AS/NZS 1080.1:2012

Australian/New Zealand Standard™

Timber—Methods of test
Method 1: Moisture content

PREFACE

This Standard was prepared by the Joint Standards Australia/Standards New Zealand Committee TM-003, Timber Grading, to supersede AS/NZS 1080.1:1997.

This Standard sets out the oven-dry method (see Clause 4) for determining the moisture content of timber as the only accurate method of truly assigning, with confidence, a moisture content to a piece of timber.

Two other commonly used methods are offered as a means of estimating the moisture content of timber, i.e., the resistance method (see Clause 5) and the capacitance method (see Clause 6). Mandatory requirements for the operation of resistance meters and capacitance meters are specified in the body of this Standard, and further information is provided in informative Appendices of this Standard.

The electrical resistance and capacitance methods give less accurate results but may be used effectively for routine monitoring and inspection work.

The capacitance method is used to provide an indication of moisture content and is particularly beneficial in isolating high moisture content material in certain species. It provides a non-invasive method and takes readings very fast, making it suitable for in-line processing but has lower accuracy than the above two methods.

The usefulness of the resistance and capacitance indirect methods varies with species. For example, manufacturers of some hardwood species do not find sufficient levels of accuracy for the capacitance method to be of benefit to them for control purposes but sufficient as an indicator of a satisfactory drying end point. In contrast, most pine producers find sufficient levels of accuracy with the capacitance method as do some hardwood producers dealing with higher density Australian hardwoods. Neither resistance nor capacitance moisture content meters appear to provide consistent and accurate estimates of moisture content with non-solid products such as engineered wood flooring and bamboo-based flooring.

The oven-drying method for moisture content determination and resistance methods for moisture content estimation are referenced in Australian and New Zealand Standards for sawn, milled and joinery timber products.

The objective of this revision is to update the information to be in line with current research and practices. It includes the following technical changes:

(a) Recognition of resistance moisture meter methods as estimators of moisture content and providing normative requirements for their operation and further information in an informative Appendix.

(b) Recognition of capacitance moisture meter methods as estimators of moisture content and providing normative requirements for their operation and further information in an informative Appendix.

(c) General revision of technical content within the Standard to provide greater clarity.

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The terms 'normative' and 'informative' have been used in this Standard to define the application of the appendix to which they apply. A 'normative' appendix is an integral part of a Standard, whereas an 'informative' appendix is only for information and guidance.

METHOD

1 SCOPE

This Standard sets out the oven-drying method (Clause 4) for determining the moisture content of specimens cut from solid timber, and the procedure for sampling of timber lots (Appendix A).

This Standard also specifies requirements for the methods of estimating the local moisture content of solid timber using resistance meter (Clause 5) and capacitance meter (Clause 6).

NOTES:

1 For advice on the use of resistance meters, see Appendix B.

2 For advice on the use of capacitance meters, see Appendix C.

3 For determination of the moisture content of plywood, see AS/NZS 2098.1.

4 For determination of the moisture content of reconstituted wood-based panels, see AS/NZS 4266.3.

5 The oven-drying method may also provide a useful estimation of moisture content for other non-solid products such as engineered wood flooring and bamboo-based flooring

6 A bibliography listing sources for moisture content correction is given in Appendix G.

7 When using meters that are not covered by this Standard, user should follow manufacturer's instructions and check literature for additional information that may contribute to understanding the limitations of that particular meter.

2 REFERENCED DOCUMENTS

The following are the documents referenced in this Standard:

AS/NZS

2098 Methods of test for veneer and plywood

2098.1 Method 1: Moisture content of veneer and plywood

4266 Reconstituted wood-based panels—Methods of test

4266.3 Method 3: Moisture content

4491 Timber—Glossary of terms in timber-related Standards

3 DEFINITIONS

For the purpose of this Standard, the definitions given in AS/NZS 4491 and those below apply.

3.1 Moisture content (MC)

The amount of moisture in wood, usually expressed as a percentage of the oven-dry mass.

3.2 Test piece

A piece of a required size for a specific test that has been cut from a test specimen or test sample (see Figure 4.1).

3.3 Test sample

One or more pieces of timber drawn from a population of timber.

3.4 Test specimen

A smaller piece, at least 300 mm long, cut from a test sample for convenient transfer to the testing facility.

3.5 Meter, capacitance

A meter that measures the 'dielectric constant', an electrical property associated with a 'capacitor' type arrangement when the electric field produced by the meter is in the presence of timber and the moisture within it. When adjusted for the density of the timber, the estimated moisture content is read directly from the meter.

3.6 Meter, electrical resistance

A meter that measures the electrical resistance of a timber sample by applying a voltage between two points, and is calibrated to read directly the estimated moisture content for a particular species at a specific reference temperature.

4 DETERMINATION OF MOISTURE CONTENT—OVEN-DRY METHOD

4.1 Application

The oven-dry method shall be used where the accuracy of the moisture content determination is important (e.g., in the event of disputes where the use of meters would not give the required accuracy, in the calibration of equipment, for kiln drying quality control, research work or in similar applications).

NOTES:

1 Although the oven-dry method may be used for routine measures in timber yards and the timber processing industries, it would be more usual for these measurements to be made using an electrical moisture meter.

2 The oven-dry method does not require especially elaborate apparatus, or appreciable technical skill. The moisture content (MC) is determined by initial weighing of the sample, then drying in an oven to the point where the mass does not change. This is known as the oven-dry mass. The moisture content is the difference between the initial and oven-dry mass expressed as a percentage of the oven-dry mass.

3 Oven-drying is simple and is sufficiently accurate except where some timbers contain significant amounts of evaporable material other than moisture. Its disadvantage is the time required for oven-drying (generally from 18 h to 36 h) and the fact that it is a destructive method, because of the need to cut test pieces from the timber sample.

4.2 Apparatus

4.2.1 *Scales*

Scales shall be capable of weighing test pieces to an accuracy of at least 1 in 500 (e.g., an accuracy of 0.1 g for a specimen of 50 g). For products such as domestic flooring and decking, a test piece is likely to weigh less than 50 g and, in these instances, the resolution of the scales shall be 0.01 g.

4.2.2 *Drying oven*

The oven shall be of the ventilated or forced convection type and capable of drying the test pieces at a temperature of 103 ±2°C throughout the drying chamber for the period required.

NOTE: Forced convection ovens are preferred.

4.3 Preparation of test pieces

4.3.1 *Sampling*

Sampling of timber lots shall be in accordance with Appendix A.

4.3.2 *Determination of cutting patterns and recording of information*

Before proceeding with the preparation of the test pieces, the reasons for the test and the information required from the results shall be determined.

NOTE: If case and core moisture contents are being tested it is usual to also determine the mean moisture content by additionally testing an adjacent test piece of full cross-section.

4.3.3 *Test pieces for determining moisture content*

4.3.3.1 *Length of test piece*

One of the following shall apply:

(a) Test pieces for the determination of moisture content shall incorporate the entire cross-sectional region for which a moisture content result is required and generally be 15 mm to 30 mm long in the direction of the grain.

(b) If case and core moisture content are to be measured (see Clause 4.3.4), a length of between 30 and 40 mm shall be used to compensate for the reduced weight of the test pieces.

4.3.3.2 *Cutting of test piece*

Where possible, pieces shall be cut to avoid the inclusion of characteristics or features such as knots and resin pockets.

The test pieces shall be cut from the timber as follows:

(a) If the test piece can be cut from a test sample and weighed immediately after cutting, it shall be cut at a distance not less than 400 mm from either end of the test sample.

(b) If a test specimen (at least 300 mm long) is cut from a test sample to allow later cutting of the test piece, it shall be cut at a distance not less than 400 mm from either end of the test sample. The test specimen shall be protected from changes in moisture content by being completely and tightly wrapped in plastic (cling wrap, plastic bag or similar waterproof covering) and stored in a cool place away from any moisture or heat source. Within 24 h, a test piece as described in Item (a) shall be cut from midway along of the test specimen.

(c) If the item to be tested is smaller than the dimensions specified in Items (a) and (b) above (e.g., a wooden-tool handle blank, parquetry block, or other small section) the test piece shall be cut from the centre. Mosaic parquet fingers or other similar small pieces of timber may be tested as whole.

4.3.4 *Test pieces for determining moisture distribution*

Test pieces for determination of moisture distribution throughout the thickness of a piece of timber shall be obtained by the procedure given in Clause 4.3.3.2(a), 4.3.3.2(b), or 4.3.3.2(c), as appropriate, except that the test pieces shall be cut from a complete cross-section between 30 mm and 40 mm long.

Each test piece cross-section shall be marked out on the end grain, according to one of the patterns in Figure 4.1 (see Notes 1 and 2), and shall be cut as close as possible along the marked lines. All cut sections shall be clearly marked in a manner that will identify them in relation to the test piece from which they are cut.

NOTES:

1 Different patterns are indicated in Figure 4.1. The choice will depend on the type of saw to be used and whether the moisture content of an intermediate zone is required in addition to the moisture content of the core and the case. Division into three zones is normally necessary only for stock that is 35 mm or more in thickness.

2 When moisture gradients are being measured it is usual practice to cut an adjacent test piece from the test sample to additionally determine the mean moisture content.

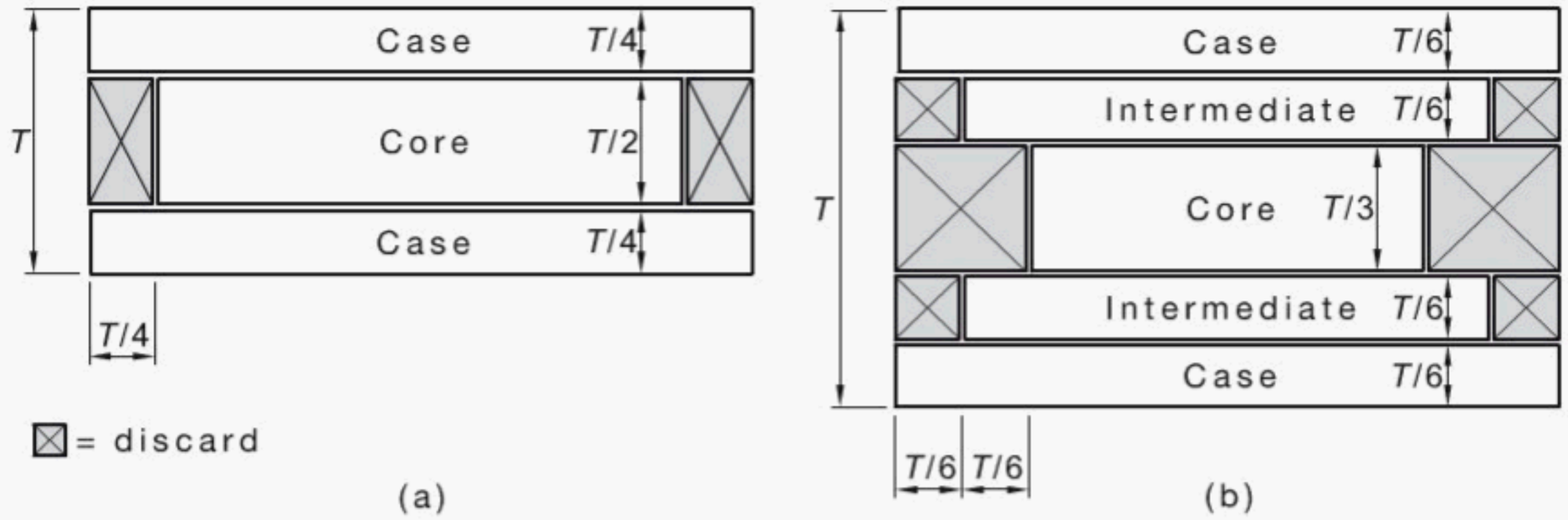


FIGURE 4.1 CUTTING PATTERNS FOR TEST PIECES

4.4 Procedure

4.4.1 *Sample preparation*

Immediately after cutting each test piece (see Clauses 4.3.3 and 4.3.4), remove any loose splinters and sawdust by brushing, sanding or scraping.

4.4.2 *Determination of mass*

Determine the mass of each test piece by weighing with the scales.

4.4.3 *Oven-drying*

Dry test pieces in a well-ventilated drying oven at a temperature of 103 ±2°C until there is essentially no more reduction in mass (see Note 1).

NOTES:

1 To ensure that the test pieces have reached the point where there is essentially no reduction in mass, they should be reweighed after they have been in the oven for a period considered sufficient for that species, usually in the range of 18 h to 24 h. They should then be returned to the oven for 4 h (lower density species) to 6 h (higher density species) and reweighed. If the second weight is within 0.2% of the first, then there is essentially no reduction in mass. If the difference between the first and second weights is greater than 0.2%, then a further period of drying is necessary until the last weighing is within 0.2% of the previous weighing.

Example: Weight after 18 h is 35.73 g and the weight after 24 h is 35.69 g. A 0.2% reduction in the weight at 18 h is 35.73 g – (0.002 × 35.73 g) = 35.66 g. The weight after 24 h is 35.69 g which is greater than 35.66 gm. Therefore it is deemed that there is essentially no reduction in mass.

2 The loading of fresh test pieces into the oven before taking out others for determining their mass should be avoided, since the latter may temporarily gain weight as a result of the possible rise in humidity within the oven.

3 Some timbers such as *spotted gum* are very slow drying and test pieces can take well in excess of 24 h to reach the point where there is essentially no reduction in mass.

4.5 Calculation

The percentage moisture content of a test piece shall be determined using the following equation and shall be expressed to the nearest 0.2%:

$$MC = \frac{M_i - M_o}{M_o} \times 100 \qquad \ldots 4.5(1)$$

where

MC = percentage moisture content of test piece

M_i = initial mass of test piece

M_o = oven-dry mass of test piece

NOTES:

1 The equation may also be expressed as—

$$MC = \left(\frac{M_i}{M_o} - 1 \right) \times 100 \quad \ldots 4.5(2)$$

2 The most common error results from insufficient drying, which underestimates the moisture content. If sample masses are small then measuring errors can significantly affect the moisture content calculation.

4.6 Use of oven-dry method to calibrate resistance and capacitance meters

4.6.1 *General*

For a particular application of either electrical resistance meters or capacitance meters, calibration shall be undertaken of the meter's estimate of moisture content against the oven-dry moisture content determined using the procedure given in Clauses 4.4 and 4.5. The resistance meter probes or the capacitance meter plates shall be positioned on the timber specimen in the area from which the oven-dry moisture content sample is to be taken. The test pieces for oven-dry moisture content determination shall be cut from the timber immediately after the meter reading is taken (see Clauses 5 and 6).

