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AEROSPACE MATERIAL SPECIFICATION

AMS 4009

Issued 3-1-74
Revised 4-1-85

ALUMINUM ALLOY FOIL
1.0Mg - 0.60Si - 0.30Cu - 0.20Cr (6061-0)

This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of 4-6-84. 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.

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

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Issued March 1, 1974
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ALUMINUM ALLOY FOIL
1.0Mg - 0.6Si - 0.30Cu - 0.20Cr (6061-0)

1. SCOPE:

1.1 Form: This specification covers an aluminum-base alloy in the form of foil.

1.2 Application: Primarily for fabrication of diffusion-bonded, fiber-reinforced-composite tape, sheet, plate, and other structural forms.

2. APPLICABLE DOCUMENTS: The following publications form a part of this specification to the extent specified herein. The latest issue of Aerospace Material Specifications (AMS) shall apply. The applicable issue of other documents shall be as specified in AMS 2350.

2.1 SAE Publications: Available from Society of Automotive Engineers, Inc., Two Pennsylvania Plaza, New York, New York 10001.

2.1.1 Aerospace Material Specifications:

AMS 2350 - Standards and Test Methods
AMS 2355 - Quality Assurance Sampling and Testing of Aluminum-Base and Magnesium-Base Alloys, Wrought Products (Except Forgings) and Flash Welded Rings

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, Pennsylvania 19103.

ASTM E252 - Thickness of Thin Foil and Film by Weighing
ASTM E345 - Tension Testing of Metallic Foil

3. TECHNICAL REQUIREMENTS:

3.1 Composition: Shall conform to the following percentages by weight, determined in accordance with AMS 2355:

	min	max
Magnesium	0.8	1.2
Silicon	0.40	0.8
Copper	0.15	0.40
Chromium	0.04	0.35
Iron	--	0.7
Zinc	--	0.25
Manganese	--	0.15
Titanium	--	0.15
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition: Annealed.

3.3 Properties: The product shall conform to the following requirements; tensile strength shall be determined in accordance with ASTM E345 and bending shall be performed in accordance with AMS 2355:

3.3.1 Tensile Properties As Annealed:

Tensile Strength, max	22,000 psi (152 MPa)

3.3.2 Properties After Solution Heat Treatment: The product after proper solution heat treatment and aging for not less than 4 days at room temperature shall have the following properties:

3.3.2.1 Tensile Properties:

Tensile Strength, min	42,000 psi (290 MPa)

3.3.2.2 Bending: The product shall withstand, without cracking, bending through an angle of 180 deg (3.14 rad) around a diameter equal to two times the nominal thickness with axis of bend parallel to the direction of rolling.

3.4 Quality: Foil shall be uniform in quality and condition, sound, and free from holes, tears, and other discontinuities and from internal imperfections detrimental to fabrication or to performance of parts. Dents, ripples, kinks, and other sharp bends in the foil shall be unacceptable unless they are located within 0.050 in. (1.27 mm) of an edge or are less than 0.030 in. (0.76 mm) deep.

3.4.1 Cleanliness of Foil: Foil shall be free from oil, grease, and dirt to the extent that a clean, white rag wiped on the foil for several passes shall pick up no perceptible liquid or solid contaminants.

3.5 Tolerances:

3.5.1 Thickness: Shall not deviate from the specified thickness by more than ± 10%, determined on two specimens for each nominal thickness by instrument measurement or by the weighing method specified for thin foil in ASTM E252.

3.5.1.1 When a dispute occurs between purchaser and vendor over the thickness values, thickness determined by the weighing method of ASTM E252 shall apply. For such calculations, density shall be taken as 0.0976 lb per cu in. (2.702 Mg/m^3).

3.5.2 Width: Shall be within ± 0.032 in. (0.79 mm) of that specified.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of foil shall supply all samples and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.4. Purchaser reserves the right to perform such confirmatory testing as he deems necessary to assure that the foil conforms to the requirements of this specification.

4.2 Classification of Tests: Tests to determine conformance to all technical requirements of this specification are classified as acceptance or routine control tests.

4.3 Sampling: One sample shall be selected for each 2000 lb (908 kg) or fraction thereof from each lot; however, not more than one sample is required from a coil.

4.3.1 An inspection lot shall consist of an identifiable quantity of material of the same alloy, temper, finish, and nominal dimensions subjected to inspection at one time.

4.4 Reports:

4.4.1 The vendor of the product shall furnish with each shipment three copies of a report showing the results of tests made on the product to determine conformance to the technical requirements of this specification. This report shall include the purchase order number, material specification number, lot number, size, and quantity.

4.4.2 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.

4.5 Resampling and Retesting: If any specimen used in the above tests fails to meet the specified requirements, disposition of the product may be based on the results of testing three additional specimens for each original nonconforming specimen. Failure of any retest specimen to meet the specified requirements shall be cause for rejection of the product represented and no additional testing shall be permitted. Results of all tests shall be reported.

5. PREPARATION FOR DELIVERY:

5.1 Packaging and Identification:

5.1.1 Foil shall be furnished in rolls, wound on 3 in. (76 mm) diameter cores; the diameter of the rolls shall be not less than 6 in. (152 mm) nor more than 34 in. (864 mm). The foil in each roll, when possible, shall be in one continuous length but may contain a maximum of one splice for every 3000 lineal feet (914 m) or fraction thereof per roll. Unless otherwise specified, the splices shall be made with pressure-sensitive tape or by electric or ultrasonic welding. Splices shall be marked with a colored tape or equivalent that shall extend over the edge of the roll so as to be easily seen at the edges of the roll. Foil condition and coiling shall be such that complete uncoiling may be accomplished with no resulting tearing or other damage to the foil. Each roll shall be closely wrapped in waterproof paper.

5.1.2 Each wrapped coil shall be identified with the following information either stencilled on the outer layer of the wrapping or on a suitable tag attached to the roll, preferably to the core. The marking shall be of such size as to be clearly legible and which will not be obliterated by normal handling:

ALUMINUM-BASE ALLOY FOIL, 6061-0
AMS 4009
PURCHASE ORDER NUMBER_____
MANUFACTURER'S IDENTIFICATION_____
THICKNESS _____
WIDTH _____
WEIGHT OR LENGTH_____

5.1.3 Each wrapped coil shall be packed in a suitable shipping container in such a manner that the weight of the coil is supported by the core and the coil is restrained to prevent telescoping.

5.1.4 Exterior shipping containers shall be legibly marked with the following information in such a manner that the markings shall not smear or be obliterated during normal handling or use:

ALUMINUM-BASE ALLOY FOIL (6061-0)
AMS 4009
PURCHASE ORDER NUMBER_____
MANUFACTURER'S IDENTIFICATION_____
THICKNESS(ES)_____
WIDTH(S)_____
TOTAL WEIGHT OR LENGTH_____

5.1.5 Exterior containers shall be prepared for shipment in accordance with commercial practice to assure carrier acceptance and safe transportation to the point of delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.