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Tanzania Bureau of Standards (TBS) is the statutory national standards body for Tanzania established under the Standards Act No. 3 of 1975, repealed and replaced by the Standards Act No. 2 of 2009.

The Building and Construction Divisional Standards Committee under whose supervision this Tanzania Standard was prepared, consists of representatives from the following organizations:

Ministry of Works, Transportation and Communication (MoWTC)
*National Housing and Building Research Agency (NHBRA)
Commission for Science and Technology (COSTECH)
Tanzania National Service (JKT HQ)
*National Estates and Designing Consultants Company Ltd (NEDCO)
*University of Dar es Salaam (College of Engineering and Technology)
Engineers Registration Board (ERB)
*National Construction Council (NCC)
*National Housing Corporation (NHC)
Contactors Registration Board (CRB)
Institute of Engineers Tanzania (IET)
*Architects and Quantity Surveyors Registration Board (AQRB)

The organizations marked with an asterisk (*) in the above list, together with the following, were directly represented on the Technical Committee entrusted with the preparation of this Tanzania Standard:

Sokoine University of Agriculture (SUA)
Tanzania Forestry Research Institute (TAFORI)
Sao Hill Timber Limited
Preface

This specification supplies information concerning the grades of the wood of both indigenous and exotic trees suitable for the manufacture of furniture. The main purpose in grading wood is to establish and maintain acceptable standards of evaluation irrespective of the source of the wood, so that a given grade will set a standard that can be used as a basis on which to contract.

The determination of the grade rests largely on visual examination, by which means an experienced grader can normally achieve sufficiently accurate results. In doubtful cases, however, careful verification by physical measuring and weighing may be necessary. The grading of timber, depending as it does on empirical assessment made at production tempo, is not looked upon as an exact science. Experience in South Africa has shown that a variation of about 5% between the grading of two graders is reasonable, and this should be accepted as the degree of variation in timber grading.

Hardness and strength are both related to density, and where these properties are important, timber of density exceeding 600 kg/m\(^3\) (0.600 g/cm\(^3\)) at a 12% (m/m) moisture content should be used. Where hardness and strength are not essential (as in inside and decorative work), wood of a density as low as 450 kg/m\(^3\) may be used to advantage.

The grades set out in this specification are based on dry wood, i.e. wood of which the moisture content does not exceed 12% in dry regions and 15% in high-moisture regions. Before rough-sawn timber is converted into furniture, the manufacturer should ensure that the wood has been seasoned to a moisture content that will be in equilibrium with the surroundings in which the manufactured article is to be used.

It will be in the interests of a furniture manufacturer to acquire the necessary instruments to measure moisture content. To prevent warping of furniture after manufacture, care should be taken during the seasoning process to prevent the development of seasoning stresses and a high moisture gradient in the seasoned timber.

The sapwood of most hardwood timbers is subject to attack by the various species of beetle during the period when the timber is being air-seasoned after sawing, and also during storage; both the sapwood of Eucalyptus species and that of mninga (*Pterocarpus angolensis*) including other related hardwood species are for instance particularly liable to attack.

To protect the sapwood of hardwoods during air-seasoning and subsequent storage, the freshly sawn boards should be immersed in (or thoroughly sprayed with) a suitable insecticide. Timber treated in this way should be block-stacked for 48h before being open-stacked in the seasoning stacks.

This treatment serves only to arrest attack up to the time of manufacture and cannot be regarded as a permanent preservative treatment. However, if the wood is free from all stages of beetle infestation at the time of manufacture, it is unlikely that it will be infested later.

This specification applies to the condition of the wood at the time of dispatch, and does not cover deterioration brought about by unfavourable conditions during transportation and storage.
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National Foreword

The Tanzania Bureau of Standards is the statutory national standards body for Tanzania, established under standards Act No. 3 of 1975, amended by Act No. 1 of 1977 and then Act No. 3 was replaced by the Act No. 2 of 2009.

This draft Tanzania Standard was prepared by BCDC 6 Sawn timber, Sawn logs and Wood based Components Technical Committee, under the supervision of the Building and Construction Divisional Committee (BCDC).

During the preparation of this draft Tanzania Standard assistance was derived from:

- SANS 1099:2008; *Hardwood furniture timber*
- TANZANIA FOREST REGULATION 2004 PART III.

In reporting the results of a test made in accordance with this Tanzania Standard, if the final value observed or calculated is to be rounded off, it shall be done in accordance with TZS 4 (see clause 2).
1 Scope

1.1 This specification covers three basic grades (i.e. clear grade, semi-clear grade and knotty grade) of rough-sawn hardwood timber and timber derived from trees of the Podocarpus spp., of density (at a moisture content of 12 % (m/m)) at least 400 kg/m³, and intended for use in the manufacture of furniture. It also covers pieces of cutting grade from which at least one smaller piece of one of the basic grades can be cut.

