SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4035K

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Reaffirmed MAY 2008

Superseding AMS 4035J

Aluminum Alloy, Sheet and Plate
4.4Cu - 1.5Mg - 0.60Mn (2024-0)
Annealed

(Composition similar to UNS A92024)

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 which will be subsequently heat treated, 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 after heat treatment; 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.

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
AS1990	Aluminum Alloy Tempers
ARP823	Minimizing Stress-Corrosion Cracking in Wrought Heat-Treatable Aluminum Alloy Products

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 Products

2.3 ANSI Publications:

Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002 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, determined in accordance with AMS 2355.

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:

Annealed in accordance with AMS 2772.

3.3 Properties:

The product shall conform to the following requirements, determined in accordance with AMS 2355 on the mill produced size:

3.3.1 As Annealed (O Temper) (see AS1990):

3.3.1.1 Tensile Properties: Shall be as shown in Table 2.

TABLE 2A - Tensile Properties, Inch/Pound Units

Nominal Thickness Inches	Tensile Strength ksi, max	Yield Strength at 0.2% Offset ksi, max	Elongation in 50.8 mm or 4D %, min
0.10 to 0.499, incl	32.0	14.0	12
Over 0.499 to 1.750, incl	32.0	--	12

TABLE 2B - Tensile Properties, SI Units

Nominal Thickness Millimeters	Tensile Strength ksi, max	Yield Strength at 0.2% Offset ksi, max	Elongation in 50.8 mm or 4D %, min
0.25 to 12.67, incl	221	96	12
Over 12.67 to 44.45, incl	221	--	12

3.3.1.2 Bending: Product up to 0.499 inch (12.67 mm) 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. For thickness greater than 0.499 to 1.750 inches (12.67 to 44.45 mm), bend testing is not required unless specified by the customer and agreed to by the supplier. Bend parameters will be specified and agreed to at the time of order entry for these thicknesses.

TABLE 3 - Bending Parameters

Nominal Thickness Inch	Nominal Thickness Millimeters	Bend Factor
0.010 to 0.032, incl	0.25 to 0.81, incl	0
Over 0.032 to 0.063, incl	Over 0.81 to 1.60, incl	1
Over 0.063 to 0.128, incl	Over 1.60 to 3.25, incl	4
Over 0.128 to 0.499, incl	Over 3.25 to 12.67, incl	6

3.3.2 Response to Heat Treatment: The product, as received by purchaser, shall have the following properties after being solution heat treated in accordance with AMS 2772 and aging for not less than 4 days at room temperature to the -T42 temper:

3.3.2.1 Tensile Properties: Shall be as shown in Table 4.

TABLE 4A - 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 %, min
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

TABLE 4B - Minimum Tensile Properties, SI Units

Nominal Thickness Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %, min
0.25 to 0.51, incl	427	262	12
Over 0.51 to 6.32, incl	427	262	15
Over 6.32 to 12.67, incl	427	262	12
Over 12.67 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

3.3.2.2 Bending: Product up to 0.499 inch (12.67 mm) 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 5 times the nominal thickness of the product with axis of bend parallel to the direction of rolling. For thickness greater than 0.499 to 1.750 inches (12.67 to 44.45 mm), bend testing is not required unless specified by the customer and agreed to by the supplier. Bend parameters will be specified and agreed to at the time of order entry for these thicknesses.

TABLE 5 - Bending Requirements

Nominal Thickness Inch	Nominal Thickness Millimeters	Bend Factor
0.010 to 0.020, incl	0.25 to 0.51, incl	4
Over 0.020 to 0.051, incl	Over 0.51 to 1.30, incl	5
Over 0.051 to 0.126, incl	Over 1.30 to 3.25, incl	6
Over 0.126 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

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 product.

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.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Composition (3.1), tensile properties as annealed (3.3.1.1) and after solution heat treatment and aging (3.3.2.1), and tolerances (3.5) are acceptance tests and, except for composition, shall be performed on each inspection lot.

4.2.2 Periodic Tests: Bending as annealed (3.3.1.2) and after response to heat treatment (3.3.2.2) are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling and Testing:

Shall be in accordance with AMS 2355.

4.4 Reports:

The vendor of the product shall furnish with each shipment a report stating that the product conforms to the chemical composition, tolerances and showing the numerical results of tests on each inspection lot to determine conformance to the other acceptance test requirements. This report shall include the purchase order number, inspection lot number(s), AMS 4035K, size, and quantity. The report shall also identify the producer, the product form, and the size of the mill product.

4.5 Resampling and Retesting:

Shall be in accordance with AMS 2355.