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INTERNATIONAL
400 Commonwealth Drive, Warrendale, PA 15096-0001

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4247A

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Submitted for recognition as an American National Standard

Superseding AMS 4247

ALUMINUM ALLOY, HAND FORGINGS
7.7Zn - 2.4Mg - 1.6Cu - 0.16Cr (7049-T7352)
Solution Heat Treated, Stress Relieved by Compression, and Precipitation Heat Treated

UNS A97049

1. SCOPE:

1.1 Form:

This specification covers an aluminum alloy in the form of hand forgings procured to inch/pound dimensions.

1.1.1 MAM 4247 is the metric version of this AMS.

1.2 Application:

These forgings have been used typically for parts requiring a combination of high strength and resistance to stress-corrosion cracking and for parts requiring stability during machining, but usage is not limited to such applications.

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.

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 2645 Fluorescent Penetrant Inspection
AMS 2808 Identification, Forgings

2.2 ASTM Publications:

ASTM 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 DODSSP, Subscription Services 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 AMS 2355.

TABLE 1 - Composition

Element	min	max
Zinc	7.2	8.2
Magnesium	2.0	2.9
Copper	1.2	1.9
Chromium	0.10	0.22
Iron	--	0.35
Silicon	--	0.25
Manganese	--	0.20
Titanium	--	0.10
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition:

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

3.3 Properties:

Forgings shall conform to the following requirements, determined in accordance with AMS 2355:

3.3.1 Tensile Properties: Specimens, machined from forgings having an essentially square or rectangular cross-section heat treated in the indicated thickness, shall have the properties shown in Table 2 provided as-forged thickness does not exceed 5 inches.

TABLE 2 - Minimum Tensile Properties

Nominal Thickness at Time of Heat Treatment Inches	Specimen Orientation	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 4D %
Up to 2, incl	Longitudinal	71.0	59.0	9
	Long-Trans.	71.0	57.0	4
Over 2 to 3, incl	Longitudinal	71.0	59.0	9
	Long-Trans.	71.0	57.0	4
	Short-Trans.	69.0	56.0	3
Over 3 to 4, incl	Longitudinal	69.0	57.0	8
	Long-Trans.	69.0	54.0	3
	Short-Trans.	67.0	53.0	2
Over 4 to 5, incl	Longitudinal	67.0	54.0	7
	Long-Trans.	67.0	53.0	3
	Short-Trans.	66.0	51.0	2

3.3.1.1 Tensile specimens cut from special purpose forgings or from forgings beyond the size and configuration limits of 3.3.1 shall have tensile properties as specified on the drawing or as agreed upon by purchaser and vendor.

3.3.2 Hardness: Should be not lower than 135 HB/10/500 or 140 HB/10/1000 but forgings shall not be rejected on the basis of hardness if the tensile property requirements are met.

3.3.3 Conductivity: Shall be as follows:

3.3.3.1 If the conductivity is 40.0% IACS (International Annealed Copper Standard) or higher and tensile properties meet specified requirements, forgings are acceptable.

3.3.3.2 If the conductivity is 38.0 to 39.9% IACS, if the tensile properties meet specified requirements, and if the longitudinal yield strength does not exceed the specified minimum value by more than 9900 psi, the forgings are acceptable.

3.3.3.3 If the conductivity is below 40.0% IACS and the longitudinal yield strength exceeds the specified minimum value by more than 9900 psi, the forgings shall be given additional precipitation heat treatment. If, after such treatment, the forgings meet the requirements of 3.3.1 and 3.3.3.1 or 3.3.3.2, the forgings are acceptable.

3.3.3.4 If the conductivity is below 38.0% IACS, the forgings are not acceptable and shall be reprocessed regardless of tensile property level.

3.3.4 (R) Stress-Corrosion Resistance: Specimens cut from forgings shall show no evidence of stress-corrosion cracking when stressed to 75% of the specified minimum long-transverse yield strength.

3.4 Quality:

Forgings, 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.

3.4.1 All forgings shall be subjected to ultrasonic inspection in accordance with ASTM B 594 and shall meet Class A.

3.4.2 (R) When specified, forgings 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:

(R) The vendor of forgings 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 forgings conform to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for composition (3.1), tensile properties (3.3.1), conductivity (3.3.3), ultrasonic soundness (3.4.1), and, when specified, fluorescent penetrant inspection (3.4.2) are acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests for hardness (3.3.2) and stress-corrosion resistance (3.3.4) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.