Society of Automotive Engineers, Inc.
400 COMMONWEALTH DRIVE, WARRENDALE, PA. 15096

# AEROSPACE MATERIAL SPECIFICATION

AMS 4067E
Superseding AMS 4067D

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## ALUMINUM ALLOY TUBING, SEAMLESS, DRAWN, ROUND
## 1.25Mn - 0.12Cu (3003-H14)





1. SCOPE:

1.1 Form: This specification covers an aluminum alloy in the form of seamless tubing.

1.2 Application: Primarily for parts and assemblies, such as brackets, conduits, and low pressure lines, requiring good weldability and resistance to corrosion.

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 2203 - Tolerances, Aluminum Alloy Drawn Tubing
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 Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.2.1 Military Standards:

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

3. TECHNICAL REQUIREMENTS:

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

| ø | min | max |
|---|---|---|
| Manganese | 1.0 | 1.5 |
| Copper | 0.05 | 0.20 |
| Iron | -- | 0.7 |
| Silicon | -- | 0.6 |
| Zinc | -- | 0.10 |
| Other Impurities, each | -- | 0.05 |
| Other Impurities, total | -- | 0.15 |
| Aluminum | remainder | |

3.2 Condition: Strain hardened to H14 temper.

3.3 Properties: Tubing shall conform to the following requirements:

3.3.1 Tensile Properties: Shall be as follows, determined in accordance with AMS 2355:

| | |
|---|---|
| Tensile Strength, min | 20,000 psi (138 MPa) |

3.3.2 Flattening: Tubing having nominal wall thickness less than 10% of the nominal OD shall withstand, without cracking, flattening sideways under a load applied gradually at room temperature until the outside dimension under load is equal to 6 times the nominal wall thickness.

3.3.2.1 If tubing does not pass the flattening test of 3.3.2, a section of tube not less than 1/2 in. (12.7 mm) in length and embracing 1/3 to 1/2 the circumference of the tube shall withstand, without cracking, bending at room temperature through an angle of 180 deg (3.14 rad) around a diameter equal to 4 times the nominal wall thickness of the tubing with axis of bend parallel to axis of tube and with ID of tube on inside of bend.

3.3.3 Flarability: Tubing with nominal OD of 0.375 in. (9.52 mm) and under shall withstand double-flaring and tubing with nominal OD over 0.375 in. (9.52 mm) shall withstand single-flaring without formation of cracks or other visible defects. The specimen shall, at room temperature, be forced axially with steady pressure over a hardened and polished tapered steel pin having a 74 deg (1.29 rad) included angle, to produce a flare having a permanent expanded OD not less than specified in Table I.

TABLE I

| Nominal OD Inches | Expanded OD Inches | Nominal OD Inches | Expanded OD Inches |
|---|---|---|---|
| 0.125 | 0.224 | 0.750 | 0.937 |
| 0.188 | 0.302 | 1.000 | 1.187 |
| 0.250 | 0.359 | 1.250 | 1.500 |
| 0.312 | 0.421 | 1.500 | 1.721 |
| 0.375 | 0.484 | 1.750 | 2.106 |
| 0.500 | 0.656 | 2.000 | 2.356 |
| 0.625 | 0.781 | 2.500 | 2.856 |
| | | 3.000 | 3.356 |

TABLE I (SI)

| Nominal OD Millimetres | Expanded OD Millimetres | Nominal OD Millimetres | Expanded OD Millimetres |
|---|---|---|---|
| 3.18 | 5.69 | 19.05 | 23.80 |
| 4.78 | 7.67 | 25.40 | 30.15 |
| 6.35 | 9.12 | 31.75 | 38.10 |
| 7.92 | 10.69 | 38.10 | 43.71 |
| 9.52 | 12.29 | 44.45 | 53.49 |
| 12.70 | 16.66 | 50.80 | 59.84 |
| 15.88 | 19.84 | 63.50 | 72.54 |
| | | 76.20 | 85.24 |

3.3.3.1 Tubing with nominal OD between any two standard sizes shown in 3.3.3 shall take the same percentage flare as that for larger of the two sizes.

3.3.3.2 Tubing with nominal OD greater than 3.000 in. (76.20 mm) or less than 0.125 in. (3.18 mm) shall have flarability as agreed upon by purchaser and vendor.

3.4 Quality: Tubing, as received by the 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 tubing.

3.5 Tolerances: Unless otherwise specified, tolerances shall conform to all applicable requirements of AMS 2203.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of tubing 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 tubing conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to composition (3.1), tensile property (3.3.1), and tolerance (3.5) requirements are classified as acceptance tests.

4.2.2 Periodic Tests: Tests to determine conformance to flattening (3.3.2) and flarability (3.3.3) requirements are classified as periodic tests.

4.3 Sampling: Shall be in accordance with AMS 2355 and the following. Frequency of sampling for periodic tests shall be as agreed upon by purchaser and vendor:

4.3.1 Specimens for flaring may be cut from any portion of the tube or an entire tube may be used as a specimen. The end of the specimen to be flared shall be cut square, with the cut end smooth and free from burrs, but not rounded except for sizes 0.375 in. (9.52 mm) and under.

4.4 Reports:

4.4.1 The vendor of tubing shall furnish with each shipment three copies of a report stating that the tubing conforms to the chemical composition and other technical requirements of this specification. This report shall include the purchase order number, material specification number and its revision letter, size, 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 and its revision letter, contractor or other direct supplier of tubing, part number, and quantity. When tubing for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of tubing to determine conformance to the requirements of this specification, and shall include in the report a statement that the tubing conforms, 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: Tubing shall be identified as follows: