

LLL-C-310B
 September 29, 1973
 SUPPLACED BY
 Fed. Spec. LLL-9-910A
 July 7, 1965

FEDERAL SPECIFICATION
 BUILDING BOARD, (HARDBOARD) HARD
 PRESSED, VEGETABLE FIBER

This specification was approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers building board (hardboard) for interior and exterior use (see 6.1).

1.2 Classification.

1.2.1 Types, surface, finish, and design. Hardboard shall be of the following types, surface, finish, and design, as specified (see 6.2).

Type:

- I - Tempered
- II - Standard
- III - Service-tempered
- IV - Service
- V - Industrial

Surface:

- 1 - Smooth one side (S1S)
- 2 - Smooth two sides (S2S)

Finish:

- A - Surface unfinished
- B - Primed surface
- C - Filled surface
- D - Sealed surface

Design:

- a - Board plain
- b - Perforated
- c - Filigree

1.2.2 Sizes. Hardboard shall be of the following sizes as specified (see 6.2):

Width and Length. Four or five feet wide by 4, 6, 8, 12 and 10 feet long.

Thickness:

1/8, 3/16, 1/4, 5/16 and 3/8 inch.
 1/10 and 1/12 inch available in tempered and standard type.
 7/16 and 1/2 inch available in service and industrial.
 5/8, 11/16, 3/4, 13/16, 7/8, 1 and 1-1/8 available in Service and Industrial types with an (S2S) surface.

2. APPLICABLE DOCUMENTS

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

Federal Standard:

Fed. Std. No. 123 - Marking for Domestic Shipment (Civil Agencies).

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(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal Specifications required by required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

Military Specification:

MIL-W-3448 - Wallboard; packaging of.

Military Standards:

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.
MIL-STD-129 - Marking for Shipment and Storage.

(Copies of Military Specifications and Standards 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 documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply.

American Society for Testing and Materials (ASTM) Standard:

D 1037 - Standard Methods of Evaluating the Properties of Wood-Based Fiber and Particles Panel Materials.

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103.)

National Motor Freight Traffic Association, Inc., Agent:

National Motor Freight Classification.

(Application for copies should be addressed to the American Trucking Associations, Inc., Tariff Order Section, 1616 P St., N.W., Washington, DC 20036.)

Uniform Classification Committee, Agent:

Uniform Freight Classification.

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

(Technical society and technical association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

3. REQUIREMENTS

3.1 Material. The basic material shall be inter-felted ligno-cellulosic fibers consolidated under heat and pressure in a hot-press to density of 31 pounds per cubic foot or greater. Other materials may be added to improve certain properties as stiffness, hardness, finishing properties, resistance to abrasion and moisture and to increase strength, durability and utility.

TABLE I. Classification of hardboard by surface finish, thickness, and physical properties (con.)

Type	Surface	Nominal thickness	Water resistance (max av per panel)				Modulus of rupture (min av per panel)	Tensile strength (min av per panel)	
			Water absorption based on weight		Thickness swelling			Parallel to surface	Perpendicular to surface
			S1S	S2S	S1S	S2S			
		Inch	percent	percent	percent	percent	psi	psi	psi
Industrial	S1S	3/8	25	25	20	20	2000	1000	35
	anc	7/16	25	25	20	20			
	S2S	1/2	25	25	20	20			
		5/8	--	22	--	18			
		11/16	--	22	--	18			
	S2S	3/4	--	20	--	16			
		13/16	--	20	--	16			
		7/8	--	20	--	16			
		1	--	20	--	16			
		1-1/8	--	20	--	16			

3.2 Surfaces. Surface 1 shall be classified, smooth one side (S1S) and Surface 2 shall be classified smooth two sides (S2S) in accordance with 1.2.1 as specified (see 6.2). If S1S is specified, S2S can be substituted.

