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AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 4078D
Superseding AMS 4078C

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ALUMINUM ALLOY PLATE
5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (7075-T7351)
Solution Heat Treated, Stress Relieved, and Overaged

UNS A97075

1. SCOPE:

1.1 Form: This specification covers an aluminum alloy in the form of plate.

1.2 Application: Primarily for machined parts subject to excessive warpage during machining due to residual stresses and for parts requiring high strength and resistance to stress-corrosion cracking.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2202 - Tolerances, Aluminum Alloy and Magnesium Alloy Sheet and Plate
AMS 2350 - Standards and Test Methods
AMS 2355 - Quality Assurance Sampling and Testing of Aluminum-Base and Magnesium-Base Alloys, Wrought Products (Except Forgings and Forging Stock) and Flash Welded Rings

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM B594 - Ultrasonic Inspection of Aluminum-Alloy Products for Aerospace Applications
ASTM G47 - Determining Susceptibility to Stress-Corrosion Cracking of High-Strength Aluminum Alloy Products

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

REAFFIRMED 10/91

2.3.1 Military Specifications:

MIL-H-6088 - Heat Treatment of Aluminum Alloys

2.3.2 Military Standards:

MIL-STD-649 - Aluminum and Magnesium Products, Preparation for Shipment and Storage
MIL-STD-1537 - Electrical Conductivity Test for Measurement of Heat Treatment of Aluminum Alloys, Eddy Current Method

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined in accordance with AMS 2355:

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

3.2 Condition: Solution heat treated, stretched to produce a nominal permanent set of 2%, but not less than 1-1/2% nor more than 3%, and overaged; heat treatments shall be performed in accordance with MIL-H-6088.

3.2.1 Plate shall receive no straightening operations after stretching.

3.3 Properties: Plate shall conform to the following requirements, determined in accordance with AMS 2355:

3.3.1 Tensile Properties: Shall be as specified in Table I and 3.3.1.1.

TABLE I

Nominal Thickness Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset psi, min	Elongation in 2 in. or 4D %, min
0.250 to 1.000, incl	69,000	57,000	7
Over 1.000 to 2.000, incl	69,000	57,000	6
Over 2.000 to 2.500, incl	66,000	52,000	6
Over 2.500 to 3.000, incl	64,000	49,000	6
Over 3.000 to 3.500, incl	63,000	49,000	6
Over 3.500 to 4.000, incl	61,000	48,000	6

TABLE I (SI)

Nominal Thickness Millimetres	Tensile Strength MPa, min	Yield Strength at 0.2% Offset MPa, min	Elongation in 50 mm or 4D %, min
Over 6.25 to 25.00, incl	475	395	7
Over 25.00 to 50.00, incl	475	395	6
Over 50.00 to 62.50, incl	455	360	6
Over 62.50 to 75.00, incl	440	340	6
Over 75.00 to 87.50, incl	435	340	6
Over 87.50 to 100.00, incl	420	330	6

3.3.1.1 Tensile property requirements for plate over 4.000 in. (100.00 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

3.3.2 Conductivity: Shall be as follows, determined in accordance with MIL-STD-1537 on the surface of the sample used for tensile testing:

3.3.2.1 Electrical conductivity shall be not lower than 38.0% IACS (International Annealed Copper Standard) (22.0 MS/m).

3.3.2.1.1 If electrical conductivity is 40.0% IACS (23.2 MS/m) or higher and tensile properties meet the requirements of 3.3.1, the plate is acceptable.

3.3.2.1.2 If the conductivity is 38.0 - 39.9% IACS (22.0 - 23.1 MS/m), incl, if the tensile properties meet the requirements of 3.3.1, and if the yield strength does not exceed the specified minimum by more than 11,900 psi (82 MPa), the plate is acceptable.

3.3.2.1.3 If the conductivity is below 40.0% IACS (23.2 MS/m) and the yield strength exceeds the specified minimum value by more than 11,900 psi (82 MPa), the plate shall be given additional aging. If after such additional treatment, the plate meets the requirements of 3.3.1 and 3.3.2 the plate is acceptable.

3.3.3 Stress-Corrosion Resistance: Specimens cut from plate 0.750 in. (19 mm) and over in nominal thickness shall meet the requirements of ASTM G47 when stressed to 75% of the minimum yield strength specified in 3.3.1.

3.4 Quality: Plate, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external imperfections detrimental to usage of the plate.

3.4.1 When specified, each plate 0.500 in. (12.50 mm) and over in nominal thickness shall be ultrasonically inspected in accordance with ASTM B594 and shall meet the requirements of 3.4.1.1 or 3.4.1.2 as applicable.

3.4.1.1 Plates weighing 2,000 lb (900 kg) and under shall meet the requirements for ultrasonic class shown below:

Nominal Thickness		Ultrasonic Class
Inches	Millimetres	
0.500 - 1.500, excl	12.50 - 37.50, excl	B
1.500 - 3.000, incl	37.50 - 75.00, incl	A
Over 3.000 - 4.000, incl	Over 75.00 - 100.00, incl	B

3.4.1.2 The ultrasonic class for plates weighing over 2,000 lb (900 kg) or over 4.000 in. (100.00 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

3.5 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2202.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of plate shall supply all samples for vendor's tests and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the plate conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for composition (3.1), tensile properties (3.3.1), conductivity (3.3.2), tolerances (3.5), and, when specified, ultrasonic soundness (3.4.1) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for stress-corrosion resistance (3.3.3) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling: Shall be in accordance with AMS 2355 and the following; an inspection lot shall be all plate of the same size traceable to a heat treatment lot or lots, and submitted for vendor's inspection at one time.

4.3.1 Specimens for electrical conductivity testing (3.3.2) shall be the samples used for tensile testing.

4.4 Reports:

4.4.1 The vendor of plate shall furnish with each shipment a report stating that the plate conforms to the chemical composition and other technical requirements of this specification. This report shall include the purchase order number, AMS 4078D, size, and quantity.