

Australian/New Zealand Standard™

Reconstituted wood-based panels— Methods of testing

Part 1: Base panels



AS/NZS 4266.1:2017

This Joint Australian/New Zealand Standard was prepared by Joint Technical Committee TM-011, Engineered Timber Products. It was approved on behalf of the Council of Standards Australia on 12 October 2017 and by the New Zealand Standards Approval Board on 1 November 2017.
This Standard was published on 13 December 2017.

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Australian Forest Products Association
Australian Timber Importers Federation
Australian Wood Panels Association
Building Research Association of New Zealand
Engineered Wood Products Association of Australasia
Forest and Wood Products Australia
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This Standard was issued in draft form for comment as DR AS/NZS 4266.1:2016.

Australian/New Zealand Standard™

Reconstituted wood-based panels— Methods of testing

Part 1: Base panels

Originated in Australia as part of AS O115—1968, AS 1859—1976, AS/NZS 4266.11:1995, AS/NZS 4266.13:1995, AS/NZS 4266.14:1995, AS/NZS 4266.16:1995, AS/NZS 4266.34(Int):2001 and AS/NZS 4266.35(Int):2001 and in New Zealand as part of NZS/BS 1142.1:1971 and NZS/BS 1142:1989.

Previous edition AS/NZS 4266.1:2004.

AS/NZS 4266.1:2004, AS/NZS 4266.2:2004, AS/NZS 4266.3:2004, AS/NZS 4266.4:2004, AS/NZS 4266.5:2004, AS/NZS 4266.6:2004, AS/NZS 4266.7:2004, AS/NZS 4266.8:2004, AS/NZS 4266.9:2003, AS/NZS 4266.10:2004, AS/NZS 4266.11:2004, AS/NZS 4266.12:2004, AS/NZS 4266.13:2003, AS/NZS 4266.14:2004, AS/NZS 4266.16:2004, AS/NZS 4266.34:2004 and AS/NZS 4266.35:2004 jointly revised and designated as AS/NZS 4266.1:2017.

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Jointly published by SAI Global Limited under licence from Standards Australia Limited, GPO Box 476, Sydney, NSW 2001 and by Standards New Zealand, PO Box 1473, Wellington 6140.

ISBN 978 1 76035 959 1

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TM-011, Engineered Timber Products.

This Standard supersedes the following methods from the AS/NZS 4266 series *Reconstituted wood-based panels—Methods of test*:

- Method 1: Sampling, cutting, and conditioning of test pieces (2004)
- Method 2: Dimensions, squareness, flatness and edge straightness of whole panel (2004)
- Method 3: Moisture content (2004)
- Method 4: Density (2004)
- Method 5: Modulus of elasticity in bending and bending strength (2004)
- Method 6: Tensile strength perpendicular to the plane of the panel (internal bond strength) (2004)
- Method 7: Surface soundness (2004)
- Method 8: Swelling in thickness after immersion in water (2004)
- Method 9: Thickness stability and glue bond quality (2003)
- Method 10: Wet bending strength after immersion in water at 70°C or boiling temperature (2004)
- Method 11: Moisture resistance under cyclic test conditions (2004)
- Method 12: Surface water absorption (2004)
- Method 13: Resistance to axial withdrawal of screws (2003)
- Method 14: Dimensional changes associated with changes in relative humidity (2004)
- Method 16: Formaldehyde emission—Desiccator method (2004)
- Method 34: Surface absorption
- Method 35: Dimensions of test pieces (2004)

The objectives of this revision are—

- (a) to update test methods for reconstituted wood-based panels after 10 years;
- (b) to consolidate many separate test method Standards into one document; and
- (c) to adopt ISO versions of test methods where appropriate.

