SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS-QQ-A-225/4

Issued 1997-07
Reaffirmed 2010-05

Aluminum Alloy, 2014, Bar, Rod, Wire and Special Shapes, Rolled, Drawn, or Cold Finished

A92014

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-225/4E and contains only minor editorial and format changes required to bring it into conformance with the publishing requirements of SAE technical standards.

The original Federal Specification was adopted as an SAE standard under the provisions of the SAE Technical Standards Board (TSB) Rules and Regulations (TSB 001) pertaining to accelerated adoption of government specifications and standards. TSB rules provide for (a) the publication of portions of unrevised government specifications and standards without consensus voting at the SAE Committee level, (b) the use of the existing government specification or standard format, and (c) the exclusion of any qualified product list (QPL) sections.

The complete requirements for procuring 2014 aluminum alloy, bar, rod, wire, and special shapes, rolled, drawn, or cold finished shall consist of this specification and the latest issue of AMS-QQ-A-225.

TO PLACE A DOCUMENT ORDER: Tel: 877-606-7323 (inside USA and Canada)
Tel: +1 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: http://www.sae.org

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMSQQA225/4

1. SCOPE AND CLASSIFICATION:

1.1 Scope:

This specification covers the specific requirements for 2014 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/

Elements	Percent	
	Minimum	Maximum
Copper	3.9	5.0
Silicon	0.50	1.2
Manganese	0.40	1.2
Magnesium	0.20	0.8
Iron	-	0.7
Zinc	-	0.25
Titanium	-	0.15
Chromium	-	0.10
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 requirements of Table II for the temper specified.

TABLE I. Mechanical Properties (See 6.5)

Temper	Diameter or Thickness Inches	Tensile Strength minimum ksi	Yield Strength at 0.2 percent Offset or at Extension Indicated 5/		Elongation in 2 Inches or 4 times diameter 5/ minimum, percent
			Minimum, ksi	Extension under load, inch/inch	
O	Up to 8.000, incl	35.0 2/	--	--	12
T4 and T42 4/ 6/	Up to 8.000, incl 3/	55.0	32.0	0.0050	16
T451 1/ 6/	0.500 to 8.000, incl 3/	55.0	32.0	0.0050	16
T6 and T62 4/ 6/	Up to 8.000, incl 3/	65.0	55.0	0.0072	8
T651 1/ 6/	0.500 to 8.000, incl 3/	65.0	55.0	0.0072	8

1/ T451 and T651 tempers are available only in bar, rod, and shapes.
2/ Maximum.
3/ For rounds (rod), maximum diameter is 8.000 inches; for square, rectangular, hexagonal, or octagonal bar, maximum thickness is 4 inches, and maximum cross-sectional area is 36 square inches.
4/ Material in the T42 and T62 temper is not available from the material producers.
5/ See AMS-QQ-A-225 for exceptions to yield strength and elongation requirements.
6/ To avoid localized melting, solution heat treatment should be performed at a temperature below 945°F.

3.2.2 Mechanical Properties After Heat Treatment: In addition to conforming to the requirements of 3.2.1, material in the tempers identified in the following paragraphs shall, after having been processed to tempers also identified therein, have properties conforming to those specified in Table II, as applicable.

3.2.2.1 Material in the Annealed (O) Temper: Material in the O temper, without the subsequent imposition of cold work or forming operations, shall, after proper solution heat treatment, develop the properties specified for the T4 and T42 tempers.

3.2.2.2 Material in the T4, T451, T6 and T651 Tempers: Material in the T4, T451, T6 and T651 tempers shall, without the subsequent imposition of cold work or forming operations, be heat-treatable to the properties specified for the T4 and T42 tempers. Such capability shall be demonstrated when specified (See 6.2 and 6.3).

3.2.2.3 Material in the T4, T42 and T451 Tempers: Material in the T4, T42, and T451 tempers shall be heat-treatable to the properties specified for the T6, T62, and T651 tempers, respectively. Such capability shall be demonstrated when specified (See 6.2).

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 final size by cold finishing.

3.4 Marking:

In addition to marking as required in AMS-QQ-A-225, material in the T6 and T651 temper shall also 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 Tension Testing:

Specimens in the T4, T42, and T451 tempers will not be required to be tested within 4 days after completion of the solution heat treatment. If within this period, the manufacturer elects to test specimens, and the subsequent results fail to meet the requirements, he may discard these initial test results and test additional specimens which have been aged for at least 4 days. These specimens shall be selected from the same samples 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 each temper of those specified for heat-treatability demonstrations in 3.2.2 and 6.2, an additional number of specimens equal to that required in AMS-QQ-A-225 shall be taken and tested after heat treatment to each temper specified, as applicable, to determine conformance to 3.2.2.

5. PREPARATION FOR DELIVERY:

See AMS-QQ-A-225.