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American National Standard

Hardboard Siding



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Hardboard Siding

Abstract:

This Standard covers requirements and methods of testing for the dimensions, straightness, squareness, physical properties, and surface characteristics of hardboard siding. Definitions of trade terms used and methods of identifying products that comply with the standard are included.

Foreword:

(This Foreword is not a part of American National Standard for Hardboard Siding.)

Hardboard siding is a wood-based product used for exterior wall covering. Hardboard siding is manufactured as panel or lap sidings in smooth and textured surfaces, unfinished, factory primed for painting or prefinished.

This Standard was originally promulgated under the procedures of the U.S. Department of Commerce, National Bureau of Standards, and designated as Voluntary Product Standard PS 60-73. This American National Standard is published with updated provisions which reflect the present state of the art. This 1998 revision makes editorial changes, adds metric equivalents and adds 80% RH as the specified maximum for linear expansion testing, while 90% RH remains as an alternative.

The development of this American National Standard for Hardboard Siding offers manufacturers, consumers, and the general public an effective guide developed under the consensus procedures of the American National Standards Institute.



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1. SCOPE

This Standard covers requirements and methods of testing for the dimensions, straightness, squareness, physical properties, and surface characteristics of hardboard siding at the time of manufacture.¹ Definitions of trade terms used and methods of identifying products that comply with this Standard are included.

2. CLASSIFICATION

This Standard covers the following types and surfaces of hardboard siding:

2.1. Types. Lap Siding – Long strips designed to be installed with the long dimension oriented horizontally. This siding is embossed, grooved, and/or smooth on the face. Panel Siding – Wide sheets designed to be installed with the long dimension oriented vertically. This siding is embossed, grooved, and/or smooth on the face.

Note: Embossed products, because of their varying surfaces and patterns, require the recognition that certain adjustments and allowances must be made in the evaluation of various physical property requirements found in this Standard. Specific adjustments for embossed products have been designated wherever possible. With certain finished siding surface configurations, the manufacturer shall be consulted for specific adjustments in the test procedures.

2.2. Surfaces. Unprimed – Siding that has only the surface characteristics provided by the basic manufacturing process.

Primed – Siding that has been factory coated with a primer to provide a surface ready for field applied paint.

Prefinished – Siding that has been factory painted, stained or, film overlaid, which does not require additional painting at the time of installation.

3. REQUIREMENTS

3.1. General. Products represented as complying with this Standard shall meet all of the requirements specified herein. The inspection and test proce-

dures contained in Sections 3 and 4 are to be used to determine the conformance of products to the requirements of this Standard.

3.2. Dimensions and Tolerances. The dimension tolerance for hardboard siding shall be plus 0 mm(0 in) and minus 4.8 mm(3/16 in) from the agreed upon nominal length and width. Thickness shall be as specified in Table 1. Thickness shall be determined in accordance with Sections 151-154 of American Society for Testing and Materials ASTM D1037-96, *Standard Test Methods For Evaluating Properties of Wood-Base Fiber and Particle Panel Materials*^{2,3}, except that test specimens shall be selected in accordance with Section 3.5 and Figure 1 of this Standard.

3.3. Edge Straightness. Trimmed edges shall conform to a straight line extending from corner to corner on the same edge, with no deviation greater than 1.3 mm/m(1/64 in/ft) of edge length.

Table 1.
Thicknesses and Ranges for
Hardboard Siding

Nominal Thickness		Ranges min. - max.	
mm	inch	mm	inch
6.4	1/4(0.250)	5.59-6.73	0.220-0.265
9.5	3/8(0.375)	8.25-9.53	0.325-0.375
11.1	7/16(0.438)	9.55-11.43	0.376-0.450
12.7	1/2(0.500)	11.45-13.33	0.451-0.525

3.4. Squareness. For panel siding, the difference between lengths of the face diagonals shall not differ by more than 1.3 mm/m(1/64 in/ft). For lap and panel siding, opposite sides of the siding shall not vary in length more than 3.2 mm(1/8 in).

