

# AEROSPACE MATERIAL SPECIFICATION

**SAE** AMS4186

REV. D

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Superseding AMS4186C

Aluminum Alloy Bars, Rods, and Wire, Rolled or Cold Finished  
5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075-F)  
As Fabricated, or when specified, Annealed (7075-O)  
(Composition similar to UNS A97075)

## RATIONALE

AMS4186D adds coverage for O temper (Title, 3.2), and adds tensile properties for annealed product (3.3.2, Table 2, 4.2.1) to facilitate future cancellation of AMS-QQ-A-225/9.

### 1. SCOPE

#### 1.1 Form

This specification covers an aluminum alloy in the form of bars, rods, and wire in the "as fabricated (F) temper. When specified, product shall be supplied in the annealed (O) condition.

#### 1.2 Application

These products have been typically used for parts requiring forming and as stock for flash welded rings which are to be subsequently solution and precipitation heat treated, but usage is not limited to such applications.

1.2.1 Certain design and processing procedures may cause these products to become susceptible to stress-corrosion cracking after solution and precipitation heat treatment; ARP823 recommends practices to minimize such conditions.

### 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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<http://www.sae.org/technical/standards/AMS4186D>**

## 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).

AMS2355	Quality Assurance, Sampling and Testing, Aluminum Alloys and Magnesium Alloy, Wrought Products (Except Forging Stock), and Rolled, Forged, or Flash Welded Rings
AMS2772	Heat Treatment of Aluminum Alloy Raw Materials
ARP823	Minimizing Stress-Corrosion Cracking in Wrought Heat-Treatable Aluminum Alloy Products
AS1990	Aluminum Alloy Tempers

## 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 B 660	Packaging/Packing of Aluminum and Magnesium Products
ASTM B 666/B 666M	Identification Marking of Aluminum and Magnesium Products

## 2.3 ANSI Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, [www.ansi.org](http://www.ansi.org).

ANSI H35.2	Dimensional Tolerances for Aluminum Mill Products
ANSI H35.2	Dimensional Tolerances for Aluminum Mill Products, Metric

## 3. TECHNICAL REQUIREMENTS

### 3.1 Composition

Shall conform to the following percentages by weight shown in Table 1, determined in accordance with AMS2355.

TABLE 1 - COMPOSITION

Element	min	max
Silicon	--	0.40
Iron	--	0.50
Copper	1.2	2.0
Manganese	--	0.30
Magnesium	2.1	2.9
Chromium	0.18	0.28
Zinc	5.1	6.1
Titanium	--	0.20
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

### 3.2 Condition

3.2.1 Rolled or cold finished, as ordered, in the as-fabricated condition.

3.2.2 When specified, material may be provided annealed in accordance with AMS2772.

### 3.3 Properties

The product shall conform to the following requirements, determined in accordance with AMS2355 on the mill produced size:

#### 3.3.1 As Fabricated

No requirements.

#### 3.3.2 As Annealed

##### 3.3.2.1 Tensile Properties

Shall be as shown in Table 2.

TABLE 2 – ANNEALED TENSILE PROPERTIES

Property	Value
Tensile Strength, max	40.0 ksi (276 MPa)
Yield Strength at 0.2% Offset, min	--
Elongation in 2 inches (50.8 mm) or 4D, min	10%

#### 3.3.3 Response to Solution and Precipitation Heat Treatment

Rods and wire 4 inches (102 mm) and under in nominal diameter; square, hexagonal, and octagonal bar 3-1/2 inches (89 mm) and under in nominal thickness; and rectangular bar 3 inches (76 mm) and under in nominal thickness and 6 inches (152 mm) and under in nominal width or 10 inches (254 mm) and under in nominal width when nominal thickness is under 3 inches (76 mm) shall have the following properties after solution and precipitation heat treatment in accordance with AMS2772 to the -T62 temper (See AS1990):

##### 3.3.3.1 Tensile Properties

TABLE 3 - MINIMUM TENSILE PROPERTIES IN T62 TEMPER

Property	Value
Tensile Strength	77.0 ksi (531 MPa)
Yield Strength at 0.2% Offset	66.0 ksi (455 MPa)
Elongation in 2 inches (50.8 mm) or 4D	7%

### 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 ANSI H35.2 or ANSI H35.2M.

#### 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.

##### 4.2 Classification of Tests

###### 4.2.1 Acceptance Tests

Composition (3.1), tensile properties as annealed (3.3.2.1) (not applicable to F temper), tensile properties after solution and precipitation heat treatment (3.3.3.1) and tolerances (3.5) are classified as acceptance tests and shall, except for composition, be performed on each lot.

##### 4.3 Sampling and Testing

Shall be in accordance with AMS2355.

##### 4.4 Reports

The vendor of the product shall furnish with each shipment a report stating that the product conforms to the composition, tolerances and showing the numerical results of tests on each inspection lot to determine conformance to the other technical requirements of this specification. This report shall include the purchase order number, lot number, AMS4186D, size, and quantity. The report shall also include the identity of the mill and the size of the mill product.

##### 4.5 Resampling and Retesting

Shall be in accordance with AMS2355.

#### 5. PREPARATION FOR DELIVERY

##### 5.1 Identification

Shall be in accordance with ASTM B 666/B 666.

##### 5.2 Packaging

The product shall be prepared for shipment in accordance with ASTM B 660 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 vendor 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 purchaser, will be subject to rejection.