4.6.2 *Sampling*

Sampling determination shall be dependent on the application.

NOTES:

1 The sampling details should take account of the species of timber under consideration, the temperature range and the range of moisture contents over which the meter is expected to be used and the scope of applicability.

2 For guidance on electrical resistance meters, see Appendix B.

3 For guidance on capacitance meters, see Appendix C.

4.7 Test report

Where a report is required, the following information shall be reported:

(a) Name of the laboratory or authority that performed the test.

(b) Reference to this Standard, i.e., AS/NZS 1080.1.

(c) The method used, i.e., oven-dry method.

(d) Date on which the test was carried out or, if carried out over a period, the dates of commencement and completion of the test.

(e) Identification of sample, which may include species and identifying marks on the pack or pieces.

(f) Number of test pieces being tested.

(g) Details of the test method, including sampling procedure.

(h) For each test piece, the average cross-sectional moisture content to the nearest 0.2% moisture content. If intermediate or core moisture content determinations were undertaken, these shall be identified and the results presented with the corresponding cross-sectional mean moisture content result.

(i) If more than one test piece from a test sample of test specimen, the lowest, and highest result to the nearest 0.2%.

(j) Any observation, in relation to the sampling, test pieces or the performance of the test, which may assist in the correct interpretation of the test results.

5 ESTIMATION OF MOISTURE CONTENT—ELECTRICAL RESISTANCE METER

5.1 Procedure for using resistance moisture meters

The procedure shall be as follows:

(a) The meter manufacturer's instructions shall be followed. The meter shall be adjusted correctly and working properly. If the meter is pre-programmed for species, the applicable species shall be selected.

(b) Before readings are taken, the battery power shall be checked for adequacy and the circuit shall also be checked using a resistor equivalent to that of high moisture content.

NOTE: For example 1 MΩ should read 23% (see Appendix F).

(c) Where possible, end drying effects shall be avoided by taking meter readings at least 400 mm from the ends of any test sample. Characteristics and features such as knots and resin pockets shall also be avoided where testing is undertaken.

NOTE: Such material may give higher results than if the outside is dry. Allowing the surface to dry before further measurements may give a result close to oven-dry moisture content.

(d) The electrodes shall be inserted to the required depth and firm contact between the electrode and the timber shall be ensured.

NOTE: Insertion of insulated pins to 1/3 the thickness of test sample or test specimen normally provides a firm contact and gives a good approximation for the average moisture content.

(e) The meter shall be read immediately.

NOTE: This is important because the reading will drift lower with time.

(f) The meter reading shall be recorded to the nearest 0.5% moisture content and, if the meter does not include temperature compensation, the actual or estimated wood temperature should be recorded and the readings should be corrected for temperature.

NOTE: Correction for temperature should be either in accordance with the manufacturer's operation manual or Appendix D.

(g) After correction for temperature, the reading shall be corrected for species and timber preservative treatments. This shall be achieved by—

(i) using the pre-programmed settings on the meter (if available and confirmed by a calibration check);

(ii) using acknowledged correction factors for the species and meter used (if available and confirmed by a calibration check); or

(iii) using correction factors found by calibration against the oven-dry method (see Clause 5.2).

NOTES:

1 For more information on electrical resistance meter moisture content estimations, see Appendix B.

2 For some species corrections, see Appendix E.

3 Species corrections for several meters and several hardwood species may be found in Blakemore (see Ref. 15, Appendix G).

5.2 Calibration for species and timber preservative treatments

If calibration for species and timber preservative treatments is required to be undertaken [see Clause 5.1(g)(iii))], the following shall apply:

(a) Ten samples (of at least 300 mm length) for each combination of species and treatment shall be conditioned to moisture contents covering the range of expected moisture contents in the product.

(b) Immediately after conditioning, the meter probes shall be inserted at the mid-length of the sample and a reading taken.

(c) A test piece shall be cut from the mid-length of the sample in accordance with Clause 4.3.3 and the oven-dry moisture content shall be determined in accordance with Clauses 4.4 and 4.5.

(d) The oven-dry moisture contents shall be plotted against the corresponding meter readings, and a line of best-fit shall be drawn through the plotted points.

(e) The correction to the meter reading shall be determined as the equation of the plotted best-fit line.

NOTE: The line of best-fit need not be linear, and its type should be selected to match the shape of the data.

5.3 Test report

Where a report is required, the following information shall be reported:

(a) Name of the organization that performed the test.

(b) Reference to this Standard, i.e., AS/NZS 1080.1.

(c) The estimation method used, i.e., electrical resistance meter method.

(d) The brand name of the electrical resistance meter.

(e) The calibration process for the meter.

(f) Date on which the test was carried out.

(g) Identification of sample, which may include species and identifying marks on the pack or pieces.

(h) Place where the measurements were taken.

(i) List of all the corrected results.

(j) Any observations that may assist in the correct interpretation of the results.

NOTE: Explanations should be sought for any readings that stand out as being at variance with the general results (e.g., incorrect storage or handling leading to exposure to rain).

6 ESTIMATION OF MOISTURE CONTENT—CAPACITANCE METER

6.1 Procedure for using hand-held capacitance moisture meters

The procedure shall be as follows for each species:

(a) The meter manufacturer's instructions shall be followed and the meter shall be adjusted correctly and working properly. The battery shall have sufficient charge.

(b) The appropriate meter settings for dry density (or specific gravity), board thickness, surface condition, etc., for each species shall be entered and the meter checked for calibration in accordance with Clause 6.2, or checked against test blocks, if available.

(c) Where possible, end drying effects shall be avoided by taking meter readings at least 400 mm from the ends of any test sample. Characteristics and features such as knots and resin pockets shall also be avoided where testing is undertaken.

(d) The plate of the meter shall be in firm and flat contact with the board before a reading is taken. The plate shall be in the correct orientation, as outlined by the meter manufacturer.

(e) The reading shall be taken when the display has stabilized and readings shall be recorded to the nearest 1% moisture content.

NOTE: For more information on capacitance meters moisture content estimation, see Appendix C.

6.2 Procedure for using in-line capacitance moisture meters

The procedure shall be as for hand-held capacitance moisture meters except that the plates of the meter shall be spaced from the board in accordance with the manufacturer's specifications.

6.3 Calibration for species and timber preservative treatments

If calibration for species and timber preservative treatments is required to be undertaken [see Clause 6.1(b)], the following shall apply:

(a) Ten samples (of at least 300 mm length) for each combination of species and treatment shall be conditioned to moisture contents covering the range of expected moisture contents in the product.

(b) Immediately after conditioning, the meter plate shall be placed in firm contact with the timber at the mid-length of the sample and a reading taken.

(c) A test piece shall be cut from the mid-length of the sample in accordance with Clause 4.3.3 and the oven-dry moisture content shall be determined in accordance with Clauses 4.4 and 4.5.

(d) The oven-dry moisture contents shall be plotted against the corresponding meter readings, and a line of best-fit shall be drawn through the plotted points.

(e) The correction to the meter reading shall be determined as the equation of the plotted best-fit line.

NOTE: The line of best-fit need not be linear, and its type should be selected to match the shape of the data.

6.4 Test report

Where a report is required, the following information shall be reported:

(a) Name of the organization that performed the test.

(b) Reference to this Standard, i.e., AS/NZS 1080.1.

(c) The estimation method used, i.e., capacitance meter method.

(d) The brand name of the capacitance meter.

(e) The calibration process for the meter.

(f) Date on which the test was carried out.

(g) Identification of sample, which may include species and identifying marks on the pack or pieces.

(h) Place where the measurements were taken.

(i) List of all the corrected results.

(j) Any observations that may assist in the correct interpretation of the results.

NOTE: Explanations should be sought for any readings that stand out as being at variance with the general results (e.g., incorrect storage or handling leading to exposure to rain).

APPENDIX A

SAMPLING OF TIMBER LOTS

(Normative)

A1 SCOPE

This Appendix provides the procedure for determining the number of samples required to estimate average moisture content with defined precision, and is to be used when moisture content testing is undertaken using the oven-dry test method.

A2 SAMPLING

The number of samples required to estimate the average moisture content with a defined level of precision and specified confidence shall be given by the following equation, where the equation assumes that the data is normally distributed:

$$n = \left(\frac{1.8\, s_o}{E} \right)^2 \quad \ldots \text{A2(1)}$$

where

n = number of samples required

1.8 = a constant, corresponding to a probability of 0.1 that E will be exceeded

NOTE: This constant is appropriate for n between 10 and 20. If $n > 20$, 1.7 is appropriate. Exact values of this constant may be determined from statistical tables of t-distribution.

s_o = advance estimate of the population standard deviation

E = maximum allowable error in the estimate of the average moisture content (i.e., the precision), in percent

In the absence of other data, s_o may be estimated by the following equation:

$$s_o = \frac{\text{Data range for 10 samples}}{3.0} \quad \ldots \text{A2(2)}$$

Example:

To estimate the mean moisture content of a parcel of timber to 1% moisture content (i.e., precision, $E = 1.0$), an initial moisture meter check of 10 samples shows that the lowest moisture content is 8% and the highest moisture content is 14%. Therefore, the range in moisture content is 14% – 8% = 6%. The advance estimate of the population standard deviation (s_o) is given by the following equation:

$$s_o = 6/3.0 = 2.0 \quad \ldots \text{A2(3)}$$

The number of samples required is—

$$n = \left(\frac{1.8 \times 2.0}{1.0} \right)^2 = 12.96 \quad \ldots \text{A2(4)}$$

This example indicates a minimum of 13 samples to be taken to provide an estimate of the average moisture content with a precision of 1.0% moisture content at the 90% confidence level. It would be usual practice to take several more samples than the minimum required in case the advance estimate of the standard deviation was smaller than the actual standard deviation of the moisture contents of the test pieces.

APPENDIX B

ELECTRICAL RESISTANCE METER METHOD

(Informative)

B1 APPLICATION

Commercially available moisture meters are under continual development and the information in this Appendix was compiled on the most commonly available meters in Australia and New Zealand at the time of publication. When using meters that are not covered by this Appendix, users should follow manufacturer's instructions and check literature for additional information that may contribute to understanding the limitations of that particular meter.

The electrical resistance moisture meter method may provide a suitable indication of moisture content where convenience requires quicker measurements without destruction of the timber and where the moisture content falls within the range 8% to 25%; however, the timber will be marked by the electrode pins. The accuracy of the determined moisture content will be less than that determined using the oven-dry method.

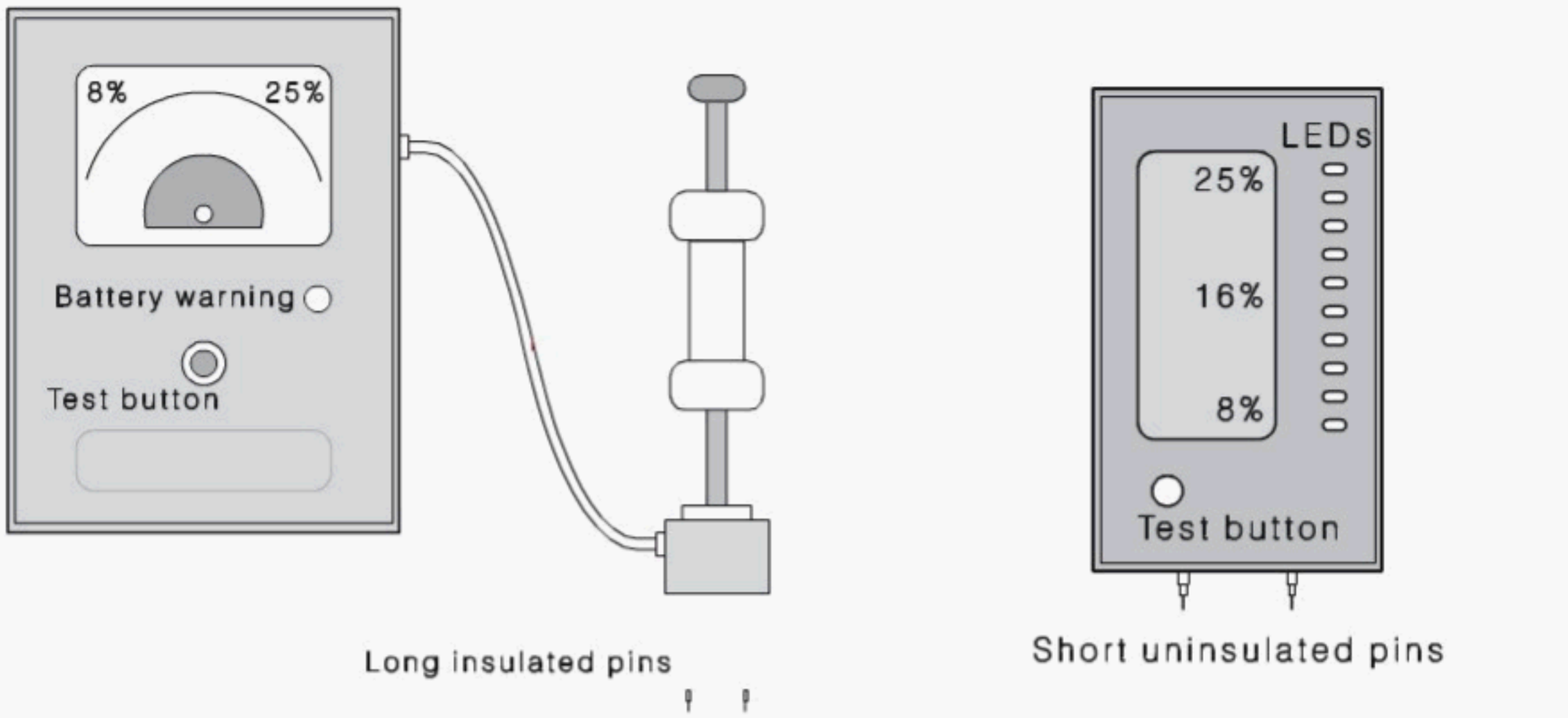
B2 PRINCIPLE

Electrical resistance moisture meters take account of the change in the electrical resistance (predominantly ionic conductance) of timber with changing moisture content. The resistance is measured between electrodes (generally pins) inserted into the test sample or test specimen. The meter should be operated strictly in accordance with the manufacturer's instructions and, if not programmed into the meter, the correction tables for species and temperature given in Appendix D and Appendix E should be used. Where meters can be pre-programmed for species and temperature compensation then it has to be ensured that the correct figures have been programmed in. Where moisture meters have been pre-programmed for species correction, it is recommended that a comparison oven test be done to check the accuracy of the meter against the species being tested in accordance with Paragraph B4.3.

