



AEROSPACE MATERIAL SPECIFICATION

AMS4349™**REV. F**

Issued 1977-07
Reaffirmed 2011-11
Revised 2024-09

Superseding AMS4349E

Core, Honeycomb, Aluminum Alloy, Corrosion Inhibited,
For Sandwich Construction,
5056, 350 Fahrenheit (177 Celsius)

RATIONALE

AMS4349F results from a Five-Year Review and update of this specification with changes to update the Title to add temperature units, relocate Definitions (see 2.3), and update Applicable Documents (see Section 2) and wording to prohibit unauthorized exceptions (see 8.4).

1. SCOPE

1.1 Form

This specification covers bonded honeycomb core made of aluminum alloy and supplied in the form of blocks, slices, or other configurations as ordered (see 8.5).

1.2 Application

This honeycomb core has been used typically in sandwich construction for short-term exposure up to 350 °F (177 °C) or for long-term exposure up to 200 °F (95 °C), but usage is not limited to such applications.

1.3 Safety - Hazardous Materials

While the materials, methods, applications, and processes described or referenced in this specification may involve the use of hazardous materials, this specification does not address the hazards that may be involved in such use. It is the sole responsibility of the user to ensure familiarity with the safe and proper use of any hazardous materials and to take necessary precautionary measures to ensure the health and safety of all personnel involved.

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.

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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.

AMS-A-81596 Aluminum Foil for Sandwich Construction

AMS-STD-595 Colors Used in Government Procurement

AS7766 Terms Used in Aerospace Metals Specifications

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 B117 Operating Salt Spray (Fog) Apparatus

ASTM C273/C273M Shear Properties of Sandwich Core Materials

ASTM C365/C365M Flatwise Compressive Properties of Sandwich Cores

2.3 Definitions

Terms used in AMS are defined in AS7766 and as follows:

2.3.1 MISMATCHED NODES

A stacking misalignment defect that can occur for honeycomb that is manufactured using a corrugation process rather than an expansion process. See Figure 2 for a depiction of this defect.

3. TECHNICAL REQUIREMENTS

3.1 Material

3.1.1 Metal

Shall be AMS-A-81596, alloy 5056 aluminum alloy foil of the thickness specified on the part drawing or purchase order (see 8.5).

3.1.2 Adhesive

The adhesive system used for node-to-node attachment shall be such that the resultant core meets the requirements specified herein.

3.2 Configuration

The core material shall consist of strips of aluminum alloy foil treated for corrosion protection, bonded together such that cells approximately hexagonal in shape are formed when fully expanded (see Figure 1).

3.2.1 Designation

Core shall be designated according to the following numbering system:

Nominal density, pounds per cubic foot (kg/m³)

Cell size, inch (mm)

Foil thickness, inch (μm)

“N” for non-perforated, “P” for perforated, or “HP” for highly perforated (see 3.2.2)

Alloy

Adhesive, option of supplier

EXAMPLE: Core with a nominal density of 4.3 pounds per cubic foot (69 kg/m³) with a 1/4 inch (6.4 mm) cell size, 0.0020-inch (51-μm) foil thickness, non-perforated, made of 5056 aluminum alloy, and bonded with required adhesive shall be numbered as follows:

4.3 - 1/4 20N (5056) (XXXX) in inch/pound units

69 - 6.4 51N (5056) (XXXX) in SI units

3.2.2 Perforations

When perforated core is specified, the perforations shall be approximately 0.005 inch (0.13 mm) in diameter and spaced to vent each cell into at least three adjacent cells at least once for each 1/4 inch (6.4 mm) of core thickness. When thicknesses under 1/4 inch (6.4 mm) are furnished, there shall be at least one perforation per cell into each of three adjacent cells. When Type HP is specified, there shall be no fewer than 6000 perforations per square foot of foil, uniformly spaced and staggered.

3.2.3 Cell Pitch

Shall be 1.733 times the nominal cell size, +20%, -10%, measured by taking the average distance between ten nodes along a ribbon for six different ribbons.

3.3 Condition

Core shall be supplied in the expanded form; it shall be clean, free of contamination, and treated for corrosion resistance.