**NOTE**—Requirements that must be specified by the purchaser, and those that must be agreed upon are listed in appendix A.

2 Normative reference

2.1 The following standards contain provisions which, through reference in this text, constitute provisions of this standard. It is subject to revision and, since any reference to a standard is deemed to be a reference to the latest edition of that standard, parties to agreements based on this standard are encouraged to take steps to ensure the use of the most recent editions of the standard indicated below.

2.2 Information on currently valid national and international standards can be obtained from the TBS.

TZS 1347 *Preservative—treated timber*

3 Definitions

For the purposes of this specification the following definitions shall apply:

3.1 **acceptable**
acceptable to the authority administering the standard, or to the parties concluding the purchase contract, as relevant.

3.2 **board**
piece of timber of rectangular cross-section, of width at least 75 mm, of thickness not exceeding 76 mm, and of which the width is at least three times the thickness cross fracture compression break visible separation of, or a line of collapse of, the wood elements across the grain due to the compressive strength of the timber having been exceeded at some stage

**NOTE**—The separation may be clearly distinguishable as a gap in the wood, or difficult to distinguish as irregular white lines across the wood. Such wood is characterized by extreme brashness.

3.3 **cutting grade**
grade of timber supplied as boards that have not been edged or cross-cut to remove defects, but that have been marked with lines that indicate the sawing necessary to obtain one or more pieces of timber of a basic grade.

3.4 **defective**
piece of timber that fails in one or more respects to comply with the relevant requirements of the specification.

3.5 **density**
mass per unit volume expressed in kg/m³ or g/cm³.
3.6 slope of grain
general slope of grain, as observed over a distance of at least 600 mm, on the face that is furthest from the pith and reasonably tangential to a growth ring.

3.7 lot
at least 51 and not more than 10 000 pieces of timber of the same grade, species, and nominal thickness, from one manufacturer, submitted at any one time for inspection and testing

3.8 permissible mechanical damage
defect caused by mechanical action, and of which the deleterious effect does not exceed that of a permissible defect.

3.9 semi-square section
rectangular cross-section in which the longer dimension is less than three times the shorter one

3.10 sound knot
knot that is free from decay and insect damage, and is attached along at least two-thirds of its periphery to the surrounding wood on the face (or faces) where it occurs, and that may contain not more than three checks, each of width not exceeding 2 mm

3.11 sound splay knot
sound knot of which the length exceeds three times the width (both dimensions measured on the face on which the knot occurs)

4 Requirements

4.1 Species
4.1.1 Hardwood furniture timber shall be of the species (that may include Podocarpus spp.) specified by the purchaser.
4.1.2 The purchaser may seek the assistance from the professional timber graders.

4.2 Grade
The timber shall be of clear grade, semi-clear grade, or knotty grade, as specified by the purchaser, or, when the supply of cutting grade is agreed upon between supplier and purchaser, of clear grade cutting, semi-clear grade cutting, or knotty grade cutting, as required by the purchaser.

4.3 Grade requirements for basic grades

4.3.1 Defects not allowed
Pieces of hardwood furniture timber shall be free from:
 a) cross fracture (compression breaks),
 b) decay other than decay in knots (see table 1),
 c) insect damage other than that caused by bark borers and pinhole borers (see table 1),
 d) clearly defined tension wood that is not confined to a local area around a knot,
 e) pith and any adjacent defective wood,
 f) splits other than end splits, and
 g) honeycombing.
 h) Raised grain
NOTE-- As honeycombing does not extend to the end of a piece unless it has been cross-cut after seasoning, checking for honeycombing can be done only after cross-cutting the piece at a position at least 150 mm away from an end.

4.3.2 Permissible defects

When inspected in accordance with 7.1, no piece of hardwood furniture timber shall contain more than a combination of the appropriate maxima of the defects laid down in table 1, and of permissible mechanical damage.

4.4 Grade requirements for cutting grade

a) In the case of a cutting grade each portion of a piece of timber that is intended for use shall be defined by lines drawn (an acceptable lumber crayon being used) at right angles to and, where necessary, parallel to the length of the piece. The removal of a portion intended to be discarded shall not involve deep cutting, and each such portion shall be marked by diagonal lines that form a cross of acceptable size.

b) Each portion intended for use shall comply with the requirements of 4.3 applicable to the corresponding basic grade with which it is marked (see 5.2).

c) No piece of cutting grade shall be marked to contain more than one basic grade or more than two portions to be discarded.

d) The intended length, in metres, and the intended width, in millimetres, shall be marked on each graded portion.

