

# AEROSPACE MATERIAL SPECIFICATION

Aluminum Alloy, Extruded Rod, Bar, and Profiles (7055-T76511)  
8.0Zn - 2.3Cu - 2.0Mg - 0.16Zr  
Solution Heat Treated, Stress-Relieved, and Overaged  
(Composition similar to UNS A97055)

## 1. SCOPE:

### 1.1 Form:

This specification covers an aluminum alloy procured in the form of extruded bars, rods, and profiles (shapes) with cross-sectional area of 12 square inches (77 cm<sup>2</sup>) maximum and circle size of 10 inches (254 mm) maximum.

### 1.2 Application:

These extrusions have been used typically for structural applications requiring a combination of high tensile and compressive strength and good exfoliation corrosion resistance, 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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

### 2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or [www.sae.org](http://www.sae.org).

|          |   |
|----------|---|
| AMS 2355 | Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock and Rolled, Forged, or Flash Welded Rings                    |
| MAM 2355 | Quality Assurance Sampling and Testing, Aluminum Alloys and Magnesium Alloys, Wrought Products, Except Forging Stock and Rolled, Forged, or Flash Welded Rings, Metric (SI) Units |
| AMS 2772 | Heat Treatment of Aluminum Alloy Raw Materials  |

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## 2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or [www.astm.org](http://www.astm.org).

|                  |  |
|------------------|--|
| ASTM B 666/B666M | Identification Marking of Aluminum and Magnesium Products                                |
| ASTM B 660       | Packaging/Packing of Aluminum and Magnesium Products                                     |
| ASTM E 1004      | Method for Electromagnetic (Eddy Current) Measurements of Electrical Conductivity        |
| ASTM G 34-72     | Exfoliation Corrosion Susceptibility in 2xxx and 7xxx Series Aluminum Alloys (EXCO Test) |

## 2.3 ANSI Publications:

Available from ANSI, 25 West 43rd Street, New York, NY 10036-8002.

|             |  |
|-------------|--|
| ANSI H35.1  | Alloy and Temper Designation System for Aluminum Alloys    |
| ANSI H35.2  | Dimensional Tolerances for Aluminum Mill Products          |
| ANSI H35.2M | Dimensional Tolerances for Aluminum Mill Products (Metric) |

## 3. TECHNICAL REQUIREMENTS:

## 3.1 Composition:

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS 2355 or MAM 2355.

TABLE 1 - Composition

| Element               | min       | max  |
|-----------------------|-----------|------|
| Silicon               | --        | 0.10 |
| Iron                  | --        | 0.15 |
| Copper                | 2.0       | 2.6  |
| Manganese             | --        | 0.05 |
| Magnesium             | 1.8       | 2.3  |
| Chromium              | --        | 0.04 |
| Zinc                  | 7.6       | 8.4  |
| Titanium              | --        | 0.06 |
| Zirconium             | 0.08      | 0.25 |
| Other Elements, each  | --        | 0.05 |
| Other Elements, total | --        | 0.15 |
| Aluminum              | remainder |      |

## 3.2 Condition:

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 overaged to the -T76511 temper. (See ANSI H35.1).

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 Heat Treatment:

Shall be performed in accordance with AMS 2772 and as follows:

3.3.1 Overaging Heat Treatment: Heat to 240 to 250 °F (116 to 121 °C), hold at temperature for a time of 4 to 6 hours, then heat to 310 to 320 °F (154 to 160 °C), hold at temperature for a time of 6.5 to 7.5 hours, and air cool.

## 3.4 Properties:

Extrusions shall conform to the following requirements, determined on the mill produced size in accordance with AMS 2355 or MAM 2355:

3.4.1 Longitudinal tensile properties of extrusions with a maximum cross-sectional area of 12 square inches (77 cm<sup>2</sup>) and a maximum circle size of 10 inches (254 mm) shall be as shown in Table 2.

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

| Nominal Thickness<br>Inches | Tensile<br>Strength<br>ksi | Yield Strength<br>at 0.2% Offset<br>ksi | Elongation in<br>2 inches or 4D<br>% |
|-----------------------------|----------------------------|---|--------------------------------------|
| Up to 0.249, incl           | 89.0                       | 85.0                                    | 7                                    |
| Over 0.249 to 0.499, incl   | 90.0                       | 85.0                                    | 9                                    |

TABLE 2B - Minimum Longitudinal Tensile Properties, SI Units

| Nominal Thickness<br>Millimeters | Tensile<br>Strength<br>MPa | Yield Strength<br>at 0.2% Offset<br>MPa | Elongation in<br>50.8 mm or 4D<br>% |
|----------------------------------|----------------------------|---|-------------------------------------|
| Up to 6.34, incl                 | 614                        | 586                                     | 7                                   |
| Over 6.34 to 12.68, incl         | 621                        | 586                                     | 9                                   |

3.4.2 Electrical Conductivity (EC): Shall be not lower than 35.0% IACS (International Annealed Copper Standard) (20.9 MS/m), in accordance with ASTM E 1004, determined on the surface of the test coupon prior to turning.

3.4.3 Exfoliation Corrosion Resistance: Specimens cut from extrusions shall not exhibit exfoliation corrosion at a T/10 plane greater than that illustrated by Photograph B, Figure 2, of ASTM G 34.

### 3.5 Quality:

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

3.5.1 Intergranular Attack (IGA): No IGA is permitted on sections up to 0.450 inch (11.43 mm) thick. IGA, if found during visual inspection, shall be removed by suitable means (machining, sanding, etc.) (See 8.2).

### 3.6 Tolerances:

Shall conform to all applicable requirements of ANSI H35.2 or ANSI H35.2M.

## 4. QUALITY ASSURANCE PROVISIONS:

### 4.1 Responsibility for Inspection:

The vendor of the product 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), tensile properties (3.4.1), electrical conductivity (3.4.2), and tolerances (3.6) are acceptance tests and, except for composition, shall be performed on each inspection lot.

4.2.2 Periodic Tests: Exfoliation corrosion resistance (3.4.3) is a periodic test and shall be performed at a frequency selected by the vendor unless frequency of testing is specified by purchaser.

### 4.3 Sampling and Testing:

Shall be in accordance with AMS 2355 or MAM 2355.