

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/3, Timber Grading, to supersede AS 1080.1—1972, *Methods of testing timber*, Part 1: *Moisture content*.

This revision was undertaken to provide two methods for determining the moisture content of timber given in various Australian and New Zealand specifications for sawn, milled and joinery timber products. The oven-drying method is applicable when accuracy, rather than the time taken to obtain a result, is important; e.g. in the resolution of disputes, calibration of instruments or research work. The electrical resistance method gives less accurate results but can be used for routine monitoring.

This revision has resulted in changes to style, format and expression, which accommodate current editorial practice, and includes the following technical changes:

- (a) For the oven-dry method, forced draught or convection ovens are the preferred method of drying. Microwave ovens are not considered to be a suitable alternative.
- (b) Greater emphasis is placed on the application of apparatus that is not elaborate. The distillation and Karl Fischer titration methods are not included as both require involved laboratory apparatus.
- (c) Clauses on the correct use of resistance type electrical moisture meters are added, and tables for temperature and species correction are introduced.
- (d) Capacitance type meters are not included. They are increasingly used in the industry as they do not mark the timber; however, the factors that affect their use are different to those relevant to electrical resistance meters.

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 describes two methods for determining the moisture content of solid timber.

NOTES:

- 1 For determination of the moisture content of plywood see AS 2098.1.
- 2 For determination of the moisture content of reconstituted wood based panels see AS 2098.3.
- 3 A bibliography is given in Appendix A.

2 REFERENCED DOCUMENTS The following documents are referred to in this Standard:

AS

O1 Glossary of terms used in timber Standards

2098 Methods of test for veneer and plywood

2098.1 Part 1: Moisture content of veneer and plywood

3 DEFINITIONS For the purpose of this Standard, the definitions given in AS O1 and those below apply.

3.1 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 in moisture content for a particular species at a specific reference temperature.

3.2 Moisture content (MC)—the amount of moisture in wood, usually expressed as a percentage of the oven dry mass.

3.3 Non-truewood—a mixture of sapwood and intermediate truewood.

3.4 Test piece—a piece of a required size for a specific test cut from a test sample (see Figure 7.1).

3.5 Test sample—one or more pieces of timber drawn from a population of timber.

3.6 Test specimen—a section from a piece from a test sample, of sufficient size for a specific test.

4 OVEN-DRY METHOD

4.1 Application The oven-dry method is suitable for use where the accuracy of the moisture content determination is important, e.g. in the event of disputes where the use of an electrical resistance moisture metre would not give the required accuracy, in the calibration of equipment, for kiln drying quality control, research work or in similar applications. Although it can 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 resistance moisture meter.

4.2 Principle The oven-dry method does not require especially elaborate apparatus, nor appreciable technical skill. The moisture content is determined by initial weighing of the sample, then drying in an oven to a constant or 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.

Oven-drying is simple and is sufficiently accurate except where the material contains significant amounts of evaporable material other than moisture. Its disadvantage is the time required for oven-drying (approximately 24 h) and the fact that it is a destructive method, because of the need to cut test pieces from the sample timber.

4.3 Apparatus

4.3.1 Balance—capable of weighing test pieces to an accuracy of at least 1 in 500. For test pieces with a mass greater than 50 g, the resolution of the balance shall be 0.1 g or better.

NOTE: Where test pieces have a mass less than 50 g improved sensitivity is required (e.g. 0.01 g).

4.3.2 Drying oven—of the ventilated or forced convection type and capable of drying the test pieces at a temperature of $103^{\circ}\text{C} \pm 2^{\circ}\text{C}$ throughout the drying chamber for the period required. Forced convection ovens are preferred.

4.4 Preparation of test pieces

NOTE: A method for sampling of timber lots is given in Appendix B.

4.4.1 *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 should be recorded. Where possible, a mean moisture content shall be performed on all samples.

4.4.2 *Test pieces for determining moisture content* Test pieces for the determination of moisture content shall incorporate the entire cross-sectional region for which a moisture content result is required and be 15 mm to 30 mm long in the direction of the grain. Where possible, pieces shall be cut to avoid the inclusion of imperfections such as knots and resin pockets.

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

- (a) If the test piece can be weighed immediately, it shall be cut at a distance not less than 0.4 m from an end of the test sample.
- (b) If the test piece cannot be weighed immediately, a test specimen 0.3 m long shall be cut at a distance not less than 0.4 m from an end of the test sample. The test specimen shall be protected from changes in moisture content by being completely and tightly wrapped in plastic sheeting or other similar waterproof covering and stored in a cool place away from any moisture source. Within 24 h, a test piece as described in Item (a) shall be cut from the centre of the test specimen.
- (c) If the test sample of timber is less than 0.8 m long, 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 similarly small pieces of timber may be tested as whole.

4.4.3 *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 described in Clause 2.4.2(a), (b) or (c), as appropriate, except that the test pieces shall be cut from a complete cross-section about 35 mm long.

Each test piece cross-section shall be marked out with a pencil on the end grain, according to one of the patterns in Figure 4.1 (see Notes 1 and 2), and shall be cut 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 It is usual practice to cut adjacent test pieces from the sample piece of timber when moisture content and moisture gradient are required.

