

AMS 3722A-88
10 June 1988
SUPERSEDES
AMS 3722
29 January 1971

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Title of Document: PAPER HONEYCOMB, 125 lb (55 kg) PAPER

Date of Specific Issue Adopted: 1 January 1988

Releasing Industry Group: Society of Automotive Engineers

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Custodians:
Army - MR
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Military Coordinating Activity:
Navy - AS
(Project No. 5640-0471)

AMSC N/A

FSC 5640

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PAPER HONEYCOMB
125 lb (55 kg) Paper

THIS REVISION CONTAINS ONLY EDITORIAL CHANGES.

1. SCOPE:

1.1 Form: This specification covers paper base honeycomb material having a cell size of 0.440 in. (11.18 mm). Unless otherwise ordered, size 0.440 in. (11.18 mm) will be supplied.

1.2 Application: Primarily for use as a core in sandwich construction of light weight partitions, space fillers, and non-structural parts. This product is not intended for aircraft structural or exterior applications.

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

2.2 ASTM Publications: Available from American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.

ASTM D774 - Bursting Strength of Paper

2.3 U.S. Government Publications: Available from Commanding Officer, Naval Publications and Forms Center, 5801 Tabor Avenue, Philadelphia, PA 19120.

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2.3.1 Military Standards:

MIL-STD-794 - Parts and Equipment, Procedures for Packaging and Packing of

3. TECHNICAL REQUIREMENTS:

3.1 Material: Shall consist of Kraft paper suitably bonded together along the applied glue lines in such a manner as to form a hexagonal, cellular structure after impregnating with a thermosetting phenolic type laminating resin and thoroughly curing by the application of heat.

3.1.1 Paper: Shall be a resin sized, 100% unbleached sulfate fiber No. 2 Kraft wrapping paper meeting the following requirements:

Ream Weight (500 sheets 24 x 36 in. [610 x 915 mm])	125 lb ± 5 (55 kg ± 2)
Average Bursting Strength, min	92 lb (410 N) ASTM D774
Thickness, in.	0.0110 - 0.0120 (0.279 - 0.305 mm)
pH	7.0 ± 1.0

3.1.2 Impregnating Resin: Shall not adversely affect the strength or life of the paper and shall contain no additional agents which will adversely affect the strength or life of either the glue line or paper.

3.2 General:

3.2.1 Alignment: The matching flats of each cell shall be accurately aligned during the bonding operation so that 100% of the available bonding width of each flat is in contact, and no block shall have any corrugations misaligned or partially overlapping. Product shall contain not more than one misplaced sheet per in. (25 mm) of length. The overlap of such misplaced sheet shall not exceed 25% of the available matching flat area.

3.2.2 Bonding: The glue lines shall be completely bonded over their entire width. There shall be not more than one unbonded glue line in any 10 in. (250 mm) sq area of the sheet after slicing or band-sawing the sheet into slabs.

3.2.3 Trimming: The honeycomb shall be neatly trimmed so that the trimmed edges exhibit a uniform structure free from trim scraps. The faces shall be sawed, sanded, or otherwise trimmed to provide parallel surfaces suitable for bonding.

3.2.4 Impregnation: The impregnating resin shall completely cover the honeycomb in a uniformly thin film free from starved areas. Occasional bubbles or pinholes will not be cause for rejection.

3.2.5 Corrosion: The product shall have no corrosive effect on other materials when exposed to conditions normally encountered in service. Discoloration of metal shall not be considered objectionable.

