

AEROSPACE MATERIAL SPECIFICATION

SAE

AMS 4130K

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Superseding AMS 4130J

Submitted for recognition as an American National Standard

ALUMINUM ALLOY DIE FORGINGS
4.4Cu - 0.85Si - 0.80Mn (2025-T6)
Solution and Precipitation Heat Treated

UNS A 92025

1. SCOPE:

1.1 Form: This specification covers an aluminum alloy in the form of die forgings and forging stock.

1.2 Application: Primarily for complex-shaped parts requiring moderate strength and good forgeability of the material.

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

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of SAE publications shall apply. The applicable issue of other publications shall be the issue in effect on the date of the purchase order.

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001.

2.1.1 Aerospace Material Specifications:

AMS 2201 - Tolerances, Aluminum and Aluminum Alloy Bar, Rod, Wire, and Forging Stock, Rolled or Cold Finished

MAM 2201 - Tolerances, Metric, Aluminum and Aluminum Alloy Bar, Rod, Wire, and Forging Stock, Rolled, Drawn, or Cold Finished

AMS 2355 - Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings

MAM 2355 - Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings, Metric (SI) Units

AMS 2645 - Fluorescent Penetrant Inspection

AMS 2808 - Identification, Forgings

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2.1.2 Aerospace Recommended Practices:

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

2.2 ASTM Publications: Available from ASTM, 1916 Race Street, Philadelphia, PA 19103-1187.

ASTM B 594 - Ultrasonic Inspection of Aluminum-Alloy Products for Aerospace Applications

ASTM B 660 - Packing/Packaging of Aluminum and Magnesium Products

2.3 U.S. Government Publications: Available from Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.

2.3.1 Military Specifications:

MIL-H-6088 - Heat Treatment of Aluminum Alloys

3. TECHNICAL REQUIREMENTS:

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

	min	max
Copper	3.9	5.0
Silicon	0.50	1.2
Manganese	0.40	1.2
Iron	--	1.0
Zinc	--	0.25
Titanium	--	0.15
Chromium	--	0.10
Magnesium	--	0.05
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition: The product shall be supplied in the following condition:

3.2.1 Forgings: Solution and precipitation heat treated in accordance with MIL-H-6088.

3.2.2 Forging Stock: As ordered by the forging manufacturer.

3.3 Properties: The product shall conform to the following requirements determined in accordance with AMS 2355 or MAM 2355:

3.3.1 Forgings:

3.3.1.1 Tensile Properties: Shall be as follows:

3.3.1.1.1 Test Specimens: Specimens, machined from separately-forged coupons or from forging stock representing the forgings and, in either case, heat treated with the forgings or machined from prolongations on heat treated forgings, shall have the following properties:

Tensile Strength, minimum	55.0 ksi (379 MPa)
Yield Strength at 0.2% Offset, minimum	33.0 ksi (228 MPa)
Elongation in 4D, minimum	16%

3.3.1.1.2 Forgings, With Grain Flow: Specimens, machined from forgings not over 4 inches (102 mm) in nominal thickness with axis of specimen in area of gage length varying not more than 15 degrees from parallel to the forging flow lines, shall have properties as specified in 3.3.1.1.1 except that elongation may be as low as 11%.

3.3.1.1.3 Forgings, Across Grain Flow: Specimens, machined from forgings whose length is not greater than 4 times the thickness with axis of specimen in area of gage length varying not more than 15 degrees from perpendicular to the forging flow lines, shall have the following properties:

Tensile Strength, minimum	52.0 ksi (359 MPa)
Yield Strength at 0.2% Offset, minimum	32.0 ksi (221 MPa)
Elongation in 4D, minimum	8%

3.3.1.2 Hardness: Should be not lower than 100 HB/10/500 or 106 HB/10/1000, or equivalent, but forgings shall not be rejected on the basis of hardness if the tensile property requirements are met.

3.3.2 Forging Stock: When a sample of stock is forged to a test coupon having a degree of mechanical working not greater than the forging and heat treated in the same manner as the forgings, tensile specimens taken from the heat treated coupon shall conform to the requirements of 3.3.1.1.1 and 3.3.1.2. If specimens taken from the stock after heat treatment in the same manner as forgings conform to the requirements of 3.3.1.1.1 and 3.3.1.2, the tests shall be accepted as equivalent to tests of a forged coupon.

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.

3.4.1 When specified, each die forging shall be etched to produce a surface suitable for visual inspection. Surface shall be evaluated for defects and, if defects can be removed so they do not appear on re-etching and if the required section thickness is maintained, the forgings are acceptable.

3.4.1.1 When approved by purchaser, a sampling plan may be used in lieu of etching each forging.

3.4.2 When specified, forgings shall be subjected to fluorescent penetrant inspection in accordance with AMS 2645 and/or to ultrasonic inspection in accordance with ASTM B 594. Standards for acceptance shall be as agreed upon by purchaser and vendor.

3.4.3 Grain flow of die forgings, except in areas which contain flash-line end grain, shall follow the general contour of the forgings, showing no evidence of re-entrant grain flow.

3.5 Tolerances: Forging stock shall conform to all applicable requirements of AMS 2201 or MAM 2201.

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 performing all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests for the following requirements are acceptance tests and shall be performed on each lot:

4.2.1.1 Composition (3.1).

4.2.1.2 Tensile properties (3.3.1.1) and, when specified, fluorescent penetrant and/or ultrasonic inspection (3.4.1) of each lot of forgings.

4.2.1.3 Tolerances (3.5) of forging stock.

4.2.2 Periodic Tests: Tests for the following requirements are periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.2.2.1 Hardness (3.3.1.2) of forgings.

4.2.2.2 Ability of stock to develop required properties (3.3.2).

4.2.2.3 Grain flow (3.4.3) of die forgings.

4.3 Sampling and Testing: Shall be in accordance with AMS 2355 or MAM 2355. A lot shall be all forgings of the same part number, size, or nominal cross-section and configuration heat treated in the same batch-furnace load or in a continuous furnace consecutively during an eight-hour period. The maximum lot size for forgings heat treated in a continuous furnace shall be 6000 pounds (2722 kg).