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SAE AMS-QQ-A-200/13 REV. B

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Superseding AMS-QQ-A-200/13A

Aluminum Alloy 7178, Bar, Rod, Shapes, Tube, and Wire, Extruded

UNS A97178

RATIONALE

AMS-QQ-A-200/13B has been reaffirmed to comply with the SAE five-year review policy.

NONCURRENT NOTICE

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of March 2007. It is recommended, therefore, that this specification not be specified for new designs.

"NONCURRENT" refers to those specifications which have previously been widely used and which may be required for production or processing of existing designs in the future. The Aerospace Materials Division, however, does not recommend these specifications for future use in new designs. "NONCURRENT" specifications are available from SAE upon request.

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NOTICE

This document has been taken directly from Federal Specification QQ-A-200/13C 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 aluminum alloy 7178 bar, rod, shapes, tube, and wire extruded described herein shall consist of this document and the latest issue of AMS-QQ-A-200.

1. SCOPE AND CLASSIFICATION:

1.1 Scope:

This specification covers the specific requirements for aluminum alloy 7178 bar, rod, shapes, tube, and wire produced by extrusion.

1.2 Classification:

1.2.1 Tempers: Bar, rod, shapes, tube, and wire are classified in the following tempers as specified (See 6.2): O, T6, T62, T6510, and T6511. Definitions of tempers are specified in AMS-QQ-A-200.

1.2.1.1 Alloy 7178 in the T6 temper shall not be used for new aerospace design or application without the prior approval of the procuring activity (See 6.1 and 6.2)

1.2.2 Tubing: Tubing shall be additionally classified as follows:

Type	Description
I	- Tubing extruded from hollow billets using die and mandrel (See AMS-QQ-A-200).
II	- Tubing extruded from solid billets using a porthole or spider die or similar tooling (See AMS-QQ-A-200).

2. APPLICABLE DOCUMENTS:

See AMS-QQ-A-200.

3. REQUIREMENTS:

3.1 Chemical Composition:

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

TABLE I. Chemical Composition 1/

Element	Percent	
	Minimum	Maximum
Zinc	6.3	7.3
Magnesium	2.4	3.1
Copper	1.6	2.4
Chromium	0.18	0.28 2/
Manganese	--	0.30
Iron	--	0.50
Silicon	--	0.40
Titanium	--	0.20
Other Elements, each	--	0.05
Other Elements, total 3/	--	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 amounts greater than the specified limits, further analysis shall be made to determine that these elements are not present in excess of specified limits.

2/ Material on hand which has a chromium content in excess of 0.28 percent, but not more than 0.35 percent, may be used, unless otherwise specified (See 6.2).

3/ The sum of those "Others" metallic elements 0.010 percent or more each, expressed to the second decimal before determining the sum.

3.2 Mechanical Properties:

3.2.1 Mechanical Properties of Material as Supplied: The mechanical properties in the direction of extrusion shall conform to requirements specified in Table II (See AMS-QQ-A-200 for exceptions to elongation requirements).

TABLE II. Mechanical Properties

Temper	Thickness, (bar and shapes); diameter, (rod and wire); wall thickness, (tube); Inches	Area Square Inches	Tensile Strength Minimum ksi	Yield Strength at 0.2 percent Offset Minimum ksi	Elongation in 2 inches or 4 times D 1/ Minimum percent
O	All	Up thru 32	2/	2/	10
T6, T6510 3/, and T6511	Up thru 0.061	All	82.0	76.0	--
	0.062 - 0.249	Up thru 20	84.0	76.0	5
	0.250 - 1.499	Up thru 25	87.0	78.0	5
	1.500 - 2.499	Up thru 25	86.0	77.0	5
	1.500 - 2.499	Over 25 thru 32	84.0	75.0	5
	2.500 - 2.999	Up thru 32	82.0	71.0	5
T62 4/	Up thru 0.061	All	79.0	73.0	--
	0.062 - 0.249	Up thru 20	82.0	74.0	5
	0.250 - 1.499	Up thru 25	86.0	77.0	5
	1.500 - 2.499	Up thru 25	86.0	77.0	5
	1.500 - 2.499	Over 25 thru 32	84.0	75.0	5
	2.500 - 2.999	Up thru 32	82.0	71.0	5

1/ D represents specimen diameter.
2/ No minimum. Maximum tensile and yield strengths shall be 40.0 ksi and 24.0 ksi, respectively.
3/ For stress-relieved tempers, the characteristics and properties, other than those specified, may differ somewhat from the corresponding characteristics and properties of material in the basic temper.
4/ Material in the T62 temper is not available from material producers.

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

3.2.2.1 Material in the O Temper: Material in the O temper, without the subsequent imposition of cold work or forming operations, shall, after proper solution heat treatment and artificial aging, develop the properties specified in Table II for the T62 temper.

3.2.2.2 Material in the T6, T6510, and T6511 Tempers: Material in the T6, T6510, and T6511 tempers, without the subsequent imposition of cold work or forming operations, shall be capable of being re-solution-treated and artificially aged to the properties specified for the T62 temper. Such capability shall be demonstrated when specified (See 6.2).

3.3 Internal Defects:

When specified (See 6.2), bar, rod, tube, and shapes shall be ultrasonically inspected (See AMS-QQ-A-200). Acceptance limits shall be as specified in Table III. The technique for testing tubes shall be as agreed upon by the procuring activity and the contractor (See 6.2).

TABLE III. Ultrasonic Discontinuity Acceptance Limits 1/

Thickness, (bar and shapes); diameter, (rod); wall thickness, (tube) Inches 3/	Maximum Weight per Piece pounds	Maximum Width to Thickness ratio 4/	Discontinuity Class 2/
0.500 to 1.499	600	10 to 1	B
1.500 and over	600	10 to 1	A

1/ Discontinuities in excess of those listed in Table III may be allowed subject to approval of the procuring activity, if it is established that they will be removed by machining or that they are in noncritical areas.
2/ Discontinuity class limits are defined in MIL-STD-2154.
3/ The thickness of any element of a shape shall be deemed to be the smallest dimension of that element, and the discontinuity class applicable to that particular thickness shall apply to that element of the shape.
4/ Not applicable to rod and tube.