



AEROSPACE MATERIAL SPECIFICATION

AMS4107™**REV. H**

Issued 1975-06
Reaffirmed 2012-05
Revised 2023-05

Superseding AMS4107G

Aluminum Alloy Die Forgings
(7050-T74)
Solution Heat Treated and Overaged
(Composition similar to UNS A97050)

RATIONALE

AMS4107H results from a Five-Year Review and update of this specification with changes to update wording to prohibit unauthorized exceptions (3.3.1.1.3, 3.3.1.1.4, 3.6, and 8.4), update applicable documents (Section 2), and quality (3.4.2.1), hardness (8.3), and ordering information (8.6), relocate definitions (2.4), and allow the use of the immediate prior specification revision (8.5).

1. SCOPE

1.1 Form

This specification covers an aluminum alloy in the form of die forgings up to 6.000 inches (152.40 mm), inclusive, in nominal thickness and forging stock of any size (see 8.6).

1.2 Application

These products have been used typically for structural applications requiring good resistance to stress-corrosion cracking, but usage is not limited to such applications.

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

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For more information on this standard, visit
<https://www.sae.org/standards/content/AMS4107H/>

SAE WEB ADDRESS:

AMS2808 Identification, Forgings

AS7766 Terms Used in Aerospace Metals Specifications

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 B557	Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products
ASTM B557M	Tension Testing Wrought and Cast Aluminum- and Magnesium-Alloy Products, Metric
ASTM B594	Ultrasonic Inspection of Aluminum-Alloy Wrought Products
ASTM E10	Brinell Hardness of Metallic Materials
ASTM E1417/E1417M	Liquid Penetrant Testing
ASTM G34	Exfoliation Corrosion Susceptibility in 2xxx and 7xxx Series Aluminum Alloys (EXCO Test)
ASTM G47	Determining Susceptibility to Stress-Corrosion Cracking of 2XXX and 7XXX Aluminum Alloy Products

2.3 ANSI Accredited Publications

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

ANSI H35.1/H35.1M	Alloy and Temper Designation Systems for Aluminum
ANSI H35.2	Dimensional Tolerances for Aluminum Mill Products
ANSI H35.2M	Dimensional Tolerances for Aluminum Mill Products (Metric)

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	--	0.12
Iron	--	0.15
Copper	2.0	2.6
Manganese	--	0.10
Magnesium	1.9	2.6
Chromium	--	0.04
Zinc	5.7	6.7
Titanium	--	0.06
Zirconium	0.08	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 Forgings

Solution heat treated and overaged to the T74 temper (refer to ANSI H35.1/H35.1M) in accordance with AMS2772.

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 AMS2355 on the mill produced size.

3.3.1 Forgings

The following requirements apply to forgings having an as-forged thickness not more than twice the nominal thickness at time of heat treatment:

3.3.1.1 Tensile Properties

Shall be as follows:

3.3.1.1.1 With Grain Flow (Longitudinal)

Specimens, machined from forgings or from prolongations on such forgings, with axis of specimen in area of gage length varying not more than 15 degrees from parallel to the forging flow lines, shall have the properties specified in Table 2.

Table 2A - Minimum tensile properties, inch/pound units

Nominal Thickness at Time of Heat Treatment Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
Up to 2.000, incl	72.0	62.0	7
Over 2.000 to 4.000, incl	71.0	61.0	7
Over 4.000 to 5.000, incl	70.0	60.0	7
Over 5.000 to 6.000, incl	70.0	59.0	7

Table 2B - Minimum tensile properties, SI units

Nominal Thickness at Time of Heat Treatment Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
Up to 50.80, incl	496	427	6
Over 50.80 to 101.60, incl	490	421	6
Over 101.60 to 127.00, incl	483	414	6
Over 127.00 to 152.40, incl	483	407	6

3.3.1.1.2 Across Grain Flow (Long Transverse)

Specimens, machined from forgings or from prolongations on such forgings 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 specified in Table 3.