B3 TYPES OF HAND-HELD RESISTANCE METERS

A wide variety of meters is available. Current meters have two pins that are used to penetrate the timber but the pins may vary in length from approximately 6 mm up to 60 mm. The longer pins are often insulated up to the pointed ends to prevent surface moisture effects from interfering with core measurements. Those with longer pins are also usually of the 'sliding hammer' type, which provides a means of driving the pins into the timber. The sophistication of the meters varies greatly in terms of features such as inbuilt temperature correction, pre-programmed species calibration and depth indication. Many of the meters now have a means to check calibration. Purchasers of resistance moisture meters are strongly advised to check that the meter that they are purchasing meets the standard resistance calibrations given in Table F1, Appendix F.

Figure B1 shows the main features of typical electrical resistance moisture meters with pin electrodes.



(a) Meter with slide hammer, pin electrodes and analogue display

(b) Meter with press in pin electrodes and LED display

FIGURE B1 EXAMPLES OF MAIN FEATURES OF RESISTANCE MOISTURE METER

B4 GENERAL

B4.1 Moisture distribution determination

In timber thicker than 25 mm, readings taken in the usual way with short electrodes will be misleading. For core moisture content determinations or for measuring moisture gradients in such timber, sliding hammer electrodes (preferably with insulated probes) should be used. The depth to which they should be driven will be governed by the depth at which the moisture content is to be measured (see Note 2). When the insulation is driven below the timber surface, insulated electrodes are necessary to avoid the effect of surface moisture or coatings.

NOTES:

1 Wherever possible, the holes made by the electrodes should be on the unexposed face of the piece and in a position that will have least effect on the quality or utility of the piece being tested.

2 Special care as regards penetration depth should be taken when testing thick timber (to detect moisture gradients), or very thin timber (to avoid penetrating through the test sample.

3 Readings from resistance moisture meters will increase with depth even when actual moisture contents do not. Therefore, the extent to which moisture content gradient can be measured in common board sizes with resistance meters is limited. (Refer to Scion publication *Wood Drying* – Issue No. 36 July 2005, *Measuring moisture content profiles with insulated pin electrodes*, S Riley, L van Wyk).

4 When insulation is damaged, readings will not necessarily reflect moisture levels at the pin depth and, therefore, damaged electrodes should be replaced.

B4.2 Effect of wood preservatives and adhesives

Readings of electrical resistance meters will be less accurate if the timber has been treated with wood preservatives unless specific correction figures are available. Variable results also occur if the electrodes approach or penetrate adhesives even if they seem to be thoroughly dry, as adhesive provides a path of lower resistance. For this reason, resistance moisture meters do not provide accurate readings in sheet materials such as plywood and particleboard.

In the case of preservatives, the meter will read differently for treated timber and untreated timber of the same true moisture content. This effect generally increases with the preservative loading and the moisture content (that is, the effect is greater at higher moisture content).

Care should be taken in use of preservative correction figures as preservative conductivity effects can be subject to variation between type, brand and ongoing adjustment to preservative mixes by manufacturers seeking to reduce environmentally unacceptable compounds in preservatives, including carriers and dispersant materials.

Timber affected by seawater will also show unreliable results as the salt affects the conductivity, even if only on the surface. For these cases, it may be preferable to use the oven-dry method.

Timber affected by surface coatings (e.g., oils, stains, paints or varnishes, or their residues) will also show unreliable results unless insulated electrodes are used and the insulated portion is driven below the surface.

B4.3 Calibration by comparison with oven-dry method

Calibration of resistance meters by direct comparison with specimens that have had their moisture content determined by the oven-dry method is recommended. This process can be used effectively in drying operations that utilize both meters and oven-dry testing. When using this method of calibration, the comparison should be made using the species, temperature, and range of moisture contents at which the resistance meter is to be used.

B4.4 Accuracy

Resistance moisture meters provide reliable results in the moisture content range 7% to 22%, provided species and temperature corrections are made. Such meters can be used above 22%, but their accuracy diminishes as moisture content increases to such an extent that they are generally considered unsuitable for use above 40%. They are also unsuitable for measurements below 6% moisture content. At moisture contents between 10% and 12% accuracy is greatest at approximately ±0.5% to ±1% moisture content. Above 12% moisture content a variance of ±1.5% to ±3% moisture content can be expected with higher density species generally of lower accuracy.

The electrical resistance of wood varies with its temperature. Some meters will auto correct for wood temperature. Where this does not occur, readings for electrical resistance moisture meters are corrected [see Clause 5.1(f)] for wood temperature as directed in the instructions supplied with the meter and using the correction figures given in Appendix D. Correction for temperature is made before species correction.

B4.5 Correction for timber species

Electrical resistance moisture meter readings are to be adjusted by the corrections applicable to the species of timber being tested. Resistance meters are usually calibrated to standard resistances originally based on the electrical characteristics of Douglas fir. The correction figures given in Appendix F should be used. Where species are pre-programmed into meters, they should be checked to ensure that they are in line with Appendix F. If not, further specific corrections may need to be applied.

B5 PRECAUTIONS AND LIMITATIONS WITH RESISTANCE METERS

The method is conducive to only taking a relatively small number of sample readings and the measurement necessitates damaging the surface of the timber. The following precautions should be taken into consideration with the use of resistance moisture meters:

(a) Use of meters in a hot environment such as kilns will be prone to error.

(b) It is necessary to keep the meter dry and clean, both in use and storage, to maintain accuracy.

(c) A low battery can cause low readings in high moisture content material.

(d) Care should be taken not to damage the insulation of the flexible leads to the moisture meter. The insulation resistance is satisfactory when a reading below the minimum on the scale is obtained with the electrodes in the air. Perspiration and dirt at connections will produce errors at low moisture contents.

(e) If the species is not known, readings will be of questionable accuracy. Therefore, for accurate results the oven-dry method should be used.

(f) Uncertainty over the species can make species corrections difficult and species such as *brush box* with very high species correction factors are prone to greater error. With such species, oven-dry testing should be considered.

(g) Meters only read the 'wettest' part of the timber exposed to pin contact. Therefore, surface moisture can provide artificially high readings not reflecting wood moisture content.

(h) Salt water or any preservative treatment salts can affect meter readings and will usually raise them.

(i) Meters can also be affected by surface condensation. In addition, some preservatives are considered to be hygroscopic and absorb moisture from the atmosphere at times of high humidity. The long-term effects vary, but if timber is preservative treated and readings are considered to be of concern, readings should be taken at depth or sample moisture levels determined by the oven-dry method.

(j) Care should be taken that over-width probes, placed close together, do not 'squeeze' moisture from timber resulting in higher than normal moisture indications.

(k) If moisture meters are being used to determine moisture in a composite construction such as a clad wall, particular care should be given to ensuring that insulation to probes is pristine and readings do not reflect moisture of anything but the timber being sampled. Metal meshes in stucco, aluminium foil wraps, etc., can result in shorting between probes and misleading readings.

APPENDIX C

CAPACITANCE METER METHOD

(Informative)

C1 APPLICATION

Commercially available moisture meters are under continual development and the information in this Appendix was compiled on the most commonly available meters in Australia and New Zealand at the time of publication. When using meters that are not covered by this Appendix, users should follow manufacturer's recommendations and check literature for additional information that may contribute to understanding the limitations of that particular meter.

Capacitance meters are available as both hand-held meters and as process meters for timber manufacturing facilities. They are particularly useful where many readings are necessary for comparative purposes and where production statistics are required. A lesser degree of accuracy than the oven-dry method should generally be accepted. In-line models may be used to check the moisture content along the entire length of boards. Hand-held meters are often used to determine if a proportion of timber has been affected by moisture either in pack form or after installation. Where there is significant variation in density between boards, or where the density is difficult to estimate, the method loses accuracy. Where mixed species of timber exhibit a wide range of densities in any given parcel, then the accuracy of the readings from a capacitance meter are likely to vary greatly and not provide a useful indication of board moisture contents (for example, Eucalyptus species marketed as *Tasmanian oak* and *Victorian Ash*). In such instances, capacitance meter method is not a suitable method to assess board moisture contents. Either resistance meters should be used or oven-dry testing.

In-line production models are effective in scanning entire production runs and are effective in separating boards with high or low readings for further consideration, after kiln-drying and prior to machining. They also provide an important quality control tool enabling run statistics to be generated and from this process control parameters can be adjusted.

In-line capacitance moisture meters are used extensively in softwood production and to a lesser extent in hardwood production.

The more sophisticated hand-held meters can be adjusted for timbers of different densities. Less sophisticated meters do not have density compensation and for these meters corrections to meter readings should be applied, based on the density of the species being tested. Such meters are usually pre-set to be more suited to softwoods and lower density hardwoods, which causes limitations with higher density species where they are of limited value (that is, large correction factors are necessary and correction tables are generally unavailable).

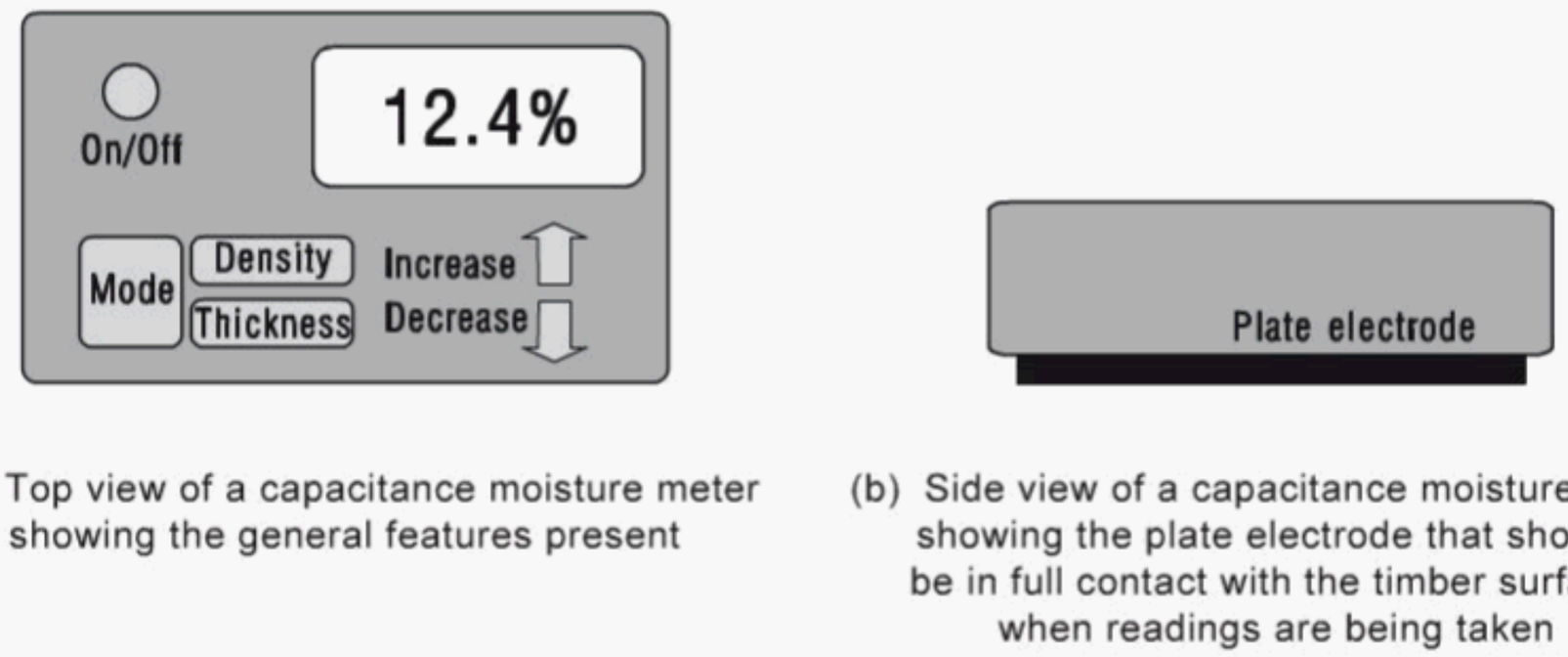
As yet there are no standard capacitance correction figures for species density calibrations that can be used across a range of meters. The electronic processes that are used differ between meters, particularly in relation to frequencies used and depth of signal penetration. There is a strong dependence of capacitance meters on density. The vast majority of capacitance meter manufacturers use this relationship as a means of approximating the species corrections that would otherwise be generated. Most meters either have a density correction or a density grouping built into the meters, or correction tables are supplied with the meter. Corrections for preservative treatments should be possible at lower meter readings but these corrections would need to be determined on the basis of species, treatment level and type, and meter model.

C2 PRINCIPLE

Electrical capacitance moisture meters measure an electrical property called the 'dielectric constant' and, in so doing, an electric field produced by the meter and the presence of the timber on which the meter is positioned form a 'capacitor' type of arrangement. The moisture content, thickness and the density of the timber affect this electrical property and, therefore, each has an effect on the readings. In hand-held capacitance moisture meters, the electric field can penetrate deep into the timber but meter readings are biased toward moisture in the surface layers. In-line capacitance moisture meters using plates over the top and bottom of the board apply a field over the whole cross-section of the board and, therefore, are not biased toward moisture in the surface layers. The effective range of capacitance meters is from approximately 0% to 30% moisture content.

C3 TYPES OF HAND-HELD CAPACITANCE MOISTURE METERS

Hand-held capacitance moisture meters range from those with few features to those with a wider range of features. Features include settings for timber density (or specific gravity) and timber thickness as well as the ability to store readings and apply some statistics to the results. If the meter is being used with higher density hardwoods, timber density (or specific gravity) adjustment will be necessary. Figure C1 shows the main features of a typical hand-held capacitance moisture meter.



(a) Top view of a capacitance moisture meter showing the general features present

(b) Side view of a capacitance moisture meter showing the plate electrode that should be in full contact with the timber surface when readings are being taken

FIGURE C1 EXAMPLE OF MAIN FEATURES OF CAPACITANCE MOISTURE METER

C4 GENERAL

C4.1 Accuracy of capacitance moisture meters

Hand-held capacitance moisture meters in the moisture content range 7% to 22% have accuracies between ±3% and ±6% moisture content. The accuracy is very dependent on density and board thickness. To provide for higher levels of accuracy, calibration against the oven-dry method may be undertaken. In-line capacitance moisture meters can achieve greater accuracies if installed in series with an in-line density determination system, which is programmed to correct the estimated moisture content for local density.

