

MIL-C-8073D

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SUPERSEDING

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MILITARY SPECIFICATION

**CORE MATERIAL, PLASTIC HONEYCOMB,
LAMINATED GLASS FABRIC BASE, FOR AIRCRAFT
STRUCTURAL AND ELECTRONIC APPLICATIONS**

**This specification is approved for use by all Depart-
ments and Agencies of the Department of Defense.**

1. SCOPE

1.1 Scope. This specification covers the requirements for glass fabric base plastic honeycomb core materials for aircraft structural applications, including aircraft exterior parts, such as radio and radar antenna housings, and other parts.

1.2 Classification.

1.2.1 Class. Glass fabric base plastic honeycomb core materials shall be of the following classes, as specified:

Class I - Radar purpose

Class II - General purpose (nonelectrical)

*** 1.2.2 Types. Types of glass fabric base plastic honeycomb core materials shall be of the following types, as specified:**

Type I-A 3/16 inch cell size; 4 lbs/cu ft., nominal density

Type I-B 3/16 inch cell size; 5.5 lbs/cu ft., nominal density

Type I-C 3/16 inch cell size; 8.0 lbs/cu ft., nominal density

Type II-A 1/4 inch cell size; 3.5 lbs/cu ft., nominal density

Type II-B 1/4 inch cell size; 4.5 lbs/cu ft., nominal density

Type II-C 1/4 inch cell size; 6.5 lbs/cu ft., nominal density

Type II-D 1/4 inch cell size; 8.5 lbs/cu ft., nominal density

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Type III-A 3/8 inch cell size; 2.2 lbs/cu ft., nominal density

Type III-B 3/8 inch cell size; 3.2 lbs/cu ft., nominal density

Type III-C 3/8 inch cell size; 4.5 lbs/cu ft., nominal density

Type III-D 3/8 inch cell size; 6.0 lbs/cu ft., nominal density

2. APPLICABLE DOCUMENTS

2.1 The following documents, of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein.

SPECIFICATIONS**Federal**

PPP-B-585 Boxes, Wood, Wirebound

PPP-B-591 Boxes, Fiberboard, Wood-Cleated

PPP-B-636 Box, Fiberboard

Military

MIL-P-116 Preservation, Methods of

STANDARDS**Military**

MIL-STD-105 Sampling Procedures and Tables for Inspection by Attributes

MIL-STD-129 Marking for Shipment and Storage

MIL-STD-401 Sandwich Constructions and Core Materials, General Test Methods

(Copies of specifications, standards, drawings, and publications required by suppliers in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following document forms a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

National Standards Association, Inc.

ATC Report No. ARTC-4: Electrical Test Procedures for Radomes and Radome Materials

(Application for copies should be addressed to the National Standards Association, Inc., 1321 Fourteenth Street NW, Washington, DC 20005.)

3. REQUIREMENTS

3.1 Materials. The materials comprising the core shall conform to applicable specifications and shall be as specified herein. Materials which are not covered by applicable specifications, or which are not specifically described herein, shall be subject to the approval of the procuring activity.

3.1.1 Fabric. The fabric shall be glass cloth woven of continuous filament yarns and treated with a coupling finish which is compatible with the applicable impregnating and node bonding resin to yield a core material with the physical and dielectric properties required in this specification. The glass fabric shall be uniform in color, shall not be streaked or splotchy in appearance, shall be free from oil or grease spots or other contamination, shall be free of creases and wrinkles or other permanent distortions, shall not be brittle or fused. The glass fabric after impregnation with resin shall also conform to the above requirements as to uniformity, defects, and contamination.

3.1.2 Resin. The resin system used to impregnate the fabric shall not be corrosive to metals. Node bonding shall be accomplished with the same resin as used for impregnation, or with a compatible resin adhesive.

3.2 Configuration. The core material shall consist of thin glass fabric base plastic sheets bonded together to form cells approximately hexagonal in shape. (See Figure 1.)

3.3 Sizes. The material shall be furnished in blocks or slices, as specified by the procuring activity. The dimensions and dimensional tolerances for the blocks or slices shall be as specified by the procuring activity.

* 3.4 Cure. The honeycomb core material shall be fully cured. When specified, the material may be furnished in a partially cured state to afford better conformability when used in curved sections. In this case the material shall be fully cured in accordance with the manufacturer's instructions prior to testing.

