SAE Aerospace
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AEROSPACE MATERIAL SPECIFICATION

SAE AMS4037 REV. P

Issued 1940-06
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Superseding AMS4037N

Aluminum Alloy, Sheet and Plate
4.4Cu - 1.5Mg - 0.60Mn (2024; -T3 Flat Sheet, -T351 Plate)
Solution Heat Treated

(Composition similar to UNS A92024)

RATIONALE

AMS4037P adds -T81/-T851 response to heat treatment test and response to heat treatment to the -T42, -T62, -T72 temper (3.3.3, Table 4), adds ultrasonic inspection requirements when specified (3.4.1), and revises Acceptance (4.2.1) and Periodic (4.2.2) Tests. These changes will help facilitate the cancellation of AMS-QQ-A-250/4.

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of sheet and plate.

1.2 Application

These products have been used typically for formed structural parts of good strength. Plate is also suitable for structural machined parts where warpage, during machining, due to residual stresses must be minimized, 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 supplied 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.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
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SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS4037P

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 660 Packaging/Packing of Aluminum and Magnesium Products

ASTM B 666/B 666M Identification 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, determined in accordance with AMS2355.

TABLE 1 - COMPOSITION

Element	min	max
Silicon	--	0.50
Iron	--	0.50
Copper	3.8	4.9
Manganese	0.30	0.9
Magnesium	1.2	1.8
Chromium	--	0.10
Zinc	--	0.25
Titanium	--	0.15
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

3.2 Condition

The product shall be supplied in the following condition:

3.2.1 Sheet

Solution heat treated in accordance with AMS2772 and cold worked to the T3 temper (See AS1990).

3.2.2 Plate

Solution heat treated in accordance with AMS2772 and stretched to produce a nominal permanent set of 2% but not less than 1-1/2% nor more than 3% to the T351 temper (See AS1990).

3.2.2.1 Plate shall receive no further straightening operations after stretching.

3.3 Properties

The product shall conform to the following requirements, determined in accordance with AMS2355 on the mill produced size.

3.3.1 Tensile Properties

Shall be as specified in Table 2.

TABLE 2A - MINIMUM TENSILE PROPERTIES, INCH/POUND UNITS

Temper	Nominal Thickness, Inches	Tensile Strength, ksi	Yield Strength at 0.2% Offset, ksi	Elongation in 2 inches or 4D, %
-T3	Over 0.008 to 0.009, incl	63.0	42.0	10
	Over 0.009 to 0.020, incl	63.0	42.0	12
	Over 0.020 to 0.128, incl	63.0	42.0	15
	Over 0.128 to 0.249, incl	64.0	42.0	15
-T351	Over 0.249 to 0.499, incl	64.0	42.0	12
	Over 0.499 to 1.000, incl	63.0	42.0	8
	Over 1.000 to 1.500, incl	62.0	42.0	7
	Over 1.500 to 2.000, incl	62.0	42.0	6
	Over 2.000 to 3.000, incl	60.0	42.0	4
	Over 3.000 to 4.000, incl	57.0	41.0	4
(See 8.6)				

TABLE 2B - MINIMUM TENSILE PROPERTIES, SI UNITS

Temper	Nominal Thickness, Millimeters	Tensile Strength, MPa	Yield Strength at 0.2% Offset, MPa	Elongation in 50.8 mm or 4D, %
-T3	Over 0.20 to 0.23, incl	434	290	10
	Over 0.23 to 0.51, incl	434	290	12
	Over 0.51 to 3.25, incl	434	290	15
	Over 3.25 to 6.32, incl	441	290	15
-T351	Over 6.32 to 12.67, incl	441	290	12
	Over 12.67 to 25.40, incl	434	290	8
	Over 25.40 to 38.10, incl	427	290	7
	Over 38.10 to 50.80, incl	427	290	6
	Over 50.80 to 76.20, incl	414	290	4
	Over 76.20 to 101.60, incl	393	283	4
(See 8.6)				

3.3.2 Bending

Product 0.008 to 0.499 inch (0.20 to 12.67 mm), inclusive, in nominal thickness 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 3 times the nominal thickness of the product with axis of bend parallel to the direction of rolling.

TABLE 3 - BENDING PARAMETERS

Nominal Thickness Inch	Nominal Thickness Millimeters	Bend Factor
0.008 to 0.020, incl	0.20 to 0.51, incl	4
Over 0.020 to 0.051, incl	Over 0.51 to 1.30, incl	5
Over 0.051 to 0.128, incl	Over 1.30 to 3.25, incl	6
Over 0.128 to 0.249, incl	Over 3.25 to 6.32, incl	8
Over 0.249 to 0.499, incl	Over 6.32 to 12.67, incl	10

Bending requirements for product over 0.499 inches (12.67 mm) in nominal thickness shall be as agreed upon by purchaser and vendor.

3.3.3 Response to Heat Treatment (-T81, -T851, -T42, -T62, -T72 Temper)

The product, as received by purchaser, shall have the following properties shown in Table 4 after precipitation heat treatment to the -T81/-T851 temper (See AS1990) in accordance with AMS2772. The product, as received by purchaser, shall have the following properties shown in Table 4 after solution and precipitation heat treatment to the -T42 temper (See AS1990) in accordance with AMS2772. Material in the -T42 condition shall have the following properties shown in Table 4 after precipitation heat treatment to the -T62 and -T72 temper (See AS1990) in accordance with AMS2772.

TABLE 4A - MINIMUM TENSILE PROPERTIES INCH/POUND UNITS

Temper	Nominal Thickness, Inches	Tensile Strength, ksi	Yield Strength at 0.2% Offset, ksi	Elongation in 2 inches or 4D, %
-T81	0.010 to 0.249, incl	67.0	58.0	5
-T851	0.250 to 0.499, incl	67.0	58.0	5
	Over 0.249 to 1.000, incl	66.0	58.0	5
	Over 1.000 to 1.499, incl	66.0	57.0	5
-T42	0.010 to 0.020, incl	62.0	38.0	12
	Over 0.020 to 0.249, incl	62.0	38.0	15
	Over 0.249 to 0.499, incl	62.0	38.0	12
	Over 0.499 to 1.000, incl	61.0	38.0	8
	Over 1.000 to 1.500, incl	60.0	38.0	7
	Over 1.500 to 1.750, incl	60.0	38.0	6
-T62	0.010 to 0.499, incl	64.0	50.0	5
	Over 0.499 to 1.750, incl	63.0	50.0	5
-T72	0.010 to 0.249, incl	60.0	46.0	5
(See 8.6)				

TABLE 4B - MINIMUM TENSILE PROPERTIES, SI UNITS

Temper	Nominal Thickness, Millimeters	Tensile Strength, MPa	Yield Strength at 0.2% Offset, MPa	Elongation in 2 mm or 4D, %
-T81	0.25 to 6.32, incl	462	400	5
-T851	6.35 to 12.67, incl	462	400	5
	Over 12.67 to 25.40, incl	455	400	5
	Over 25.40 to 38.07, incl	455	393	5
-T42	0.25 to 0.51, incl	427	262	12
	Over 0.51 to 6.32, incl	427	262	15
	Over 6.33 to 12.68, incl	427	262	12
	Over 12.68 to 25.40, incl	421	262	8
	Over 25.40 to 38.10, incl	414	262	7
	Over 38.10 to 44.45, incl	414	262	6
-T62	0.25 to 12.68, incl	441	345	5
	Over 12.68 to 44.45, incl	434	345	5
-T72	0.25 to 6.32 incl	414	317	5
(See 8.6)				