C4.2 Calibration by comparison with oven-dry method

To provide a greater degree of accuracy and reliability, calibration of capacitance meters by direct comparison with the test pieces that have had their moisture content determined by the oven-dry method is recommended. This process can be used effectively in drying operations that utilize both meters and oven-dry testing.

The variation in meter readings at various degrees of moisture content needs to be determined. In addition to this, within-species density variations need to be considered in order to ascertain inherent inaccuracies within a species or a specific resource of that species at a particular time.

When using this method of calibration, the comparison between oven-dry testing and meter readings should be made for each species, or a specific resource of that species, in the range of moisture contents and temperatures at which the capacitance meter is to be used.

As a result of this process, manufacturers of *Tasmanian oak* timber do not find sufficient levels of accuracy for this method to be of benefit to them. In contrast to this, most pine producers find sufficient levels of accuracy as do some hardwood producers dealing with higher density Australian hardwoods.

C4.3 Correction for temperature

Additional temperature corrections for capacitance (dielectric) meters are not normally required.

NOTE: Refer to meter manufacturer's instruction.

C4.4 Correction for density and thickness

Capacitance moisture meters, where provided for, require the density (specific gravity), appropriate to the particular species to be set prior to taking any readings. If no density (specific gravity) settings are available on the meter then these meters should only be used for timbers similar in density to that which the meter has been calibrated. Where thickness adjustment is provided for on the meter then it should be set prior to taking readings. If no thickness adjustment is available manual adjustment of readings in accordance with the manufacturer's instructions will be necessary.

NOTES:

1 Juvenile wood of some species can be of significantly lower density and, therefore, care is necessary. Similarly, some species or species mixes processed at one time exhibit much greater density variation.

2 The density (or specific gravity) is often calculated differently for different reasons (i.e., green density, density at 12% moisture content or basic density). Specific gravity is the density of a material divided by the density of water (approximately 1000 kg/m^3). It is necessary to obtain from the meter supplier the relevant figures applicable to the meter being used to ensure the correct species density data is applied to the meter.

C5 PRECAUTIONS AND LIMITATIONS WITH HAND-HELD CAPACITANCE MOISTURE METERS

Hand-held capacitance moisture meters enable a large number of readings (including along the length of a board) to be taken in quick succession and the surface of the timber is not damaged in the process. The meters use a plate electrode that is in full contact with the timber and, for this reason they are generally only suited to board products. The following precautions should be taken into consideration with the use of capacitance moisture meters:

(a) Estimating the correct density setting can be difficult, particularly if the meter is being used on a wide range of different timbers. Similarly, care is necessary between juvenile and mature timber densities of the same species as this can significantly reduce field measurement accuracy.

(b) Density (specific gravity) information for Australian species relating to specific meters is not well documented.

(c) Without thickness setting, samples of the same moisture content that are thicker will read higher.

(d) Any gap between the plate of the meter and the board (e.g., a cupped surface) will cause lower readings.

(e) The presence of salts (from either salt water or preservation treatment) will cause readings to be higher. Readings in some species such as brush box also appear to be unreliable.

(f) Framing beneath timber that is being tested will raise meter readings where the exposed timbers cross (e.g., softwood floor over hardwood joists).

(g) Readings should be taken from clean timber and away from any metal or other conductive materials that will affect integrity of meter output.

(h) Surface preservative and near surface preservative salt deposits may affect readings according to the conductivity of the preservative and/or its hygroscopicity or ability to extract moisture from the atmosphere. Particular care is required if timber has been subjected to rain or high humidity.

C6 REPORTING

Other than quality control reports in a production environment, these meters do not generally provide a method by which individual board moisture contents can be reported on, unless specific comparison checks to the oven-dry method have been undertaken (see Paragraph C4.2). As such, no formal reporting structure is provided in this Standard; however, when the results of capacitance meter testing are being conveyed, the type of meter used should be documented along with the range of readings (which may differ from one area being sampled to another) and the meter settings used. A general statement relating to accuracy, as outlined in this Standard, should also be made.

The results of such testing can still be clear and decisive, particularly if moisture content readings were for example 18% to 25%, when readings in the range from 10% to 14% were expected. As such, these meters are particularly useful for moisture survey work and for a general indication of moisture level differences. In many instances, test results will need to be backed up by another method of greater accuracy such as resistance meters or, for even greater accuracy, the oven-dry method.

APPENDIX D

ELECTRIC RESISTANCE MOISTURE METER— TEMPERATURE CORRECTION TABLE FOR SOLID TIMBER

(Informative)

TABLE D1

TEMPERATURE CORRECTION

Meter reading, %	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
Wood temperature, °C	Moisture content corrected for temperature, %																						
5	7	8	9	11	12	13	14	15	16	17	19	20	21	22	—	—	—	—	—	—	—	—	—
10	7	8	9	10	11	12	13	14	16	17	18	19	20	21	22	—	—	—	—	—	—	—	—
15	6	7	8	9	11	12	13	14	15	16	17	18	19	20	22	—	—	—	—	—	—	—	—
20	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	—	—	—	—	—	—
25	—	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	—	—	—	—	—
30	—	6	7	8	9	10	11	12	12	13	14	15	16	17	18	19	20	21	22	—	—	—	—
35	—	—	6	7	8	9	10	11	12	13	14	15	15	16	17	18	19	20	21	22	—	—	—
40	—	—	—	6	7	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	—	—
50	—	—	—	—	6	7	8	9	10	11	11	12	13	14	15	16	17	18	19	19	20	21	22
60	—	—	—	—	—	6	7	8	8	9	10	11	12	13	14	14	15	16	17	18	19	20	20
70	—	—	—	—	—	—	—	3	7	8	9	10	11	11	12	13	14	15	16	16	17	18	19
80	—	—	—	—	—	—	—	—	6	7	8	9	9	10	11	12	13	13	14	15	16	17	18
90	—	—	—	—	—	—	—	—	—	6	7	8	8	9	10	11	11	12	13	14	15	15	16

NOTE: Temperature correction should be applied before species correction.

APPENDIX E

MOISTURE CONTENT CORRECTION FOR ELECTRICAL RESISTANCE MOISTURE METERS

(Informative)

TABLE E1

MOISTURE CONTENT CORRECTION FOR ELECTRICAL RESISTANCE MOISTURE METERS

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	Botanical name	Source*	Corrected moisture content, %																		
abura	Mitragyna ciliata	(d)	—	8	9	10	11	12	13	14	14	15	16	16	17	18	18	19	20	21	21
afara	Terminalia superba	(d)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
afrormosia	Pericopsis elata	(d)	—	7	8	9	10	10	11	12	13	14	15	15	16	16	17	18	18	19	20
agba	Gossweilerod-endron balsamiferum	(d)	—	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
albizzia, New Guinea	Albizzia falcataria	(a)	7	8	9	10	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
albizzia, Solomon Is.	A. falcataria	(a)	6	7	7	8	9	10	10	11	12	13	14	14	15	16	17	17	18	19	20
alder, blush	Sloanea australis	(a)	6	7	8	8	9	10	10	11	12	12	13	14	14	15	16	16	17	18	19
alder, brown	Caldcluvia paniculosa	(a)	8	9	10	10	11	12	13	13	14	15	15	16	17	18	18	19	20	20	21
alder, rose	C. australiensis	(a)	7	8	9	10	10	11	12	13	13	14	15	16	16	17	18	18	19	20	21
almond, Indian (Fiji)	Terminalia catappa	(j)	7	7	8	8	9	10	10	11	12	12	13	14	14	15	15	16	17	—	—
amberoi	Pterocymbium beccarii	(a)	6	7	7	8	9	9	10	11	12	12	13	14	14	15	16	17	17	18	19
amoora, New Guinea	Amoora cucullata	(a)	5	6	7	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
antiaris, New Guinea	Antiaris toxicaria	(a)	7	8	9	10	11	12	12	13	14	15	16	17	18	19	20	21	21	22	23
apple, black	Planchonella australis	(a)	9	9	10	10	11	12	12	13	14	14	15	15	16	17	17	18	19	19	20
ash, alpine	Eucalyptus delegatensis	(a)	8	9	10	11	12	13	14	15	16	17	18	18	19	20	21	22	23	24	25
ash, American (black)	Fraxious nigra	(g)	—	7	9	10	12	13	15	16	17	19	20	21	23	24	—	—	—	—	—
ash, American (white)	F. americana	(g)	—	7	9	10	11	13	14	15	17	18	19	20	21	23	24	—	—	—	—
ash, Bennett's	Flindersia bennettiana	(a)	7	8	9	10	11	11	12	13	14	15	15	16	17	18	19	19	20	21	22
ash, Crow's	F. australis	(a)	8	9	10	10	11	12	12	13	14	14	15	16	17	17	18	19	20	20	21

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
ash, European	Fraxinus excelsior	(a)	8	8	9	10	11	12	12	13	14	14	15	16	17	18	18	19	20	21	21
ash, hickory	Flindersia ifflaiana	(a)	8	8	9	10	11	12	12	13	14	14	15	16	17	18	18	19	20	20	21
ash, Japanese	Fraxinus mandshurica	(d)	—	7	7	8	9	10	11	12	13	14	15	15	16	17	18	19	19	20	21
ash, mountain	Eucalyptus regnans	(a)	8	9	10	11	12	13	14	15	16	17	18	18	19	20	21	22	23	24	25
ash, New Guinea silver	Flindersia amboinensis	(a)	7	8	9	10	11	11	12	13	14	15	16	17	18	19	19	20	21	22	23
ash, red	Alphitonia excelsa	(a)	6	7	8	8	9	10	11	11	12	13	14	14	15	16	16	17	18	18	19
ash, scaly	Ganophyllum falcatum	(a)	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	23	24
ash, silver (northern)	Flindersia schottiana	(a)	8	9	10	10	11	12	13	13	14	15	16	16	17	18	18	19	20	20	21
ash, silver (Qld)	F. bourjotiana	(a)	8	9	10	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	24
ash, silver (southern)	F. schottiana	(a)	8	9	10	11	12	13	14	15	15	16	17	18	19	20	20	21	22	23	24
ash, silvertop	Eucalyptus sieberi	(a)	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
aspen, (American)	Populus grandidentata	(g)	—	—	7	8	10	11	12	14	15	16	18	19	20	21	23	24	—	—	—
aspen, hard	Acronychia laevis	(a)	6	7	8	9	10	10	11	12	12	13	14	14	15	16	16	17	18	18	19
balau (Malaysia)	Shorea laevis	(l)	7	7	8	8	9	10	10	11	12	13	14	15	16	17	18	19	20	23	27
balau, red (Malaysia)	S. guiso	(l)	5	6	7	8	9	10	10	11	12	13	14	15	16	17	18	19	20	21	21
balau, red (Philipp.)	S. guiso	(c)	—	10	11	12	12	13	14	15	16	17	17	18	19	20	21	22	22	24	24
balsa	Ochroma pyramidale	(d)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
baltic, red	Pinus sylvestris	(d)	—	9	10	11	12	13	14	15	15	16	17	18	18	19	20	21	22	23	24
baltic, white	Picea abies	(d)	—	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27
basswood, Fijian	Endospermum macrophyllum	(j)	6	6	7	8	8	9	10	10	11	12	12	13	14	14	15	16	16	17	18
basswood, Malaysian	E. malaccense	(l)	9	10	11	12	13	14	15	17	18	19	20	22	24	30	—	—	—	—	—
basswood, New Guinea	E. medullosum	(a)	7	7	8	9	10	11	12	12	13	14	15	16	16	17	18	19	20	20	21
basswood, Solomon Is.	E. medullosum	(a)	5	6	6	7	8	9	9	10	11	11	12	13	13	14	15	16	16	17	18

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
basswood, silver	Polyscias elegans	(a)	8	9	10	10	11	12	12	13	14	15	16	16	17	18	18	19	20	21	22
bauvudi	Palaquium fidjiense (P. vitilevuense)	(j)	7	7	8	9	9	10	11	11	12	13	13	14	15	15	16	17	17	18	18
bean, black	Castanospermum australe	(a)	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23	24	25
beech, European	Fagus sylvatica	(d)	—	10	11	12	13	14	15	16	—	—	—	—	—	—	—	—	—	—	—
beech, myrtle	Nothofagus cunninghamii	(a)	7	8	9	10	11	11	12	13	14	14	15	16	17	18	18	19	20	21	22
beech, New Zealand red	Nothofagus fusca																				
	Sapwood untreated	(e)	—	—	—	—	10	11	12	13	14	15	16	17	18	19	19	20	21	22	23
	Sapwood boron	(e)	—	—	—	—	9	10	11	12	13	14	15	16	17	18	20	21	22	23	24
	Heart untreated	(e)	—	—	—	—	12	13	14	15	16	17	18	19	20	21	22	22	23	24	25
beech, silky	Citronella moorei	(a)	9	9	10	11	12	12	13	14	14	15	16	16	17	18	18	19	20	20	21
beech, silver	Nothofagus menziesii	(a)	9	9	10	10	11	12	12	13	13	14	14	15	16	16	17	17	18	19	19
	Sapwood untreated	(e)	—	—	—	—	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
	Sapwood tanalith	(e)	—	—	—	—	10	11	12	13	13	14	15	16	17	18	18	19	20	21	21
beech, Wau	Elmerrillia papuana	(a)	8	9	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
beech, white (Fiji)	Gmelina vitiensis	(j)	6	7	8	9	10	10	11	12	13	14	15	15	16	17	18	19	20	20	21
beech, white (Qld)	G. leichhardtii	(a)	7	8	9	10	11	12	13	14	14	15	16	17	18	19	19	20	21	22	23
birch, European	Betula pubescens	(d)	—	10	11	12	13	14	15	16	—	—	—	—	—	—	—	—	—	—	—
birch, paper	B. papyrifera	(g)	—	—	—	8	9	10	11	12	13	14	15	16	17	18	20	21	22	23	24
birch, white	Schizomeria ovata	(a)	8	9	10	11	12	12	13	14	15	15	16	17	18	18	19	20	21	22	22
birch, yellow	Betula lutea	(d)	—	8	9	10	11	12	13	14	14	15	16	16	17	18	18	19	20	21	21
bishop wood (Fiji)	Bischofia javanica	(j)	6	7	8	8	9	10	11	12	12	13	14	15	16	16	17	18	19	19	20
blackbutt	Eucalyptus pilularis	(a)	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
blackbutt, Western Australian	Eucalyptus patens	(a)	8	9	10	11	12	12	13	14	15	16	17	18	19	20	21	22	23	24	25