3.3 Finish.

3.3.1 Finish A-Surface unfinished. Surface unfinished hardboard shall be clean, uniform in texture, and free from voids, swells, chips, flakes, shavings, scuffs, dents, scratches or cracks. The hardboard shall be smooth on one side (S1S) or smooth on both sides (S2S) as specified (see 6.2).

3.3.2 Finish B-Primed surface. When primed surface hardboard is specified, the prime coat shall be applied to a discernible film thickness for protective purposes or as a base for further finish (see 6.2).

3.3.3 Finish C-Filled surface. When filled surface hardboard is specified the filling material shall be incorporated into the hardboard surface for improved smoothness and finishing characteristics (see 6.2).

3.3.4 Finish D-Sealed surface. When sealed surface hardboard is specified the sealing material shall be incorporated into the hardboard surface for improved stain resistance and finishing characteristics (see 6.2).

3.4 Design.

3.4.1 Design a, Plain. When plain board is specified the plain surface shall be uniform in appearance throughout and shall be free from visible variation in the surface plane as commercially practicable when visually inspected (see 6.2).

3.4.2 Design b, Perforated. When perforated board is specified the peg holes in the perforated boards shall be uniform in size, and spaced uniformly throughout. Perforated boards shall be free from visible variations on the surface as commercially practicable when visually inspected (see 6.2).

3.4.3 Design c, Filigree. When filigree board is specified the filigree design shall be uniform in appearance throughout and shall be free from visible variations in the surface as commercially practicable when visually inspected (see 6.2).

3.5 Physical and dimensional requirements.

3.5.1 Dimensions and tolerances. The hardboard panels shall have a nominal width of 4 feet or 5 feet. The nominal length of the panels shall be as specified in paragraph 1.2.2. The tolerance on the nominal width and length shall be plus or minus 1/64 inch per linear foot. The nominal thicknesses shall be as designated in table II, see paragraph 4.4.2.

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3.1.1 Type I - Tempered. Tempered hardboard is a hardboard which has been impregnated with a siccativc material, such as drying oil blends of oxidizing resin, and which is then stabilized by heat or which is processed with special additives during manufacture to impart substantially improved properties of stiffness, strength, hardness, and resistance to water and abrasion as compared to Standard hardboard.

3.1.2 Type II - Standard. Standard hardboard is a hardboard of high strength and water resistance. It is in substantially the same form as when it comes from the manufacturing press, except for minor processing steps such as humidification and trimming to size.

3.1.3 Type III - Service-Tempered. Service-tempered hardboard is a hardboard which has been impregnated with a siccativc material such as drying oil blends of oxidizing resin and which is then stabilized by heating or which is processed with special additives during manufacture to impart substantially improved properties of stiffness, strength, hardness, and resistance to water and abrasion as compared to Service hardboard.

3.1.4 Type IV - Service. Service hardboard is of good strength, but is somewhat less strong than Standard hardboard. It is in substantially the same form as when it comes from the manufacturing press, except for minor processing steps such as humidification and trimming to size.

3.1.5 Type V - Industrial. Industrial hardboard is of moderate strength and has a lower unit weight than other types of hardboard. It is in substantially the same form as when it comes from the manufacturing press, except for minor processing steps such as humidification and trimming to size.

TABLE I. Classification of hardboard by surface finish, thickness, and physical properties