This Standard covers methods of test for properties specified in the following Standards for reconstituted wood-based panels:

AS/NZS

- 1859 Reconstituted wood-based panels—Specifications
 - 1859.1 Part 1: Particleboard
 - 1859.2 Part 2: Dry process fibreboard
 - 1859.4 Part 4: Wet process fibreboard
- 1860 Particleboard flooring
 - 1860.1 Part 1: Specifications

The terms ‘normative’ and ‘informative’ are used in a Standard to define the application of the appendices to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

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STANDARDS AUSTRALIA/STANDARDS NEW ZEALAND

Australian/New Zealand Standard
Reconstituted wood-based panels—Methods of testing

Part 1: Base panels

SECTION 1 SCOPE AND GENERAL**1.1 SCOPE**

This Standard covers methods of test for properties specified in the following standards for reconstituted wood-based panels:

AS/NZS

1859 Reconstituted wood-based panels—Specifications

1859.1 Part 1: Particleboard

1859.2 Part 2: Dry process fibreboard

1859.4 Part 4: Wet process fibreboard

1860 Particleboard flooring

1860.1 Part 1: Specifications

NOTES:

- 1 Test methods for AS/NZS 1859.3, Decorative overlaid wood panels, are covered in AS/NZS 4266.2.
- 2 Sampling specified in this Standard is suitable for production control.

1.2 REFERENCED DOCUMENTS**AS/NZS**

1859 Reconstituted wood-based panels—Specifications

1859.1 Part 1: Particleboard

1859.2 Part 2: Dry process fibreboard

1859.4 Part 4: Wet process fibreboard

1860 Particleboard flooring

1860.1 Part 1: Specifications

ISO

835 Laboratory glassware—Graduated pipettes

1478 Tapping screws thread

16985 Wood-based panels—Determination of dimensional changes associated with changes in relative humidity

16987 Wood-based panels—Determination of moisture resistance under cyclic test conditions

27528 Wood-based panels—Determination of resistance to axial withdrawal of screws

1.3 TEST EQUIPMENT

1.3.1 Thickness measurement

Micrometer, or similar measuring instrument, having flat and parallel circular anvils of between 6.0 mm to 16.0 mm diameter. The graduation of the instrument shall allow reading to 0.01 mm.

NOTE: The anvil diameter selected will depend on the panel type. In principle, panels of low density and/or uneven surface should be measured using the larger anvil diameter.

1.3.2 Length and width measurement

Length and width shall be measured in accordance with the following:

- (a) *For panels* Steel measuring tape, scale interval 1 mm.
- (b) *For test pieces* Sliding calliper, or any other instrument with measuring surfaces of a least 5 mm wide, graduated to allow a reading to 0.1 mm.

1.3.3 Drying oven

Ventilated drying oven capable of being controlled to $103 \pm 2^\circ\text{C}$.

1.3.4 Balance

Balance with a scale interval of 0.01 g.

1.3.5 Deviation measurement

A steel rule, wedge or calliper for deviation measurement allowing a reading of 0.5 mm.

1.3.6 Thermometer

A thermometer or other temperature measuring equipment, capable of measuring to $\pm 0.5^\circ\text{C}$.

1.4 DEFINITIONS

For the purposes of this Standard the definitions below apply.

1.4.1 Batch

Any quantity of panels from the same manufacturer that is presented for sampling, consisting of panels from a single product type, grade or class of the same thickness range manufactured under essentially the same production conditions.

NOTE: A batch may consist of multiple production runs.

1.4.2 Initial type testing (ITT)

Testing to confirm compliance of a new product or of a product already in production but for which no compliance claims were made.

1.4.3 Production run

Panels of the same product type, grade or class of the same thickness range manufactured under essentially the same production conditions.

1.4.4 Thickness range

Panels for which the same specification limits apply according to the relevant product specification.

1.5 CONDITIONING

When required, the test pieces shall be conditioned to constant mass, or for seven days, in a standard climate of $20 \pm 2^\circ\text{C}$ and relative humidity of $65 \pm 5\%$.

Constant mass is considered to have been reached when the results of two successive weighing operations, carried out at an interval of 24 hours, do not differ by more than 0.1% of the mass of the test piece.

In some cases, for instance in a cyclic test in humid conditions, alternative conditioning procedures may be specified. In this case, the appropriate Standard shall be consulted and followed.

NOTE: The tests should be carried out not later than one hour after removal of the test pieces from the conditioning environment.

