SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS 4317

Issued JUL 2005

Aluminum Alloy, Extruded Bar, Rod, and Shapes
5.6Zn - 2.5Mg - 1.6Cu - 0.23Cr
7075-T76(51X)
Solution Heat Treated and Overaged

(Composition Similar to UNS R97075)

1. SCOPE:

1.1 Form:

This specification covers an aluminum alloy in the form of extruded bars, rods, and shapes.

1.2 Application:

This product has been used typically for structural applications requiring material with high strength and resistance to exfoliation-corrosion, but usage is not limited to such applications.

1.2.1 Certain design and processing procedures may cause these products 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 canceled and no superseding document has been specified, the last published issue of that document shall apply.

TO PLACE A DOCUMENT ORDER:
Tel: 877-606-7323 (inside USA and Canada)
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: custsvc@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE 100 Leading Our World In Motion

2.1 SAE Publications:

Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096-0001 or 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
AMS 2772	Heat Treatment of Aluminum Alloy Raw Materials
ARP823	Minimizing Stress-Corrosion Cracking in Wrought Heat-Treatable Aluminum Alloy Products
AS1990	Aluminum Alloy Tempers

2.2 ASTM Publications:

Available from ASTM, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959 or 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 ANSI, 25 West 43rd Street, New York, NY 10036 or 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 shown in Table 1, determined in accordance with AMS 2355.

TABLE 1 - Composition

Element	min	max
Silicon	--	0.40
Iron	--	0.50
Copper	1.2	2.0
Manganese	--	0.30
Magnesium	2.1	2.9
Chromium	0.18	0.28
Zinc	5.1	6.1
Titanium	--	0.20
Other Elements, each	--	0.05
Other Elements, total	--	0.15
Aluminum	remainder	

3.2 Condition:

Extrusions shall be supplied as follows:

3.2.1 Heat treatment: Heat treatment shall be performed in accordance with AMS 2772 to one of the following tempers:

3.2.1.1 Solution heat treated and overaged, to the T76 temper (See AS1990).

3.2.1.2 Solution heat treated, stress-relieved by stretching, and precipitation heat treated to the T76510 or T76511 temper (See AS1990).

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

3.3 Properties:

Extrusions shall conform to the following requirements, determined in accordance with AMS 2355 on the mill product size (See 8.2):

3.3.1 Tensile Properties:

3.3.1.1 Longitudinal: Shall be as shown in Table 2 for all tempers.

TABLE 2A - Minimum Longitudinal Tensile Properties, Inch/Pound Units (See 8.2)

Nominal Diameter or Least Thickness Inches	Nominal Cross-Sectional Area Square Inches	Tensile Strength, ksi	Yield Strength at 2% Offset ksi	Elongation in 2 Inches or 4D %
Up to 0.049, incl	All	73.0	63.0	7
Over 0.049 to 0.124, incl	All	74.0	64.0	7
Over 0.124 to 0.249, incl	Up to 20	74.0	64.0	7
Over 0.249 to 2.000, incl	Up to 20	75.0	65.0	7
Over 2.000 to 3.000, incl	Up to 20	74.0	64.0	7
Over 3.000 to 4.000, incl	Up to 20	74.0	63.0	7

TABLE 2B - Minimum Longitudinal Tensile Properties, SI Units (See 8.2)

Nominal Diameter or Least Thickness Millimeters	Nominal Cross-Sectional Area Square Centimeters	Tensile Strength MPa	Yield Strength at 2% Offset MPa	Elongation in 50.8 mm or 4D %
Up to 1.24, incl	All	503	434	7
Over 1.24 to 3.15, incl	All	510	441	7
Over 3.15 to 6.32, incl	Up to 129	510	441	7
Over 6.32 to 50.80, incl	Up to 129	517	448	7
Over 50.80 to 76.20, incl	Up to 129	510	441	7
Over 76.20 to 101.60, incl	Up to 129	510	434	7

3.3.2 Electrical Conductivity: Conductivity shall be measured on the same specimens used for mechanical property tests and shall be measured prior to testing for mechanical properties.

3.3.2.1 If the conductivity is 38 percent IACS or higher, and the tensile properties meet the minimum limits specified herein, the material is acceptable.

3.3.2.2 If the conductivity is at least 36 percent IACS but less than 38 percent IACS, the material may be tested as specified in 3.3.3 and 3.3.4 and accepted if it passes these tests. As alternatives, the product may be given an additional precipitation heat treatment, or reheat treated, and retested.

3.3.2.3 If the conductivity is lower than 36.0% IACS (22.0 MS/m), the product is not acceptable and may be given an additional precipitation heat treatment, or entirely reheat treated, and retested.

3.3.3 Exfoliation Resistance: Product shall not exhibit exfoliation corrosion at the T/10 plane greater than that illustrated by Photo B, Figure 2 of ASTM G 34.

3.3.4 Stress-Corrosion Test: Specimens, cut from material 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 G 47 and stressed in the short-transverse direction to 25.0 ksi (172 MPa).

3.4 Quality:

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

3.4.1 When specified, rod, bar, and shapes shall be ultrasonically inspected in accordance with ASTM B 594 to the acceptance limits specified in Table 3. All extrusions in the inspection lot shall be inspected.

Table 3 - Ultrasonic Acceptance Limits

Nominal Diameter or Least Thickness Inches (mm)	Maximum Weight of Piece pounds (kg)	Maximum Thickness to Width Ratio	Discontinuity Class
0.500 (12.7) to 1.499 (38.1) incl	600 (272)	10 to 1	B
Over 1.499 (38.1)	600 (272)	10 to 1	A

3.5 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 extrusions 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 extrusions conform to specified requirements.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Composition (3.1), longitudinal tensile properties (3.3.1.1), electrical conductivity (3.3.2), quality (3.4), tolerances (3.5) and, when specified, ultrasonic testing (3.4.1) are acceptance tests and, except for composition, shall be performed on each inspection lot.