American National Standard

Engineered Wood Siding

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ANSI A135.6-2012 (R2020)

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American National Standard

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Abstract

This Standard, previously titled hardboard siding, covers requirements and methods of testing for the dimensions, straightness, squareness, physical properties, and surface characteristics of engineered wood siding. In 2010 the industry changed the product name from hardboard siding to Engineered Wood Siding to more accurately describe the product. 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 Engineered Wood Siding. Engineered Wood Siding is a wood-based product used for exterior wall covering. Engineered Wood 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. The 2012 revision made editorial changes, updated the referenced test methods and changes the product name from hardboard siding to Engineered Wood Siding. This 2020 reaffirmation contains no substantive changes to the 2012 standard.

The development of this American National Standard for Engineered Wood Siding offers manufacturers, consumers, and the general public an effective guide developed under the consensus procedures of the American National Standards Institute. The following organizations, recognized as having an interest in Engineered Wood Siding, participated in the consensus process prior to the approval of this standard.

APA —The Engineered Wood Association

Collins Products, LLC

Element Materials Technology

ICC-ES Evaluation Services, LLC

JELD-WEN

Louisiana-Pacific Corporation

Masonite International

National Association of Home Builders

Uniboard Canada Inc.

University of Minnesota

1. SCOPE

This Standard covers requirements and methods of testing for the dimensions, straightness, squareness, select physical and mechanical properties, and surface characteristics of Engineered Wood Siding at the time of manufacture. 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 Engineered Wood 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 in Table 2 herein. The inspection and test procedures 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 dimensional tolerance for siding shall be plus 0 mm (0 in) and minus 4.8 mm (3/16 in) from the agreed upon specified nominal length and width. Thickness shall be as specified in Table 1. Thickness shall be determined in the following manner.[1] Panel thickness shall be measured with a micrometer having 19 mm (3/4 in) diameter anvils. Measurement shall be taken at an applied anvil pressure of not less than 34 kPa (5 psi) or more than 69 kPa (10 psi).The location of measurement shall be representative of general panel thickness at approximate mid-width on one end of each panel. Panels should be measured while still in their largest practical size which typically would be a whole panel. If that measurement is below minimum or above maximum requirements, three additional measurements shall be taken, one at approximate mid-width on the opposite end and one at approximate mid-length on each side of the panel, and the average of four measurements shall be taken as the thickness of that panel.

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 Range for Engineered Wood Siding

Specified 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

[1] For embossed products, take two measurements on each sample. Each measurement should be taken at the highest point along 25 mm (1 in) lines which are perpendicular to the long edges of the sample. These lines shall be at the midpoints of the edges and extend in from the sample edges 25 mm (1 in) The two measurements should be averaged for each sample.

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. Select Physical and Mechanical Properties. The siding shall be manufactured primarily of interfelted ligno-cellulosic fibers, consolidated under heat and pressure in a hot-press to a density of not less than 500 kg/m3 (31 lbs/ft^3) 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 Figures 1 or 2.

3.6. Linear Expansion. The relative humidity range for measuring Linear Expansion is 30 to 80%.

4. INSPECTION AND TEST PROCEDURES

4.1. Weatherability of Substrate

A) Apparatus

1) Forced—air circulation[2] 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±5°)
5) Rack capable of suspending test specimens in water bath to a depth of 25 mm±3.2 mm (1 in±1/8 in).

B) Test Specimen

Specimen shall be a nominal 50 mm (2 in) by at least 150 mm (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 50 mm (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 0.02 mm (0.001in).
3) Suspend specimen in vertical position with the measured end in water bath to a depth of 25 mm (1 in). Specimens should be no closer than 6.4 mm (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 18.5 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:

$$\% \text{ Residual Swell} = \frac{100(CF - CI)}{CI}$$

where: CI=Conditioned Initial Thickness

CF = Conditioned Final Thickness

Note: Should scheduling necessitate a hold in the test cycle, it must be done at the conclusion of 4.1.C.4.f. Specimens shallbe sealed in a plastic bag at room temperature (21°C±3°, 68°F±5°)

4.2. Weatherability of Primed Substrate[3]. Unprimed products shall be primed before testing. This test is not applicable to factory prefinished product. This test is applicable only to flat surfaces. If a textured product is to be tested, a flat area of the pattern should be selected.