1.6 EXPRESSION OF RESULTS

Each test method provides the method of calculating the relevant property of each test piece and the appropriate precision to express the result. The property of a panel shall be obtained by calculating the arithmetic mean of the property of all the test pieces taken from the same panel and shall be expressed with the same precision as for the test pieces.

1.7 EVALUATION OF RESULTS

1.7.1 General

Each product standard (AS/NZS 1859.1, AS/NZS 1859.2, AS/NZS 1859.4 and AS/NZS 1860.1) specifies properties for which compliance will be confirmed by statistical methods and which may be confirmed by mean values.

1.7.2 Confirmation by mean value

Where confirmation of compliance of a particular property is permitted by using means, panel properties shall be averaged and the result compared with the required value for the relevant product. The number of sample panels to be included in the average shall be those as specified in Clause 2.1.

1.7.3 Statistical analysis

Statistical methods are used to calculate 5-percentile or 95-percentile values as outlined in Appendix A. Other statistical methods may be used to confirm compliance if it can be demonstrated that the alternative method is equivalent to the methods documented in this Standard.

The probability of acceptance at the 5-percentile or 95-percentile has been set at 50%.

Appendix A provides two options for evaluating test results; one is based on panels sampled from production runs, the other is based on the last panel sample mean and the rolling 30 sample panel standard deviations for the same product type. Only one of these two methods is required to assess compliance with product Standard requirements.

1.8 TEST METHOD VARIATIONS

This Standard specifies test methodology for determining the nominated properties of particleboard and fibreboard. The designated methods shall be used to resolve doubts or disputes. Variations to some aspects of the standard methods may be permitted for process control testing provided that evidence is maintained to confirm—

- (a) the variation is conservative compared with the standard method; and/or
- (b) a valid correlation is established between the standard method and the varied method.

Online testing or continuous monitoring may be used if similar accuracy to standard methods can be demonstrated.

Guidance on statistical analysis to confirm an alternative test method is provided in Appendix C.

1.9 TEST REPORT

If required, the test report shall contain the following:

- (a) Name and address of testing laboratory.
- (b) Where required, a sampling report according to Section 2.
- (c) Date of the test report.
- (d) Reference to this Standard, i.e. AS/NZS 4266.1 and the relevant section.
- (e) Panel type and thickness.
- (f) Relevant product specification.
- (g) Surface treatment, if relevant.
- (h) Test results expressed as stated in the relevant section of this Standard.
- (i) All deviations from this Standard.

SECTION 2 SAMPLING AND PREPARATION OF TEST PIECES

2.1 SAMPLING

2.1.1 General

Sampling depends on the purpose for the determination of panel properties. This Standard covers two sampling arrangements; sampling for initial type testing followed by sampling for production control and sampling to confirm a specific batch. The method of assessing compliance for dimensions, formaldehyde emission and all other properties shall be as specified in relevant product Standards.

2.1.2 Initial type testing

Sampling for initial type testing shall be as follows:

- (a) At least twelve sample panels shall be selected at random from three production runs of the same product type. At least three samples shall be taken from each run.
- (b) Test pieces shall be cut from each panel as listed in Appendix B and properties determined according to the test methods in this Standard.
- (c) Confirmation of compliance shall be based on sample means and standard deviations as outlined in Appendix A using Table A1.

NOTE: After initial type testing, normal production control procedures should follow.

2.1.3 Production control

Sampling frequency for production control is at the discretion of the manufacturer with consideration given to the following factors:

- (a) Degree of production control in relation to plant age and the extent and nature of continuous monitoring.
- (b) Type of product (e.g. structural, such as flooring or panels intended for a decorative overlay).
- (c) History of plant stability or variability.
- (d) Test pieces should be cut from each panel as listed in Appendix B and properties determined according to the test methods in this Standard.

Confirmation of compliance shall be based on sample means and standard deviations according to Appendix A with two options as outlined in Tables A1 and A2.

2.1.4 Batch assessment

The number of panels sampled from a batch shall be determined by the test facility or testing authority with consideration given to the following:

- (a) Purpose of the sampling and testing.
- (b) Nature of the batch (e.g. a quantity of imported material).
- (c) Nature of the product.
- (d) Any knowledge of the manufacturing arrangements.
- (e) Size (number of panels) of the batch.