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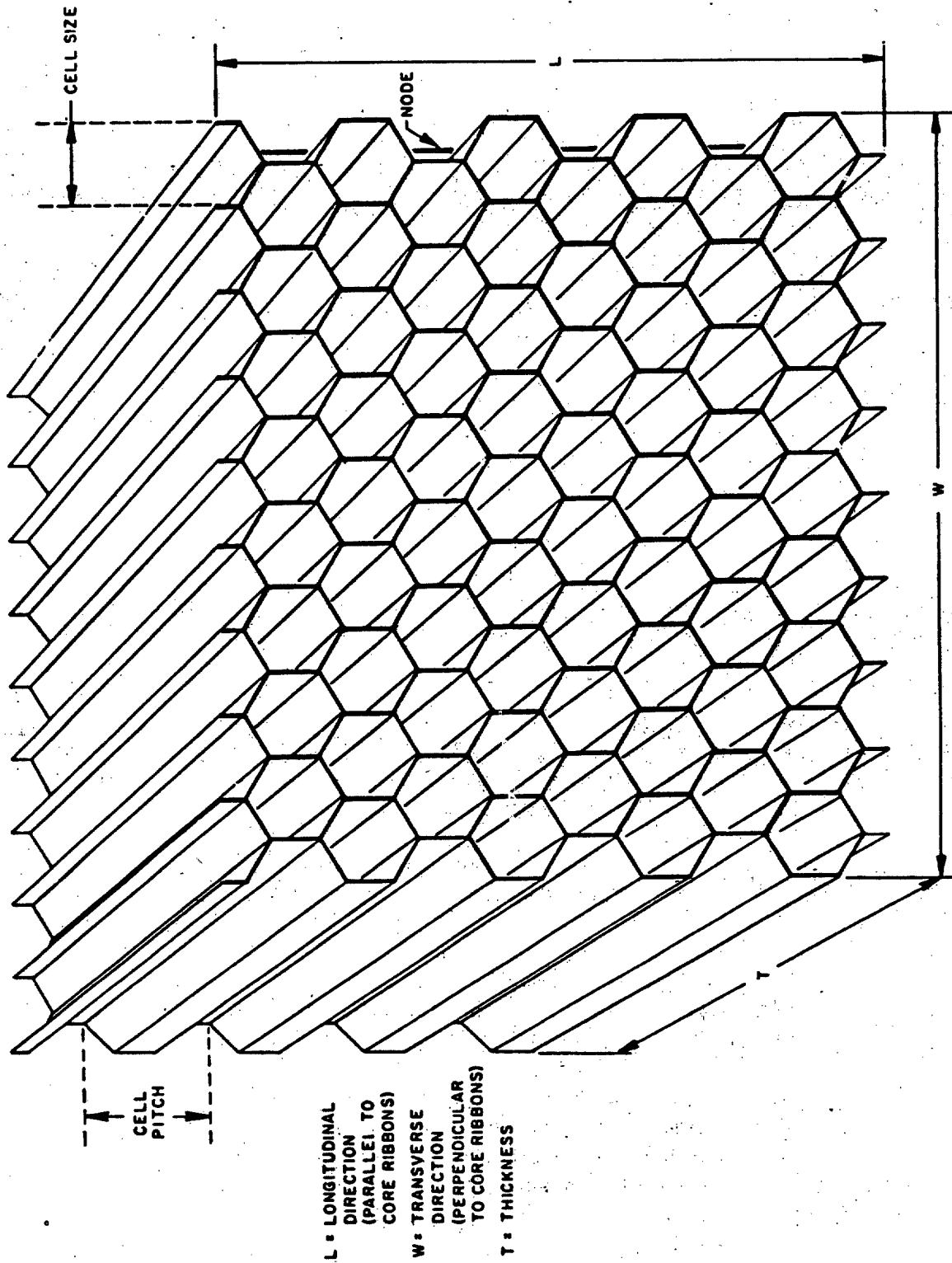


Figure 1. Reference areas for honeycomb cores

3.5 Bond or slicing test. The node bonds of the honeycomb core material shall be sufficiently strong so as to meet the requirements specified herein when machined in accordance with manufacturer's recommendations.

3.6 Cell wall edges. The honeycomb cell wall edges on the faces of the sliced core shall be in a condition as specified by the procuring activity, suitable for forming a good bond, as when wet-laminated to glass fabric base plastic laminate.

* **3.7 Core material properties.** The nominal cell size, apparent density, compressive strength in the direction of the cells (parallel to the T direction, as illustrated in Figure 1), and the plate shear strength, L and W direction, shall conform to the requirements of Table I.

* **3.7.1 Mechanical properties at elevated temperature.** The core shall conform to the requirements of Table I for compressive strength and shear strength when tested at $350 \pm 10^{\circ}\text{F}$ ($177 \pm 5^{\circ}\text{C}$).

3.7.2 Wet strength. Compressive strength of the core in wet condition shall be no less than 90 percent of the room temperature value specified in Table I.

3.8 Electrical properties for Class I. The dielectric constant of the core material shall be determined. The maximum value of the dielectric constant shall not exceed 1.5. The material shall be conditioned at room temperature for 48 hours at 50 ± 2 percent relative humidity. No electrical tests are required for Class II material.

