

NET-4 Section 4.XX. Structural Plywood and Wood-Based Structural Panels

4.XX. Structural Plywood and Wood-Based Structural Panels

4.XX.1. Test Equipment

- Steel linear measure
 - For labeled dimensions exceeding 304 mm (12 in), use a measure with 0.05 mm ($\frac{1}{32}$ in or 0.031 in) graduations.
- Calculator
- Worksheet for Plywood Sheet and Wood-Based Structural Panels
- Micrometer, caliper, or dial gauge 25 mm to 50 mm (1 in to 2 in) with 19.1 mm ($\frac{3}{4}$ in) anvils
 - A mechanism that applies constant pressure between 34 kPa (5 psi) and 69 kPa (10 psi) during the measurement.
- For “tongue and groove” (e.g., floor panels) and “shiplap” (e.g., exterior siding panels), a micrometer with a 152 mm (6 in) throat; 19.1 mm ($\frac{3}{4}$ in) anvils may be necessary.
 - A mechanism that applies constant pressure between 34 kPa (5 psi) and 69 kPa (10 psi) during the measurement.
- Gage blocks
- The latest version of U.S. Department of Commerce, Voluntary Product Standard PS 1-09, “Structural Plywood.”
- The latest version of U.S. Department of Commerce, Voluntary Product Standard PS 2-10, “Performance Standard for Wood-Based Structural-Use-Panels.”
- Aluminum foil and plastic bags
- Saw

4.XX.2. Test Procedure

Use this procedure to verify the length, width, and thickness of structural plywood and wood-based structural panels.

1. Follow Section 2.3.1. “Define the Inspection Lot.” Use a “Category A” sampling plan in the inspection. Select a random sample.
2. Identify the Performance Category and actual size of each piece (e.g., 1.2 m × 2.4 m) (4 ft × 8 ft) from the latest version of Voluntary Product Standards PS 1-09, “Structural Plywood” or PS 2-10, “Performance Standard for Wood-Based Structural-Use-Panels”.

- 3. Remove from the lot any outer pieces (top, sides) that have been exposed to the elements (e.g., weather, rain, moisture, sun). Conduct a visual inspection of each panel to ensure there are no signs of water or other damage.**

Note: Overlapping (e.g., shipped siding) or interlocking panels (e.g., tongue and groove floor panels) shall be measured according to the exposed face. Measurements are taken on the surface that will be exposed after installation and shall not include the overlap tab.

4. Determining Length

- **For sheet lengths up to 3 m (10 ft), take at least two measurements along the sheet's length about one-quarter of the distance from the center line to each edge of the sheet (see Figure 4. Determining Length). Average the results to obtain the Average Length.**

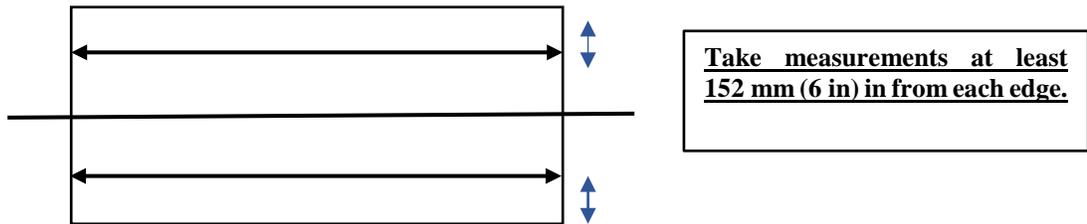


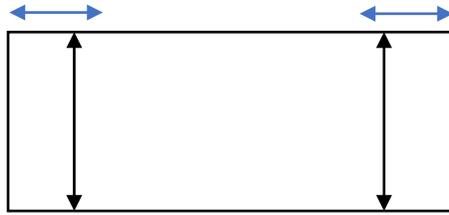
Figure 4. Determining Length.

Note: Measurements should not be made across the ends of the board or where there is a knot or surface defect that may affect the measurement. Measurements should not be taken within 150 mm (6 in) from the edges of the sheet.

5. Determining Width

- **For sheet lengths up to 3 m (10 ft), take at least two measurements across the sheet's width about one-quarter of the distance from each end of the sheet (see Figure 5. Determining Width). Average the results to obtain the Average Width.**

Note: Measurements should not be made anywhere across the sheet where there is a knot or surface defect that may affect the measurement. Measurements should not be taken within 150 mm (6 in) from the ends of the sheet.

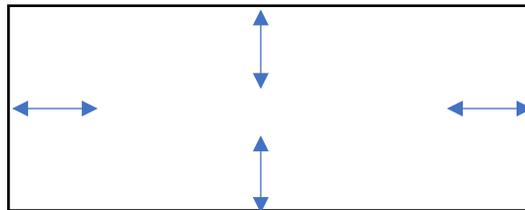


Take measurement at least 152 mm (6 in) in from each edge.

Figure 5. Determining Width.