3.4 Properties

Core, having nominal dimensions as specified in Table 1, shall conform to the following requirements; tests shall be conducted on the core supplied in accordance with specified test methods. Properties of core having nominal dimensions other than specified in Table 1 shall be acceptable to the purchaser.

3.4.1 Flatwise Compressive Strength

The minimum individual values shall be as specified in Table 1, determined in accordance with 4.5.1.

3.4.2 Plate Shear Strength and Plate Shear Modulus

Shall be as specified in Table 1, determined in accordance with ASTM C273/C273M at 65 to 85 °F (18.3 to 29.4 °C), using a 0.625-inch (15.88-mm) thick specimen.

3.4.3 Node Bond Strength

Shall be not less than 30 pound-force (133 N) at 65 to 85 °F (18.3 to 29.4 °C) and not than 15 pound-force (67 N) at 350 °F ± 5 °F (177 °C ± 3 °C), determined less in accordance with 4.5.2.

3.4.4 Core Density

Shall be within ±10% of the specified density, determined in accordance with 4.5.3.

3.4.5 Corrosion Resistance

Core specimens shall show a weight loss not greater than 125 mg per square foot (1345 mg/m²) of exposed foil area, determined in accordance with 4.5.4.

Table 1A - Core properties, inch-pound units (see 8.2)

Cell Size Inches	Nominal Foil Thickness Designated Inches	Nominal Foil Thickness Maximum Inches	Nominal Density Pounds per Cubic Foot	Plate Shear Strength psi, Min Individual Direction of Test W	Plate Shear Strength psi, Min Individual Direction of Test L	Plate Shear Modulus ksi, Min Average Direction of Test W	Plate Shear Modulus ksi, Min Average Direction of Test L	Flatwise Compressive Strength psi, Min (Individual) Bare	Flatwise Compressive Strength psi, Min (Individual) Stabilized
1/8	0.0007	0.0011	3.1	110	200	16.0	31.0	250	260
	0.0010	0.0015	4.5	205	350	25.0	51.0	475	500
	0.0015	0.0022	6.1	305	535	37.0	77.0	760	825
	0.0020	0.0029	8.1	440	740	50.0	112.0	1200	1300
5/32	0.0007	0.0011	2.6	80	152	12.0	24.0	180	185
	0.0010	0.0015	3.8	155	272	20.0	41.0	360	375
	0.0015	0.0022	5.3	250	435	31.0	64.0	615	650
	0.0020	0.0029	6.9	360	610	42.0	91.0	920	1000
	0.0025	0.0034	8.4	455	775	52.0	115.0	1110	1375
3/16	0.0007	0.0011	2.0	50	105	9.0	17.0	110	120
	0.0010	0.0015	3.1	110	200	16.0	31.0	250	260
	0.0015	0.0022	4.4	198	340	24.0	50.0	460	490
	0.0020	0.0029	5.7	280	480	34.0	70.0	665	735
	0.0025	0.0034	6.9	360	610	42.0	91.0	920	1000
	0.0030	0.0042	8.1	440	740	50.0	112.0	1200	1300
1/4	0.0007	0.0011	1.6	38	78	6.0	13.0	75	80
	0.0010	0.0015	2.3	62	130	11.0	21.0	145	155
	0.0015	0.0022	3.4	130	230	18.0	35.0	300	315
	0.0020	0.0029	4.3	190	325	24.0	48.0	440	465
	0.0025	0.0034	5.2	245	425	30.0	62.0	600	645
	0.0030	0.0042	6.0	300	512	36.0	75.0	740	805
	0.0040	0.0053	7.9	430	720	49.0	108.0	1150	1265
3/8	0.0007	0.0011	1.0	25	45	4.0	7.0	25	35
	0.0010	0.0015	1.6	38	78	6.0	13.0	75	80
	0.0015	0.0022	2.3	62	130	11.0	21.0	145	155
	0.0020	0.0029	3.0	100	190	15.0	30.0	240	250
	0.0025	0.0034	3.7	150	260	20.0	40.0	335	362
	0.0030	0.0042	4.2	180	315	23.0	47.0	410	443
	0.0040	0.0053	5.4	260	450	32.0	66.0	630	680
	0.0050	0.0065	6.5	335	568	39.0	84.0	825	908