NOTES:

- 1 Appendix B provides requirements on test pieces to be cut from each sample panel.
- 2 A minimum of 12 sample panels is recommended for batch evaluation which will give a probability of acceptance similar to that for initial type testing. If subsequent testing is required of panels essentially from the original batch, a smaller number of sample panels could be considered.
- 3 Confirmation of compliance following batch assessment applies only to the panels making up the batch.

Confirmation of compliance shall be based on sample means and standard deviations as outlined in Appendix A using Table A1.

2.2 TEST PIECES**2.2.1 Cutting**

The test pieces shall be cut from the individual panels to the dimensions specified in the relevant Standards for the respective test methods, using a suitable method to ensure unbiased selection. Cutting of test pieces shall be carried out in such a way that their edges are clean, without burns, and perpendicular to the plane of the panel.

NOTE: Test pieces of larger size may be used where there is difficulty in safely cutting small pieces. In such cases, the correlation should be derived with the size specified in this Standard.

2.2.2 Cutting plan

Test pieces shall be extracted from the panel in such a manner as to ensure they are representative of the entirety of the panel.

If required, a copy of the cutting plan should be included in the sampling report [see Clause 2.4(e)].

2.2.3 Marking

All test pieces cut from a panel shall be marked on the same surface with—

- (a) the test panel identification number;
- (b) the test piece serial number; and
- (c) if possible, the original length direction and the original upper or lower surface of the panel.

2.2.4 Asymmetric surfaces

Where the product is designed to be used with one surface as the 'top' or 'loadbearing surface' and nominated by the manufacturer as such, then all test pieces shall be tested on the specified top face.

In all other cases where the orientation of the surface of the panel is of minor influence on the property tested, the position of the upper or lower surface during the test shall be chosen at random.

2.3 CONDITIONING

When required, the test pieces shall be conditioned in accordance with Clause 1.5. Conditioning is not required for production control, unless specified in the test method.

2.4 SAMPLING REPORT

When required, the sampling report shall contain the following:

- (a) Where required, place and date of sampling and persons present at sampling.
- (b) Reference to this Standard, i.e. AS/NZS 4266.1.

- (c) Number of panels.
- (d) Number of test pieces taken from each panel for each test.
- (e) A copy of the cutting plan used, if required.
- (f) Results of test(s).
- (g) Any further relevant information.

NOTE: A sampling report is not usually required for production control sampling.

SECTION 3 DIMENSIONS OF TEST PIECES

3.1 PRINCIPLE

The thickness, length and width of test pieces are determined by linear measurement.

3.2 TEST EQUIPMENT

Micrometer for thickness measurement and sliding calliper for length and width measurement are as specified in Section 1.

3.3 PROCEDURE

3.3.1 Measuring points

The number and positions of the measuring points shall be as specified for specific test methods.

3.3.2 Thickness measurement

Without excessive pressure, apply the measuring surfaces of the instrument to the test piece. Measure the thickness to the required accuracy as specified in the test method.

3.3.3 Length and width measurement

For measuring the length and width, without excessive pressure, apply the measuring instrument to the test piece, at an angle of approximately 45° to the plane of the test piece (see Figure 3.1). Measure the length and width to the required accuracy as specified in the test method.