[3] Minimum circulation rate is to be 7100 L/min. (250 ft^{3}lmin).

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 or excessive chipping next to the cut.

A) Apparatus
A weathering appliance of type D or DH as described in ASTM D153-04, Standard Practice for Operating Enclosed Carbon Arc Light Apparatus Exposure of Nonmetallic Materials.

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.

A1.) Alternate Apparatus Alternate method for using Xenon arc weatherometer, per ASTM G155-05a, "Standard Practice for Operating Xenon Arc Light Apparatus for Exposure of Non-Metallic Materials."

B1.) Procedure

1) The primed siding specimen shall be placed in the weathering appliance and tested for 300 cumulative hours using the following cycle:

a) Expose the specimen to 102 minutes of light only followed by 18 minutes of light with a water spray.

b) Remove the specimen from the weatherometer and allow the specimen to rest for at least 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.

c) Inspect as described in 4.2.C.

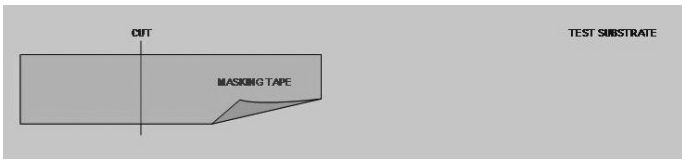
2) Clean the surface of the specimen prepared in paragraph B, and a control specimen[A] as follows. Following the appropriate safety precautions and using the appropriate safety equipment and ventilation, clean the *primed* surface of the specimens with regular mineral spirits (not low odor mineral spirits) as follows. Saturate an absorbent 100% cotton cheesecloth wipe[B] with mineral spirits. Let any excess solvent drip from the wipe prior to wiping, then immediately wipe the primed surface of the specimen with light manual pressure. Allow specimen to dry. Use a fresh wipe and solvent for each test area.

Make a cut at least 25 mm (1 in) long into the test finish with a new sharp #11 X-ACTO blade mounted in an X-ACTO #1 precision blade holder[C] or equivalent.

Apply a piece of 25 mm (1 in) wide flatback masking tape[D] perpendicular to the cut and press firmly in place by using the roller specified in ASTM D3330/D3330M-04, "Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape[E]." Roll twice in each lengthwise direction; forward and back, twice.

Allow the cut to extend beyond the edges of the tape and the tape to contact the finish for a distance of at least 50 mm (2 inches) on each side of the cut.

Allow sufficient excess tape on one side, or extend the tape tab as needed with an additional length of tape, to perform a 90° peel adhesion. For interlaboratory comparison or when results are contested, conduct adhesion testing using a constant-rate-of-extension (CRE) tension or peel tester, per ASTM D3330/D3330M-04, Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape, Test Method F – Single Coated Tapes at 90° Angle.[F] Another option is 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. For either technique, measure the distance from the cut to where the finish ceases to be "picked up" by the tape. The surface is deemed flat when no light appears between the surface and a straight edge resting upon the surface.



3) With paint and smooth siding specimens at 20°C±3°C (68°F±5°C), apply an acrylic latex paint using a No. 60 wire wound rod drawdown bar to give 0.08 ± 0.03 dry mm (3 ± 1 mil dry) thickness. The paint shall be formulated in accordance with Rohm & Haas Formulation W-264-8. Allow the paint to dry for 7 (+2 / -0) days at 20°C±3° (68°F±5°) 50±5% RH. If the specimen's surface can not be coated evenly, use a 120 grit sanding block to chamfer the specimen's edge prior to applying the topcoat.

4) Using the specimen prepared in paragraph B.3., repeat the adhesion test described in paragraph B.2.

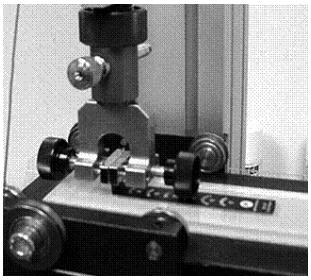
Note (A) Conducting paint adhesion testing on a control board, as well as an exposed board, will help determine if adhesion properties change as a result of exposure.

Note (B) The following product, or an equivalent, will meet this requirement: Fisherbrand Cheesecloth wipes, certified to be 100% pure cotton of reagent grade quality. Available from Fisher Scientific.

