The Engineering Society For Advancing Mobility Land Sea Air and Space®

400 COMMONWEALTH DRIVE, WARRENDALE, PA 15096

AEROSPACE MATERIAL SPECIFICATION

Submitted for recognition as an American National Standard

AMS 4196

Issued 11-1-70
Revised 4-1-88

ALUMINUM ALLOY SHEET AND PLATE, ALCLAD
5.6Zn - 2.5Mg - 1.6Cu - 0.26Cr (7011 Alclad 7075-O)

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of October 1986. It is recommended that this specification not be specified for new designs.

This cover sheet should be attached to the original issue of the subject specification.

Some time ago the aluminum industry standardized on 7008 in lieu of 7011 for strong cladding on 7XXX alloys. Chemistry is somewhat different but properties are essentially the same.

Nonconcurrent refers to those materials which have previously been widely used and which may be required on some existing designs in the future. The Aerospace Materials Division, however, does not recommend these as standard materials for future use in new designs. Each of these "Noncurrent" specifications is available on request from SAE.

This specification is under the jurisdiction of AMS Committee "D".

Society of Automotive Engineers, Inc.
TWO PENNSYLVANIA PLAZA, NEW YORK, N.Y. 10001

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1. ACKNOWLEDGMENT: A vendor shall mention this specification number in all quotations and when acknowledging purchase orders.

2. APPLICATION: Primarily for structural use, including machine tapered parts, where fatigue strength and tensile properties higher than those provided by AMS 4048 are required. Certain design and processing procedures may cause this material to be susceptible to stress corrosion cracking after heat treatment; ARP 823 recommends practices to minimize such conditions.

3. COMPOSITION:

Core (7075)	min	max	Cladding (7011)	min	max
Zinc	5.1	6.1	Zinc	4.0	5.5
Magnesium	2.1	2.9	Magnesium	1.0	1.6
Copper	1.2	2.0	Manganese	0.10	0.30
Chromium	0.18	0.35	Chromium	0.05	0.20
Iron	--	0.50	Iron	--	0.20
Silicon	--	0.40	Silicon	--	0.15
Manganese	--	0.30	Copper	--	0.05
Titanium	--	0.20	Titanium	--	0.05
Other Impurities, each	--	0.05	Other Impurities, each	--	0.05
Other Impurities, total	--	0.15	Other Impurities, total	--	0.15
Aluminum	remainder		Aluminum	remainder	

4. CONDITION: Annealed.

5. TECHNICAL REQUIREMENTS: The product shall conform to the following requirements; tensile properties shall be determined in accordance with the latest issue of AMS 2355.

5.1 Cladding Thickness: After rolling, the average cladding thickness shall be as shown. Routine measurements are not required.

Total Thickness of Composite Product Inches	Cladding Thickness Per Side % of Total Thickness min	max
0.015 to 0.062, incl	3.2	--
Over 0.062 to 0.187, incl	2.0	--
Over 0.187 to 0.500, excl	1.2	--
0.500 to 2.000, incl	1.2	3.0

5.2 Tensile Properties:

Nominal Thickness Inches	Tensile Strength psi, max	Yield Strength at 0.2% Offset or at Extension Indicated (See 5.4.1.1) psi, max	Extension Under Load in. in 2 in.	Elongation % in 2 in. or 4D, min
0.015 to 0.500, excl	40,000	21,000	0.0081	10
0.500 to 2.000, incl	40,000	--	--	10

5.2.1 When a dispute ocurs between purchaser and vendor over the yield strength values, yield strength determined by the offset method shall apply.

5.3 Bending: Material shall be capable of withstanding, without cracking, bending at room temperature through an angle of 180 deg around a diameter equal to the bend factor times the nominal thickness of the material with axis of bend parallel to direction of rolling.