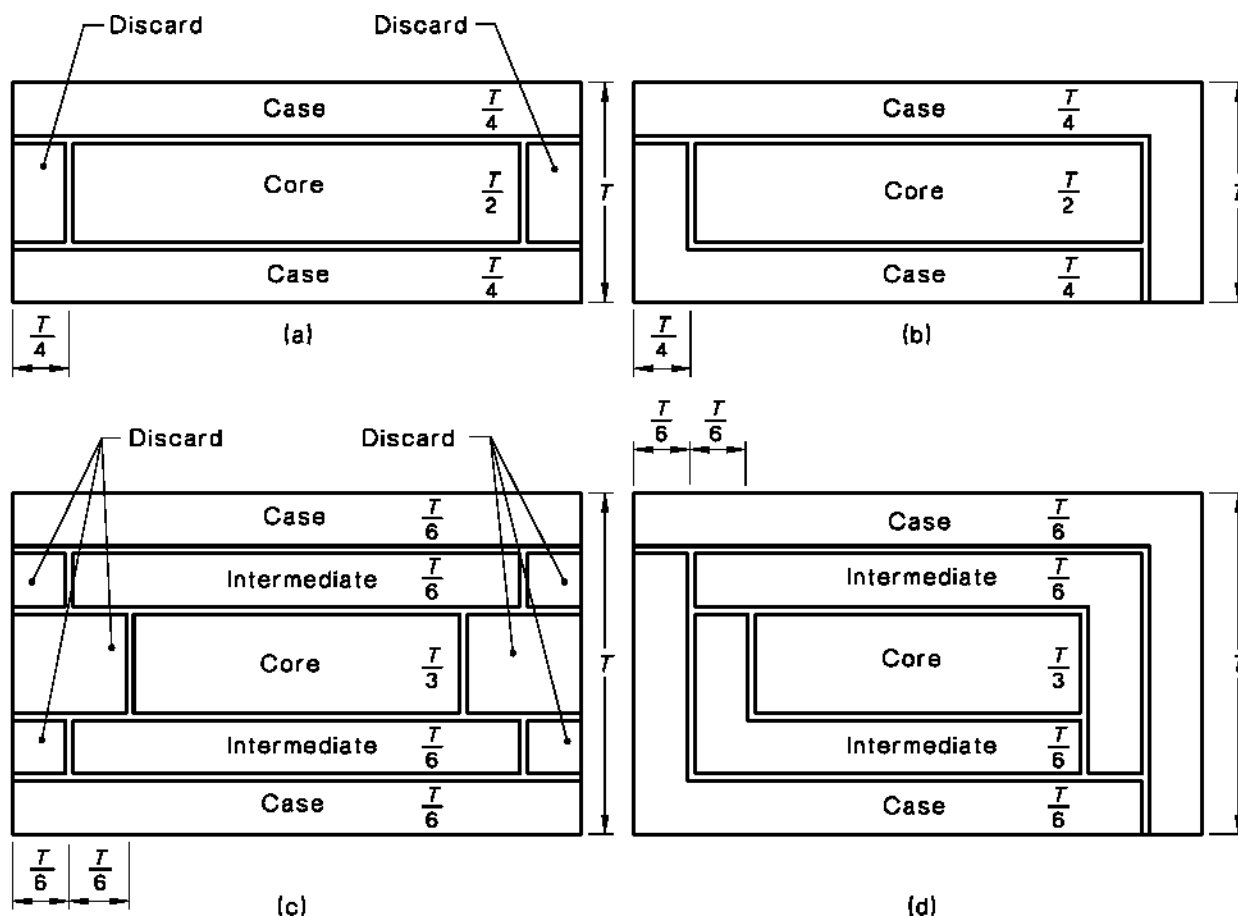


FIGURE 4.1 CUTTING PATTERNS FOR TEST PIECES

4.5 Procedure

4.5.1 Sample preparation Immediately after cutting each test piece (see Clauses 4.4.2 and 4.4.3), remove any loose splinters and sawdust by brushing or scraping.

4.5.2 Determination of mass Determine the mass of each test piece by weighing with the balance.

4.5.3 Oven-drying Dry test pieces in a well ventilated drying oven at a temperature of $103^{\circ}\text{C} \pm 2^{\circ}\text{C}$ until an essentially constant mass is obtained (see Note 1).

NOTES:

- 1 To ensure that the test pieces have reached an essentially constant 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 to 24 h, or perhaps less for forced convection ovens. They should then be returned to the oven for 2 to 5 h and reweighed. If the second weight is within 0.2% of the first, then an essentially constant mass can be considered to have been attained. If the difference between the first and second weights is greater than or equal to 0.2%, then a further period of drying is necessary until the last two weighings agree to within 0.2%.
- 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.

4.6 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%:

$$MC = \frac{M_i - M_o}{M_o} \times 100 \quad \dots 4.6(1)$$

where

MC = percentage moisture content of test piece

M_i = initial mass of test piece

M_o = oven-dry mass of test piece.

The equation may also be expressed as —

$$MC = \left(\frac{M_i}{M_o} - 1 \right) \times 100 \quad \dots 4.6(2)$$

4.7 Test report The following information shall be reported:

- (a) Name of the laboratory or authority which performed the test.
- (b) Number of this Australian/New Zealand Standard, i.e. AS/NZS 1080.1.
- (c) Title of 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, including 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 case, intermediate or core moisture content determinations were undertaken, these shall be identified and the results presented with the corresponding cross-sectional moisture content result.
- (i) If more than one test piece, 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, that may assist in the correct interpretation of the test results.

4.8 Supplementary information The following supplementary information should be provided:

- (a) If a test piece has been cut from a bulk sample, the location (and orientation) of the test piece in the sample from which it was taken; this may be noted with the aid of diagrams.
- (b) Description or identification of conditions under which the test was conducted, particularly if different from standard conditions (e.g. field testing conditions).

5 ELECTRICAL RESISTANCE METER METHOD

5.1 Application The electrical resistance moisture meter method is suitable for use where convenience requires quick measurements without destruction of the timber and where the moisture content falls within the range 8% to 25%.

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