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
blackwood	Acacia melanoxylon	(a)	8	9	9	10	11	12	12	13	14	15	16	16	17	18	19	20	20	21	22
bloodwood, red	Corymbia gunmifera	(a)	9	10	10	11	12	13	14	15	15	16	17	18	19	19	20	21	22	23	23
bollywood	Litsea reticulata	(a)	7	7	8	9	10	11	12	12	13	14	15	16	16	17	18	19	20	21	22
box, black	Eucalyptus largiflorens	(a)	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
box, brush (NSW)	Lophostemon confertus	(a)	5	6	7	7	8	8	9	9	10	11	11	12	12	13	14	14	15	15	16
box, brush (Qld)	L. confertus	(a)	7	8	8	9	9	9	10	10	11	11	12	12	13	13	14	14	14	15	15
box, brush (source unknown)	L. confertus	(h)	6	7	7	8	8	9	9	10	10	11	11	12	13	13	14	14	15	15	16
box, grey	Eucalyptus moluccana	(a)	9	10	11	12	12	13	14	14	15	16	17	17	18	19	20	20	21	22	23
box, grey, coast	E bosistoana	(a)	8	9	10	11	11	12	13	14	14	15	16	17	18	18	19	20	21	22	22
box, kanuka	Tristania laurina	(a)	8	8	9	10	11	12	12	13	14	15	16	16	17	18	19	20	20	21	22
boxwood, New Guinea	Xanthopyllum papuanum	(a)	7	7	8	9	9	10	11	12	12	13	14	15	15	16	17	17	18	19	20
boxwood, yellow	Planchonella pohlmaniana	(a)	9	9	10	10	11	12	12	13	14	14	15	15	16	17	17	18	19	19	20
brachychiton New Guinea	Brachychiton carruthersii	(a)	6	7	7	8	8	9	9	10	11	11	12	12	13	13	14	15	—	—	—
bridelia	Bridelia minutiflora	(a)	7	8	9	10	12	13	14	15	16	17	18	19	21	22	23	24	25	26	27
brigalow	Acacia harpohylla	(a)	7	8	9	10	11	11	12	13	14	15	16	17	18	19	20	20	21	22	23
brownbarrel	Eucalyptus fastigata	(a)	6	7	8	9	10	11	12	12	13	14	15	16	17	18	18	19	20	21	22
buchanania	Buchanania arborescens	(a)	5	6	7	8	9	10	10	11	12	13	14	14	15	16	17	18	19	19	20
burckella, Solomon Is.	Burckella obovata	(a)	5	6	6	7	8	8	9	9	10	11	11	12	13	13	14				
butternut, rose	Blepharocarya involucrigera	(a)	6	7	8	8	9	10	10	11	12	13	13	14	15	16	16	17	18	19	19
calophyllum, beach (Philippines)	Calophyllum inophyllum	(c)	—	8	9	10	11	11	12	13	14	15	16	16	17	18	19	20	21	21	22
calophyllum, Fijian	C. leucocarpum (C vitiense)	(j)	7	8	9	10	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23
calophyllum, Malaysian	C. curtisii	(l)	7	8	9	10	10	11	12	13	14	15	16	16	17	18	18	19	20	21	22

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
calophyllum, New Guinea	C. papuanum	(a)	6	7	8	9	10	12	13	14	15	16	17	18	19	20	21	22	23	24	26
calophyllum, Solomon Is.	C. kajewskii (C vitiense)	(a)	6	6	7	8	9	10	10	11	12	13	14	14	15	16	17	18	18	19	20
camphorwood, New Guinea	Cinnamomum spp.	(a)	7	8	9	10	10	11	12	13	13	14	15	16	17	17	18	19	20	21	21
campnosperma (Malaysia)	Campnosperma auriculata	(l)	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
campnosperma (N.G.)	C. brevipetiolata	(a)	6	7	8	9	10	10	11	12	13	14	15	16	16	17	18	19	20	20	21
campnosperma (Solomon Is.)	C. brevipetiolata	(a)	4	5	6	7	8	8	9	10	11	12	13	14	14	15	16	17	18	19	20
cananga (Philippines)	Canangium odoratum	(c)	—	7	10	11	11	12	12	13	14	14	15	16	16	17	18	18	19	19	20
canaruim, African	Canarium schweinfurthii	(d)	—	9	10	11	12	13	14	15	15	16	17	18	18	19	20	21	22	23	24
canarium, New Guinea	C. oleosum	(a)	6	7	8	9	9	10	11	12	13	13	14	15	16	17	17	18	19	20	21
canarium, Fijian	C. vitiense (C smithii)	(j)	6	7	8	9	10	11	11	12	13	14	15	16	16	17	18	19	20	20	21
canarium, Solomon Is.	C. salomonense	(a)	5	6	7	7	8	9	9	10	11	11	12	13	13	14	15	16	16	17	18
candlenut, (Philipp.)	Aleurites moluccana	(c)		5	8	10	12	14	16	18	21	23	25	27	29	31	34	36	38	40	42
carabeen, yellow	Sloanea woollsii	(a)	7	8	9	9	10	11	12	12	13	14	14	15	16	16	17	18	18	19	20
cathormion, New Guinea	Cathormion umbellatum	(a)	5	6	6	7	8	8	9	9	10	10	11	12	12	13	—	—	—	—	—
cedar, red	Toona ciliata	(a)	8	9	10	11	12	13	14	16	17	18	19	20	21	22	23	25	26	27	27
cedar, South American	Cedrela odorata	(c)	—	9	10	11	12	13	13	14	15	16	17	17	18	19	20	21	22	22	23
cedar, western red	Thuja plicata	(b)	—	—	8	9	9	10	11	12	13	14	15	16	17	17	18	19	20	21	22
cedar, white	Melia azedarach	(a)	8	9	10	11	12	13	14	15	16	17	18	18	19	20	21	22	23	24	24
cedar, yellow	Chamaecyparis nootkatensis	(b)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
celtis, New Guinea	Celtis nymanni & Celtis spp.	(a)	7	7	8	9	9	10	11	12	12	13	14	14	15	16	17	17	18	19	19
celtis, Solomon Is.	Celtis philippinensis	(a)	5	6	7	7	8	8	9	9	10	11	11	12	12	13	14	—	—	—	—
cheesewood, white (New Guinea)	Alstonia scholaris	(a)	7	8	9	9	10	11	12	13	13	14	15	16	16	17	18	19	20	20	21

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
cheesewood, white (Philippines)	A scholaris	(c)	—	9	10	11	12	13	13	14	15	16	17	17	18	19	20	20	21	22	23
cheesewood, white (Qld)	A scholaris	(a)	6	7	8	9	10	10	11	12	13	14	15	15	16	17	18	19	20	20	21
cheesewood, white (Solomon Is.)	A scholaris	(a)	5	6	7	7	8	9	10	10	11	12	12	13	14	15	15	16	17	17	18
chengal (Malaysia)	Neobalanocarpus heimii	(l)	6	6	7	8	9	10	11	11	12	13	14	15	16	16	17	18	19	20	20
cherry (Europe)	Prunus avium	(d)	—	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
cleistocalyx	Cleistocalyx myrtoides	(a)	7	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23	24
coachwood	Ceratopetalum apetalum	(a)	5	6	7	8	9	10	11	12	13	14	14	15	16	17	18	19	20	21	22
coondoo, blush	Planchonella laurifolia	(a)	6	7	8	9	10	10	11	11	12	12	13	14	14	15	15	16	17	17	18
cordia, New Guinea	Cordia dichotoma	(a)	6	7	7	8	8	9	9	10	10	11	11	12	12	13	14	—	—	—	—
corkwood, grey	Erythrina vespertilio	(a)	7	8	9	9	10	10	11	12	12	13	13	14	14	15	15	16	17	17	18
cudgerie, brown	Canarium australasicum	(a)	8	9	10	11	11	12	13	13	14	15	15	16	17	17	18	19	19	20	21
dakua, salusalu (Fiji)	Decussocarpus vitiensis	(j)	8	9	10	11	11	12	13	14	15	16	17	18	19	19	20	21	22	23	24
dillenia (Solomon Is.)	Dillenia salomonense	(a)	6	6	7	8	8	9	10	10	11	12	13	13	14	15	15	16	17	17	18
doi (Fiji)	Alphitonia zizyphoides	(j)	6	7	7	8	9	10	10	11	12	13	14	14	15	16	17	17	18	19	20
drypetes, New Guinea	Drypetes spp.	(a)	8	9	10	10	11	11	12	13	13	14	15	15	16	16	17	18	18	19	20
duabanga, New Guinea	Duabanga moluccana	(a)	6	6	7	8	9	10	10	11	12	13	13	14	15	16	16	17	18	19	20
ebony, New Guinea Indian	Diospyrus spp.	(a)	7	8	8	9	9	10	10	11	12	12	13	13	14	14	15	16	16	—	—
elm, European	Ulmus spp.	(d)	—	8	9	10	11	12	13	14	14	15	16	16	17	18	18	19	20	21	21
elm, white	U. americana	(g)	—	7	9	11	13	14	16	17	18	20	21	22	24	—	—	—	—	—	—
erima	Octomeles sumatrana	(a)	7	8	8	9	10	11	12	12	13	14	15	15	16	17	18	19	19	20	21
erima (Philippines)	O. sumatrana	(c)		6	7	8	9	9	10	11	12	12	13	14	15	15	16	17	18	18	19
evodia, white	Melicope micrococca	(a)	6	7	8	8	9	9	10	11	11	12	13	13	14	14	15	16	16	17	18

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	Botanical name	Source*	Corrected moisture content, %																		
figwood (Moreton Bay)	Ficus macrophylla	(a)	7	8	9	10	10	11	11	12	12	13	13	14	14	15	16	16	17	17	18
fir, alpine	Abies lasiocarpa	(b)	8	8	9	10	11	12	13	14	15	15	16	17	18	19	20	20	21	22	23
fir, amabilis	A. amabilis	(b)	—	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
fir, Douglas	Pseudotsuga menziesii	(d)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
fir, Douglas (Canada)	P. menziesii	(a)	7	8	9	10	11	12	12	13	14	15	16	17	18	18	19	20	21	22	23
fir, Douglas (Canada) (coastal)	P. menziesii	(b)	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20	21	22	23	24
fir, Douglas (Canada) (interior)	P. menziesii	(b)	7	8	9	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
fir, Douglas (NZ)	P. menziesii																				
	Sapwood untreated	(e)	—	—	—	—	12	13	14	15	16	18	19	20	21	22	24	25	26	27	28
	Truewood untreated	(e)	—	—	—	—	10	11	12	13	14	15	16	18	19	20	21	22	23	24	25
fir, Douglas (Victoria)	P. menziesii	(a)	8	9	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
fir, grand	Abies grandis	(d)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
galip	Canarium indicum	(a)	7	7	8	9	9	10	11	11	12	13	13	14	15	15	16	17	17	18	19
garawa	Anisoptera polyandra	(a)	6	7	8	9	9	10	11	12	12	13	14	15	15	16	17	18	18	19	20
garo garo	Mastixiodendron pachyclados	(a)	6	7	8	8	9	10	11	11	12	13	13	14	15	16	16	17	18	18	19
garuga	Garuga floribunda	(a)	7	8	8	9	9	10	10	11	12	12	13	13	14	14	15	15	16	16	17
giam	Hopea iriana	(a)	8	9	10	11	12	13	14	15	16	16	17	18	19	20	22	23	25	27	28
greenheart	Ocotea rodiaei	(d)	—	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27
greenheart, Queensland	Endiandra compressa	(a)	9	10	11	12	12	13	14	15	16	17	18	18	19	20	21	22	23	24	24
guarea, scented (black)	Guarea cedrata	(d)	—	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
guarea, scented (white)	G. cedrata	(d)	—	11	12	12	13	14	14	15	16	16	17	17	18	18	19	20	21	22	23
gum, blue, southern	Eucalyptus globulus	(a)	7	8	9	10	11	12	12	13	14	15	16	17	17	18	19	20	21	22	22
gum, blue, Sydney	E. saligna	(a)	8	9	10	11	12	12	13	14	15	15	16	17	18	19	19	20	21	22	23
gum, grey	E. punctata	(a)	7	8	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
gum, grey, mountain	E. cypellocarpa	(a)	8	9	9	10	11	12	13	14	14	15	16	17	18	19	19	20	21	22	23
gum, maiden's	E. maidenii	(a)	9	10	11	11	12	13	14	15	16	16	17	18	19	20	20	21	22	23	24
gum, manna	E. viminalis	(a)	6	7	7	8	9	10	11	12	13	14	14	15	16	17	18	19	20	21	21
gum, mountain	E. dalrympleana	(a)	6	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
gum, pink	E. fasciculosa	(a)	8	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23	24
gum, red, forest	E. tereticornis	(a)	9	10	11	12	12	13	14	15	16	17	18	18	19	20	21	22	23	24	24
gum, red, river	E. camaldulensis	(a)	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
gum, rose	E. grandis	(a)	8	9	10	11	12	13	14	14	15	16	17	18	18	19	20	21	22	23	24
gum, shining	E. nitens	(a)	7	8	9	10	11	11	12	13	14	15	16	17	18	19	20	20	21	22	23
gum, spotted (NSW)	Corymbia maculata	(a)	7	8	8	9	9	10	10	11	12	12	13	13	14	14	15	15	16	17	—
gum, spotted (lemon-scented)	C. citriodora	(a)	6	6	7	8	9	10	10	11	12	13	13	14	15	16	17	17	18	19	20
gum, spotted	C. maculata	(a)	7	8	9	9	10	11	12	12	13	14	15	15	16	17	18	18	19	20	21
gum, sugar	E. cladocalyx	(a)	8	9	10	10	11	12	13	14	15	16	16	17	18	19	20	20	21	22	23
gum, white, Dunn's	E. dunnii	(f)	5	6	7	8	9	9	10	11	12	12	13	14	15	16	16	17	18	19	19
gum, yellow	E. leucoxylon	(a)	9	9	10	11	12	12	13	14	15	15	16	17	18	18	19	20	21	21	22
handlewood, grey	Aphananthe philippinensis	(a)	6	7	8	9	10	10	11	12	12	13	14	14	15	16	16	17	18	18	19
handlewood, white	Streblus pendulinus	(a)	8	9	9	10	10	11	12	12	13	13	14	14	15	16	16	17	17	18	19
hardwood, Johnstone River	Backhousia bancroftii	(a)	6	6	7	8	9	10	10	11	12	13	13	14	15	16	17	17	18	19	20
hemlock, Taiwan	Tsuga chinensis	(a)	7	8	8	9	10	11	11	12	13	13	14	15	16	16	17	18	18	19	20
hemlock, western	T. heterophylla	(b)	7	8	9	10	11	12	13	15	16	17	18	19	20	21	22	23	24	26	27
heritiera, New Guinea	Heriteria littoralis	(a)	6	7	8	8	9	10	10	11	12	13	13	14	15	15	16	17	18	18	19
hickory	Carya spp.	(g)	—	—	7	9	11	13	14	16	17	18	20	21	22	24	—	—	—	—	—
hollywood, yellow	Premna lignum-vitae	(a)	9	9	10	11	11	12	13	13	14	15	16	16	17	18	18	19	20	20	21
horizontal	Anodopetalum biglandulosum	(a)	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	22	23	24
incensewood	Pseudocarapa nitidula	(a)	9	9	10	10	11	12	12	13	13	14	14	15	16	16	17	17	18	19	19
iroko	Chlorophora excelsa	(b)	—	7	7	8	9	10	11	12	13	14	15	15	16	17	18	19	19	20	21

