AEROSPACE MATERIAL SPECIFICATION

AMS-QQ-A-250/3	REV. A

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Superseding AMS-QQ-A-250/3

Aluminum Alloy Alclad 2014, Plate and Sheet

A82014

RATIONALE

AMS-QQ-A-250/3A has been designated stabilized because a survey of users and producers has indicated that the products included in this document may no longer be commercially available.

STABILIZATION NOTICE

AMS-QQ-A-250/3A has been declared "STABILIZED" by AMS Committee D. The products included in this document may no longer be commercially available. This document will no longer be updated and may no longer represent standard industry practice. The last technical update of this document occurred in August 1997. Users of this document should refer any certification issues (e.g. exceptions listed on the certification report) to the cognizant engineering organization for their disposition. CAUTION: In many cases the purchaser is not the cognizant engineering organization (i.e. purchaser may be a sub tier supplier).

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NOTICE

This document has been taken directly from Federal Specification QQ-A-250/3F 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 alclad plate and sheet described herein shall consist of this document and the latest issue of AMS-QQ-A-250.

1. SCOPE AND CLASSIFICATION:

1.1 Scope:

This specification covers the specific requirements for 2014 aluminum alloy alclad plate and sheet; the general requirements are covered in AMS-QQ-A-250. The plate and sheet covered by this specification shall be an integral composite product consisting of a heat-treatable aluminum alloy (2014) core with thin layers of an aluminum alloy (6003) anodic to the core and of approximately equal thickness bonded to both surfaces.

1.2 Classification:

1.2.1 Tempers: The plate and sheet are classified in one of the following tempers as specified (See 6.4): O, T3, T4, T6, T42, T62, T451, T651, or F temper. Definitions of these tempers are specified in AMS-QQ-A-250.

2. APPLICABLE DOCUMENTS:

See AMS QQ-A-250.

3. REQUIREMENTS:

3.1 Chemical Composition:

3.1.1 The chemical composition of the core ingots or slabs and of the cladding plates used for the manufacture of the alclad plates and sheets shall conform to the requirements specified in Table I for core and cladding, respectively.

TABLE I. Chemical Composition 1/

Element	Analysis			
	Core Alloy (2014)		Cladding alloy (6003)	
	Minimum Percent	Maximum Percent	Minimum Percent	Maximum Percent
Copper	3.9	5.0	--	0.10
Silicon	0.50	1.2	0.35	1.0
Manganese	0.40	1.2	--	0.8
Magnesium	0.20	0.8	0.8	1.5
Iron	--	0.7	--	0.6
Chromium	--	0.10	--	0.35
Zinc	--	0.25	--	0.20
Titanium	--	0.15	--	0.10
Other Elements, each	--	0.05	--	0.05
Other Elements, total	--	0.15	--	0.15
Aluminum	Remainder		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.

3.2 Mechanical Properties:

3.2.1 Mechanical Properties of Material as Supplied: The mechanical properties perpendicular to the direction of final rolling, except for material under 9 inches in width, shall conform to the requirements of Table II for the temper specified. For material under 9 inches in width, the mechanical properties parallel to the direction of final rolling shall conform to the requirements of Table II for the temper specified.