Note (C) X-ACTO #1 blade holder and #11 blades are available through many retail sources.

Note (D) The masking tape shall be procured within the past six months, have been properly stored at 21°±3°C (70°±5°F) and 50%±2%Relative Humidity, and shall have an adhesion to stainless steel strength of 7.1 ± 0.7 N/10mm (65 ± 6 oz. per in) when tested in accordance with ASTM Test Method D3330/ D3330M-04, "Standard Test Method for Peel Adhesion of Pressure-Sensitive Tape." Per the manufacturer's specifications, 3M #250 Flatback Masking Tape meets these requirements, but adhesion strength should be verified within 7 days of all tests.

Note (E) ASTM D3330-04, section 6.4.1 A steel roller 85 ± 2.5 mm [3.25 ± 0.1 in.] in diameter and 45 ± 1.5 mm [1.75 ± 0.05 in.] in width, covered with rubber approximately 6 mm [0.25 in.] in thickness, having a Shore scale A durometer hardness of 80 ± 5. The surface shall be a true cylinder void of any convex or concave deviations. The mass of the roller shall be 2040 ± 45 g [4.5 ±0.1 lb]. 6.4.2 No part of the apparatus shall increase the mass of the roller during use. The roller shall move either mechanically or by hand at the rate of 10 ± 0.5 mm/s [24 ± 0.5 in./min]. A mechanically operated roller is recommended when results are contested.



Note (F) ASTM D3330-04, section 16.2 Double back the folded end of the tape at a 90° angle and peel 25 mm [1 in.] of the tape from the panel. Place the panel into a fixture clamped to the moving jaw of the adhesion tester so that it will maintain a peeling angle at 90° during the peeling of the next 75 mm [3 in.] of tape and the free end of the tape into the other jaw. Operate the moving jaw at 5.0 ± 0.2 mm/s [12 ± 0.5 in./min]. This method allows for an even uniform pulling of the test tape.

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.

[3] The Weatherability of Primed Substrate test is used to test the adhesions of the primer paint and the finish coat of paint applied in the field even if the finish coat is not applied immediately after installation but within the manufacturer's guidelines.

Table 2.
Physical and Mechanical Properties of Engineered Wood Siding

Property	Requirement		Test Method[a,b]
Water absorption, percent based on weight (max avg per panel)	12		Section 36. Submerge the specimens horizontally under water.
Thickness swelling, percent (max avg per panel)	8		Section 36. Use a 19 mm (3/4 in) anvil on the micrometer. Submerge the specimens horizontally under water.
Weatherability of substrate (max percent residual swell)	17		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 than 3.2 mm (0.125in) of coating "picked up."		4.2 of this Standard.
Linear expansion 30–80% RH. (max percent) Specific Method	Specified Thickness mm (in) 6.4 (1/4) 9.5 (3/8) 11.1 (7/16) 12.7 (1/2)	Maximum Linear Expansion % 0.31 0.33 0.35 0.35	Section 24 and Notes 47 and 48. Lap siding shall be cut parallel with the long dimension of the siding. Report maximum RH used.
Nail-head pull-through, N (lb) (min avg per panel)	670 (150)		Section 15 except that specimens shall be tested in the dry condition. Three 6-penny (2.9 mm, 0.113 in wire diameter) common nails shall be used per specimen. The nails shall be driven into the specimen at least 25mm (1in) apart. The holding fixture shall consist of a plate with a 38mm (1-1/2 in) diameter opening centered in it, and the speed of testing shall be at a rate of 3.2-4.5 mm (0.125-0.175 in) per minute. For embossed products, disregard thickness.
Lateral nail resistance N (lb) (min avg per panel)	670 (150)		Section 13 except that specimens shall be tested in the dry condition. One 8-penny (3.3 mm, 0.131 in diameter) nail shall be used per specimen spaced 9.5 mm (3/8 in) from any specimen edge[c]. Testing speed shall be 3.2 - 4.5 mm (0.125 - 0.175 in) per minute. For embossed products, disregard thickness.
Modulus of rupture[d] MPa (psi) (min avg per panel)	12.4 (1800) for 9.5 mm (3/8 in), 11.1 mm (7/16 in), & 12.7 mm (1/2 in) thick 20.7 (3000) for 6.4 mm (1/4 in) thick		Section 33. For panel siding test 2 specimens perpendicular and 2 parallel. When testing Lap Siding, if the face grooves or width prevent the cutting of samples in the perpendicular direction then 4 specimens shall be cut from the parallel direction.
Hardness N (lb) (min avg per panel)	2000 (450)		Section 17. For embossed products, conduct test on backside only.
Impact mm (in) (min avg per panel)	225 (9)		Section 21 except that the initial drop shall be 225 mm (9 in). Failure shall be when a visible fracture occurs at the bottom surface of the specimen.
Moisture Content[e], Percent	4 to 9, and not more than 3 percent variance between any two boards in any one shipment of order.		Section 37.