Table 3A - Minimum tensile properties, inch/pound units

Nominal Thickness at Time of Heat Treatment Inches	Tensile Strength ksi	Yield Strength at 0.2% Offset ksi	Elongation in 2 Inches or 4D %
Up to 2.000, incl	68.0	56.0	5
Over 2.000 to 4.000, incl	67.0	55.0	4
Over 4.000 to 5.000, incl	66.0	54.0	3
Over 5.000 to 6.000, incl	66.0	54.0	3

Table 3B - Minimum tensile properties, SI units

Nominal Thickness at Time of Heat Treatment Millimeters	Tensile Strength MPa	Yield Strength at 0.2% Offset MPa	Elongation in 50.8 mm or 4D %
Up to 50.80, incl	469	386	5
Over 50.80 to 101.60, incl	462	379	4
Over 101.60 to 127.00, incl	455	372	3
Over 127.00 to 152.40, incl	455	372	3

3.3.1.1.3 Special Purpose Forgings

Tensile specimens cut from special purpose forgings or from forgings beyond the size and configuration limits of 3.3.1.1.1 or 3.3.1.1.2 shall meet tensile property requirements specified on the drawing or as agreed upon by the purchaser and producer and reported per 4.4.1.1 (see 8.6).

3.3.1.1.4 Mechanical property requirements for forgings outside the thickness range of 1.1 shall be as agreed upon by the purchaser and producer and reported per 4.4.1.1 (see 8.6).

3.3.1.2 Corrosion Resistance

Resistance to stress-corrosion cracking and to exfoliation-corrosion is acceptable if the conditions of 3.3.1.2.1 and 3.3.1.2.2 are met.

3.3.1.2.1 Electrical conductivity shall be not lower than 38.0% IACS (International Annealed Copper Standard) (22.0 MS/m) and longitudinal (with grain flow) yield strength shall not exceed 72.0 ksi (496 MPa).

3.3.1.2.2 Stress-Corrosion Susceptibility Factor (SCF)

Shall be not greater than 32.0 (220), determined by subtracting the electrical conductivity, AA.A% IACS (12 times BB.B MS/m) from the longitudinal (with grain-flow) yield strength, XX.X ksi (YYY MPa).

EXAMPLES: Inch/Pound Units 72.0 ksi - 38.5% IACS = 33.5, Unacceptable
68.0 ksi - 40.2% IACS = 27.8, Acceptable

SI Units: 496 MPa - 12 X 22.3 MS/m = 228.4, Unacceptable
469 MPa - 12 X 23.3 MS/m = 189.4, Acceptable

3.3.1.2.3 Forgings not conforming to 3.3.1.2.1 and 3.3.1.2.2 may be given additional overaging and retested to determine conformance to 3.3.1.1 and 3.3.1.2.

3.3.1.3 Exfoliation-Corrosion Resistance

Specimens cut from forgings shall exhibit exfoliation-corrosion, at any plane, not greater than that illustrated by photograph B, Figure 2, of ASTM G34.

3.3.1.4 Stress-Corrosion Resistance

Specimens cut from forgings 0.750 inch (19.05 mm) and over in nominal thickness, shall show no evidence of stress-corrosion cracking when tested in accordance with ASTM G47 and stressed at 35.0 ksi (241 MPa) in the short-transverse direction.

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 forgings, specimens taken from the heat-treated coupon shall conform to the requirements of 3.3.1.1. If specimens taken from the stock after heat treatment in the same manner as forgings conform to the requirements of 3.3.1.1, the tests shall be accepted as equivalent to tests of a forged coupon.

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. Standards for acceptance shall be specified by the purchaser (see 8.6).

3.4.2 When specified, forgings shall be subjected to ultrasonic inspection in accordance with ASTM B594 or other method specified by the purchaser and shall meet the following acceptance standards:

3.4.2.1 Forgings with nominal section thicknesses from 0.500 to 4.000 inches (12.70 to 101.60 mm) shall meet ultrasonic Class B of ASTM B594. The ultrasonic class for nominal thicknesses over 4.000 inches (101.60 mm) shall be as agreed upon by the purchaser and producer (see 8.6).

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

3.5 Tolerances

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

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 the specified requirements.