Nominal Thickness Inch	Bend Factor
0.015 to 0.020, incl	1
Over 0.020 to 0.062, incl	2
Over 0.062 to 0.091, incl	3
Over 0.091 to 0.125, incl	4
Over 0.125 to 0.249, incl	5
Over 0.249 to 0.500, excl	6

5.4 Properties After Heat Treatment: Material, after proper solution and precipitation heat treatment, shall conform to the following requirements:

5.4.1 Tensile Properties:

Nominal Thickness Inches	Tensile Strength psi, min	Yield Strength at 0.2% Offset or at Extension Indicated (See 5.4.1.1) psi, min	Extension Under Load in. in 2 in.	Elongation % in 2 in. or 4D, min
0.015 to 0.039, incl	73,000	63,000	0.0164	7
Over 0.039 to 0.187, incl	75,000	65,000	0.0167	8
Over 0.187 to 0.249, incl	76,000	66,000	0.0169	8
Over 0.249 to 0.500, excl	76,000	66,000	0.0169	9
0.500 to 1.000, incl	78,000	68,000	0.0172	7
Over 1.000 to 2.000, incl	77,000	67,000	0.0170	6

5.4.1.1 Extension under load is based upon the following values of E:

Nominal Thickness Inches	E
0.015 to 0.500, excl	10,200,000
0.500 to 2.000, incl	10,300,000

5.4.1.2 When a dispute occurs between purchaser and vendor over the yield strength values, yield strength determined by the offset method shall apply.

5.4.2 Bending: Material shall be capable of withstanding, without cracking, bending at room temperature through an angle of 180 deg around a diameter equal to the bend factor times the nominal thickness of the material with axis of bend parallel to direction of rolling.

Nominal Thickness Inch	Bend Factor
0.015 to 0.020, incl	7
Over 0.020 to 0.062, incl	8
Over 0.062 to 0.091, incl	9
Over 0.091 to 0.125, incl	10
Over 0.125 to 0.249, incl	11
Over 0.249 to 0.500, excl	14

6. QUALITY: Material shall be uniform in quality and condition, clean, sound, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts.

7. TOLERANCES: Unless otherwise specified, tolerances shall conform to all applicable requirements of the latest issue of 2202.

8. REPORTS:

8.1 Unless otherwise specified, the vendor of the product shall furnish with each shipment three copies of a report stating that the product conforms to the chemical composition and technical requirements of this specification. This report shall include the purchase order number, material specification number, thickness, size, and quantity.

8.2 Unless otherwise specified, the vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.

9. IDENTIFICATION: Unless otherwise specified, each sheet and plate shall be marked on one face, in the respective location indicated below, with the alloy number and temper, AMS 4196 or applicable Federal or Military specification designation, manufacturer's identification, and nominal thickness in inches. The alloy number shall be "7011 Alclad 7075". The characters shall be of such size as to be clearly legible, shall be applied using a suitable marking fluid, and shall be sufficiently stable to withstand normal handling.

9.1 Flat Sheet and Plate Under 6 In. Wide: Shall be marked in one or more lengthwise rows of characters recurring at intervals not greater than 3 feet.

9.2 Flat Sheet and Plate 0.375 In. and Under Thick, 6 - 60 In., Incl, Wide, and 36 - 200 In., Incl, Long: Shall be marked in lengthwise rows of characters recurring at intervals not greater than 3 ft, the rows being spaced approximately 6 in. on centers across the width and staggered. Every third row shall show the manufacturer's identification and nominal thickness in inches. The other rows shall show the alloy number and temper and AMS 4196 or applicable Federal or Military specification designation.

9.3 Flat Sheet and Plate Over 0.375 In. Thick, or Over 60 In. Wide, or Over 200 In. Long: Shall be marked as in 9.2 above or, at vendor's discretion, shall be marked in one or two rows of characters recurring at intervals not greater than 3 ft and running around the periphery of the piece. If one row is used, it shall show all information of Paragraph 9 above. If two rows are used, one row shall show the alloy number and temper and AMS 4196 or applicable Federal or Military specification designation; the second row shall show the manufacturer's identification and nominal thickness in inches.