

AEROSPACE MATERIAL SPECIFICATION



AMS-QQ-A-225/8A

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Superseding AMS-QQ-A-225/8

Aluminum Alloy 6061, Bar, Rod, Wire, and Special Shapes;
Rolled, Drawn, or Cold Finished

A96061

RATIONALE

This document has been reaffirmed to comply with the SAE 5-year Review policy.

NOTICE

This document has been taken directly from Federal Specification QQ-A-225/8E and contains only minor editorial and format changes required to bring it into conformance with the publishing requirements of SAE technical standards.

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The complete requirements for procuring 6061 aluminum alloy bar, rod, wire and special shapes described herein shall consist of this document and the latest issue of AMS-QQ-A-225.

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1. SCOPE AND CLASSIFICATION:

1.1 Scope:

This specification covers the specific requirements for 6061 aluminum alloy bar, rod, wire, and special shapes produced by rolling, drawing, or cold finishing.

1.2 Classification:

1.2.1 Tempers: Bar, rod, wire, and special shapes are of the following tempers, as specified (See 6.2): O, T4, T6, T42, T62, T451, or T651 temper. Definitions of these tempers are specified in AMS-QQ-A-225.

2. APPLICABLE DOCUMENTS:

See AMS-QQ-A-225.

3. REQUIREMENTS:

3.1 Chemical Composition:

The chemical composition shall conform to the requirements specified in Table I.

Chemical Composition ^{1/}

Element	Percent	
	Minimum	Maximum
Magnesium	0.8	1.2
Silicon	0.4	0.8
Copper	0.15	0.40
Chromium	0.04	0.35
Iron	-	0.7
Zinc	-	0.25
Titanium	-	0.15
Manganese	-	0.15
Other Elements, each	-	0.05
Other Elements, total	-	0.15
Aluminum	Remainder	

^{1/} Analysis shall routinely be made only for the elements specifically mentioned in Table I. If, however, the presence of other elements is indicated or suspected in the course of routine analysis, further analysis shall be made to determine conformance to the limits specified for other elements.

3.2 Mechanical Properties:

3.2.1 Mechanical Properties of Material as Supplied: The mechanical properties in the direction of working shall conform to the requirements of Table II for the temper specified.

TABLE I. Mechanical Properties (See 6.4)

Temper	Diameter or Thickness Inches	Tensile Strength minimum ksi	Yield Strength at 0.2 percent Offset or at Extension Indicated 5/		Elongation in 2 in. or 4 times diameter 5/ minimum percent
			minimum, ksi	extension under load, inch/inch	
O	Up to 8.000, incl 3/	22.0 2/	6.0	--	18
T4	Up to 8.000, incl 3/	30.0	16.0	0.0036	18
T42 4/	Up to 8.000, incl 3/	30.0	14.0	0.0034	18
T451 1/	0.500 to 8.000, incl 3/	30.0	16.0	0.0036	18
T6 and T62 4/	Up to 8.000, incl 3/	42.0	35.0	0.0055	10
T651 1/	0.500 to 8.000, incl 3/	42.0	35.0	0.0055	10

1/ Tempers T451 and T651 are available only in rod, bar, and shapes

2/ Maximum

3/ For bar, the maximum cross-sectional area is 50 square inches

4/ Material in the T42 or T62 temper is not available from material producers

5/ See AMS-QQ-A-225 for yield strength and elongation requirement exceptions

3.2.2 Mechanical Properties After Heat Treatment: In addition to conforming to requirements of 3.2.1, the mechanical properties, in the direction of working, of material ordered in the annealed (O) temper and, without cold working or forming, subsequently solution heat-treated and properly aged shall conform to requirements specified in Table II for the T4, T42, T6, and T62 tempers. Material in the T4, T6, T42, T451, and T651 tempers shall, after proper heat treatment, be capable of conforming to the requirements specified in Table II for the T4, T42, T6, and T62 tempers. Material in the T4, T42, and T451 tempers shall, after proper aging, conform to the requirements specified in Table II for the T6, T62, and T651 tempers, respectively.

3.3 Finish:

Unless otherwise specified in the contract or purchase order (See 6.2), rod up to and including 3 inches in diameter, and bar up to and including 2 inches thick (with maximum width for rectangles of 4 inches) shall be processed to size by cold finishing.

3.4 Marking:

When specified (See 6.2), in addition to the marking required in AMS-QQ-A-225, material in the T6 and T651 tempers shall be identified by a lot number marked in at least one location on each piece.

4. QUALITY ASSURANCE PROVISIONS:

See AMS-QQ-A-225 and the following:

4.1 Heat Treatment, Aging Period Before Mechanical Property Testing:

Specimens in the T4, T42, and T451 tempers will not be required to be tested within 4 days after completion of the heat treatment. If, within this period, the manufacturer elects to test samples which fail to meet the requirements, he can discard these initial test results and test additional specimens selected after four days of aging. These specimens shall be selected from the same location in the lot from which the prior specimens were removed.

4.2 Mechanical Test After Heat Treatment:

4.2.1 Number of Tests After Heat Treatment: From material in the annealed (O) temper, an additional number of specimens equal to those required by AMS-QQ-A-225 shall be taken and tested after solution heat-treatment and natural aging or solution heat-treatment and artificial aging to determine compliance with 3.2.2.

5. PREPARATION FOR DELIVERY:

See AMS-QQ-A-225.

6. NOTES:

6.1 Intended Use:

This alloy is intended for use where good strength, weldability and workability are required.

6.1.1 Mechanical Properties After Heat Treatment: Material in the T4, T451, T6, and T651 tempers may not meet the requirements of Table II for T42 temper after re-solution heat treatment because of a tendency for grain growth.