



AEROSPACE MATERIAL SPECIFICATION	AMS4013™	REV. J
	Issued 1958-01 Reaffirmed 2012-09 Revised 2024-11 Superseding AMS4013H	
Aluminum Sheet, Laminated, Surface Bonded		

RATIONALE

AMS4013J results from a Five-Year Review and update of this specification with changes to relocate Definitions (see 2.3), update wording to prohibit unauthorized exceptions (see 8.5), and Applicable Documents (see Section 2).

1. SCOPE

1.1 Form

This specification covers aluminum and aluminum alloy foil in the form of laminated sheet (see 8.6).

1.2 Application

This product has been used typically for shims in which thickness is to be adjusted by removal of laminations as required, 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 +1 724-776-4970 (outside USA), www.sae.org.

AMS4016	Aluminum Alloy, Sheet and Plate, 2.5Mg - 0.25Cr (5052-H32), Strain Hardened, Quarter-Hard, and Stabilized
AMS4017	Aluminum Alloy, Sheet and Plate, 2.5Mg - 0.25Cr (5052-H34), Strain-Hardened, Half-Hard, and Stabilized
AMS4041	Aluminum Alloy, Sheet and Plate, Alclad, 4.4Cu - 1.5Mg - 0.60Mn (2024, -T3 Sheet/-T351 Plate with 1-1/2% Alclad), Solution Heat Treated, Cold Worked and Naturally Aged
AS7766	Terms Used in Aerospace Metals Specifications

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For more information on this standard, visit
<https://www.sae.org/standards/content/AMS4013J/>

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 B660 Packaging/Packing of Aluminum and Magnesium Products

2.3 Definitions

Terms used in AMS are defined in AS7766.

3. TECHNICAL REQUIREMENTS

3.1 Composition

3.1.1 Laminations

Shall be AA1100, AA1145, AA3003, or AA5052 aluminum alloy foil. The choice of alloy shall be at the discretion of the producer unless a specific alloy is specified by the purchaser (see 8.6).

3.1.2 Solid Base

Shall be AMS4041 aluminum alloy sheet, except that when laminations are AA5052 aluminum alloy foil the base shall be AMS4016 or AMS4017 aluminum alloy sheet.

3.1.3 Adhesive

Shall be a composition that will meet the fabrication and quality requirements of 3.2, 3.3, and 3.4.

3.2 Fabrication

Laminated shim stock shall be fabricated from hard or extra hard laminations, in combination with a solid base, when required. Laminations shall be 0.0030 inch \pm 0.0003 inch (0.076 mm \pm 0.008 mm) thick unless thickness of 0.0020 inch \pm 0.0002 inch (0.051 mm \pm 0.005 mm) is specified. The thickness of each layer of adhesive shall not exceed 0.0003 inch (0.008 mm).

3.2.1 Laminations and solid base, when applicable, shall be bonded together throughout the surface area in a manner that will permit peeling of laminations for adjustment of shim thickness without separation of the remaining laminations and solid part. Laminations shall be bonded together so that any shape can be cut from the material using suitable tools, without separation. Material shall remain intact without separation during normal handling. Requirements shall be applicable to laminations not less than 8 hours after completion of bonding.

3.2.2 Surface Roughness

Flat surfaces of laminations, and solid stock when applicable, shall have a maximum roughness of 63 Ra (microinches) on original surfaces and on metallic surfaces after peeling.

3.2.3 Water Resistance

Sheet shall withstand immersion in tap water at 120 °F \pm 5 °F (49 °C \pm 3 °C) for not less than 3 hours without separation of laminations or any evidence of corrosion.

3.3 Sizes

Sheet shall be of the thicknesses and combinations of laminations and solid base specified in Table 1.

Table 1 - Lamination thickness/combinations

Nominal Thickness of Shim Stock		All Laminated,	All Laminated,	Half Solid, Half Laminated,	Half Solid, Half Laminated,	Three-Quarters Solid, One-Quarter Laminated,	Three-Quarters Solid, One-Quarter Laminated,
Inch	Millimeters	0.002 inch (0.05 mm)	0.003 inch (0.08 mm)	0.002 inch (0.05 mm)	0.003 inch (0.08 mm)	0.002 inch (0.05 mm)	0.003 inch (0.08 mm)
0.006	0.15	X					
0.008	0.20	X					
0.010	0.25	X					
0.012	0.30	X					
0.015	0.38	X	X				
0.016	0.41	X	X				
0.020	0.51	X	X				
0.021	0.53	X	X				
0.032	0.81	X	X				
0.033	0.84	X	X				
0.047	1.19	X	X				
0.048	1.22	X	X				
0.062	1.58	X	X	X	X		
0.063	1.60	X	X	X	X		
0.078	1.98	X	X	X	X		
0.080	2.03	X	X	X	X		
0.093	2.36	X	X	X	X		
0.094	2.39	X	X	X	X		
0.109	2.77	X	X	X	X		
0.121	3.07	X	X	X	X	X	X
0.125	3.18	X	X	X	X	X	X

3.4 Quality

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

3.5 Tolerances

Shall be as specified in Table 2.

Table 2A - Tolerances, inch/pound units

Nominal Thickness Inch	Tolerance Inch Plus	Tolerance Inch Minus
Up to 0.008, incl	0.001	0.005
Over 0.008 to 0.010, incl	0.0015	0.005
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 2B - Tolerances, SI units

Nominal Thickness Millimeters	Tolerance Millimeter Plus	Tolerance Millimeter Minus
Up to 0.20, incl	0.025	0.013
Over 0.20 to 0.25, incl	0.038	0.013
Over 0.25 to 0.41, incl	0.038	0.03
Over 0.41 to 0.53, incl	0.05	0.03
Over 0.53 to 0.84, incl	0.08	0.05
Over 0.84 to 1.22, incl	0.13	0.05
Over 1.22 to 1.60, incl	0.15	0.05
Over 1.60 to 2.03, incl	0.17	0.05
Over 2.03 to 2.39, incl	0.23	0.08
Over 2.39 to 2.77, incl	0.25	0.08
Over 2.77 to 3.18, incl	0.30	0.08
Over 3.18 to 3.96, incl	0.38	0.08
Over 3.96 to 4.75, incl	0.46	0.08
Over 4.75 to 4.83, incl	0.46	0.13

3.6 Exceptions

Any exceptions shall be authorized by the purchaser and reported as in 4.4.1.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for Inspection

The producer of sheet shall supply all samples for the producer's tests and shall be responsible for the performance of all required tests. The purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the sheet conforms to specified requirements.