



AEROSPACE MATERIAL SPECIFICATION

AMS4366

Issued

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Aluminum Alloy, Extruded Profiles (2065-T84)
4.2Cu - 1.2Li - 0.52Mg - 0.32Mn - 0.32Ag - 0.1Zr
Solution Heat Treated, Stress Relieved by Stretching and Artificially Aged

RATIONALE

AMS4366 is a new specification to cover aluminum alloy 2065-T84 extruded profiles.

1. SCOPE

1.1 Form

This specification covers an aluminum-lithium alloy in the form of extruded profiles with a maximum cross-sectional area of 19 square inches (123 cm²) and a maximum circle size of 11 inches (279mm) from 0.040 to 0.499 inches (1.00 to 12.50 mm) in thickness (See 8.5).

1.2 Application

These extrusions have been used typically for machined parts requiring high strength and good corrosion resistance, but usage is not limited to such applications.

1.2.1 Certain processing procedures may cause this product to become susceptible to stress-corrosion cracking; 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.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 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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SAE values your input. To provide feedback on this Technical Report, please visit <http://www.sae.org/technical/standards/AMS4366>

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

AS1990 Aluminum Alloy Tempers

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

ASTM B 660 Packaging/Packing of Aluminum and Magnesium Products

ASTM B 666/B 666M Identification Marking of Aluminum and Magnesium Products

ASTM G 47 Determining Susceptibility to Stress-Corrosion Cracking of High Strength Aluminum Alloy Products

2.3 ANSI Publications

Available from American National Standards Institute, 25 West 43rd Street, New York, NY 10036, Tel: 212-642-4900, www.ansi.org.

ANSI H 35.2 Dimensional Tolerances for Aluminum Mill Products

ANSI H 35.2M Dimensional Tolerances for Aluminum Mill Products (Metric)

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight as shown in Table 1, determined in accordance with AMS2355.

TABLE 1 - Composition

| Element | min | max |
|-----------------------|-----------|------|
| Silicon | -- | 0.10 |
| Iron | -- | 0.10 |
| Copper | 3.8 | 4.7 |
| Manganese | 0.15 | 0.50 |
| Magnesium | 0.25 | 0.8 |
| Zinc | -- | 0.30 |
| Titanium | -- | 0.10 |
| Lithium | 0.8 | 1.5 |
| Silver | 0.15 | 0.50 |
| Zirconium | 0.05 | 0.15 |
| Other Elements, each | -- | 0.05 |
| Other Elements, total | -- | 0.15 |
| Aluminum | remainder | |

3.2 Condition

Extruded, solution heat treated and stress relieved by stretching to produce a nominal permanent set of 3.5%, but not less than 3% nor more than 4%, and aged to T84 temper (See AS1990). Solution and precipitation heat treatment shall be performed in accordance with AMS2772 as applicable to 2XXX alloys. Actual practices are proprietary.

3.2.1 Product shall be supplied with an as-extruded surface finish; light polishing to remove minor surface conditions is permissible provided such conditions can be removed within specified dimensional tolerances.

3.2.2 Product may receive minor straightening, after stretching, of an amount necessary to meet the requirements of 3.6.

3.3 Properties

Product shall conform to the following requirements, determined on the mill produced size in accordance with AMS2355:

3.3.1 Longitudinal tensile properties of extrusions, with a maximum cross-sectional area of 19 square inches (123 cm²) and a maximum circle size of 11 inches (279mm) shall be as specified in Table 2.

3.3.2 Mechanical property requirements for product outside of the range covered by Table 2 shall be agreed upon between purchaser and producer.

TABLE 2A - Minimum Tensile Properties, Inch/Pound Units

| Nominal Thickness Inches | Specimen Orientation | Tensile Strength ksi | Yield Strength At 0.2% Offset ksi | Elongation in 2 inches or 4D % |
|-----------------------------|-------------------------|----------------------------|---|--------------------------------------|
| 0.040 to 0.249 | Longitudinal | 87.0 | 83.0 | 6 |
| Over 0.250 to 0.499 | Longitudinal | 87.0 | 84.0 | 6 |

TABLE 2B - Minimum Tensile Properties, SI Units

| Nominal Thickness Millimeters | Specimen Orientation | Tensile Strength MPa | Yield Strength At 0.2% Offset MPa | Elongation in 50.8 mm % |
|----------------------------------|-------------------------|----------------------------|---|-------------------------------|
| 1.00 to 6.00 | Longitudinal | 600 | 570 | 6 |
| 6.00 to 12.5, incl | Longitudinal | 600 | 580 | 6 |

3.3.3 Stress-Corrosion Test

Stress corrosion testing, when specified, shall show no evidence of stress-corrosion cracking when tested in accordance with ASTM G 47 and stressed in the long-transverse direction to 58.0 ksi (400 MPa) for 30 days.

3.4 Quality

Products, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from conditions detrimental to usage of the extrusions.

3.4.1 When specified, each extruded profile having a maximum width-to-thickness ratio of 10:1 shall meet ultrasonic class B requirements, as described in ASTM B 594.

3.5 Tolerances

Shall conform to all applicable requirements of ANSI H 35.2 or ANSI H 35.2M.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The vendor of the products 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 products conform to specified requirements.

4.2 Classification of Tests

4.2.1 Acceptance Tests

Composition (3.1), longitudinal tensile properties (3.3.1), stress corrosion resistance, when specified (3.3.3), ultrasonic inspection (when specified) (3.4.1), and tolerances (3.5) are acceptance tests and, except for composition, shall be performed on each inspection lot.

4.3 Sampling and Testing

Shall be in accordance with AMS2355.

4.4 Reports

The vendor of the product shall furnish with each shipment a report stating that the product conforms to the composition, ultrasonic inspection when specified, and 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, AMS4366, size or section identification number, and quantity. This 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 AMS2355.

5. PREPARATION FOR DELIVERY

5.1 Identification

Shall be in accordance with ASTM B 666/B 666M.

5.2 Packaging

Products shall be prepared for shipment in accordance with ASTM B 660 and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the product to ensure carrier acceptance and safe delivery.

6. ACKNOWLEDGEMENT

A vendor shall include this specification number in all quotations and when acknowledging purchase orders.

7. REJECTIONS

Products not conforming to this specification, or to modifications authorized by purchaser, will be subject to rejection.

8. NOTES

8.1 A change bar (|) located in the left margin is for the convenience of the user in locating areas where technical revisions, not editorial changes, have been made to the previous issue of this document. An (R) symbol to the left of the document title indicates a complete revision of the document, including technical revisions. Change bars and (R) are not used in original publications, nor in documents that contain editorial changes only.

8.2 Extrusions produced to this specification exhibit a thin re-crystallized surface layer similar to other high strength 2xxx alloys.