6. Determining Thickness

- Verify the accuracy of the micrometer, caliper, or dial gauge using the gauge blocks. Use the micrometer, caliper, or dial gauge 25 mm to 50 mm (1 in to 2 in); 19.1 mm ($\frac{3}{4}$ in) anvils to measure thickness and record the actual dimensions on the “Worksheet for Plywood Sheets.” For “tongue and groove” (e.g., floor panels) and “shiplap” (e.g., exterior siding panels) a micrometer with a 152 mm (6 in) throat; 19.1 mm ($\frac{3}{4}$ in) anvils may be necessary.
- Panel thickness shall be measured with a micrometer having 19.1 mm ($\frac{3}{4}$ in) (minus 0, plus 1.3 mm [0.050 in]) diameter anvils.
- Measurements shall be taken at an applied anvil pressure of not less than 34 kPa (5 psi) or more than 69 kPa (10 psi) with the anvil center at 19 mm to 25 mm ($\frac{3}{4}$ in to 1 in) from the panel edge.
- The location of the measurements shall be representative of general panel thickness at approximate mid-length, ± 50 mm (2 in) along each edge of the panel and the average of the four measurements shall be taken as the thickness of that panel (see Figure 6. Determining Thickness). If a measurement point contains a permissible grade characteristic that affects panel thickness, then the measurement point shall be shifted from that point.



Take measurements at least 50 mm (2 in) in from each edge.

Figure 6. Determining Thickness.

4.XX.2.1. Labeling and Other Requirements for Structural Plywood and Wood-Based Structural Panels

a. Structural Plywood Sheets

- 1. Shall be labeled in accordance with the latest version of Voluntary Product Standard PS 1-09 “Structural Plywood.”**
- 2. Includes grade, performance category (abbreviations: PERF CAT, CAT or Category are permitted), thickness, and mill number.**
- 3. Panel sizes are typically 1.2 m (4 ft) × 2.4 m (8 ft), or 2.7 m (9 ft) or 3 m (10 ft) on a nominal basis.**

4. Panel length and width information may be included on the panel manufacturer bundle tag.
5. Panels shall comply with the thickness tolerances for the performance category in the latest version of Voluntary Product Standard PS 1-09, Table 10, “Plywood Thickness Requirements.”
6. Panels shall bear the stamp of a qualified inspection and testing agency in accordance with the latest version of Voluntary Product Standard PS 1-09, Section 7.1 Certification.

b. Structural Panels

1. Shall be labeled according to the latest version of Voluntary Product Standard PS 2-10 “Performance Standard for Wood-Based Structural Use Panels” for grade, span rating, performance category (abbreviations: PERF CAT, CAT or Category are permitted), thickness, and mill number.
2. Performance category, such as 23/32 PERF CAT, means the sheet shall comply with the thickness tolerances for 23/32 PERF CAT in the latest version of Voluntary Product Standard PS2-10, Table 1 “Panel Thickness Requirements.”
3. Panels shall bear the stamp of a qualified inspection and testing agency in accordance with the latest version of Voluntary Product Standard PS 2-10, Section 8.1. Certification.

Notes:

- (1) When structural plywood sheets or structural panels are tested in retail stores, it is recommended that they be sorted by mill and then panel type (grade, thickness).
- (2) If lots are mixed, be sure to record the codes for all sheets in the sample so the inspector and other interested parties can follow up on the information.
- (3) Record or attach a photograph of the information located on the grade stamp including the manufacturer, grade, standard (i.e., PS 1), mill number, and agency.

4.XX.2.2. Moisture Allowance for Structural Plywood and Wood-Based Structural Panels

Structural Plywood and OSB shrink and swell with changes in moisture content. The standardized moisture content for Structural Plywood is 9 % (PS 1-09, Section 5.10, “Dimensional Tolerances and Squareness of Panels)”. The equivalent standardized moisture content of OSB is 8 %.

1. If the average error is a minus value, determine the moisture content on each piece using the latest version of ASTM D4442, “Standard Test Methods for Direct Moisture Content Measurement of Wood and Wood-Based Materials”, Method B. “Secondary Oven-Drying Method”.
2. Using a saw, cut a 15.24 cm × 15.24 cm (6 in × 6 in) piece from each sample at least 50 mm (2 in) from any edge.
3. Tightly wrap each piece in aluminum foil and place each sample in a plastic bag to preserve moisture content during transport to the laboratory.
 - a. **Moisture Allowance – Thickness for Structural Plywood and Wood-Based Structural Panels**

1. For structural plywood: 0.35 % adjustment per 1 % moisture content below 9 %.
2. For OSB: 1.0 % adjustment per 1 % moisture content below 8 %.
 - b. Moisture Allowance – Length and Width for Structural Plywood and Wood-Based Structural Panels
 1. For Structural plywood: 0.04 % adjustment per 1 % moisture content below 9 %;
 2. For OSB: 0.04 % adjustment per 1 % moisture content below 8 %.

*It is recommended that the inspector notify APA – The Engineered Wood Association, if any lots fail compliance. APA may be able to provide further evaluation.