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
ironbark, grey	Eucalyptus drephanophylla	(a)	9	10	11	11	12	13	14	15	16	17	18	19	20	21	22	23	24	24	25
ironbark, grey	E. paniculata	(a)	7	8	9	10	11	12	13	14	15	15	16	17	18	19	20	21	22	23	24
ironbark, red	E. sideroxylon	(a)	10	11	12	12	13	14	15	16	16	17	18	19	20	21	22	22	23	24	24
ironbark, red, broad-leaved	E. fibrosa	(a)	10	11	12	12	13	14	15	16	16	17	18	19	20	21	22	22	23	24	25
ironbark, red, narrow-leaved	E. crebra	(a)	7	8	9	10	11	12	13	14	14	15	16	17	18	19	20	21	22	23	24
jarrah	E. marginata	(a)	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
jelutong (Malaysia)	Dyera costulata	(l)	—	—	—	—	7	8	9	10	11	12	13	14	16	17	18	20	21	22	24
kahikatea (NZ)	Dacrycarpus dacrydioides—Mixed heart and sapwood:																				
	Untreated	(e)	—	—	—	—	11	12	12	13	14	15	16	16	17	18	19	19	20	21	22
	Boron	(e)	—	—	—	—	11	12	12	13	14	14	15	16	16	17	18	18	19	19	20
kamarere (Fiji)	Eucalyptus deglupta	(j)	6	7	8	8	9	10	11	11	12	13	13	14	15	15	16	17	17	18	19
kamarere (N.G.)	E. deglupta	(a)	7	8	9	10	10	11	12	13	14	15	16	17	18	19	19	20	21	22	23
kapur, Malaysian	Dryabalanops aromatica	(l)	—	3	4	5	6	7	7	8	9	10	11	12	13	14	15	16	17	17	18
karri	Eucalyptus diversicolor	(a)	7	7	8	9	10	11	12	13	13	14	15	16	17	18	18	19	20	21	22
kauceti	Kermadecia vitiensis	(j)	6	6	7	8	8	9	9	10	11	11	12	12	13	14	14	15	—	—	—
kauri, East Indian (Malaysian)	Agathis borneensis	(l)	6	6	7	7	8	9	9	10	11	12	13	14	16	17	19	20	21	22	24
kauri, New Zealand	A. australis	(a)	8	9	10	10	11	12	12	13	13	14	14	15	16	16	17	17	18	18	19
kauri, Vanikoro	A. macrophylla	(a)	10	11	12	13	13	14	14	15	15	15	16	16	17	17	18	18	18	19	19
keledang (Malaysia)	Artocarpus lanceifolius	(l)	5	6	7	8	10	11	13	14	16	18	20	21	22	24	26	30	—	—	—
kempas, Malaysian	Koompassia malaccensis	(l)	8	8	9	9	10	11	12	13	14	15	16	17	18	19	21	24	27	—	—
kempas, Malaysian	K. excelsa	(l)	7	8	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
keranji (Malaysia)	Dialium platysepalum	(l)	—	—	—	—	7	8	9	10	12	13	14	15	17	18	19	23	24	26	28
keruing, Malaysian	Dipterocarpus crinitus	(l)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
keruing, Malaysian	D. kerrii	(l)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	22	22	—	—

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
keruing, Philippine	D. grandiflorus	(c)	—	8	9	10	11	11	12	13	14	15	15	16	17	18	19	19	20	21	22
keruing, Philippine	D. warburgii	(c)	—	9	10	11	12	12	13	14	15	16	17	18	19	20	21	22	23	23	24
keruing, Philippine	D. gracilis	(c)	—	7	8	9	10	11	12	13	14	15	15	16	17	18	19	20	21	22	23
kiso	Chisocheton schumannii	(a)	7	8	8	9	9	10	10	11	11	12	12	13	14	14	15	15	16	—	—
kwila (Fiji)	Intsia bijuga	(j)	7	8	9	10	10	11	12	13	14	14	15	16	17	18	18	19	20	21	21
kwila (Malaysia)	I. palembanica	(l)	7	7	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23
kwila (Malaysia)	I. palembanica	(a)	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23	24	25
lacewood, yellow	Polyalthia oblongifolia	(a)	6	7	8	9	9	10	11	11	12	13	14	14	15	16	16	17	18	19	19
laran	Anthocephalus chinensis	(a)	7	8	8	9	10	11	11	12	13	14	14	15	16	17	17	18	18	19	19
larch, European	Larix decidua	(e)	—	—	—	—	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
larch, Japanese	Larix kaempferi	(d)	—	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27
larch, western	L. occidentalis	(b)	7	8	9	10	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
leatherwood	Eucryphia lucida	(a)	8	9	10	10	11	12	13	14	15	15	16	17	18	19	20	20	21	22	23
lightwood	Acacia implexa	(a)	8	9	9	10	11	11	12	12	13	14	14	15	16	16	17	18	18	19	19
lime, American	Tilia americana	(d)	—	7	8	9	10	10	11	12	—	—	—	—	—	—	—	—	—	—	—
lime, European	T. vulgaris	(d)	—	7	7	8	9	10	11	12	13	14	15	15	16	17	18	18	19	20	21
lumbayau (Malaysia)	Heritiera javanica	(l)	—	—	—	—	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
lusitanica	Cupressus lusitanica	(e)	—	—	—	—	11	12	13	14	15	16	16	17	18	19	20	21	22	23	24
macrocarpa	Cupressus macrocarpa	(e)	—	—	—	—	11	11	12	13	14	15	16	17	18	18	19	20	21	22	23
macadamia	Floydia praealta	(a)	9	9	10	10	11	12	12	13	13	14	14	15	16	16	17	18	18	19	19
mahogany, African	Khaya spp.	(d)	—	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
mahogany, American	Swietenia spp.	(d)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
mahogany, American (Malaysia)	Swietenia macrophylla	(l)	—	—	—	—	10	10	11	12	13	14	15	16	17	18	19	20	21	22	23
mahogany, brush	Geissois benthamii	(a)	8	8	9	10	10	11	11	12	12	13	14	14	15	15	16	16	17	18	18

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
mahogany, miva	Dysoxylum muelleri	(a)	9	10	11	12	12	13	14	15	15	16	17	18	18	19	20	20	21	22	23
mahogany, (N.G.)	Dysoxylum spp.	(a)	8	9	9	10	11	12	12	13	14	15	16	16	17	18	19	19	20	21	22
mahogany, Philippine, light red	Shorea almon	(c)	—	8	9	9	10	11	12	12	13	14	15	15	16	17	18	18	19	20	21
mahogany, Philippine, light red	Parashorea plicata	(c)	—	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
mahogany, Philippine, light red	Pentacme contorta	(c)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
mahogany, Philippine, light red	Shorea squamata	(c)	—	9	9	10	11	12	12	13	14	15	15	16	17	17	18	19	20	20	21
mahogany, Philippine, light red (Malaysia)	Parashorea densiflora	(l)	8	9	10	10	11	12	13	14	15	16	17	19	21	22	23	25	28	29	30
mahogany, Philippine, red	Shorea negrosensis	(c)	—	8	9	10	11	12	13	14	15	16	17	18	19	20	21	21	22	23	24
mahogany, Philippine, red	S. polysperma	(c)	—	8	9	10	11	12	13	14	14	15	16	17	18	19	20	21	21	22	23
mahogany, red	Eucalyptus resinifera	(a)	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	24	25	26
mahogany, rose	Dysoxylum fraseranum	(a)	8	9	10	10	11	12	12	13	14	14	15	16	16	17	18	18	19	20	20
mahogany, southern	Eucalyptus botryoides	(a)	7	8	9	10	11	12	12	13	14	15	16	17	18	19	20	20	21	22	23
mahogany, white	E. acmenoides	(a)	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
mako	Trichospermum richii	(j)	5	5	6	7	8	8	9	10	11	11	12	13	14	14	15	16	17	17	18
makore	Tieghemella heckelii	(d)	—	9	10	11	12	13	14	15	15	16	17	18	18	19	20	21	22	23	24
malas	Homalium foetidum	(a)	6	7	8	9	9	10	11	12	12	13	14	15	15	16	17	18	19	19	20
malletwood	Rhodamnia argentea	(a)	6	7	8	9	10	10	11	12	13	13	14	15	15	16	17	17	18	19	19
malletwood, brown	R. rubescens	(a)	6	7	8	8	9	10	11	11	12	13	14	14	15	16	17	17	18	19	20
manggachapui	Hopea acuminata	(c)	—	9	9	10	11	12	13	14	15	16	17	18	19	20	21	22	22	23	24
mango	Mangifera minor	(a)	6	7	7	8	9	10	10	11	12	12	13	14	15	15	16	17	18	18	19

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
mango (Philippines)	M. altissima	(c)	—	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	26
mangosteen (Fiji)	Garcinia myrtifolia	(j)	7	7	8	9	10	10	11	12	12	13	14	15	15	16	17	17	18	19	20
mangrove, cedar	Xylocarpus australasicus	(a)	8	9	10	11	12	12	13	14	15	16	17	18	18	19	20	21	22	23	24
manilkara	Manilkara kanosiensis	(a)	5	6	7	7	8	9	9	10	11	12	12	13	14	14	15	16	16	17	18
maniltoa (Fiji)	Cynometra insularis (Maniltoa grandiflora, M minor)	(j)	7	7	8	9	9	10	10	11	12	12	13	13	14	15	15	16	16	17	18
maniltoa (N.G.)	M. psilogyne	(a)	7	7	8	9	9	10	10	11	12	12	13	13	14	15	15	16	16	17	18
mansonia	Mansonia altissima	(d)	—	9	10	11	12	13	14	15	15	16	17	18	18	19	20	21	22	23	24
maple (Canada)	Acer spp.	(d)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
maple, New Guinea	Flindersia pimenteliana	(a)	7	8	9	10	11	12	13	14	15	16	17	18	18	19	20	21	22	23	24
maple, Queensland	F. brayleyana	(k)	7	9	10	12	13	14	16	17	18	20	—	—	—	—	—	—	—	—	—
maple, rose	Cryptocarya erythroxylon	(a)	7	8	8	9	10	10	11	12	12	13	14	14	15	16	16	17	18	18	19
maple, scented	Flindersia laevicarpa	(a)	8	9	10	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	
maple, sugar	Acer saccharum	(g)			7	8	10	12	13	14	15	16	17	18	19	20	21	22	23	24	
mararie	Pseudoweinwannia lachnocarpa	(a)	9	10	11	11	12	13	14	14	15	16	17	18	18	19	20	21	21	22	23
marri	Eucalyptus calophylla	(a)	7	7	8	9	9	10	11	11	12	13	13	14	15	15	16	17	17	18	19
masiratu	Degeneria vitiensis	(j)	6	7	8	8	9	10	11	11	12	13	13	14	15	16	16	17	18	18	19
matai	Podocarpus spicatus	(a)	8	9	9	10	11	12	12	13	14	15	16	16	17	18	18	19	20	21	22
meranti, dark red (Malaysia)	Shorea curtisii	(a)	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	24	27	—	—
meranti, dark red (Malaysia)	S. pauciflora	(a)	8	9	10	12	13	14	15	17	18	19	20	21	23	24	25	—	—	—	—
meranti, dark red (Malaysia)	Shorea singkawang	(l)	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
meranti, dark red (Malaysia)	Shorea spp.	(f)	6	7	8	9	10	11	11	12	13	14	15	16	17	18	19	20	21	21	22