3.5. Physical Properties. The siding shall be manufactured primarily of inter-felted ligno-cellulosic fibers, consolidated under heat and pressure in a hot-press to a density of not less than 500 kg/m³(31 lbs/ft³) and shall have the properties specified in Table 2 when tested in accordance with the test methods indicated therein. Specimens shall be selected for testing as diagrammed in Figure 1.

3.6. Linear Expansion. With the adoption of this Standard, the specific relative humidity range for measuring Linear Expansion is 30 to 80%. Values for 30 to 90% have been left in this revision to allow a transition period. The 30 to 90% values will be deleted during the next revision. It is not intended that the test be run at both relative humidity ranges. When reviewing Linear Expansion data, it is essential to know which range was used so that the matching requirement in Table 2 is applied.

4. INSPECTION AND TEST PROCEDURES

4.1. Weatherability of Substrate

A. Apparatus

1. Forced – air circulation⁴ oven capable of 105°C±3°(220°F±5°).
2. Micrometer reading to 0.02 mm (0.001 in) with an anvil diameter of 19 mm(3/4 in).
3. Water bath capable of holding a minimum of 50 mm(2 in) of distilled water at 38°C±3° (100°F±5°).
4. Freezer maintained at -15°C ± 3° (5°F±6°).
5. Rack capable of suspending test specimens in water bath to a depth of 25mm±3.2mm (1 in±1/8 in).

¹ Other Standards cover:

- a. Basic Hardboard ANSI/AHA A135.4
- b. Prefinished Hardboard Paneling ANSI/AHA A135.5

² Later issues of this publication may be used providing the requirements are applicable and consistent with the issue designated. Copies are obtainable from the American Society for Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.

³ For embossed products, replace Paragraph 160 in ASTM D1037 with the following: Take two measurements on each sample. Each measurement should be taken at the highest point along 25mm(1 in) lines which are perpendicular to the long edges of the sample. These lines shall be at the mid points of the edges and extend in from the sample edges 25mm(1 in) The two measurements should be averaged for each sample.

⁴ Minimum circulation rate is to be 7100 L/min. (250 ft³/min).

B. Test Specimen

Specimen shall be a nominal 50mm (2 in) by at least 150mm(6 in) with no primer on test edges. Remove any primer from edges by sawing away 3.2 mm(1/8 in).

C. Procedure

1. Condition specimen to equilibrium moisture content at 50%±2% relative humidity and 20°C±3° (68°F±5°).
2. Measure the thickness of the edge to be submerged at the center of the 50mm(2 in) dimension with micrometer anvil centered on the edge of the specimen so that repeatable measurements can be taken. Record the measurement to the nearest 0.02mm(0.001 in).
3. Suspend specimen in vertical position with the measured end in water bath to a depth of 25mm (1 in). Specimens should be no closer than 6.4mm(1/4 in) from each other or the container wall.
4. Cycle specimen in the following sequence:
 - a. Immerse the measured end of the specimen in 38°C(100°F) distilled water for 18-1/2 hours.
 - b. Place specimen in 105°C(220°F) oven for 30 minutes.
 - c. Place specimen in freezer at 15°C (5°F) for 2 hours.
 - d. Place specimen in 105°C(220°F) oven for 30 minutes.
 - e. Place specimen in freezer at 15°C (5°F) for 2 hours.
 - f. Place specimen in 105°C(220°F) oven for 30 minutes.
5. Repeat cycle an additional 5 times using fresh distilled water at the start of each cycle.
6. After 6 complete cycles, condition specimen to equilibrium moisture content at 50%±2% relative humidity and 20°C±3° (68°F±5°).

7. Measure thickness as in paragraph C.2., calculate and report average percent residual swell using the following formula:

$$\% \text{ Residual Swell} = \frac{100(C_F - C_I)}{C_I}$$

where: C_I =Conditioned Initial Thickness

C_F =Conditioned Final Thickness

Note: Should scheduling necessitate a hold in the test cycle, it must be done at the conclusion of 4.f. Specimens shall be sealed in a plastic bag at room temperature.

