AEROSPACE MATERIAL SPECIFICATION

AMS4125	REV. L

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Superseding AMS4125K

Aluminum Alloy Die Forgings, and Rolled or Forged Rings
0.9Si - 0.62Mg - 0.25Cr (6151-T6)
Solution and Precipitation Heat Treated
(Composition similar to UNS A 96151)

RATIONALE

AMS4125L stabilizes this document because it contains mature technology that is not expected to change and thus no further revisions are anticipated.

STABILIZED NOTICE

This document has been declared “Stabilized” by the AMS D Nonferrous Alloys Committee. This document will no longer be updated and may no longer represent standard industry practice. This document was stabilized because this document containes mature technology that is not expected to change and thus no further revisions are anticipated. Previously this document was Noncurrent. The last technical update of this document occured in May, 2001. Users of this document should refer to the cognizant engineering organization for disposition of any issues with reports/certifications to this specification; including exceptions listed on the certification. NOTE: In many cases, the purchaser may represent a sub tier supplier and not the cognizant engineering organization.

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1. SCOPE:

1.1 Form:

This specification covers an aluminum alloy in the form of die forgings, rolled or forged rings, and stock for forgings and rings.

1.2 Application:

These products have been used typically for complex-shaped parts requiring moderate strength and good forgeability of the material, but usage is not limited to such applications. Corrosion resistance of this alloy is superior to that of the copper-containing alloys.

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.

2.1 SAE Publications:

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

AMS 2355	Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings
MAM 2355	Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings, Metric (SI) Units
AMS 2772	Heat Treatment of Aluminum Alloy Raw Materials
AMS 2808	Identification, Forgings

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2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959.

ASTM B 594	Ultrasonic Inspection of Aluminum-Alloy Wrought Products for Aerospace Applications
ASTM B 660	Packing/Packaging of Aluminum and Magnesium Products
ASTM E 1417	Liquid Penetrant Examination

2.3 ANSI Publications:

Available from ANSI, 11 West 42nd Street, New York, NY 10036-8002.

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 following percentages by weight, determined in accordance with AMS 2355 or MAM 2355:

TABLE 1 - Composition

Element	min	max
Silicon	0.6	1.2
Iron	--	1.0
Copper	--	0.35
Manganese	--	0.20
Magnesium	0.45	0.8
Chromium	0.15	0.35
Zinc	--	0.25
Titanium	--	0.15
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

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3.2 Condition:

The product shall be supplied in the following condition:

3.2.1 Die Forgings and Rolled or Forged Rings: Solution and precipitation heat treated in accordance with AMS 2772 to the T6 temper.

3.2.2 Forging Stock: As ordered by the forging manufacturer.

3.3 Properties:

The product shall conform to the following requirements, determined on the mill produced size in accordance with AMS 2355 or MAM 2355 and as specified herein.

3.3.1 Forgings:

3.3.1.1 Tensile Properties: Shall be as follows:

3.3.1.1.1 Die Forgings:

3.3.1.1.1.1 With Grain Flow: Specimens, machined from forgings not over 4 inches (102 mm) in nominal thickness at time of heat treatment with axis of specimen in area of gage length varying not more than 15 degrees from parallel to the forging flow lines, shall meet the requirements shown in Table 2:

TABLE 2 - Minimum Tensile Properties

Property	Value
Tensile Strength	44.0 ksi (303 MPa)
Yield Strength at 0.2% Offset	37.0 ksi (255 MPa)
Elongation in 4D	10%
in 5D	9%

3.3.1.1.1.2 Across Grain Flow: Specimens machined from forgings not over 4 inches (102 mm) in nominal thickness at time of heat treatment 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 properties shown in Table 3:

TABLE 3 - Minimum Tensile Properties

Property	Value
Tensile Strength	44.0 ksi (303 MPa)
Yield Strength at 0.2% Offset	37.0 ksi (255 MPa)
Elongation in 4D	6%
in 5D	5%

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3.3.1.1.2 Rolled or Forged Rings:

3.3.1.1.2.1 Tangential: Specimens, machined from rings not over 2.5 inches (63.5 mm) in nominal thickness at time of heat treatment with axis of specimen tangential to the ring circumference (approximately parallel to the direction of rolling), shall have the properties shown in Table 4:

TABLE 4 - Minimum Tensile Properties

Property	Value
Tensile Strength	44.0 ksi (303 MPa)
Yield Strength at 0.2% Offset	37.0 ksi (255 MPa)
Elongation in 4D	5%
in 5D	4%

3.3.1.1.2.2 Axial: Specimens, machined from rings not over 2.5 inches (63.5 mm) in nominal thickness at time of heat treatment with axis of specimen parallel to axis of ring (transverse to direction of rolling), shall have the properties shown in Table 5:

TABLE 5 - Minimum Tensile Properties

Property	Value
Tensile Strength	44.0 ksi (303 MPa)
Yield Strength at 0.2% Offset	35.0 ksi (241 MPa)
Elongation in 4D	4%
in 5D	3%

3.3.1.1.3 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 die forgings, shall have the properties shown in Table 6:

TABLE 6 - Minimum Tensile Properties

Property	Value
Tensile Strength	44.0 ksi (303 MPa)
Yield Strength at 0.2% Offset	37.0 ksi (255 MPa)
Elongation in 4D	14%
in 5D	12%

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3.3.2 Stock for Forgings or Rings: 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 forgings or rings, specimens taken from the heat treated coupon shall conform to the requirements of 3.3.1.1.1. 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, 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 Each die forging and, when specified, each rolled or forged ring 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 reappear on re-etching and if the required section thickness is maintained, the forgings and rings are acceptable.

3.4.1.1 When approved by purchaser, a sampling plan may be used in lieu of etching each die forging and/or ring.

3.4.2 When specified, die forgings and rolled or forged rings shall be subjected to fluorescent penetrant inspection in accordance with ASTM E 1417 and/or 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 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 the specified requirements.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: The following requirements are acceptance tests and, except for composition, shall be performed on each lot:

4.2.1.1 Composition (3.1).

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