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
meranti, light red (Malaysia)	S. acuminata	(a)	8	9	10	11	12	13	15	16	17	18	19	21	22	23	25	—	—	—	—
meranti, light red (Malaysia)	S. macroptera	(l)	7	7	8	9	9	10	11	12	13	14	15	16	18	20	22	24	26	27	28
meranti, light red (Malaysia)	S. leprosula	(l)	5	6	7	8	9	10	10	11	12	13	14	15	15	16	17	18	19	20	20
meranti, light red (Malaysia)	S. uliginosa	(l)	9	10	11	11	12	13	14	15	16	17	18	19	20	21	22	24	26	30	—
meranti, white (Indonesia)	Shorea spp.	(a)	8	9	10	11	11	12	13	14	14	15	16	17	18	18	19	20	21	21	22
meranti, white (Malaysia)	Shorea spp.	(f)	7	8	9	10	11	13	14	15	16	17	18	19	21	22	23	24	25	26	27
meranti, white (Malaysia)	S. hypochra	(l)	7	8	8	9	10	10	11	12	13	14	15	16	17	19	20	21	22	24	27
meranti, yellow (Malaysia)	Shorea spp.	(f)	—	—	6	8	9	11	13	14	16	18	19	21	23	25	26	28	30	31	33
meranti, yellow (Malaysia)	S. multiflora	(l)	—	—	3	4	5	6	7	7	9	11	13	15	17	18	18	19	20	21	—
merawan	Hopea sulcata	(l)	6	7	8	9	10	12	13	14	14	15	16	17	18	19	20	21	22	23	24
mersawa, Malaysian	Anisoptera laevis	(l)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	21	22	23	24	25
mersawa, Philippine	A. surea	(d)	—	10	10	11	12	12	13	14	14	15	16	16	17	18	19	19	20	21	21
messmate	Eucalyptus obliqua	(a)	9	10	11	12	12	13	14	15	16	16	17	18	18	19	20	21	22	22	23
messmate (immature)	E. obliqua	(a)	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
moustiquaire	Cryptocarya spp.	(a)	6	7	8	8	9	10	11	12	13	13	14	15	16	17	18	18	19	20	21
musizi	Maesopsis eminii	(d)	—	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
neuburgia	Neuburgia collina	(a)	8	9	10	11	11	12	13	14	15	15	16	17	18	18	19	20	21	22	22
nutmeg (Fiji)	Myristica spp.	(j)	7	7	8	9	10	11	11	12	13	14	14	15	16	17	18	18	19	20	21
nutmeg (N.G.)	M. buchneriana (Horsefieldia irya)	(a)	7	8	8	9	10	11	12	13	13	14	15	16	17	18	18	19	20	21	22
nyatoh (Malaysia)	Palaquium spp.	(l)	5	6	7	8	9	10	12	14	15	16	16	17	18	21	23	25	28	30	
nyatoh (Malaysia)	Madhuca utilis	(l)	9	10	11	11	12	13	14	15	16	17	18	19	20	21	22	23	24	24	25
nyatoh (Philippines)	M. oblongifolia	(c)	—	10	10	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
oak, American red	Quercus spp.	(g)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
oak, American white	Quercus spp.	(g)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
oak, European	Quercus spp.	(d)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
oak, Japanese	Quercus spp.	(d)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
oak, New Guinea	Castanopsis acuminatissima	(a)	7	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
oak, silky, fishtail	Neorites kevediana	(k)	5	5	6	7	7	8	9	9	10	10	11	12	12	13	14	14	15	16	16
oak, silky, northern	Cardwellia sublimis	(a)	7	8	8	9	10	11	12	13	14	15	16	17	17	18	19	20	21	22	23
oak, silky, red	Stenocarpus salignus	(a)	7	8	9	9	10	11	11	12	13	13	14	15	16	16	17	18	18	19	20
oak, silky, southern	Grevillea robusta	(a)	7	7	8	9	9	10	11	11	12	13	13	14	15	15	16	17	17	18	19
oak, silky, white	Stenocarpus sinuatus	(a)	7	8	9	9	10	11	11	12	13	13	14	15	15	16	17	17	18	19	19
oak, tulip, blush	Argyrodendron actinophyllum	(a)	8	8	9	9	10	11	11	12	12	13	14	14	15	16	16	17	17	18	19
oak, tulip, brown	A. trifoliolatum	(a)	10	10	11	12	12	13	13	14	14	15	16	16	17	18	18	19	19	20	20
oak, tulip, red	A. peralatum	(a)	10	11	12	13	14	15	16	17	18	18	19	20	21	22	23	24	25	25	26
oak, white tulip	Pterygota horsefieldii	(d)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
obah	Eugenia spp.	(a)	6	7	8	8	9	10	10	11	12	12	13	14	15	15	16	17	17	18	19
obeche	Triplochiton scleroxylon	(d)	—	7	8	9	10	10	11	12	13	14	15	15	16	16	17	18	18	19	20
odoko	Scottellia coriacea	(d)	—	8	9	10	11	12	13	14	14	15	16	16	17	18	18	19	20	21	21
olive, East African	Olea hochstetteri	(d)	—	9	10	11	12	13	14	15	15	16	17	18	18	19	20	21	22	23	24
olivillo	Aextoxicon punctatum	(d)	—	7	8	9	10	10	11	12	13	14	15	15	16	16	17	18	18	19	20
opepe	Nauclea diderrichii	(d)	—	11	12	12	13	14	14	15	16	16	17	17	18	18	19	20	21	22	23
padauk, African	Pterocarpus soyauxii	(d)	—	7	7	8	9	10	11	12	13	14	15	15	16	17	18	19	19	20	21
palaquium, Fijian	Palaquium hornei	(j)	7	8	9	9	10	11	11	12	12	13	14	14	15	16	16	17	17	—	—
palaquium, Solomon Is.	Palaquium spp.	(a)	5	6	7	8	8	9	10	11	11	12	13	14	15	15	16	17	18	18	19
papuacedrus	Papuacedrus papuana	(a)	8	9	10	11	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
parinari, Fijian	Parinari insularum	(j)	6	7	8	9	9	10	11	12	13	14	14	15	16	17	18	19	20	20	21
penarahan (Malaysia)	Myristica iners	(l)	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	—	—	—
peppermint, broad-leaved	Eucalyptus dives	(a)	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
peppermint, narrow-leaved	E. australiana	(a)	9	10	11	11	12	13	14	14	15	16	17	18	18	19	20	21	22	22	23
persimmon, grey	Diospyros pentamera	(a)	8	8	9	10	10	11	11	12	13	13	14	14	15	16	16	17	18	18	19
persimmon (U.S.A.)	D. virginiana	(d)	—	7	8	9	10	10	11	12	13	14	15	15	16	16	17	18	18	19	20
perupok (Malaysia)	Lophopetalum subovatum	(l)	10	11	12	13	14	15	16	17	18	19	20	21	23	24	24	25	26	28	—
perupok (Malaysia)	Kokoona spp.	(l)	4	5	7	8	10	11	12	14	16	17	19	21	22	23	24	26	28	30	—
pillarwood	Cassipourea malosano	(d)	—	7	7	8	9	10	11	12	13	14	15	15	16	17	18	19	19	20	21
pine, Aleppo	Pinus halepensis	(a)	9	10	11	11	12	13	14	14	15	16	17	18	18	19	20	21	22	22	23
pine, Benguet	P. kesiya	(c)	—	11	13	14	15	16	17	18	19	20	21	22	24	25	26	27	28	29	30
pine, black	Prumnopitys amarus	(a)	6	7	8	9	10	11	12	12	13	14	15	16	16	17	18	19	19	20	21
pine, bunya	Araucaria bidwillii	(a)	9	10	11	12	12	13	14	14	15	16	16	17	18	18	19	20	21	21	22
pine, Canary Is.	Pinus canariensis	(a)	8	8	9	10	11	12	13	14	14	15	16	17	18	19	19	20	21	22	23
pine, Caribbean	P. caribaea	(d)	—	9	10	11	12	13	14	15	—	—	—	—	—	—	—	—	—	—	—
pine, Caribbean (immature) (Fiji)	P caribaea	(j)	5	7	8	10	11	12	14	15	17	18	20	21	22	24	25	—	—	—	—
pine, celery-top	Phyllocladus aspenifolius	(a)	8	9	10	10	11	12	13	13	14	15	16	16	17	18	19	19	20	21	21
pine, Corsican (NZ)	Pinus nigra	(i)	—	—	10	11	12	13	14	15	16	18	19	20	21	22	24	25	26	27	28
pine, cypress, northern	Callitris intratropica	(a)	7	8	9	10	11	12	12	13	14	15	16	17	17	18	19	20	21	21	22
pine, cypress, Rottnest Is.	C. preissii	(a)	9	10	11	11	12	13	14	15	16	16	17	18	19	20	21	21	22	23	24
pine, cypress, white	Callitris glaucophylla	(a)	8	9	10	10	11	12	13	14	15	16	17	18	19	20	21	22	22	23	24
pine, hoop	Araucaria cunninghamii	(a)	9	10	11	12	12	13	14	15	16	16	17	18	19	20	21	22	22	23	24

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
pine, Huon	Dacrydium franklinii	(a)	9	10	10	11	12	13	13	14	15	15	16	17	18	18	19	20	20	21	22
pine, jack	Pinus banksiana	(g)	—	—	6	7	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
pine, kauri, Queensland	Agathis robusta	(a)	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23	24	24	25
pine, King William	Athrotaxis selaginoides	(a)	9	9	10	11	12	12	13	14	14	15	16	16	17	18	18	19	20	20	21
pine, klinki	Araucaria hunsteinii	(a)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
pine, loblolly (Qld)	Pinus taeda	(a)	8	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
pine, loblolly (immature)	P. taeda	(a)	5	6	8	9	11	12	14	15	17	18	19	20	22	23	24	—	—	—	—
pine, lodgepole	P. contorta	(b)	7	8	9	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
pine, longleaf	P. palustris	(d)	—	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27
pine, maritime	P. pinaster	(a)	9	10	11	12	12	13	14	15	15	16	17	18	18	19	20	21	21	22	23
pine, Parana	Araucaria angustifolia	(a)	6	7	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23
pine, ponderosa	Pinus ponderosa	(b)	—	7	9	10	11	13	14	15	16	17	18	19	20	21	22	22	23	24	25
pine, radiata (NZ)	Pinus radiata	(a)	6	7	8	10	11	12	13	14	16	17	18	19	20	22	23	24	25	27	28
	Sapwood untreated	(e)	—	—	—	—	12	12	13	14	15	16	17	18	19	20	21	22	23	24	25
	Sapwood boron	(e)	—	—	—	—	11	11	12	12	13	13	14	15	16	16	17	18	19	20	21
pine, radiata (S.A.)	P. radiata	(a)	9	10	11	11	12	13	14	15	16	17	18	19	20	21	22	24	25	26	27
pine, radiata (Vic)	P. radiata	(a)	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
pine, red	P. resinosa	(g)	—	—	—	7	8	9	11	12	13	14	15	16	17	18	19	20	22	23	24
pine, shortleaf	P. echinata	(d)		9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27
pine, slash (Qld)	P. elliottii	(a)	7	8	9	10	11	12	13	14	15	16	17	17	18	19	20	21	22	23	24
pine, slash (immature)	P. elliottii	(a)	6	7	8	9	10	11	12	14	15	17	18	20	21	22	24	—	—	—	—
pine, stone	P. pinea	(a)	8	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23	24	25
pine, sugar (imported)	Pinus lambertiana	(a)	7	8	9	10	11	12	13	14	15	16	17	18	20	21	22	23	24	25	26
pine, western white	P. monticola	(b)	—	—	8	9	10	11	11	12	13	14	15	16	17	17	18	19	20	21	22
pitttosporum (Tas.)	Pittosporum bicolor	(a)	5	6	7	8	9	10	11	12	12	13	14	15	16	17	18	19	20	20	21

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
planchonella, Fijian	Planchonella vitiensis	(j)	7	7	8	9	9	10	11	11	12	13	13	14	14	15	16	16	17	18	18
planchonella, New Guinea	P. kaernbachiana	(a)	6	6	7	8	9	9	10	11	12	12	13	14	15	16	16	17	18	19	19
planchonella, New Guinea	P. torricellensis	(a)	1	4	5	6	6	7	8	9	9	10	11	12	12	13	—	—	—	—	—
planchonella, Solomon Is.	P. thyrsoidea	(a)	5	5	6	7	7	8	8	9	10	10	11	11	12	13	—	—	—	—	—
planchonia	Planchonia papuana	(a)	7	8	8	9	10	11	12	12	13	14	15	15	16	17	18	19	19	20	21
pleiogynium	Pleiogynium timorense	(a)	8	8	9	9	10	11	11	12	12	13	13	14	15	15	16	16	17	18	18
podocarp, Fijian	Podocarpus neriifolius	(j)	8	9	9	10	11	12	13	14	14	15	16	17	18	19	20	20	21	22	23
podocarp, red	Decussocarpus vitiensis	(a)	8	9	10	11	12	13	13	14	15	16	17	18	19	20	20	21	22	23	24
poplar, black	Populus nigra	(d)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
poplar, pink	Euroschinus falcata	(a)	8	8	9	10	10	11	12	12	13	14	14	15	16	17	17	18	19	19	20
quandong, brown	Elaecarpus coorangooloo	(k)	8	8	8	9	9	10	11	11	12	13	14	14	15	16	17	19	20	21	22
quandong, silver	E. angustifolius	(a)	7	7	8	9	10	10	11	12	12	13	14	14	15	16	16	17	18	18	19
quandong, Solomon Is.	E. sphaericus	(a)	5	6	6	7	8	9	9	10	11	11	12	13	14	14	15	16	17	17	18
qumu	Acacia richii	(j)	7	7	8	9	9	10	11	12	12	13	14	14	15	16	17	17	18	19	19
raintree (Fiji)	Samanea saman	(j)	6	6	7	7	8	8	9	9	10	10	11	11	12	—	—	—	—	—	—
ramin, Fijian	Gonystylus punctatus	(j)	7	8	9	10	10	11	12	12	13	14	15	15	16	17	17	18	19	20	20
ramin, Philippine	G. macrophyllus	(c)	—	11	12	12	13	14	15	15	16	17	18	18	19	20	21	21	22	23	24
ramin, Malaysian	G. bancanus	(l)	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	25	27	28	30
ramin, Sarawak	Gonystylus spp.	(a)	6	7	8	9	10	10	11	12	13	14	15	15	16	17	18	19	20	20	21
redwood	Sequoia sempervirens	(a)	8	9	10	10	11	12	13	14	15	16	16	17	18	19	20	20	21	22	23
rengas (Malaysia)	Gluta spp.	(l)	6	7	8	9	10	11	12	13	14	14	15	16	17	18	19	20	21	22	23
resak (Malaysia)	Cotylelobium melanoxylon	(l)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	20	21	22	23	23

