

# AEROSPACE

# AMS 4013A

## MATERIAL SPECIFICATIONS

SOCIETY OF AUTOMOTIVE ENGINEERS, Inc. 485 Lexington Ave., New York 17, N.Y.

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### ALUMINUM SHEET, LAMINATED, SURFACE BONDED

1. ACKNOWLEDGMENT: A vendor shall mention this specification number and its revision letter in all quotations and when acknowledging purchase orders.
2. APPLICATION: Primarily shims in which thickness is to be adjusted by removal of laminations as required.
3. COMPOSITION:
  - 3.1 Laminations: Shall be 1100, 1145, 3003, or 5052 aluminum alloy foil. Unless  $\phi$  otherwise specified, the choice of alloy shall be at the discretion of the producer.
  - 3.2 Solid Base: Shall be AMS 4041 aluminum alloy sheet.
  - 3.3 Adhesive: Shall be of a composition which will meet the fabrication and quality requirements of this specification.
4. FABRICATION:
  - 4.1 The product shall be fabricated from hard or extra hard laminations, in combination with a solid base when required. Laminations shall be 0.003 in. + 0.0003  $\phi$  thick unless 0.002 in. + 0.0002 is specified. Adjoining laminations shall be bonded together throughout the whole surface area by an adhesive which will permit peeling of the layers for adjustment of shim thickness. The thickness of each layer of adhesive shall not exceed 0.0003 inch.
  - 4.2 Unless otherwise specified, the product shall be available in the following  $\phi$  thicknesses and combinations of laminations and solid base:

Nominal Thickness Inch	Half Solid		Three Quarters Solid
	All Laminations	Half Laminations	One Quarter Laminations
0.006	X		
0.008	X		
0.010	X		
0.016	X		
0.020	X		
0.032	X		
0.047	X		
0.062	X	X	
0.094	X	X	
0.125	X	X	X
0.190	X	X	X

5. QUALITY:

- 5.1 Material shall be uniform in quality and condition, clean, sound, smooth, and free from foreign materials and from internal and external imperfections detrimental to fabrication or to performance of parts.
- 5.2 Laminations shall be bonded together in such a manner that any shape can be cut out of the product without causing the laminations to separate. The layers shall be capable of being readily peeled.
6. TOLERANCES: The maximum taper for panels 2 in. or less in length shall be 0.002 inch. For panels over 2 in. in length, the maximum taper shall be 0.002 in. plus 0.0005 in. for each inch of length over 2 inches. Unless otherwise specified, thickness tolerances shall be as specified below:

Nominal Total Thickness Inch	Tolerance, Inch Plus Only
0.010 and under	0.001
Over 0.010 to 0.020, incl	0.002
Over 0.020 to 0.047, incl	0.004
Over 0.047 to 0.094, incl	0.006
Over 0.094 to 0.125, incl	0.008
Over 0.125 to 0.190, incl	0.010

7. REPORTS:

- 7.1 Unless otherwise specified, the vendor of the product shall furnish with each shipment three copies of a report showing the results of tests for chemical composition or stating that the chemical composition of the shim stock conforms to the requirements specified. This report shall include the purchase order number, material specification number, shim stock thickness, foil thickness, size, and quantity.
- 7.2 Unless otherwise specified, the vendor of finished or semi-finished parts shall furnish with each shipment three copies of a report showing the purchase order number, material specification number, contractor or other direct supplier of material, part number, and quantity. When material for making parts is produced or purchased by the parts vendor, that vendor shall inspect each lot of material to determine conformance to the requirements of this specification, and shall include in the report a statement that the material conforms, or shall include copies of laboratory reports showing the results of tests to determine conformance.

8. IDENTIFICATION:

- 8.1 Laminated shim stock shall be marked with nominal shim stock thickness, nominal foil thickness, percentage of total thickness which is laminated, nominal thickness of solid base if present, and AMS 4013.
- 8.2 Packages of laminated shim stock shall be marked with purchase order number, AMS 4013, nominal shim stock thickness, nominal foil thickness, size and quantity.
- 8.3 Packages of parts shall be marked with part number, purchase order number, and quantity.