Type	Surface	Nominal Thickness	Water resistance (max av per panel)				Modulus of rupture (min av per panel) psi	Tensile strength (min av per panel)	
			Water absorption based on weight		Thickness swelling	Parallel to surface		Perpendicular to surface	
			S1S	S2S					S1S
			percent	percent	percent	percent		psi	psi
I Tempered	S1S	1/12	30	--	25	--	7000	3500	150
	S1S and S2S	1/10	20	25	16	20			
		1/8	15	20	11	16			
		3/16	12	13	11	15			
		1/4	10	12	8	11			
II Standard	S1S and S2S	5/16	8	11	8	10	5000	2500	100
		3/8	8	10	8	9			
		1/12	40	40	30	30			
		1/10	25	30	22	25			
		1/8	20	25	16	18			
III Service-tempered	S1S and S2S	3/16	18	25	14	18	4500	2000	100
		1/4	16	20	12	14			
		5/16	14	15	12	15			
		3/8	12	12	10	12			
		1/8	20	25	15	22			
IV Service	S1S and S2S	3/16	25	27	17	22	3000	1500	75
		1/4	25	27	17	22			
		5/16	25	27	15	22			
		3/8	25	27	15	22			
		7/16	25	27	15	22			
	1/2	25	27	17	24				
	S2S	5/8	--	15	--	12			
		11/16	--	15	--	12			
		3/4	--	12	--	9			
		13/16	--	12	--	9			
		7/8	--	12	--	9			
1		--	12	--	9				
1-1/8	--	12	--	9					

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4.2.1 Lot. Unless otherwise specified (see 6.2) a lot shall consist of all boards of the same type, surface, finish, design and size offered for inspection at the same time.

4.2.2 Sampling for tests. Samples for tests shall be in accordance with level 5-2 in the MIL-STD-105. The acceptable quality level (AQL) shall be 2.5 percent defective for specimens used in each test.

4.3 Visual examination.

4.3.1 End Itch. Hardboard shall be examined for defects listed in table III. The acceptable quality levels (AQL's) in MIL-STD-105, shall be 2.5 percent defective for major defects and 10.0 percent defective for minor defects.

TABLE III. Classification of defects, end item

Defects	Major		Minor	
Types, surface, finish and design not specified.....	X			
Size not specified.....	X			
Thickness of board not within limits.....	X			
Length of board not within tolerance.....	X			
Boards not within tolerance for squareness.....	X			
Damage or defects not affecting function or service-ability.....				X

4.3.2 Inspection of preparation for delivery requirements. An inspection shall be made to determine that the packaging, packing, and marking comply with the requirements in section 5. Defects shall be scored in accordance with table IV. The sample unit shall be one shipping container fully prepared for delivery. Sampling shall be in accordance with MIL-STD-105. The lot size shall be the number of shipping container in the end item inspection lot. The inspection level shall be 5-2 and the AQL shall be 4.0 defects per hundred units.

TABLE IV. Classification of preparation for delivery defects

Examine	Defects
Marking	Omitted; incorrect; illegible; improper size, location, sequence, or method of application.
Materials	Any component missing or damaged.

4.4 Test methods.

4.4.1 Specimen preparation. Test specimens shall be cut from hardboard as shown in table V, and shall be measured as accurately as possible to the dimension specified for each test in accordance with Part 3 of ASTM D-1037.

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TABLE II. Thickness tolerances for hardboard panels

Nominal thickness		Thickness tolerance (min - max)
Inch		Inch
1/12	(0.083)	0.070 - 0.090
1/10	(.100)	.091 - .110
1/8	(.125)	.115 - .155
3/16	(.188)	.165 - .205
1/4	(.250)	.210 - .265
5/16	(.312)	.290 - .335
3/8	(.375)	.350 - .400
7/16	(.438)	.410 - .460
1/2	(.500)	.475 - .525
5/8	(.625)	.600 - .650
11/16	(.688)	.660 - .710
3/4	(.750)	.725 - .775
13/16	(.812)	.785 - .835
7/8	(.875)	.850 - .900
1	(1.000)	.975 - 1.025
1-1/8	(1.125)	1.115 - 1.155

3.5.2 Squareness. The lengths of the face diagonals of the hardboard panels shall not vary by more than 1/64 inch for each foot of length of the panels. Opposite sides of the panels shall not vary in length more than 1/8 inch.

3.5.3 Edge straightness. The edges of the hardboard panels shall be straight within 1/64 inch for each foot of length or width. Edge straightness shall be determined by stretching a string or wire along the edge to be measured from one corner to the adjacent corner and measuring to the nearest 1/32 inch the widest gap between the string or wire and the edge of the panel.

