



*The Engineering  
Resource For  
Advancing Mobility.*

400 Commonwealth Dr., Warrendale, PA 15096

**AEROSPACE  
MATERIAL  
SPECIFICATION**

Submitted for recognition as an American National Standard

SAE AMS 4004B

Issued 11-1-69  
Revised 10-1-86

Superseding AMS 4004A

**ALUMINUM ALLOY FOIL  
2.5Mg - 0.25Cr (5052-H191)  
Strain Hardened**

UNS A95052

**1. SCOPE:**

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

1.2 Application: Primarily for corrugated or expanded honeycomb core material for use in sandwich construction.

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

2.1 SAE Publications: Available from SAE, 400 Commonwealth Drive, Warrendale, PA 15096.

**2.1.1 Aerospace Material Specifications:**

AMS 2350 - Standards and Test Methods

AMS 2355 - Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings

MAM 2355 - Quality Assurance Sampling and Testing of Aluminum Alloys and Magnesium Alloys, Wrought Products (Except Forging Stock) and Flash Welded Rings, Metric (SI) Units

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

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

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

SAE Technical Board Rules provide that: "This report is published by SAE to advance the state of technical and engineering sciences. The use of this report is entirely voluntary, and its applicability and suitability for any particular use, including any patent infringement arising therefrom, is the sole responsibility of the user."

AMS documents are protected under United States and international copyright laws. Reproduction of these documents by any means is strictly prohibited without the written consent of the publisher.

**REAFFIRMED**  
10/91

### 2.3.1 Military Standards:

MIL-STD-649 - Aluminum and Magnesium Products, Preparation for Shipment and Storage

### 3. TECHNICAL REQUIREMENTS:

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

	min	max
Magnesium	2.2	2.8
Chromium	0.15	0.35
Iron	--	0.40
Silicon	--	0.25
Zinc	--	0.10
Manganese	--	0.10
Copper	--	0.10
Other Impurities, each	--	0.05
Other Impurities, total	--	0.15
Aluminum	remainder	

3.2 Condition: Strain hardened, mill finish.

3.3 Properties: Foil shall conform to the following requirements:

3.3.1 Tensile Properties: Shall be as follows, determined in accordance with ASTM E345 on foil under 0.006 in. (0.15 mm) in nominal thickness:

Ø

Tensile Strength, min 42,000 psi (290 MPa)  
Yield Strength at 0.2% offset, min 37,000 psi (255 MPa)

3.4 Quality: Foil, as received by purchaser, shall be uniform in quality and condition, sound, and free from holes, tears, and other discontinuities and from internal imperfections detrimental to usage of the foil. Dents, ripples, kinks, and sharp bends in the foil are acceptable provided they are located within 0.050 in. (1.25 mm) of an edge or are less than 0.030 in. (0.75 mm) deep.

3.4.1 Foil shall be free from grease and dirt and as free from oil as is commercially practicable.

3.5 Tolerances: Shall conform to the following:

3.5.1 Thickness: Shall not deviate from the thickness ordered by more than  $\pm 10\%$ , determined 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 thickness, values determined by the weighing method of ASTM E252 shall apply. For such calculations, density shall be taken as 0.097 lb per cu in. (2.68 Mg/m<sup>3</sup>).

3.5.2 Width: Shall be within  $\pm 0.032$  in. ( $\pm 0.80$  mm) of the width ordered.

**4. QUALITY ASSURANCE PROVISIONS:**

4.1 Responsibility for Inspection: The vendor of foil shall supply all samples for vendor's tests 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 sample and to perform any confirmatory testing deemed necessary to ensure 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 tests and shall be performed on each lot.

4.3 Sampling: Shall be in accordance with AMS 2355 or MAM 2355 and the following:

4.3.1 Tensile Properties: Specimens shall be cut with the axis of specimen parallel to the direction of rolling; one specimen shall be selected for each 2000 lb (900 kg) or fraction thereof from each lot except that not more than one sample will be required from a coil.

4.3.2 Thickness: Two specimens from each nominal thickness.

**4.4 Reports:**

4.4.1 The vendor of foil shall furnish with each shipment a report showing the results of tests to determine conformance to the technical requirements of this specification. This report shall include the purchase order number, AMS 4004B, lot number, size, and quantity.

4.4.2 The vendor of finished or semi-finished parts shall furnish with each shipment a report showing the purchase order number, AMS 4004B, contractor or other direct supplier of foil, part number, and quantity. When foil for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of foil to determine conformance to the requirements of this specification and shall include in the report either a statement that the foil conforms or copies of laboratory reports showing the results of tests to determine conformance.

4.5 Resampling and Retesting: Shall be in accordance with AMS 2355 or MAM 2355.

**5. PREPARATION FOR DELIVERY:**

**5.1 Packaging and Identification:**

5.1.1 Foil shall be furnished in rolls wound on 3 in. (75 mm) ID cores; the diameter of the rolls shall be not less than 6 in. (150 mm) nor more than 34 in. (850 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 ft (900 m) or fraction thereof per roll. 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 tearing or other damage to the foil. Each roll shall be wrapped in waterproof paper.

5.1.2 Each wrapped roll shall be identified with not less than 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 legible and shall not be obliterated by normal handling.

ALUMINUM ALLOY FOIL, 5052-H191

AMS 4004B

PURCHASE ORDER NUMBER

MANUFACTURER'S IDENTIFICATION

THICKNESS

WIDTH

WEIGHT OR LENGTH

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

5.1.4 Containers of foil shall be prepared for shipment in accordance with commercial practice and in compliance with applicable rules and regulations pertaining to the handling, packaging, and transportation of the foil to ensure carrier acceptance and safe delivery. Packaging shall conform to carrier rules and regulations applicable to the mode of transportation.

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

ALUMINUM ALLOY FOIL (5052-H191)

AMS 4004B

PURCHASE ORDER NUMBER

MANUFACTURER'S IDENTIFICATION

THICKNESS(ES)

WIDTH(S)

TOTAL WEIGHT OR LENGTH