3.9 Workmanship.

3.9.1 The core materials shall be uniform, free from excess resin accumulations, starved areas, tackiness, blisters, foreign materials, and other defects, such as nested cells, split or buckled cell wall and unbonded nodes, except as specifically permitted herein.

3.9.2 Defects. No more than two flaws per 12-inch diameter of exposed cell ends or per square foot of slice shall be permitted per unit of core material. For the purpose of this specification flaws shall be defined as misalignments and flute bond defects. A misalignment shall be defined as the partial imposition of one corrugation into another, and a defective flute bond as a bond having less than 75 percent of available width bonded. No more than one cell wall break per square foot of slice shall be permitted.

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* TABLE I

PROPERTIES OF CORE MATERIAL 1/

Type	Cell Size Inches ±10%	Density lbs/cu ft ±10%	Compression Strength		Plate Shear Strength					
			Room Temperature psi (min)	350 °F psi (min)	Room Temperature		350 °F			
					"L" Direction	"W" Direction	"L"	"W"		
Strength psi (min)	Minimum Average Modulus KSI	Strength psi (min)	Minimum Average Modulus KSI	Strength psi (min)	Strength psi (min)					
1-A	3/16	4.0	480	335	212	10.0	110	5.0	130	65
1-B	3/16	5.5	750	525	350	12.6	190	6.8	210	115
1-C	3/16	8.0	1280	945	625	17.8	370	11.6	375	220
II-A	1/4	3.5	400	280	170	7.8	100	4.4	100	60
II-B	1/4	4.5	560	390	250	9.5	140	5.2	150	85
II-C	1/4	6.5	900	630	450	14.5	245	9.0	270	145
II-D	1/4	8.5	1370	960	685	19.0	425	13.0	410	225
III-A	3/8	2.2	145	100	85	5.3	45	1.8	50	25
III-B	3/8	3.2	350	245	160	7.0	85	3.0	95	50
III-C	3/8	4.5	550	385	260	9.0	150	4.5	155	90
III-D	3/8	6.0	750	525	380	15.0	210	8.0	230	125

1/ The values in Table I are for procurement only and are not to be used for design values.

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- * 3.10 Identification of product. Each unit block, slices, pieces or detail part of core material shall be suitably identified, by tag or label, with the following information:

Manufacturer's Name or Trademark
 Order Number and Lot Number
 Specification Number
 Class
 Type
 Date of Manufacture
 Nominal Density
 State whether the material is fully or partially cured. And
 manufacturer's directions for cure if the material is
 partially cured (see 3.4)
 Resins, both impregnating and bonding

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Classification of tests. All of the tests required for the testing of core material are classified as quality conformance tests.

- * 4.1.2 Manufacturer's Data. For each procurement, the manufacturer shall submit a Certificate of Performance which will include test results applicable to the lot being delivered.

4.2 Sampling.

4.2.1 Lot. Unless otherwise specified in the contract or order, a lot shall consist of not more than 100 cubic feet of core material for sandwich construction of the same designated cell size dimension and density, manufactured under the same conditions and submitted for acceptance at the same time.

4.2.2 Sampling plans. Unless otherwise specified in the contract, purchase order or drawing information, sampling plans and procedures in the determination of the acceptability of products submitted by a supplier shall be in accordance with the provisions set forth in MIL-STD-105.

4.2.2.1 Visual and dimensional examination. A random sample of core material shall be selected from each lot in accordance with procedures of MIL-STD-105, Inspection Level II, Acceptable Quality Level 2.5 percent defective for test of 4.3.

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4.2.2.2 Physical and mechanical properties. A random sample shall be selected from each lot sufficient to conduct a core density test in accordance with 4.5.1, compressive strength tests in accordance with 4.5.3, 4.5.3.1, and core shear in accordance with 4.5.4 and 4.5.4.1. Samples, used for the core density test, may be used for determination of the strength tests.

4.3 Examination. The sample core material selected in accordance with 4.2.2.1 shall be visually and dimensionally examined to determine compliance with the requirements of this specification for configuration, size, identification, bond defects and workmanship. (See 3.10.)

4.4 Preservation, packaging, packing and marking. The preservation, packaging, packing and marking of items furnished under this specification shall be in accordance with the applicable requirements of Section 5.

4.5 Test methods.

4.5.1 Core density. The density of the core shall be determined in accordance with MIL-STD-401.

4.5.2 Cell size.

4.5.2.1 Specimens. The test specimens may be any convenient size or shape of the core material that can be accurately measured from blocks or slices.

4.5.2.2 Procedure. The distance between flats for ten cells in a row in the transverse direction shall be measured to the nearest 0.01 inch. The nominal cell size shall be taken as a tenth of the measured distance.

