AEROSPACE MATERIAL SPECIFICATION

AMS4134™	REV. H

Issued 1945-10
Reaffirmed 1995-11
Revised 2024-03

Superseding AMS4134G

Aluminum Alloy, Die Forgings
4.4Cu - 0.85Si - 0.80Mn - 0.50Mg (2014-T4)
Solution Heat and Naturally Aged
(Composition similar to UNS A92014)

RATIONALE

AMS4134H results from a Five-Year Review and update of this specification with changes to update wording to prohibit unauthorized exceptions (see 3.3.1.3 and 8.5), relocate Definitions (see 2.4), and update Applicable Documents (see Section 2), Condition for Forgings (see 3.2.1), Hardness (see 8.2), and Ordering Information (see 8.6).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of die forgings 4 inches (102 mm) and under in nominal thickness and forging stock of any size (see 8.6).

1.2 Application

These forgings have been used typically for parts requiring strength similar to that of parts machined from AMS4118 bars, but usage is not limited to such applications. Higher strength can be obtained by precipitation hardening to the T6 temper.

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.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or +1 724-776-4970 (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

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

For more information on this standard, visit
https://www.sae.org/standards/content/AMS4134H

AMS2808 Identification, Forgings

AS7766 Terms Used in Aerospace Metals Specifications

2.2 ANSI Accredited Publications

Copies of these documents are available online at https://webstore.ansi.org/.

ANSI H35.1/H35.1M Standard Alloy and Temper Designation System for Aluminum

ANSI H35.2 Dimensional Tolerances for Aluminum Mill Products

ANSI H35.2M Dimensional Tolerances for Aluminum Mill Products (Metric)

2.3 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 B594 Ultrasonic Inspection of Aluminum-Alloy Wrought Products

ASTM B660 Packaging/Packing of Aluminum and Magnesium Products

ASTM E10 Brinell Hardness of Metallic Materials

ASTM E1417/E1417M Liquid Penetrant Testing

2.4 Definitions

Terms used in AMS are defined in AS7766.

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	1.2
Iron	--	0.7
Copper	3.9	5.0
Manganese	0.40	1.2
Magnesium	0.20	0.8
Chromium	--	0.10
Zinc	--	0.25
Titanium	--	0.15
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

3.2 Condition

Shall be as follows:

3.2.1 Forgings

Solution heat treated and naturally aged to the T4 temper (refer to ANSI H35.1/H35.1M) in accordance with AMS2772.

3.2.2 Forging Stock

Composition shall be in accordance with Table 1 and shall be free of discontinuities that are unacceptable in the final forged product (see 3.4).

3.3 Properties

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

3.3.1 Forgings

3.3.1.1 Tensile Properties (-T4 Temper)

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 properties shown in Table 2.

Table 2 - T4 minimum tensile properties

Property	Value
Tensile Strength	55.0 ksi (379 MPa)
Yield Strength at 0.2% Offset	30.0 ksi (207 MPa)
Elongation in 2 Inches (50.8 mm) or 4D	16%

3.3.1.1.2 Forgings with Grain Flow

Specimens, machined from forgings 4 inches (102 mm) and under in nominal thickness, with axis of the specimen in area of gage length varying not more than 15 degrees from parallel to forging flow lines, shall have the properties shown in Table 2, except that elongation may be as low as 11%.

3.3.1.2 Response to Temper Conversion (T62 Temper)

Forgings in the T4 temper, after precipitation heat treatment to the T62 temper (refer to ANSI H35.1/H35.1M) in accordance with AMS2772, shall have the properties shown in Tables 3 and 4.

3.3.1.2.1 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 properties shown in Table 3.

Table 3 - T62 minimum tensile properties

Property	Value
Tensile Strength	65.0 ksi (448 MPa)
Yield Strength at 0.2% Offset	55.0 ksi (379 MPa)
Elongation in 2 Inches (50.8 mm) or 4D	10%

3.3.1.2.2 Forgings with Grain Flow

Specimens, machined from forgings with axis of the specimen in area of gage length varying not more than 15 degrees from parallel to the forging flow lines, shall have the properties shown in Table 3, except that elongation may be as low as 7%.