4.2. Weatherability of Primed Substrate⁵

A. Apparatus

A weathering appliance of type D or DH as described in ASTM G23-95 *Practice for Operating Light and Water-Exposure Apparatus (Carbon-Arc Type) for Exposure of Nonmetallic Materials*.⁶

B. Procedure

1. The primed siding specimen shall be placed in the weathering appliance and tested for 3 weeks using the following cycle:
 - a. Expose the specimen to 102 minutes of light only followed by 18 minutes of light with a spray.
 - b. Repeat (a) for a total of 20 hours.
 - c. Allow the specimen to rest for 4 hours.
 - d. Repeat (a), (b), and (c) for 5 days and then allow the specimen to rest for 48 hours at a constant temperature of 20°C±3° (68°F±5°) and 50%±2% relative humidity. During this time period, specimens shall not come into direct contact with each other.
 - e. Complete three 7 day cycles and then inspect as described in 4.2.C.
2. Clean the surface of the specimen prepared in paragraph B.1. with mineral spirits and allow it to dry. Make a cut at least 25mm (1 in) long through the finish with a sharp

razor blade or equivalent.⁷ Apply a piece of 19mm(3/4 in) wide flat-back masking tape⁸ perpendicular to the cut and press firmly in place by using a wallpaper seam roller.

Allow the cut to extend beyond the edges of the tape and the tape to contact the finish for a distance of at least 25mm (1 in) on each side of the cut. Allow sufficient excess tape on one side to hold the tape between the thumb and forefinger. Immediately pull the tape free in a slow and even manner at right angles to the cut. Measure the distance from the cut to where the finish ceases to be "picked up" by the tape.

3. With paint and siding specimens at 20°C±3° (68°F±5°), apply an acrylic latex paint using a No. 60 draw-down bar to give approximately 0.03 dry mm (1-1/2 dry mil) thickness. The paint shall be formulated in accordance with Rohm & Haas Formulation W-264-7. Allow the paint to dry for 24 hours.
4. Using the specimen prepared in paragraph B.3., repeat the adhesion test described in paragraph B.2.

⁵Unprimed products shall be primed before testing.

⁶ See footnote 2.

⁷This test is applicable only to flat surfaces. If a textured product is to be tested, a flat area of the pattern should be selected. Trial cuts should be made until either the substrate becomes visible in the bottom of the cut or, in the case of intercoat adhesion, the underlying paint film becomes visible in the bottom of the cut. Disregard any cuts of improper depth, cutting at the edge of the cut, or excessive chipping next to the cut.

⁸The masking tape shall be less than one year old, have been properly stored, and shall have an adhesive strength of 55±6 g/mm(45±5 oz. per in) when tested in accordance with ASTM Test Method D-3330.