* 4.5.3 Core flatwise compressive strength. Compressive strength of core shall be determined in accordance with MIL-STD-401, using stabilized specimens. Five specimens shall be tested at room temperature $73.5 \pm 2^\circ\text{F}$. Specimens shall be 3 by 3 by 1/2 inches; the 1/2-inch dimension shall be in the "T" direction (see Figure 1).

* 4.5.3.1 Core flatwise compressive strength at elevated temperature. Five stabilized specimens, prepared in accordance with MIL-STD-401, shall be heated at $350 \pm 10^\circ\text{F}$ for 1/2 hour and tested as in 4.5.3 at this temperature.

* 4.5.3.2 Core flatwise compressive strength; wet condition. Five stabilized specimens, prepared in accordance with MIL-STD-401, shall be immersed in water for 24 hours at $73.5 \pm 2^\circ\text{F}$. They shall be tested as in 4.5.3 immediately after removal from the water.

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* 4.5.4 Core shear strength and core shear modulus. Plate shear strength and modulus of rigidity shall be determined in accordance with MIL-STD-401. Five honeycomb specimens in both TL and TW directions shall be prepared and tested at room temperature ($73.5 \pm 2^\circ\text{F}$) and the results averaged. Tensile or compressive loading shall be employed. The modulus of rigidity shall be obtained by computing the slope of the initial straight line portion of the stress-strain curve.

* 4.5.4.1 Core shear at elevated temperature. Five specimens in each direction, prepared in accordance with MIL-STD-401, shall be heated at $350 \pm 10^\circ\text{F}$ for 1/2 hour and tested as in 4.5.4 at this temperature.

4.5.5 Electrical test (Class I only). Dielectric constant of Class I core shall be determined in accordance with paragraph 3.2.3 of ATC Report No. ARTC-4 and panels shall be as specified therein. The "W" dimension shall be parallel with the ground plane for one determination and a second determination shall be made with the "L" dimension parallel with the ground plane. The dielectric constant, recorded to the nearest one hundredth, shall be the average of the two readings.

4.6 Rejection. When the sample, consisting of five specimens of core material selected for the compressive strength acceptance test under standard conditions, as being representative of a certain lot, fails to meet the requirements, that lot shall be rejected. Core material failing to meet other requirements specified herein shall reject the lot represented.

5. PREPARATION FOR DELIVERY

5.1 Levels of packaging and packing.

5.1.1 Level A. The core material shall be packaged in accordance with Method III of MIL-P-116 in unit quantities as specified by the procuring activity. For more than one core piece per container, the layers of core material shall be interleaved with 200-pound test double-faced corrugated fiberboard conforming to PPP-B-636. The material shall be packed in overseas exterior-type shipping containers conforming to PPP-B-585, PPP-B-591, or PPP-B-636. As far as practical, exterior containers shall be of uniform shape and size, be of minimum volume and tare consistent with the protection required, and shall contain identical quantities. Containers shall be closed and strapped in accordance with the applicable container specification.

5.1.2 Level B. The core material shall be packaged and packed as indicated in 5.1.1 except that containers shall be domestic-type exterior shipping containers indicated in the applicable container specification and need not be strapped.

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5.1.3 Level C. Core material shall be packed in containers of the type, size, and kind commonly used for the purpose, in a manner that will insure acceptance by common carrier for safe delivery to destination. Shipping containers shall comply with the established rules or regulations of common carriers which are applicable to the mode of transportation employed.

5.2 Marking. In addition to any special marking required by the contract, or order, interior and exterior containers shall be marked in accordance with requirements of MIL-STD-129.

5.2.1 Container markings shall include the resins used for both impregnating and bonding.

6. NOTES

* 6.1 Intended use. Class I core material may be used for aircraft radar antenna housings as well as for applications as indicated for Class II. Class II core material may be used for general aircraft structural parts and other applications. The material may be used for application where temperature will not exceed 350°F.

* 6.2 Ordering data. Government procurement documents should always specify the following information:

- a. The title, number, and date of this specification.
- b. Whether blocks or slices are desired.
- c. Class.
- d. Type.
- e. Resins - both impregnating and bonding.
- f. The three dimensions of the core material and tolerances.
- g. The quantity of core material.
- h. Level of packaging and packing.
- i. Fully cured or partially cured.

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6.3 Changes from previous issue. The outside margins of this document have been marked with an asterisk to indicate where changes (deletions, additions, etc.) from the previous issue have been made. This has been done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content as written irrespective of the marginal notations and relationship to the last previous issue.

Custodians:

Navy - AS
Air Force - 11
Army - ME

Preparing activity:

Navy - AS
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Review activities:

Air Force - 84
Army - MI

User activities:

Army - AV

Review/user information is current as of the date of this document. For future coordination of changes to this document, draft circulation should be based on the information in the current Federal Supply Classification Listing of DOD Standardization Documents.

