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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4117H

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Superseding AMS 4117G

Aluminum Alloy, Rolled or Cold Finished Bars, Rods, and Wire and Flash Welded Rings
1.0Mg - 0.60Si - 0.28Cu - 0.20Cr (6061; -T6, -T651)
Solution and Precipitation Heat Treated

(Composition similar to UNS A96061)

1. SCOPE:

1.1 Form:

This specification covers an aluminum alloy in the form of rolled or cold-finished bars, rods, and wire and of flash welded rings and stock for flash welded rings.

1.2 Application:

These products have been used typically for parts requiring moderate strength where limited formability is acceptable, 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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

AMS 2355	Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings
MAM 2355	Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings, Metric (SI) Units
AMS 2772	Heat Treatment of Aluminum Alloy Raw Materials
AMS 7488	Rings, Flash Welded, Aluminum and Aluminum Alloys

QUESTIONS REGARDING THIS DOCUMENT: (724) 772-7161 FAX: (724) 776-0243
TO PLACE A DOCUMENT ORDER: (724) 776-4970 FAX: (724) 776-0790
SAE WEB ADDRESS: http://www.sae.org

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

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

2.3 ANSI Publications:

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

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 or MAM 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:

The product shall be supplied in the following condition:

3.2.1 Bars, Rods, and Wire: Rolled or cold finished, as ordered.

3.2.1.1 Bars, rods, and wire under 0.500 inch (12.70 mm) in nominal diameter or least distance between parallel sides shall be solution and precipitation heat treated to the -T6 temper in accordance with AMS 2772. Where -T6 temper is ordered, -T651 temper may be supplied.

3.2.1.2 Bars and rods 0.500 to 8.000 inches (12.70 to 203.20 mm), inclusive, in nominal diameter or least distance between parallel sides shall be solution heat treated, stress-relieved by stretching to produce a nominal permanent set of 1-1/2% but not less than 1% nor more than 3%, and precipitation heat treated to -T651 temper. Heat treatments shall be in accordance with AMS 2772.

3.2.1.2.1 Bars and rods stress-relieved by stretching shall receive no further straightening operations after stretching unless specifically authorized by purchaser.

3.2.2 Flash Welded Rings: Shall be manufactured in accordance with AMS 7488 and solution and precipitation heat treated to the -T6 temper in accordance with AMS 2772.

3.2.3 Stock for Flash Welded Rings: As ordered by the flash welded ring manufacturer.

3.3 Properties:

Product shall conform to the following requirements, determined in accordance with AMS 2355 or MAM 2355 on the mill product.

3.3.1 Bars, Rods, Wire, and Flash Welded Rings:

3.3.1.1 Tensile Properties: Shall be as shown in Table 2 for rounds 8 inches (203 mm) and under in specified diameter, for square, rectangular, hexagonal, and octagonal bars 50 square inches (322 cm^2) and under in cross-sectional area and 8 inches (203 mm) and under in least distance between parallel sides, and for flash welded rings 8 inches (203 mm) and under in radial thickness.

TABLE 2 - 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 2 Inches (50.8 mm) or 4D	10%

3.3.1.1.1 Yield strength and elongation requirements do not apply to product under 0.125 inch (3.18 mm) in nominal diameter or least distance between parallel sides.

3.3.2 Stock for Flash Welded Rings: Specimens taken from the stock after solution and precipitation heat treatment in accordance with 3.2.2 shall conform to the requirements of 3.3.1.1.

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:

Bars, rods, and wire 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 the specified requirements.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: The following requirements are acceptance tests and, except for composition, shall be performed on each lot:

4.2.1.1 Composition (3.1) of the product.

4.2.1.2 Tensile properties (3.3.1.1) of bars, rods, wire, and flash welded rings.

4.2.1.3 Tolerances (3.5) of bars, rods, and wire.

4.2.2 Periodic Tests: Tests of stock for flash welded rings to determine ability to develop required properties (3.3.2) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing:

Shall be in accordance with AMS 2355 or MAM 2355.

4.4 Reports:

The vendor of bars, rods, wire, and stock for flash welded rings, shall furnish with each shipment a report stating that the product conforms to the chemical 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, inspection lot number(s), AMS 4117H, size, and quantity. The report shall also identify the producer, the product form, and the size of the mill product.