



# AEROSPACE MATERIAL SPECIFICATION

AMS5766™

REV. F

Issued 1972-05  
Reaffirmed 2007-08  
Revised 2021-07

Superseding AMS5766E

Alloy, Corrosion and Heat-Resistant, Bars and Forgings  
21Cr - 32.5Ni - 0.38Ti - 0.38Al - 45Fe  
Solution Heat Treated  
(Composition similar to UNS N08800)

## RATIONALE

AMS5766F prohibits unauthorized exceptions (3.6, 4.4.5, 5.2.1.1), and allows prior revisions (8.4), adds AS1182 as a reference (3.4.2, 8.6), and results from a Five-Year Review and update of this specification.

### 1. SCOPE

#### 1.1 Form

This specification covers a corrosion and heat-resistant iron-nickel-chromium alloy in the form of bars and forgings 4.0 inches (102 mm) and under, and forging stock of any size.

#### 1.2 Application

These products have been used typically for low-stressed parts requiring corrosion and oxidation resistance 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](http://www.sae.org).

AMS2261	Tolerances, Nickel, Nickel Alloy, and Cobalt Alloy Bars, Rods, and Wire
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
AMS2374	Quality Assurance Sampling and Testing, Corrosion and Heat-Resistant Steel and Alloy Forgings

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For more information on this standard, visit  
<https://www.sae.org/standards/content/AMS5766F/>

AMS2806	Identification Bars, Wire, Mechanical Tubing, and Extrusions, Carbon and Alloy Steels and Corrosion and Heat-Resistant Steels and Alloys
AMS2808	Identification, Forgings
ARP1917	Clarification of Terms Used in Aerospace Metals Specifications
AS1182	Standard Stock Removal Allowance Aircraft-Quality and Premium Aircraft-Quality Steel Bars and Mechanical Tubing

## 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 E8/E8M	Tension Testing of Metallic Materials
ASTM E354	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	--	0.10
Manganese	--	1.50
Silicon	--	1.00
Phosphorus	--	0.035
Sulfur	--	0.015
Chromium	19.00	23.00
Nickel	30.00	35.00
Titanium	0.15	0.60
Aluminum	0.15	0.60
Copper	--	0.75
Iron	remainder	

#### 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 Bars and Forgings

Hot finished and solution heat treated.

3.2.1.1 Surface finish of bars shall be as ordered.

3.2.1.2 Bars shall not be cut from plate (see also 4.4.2).

#### 3.2.2 Forging Stock

As ordered by the forging manufacturer.

### 3.3 Properties

The product shall conform to the following requirements:

#### 3.3.1 Tensile Properties

Shall be as shown in Table 2 for bars and forgings 4.0 inches (102 mm) and under in nominal diameter or least distance between parallel sides, determined in accordance with ASTM E8/E8M.

3.3.1.1 Mechanical property requirements for product outside of the range of 1.1 shall be agreed upon between purchaser and producer.

**Table 2 - Minimum tensile properties**

Property	Value
Tensile Strength	65 ksi (448 MPa)
Yield Strength at 0.2% Offset	25.0 ksi (172 MPa)
Elongation in 4D	30%

### 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.

3.4.1 Grain flow of die forgings, except in areas which contain flash-line end grain, shall follow the general contour of the forgings showing no evidence of reentrant grain flow.

3.4.2 Round bars and the outer diameter of mechanical tubing shall be free from seams, laps, tears, and cracks after removal of the standard stock removal allowance in accordance with AS1182. Superficial surface imperfections such as scratches or pits shall not exceed applicable tolerances.

### 3.5 Tolerances

Bars shall conform to all applicable requirements of AMS2261.

### 3.6 Exceptions

Any exception shall be authorized by purchaser and reported as in 4.4.5.

## 4. QUALITY ASSURANCE PROVISIONS

### 4.1 Responsibility for Inspection

The producer of the product shall supply all samples for producer'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.

### 4.2 Classification of Tests

#### 4.2.1 Acceptance Tests

Composition (3.1), tensile properties (3.3.1), and tolerances (3.5) are acceptance tests and shall be performed on each heat or lot as applicable.

#### 4.2.2 Periodic Tests

Grain flow of die forgings (3.4.1) is a periodic test and shall be performed at a frequency selected by the producer unless frequency of testing is specified by purchaser.

#### 4.3 Sampling and Testing

Shall be as follows:

##### 4.3.1 Bars and Forging Stock

In accordance with AMS2371.

##### 4.3.2 Forgings

In accordance with AMS2374.

#### 4.4 Reports

4.4.1 The producer of the product shall furnish with each shipment a report showing the producer's name and country where the metal was melted (e.g., final melt in the case of metal processed by multiple melting operations) and the results of tests for composition of each heat and for the tensile properties of each lot, and stating that the product conforms to the other technical requirements. This report shall include the purchase order number, heat and lot numbers, AMS5766F, size, and quantity. If forgings are supplied, the size and melt source of stock used to make the forgings shall also be included.

4.4.2 If the ship size/shape is cut from a larger cross section, report the nominal metallurgically worked size (see 3.2.1.2).

4.4.3 When the product size is outside the range covered by 1.1, the report shall contain a statement to that effect.

4.4.4 The producer of forging stock shall furnish with each shipment a report showing the producer's name and country where the metal was melted (e.g., final melt in the case of metal processed by multiple melting operations) and the results of tests for composition, macrostructure and response to heat treatment of each heat. This report shall include the purchase order number, AMS5766F, size, and quality.

4.4.5 When material produced to this specification has exceptions authorized by purchaser taken to the technical requirements listed in Section 3 (see 5.2.1.1), the report shall contain a statement "This material is certified as AMS5766E(EXC) because of the following exceptions:" and the specific exceptions shall be listed.

#### 4.5 Resampling and Retesting

Shall be as follows:

##### 4.5.1 Bars and Forging Stock

In accordance with AMS2371.

##### 4.5.2 Forgings

In accordance with AMS2374.

### 5. PREPARATION FOR DELIVERY

#### 5.1 Sizes

Except when exact lengths or multiples of exact lengths are ordered, straight bars will be acceptable in mill lengths of 6 to 24 feet (1.8 to 7.3 m) but not more than 25% of any shipment shall be supplied in lengths of 6 to 9 feet (1.8 to 2.7 m) except that for bars weighing over 25 pounds per foot (37 kg/m), short lengths down to 2 feet (610 mm) may be supplied.