



AEROSPACE MATERIAL

AMS 4343

Society of Automotive Engineers, Inc. SPECIFICATION

400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

Issued 1-15-80

Revised

ALUMINUM ALLOY EXTRUSIONS 7.7Zn - 2.4Mg - 1.6Cu - 0.16Cr (7149-T73511)

1. SCOPE:

- 1.1 Form: This specification covers an aluminum alloy in the form of extruded bars, rods, wire, shapes, and tubing.
- 1.2 Application: Primarily for structural parts requiring a combination of high strength, moderate fatigue strength, good stress-corrosion resistance, and good fracture toughness.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096.

2.1.1 Aerospace Material Specifications:

AMS 2205 - Tolerances, Aluminum-Base and Magnesium-Base Alloy Extrusions

AMS 2350 - Standards and Test Methods

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

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM G47 - Determining Susceptibility to Stress Corrosion Cracking of High Strength 7XXX Aluminum Alloy Products

2.3 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.3.1 Military Specifications:

MIL-H-6088 - Heat Treatment of Aluminum Alloys

MIL-I-8950 - Inspection, Ultrasonic, Wrought Metals, Process for

2.3.2 Military Standards:

MIL-STD-649 - Aluminum and Magnesium Products, Preparation for Shipment and Storage

SAE Technical Board rules provide that: "All technical reports, including standards approved and practice recommended, are advisory only. Their use by anyone engaged in industry or trade or their use by governmental agencies is entirely voluntary. There is no agreement to adhere to any SAE standard or recommended practice, and no commitment to conform to or be guided by any technical report. In formulating and approving technical reports, the Board and its Committees will not investigate or consider patents which may apply to the subject matter. Prospective users of the report are responsible for protecting themselves against liability for infringement of patents."

3. TECHNICAL REQUIREMENTS:

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

| | min | max |
|-------------------------|-----------|------|
| Zinc | 7.2 | 8.2 |
| Magnesium | 2.0 | 2.9 |
| Copper | 1.2 | 1.9 |
| Chromium | 0.10 | 0.22 |
| Iron | -- | 0.20 |
| Manganese | -- | 0.20 |
| Silicon | -- | 0.15 |
| Titanium | -- | 0.10 |
| Other Impurities, each | -- | 0.05 |
| Other Impurities, total | -- | 0.15 |
| Aluminum | remainder | |

3.2 Condition: Extruded, solution heat treated, stress-relieved by stretching to produce a nominal permanent set of 1.5% but not less than 1% nor more than 3%, and precipitation heat treated.

3.2.1 Extrusions may receive minor straightening after stretching of an amount necessary to meet the tolerance requirements of 3.6.

3.2.2 Extrusions shall be supplied with an as-extruded surface finish; light polishing to remove minor surface imperfections is permissible provided such imperfections can be removed within the dimensional tolerances.

3.3 Heat Treatment: Extrusions shall be solution heat treated by heating to 875°F ± 10 (468°C ± 5), holding at heat for a time commensurate with section thickness but not less than 60 min., and quenching in water at room temperature; held at room temperature for not less than 48 hr; and precipitation heat treated by heating to 250°F ± 10 (120°C ± 5), holding at heat for 24 hr ± 1, followed by heating to 330°F ± 5 (165°C ± 3) for 12 - 21 hr, and cooling in air (See 8.2). Heat treatments shall be performed in accordance with equipment and procedural controls of MIL-H-6088.

3.4 Properties: Extrusions up to 5.000 in. (127.00 mm) in nominal diameter or section thickness (wall thickness of tubing) shall conform to the following requirements, determined in accordance with AMS 2355; properties of extrusions over 5.000 in. (127.00 mm) in nominal diameter or section thickness shall be as agreed upon by purchaser and vendor:

3.4.1 Tensile Properties: Shall be as specified in Table I.

TABLE I

Nominal Diameter or Least Thickness
(bars, rods, wire, shapes)
or Nominal Wall Thickness
(tubing)
Inches

| | Specimen Orientation | Tensile Strength psi, min | Yield Strength at 0.2% Offset psi, min | Elongation in 2 in. or 4D %, min |
|---------------------------|----------------------|------------------------------|--|--|
| Up to 2.999, incl | Longitudinal | 74,000 | 64,000 | 7 |
| | Long-Trans. | 70,000 | 60,000 | 5 |
| Over 2.999 to 5.000, incl | Longitudinal | 72,000 | 62,000 | 7 |
| | Long-Trans. | 68,000 | 58,000 | 5 |