3.3.1.2.3 Forgings Across Grain Flow

Specimens, machined from forgings with axis of the 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 4.

Table 4 - T62 minimum tensile properties

Property	Value
Tensile Strength	62.0 ksi (427 MPa)
Yield Strength at 0.2% Offset	52.0 ksi (359 MPa)
Elongation in 2 Inches (50.8 mm) or 4D	3%

3.3.1.2.3.1 The elongation requirement applies only to specimens having a gage-length diameter not less than 0.250 inch (6.35 mm) and cut so that the length of the specimen is in a plane parallel to the parting plane.

3.3.1.3 Mechanical property requirements for product outside of the range covered by 1.1 shall be agreed upon between the purchaser and producer and reported per 4.4.1 (see 8.6).

3.3.2 Forging Stock

When a sample of stock is forged to a test coupon and heat treated in the same manner as forgings, tensile specimens taken from the heat-treated coupon shall conform to the requirements of 3.3.1.2.1. If specimens taken from the stock after heat treatment in the same manner as forgings conform to the requirements of 3.3.1.2.1, the tests shall be accepted as equivalent to tests of a forged coupon. The forging stock supplier, however, shall not be required to use un-forged coupons when performing lot conformance testing.

3.4 Quality

The product, as received by the 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, forgings shall be subjected to fluorescent penetrant inspection in accordance with ASTM E1417/E1417M, to ultrasonic inspection in accordance with ASTM B594, or to both. Standards for acceptance shall be as agreed upon by the purchaser and producer.

3.4.2 Unless otherwise specified, grain flow of die forgings, except in areas that contain flash-line end grain, shall follow the general contour of the forgings showing no evidence of reentrant grain flow.

3.5 Tolerances

3.5.1 Forging stock shall conform to all applicable requirements of ANSI H35.2 or ANSI H35.2M.

3.5.2 Forged product shall conform to part drawing requirements (see 8.6).

3.6 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.1.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of the product shall supply all samples for the producer's tests and shall be responsible for the performance of all required tests. The 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

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

4.2.1.1 Composition (see 3.1) of the product.

4.2.1.2 Tensile properties of each inspection lot of forgings as solution heat treated (see 3.3.1.1) and after precipitation heat treatment (see 3.3.1.2).

4.2.1.3 Nondestructive inspection (see 3.4.1) of each inspection lot of forgings, when specified (see 8.6).

4.2.1.4 Tolerances (see 3.5.1) of forging stock and of forged product 3.5.2 (see 8.6).

4.2.2 Periodic Tests

Grain flow of forgings (see 3.4.2) and tests to determine ability of forging stock to develop the required properties (see 3.3.2) are periodic tests and shall be performed at a frequency selected by the producer unless frequency of testing is specified by the purchaser.

4.3 Sampling and Testing

Shall be in accordance with AMS2355.

4.4 Reports

4.4.1 The producer of forgings shall furnish with each shipment a report stating that the product conforms to the composition, tolerances, and NDT inspection when required, 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, AMS4134H, size, and quantity. The report shall also identify the producer, the product form, and the size of the mill product.

4.4.1.1 When material produced to this specification is beyond the sizes allowed in the scope or tables, or other exceptions authorized by the purchaser are taken to the technical requirements listed in Section 3, the report shall contain a statement "This material is certified as AMS4134H(EXC) because of the following exceptions:" and the specific exceptions shall be listed.

4.4.2 The producer of forging stock shall furnish with each shipment a report stating that the chemical composition of the stock conforms to specified requirements. This report shall include the purchase order number, AMS4134H, size, and quantity.

4.5 Resampling and Retesting

Shall be in accordance with AMS2355.