SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE MAM 4248B

Issued	JAN 1987
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Cancelled	MAR 2003
Superseding	MAM 4248A

Aluminum Alloy Hand Forgings and Rolled Rings
1.0Mg - 0.60Si - 0.28Cu - 0.20Cr (6061-T652)
Solution Heat Treated, Stress Relieved by Compression, and Precipitation Heat Treated

UNS A96061

CANCELLATION NOTICE

This specification has been declared "CANCELLED" by the Aerospace Materials Division, SAE, as of March, 2003. By this action, this document will remain listed in the Numerical Section of the Index of Aerospace Material Specifications.

AMS 4248 covers the same material.

"CANCELLED" specifications are available from SAE.

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1. SCOPE:

1.1 Form:

This specification covers an aluminum alloy in the form of hand forgings and rolled rings procured to metric (SI) dimensions.

1.1.1 AMS 4248 is the inch/pound version of this MAM.

1.2 Application:

These products have been used typically for complex shaped parts requiring moderate strength and good forgeability of the alloy and where stability is required during machining, but usage is not limited to such applications. Corrosion resistance of this alloy is superior to that of aluminum alloys having copper as the principal alloying element.

2. APPLICABLE DOCUMENTS:

The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications:

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

MAM 2355	Quality Assurance Sampling and Testing of Aluminum Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings, Metric (SI) Units
AMS 2645	Fluorescent Penetrant Inspection
AMS 2808	Identification, Forgings

2.2 ASTM Publications:

Available from ASTM, 1916 Race Street, Philadelphia PA 19103-1187.

ASTM B 594	Ultrasonic Inspection of Aluminum-Alloy Products for Aerospace Applications
ASTM B 660	Packaging/Packing of Aluminum and Magnesium Products

2.3 U.S. Government Publications:

Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

MIL-H-6088	Heat Treatment of Aluminum Alloys

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

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

TABLE 1 - Composition

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

3.2 Condition:

Solution heat treated, stress relieved by compression to produce a 1 to 5% permanent set, and precipitation heat treated. Heat treatments shall be performed in accordance with MIL-H-6088.

3.3 Properties:

The product shall conform to the following requirements, determined in accordance with MAM 2355:

3.3.1 Tensile Properties: Shall be as follows:

3.3.1.1 Hand Forgings: Specimens, machined from forgings having an essentially square or rectangular cross-section and heat treated in the indicated thickness, shall have the properties shown in Table 2 provided the as-forged thickness does not exceed 200 millimeters and the cross-sectional area is not over 1650 square centimeters.

TABLE 2 - Minimum Tensile Properties, Hand Forgings

Nominal Thickness at Time of Heat Treatment Millimeters	Specimen Orientation	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 5D %
Up to 50, incl	Longitudinal	260	240	9
	Long.-Trans.	260	240	7
Over 50 to 100, incl	Longitudinal	260	240	9
	Long.-Trans.	260	240	7
	Short-Trans.	255	230	4
Over 100 to 200, incl	Longitudinal	255	235	7
	Long.-Trans.	255	235	5
	Short-Trans.	240	220	3

3.3.1.2 Rolled Rings: Specimens, machined in the indicated orientation from rings 87.5 millimeters and under in nominal thickness at time of heat treatment and having an OD-to-wall thickness ratio of 10:1 or greater, shall have the properties shown in Table 3 and Table 4.

3.3.1.2.1 Tangential: Axis of specimen tangential to the ring OD (axis parallel to the direction of rolling):

TABLE 3 - Minimum Tangential Tensile Properties, Rolled Rings

Property	Value
Tensile Strength	260 MPa
Yield Strength at 0.2% Offset	240 MPa
Elongation in 5D	
Nominal Thickness, mm	
Up to 62.5, incl	9%
Over 62.5 to 87.5, incl	7%

3.3.1.2.2 Axial: Axis of specimen parallel to axis of ring (axis transverse to direction of rolling):

TABLE 4 - Minimum Axial Tensile Properties, Rolled Rings

Property	Value
Tensile Strength	260 MPa
Yield Strength at 0.2% Offset	240 MPa
Elongation in 5D	
Nominal Thickness, mm	
Up to 62.5, incl	7%
Over 62.5 to 87.5, incl	5%

3.3.1.3 Special Purpose Forgings: Tensile property requirements for specimens cut from special purpose forgings or from forgings or rolled rings beyond the size and configuration limits of 3.3.1.1 or 3.3.1.2 shall be as specified on the drawing or as agreed upon purchaser and vendor.

3.3.2 Hardness: Shall be not lower than 80 HB/10/500 or 85 HB/10/1000.

3.4 Quality:

Forgings and rolled rings, 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 forgings and rolled rings.

3.4.1 Forgings and rolled rings shall be subjected to a caustic etch followed by visual examination of the product surfaces for defect indications, such as seams, laps, bursts, and quench cracks. Surface imperfections which can be removed so that they do not reappear on etching and the required section thickness can be maintained are acceptable.

3.4.2 When specified, all forgings and rolled rings shall be subjected to ultrasonic inspection in accordance with ASTM B 594 and shall meet ultrasonic Class A.

3.4.3 When specified, forgings and rolled rings shall be subjected to fluorescent penetrant inspection in accordance with AMS 2645. Standards for acceptance shall be established by the cognizant engineering organization.

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 performing 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 requirements of this specification.