

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)

RATIONALE

AMS4317A revises condition (3.2), corrects an error in electrical conductivity (3.3.2.3) and results from a Five Year Review and update of this specification.

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 cancelled and no superseding document has been specified, the last published issue of that document shall apply.

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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
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 10036-8002, 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 shown in Table 1, determined in accordance with AMS2355.

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

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 to the T76511 or T76510 temper (See AS1900). Heat treatments shall be performed in accordance with AMS2772.

- 3.2.1 The T76511 temper shall be supplied unless T76510 is specified. When T76 is specified, the stress relief by stretching may be omitted and the T76 temper supplied if the stretching is not practical due to the shape of the extrusion.
- 3.2.2 Extrusions supplied in the T76 or T76511 temper may receive minor straightening, after stretching, of an amount necessary to meet the requirements of 3.5.
- 3.2.3 Extrusions supplied in the T76510 temper shall receive no straightening after stretching.
- 3.2.4 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 AMS2355 on the mill produced 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% IACS (22 MS/m) 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% IACS (20.9 MS/m) but less than 38% IACS (22 MS/m), 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 (20.9 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 EB, 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