3.5.4 Moisture content. The moisture content of the hardboard shall be not less than 2.0 percent nor more than 9.0 percent and, within any one shipment, shall not vary by more than three percentage points as measured by the moisture content of the modulus of rupture specimen (see 4.4.3).

3.5.5 Modulus of rupture. The modulus of rupture shall be as specified in table I for types I, II, III, IV and V, when tested in accordance with 4.4.4.

3.5.6 Tensile strength parallel to surface. The tensile strength parallel to the surface, shall be as specified in table I for types I, II, III, IV and V, when tested in accordance with 4.4.5.

3.5.7 Tensile strength perpendicular to the surface. The tensile strength perpendicular to the surface, shall be as specified in table I for types I, II, III, IV and V, when tested in accordance with 4.4.6.

3.5.8 Water absorption and thickness of swelling. The water absorption and thickness of swelling shall be in accordance with table I for type I, II, III, IV and V, when tested in accordance with 4.4.7.

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 that supplies and services conform to prescribed requirements.

4.2 Sampling.

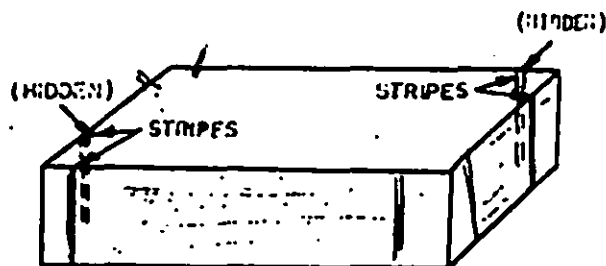
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5.2.2 Military agencies. In addition to any special marking specified in the contract or order, the interior packages and shipping containers shall be marked in accordance with MIL-STD-129.

5.2.3 Marking and identification. Each board of the type specified shall be color coded as shown in Table VI. Vertical colored stripes shall be applied to the two sides of a board. The stripes shall be applied to the right hand edges and on the adjacent edge. When marker faces the long dimension of the unit, stripes shall begin 3 inches from the corner and be 1/2 inch in width. When two stripes are used they shall be 1 inch apart.

TABLE VI. A stack of hardboard showing strip marking

<u>Product</u>	<u>Color Code</u>
Tempered	1 Red
Service-Tempered	2 Red
Standard	1 Green
Service	2 Green
Industrial	1 Blue



6. NOTES

6.1 Intended use. Hardboard is intended for use as industrial or building construction panels for interior and exterior application.

6.1.1 Type I - Tempered. Tempered hardboard is suitable for use where superior strength, water resistance, machinability, finishing characteristics, and harder surface are needed. The uses of this type of material are: storage bins and high quality finishing (see 3.1.1).

6.1.2 Type II - Standard. Standard hardboard is suitable for application where good machinability, finishing characteristic, strength and water resistance are needed as in furniture and cabinet work (see 3.1.2).

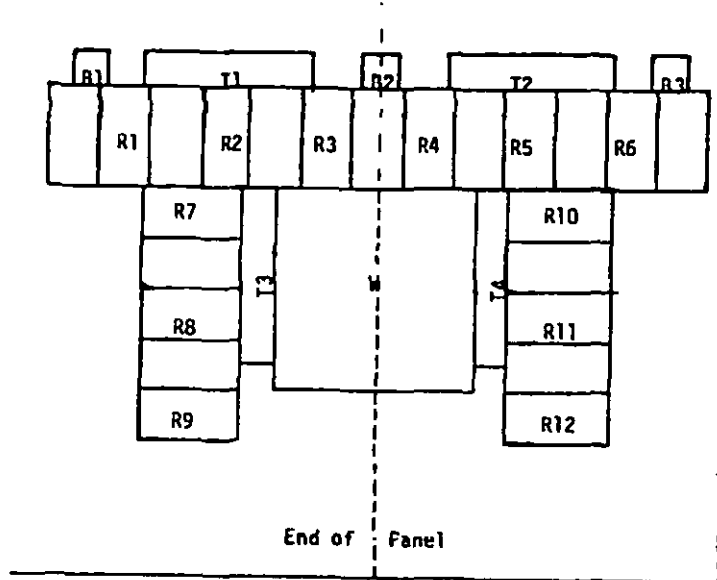
6.1.3 Type III - Service-Tempered. Service tempered hardboard is intended for use where its improved properties of stiffness, strength, hardness and resistance to water and abrasion are required (see 3.1.3).

