



# AEROSPACE MATERIAL SPECIFICATION

AMS4128

REV. D

Issued 1969-11  
Revised 2007-10  
Reaffirmed 2013-09

Superseding AMS4128C

Aluminum Alloy Bars, Rolled or Cold Finished  
1.0Mg - 0.60Si - 0.30Cu - 0.20Cr (6061-T451)  
Solution Heat Treated and Stress Relieved by Stretching  
(Composition similar to UNS A96061)

## RATIONALE

AMS4128D has been reaffirmed to comply with the SAE five-year review policy.

### 1. SCOPE

#### 1.1 Form

This specification covers an aluminum alloy in the form of bars and rods 0.500 inch (12.50 mm) and over in nominal diameter or least difference between parallel sides.

#### 1.2 Application

These bars have been used typically for parts where moderate ductility, formability, and response to precipitation heat treatment are required and where distortion during machining must be minimized, 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 724-776-4970 (outside USA), [www.sae.org](http://www.sae.org).

AMS 2355 Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings

AMS 2772 Heat Treatment of Aluminum Alloy Raw Materials

AS1990 Aluminum Alloy Tempers

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## 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 B660 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, Tel: 212-642-4900, [www.ansi.org](http://www.ansi.org).

ANSI H35.2 Dimensional Tolerances for Aluminum Mill Products  
 ANSI H35.2M Dimensional Tolerances for Aluminum Mill Products (Metric)

## 3. TECHNICAL REQUIREMENTS

### 3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS 2355.

TABLE 1 - COMPOSITION

Element	min	max
Silicon	0.40	0.8
Iron	--	0.7
Copper	0.15	0.40
Manganese	--	0.15
Magnesium	0.8	1.2
Chromium	0.04	0.35
Zinc	--	0.25
Titanium	--	0.15
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

### 3.2 Condition

Rolled or cold finished, as ordered, solution heat treated in accordance with AMS 2772, and stress-relieved by stretching to produce a nominal permanent set of 1-1/2% but not less than 1% nor more than 3% to produce the -T451 temper (See AS1990).

3.2.1 Product shall receive no further straightening operations after stretching, unless specifically authorized by purchaser.

### 3.3 Properties

Product 0.500 inch (12.50 mm) to 8.000 inch (203.2 mm) in nominal diameter or least distance between parallel sides shall conform to the following requirements, determined in accordance with AMS 2355 on the mill produced size.

### 3.3.1 As Solution Heat Treated and Stress-Relieved by Stretching

#### 3.3.1.1 Tensile Properties

Shall be as shown in Table 2:

TABLE 2A - MINIMUM TENSILE PROPERTIES, INCH/POUND UNITS

Nominal Thickness Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset	Elongation % in 2 Inches or 4D
0.500 to 8.000 <sup>(1)</sup>	30.0	16.0	18

<sup>(1)</sup> For bar maximum cross-sectional area is 50 square inches.

TABLE 2B - MINIMUM TENSILE PROPERTIES, SI UNITS

Nominal Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset	Elongation % in 50.8 mm or 4D
12.50 to 203.2 <sup>(1)</sup>	205	110	18

<sup>(1)</sup> For bar maximum cross-sectional area is 322.6 cm<sup>2</sup>.

### 3.3.2 Response to Heat Treatment

The product shall, after precipitation heat treatment in accordance with AMS 2772 to the T62 temper, have the properties shown in Table 3. In this case, T62 temper is the accepted designation demonstrating response to heat treatment when starting from T451 temper. For engineering drawings, the T451 product, when precipitation heat treated similarly with the heat treated product, would be described as T651.

#### 3.3.2.1 Tensile Properties

Shall be as shown in Table 3:

TABLE 3 - MINIMUM TENSILE PROPERTIES

Property	Value
Tensile Strength	42.0 ksi (290 MPa)
Yield Strength at 0.2% Offset	35.0 ksi (241 MPa)
Elongation in 4D	10%

### 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

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

## 4.3 Sampling and Testing

Shall be in accordance with AMS 2355.

## 4.4 Reports

The vendor of bars shall furnish with each shipment a report stating that the product conforms to the composition and tolerances, and showing the numerical results of tests on each inspection lot to determine conformance to the other acceptance test requirements. This report shall include the purchase order number, lot numbers, AMS 4128D, size, and quantity. The report shall also identify the producer, the product form, and the size of the mill product.

## 4.5 Resampling and Retesting

Shall be in accordance with AMS 2355.

## 5. PREPARATION FOR DELIVERY

### 5.1 Identification

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

### 5.2 Packaging

The product shall be prepared for shipment in accordance with ASTM B660 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

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

## 8. NOTES

8.1 A change bar (I) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this specification. An (R) symbol to the left of the document title indicates a complete revision of the specification, including technical revisions. Change bars and (R) are not used in original publications, nor in specifications that contain editorial changes only.

8.2 Hardness as-received should be 50 to 80 HB/10/500 or 55 to 85 HB/10/1000. Hardness after precipitation heat treatment should be not lower than 80 HB/10/500 or 85 HB/10/1000. Hardness has been used to verify that product is properly processed, but product with "out-of-range hardness number" is not always indicative of product with "out-of-specified tensile strength". Further analysis, including material composition verification, heat treat process parameter review, and/or tensile property measurement on product with out-of-range hardness may be necessary.

8.3 Terms used in AMS are clarified in ARP1917.