[a] Unless otherwise indicated, the test method reference pertains to sections in Part B in ASTM D1037-06a.

[b] For all tests using these test methods, except for Moisture Content, specimens shall be conditioned as described in Section 31 of ASTM D1037-06a at 50±2 % RH and a temperature of 22±1ºC (72±2ºF). Moisture Content shall be tested "as is' with no conditioning.

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

[d] The modulus of rupture determined by following Section 33 of ASTM D 1037-06a is considered a hybrid shear-bending estimate due to ratio of the specimen's length to the support span length.

[e] Since Engineered Wood Siding 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.

6. IDENTIFICATION

6.1. Information to be Provided. All Engineered Wood Siding which is represented as conforming to this American National Standard shall be identified with the following information:

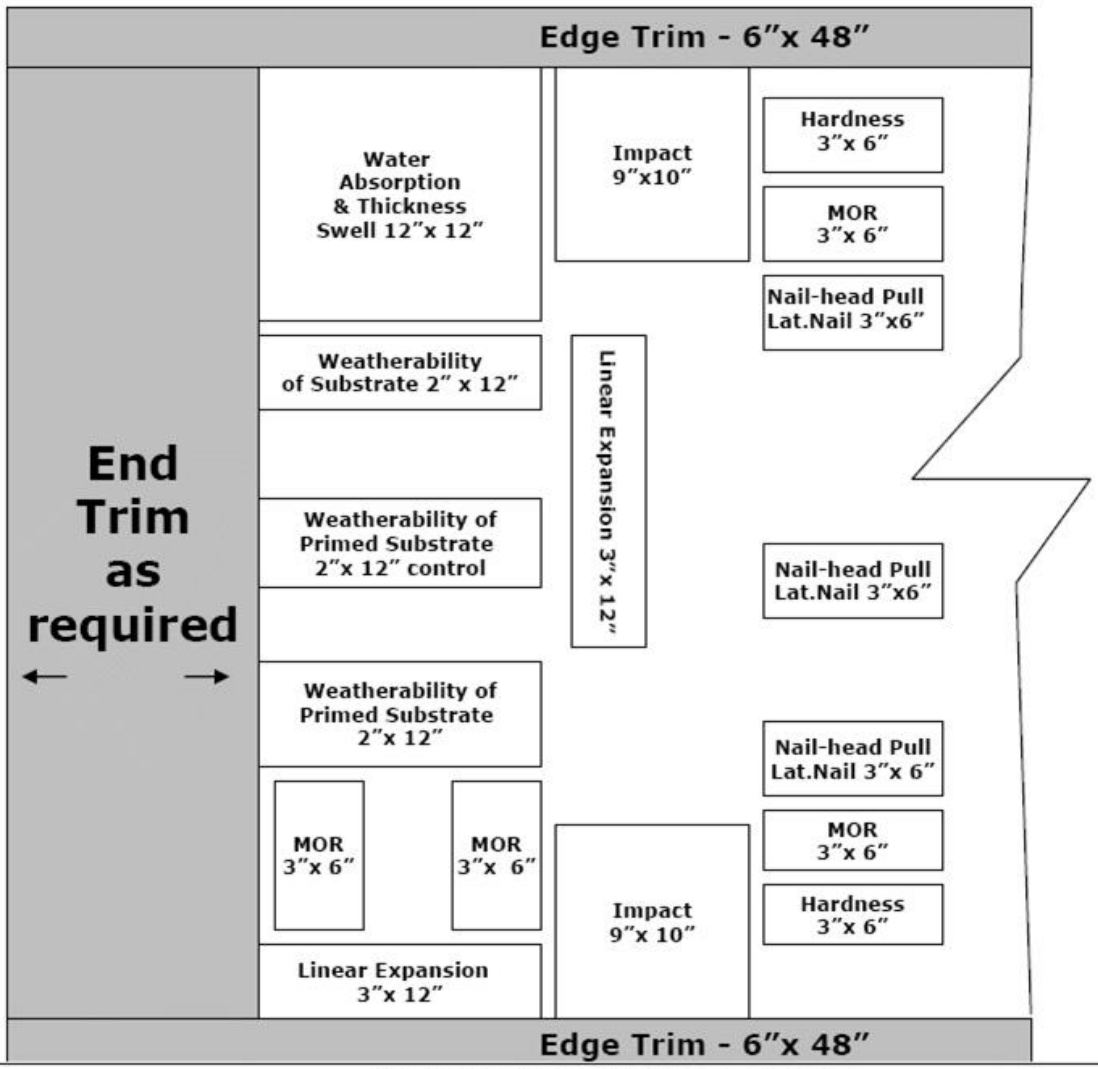
A) Manufacturer's name or trademark and mill identification