6.1.4 Type IV - Service. Service hardboard is intended for application where its lower weight is advantageous and where moderate machinability, finishing characteristics, water resistance and strength are suitable, such as interior paneling (see 3.1.4).

6.1.5 Type V - Industrial. Industrial hardboard is intended where moderate strength and where lower weight is advantageous. Generally suitable use of this hardboard is for furniture (see 3.1.5).

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TABLE V. Diagram for cutting test specimens from hardboard test panel



Modulus of rupture (R)--twelve 3 by 6 in. (76 by 152 mm)

Tensile strength parallel to surface (T)--four 2 by 10 in. (50 by 254 mm)

Tensile strength perpendicular to surface (B)--three 2 by 2 in. (50 by 50 mm)

Water absorption and swelling (W)--one 12 by 12 in. (304 by 304 mm)

NOTE - The suffix numbers may be used to identify individual specimens by location and to record specimen test data.

4.4.2 Thickness measurement. Thickness shall be as designated in table 1. Thickness tolerances shall be as specified in table 2 when measured in accordance with the applicable test method in part B of ASTM D 1037 see 3.5.1.

4.4.3 Moisture content. Moisture content shall be determined in accordance with the applicable test method in part B of ASTM D 1037 see 3.5.4.

4.4.4 Modulus of rupture. Modulus of rupture shall be determined in accordance with the applicable test method in part B of ASTM D 1037, see 3.5.5.

4.4.5 Tensile strength parallel to the surface. The tensile strength parallel to the surface shall be determined in accordance with the applicable test method in part B of ASTM D 1037, see 3.5.6.

4.4.6 Tensile strength perpendicular to the surface. The tensile strength perpendicular to the surface shall be determined in accordance with the applicable test method in part B of ASTM D 1037, see 3.5.7.

4.4.7 Water absorption and thickness of swelling. The water absorption and thickness of swelling shall be determined in accordance with the applicable test method in part B of ASTM D 1037, see 3.5.8.

5. PREPARATION FOR DELIVERY

5.1 Packing. Hardboard shall be packed in accordance with MIL-H-3448. The level of packing shall be A or C as specified (see 6.2).

5.2 Marking.

5.2.1 Civil agencies. In addition to any special marking specified in the contract or order, the interior packages and shipping containers shall be marked in accordance with Fed. Std. 123.

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6.2 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- (a) Title, number, and date of this specification.
- (b) Type, surface, finish, design and sizes (see 1.2.1, 1.2.2 and 6.1).
- (c) Size of lot, if different from 4.2.1.
- (d) Level of packaging and packing required (see 5.1).
- (e) Marking required (see 5.2.3).

6.3 Cross-reference.

	<u>LLL-B-310A</u>	<u>LLL-C-3177</u>
Type	I II III	II I IV III V
Surface	1 2	S1S S2S
Finishes	A C D E	A B D C
Design	a b	a b c

Military Coordinating Activity:

Navy - YD

Preparing activity:

GSA-FSS

Civil Agency Coordinating Activities:

COA-SS
GSA-PCD
IIT-RPA
USDA-AFC

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Orders for this publication are to be placed with the General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain extra copies and other documents referenced herein. Price 15 cents each.