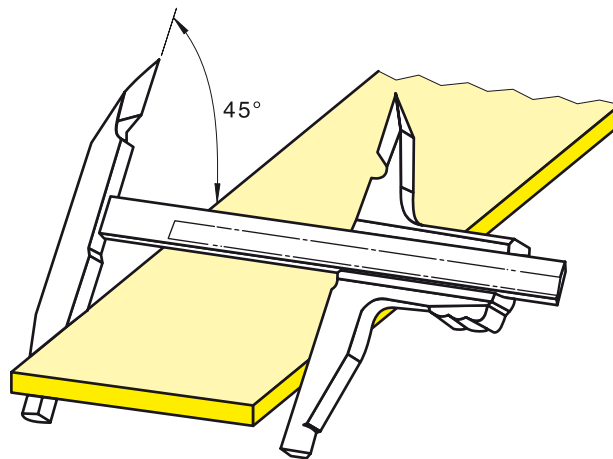


FIGURE 3.1 INCLINATION OF SLIDING CALLIPER TO PLANE OF TEST PIECE

SECTION 4 DIMENSIONS, SQUARENESS, FLATNESS AND EDGE STRAIGHTNESS OF PANELS

4.1 PRINCIPLE

Thickness, length and width of full size panels are determined by linear measurement. Squareness and edge straightness are determined by measurement of deviation from a mechanical square, or straightedge, respectively. Alternatively, squareness may be measured as the difference between panel diagonals.

Flatness is determined by measuring the deviation of the panel surface from a taut string line placed across the whole surface and against the edge of the panel.

Normally the dimensions of panels are measured in the as-received state. If specified, the moisture content of the panels shall be determined in accordance with Section 5.

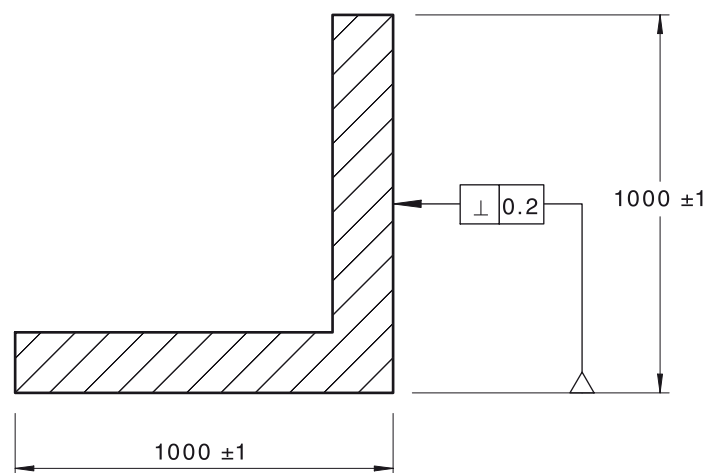
4.2 TEST EQUIPMENT

4.2.1 Measuring instruments

Thickness is measured with a micrometer, dimensional measurements are made with a steel tape and deviation measurements with a steel rule, as specified in Section 1.

4.2.2 Steel measuring tape or mechanical square

If squareness is measured by the diagonals method, a steel measuring tape shall be used. If squareness is measured using the mechanical square, it should have two arms of 1000 ± 1 mm for measuring the deviation of the angles of adjacent sides of a panel from a right angle. It shall be accurate to 0.2 mm in 1000 mm (see Figure 4.1).



DIMENSIONS IN MILLIMETRES

FIGURE 4.1 ACCURACY REQUIREMENTS OF MECHANICAL SQUARE

4.2.3 String line

A straightedge of length at least equal to the length of the board, or wire of constant cross-section and flexible enough to be stretched to assure linearity. A string line shall be fine builders string line for flatness measurement.

4.3 PROCEDURE

4.3.1 Determination of thickness of panels

Measure the thickness between 24 mm to 50 mm from the edges, at points located in each corner and in the middle of each side, that is, at eight points in all (see Figure 4.2), to an accuracy of 1% of the thickness but to not less than 0.1 mm.

For measuring the thickness, apply the measuring surfaces of the instrument slowly to the panel surface.

