

AEROSPACE MATERIAL SPECIFICATION



AMS4049

REV. L

Issued	1951-10
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Superseding AMS4049K	

Aluminum Alloy, Sheet and Plate, Alclad
5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr (Alclad 7075; -T6 Sheet - T651 Plate)
Solution and Precipitation Heat Treated
(Composition similar to UNS A97075)

RATIONALE

AMS4049L added UT inspection requirement when specified (3.4.1, Table 6) to facilitate cancellation of AMS-QQ-A-250/13.

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of sheet and plate, clad on two sides.

1.2 Application

These products have been used typically for structural use, including machined parts subject to excessive warpage during machining but usage is not limited to such applications.

1.2.1 Certain design and processing procedures may cause these products to become susceptible to stress-corrosion cracking; ARP823 recommends practices to minimize such conditions.

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.

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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.

AMS2355	Quality Assurance, Sampling and Testing, Aluminum Alloys and Magnesium Alloy, Wrought Products (Except Forging Stock), and Rolled, Forged, or Flash Welded Rings
AMS2772	Heat Treatment of Aluminum Alloy Raw Materials
ARP823	Minimizing Stress-Corrosion Cracking in Wrought Heat-Treatable Aluminum Alloy Products
AS1990	Aluminum Alloy Tempers

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.

ASTM B 594	Ultrasonic Inspection of Aluminum Alloy Products for Aerospace Applications
ASTM B 660	Packaging/Packing of Aluminum and Magnesium Products
ASTM B 666/B 666M	Identification Marking of Aluminum and Magnesium Alloy Products

2.3 ANSI Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036-8002, Tel: 212-642-4900, 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 and Table 2, determined in accordance with AMS2355.

TABLE 1 - COMPOSITION, CORE (7075)

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

TABLE 2 - COMPOSITION, CLADDING (7072)

Element	min	max
Silicon + Iron	--	0.7
Copper	--	0.10
Manganese	--	0.10
Magnesium	--	0.10
Zinc	0.8	1.3
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

3.2 Product shall be supplied in the following condition; heat treatment shall be performed in accordance with AMS2772.

3.2.1 Sheet

Solution and precipitation heat treated to the T6 temper (See AS1990).

3.2.2 Plate

Solution heat treated, stretched to produce a nominal permanent set of 2% but not less than 1-1/2%, nor more than 3%, and precipitation heat treated to the T651 temper (See AS1990).

3.2.2.1 Plate shall receive no further straightening operations after stretching.

3.3 Properties

3.3.1 The product shall conform to the following requirements, determined in accordance with AMS2355.

3.3.2 Tensile Properties

Shall be as shown in Table 3.

TABLE 3A - MINIMUM TENSILE PROPERTIES, INCH/POUND UNITS

Nominal Thickness Inches				Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 inches or 4D %
	0.008	to	0.011, incl	68.0	58.0	5
Over	0.011	to	0.039, incl	71.0	61.0	8
Over	0.039	to	0.062, incl	72.0	62.0	9
Over	0.062	to	0.187, incl	74.0	64.0	9
Over	0.187	to	0.249, incl	76.0	65.0	9
Over	0.249	to	0.499, incl	75.0	65.0	9
Over	0.499	to	1.000, incl	78.0	68.0	7
Over	1.000	to	2.000, incl	77.0	67.0	6
Over	2.000	to	2.500, incl	76.0	64.0	5
Over	2.500	to	3.000, incl	72.0	61.0	5
Over	3.000	to	3.500, incl	71.0	58.0	5
Over	3.500	to	4.000, incl	67.0	54.0	3

TABLE 3B - MINIMUM TENSILE PROPERTIES, SI UNITS

Nominal Thickness Millimeters				Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation % in 50 mm
	0.20	to	0.28, incl	469	400	5
Over	0.28	to	0.99, incl	490	420	8
Over	0.99	to	1.57, incl	496	427	9
Over	1.57	to	4.75, incl	510	441	9
Over	4.75	to	6.32, incl	524	448	9
Over	6.32	to	12.67, incl	517	448	9
Over	12.67	to	25.40, incl	538	469	--
Over	25.40	to	50.80, incl	531	462	--
Over	50.80	to	63.50, incl	524	441	--
Over	63.50	to	76.20, incl	496	420	--
Over	76.20	to	88.90, incl	490	400	--
Over	88.90	to	101.60, incl	462	372	--

3.3.3 Bending

Product shall withstand, without cracking, bending at room temperature through an angle of 180 degrees around a diameter equal to the bend factor shown in Table 4 times the nominal thickness of the product with axis of bend parallel to the direction of rolling.

TABLE 4 - BENDING PARAMETERS

Nominal Thickness Inches				Nominal Thickness Millimeters			Bend Factor	
	0.008	to	0.020, incl		0.20	to	0.51, incl	6
Over	0.020	to	0.063, incl	Over	0.51	to	1.60, incl	7
Over	0.063	to	0.091, incl	Over	1.60	to	2.31, incl	8
Over	0.091	to	0.125, incl	Over	2.31	to	3.18, incl	9
Over	0.125	to	0.249, incl	Over	3.18	to	6.32, incl	10
Over	0.249	to	0.499, incl	Over	6.32	to	12.67, incl	12

3.3.4 Cladding Thickness

After rolling, the average cladding thickness per side shall be as shown in Table 5.

TABLE 5 - MINIMUM AVERAGE CLADDING THICKNESS

								Average Cladding Thickness Per Side % of Thickness minimum	Average Cladding Thickness Per Side % of Thickness maximum
Total Thickness of Composite Product Inches				Total Thickness of Composite Product Millimeters					
	0.008	to	0.062, incl		0.20	to	1.57, incl	3.2	--
Over	0.062	to	0.187, incl	Over	1.57	to	4.75, incl	2.0	--
Over	0.187	to	0.499, incl	Over	4.75	to	12.67, incl	1.2	--
Over	0.499	to	4.000, incl	Over	12.67	to	101.60, incl	1.2	3.0