SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4049K

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Superseding AMS 4049J

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)

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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or www.sae.org.

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 2772	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, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or www.astm.org.

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 ANSI, 25 West 43rd Street, New York, NY 10036 or 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 AMS 2355.

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 AMS 2772.

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 that 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 AMS 2355.

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

Total Thickness of Composite Product Inches	Total Thickness of Composite Product Millimeters	Average Cladding Thickness Per Side % of Thickness minimum	Average Cladding Thickness Per Side % of Thickness maximum
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

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 plate.

3.5 Tolerances:

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 specified requirements.