TABLE I (SI)

| Nominal Diameter or Least Thickness (bars, rods, wire, shapes) or Nominal Wall Thickness (tubing) Millimetres | Specimen Orientation | Tensile Strength MPa, min | Yield Strength at 0.2% Offset MPa, min | Elongation in 50 mm or 4D %, min |
|---|-------------------------|---------------------------------|--|--|
| Up to 76.17, incl | Longitudinal | 510 | 441 | 7 |
| | Long-Trans. | 483 | 414 | 5 |
| Over 76.17 to 127.00, incl | Longitudinal | 496 | 427 | 7 |
| | Long-Trans. | 469 | 400 | 5 |

3.4.2 Conductivity: Shall be not lower than 40% IACS (International Annealed Copper Standard).

3.4.2.1 If the conductivity is below 40% IACS, the extrusions are not acceptable.

3.4.2.2 Extrusions found to be unacceptable may be given additional precipitation heat treatment and if, upon completion of such treatment, they develop conductivity/property relationships conforming to 3.4.1 and 3.4.2, they shall be acceptable.

3.4.3 Stress-Corrosion Resistance: Specimens, cut from extrusions 0.750 in. (19.05 mm) and over in nominal diameter or section thickness processed to meet the requirements of 3.4.2 and stressed in the short-transverse (perpendicular to grain flow) direction to 65% of the specified minimum longitudinal (parallel to grain flow) yield strength, shall meet the requirements of ASTM G47.

3.5 Quality: Extrusions, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from internal and external imperfections detrimental to usage of the extrusions.

3.5.1 When specified, extrusions shall be subjected to ultrasonic inspection in accordance with MIL-I-8950. Standards for acceptance shall be as agreed upon by purchaser and vendor.

3.6 Tolerance: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2205.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of extrusions shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to ensure that the extrusions conform to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to requirements for composition (3.1), tensile properties (3.4.1), conductivity (3.4.2), ultrasonic inspection (3.5.1) when specified, and tolerances (3.6) are classified as acceptance tests and shall be performed on each lot.

4.2.2 Periodic Tests: Tests to determine conformance to requirements for stress-corrosion resistance (3.4.3) are classified as periodic tests and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

4.3 Sampling: Shall be in accordance with AMS 2355.

4.4 Reports:

4.4.1 The vendor of extrusions shall furnish with each shipment three copies of a report stating that the extrusions conform to the chemical composition and other technical requirements of this specification. This report shall include the purchase order number, material specification number, size or section identification number, and quantity.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number, contractor or other direct supplier of extrusions, part number, and quantity. When extrusions for making parts are produced or purchased by the parts vendor, that vendor shall inspect each lot of extrusions to determine conformance to the requirements of this specification, and shall include in the report a statement that the extrusions conform, or shall include copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting: Shall be in accordance with AMS 2355.

5. PREPARATION FOR DELIVERY:

5.1 Identification: Extrusions shall be identified as follows:

5.1.1 Each straight bar, rod, and tube 0.500 in. (12.70 mm) and over in OD or least width of flat surface and each straight shape with configuration allowing access to a flat surface at least 0.500 in. (12.70 mm) wide recessed not more than 1/8 in. (3 mm) below the outline of the shape shall be marked in a row of characters recurring at intervals not greater than 3 ft (914 mm) with the alloy number and temper, AMS 4343, and manufacturer's identification. The inspection lot number shall be included in the row marking or shall be marked near one end. The characters shall be of such size as to be clearly legible, shall be applied using a suitable marking fluid, and shall be sufficiently stable to withstand normal handling. The markings shall have no deleterious effect on the extrusions or their performance.

5.1.2 All straight extrusions other than those of 5.1.1 shall be securely bundled, boxed, or secured on lifts and identified by two durable tags, marked with the information of 5.1.1, including the inspection lot number, and attached, not farther than 2 ft (610 mm) from each end, to the extrusions in each bundle, box, or lift.

5.1.3 Coiled bar, rod, wire, and tubing and spooled wire shall be identified with the information of 5.1.1, including the inspection lot number, marked on a durable tag attached to each coil or directly on one flange of each spool.

5.2 Packaging:

5.2.1 Extrusions shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the extrusions to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

5.2.2 For direct U.S. Military procurement, packaging shall be in accordance with MIL-STD-649, Level A or Level C, as specified in the request for procurement. Commercial packaging as in 5.2.1 will be acceptable if it meets the requirements of Level C.