SAE Aerospace
An SAE International Group

AEROSPACE MATERIAL SPECIFICATION

SAE AMS4004D

Issued 1969-11
Reaffirmed 1995-09
Revised 2009-10

Superseding AMS4004C

Aluminum Alloy, Foil
2.5Mg - 0.25Cr (5052-H191)
Strain Hardened

(Composition similar to UNS A95052)

RATIONALE

AMS4004D results from a Five Year Review and update of this specification.

1. SCOPE

1.1 Form

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

1.2 Application

This foil has been used typically for corrugated or expanded honeycomb core material for use in sandwich construction, but usage is not limited to such applications.

2. APPLICABLE DOCUMENTS

The issue of the following documents in effect on the date of the purchase order forms a part of this specification to the extent specified herein. The supplier may work to a subsequent revision of a document unless a specific document issue is specified. When the referenced document has been cancelled and no superseding document has been specified, the last published issue of that document shall apply.

2.1 SAE Publications

Available from SAE International, 400 Commonwealth Drive, Warrendale, PA 15096-0001, Tel: 877-606-7323 (inside USA and Canada) or 724-776-4970 (outside USA), www.sae.org.

AMS2355 Quality Assurance, Sampling and Testing, Aluminum Alloys and Magnesium Alloy, Wrought Products, Except Forging Stock, and Rolled, Forged, or Flash Welded Rings

TO PLACE A DOCUMENT ORDER: **Tel: 877-606-7323 (inside USA and Canada)**
Tel: 724-776-4970 (outside USA)
Fax: 724-776-0790
Email: CustomerService@sae.org
SAE WEB ADDRESS: **http://www.sae.org**

SAE values your input. To provide feedback on this Technical Report, please visit
http://www.sae.org/technical/standards/AMS4004D

2.2 ASTM Publications

Available from ASTM International, 100 Barr Harbor, Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, Tel: 610-832-9585, www.astm.org.

ASTM E 252 Thickness of Foil, Thin Sheet, and Film by Mass Measurement
ASTM E 345 Tension Testing of Metallic Foil

3. TECHNICAL REQUIREMENTS

3.1 Composition

Shall conform to the percentages by weight shown in Table 1, determined in accordance with AMS2355.

TABLE 1 - COMPOSITION

Element	min	max
Iron	--	0.40
Copper	--	0.10
Manganese	--	0.10
Magnesium	2.2	2.8
Chromium	0.15	0.35
Zinc	--	0.10
Silicon	--	0.25
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 shown in Table 2, determined in accordance with ASTM E 345 on foil under 0.006 inch (0.15 mm) in nominal thickness.

TABLE 2 - MINIMUM TENSILE PROPERTIES

Property	Value
Tensile Strength	42.0 ksi (290 MPa)
Yield Strength at 0.2% Offset	37.0 ksi (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 inch (1.27 mm) of an edge or are less than 0.030 inch (0.76 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 ±10%, determined by instrument measurement or by the weighing method specified for thin foil in ASTM E 252.

3.5.1.1 When a dispute occurs between purchaser and vendor over thickness, values determined by the weighing method of ASTM E 252 shall apply. For such calculations, density shall be taken as 0.097 pound per cubic inch (2.68 kg/$m^3 \times 10^3$).

3.5.2 Width

Shall be within ±0.032 inch (±0.81 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 the performance of all required tests. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the foil conforms to specified requirements.

4.2 Classification of Tests

All technical requirements are acceptance tests and, except for composition (3.1), shall be performed on each inspection lot.

4.3 Sampling and Testing

Shall be in accordance with AMS2355 and the following:

4.3.1 Tensile Properties

Specimens shall be cut with axis of specimen parallel to direction of rolling; one specimen shall be selected for each 2000 pounds (907 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

The vendor of foil shall furnish with each shipment a report stating that the foil conforms to the composition and showing the results of tests to determine conformance to the tensile properties of each lot. This report shall include the purchase order number, inspection lot number, AMS4004D, size, and quantity.

4.5 Resampling and Retesting

Shall be in accordance with AMS2355.

5. PREPARATION FOR DELIVERY

5.1 Identification

Each wrapped roll shall be identified with not less than the following information, either stenciled on the outer layer of the wrapping or on a suitable tag attached to the roll, preferably to the core. The marking shall be legible and shall not be obliterated by normal handling.

Aluminum alloy, foil, 5052-H191
AMS4004D _____
Purchase order number _____
Manufacturer's identification _____
Thickness _____
Width _____
Weight or length _____

5.1.1 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) _____
AMS4004D _____
Purchase order number _____
Manufacturer's identification _____
Thickness _____
Width _____
Total weight or length

5.2 Packaging

5.2.1 Foil shall be furnished in rolls wound on 3-inch (76-mm) ID cores; the diameter of the rolls shall be not less than 6 inches (152 mm) nor more than 34 inches (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. 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.

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

5.2.3 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.

6. ACKNOWLEDGMENT

A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.

7. REJECTIONS

Foil not conforming to this specification, or to modifications authorized by purchaser, will be subject to rejection.