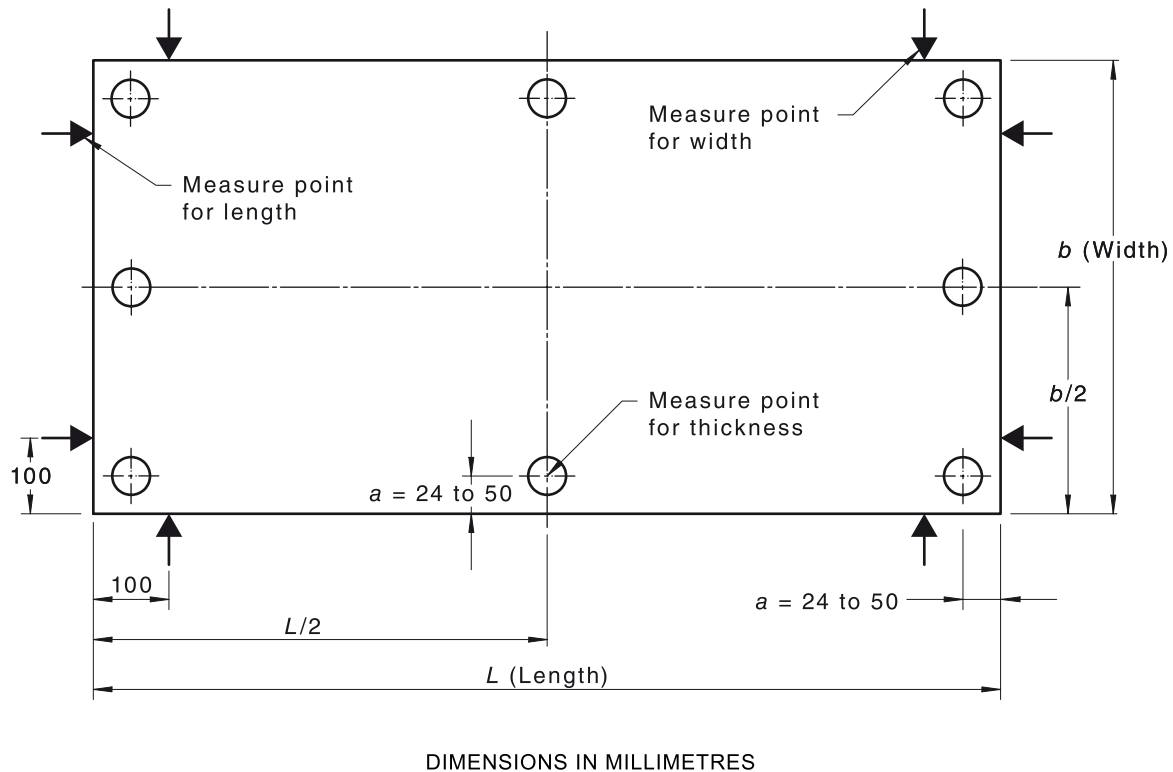


FIGURE 4.2 POINTS OF MEASUREMENT OF THICKNESS, LENGTH AND WIDTH OF A BOARD

4.3.2 Determination of length and width of panels

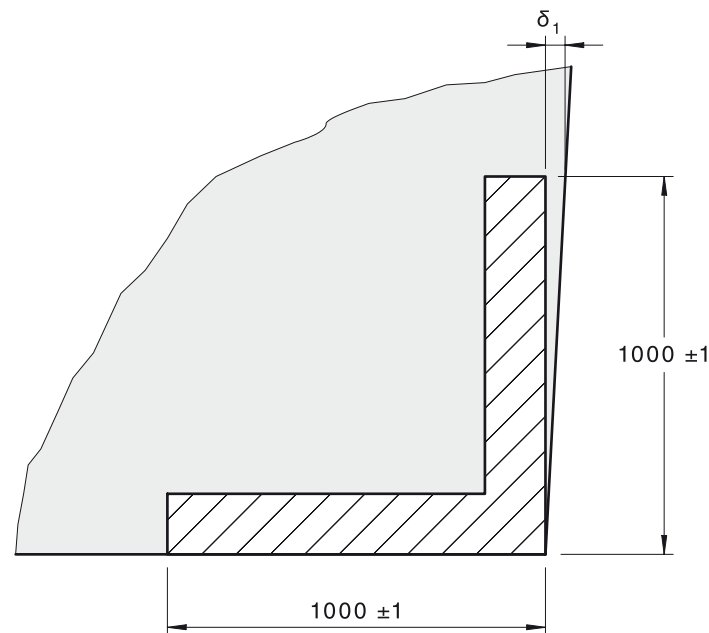
Measure both the length and width of each panel along two lines, parallel to and at a distance of, 100 mm from the edges (see Figure 4.2), to an accuracy of 0.1% but not less than 1 mm.

