# AEROSPACE MATERIAL SPECIFICATION

| AMS4012 | REV. G |
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Superseding AMS4012F

## Aluminum Sheet, Laminated Edge Bonded

RATIONALE

AMS4012G stabilizes this document because it contains mature technology that is not expected to change and thus no further revisions are anticipated.

STABILIZATION NOTICE

This document has been declared “Stabilized” by the AMS D Nonferrous Alloys Committee. This document will no longer be updated and may no longer represent standard industry practice. This document was stabilized because it contains mature technology that is not expected to change and thus no further revisions are anticipated. Previously this document was non-current. The last technical update of this document occurred in April, 1987. Users of this document should refer to the cognizant engineering organization for disposition of any issues with reports/certifications to this specification; including exceptions listed on the certification. NOTE: In many cases, the purchaser may represent a sub tier supplier and not the cognizant engineering organization.





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1. SCOPE:

1.1 Form:

This specification covers an aluminum or aluminum alloy in the form of sheet, laminated and edge bonded.

1.2 Application:

Primarily for shims of special shapes in which thickness is to be adjusted by removal of laminations as required.

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 |
| AMS 4041 | Aluminum Alloy Sheet and Plate, Alclad, 4.4Cu - 1.5Mg - 0.60Mn (Alclad 2024 and 1-1/2% Alclad 2024-T3 Flat Sheet; 1-1/2% Alclad 2024-T351 Plate) |

2.2 U.S. Government Publications:

Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

2.2.1 Military Standards:

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

3. TECHNICAL REQUIREMENTS:

3.1 Composition:

3.1.1 Laminations: Shall be 1100, 1145, 3003, or 5052 aluminum alloy foil. The choice of alloy shall be at the discretion of the producer.

3.1.2 Solid Base: Shall be AMS 4041 aluminum alloy sheet.

3.1.3 Adhesive: Shall be a composition which will meet the fabrication and quality requirements of 3.2 and 3.3.

3.2 Fabrication:

3.2.1 Sheet shall be fabricated from hard or extra-hard laminations, in combination with a solid base when required, pre-cut to the desired shape; stacked to the desired thickness, and bonded on the outside edge with adhesive such that individual laminations may be peeled for adjustment of shim thickness.

3.2.1.1 Laminations shall be bonded together in such a manner that normal handling shall not cause separation.

3.2.2 Laminations shall be 0.003 in. ± 0.0003 (0.08 mm ± 0.008) thick unless 0.002 in. ± 0.0002 (0.05 mm ± 0.005) laminations are specified or required to produce the nominal laminate thickness.

3.2.3 Sizes: The product shall be of the following thickness and combinations of laminations and solid base:

| Nominal Thickness of Shim Stock | | | | |
|---|---|---|---|---|
| Inch | mm | All Laminated | Half Solid, Half Laminated | Three-Quarters Solid, One-Quarter Laminated |
| 0.006 | 0.15 | X | | |
| 0.008 | 0.20 | X | | |
| 0.010 | 0.25 | X | | |
| 0.016 | 0.40 | X | | |
| 0.020 | 0.50 | X | | |
| 0.032 | 0.80 | X | | |
| 0.047 | 1.18 | X | | |
| 0.062 | 1.55 | X | X | |
| 0.094 | 2.35 | X | X | |
| 0.125 | 3.00 | X | X | X |
| 0.190 | 4.75 | X | X | X |

3.3 Quality:

Sheet, as received by purchaser, shall be uniform in quality and condition, sound, and free from foreign materials and from imperfections detrimental to usage of the sheet.

3.4 Tolerances:

Shall be as specified in Table I.

TABLE I

| Nominal Total Thickness Inch | Tolerance, Inch | |
|---|---|---|
| | plus | minus |
| Up to 0.008, incl | 0.001 | 0.0005 |
| Over 0.008 to 0.010, incl | 0.0015 | 0.0005 |
| Over 0.010 to 0.016, incl | 0.0015 | 0.001 |
| Over 0.016 to 0.021, incl | 0.002 | 0.001 |
| Over 0.021 to 0.033, incl | 0.003 | 0.002 |
| Over 0.033 to 0.048, incl | 0.005 | 0.002 |
| Over 0.048 to 0.063, incl | 0.006 | 0.002 |
| Over 0.063 to 0.080, incl | 0.007 | 0.002 |
| Over 0.080 to 0.094, incl | 0.009 | 0.003 |
| Over 0.094 to 0.109, incl | 0.010 | 0.003 |
| Over 0.109 to 0.125, incl | 0.012 | 0.003 |
| Over 0.125 to 0.156, incl | 0.015 | 0.003 |
| Over 0.156 to 0.187, incl | 0.018 | 0.003 |
| Over 0.187 to 0.190, incl | 0.018 | 0.005 |

TABLE I (SI)

| Nominal Total Thickness Millimetres | Tolerance, Millimetre | |
|---|---|---|
| | plus | minus |
| Up to 0.20, incl | 0.03 | 0.012 |
| Over 0.20 to 0.25, incl | 0.038 | 0.012 |
| Over 0.25 to 0.40, incl | 0.038 | 0.02 |
| Over 0.40 to 0.52, incl | 0.05 | 0.02 |
| Over 0.52 to 0.82, incl | 0.08 | 0.05 |
| Over 0.82 to 1.20, incl | 0.12 | 0.05 |
| Over 1.20 to 1.60, incl | 0.15 | 0.05 |
| Over 1.60 to 2.00, incl | 0.18 | 0.05 |
| Over 2.00 to 2.35, incl | 0.22 | 0.08 |
| Over 2.35 to 2.75, incl | 0.25 | 0.08 |
| Over 2.75 to 3.00, incl | 0.30 | 0.08 |
| Over 3.00 to 3.90, incl | 0.38 | 0.08 |
| Over 3.90 to 4.70, incl | 0.45 | 0.08 |
| Over 4.70 to 4.75, incl | 0.45 | 0.12 |