B) "ANSI A135.6-2012"

C) Lot number or date of production

6.2. Identification Methods. The identification required by Subsection 6.1 shall be in accordance with the manufacturer's quality manual.

Figure 1. Panel Siding Cutting Diagram
Original Specimen Size Approximately 48"x 48"



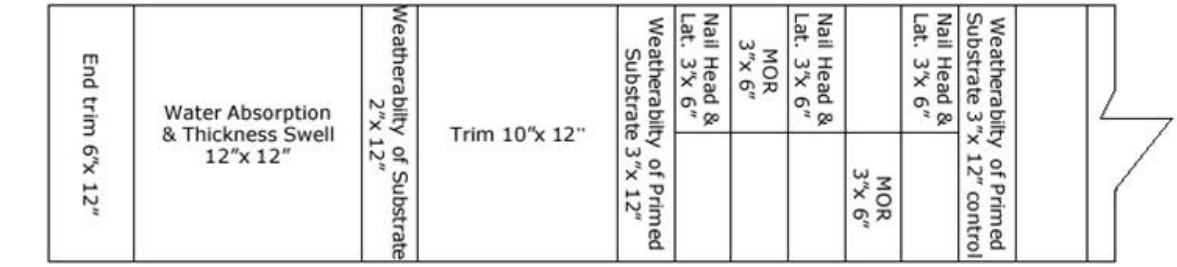
Test Specimen Dimensions in mm.

Water Absorption and Thickness Swell - 305mm x 305mm
MOR and Thickness - 76.2mm x 152mm
Nail Head Pull and Lateral Nail Resistance - 76.2mm x 152mm
Linear Expansion - 76.2mm x 305mm
Weatherability of Substrate - 50mm x 305mm
Weatherability of Primed Substrate - 50mm x 305mm
Hardness - 76.2mm x 152mm
Impact - 229mm x 305mm

Figure 2. Test Specimen Cutting Diagram -Lap Siding*

Test Specimen Dimensions in mm.

Water Absorption and Thickness Swell - 305mm x 305mm
MOR and Thickness - 76.2mm x 152mm
Nail Head Pull and Lateral Nail Resistance - 76.2mm x 152mm
Linear Expansion - 76.2mm x 305mm
Weatherability of Substrate - 50mm x 305mm
Weatherability of Primed Substrate – 76.2mm x 305mm
Hardness - 76.2mm x 152mm
Impact - 229mm x 305mm



* 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 50 mm (2in).

COMPOSITE PANEL ASSOCIATION

Founded in 1960, the Composite Panel Association (CPA) is dedicated to advancing the North American wood–based panel and decorative surfacing industries. CPA represents both industries on technical, regulatory, quality assurance and product acceptance issues. CPA General Members include the leading manufacturers of particleboard, medium density fiberboard (MDF) and hardboard, representing about 95% of North American manufacturing capacity.

CPA Associate Members include manufacturers of decorative surfaces, furniture, cabinets, mouldings, doors and equipment, along with laminators, distributors, industry media and adhesive suppliers. All are committed to product advancement and industry competitiveness.