011-07

Superseding AMS5540M

Nickel Alloy, Corrosion and Heat-Resistant, Sheet, Strip, and Plate  
74Ni - 15.5Cr - 8.0Fe  
Annealed

(Composition similar to UNS N06600)

## RATIONALE

AMS5540N revises Condition (3.2.1), Bending (3.3.3), Reports (4.4), and is a Five Year Review and update of this specification.

### 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

These products have been used typically for parts requiring oxidation resistance up to 2000 °F (1093 °C), but useful at the higher temperatures only when stresses are low, and where such parts may require welding during fabrication, but usage is not limited to such applications. Strength at elevated temperatures is similar to that of 18-8 type steels.

### 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.

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## 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](http://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
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
AS4194	Sheet and Strip Surface Finish Nomenclature

## 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](http://www.astm.org).

ASTM A 480/A 480M	Flat Rolled Stainless and Heat-Resisting Steel Plate, Sheet, and Strip
ASTM E 8/E 8M	Tension Testing of Metallic Materials
ASTM E 112	Determining Average Grain Size
ASTM E 290	Bend Testing of Material for Ductility
ASTM E 354	Chemical Analysis of High Temperature, Electrical, Magnetic, and Other Similar Iron, Nickel, and Cobalt 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	--	0.15
Manganese	--	1.00
Silicon	--	0.50
Phosphorus	--	0.040
Sulfur	--	0.015
Chromium	14.00	17.00
Nickel	72.00	--
Iron	6.00	10.00
Cobalt	--	1.00
Columbium (Niobium)	--	1.00
Titanium	--	0.50
Tantalum	--	0.05
Aluminum	--	0.35
Copper	--	0.50

### 3.1.1 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

Hot-rolled or cold-rolled, annealed, and, unless annealing is performed in an atmosphere yielding a bright finish, descaled having a surface appearance comparable to the following commercial corrosion resistant steel finishes as described in ASTM A 480/A 480M and AS4194 and 3.2.1.1 or 3.2.1.2 as applicable.

##### 3.2.1.1 Sheet

No. 2D finish

##### 3.2.1.2 Strip

No. 1 strip finish

#### 3.2.2 Plate

Hot or cold rolled, annealed, and descaled

### 3.3 Properties

3.3.1 The product shall conform to the following requirements:

#### 3.3.2 Tensile Properties

Shall be as specified in Table 2, determined in accordance with ASTM E 8/E 8M on product 2.000 inches (50.80 mm) and under in nominal thickness.

TABLE 2 - MINIMUM TENSILE PROPERTIES

Property	Value
Tensile Strength	80.0 ksi (552 MPa)
Yield Strength at 0.2% Offset	35.0 ksi (241 MPa)
Elongation in 2 inches (50.8 mm) or 4D	30%

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

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

### 3.3.3 Bending

Product 0.010 to 0.1875 inch (0.25 to 4.762 mm), exclusive, in nominal thickness shall be tested in accordance with ASTM E 290 using a sample prepared nominally 0.75 inch (19.0 mm) in width with its axis of bending parallel to the direction of rolling and shall withstand, without cracking, when bending at room temperature through an angle of 180 degrees around a diameter equal to the bend factor shown in Table 3 times the nominal thickness of the product. In case of dispute, the results of tests using the guided bend test of ASTM E 290 shall govern.

TABLE 3 - BENDING PARAMETERS

Nominal Thickness Inch	Nominal Thickness Millimeters	Bend Factor
0.010 to 0.050, incl	0.25 to 1.27, incl	1
Over 0.050 to 0.1875, excl	Over 1.27 to 4.762, excl	2

### 3.3.4 Average Grain Size

Shall be as shown in Table 4, determined in accordance with ASTM E 112.

TABLE 4 - GRAIN SIZE PARAMETERS

Form	Nominal Thickness Inch	Nominal Thickness Millimeters	ASTM Grain Size No.
Sheet	Up to 0.050, incl	Up to 1.27, incl	4.5 or finer
	Over 0.050 to 0.250, incl	Over 1.27 to 6.35, incl	3.5 or finer
Strip	Up to 0.125, incl	Up to 3.18, incl	4.5 or finer

### 3.4 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.

### 3.5 Tolerances

Shall conform to all applicable requirements of AMS2262.

## 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 the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to specified requirements.