4.3.3 Determination of squareness of panels

Measure the difference between the two diagonal lengths of the panel, ensuring that the end of the steel tape is positioned at the panel corner.

Alternatively, if using the mechanical square, place one side of the square against one side of the panel (see Figure 4.3). At a distance of 1000 ± 1 mm from the corner of the panel, measure the distance δ_1 between the panel edge and the side of the other arm of the square by means of the deviation measuring device (see Figure 4.3).

Follow the same procedure for each of the other corners.



DIMENSIONS IN MILLIMETRES

FIGURE 4.3 USE OF MECHANICAL SQUARE TO MEASURE PANEL SQUARENESS

4.3.4 Determination of edge straightness of panels

Place the straightedge against a panel edge, or locate the wire at the corners of the panel and stretch it. Measure the largest deviation between the straightedge (or wire) and the edge of the panel using one of the deviation measuring devices and read the result to 0.5 mm.

Follow the same procedure for each of the other edges.

4.3.5 Determination of flatness of panels

Place the panel without restraint on a flat horizontal surface. Span the whole surface to be tested with the string line stretched taut. Measure the distance between the string line and surface at the point of greatest deformity in the panels to the nearest 0.5 mm using the steel rule.

4.4 EXPRESSION OF RESULTS

4.4.1 Thickness

For each panel tested, the arithmetic mean of the measurements shall be calculated and expressed to the nearest 0.1 mm.

4.4.2 Length and width

For each panel tested, the arithmetic mean of the measurements shall be calculated and expressed for the length and the width to the nearest 1 mm.

4.4.3 Squareness of panels

The result is the difference between the two diagonal measurements expressed as millimetres per metre of panel length, to the nearest 0.5 mm/m. If using the mechanical square method, the result is the largest measured deviation of four sides of the panel. It is expressed in millimetres over 1 m board edge-length to 0.5 mm/m.

4.4.4 Straightness of panel edges

The result, expressed separately for width and length, in millimetres per metre (mm/m), is the larger value of the measured deviations divided by the length of the appropriate edge.

4.4.5 Flatness

Record the value measured to the nearest 0.5 mm and whether the bow is measured on the width or the length. Note the dimensions of the panel.

SECTION 5 MOISTURE CONTENT

5.1 PRINCIPLE

Moisture content is determined by—

- (a) measuring the loss of mass of each test piece between its state at the time of sampling and its state after drying to constant mass at $103 \pm 2^\circ\text{C}$; and
- (b) calculating this loss of mass as a percentage of the mass of the test piece after drying.

5.2 TEST EQUIPMENT

Balance and drying oven as specified in Clause 1.3.3.

5.3 TEST PIECES

Sampling and cutting of the test pieces shall be carried out in accordance with Section 2. Test pieces shall cover the full thickness of the panel. Each test piece shall have a minimum mass of 20 g; shape and size are unimportant. The test pieces shall be free from loose splinters and sawdust.

5.4 PROCEDURE

5.4.1 Weighing before drying

Weigh each test piece in the as sampled state to an accuracy of 0.01 g.

This initial weighing shall be carried out immediately after sampling. Where this is impossible, precautions shall be taken to avoid changes in the moisture content of the test piece after sampling.

5.4.2 Drying

Place the test pieces in the drying oven at a temperature of $103 \pm 2^\circ\text{C}$ until constant mass has been reached.

Constant mass is considered to be reached when the results of two successive weighing operations, carried out at an interval of 6 h, do not differ by more than 0.1% of the mass of the test pieces.

NOTE: For production control, experience may be used to determine a suitable drying time for specific products instead of the constant mass method given above. A typical drying time is 24 hours.

5.4.3 Weighing after drying

Weigh each test piece to an accuracy of 0.01 g, rapidly enough to avoid an increase in moisture content.

5.5 EXPRESSION OF RESULTS

Calculate the moisture content (H) of each test piece, as a percentage by mass to one decimal place, in accordance with the following equation:

$$H = \frac{m_H - m_0}{m_0} \times 100 \quad \dots 5$$

where

m_H = initial mass of the test piece, in grams

m_0 = mass of the test piece after drying, in grams