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Superseding AMS 4012E

**Aluminum Sheet, Laminated
Edge Bonded**

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This specification has been declared "NONCURRENT" by the Aerospace Materials Division, SAE, as of August 1992. It is recommended, therefore, that this specification not be specified for new designs.

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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. $\pm$ 0.0003 (0.08 mm $\pm$ 0.008) thick unless 0.002 in. $\pm$ 0.0002 (0.05 mm $\pm$ 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		All Laminated	Half Solid, Half Laminated	Three-Quarters Solid, One-Quarter Laminated
Inch	mm			
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