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
rimu	Dacrydum cupressinum																				
	Mixed heart and sapwood, untreated	(e)	—	—	—	—	12	12	13	14	15	16	16	17	18	19	19	20	20	21	21
	Mixed heart and sapwood, boron	(e)	—	—	—	—	10	11	12	13	13	14	15	16	16	17	17	18	18	19	20
	Truewood untreated	(e)	—	—	—	—	11	11	12	12	12	13	13	13	14	14	15	15	16	16	17
roble pellin	Nothofagus obliqua	(d)	—	8	9	10	11	12	13	14	14	15	16	16	17	18	18	19	20	21	21
rosarosa	Heritiera ornithocephala	(j)	8	8	9	10	10	11	12	13	13	14	15	15	16	17	18	18	19	—	—
rosewood, New Guinea	Pterocarpus indicus	(a)	6	7	8	8	9	10	10	11	12	13	13	14	15	15	16	17	17	18	19
rosewood, Philippine	P. indicus	(c)	—	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18	19	19	20
rosewood, Indian	Dalbergia spp.	(d)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
sapele	Entandrophragma cylindricum	(d)	—	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27
sasauria (Fiji)	Dysoxylum quercifolium (D. richii)	(j)	6	7	7	8	9	10	10	11	12	13	13	14	15	—	—	—	—	—	—
sassafras	Doryphora sassafras (Daphnandra micrantha)	(a)	8	8	9	10	10	11	12	13	13	14	15	16	16	17	18	18	19	20	21
sassafras, southern	Atherosperma moschatum	(a)	9	9	10	11	11	12	13	13	14	15	15	16	17	17	18	19	19	20	21
satinash, blush	Acmena hemilampra	(a)	5	6	7	8	9	10	11	12	13	14	14	15	16	17	18	19	20	21	22
satinash, grey	Syzygium gustavioides	(a)	7	8	9	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23
satinash, New Guinea	S. buettneranum	(a)	6	7	8	8	9	10	11	11	12	13	13	14	15	16	16	17	18	19	19
satinash, rose	S. francisii	(a)	6	7	7	8	8	9	10	10	11	12	12	13	13	14	15	15	16	—	—
satinay	Syncarpia hillii	(a)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
satinbox	Phebalium squameum	(a)	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25
satinheart, green	Geijera salicifolia	(a)	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	—	—
satinwood, tulip	Rhodosphaera rhodanthema	(a)	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
scentbark	Eucalyptus aromaphloia	(a)	6	7	8	9	9	10	11	12	13	14	15	16	16	17	17	18	18	18	19
schizomeria, New Guinea	Schizomeria serrata	(a)	7	8	8	9	10	11	12	13	14	15	15	16	17	18	19	20	21	22	22
schizomeria, Solomon Is.	S. serrata	(a)	5	6	6	7	8	8	9	9	10	11	11	12	13	13	14	15	—	—	—
sepetir (Malaysia)	Sindora coriaceae	(l)	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
sheoak, Fijian beach	Casuarina nodiflora	(j)	7	8	9	10	10	11	12	13	13	14	15	16	16	17	18	18	19	20	21
sheoak, river	C. cunninghamiana	(a)	8	8	9	10	10	11	11	12	12	13	14	14	15	16	16	17	17	18	19
sheoak, rose	C. torulosa	(a)	9	9	10	11	11	12	13	13	14	14	15	15	16	16	17	18	18	19	19
sheoak, Western Australia	Allocasuarina fraserana	(a)	9	9	10	11	11	12	12	13	14	14	15	16	16	17	18	18	19	20	20
silkwood, bolly	Cryptocarya oblata	(a)	9	9	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18	18
silkwood, red	Palaquium galactoxylum	(a)	5	6	7	7	8	9	10	10	11	12	12	13	14	14	15	16	17	17	18
silkwood, silver	Flindersia acuminata	(a)	9	9	10	11	12	12	13	14	15	15	16	17	18	18	19	20	20	21	22
simpoh (Philippines)	Dillenia philippinensis	(c)	—	8	9	10	11	12	13	14	15	16	17	18	18	19	20	21	22	23	24
siris, white	Ailanthus peekelii	(a)	6	7	8	9	10	10	11	12	13	13	14	15	16	17	17	18	19	20	21
siris, white	A. triphysa	(a)	8	9	10	10	11	12	13	13	14	15	16	16	17	18	19	19	20	21	22
sloanea	Sloanea spp.	(a)	7	7	8	9	10	11	12	12	13	14	15	16	17	17	18	19	20	21	21
spondias	Spondias dulcis	(a)	6	7	7	8	9	10	10	11	12	13	13	14	15	16	17	17	18	19	20
spruce, black	Picea mariana	(g)	—	—	—	7	8	9	10	12	13	14	15	16	17	17	18	19	20	21	23
spruce (Canada)	Picea spp.	(a)	7	8	9	9	10	11	12	12	13	14	14	15	16	16	17	18	19	19	20
spruce, Sitka (U.S.A.)	P. sitchensis	(b)	—	7	8	9	10	11	12	13	15	16	17	18	19	20	21	22	23	24	25
spruce, Sitka (Vic.)	P. sitchensis	(a)	—	8	9	10	11	12	14	15	16	17	18	19	20	21	22	—	—	—	—
spruce, white	P. glauca	(b)	7	9	10	11	12	13	14	15	16	17	18	20	21	22	23	24	25	26	27
sterculia, Fijian	Sterculia vitiensis	(j)	6	7	7	8	9	9	10	10	11	12	12	13	14	14	15	15	16	17	—
sterculia, New Guinea	S. conwentzii	(a)	6	6	7	8	8	9	10	10	11	11	12	13	13	14	15	15	16	17	—
sterculia	Sterculia spp.	(d)	—	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
stringybark, brown	Eucalyptus capitellata	(a)	8	9	10	11	11	12	13	14	15	16	17	18	19	19	20	21	22	23	24
stringybark, Darwin	E. tetrodonta	(a)	7	8	8	9	10	11	12	13	14	15	15	16	17	18	19	20	21	22	22
stringybark, yellow	E. muelleriana	(a)	10	11	12	13	14	14	15	16	17	18	18	19	20	21	21	22	23	24	24
sycamore	Acer psuedoplatanus	(d)	—	7	7	8	9	10	11	12	13	14	15	15	16	17	18	19	19	20	21
sycamore, satin	Ceratopetalum succirubrum	(a)	8	9	9	10	11	11	12	12	13	14	14	15	16	16	17	18	18	19	20
sycamore, silver	Cryptocarya glaucescens	(a)	9	9	10	10	11	12	12	13	13	14	14	15	16	16	17	17	18	19	19
tallowwood	Eucalyptus microcorys	(a)	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
taun (Malaysia)	Pometia pinnata	(l)	—	—	4	5	6	8	9	9	11	13	14	15	16	17	19	20	21	22	23
taun (N.G.)	P. pinnata	(a)	8	9	10	11	12	13	15	16	17	18	19	20	22	23	24	25	26	26	27
taun (Philippines)	P. pinnata	(c)	—	10	11	12	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
taun (Solomon Is.)	P. pinnata	(a)	6	7	7	8	9	10	10	11	12	13	13	14	15	16	16	17	18	19	19
tawa	Beilschmiedia tawa	(a)	9	9	10	10	11	11	12	12	13	13	14	14	15	15	16	16	17	17	18
	Sap and heart untreated (NZ)	(e)	—	—	—	—	11	11	12	13	13	14	15	15	16	17	17	18	19	19	20
	Sap and heart boron (NZ)	(e)	—	—	—	—	10	11	11	12	13	13	14	15	15	16	16	17	18	18	19
teak	Tectona grandis	(d)	—	7	7	8	9	10	11	12	13	14	15	15	16	17	18	19	19	20	21
terap (Malaysia)	Artocarpus elasticus	(l)	—	—	—	—	15	16	17	19	21	25	27	28	30	—	—	—	—	—	—
terminalia, brown (N.G.)	Terminalia brassii	(a)	6	7	7	8	9	10	11	12	13	14	15	15	16	17	18	19	20	21	22
terminalia, brown (Solomon Is.)	T. brassii	(a)	5	6	7	7	8	9	9	10	11	12	12	13	14	15	15	16	17	17	18
terminalia, red brown (Philippines)	T. microcarpa	(c)	—	5	6	7	8	8	9	10	11	11	12	13	14	15	15	16	17	18	18
terminalia, yellow (New Guinea)	T. complanata	(a)	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	20	21	22
terminalia, yellow (Solomon Is.)	T. calamansanai	(a)	5	6	7	7	8	9	10	10	11	12	13	13	14	15	16	16	17	18	19

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
tetrameles	Tetrameles nudiflora	(a)	6	7	8	8	9	10	11	11	12	13	14	14	15	16	17	17	18	19	20
tingle, red	Eucalyptus jacksonii	(a)	7	9	10	11	12	13	15	16	17	18	19	21	22	23	24	25	27	28	29
tingle, yellow	E. guilfoylei	(a)	7	9	10	11	12	13	14	15	17	18	19	20	21	22	23	25	26	27	28
totara	Podocarpus totara	(a)	8	8	9	10	10	11	12	12	13	14	14	15	16	16	17	18	18	19	19
touriga, red	Calophyllum costatum	(a)	10	11	11	12	13	14	14	15	16	17	17	18	19	20	20	21	22	23	23
tristiropsis, New Guinea	Tristiropsis canarioides	(a)	8	8	9	10	11	11	12	13	14	14	15	16	16	17	18	19	19	20	21
tuart	Eucalyptus gomphocephala	(a)	9	9	10	11	12	12	13	14	15	15	16	17	17	18	19	20	20	21	22
tulipwood	Harpullia pendula	(a)	9	9	10	11	12	12	13	14	15	16	16	17	18	19	20	20	21	22	23
turpentine	Syncarpia glomulifera	(a)	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	24
vaivai-ni-veikau	Serianthes myriadenia	(j)	6	7	7	8	9	9	10	11	11	12	12	13	14	14	15	16	16	17	18
vatica, Philippine	Vatica mangachapoi	(c)	—	9	10	10	11	12	12	13	14	14	15	15	16	17	17	18	19	19	20
vitex, New Guinea	Vitex cofassus	(a)	7	8	8	9	10	11	12	13	13	14	15	16	17	18	18	19	20	21	22
vuga	Metrosideros collina	(j)	7	8	8	9	9	10	10	11	12	12	13	13	14	14	15	16	16	—	—
vutu	Barringtonia edulis	(j)	5	6	7	7	8	8	9	9	10	11	11	12	12	13	—	—	—	—	—
walnut (West Africa)	Lovoa tichilioides	(d)	—	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27
walnut, black	Juglans nigra	(e)	—	—	—	—	11	12	13	13	14	15	16	16	17	18	19	19	20	21	22
walnut, blush	Beilschmiedia obtusifolia	(a)	9	10	11	11	12	12	13	14	14	15	16	16	17	18	18	19	19	20	21
walnut, European	Juglans regia	(d)	—	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27
walnut, New Guinea	Dracontomelum spp.	(a)	6	7	8	9	10	11	12	13	14	15	16	17	17	18	19	20	—	—	—
walnut, New Guinea (Philippines)	D. dao	(c)	—	7	8	8	9	10	10	11	12	12	13	14	15	15	16	17	17	18	19
walnut, Queensland	Endiandra palmerstonii	(a)	7	9	10	11	12	13	14	15	16	17	18	19	20	22	23	24	25	26	27
walnut, rose	E. muelleri	(a)	4	5	6	7	8	9	10	10	11	12	13	14	15	16	16	17	18	19	20
walnut, white	Cryptocarya obovata	(a)	8	9	9	10	11	11	12	13	13	14	14	15	16	16	17	18	18	19	20

* See Appendix G.

(*continued*)

NOTE: Shaded values have been extrapolated from the original source data.

TABLE E1 (*continued*)

Meter reading, %			6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Standard trade name	**Botanical name**	**Source***	**Corrected moisture content, %**																		
walnut, yellow	Beilschmiedia bancroftii	(a)	6	7	8	8	9	10	10	11	12	12	13	14	14	15	16	17	17	18	19
wandoo	Eucalyptus wandoo	(a)	9	10	11	12	13	14	15	16	16	17	18	19	20	21	22	23	24	25	25
wattle, hickory	Acacia penninervis	(a)	8	8	9	10	11	11	12	13	13	14	14	15	16	16	17	18	18	19	20
wattle, silver	A. dealbata	(a)	8	9	10	10	11	12	13	13	14	15	16	16	17	18	19	20	20	21	22
woolybutt	Eucalyptus longifolia	(a)	9	10	10	11	12	13	14	15	15	16	17	18	19	20	20	21	22	23	24
yaka	Dacrydium nausoriensis D. nidilum	(j)	8	9	9	10	11	12	12	13	14	14	15	16	17	17	18	19	19	20	21
yasi-yasi I (Fiji)	Syzygium effusum S. nidie	(j)	6	6	7	8	9	10	11	11	12	13	14	15	15	16	17	17	18	19	19
yasi-yasi II (Fiji)	Cleistocalyx spp. Syzygium spp.	(j)	6	7	8	9	10	11	12	13	14	14	15	16	17	18	19	20	21	21	22
yate	Eucalyptus cornuta	(a)	8	9	10	10	11	12	12	13	14	15	16	16	17	18	19	19	20	21	22
yertchuk	E. consideniana	(a)	9	10	11	12	13	14	15	16	17	18	19	20	20	21	22	23	24	25	26

* See Appendix G.

NOTE: Shaded values have been extrapolated from the original source data.

APPENDIX F

CIRCUIT TESTING AND CALIBRATION OF RESISTANCE ELECTRICAL MOISTURE METERS

(Informative)

The electrode circuit should be tested regularly by bridging the electrodes with a calibration resistor equivalent to a high moisture content. This ensures that the meter is operating correctly. The meter can be checked for accuracy against the moisture content versus electrical resistance curve for the meter by connecting appropriate resistors between the electrodes or by using a test card.

Different manufacturers of moisture meters may use slightly different calibration resistances. Independent laboratories in Australia and New Zealand generally use the standard resistances provided in Table F1. Resistors used should have the maximum tolerances listed in Table F2.

NOTE: Electrical resistance moisture meters should be tested by a reputable laboratory at least once every 12 months.

Not all moisture meters can be assigned a single correction figure for a given timber treatment. This was clear from the wide deviation of uncorrected meter determinations measured by Kear (Ref. 14, Appendix G) using different meter types.

TABLE F1

STANDARD RESISTANCE CALIBRATIONS

Meter reading % MC	Resistance MΩ	Meter reading % MC	Resistance kΩ
6	66000	24	770
7	22000	25	680
8	5010	26	600
9	1990	27	530
10	850	28	480
11	380	29	420
12	180	30	380
13	98	31	350
14	55	32	315
15	32	33	285
16	19	34	260
17	12	35	235
18	7.4	36	215
19	5.0	37	200
20	3.4	38	185
21	2.3	39	170
22	1.6	40	160
23	1.0		

TABLE F2

TEST RESISTOR TOLERANCE

Meter reading, % MC	Resistor tolerance, %
6 to 8	±20
9 to 11	±15
12 to 17	±10
18 to 23	±5
24 to 40	±1

NOTE: The tolerance levels have been based on the equivalent resistance values to give a meter reading tolerance of ±0.2% MC.

APPENDIX G

BIBLIOGRAPHY OF SOURCES FOR MOISTURE CONTENT CORRECTIONS

(Informative)

Tables D1 and E1 have been cited from Hartley, J. and Marchant, J. *Methods of Determining the Moisture Content of Wood*, Forests NSW (1995, revised) Tech. Paper No. 41 and are also based on data in the following sources of information:

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Australian Forest Products Association
Australian Timber Flooring Association
BRANZ
Forest and Wood Products Australia
Forests New South Wales
Frame and Truss Manufacturers Association Australia
Master Builders Australia
New Zealand Timber Industry Federation
Tasmanian Timber Promotion Board
Timber and Building Materials Association (NSW)
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