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4.XX.3. Evaluation of Results

1. To determine lot conformance, return to Section 2.3.7. “Evaluate for Compliance.”
2. Compliance with the Average Requirement and with the MAV in Table 2-8 “MAVs for Packages Labeled by Length, Width, or Area” is based on the average of multiple measurements on each sheet in the sample.
 - Length – two measurements
 - Width – two measurements
 - Thickness – four measurements
3. If the sample from the lot fails the Average Requirement, a statistical test is applied to a negative average error prior to determining if the sample passes or fails.

(Added 20XX)

Worksheet for Structural Plywood Sheets and Wood-Based Structural Panels

Product:		Mill Number and Agency:					
Labeled Dimensions:		Address:			City/State/Zip:		
Length:							
Width:		Brand/Grade/Surface:			Testing Location:		
Thickness:							

Piece Number	Average Length	Average Width	Average Thickness		Piece Number	Average Length	Average Width	Average Thickness
1.					7.			
Error:					Error:			

2.					8.			
Error:					Error:			

3.					9.			
Error:					Error:			

4.					10.			
Error:					Error:			

5.					11.			
Error:					Error:			

6.					12.			
Error:					Error:			

Total Average:								
Average Error:								

Worksheet for Structural Plywood Sheets and Wood-Based Structural Panels

MAV for Packages Labeled by Length, Width, or Area (Table 2-8)

- 1 m (1 yd) or less in 3 % of labeled quantity.
- More than 1 m (1 yd) to 43 m (48 yd) is 1.5 % of labeled quantity.

Section 1. Compliance with Maximum Allowable Variation

1. Calculate the MAV for labeled thickness = _____. Do any of the minus errors for thickness exceed the MAV?
 - a. If yes, go to Section 5.
 - b. If no, go to Section 2.
2. Calculate the MAV for length = _____. Do any of the minus errors for width exceed the MAV?
 - a. If yes, go to Section 5.
 - b. If no, go to Section 3.
3. Calculate the MAV for labeled width = _____. Do any of the minus errors for length exceed the MAV?
 - a. If yes, go to Section 5.
 - b. If no, go to Section 4.

Section 2. Compliance with the Average Requirement – Thickness

4. Calculate the Average Error for labeled thickness _____. The sample passes this requirement if the Average Error is zero or a positive number. Go to Section 3. If the Average Error is a negative number, go to Step 5.
5. Calculate the Sample Standard Deviation (*s*) and multiply (*s*) by the Sample Correction Factor (*SCF*) for the sample size to obtain the Sample Error Limit (*SEL*). Go to Step 6.
$$(s) \times (SCF) = SEL$$
6. Disregarding the signs, is the *SEL* in Step 5 larger than the Average Error in Step 4? If yes, the lot passes on thickness. If no, go to Section 3.

Section 3. Compliance with the Average Requirement – Length

7. Calculate the Average Error for labeled length _____. The sample passes this requirement if the Average Error is zero or a positive number. Go to Section 4. If the Average Error is a negative number, go to Step 8.
8. Calculate the Sample Standard Deviation (*s*) and multiply (*s*) by the Sample Correction Factor (*SCF*) for the sample size to obtain the Sample Error Limit (*SEL*). Go to Step 9.
$$(s) \times (SCF) = SEL$$
9. Disregarding the signs, is the *SEL* in Step 8 larger than the Average Error in Step 7? If yes, the lot passes on length. If no, go to Section 4.

Worksheet for Structural Plywood Sheets and Wood-Based Structural Panels

Section 4. Compliance with the Average Requirement – Width

10. Calculate the Average Error for labeled width _____. The sample passes this requirement if the Average Error is zero or a positive number. Go to Section 6. If the Average Error is a negative number, go to Step 11.

11. Calculate the Sample Standard Deviation (*s*) and multiply (*s*) by the Sample Correction Factor (*SCF*) for the sample size to obtain the Sample Error Limit (*SEL*). Go to Step 12.

$$(s) \text{_____} \times (SCF) \text{_____} = SEL \text{_____}$$

12. Disregarding the signs, is the *SEL* in Step 11 larger than the Average Error in Step 10? If yes, approve the lot. If no, go to Section 5.

Section 5. Determine Shrink Allowance

If the average error for any dimension (thickness, length, width) is a minus value, or if the MAV is exceeded for any piece, perform a moisture test on each piece to determine if a shrinkage allowance should be applied. Apply the appropriate allowance to each piece, then re-calculate the average error and re-determine compliance with the MAV.

Piece Number	Moisture Content	Shrinkage Allowance		Piece Number	Moisture Content	Shrinkage Allowance
1.				7.		
2.				8.		
3.				9.		
4.				10.		
5.				11.		
6.				12.		

Section 6. Action Taken: Lot Rejected Lot Approved

Comments:	Official Name/Signature:
	Date:

Random Numbers: Enter the numbers as you select them in the top row and reorder them in the bottom row.