3.3 Properties: Product shall conform to requirements of Table I and the following:

TABLE I

Nominal Cell Dimension, Perpendicular to Matching Flats (1)	Apparent Density		Compression Strength, min			
			Room Temp.		180°F (82°C)	
	lb per cu ft	kg/m ³	psi	kPa	psi	kPa
0.455 in. (11.56 mm)	3.4 - 4.0	54.5 - 64	340	2345	340	2345

(1) Average of ten adjacent cells

3.3.1 Compressive Strength: The honeycomb shall meet the ultimate compressive strength flatwise (parallel to the direction of the cells) shown above after being conditioned at 77°F ± 2 (25°C ± 1) and a relative humidity of 50% ± 5 for 16 hours. At least five specimens shall be tested; each specimen shall be 3 x 3 x 1 in. (75 x 75 x 25 mm) with the 1-in. (25-mm) dimension parallel to the direction of the cell axes. The face shall be bonded to parallel flat panels prior to testing. The 1-in. (25-mm) dimension shall be accurate to within 0.010 in. (0.25 mm). The compression load shall be applied evenly over the 9 sq in. (60 cm²) area at a rate of head travel not exceeding 0.006 in. (0.15 mm) per minute. When production thicknesses under 1 in. (25 mm) are tested, the compression strength requirements shall be 110% of the values in 3.3.

3.4 Bond Area: The width of the cured glue line shall be uniform within 0.015 in. (0.38 mm) located 1.0 in. ± 0.010 (25 mm ± 0.25) apart on centers across a flattened sheet, unless use of preimpregnated paper is allowed, in which case dimension and location of the bonded area shall be as agreed upon by purchaser and vendor.

3.5 Quality: Honeycombs, as received by purchaser, shall be free from foreign matter and from imperfections detrimental to usage of the honeycombs. The cells of each block shall be uniform in appearance and shall be accurately bonded to adjacent cells to form a sheet of uniform density.

3.6 Tolerances: Shall be in accordance with Table II.

TABLE II

Dimension	Tolerances			
	Plus		Minus	
	in.	mm	in.	mm
Width (Parallel to Plane of Paper)	0.5	12.5	0.0	0.0
Length (Perpendicular to Matching Flat)	2.0	50.0	0.0	0.0
Thickness (Parallel to Cell Axes)	0.01	0.25	0.01	0.25
Cell Size (Perpendicular to Matching Flat)	0.06	1.50	0.06	1.50

3.6.1 The faces of the sheet perpendicular to the cell axes may be produced by shearing, sawing, or sanding at the option of the supplier. Thickness tolerances of sheared or sawed surfaces shall be measured by means of a fixture that will impose a load of 7 psi ± 1 (48 kPa ± 7) on the honeycomb.

3.6.2 Flatness: The faces of the honeycomb perpendicular to the cell axes when measured in any direction across the sheet shall be flat to within $\pm 1/64$ in. (± 0.4 mm) in 12 in. (300 mm), using not more than 8 psi (55 kPa) superimposed load.

4. QUALITY ASSURANCE PROVISIONS:

4.1 Responsibility for Inspection: The vendor of the product shall supply all samples for vendor's test's and shall be responsible for performing all required tests. Results of such tests shall be reported to the purchaser as required by 4.6. Purchaser reserves the right to sample and to perform any confirmatory testing deemed necessary to ensure that the product conforms to the requirements of this specification.

4.2 Classification of Tests:

4.2.1 Acceptance Tests: Tests to determine conformance to the following requirements are classified as acceptance tests and shall be performed on each lot.

Requirement	Paragraph Reference
Alignment	3.2.1
Bonding	3.2.2
Trimming	3.2.3
Impregnation	3.2.4
Apparent Density	3.3
Compression Strength	3.3

4.2.2 Preproduction Tests: Tests to determine conformance to all technical requirements of this specification are classified as preproduction tests and shall be performed prior to or on the initial shipment of the product to a purchaser, when a change in material, processing, or both requires reapproval as in 4.4.2, and when purchaser deems confirmatory testing to be required.

4.2.2.1 For direct U.S. Military procurement, substantiating test data, and, when requested, preproduction test material shall be submitted to the cognizant agency as directed by the procuring activity, contracting officer, or request for procurement.

4.3 Sampling:

4.3.1 For Acceptance Tests: Sufficient product shall be taken at random from each lot to perform all required tests. The number of determinations for each requirement shall be as specified in the applicable test procedure or, if not specified therein, not less than three.

4.3.1.1 A lot shall consist of all product of the same part number presented for vendor's inspection at one time.