Table 2. Physical Properties of Hardboard Siding

Property	Requirement	Test Method										
Water absorption, percent based on weight (max avg per panel)	12	Section 163 and 164.										
Thickness swelling, percent (max avg per panel)	8	Section 163 and 164. For embossed products, use a 19mm (3/4 in) anvil on the micrometer.										
Weatherability of substrate (max percent residual swell)	20	4.1. of this Standard. For embossed products, measure the thickness at a spot of no slope or minimal slope.										
Weatherability of primed substrate	No checking, erosion, flaking or objectionable fiber raising. Adhesion – Less then 3.2mm (0.125 in) of coating “picked up”	4.2. of this Standard.										
Linear expansion 30-80% RH. (max percent) Specific Method	<table><tr><td>Nominal Thickness (in)</td><td>Maximum Linear expansion %</td></tr><tr><td>6.4 (1/4)</td><td>0.31</td></tr><tr><td>9.5 (3/8)</td><td>0.33</td></tr><tr><td>11.1 (7/16)</td><td>0.35</td></tr><tr><td>12.7 (1/2)</td><td>0.35</td></tr></table>	Nominal Thickness (in)	Maximum Linear expansion %	6.4 (1/4)	0.31	9.5 (3/8)	0.33	11.1 (7/16)	0.35	12.7 (1/2)	0.35	Sections 107-110 and Notes 38 and 39. – Lap siding shall be cut parallel with the long dimension of the siding. Report maximum RH used.
Nominal Thickness (in)	Maximum Linear expansion %											
6.4 (1/4)	0.31											
9.5 (3/8)	0.33											
11.1 (7/16)	0.35											
12.7 (1/2)	0.35											
Linear expansion 30-90% RH (max percent) Alternate Method	<table><tr><td>Nominal Thickness (in)</td><td>Maximum Linear expansion %</td></tr><tr><td>6.4 (1/4)</td><td>0.36</td></tr><tr><td>9.5 (3/8)</td><td>0.38</td></tr><tr><td>11.1 (7/16)</td><td>0.40</td></tr><tr><td>12.7 (1/2)</td><td>0.40</td></tr></table>	Nominal Thickness (in)	Maximum Linear expansion %	6.4 (1/4)	0.36	9.5 (3/8)	0.38	11.1 (7/16)	0.40	12.7 (1/2)	0.40	Sections 107-110 and Note 38. – Lap siding shall be cut parallel with the long dimension of the siding. Report maximum RH used.
Nominal Thickness (in)	Maximum Linear expansion %											
6.4 (1/4)	0.36											
9.5 (3/8)	0.38											
11.1 (7/16)	0.40											
12.7 (1/2)	0.40											
Nail-head pull-through, kg (lb) (min avg per panel)	68(150)	Section 54-60 except that specimens shall be tested in the dry condition. Three 6-penny (2.9mm 0.113 in) wire diameter & 5.3mm (17/64 in) head diameter nails shall be used per specimen. The nails shall be driven into the specimen at least 25mm (1 in) apart. The holding fixture shall consist of a plate with a 38mm (1-1/2in) diameter opening centered in it, and the speed of testing shall be at a rate of 3.2-4.5mm (0.125-0.175 in) per minute. For embossed products, disregard thickness.										
Lateral nail resistance kg (lb) (min avg per panel)	68(150)	Sections 41-46 except that specimens shall be tested in the dry condition. One 8-penny (3.3mm 0.131 inch diameter) nail shall be used per specimen spaced 9.5mm (3/8 in) from any specimen edge ^c . Testing speed shall be 3.2-4.5mm (0.125-0.175 in) per minute. For embossed products, disregard thickness.										
Modulus of rupture, MPa (psi) (min avg per panel)	12.4 (1800) for 9.5 (3/8 in), 11.1 (7/16 in), & 12.7mm (1/2 in) thick 20.7 (3000) for 6.4mm (1/4 in) thick	Sections 155-158 except that specimens of sidings having a nominal thickness of 11.1 & 11.7mm(7/16 & 1/2 in) shall have a span of 100mm (4 in) between supports.										
Hardness kg (lb) (min avg per panel)	205(450)	Sections 68-73. For embossed products, conduct test on backside only.										
Impact mm (in) (min avg per panel)	225(9)	Sections 91-95 except that the initial drop shall be 225mm(9in). Failure shall be when a visible fracture occurs at the bottom surface of the specimen.										
Moisture content ^d , Percent	4-9 incl., and not more than 3 percent variance between any two boards in any one shipment or order.	Sections 165 and 166.										

^a Unless otherwise indicated, the test method reference pertains to sections in ASTM D1037-96. See footnote 2.

^b Condition specimens as described in Section 150.

^c Galvanized nails may bend; therefore, a steel carding pin or steel drill rod of the same diameter is recommended.

^d Since hardboard is a wood-base material, its moisture content will vary with environmental humidity conditions. When the environmental humidity conditions in the area of intended use are a critical factor, the purchaser should specify a moisture content range more restrictive than 4 to 9 percent so that fluctuation in the moisture content of the siding will be kept to a minimum.

C. Inspection

Inspect for any visible defect including (checking, objectionable fiber raising, cracking, erosion or flaking) after 3 weeks. For the procedures described in paragraphs B.2. and B.4. note the amount of film removed.

5. DEFINITIONS

For the purpose of this Standard, the following definitions shall apply:

Checking - Slight breaks in the primer coat that do not penetrate to the substrate.

Cracking - Breaks in the primer coat which allow the substrate to become visible.