TABLE II. Mechanical Properties

Temper	Thickness Inches	Tensile Strength, minimum ksi	Yield Strength at 0.2 percent Offset or at extension indicated		Elongation in 2 in. or 4 times D 1/ 2/, minimum Percent
			Minimum ksi	Extension under load Inch/Inch	
O	0.020 thru 0.499	30.0 3/	14.0 3/	0.0034	16
	0.500 thru 1.000 4/	32.0 3/	---	---	10
T3 5/	0.020 thru 0.039	55.0	34.0	0.0052	14
	0.040 thru 0.249	57.0	35.0	0.0053	15
T4 6/	0.020 thru 0.039	55.0	32.0	0.0051	14
	0.040 thru 0.249	57.0	34.0	0.0052	15
T451	0.250 thru 0.499	57.0	36.0	0.0054	15
	0.500 thru 1.000 4/	58.0	36.0	0.0054	14
	1.001 thru 2.000 4/	58.0	36.0	0.0054	12
	2.001 thru 3.000 4/	57.0	36.0	0.0054	8
T42 7/	0.020 thru 0.039	55.0	32.0	0.0051	14
	0.040 thru 0.099	57.0	34.0	0.0052	15
	0.100 thru 0.499	57.0	34.0	0.0054	15
	0.500 thru 1.000 4/	58.0	34.0	0.0054	14
T6 and	0.020 thru 0.039	61.0	53.0	0.0073	7
T62 7/	0.040 thru 0.249	64.0	56.0	0.0075	8
T651 and	0.250 thru 0.499	64.0	57.0	0.0075	8
T62 7/	0.500 thru 1.000 4/	67.0	59.0	0.0076	6
	1.001 thru 2.000 4/	67.0	59.0	0.0076	4
	2.001 thru 2.500 4/	65.0	58.0	0.0076	2
	2.501 thru 3.000 4/	63.0	57.0	0.0075	2
	3.001 thru 4.000 4/	59.0	55.0	0.0073	1
F	All	8/	8/	8/	8/

1/ Not required for material 1/2 inch or less in width.
2/ D represents specimen diameter.
3/ Maximum.
4/ The properties for these thicknesses are those of the core alloy since the tests are made on a round specimen machined from the plate.
5/ Applicable to flat sheet only.
6/ Applicable to coiled sheet only.
7/ Material in the T42 and T62 tempers is not available from material producers.
8/ No requirements.

3.2.2 Mechanical Properties After Heat Treatment: In addition to conforming to the requirements of 3.2.1, material in the annealed (O) and the as-fabricated (F) tempers without the subsequent imposition of cold work or forming operations shall, after proper solution heat treatment, also conform to the requirements of Table II for the T42 temper. Material as received in the T3, T4, T451, T6, and T651 tempers shall, after proper resolution heat-treatment and natural aging for 4 days at room temperature, be capable of conforming to the requirements specified in Table II for the T42 temper. Material in the T3 or T4 tempers shall, after proper aging, be capable of conforming to the requirements specified in Table II for the T6 temper. Material in the T42 temper shall, after proper aging, be capable of conforming to the requirements specified in Table II for the T62 temper. Material in the T451 temper shall, after proper aging, be capable of conforming to the requirements specified in Table II for the T651 temper.

3.2.3 Bend Test: Bend specimens taken from material shall be capable of withstanding, without cracking, the bend test specified in AMS QQ-A-250. The values for bend factor N are given in Table III.

TABLE III. Bend Test Factor "N"

	Tempers		
Thickness of Material	O	T3, T4, and T42	T6 and T62
Inch			
0.020 thru 0.039	0	3	4
0.040 thru 0.050	0	3	5
0.051 thru 0.124	0	3	6
0.125 thru 0.249	1	4	8
0.250 thru 0.499	2	5	10

3.3 Cladding Thickness:

3.3.1 Thickness of Cladding Plates: The aluminum alloy plates that are bonded to the two sides of the aluminum alloy (2014) ingot or slab to form a composite that is to be rolled, shall each have a thickness as specified in Table IV. If question arises concerning the thickness of cladding of the finished sheet or plate, samples examined in accordance with AMS QQ-A-250 shall show an average thickness of cladding on each side, not less than that specified in Table IV.

TABLE IV. Cladding Thickness

Thickness of Finished Plate or Sheet Inches	Nominal Cladding Thickness per Side; percent of composite thickness	Average Thickness per Side of Cladding on Finished Plate or Sheet, minimum percent of plate or sheet thickness
Up thru 0.024	10	8
0.025 thru 0.039	7-1/2	6
0.040 thru 0.099	5	4
0.100 thru 4.000	2-1/2	2