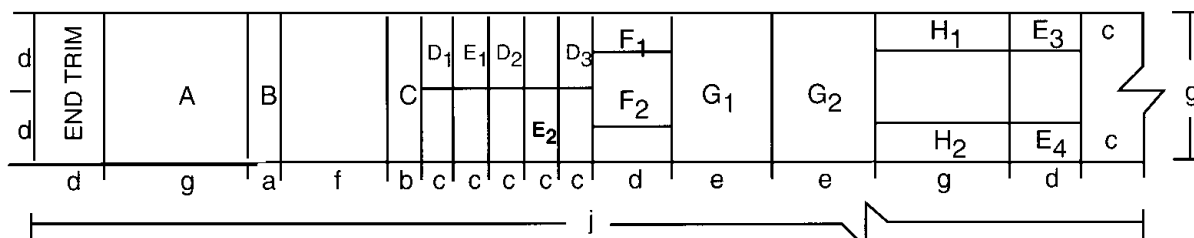
Erosion - The wearing away of the primer coat to expose the substrate.

Fiber Raising - The swelling of individual wood fibers on the board surface which causes them to be raised above the plane of the board surface.

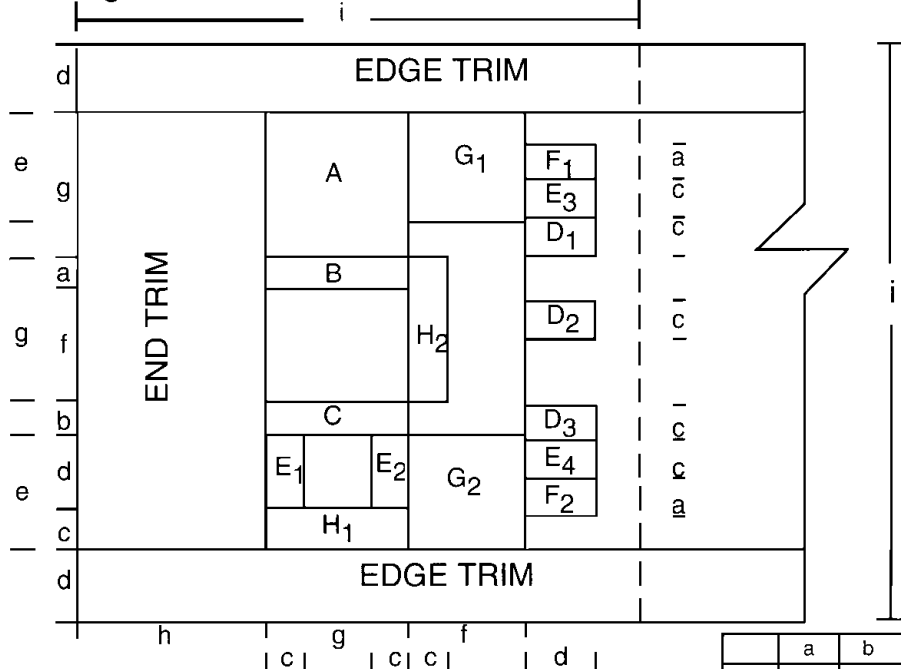
Flaking - The detachment of the primer coat from its substrate.

Figure 1. Test specimen cutting diagram for hardboard siding.⁹

Lap Siding



Panel Siding



- A-Water absorption and thickness swelling
- B-Weatherability of substrate
- C-Weatherability of primed substrate
- D-Nail-head pull-through and lateral nail resistance
- E-Modulus of rupture and thickness
- F-Hardness
- G-Impact
- H-Linear expansion

⁹ Grooved sidings shall be cut so that all strength properties are tested on the ungrooved sections of the board. When lap siding is fabricated in narrower widths than shown in the cutting diagram, the specimens shall be the maximum width possible. Modulus of rupture specimens shall be long enough to provide for the required span plus 50mm(2 in).

Test Specimen Dimensions

	a	b	c	d	e	f	g	h	i	j
mm	50.8	69.9	76.2	152	229	254	305	406	1219	2438
in	2	2 3/4	3	6	9	10	12	16	48	96