4.5 Dimensions

The nominal dimensions of pieces of basic grade (and of the graded portions of cutting grade material) shall, subject to the tolerances given in 3.6, be agreed upon between purchaser and supplier, subject to the following provision:

a) Thickness; The nominal thickness of board material shall not exceed 76 mm.

b) Width of board material; The nominal width of board material shall be at least 75 mm.

c) Length; The nominal length of each piece of basic grade (or graded portion of cutting grade material) shall be at least 0.9 m.

4.6 Tolerances on dimensions

The following tolerances on nominal dimensions shall apply:

a) Length; Plus 150 mm (no minus tolerance shall be allowed).

b) Width; Plus 10 mm (unless otherwise specified by the purchaser); minus 3 mm.

c) Thickness; Plus 5 mm; minus 1 mm.

4.7 Squareness

Out-of squareness shall be allowed provided that it will be eliminated when the timber is dressed to the relevant minimum size (based on the nominal size and the minus tolerances laid down in 3.6).
Table 1: Maximum Permissible Size of Defect or Characteristic per Grade

<table>
<thead>
<tr>
<th>Defect and characteristic</th>
<th>First</th>
<th>Second</th>
<th>Third</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knots per 0.5 m²</td>
<td>Sound knots only up to 40mm total diameter</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Centre, Margin Splay</td>
<td>Not allowed</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Rot</td>
<td>Not allowed except in unsound knots</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Wane</td>
<td>Not exceeding 1.8 thickness ½ width ¼ length</td>
<td>As for First Grade</td>
<td>Not exceeding ¼ thickness 1/6 width 1/8 length</td>
</tr>
<tr>
<td>Slope of grain</td>
<td>1.4</td>
<td>1.8</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Resin pockets or Bark pockets</td>
<td>Not more than 6mm wide or 40mm in length per 1 meter length of piece</td>
<td>Not more than 6mm wide or 80mm in length per 1 meter length of piece</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Checks and splits</td>
<td>Not more than 1mm wide or 400 in length per 1 meter length of piece</td>
<td>Not more than 2mm wide or 89 mm length of piece</td>
<td>Not more than 3mm wide or 160mm in length per 1 meter length of piece</td>
</tr>
<tr>
<td>Bow</td>
<td>4mm 1 meter of length</td>
<td>8mm in 1 meter of length</td>
<td>16mm in 1 meter of length</td>
</tr>
<tr>
<td>Spring</td>
<td>2mm 1 meter of length</td>
<td>4mm in 1 meter of length</td>
<td>3 degrees in 1 meter of length</td>
</tr>
<tr>
<td>Twist</td>
<td>1 degree in 1 meter of length</td>
<td>2 degree in 1 meter of length</td>
<td>6mm in 150mm of width</td>
</tr>
<tr>
<td>Cup</td>
<td>1.5 mm in 150mm of width</td>
<td>3mm in 150 mm width</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Bluestein</td>
<td>5%</td>
<td>15%</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Bead Borer Holes</td>
<td>Not allowed</td>
<td>Not allowed</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Sapwood (where distinct from heartwood)</td>
<td>Not allowed</td>
<td>Up to 2% of face graded</td>
<td>Unrestricted</td>
</tr>
<tr>
<td>Undersize (unseasoned timber)</td>
<td>Not allowed</td>
<td>Not allowed</td>
<td>Not allowed</td>
</tr>
<tr>
<td>Undersize (seasoned timber)</td>
<td>Not allowed</td>
<td>Not allowed</td>
<td>Not exceeding 1/8” in thickness nor ¼” in width</td>
</tr>
<tr>
<td>Oversize (seasoned timber)</td>
<td>All timber to be sawn oversize by 1.5 mm per 25mm or thickness and width</td>
<td>Not more than 3mm in thickness and not more than 6mm in width</td>
<td></td>
</tr>
</tbody>
</table>

4.8 Finish

The timber shall be well and evenly sawn, shall have (except for permissible wane (see table 1)) rectangular arrises, and the ends of pieces (other than an end marked for discard in a piece of cutting grade) shall, unless otherwise agreed upon between purchaser and supplier, be squaresawn. The timber shall be bright (except that superficial mould and discoloration within the limit given in table 1 shall be allowed).
4.9 Moisture content

4.9.1 Timber intended for use in a drier region

The moisture content, determined in accordance with 6.2, shall not exceed 12 % (m/m), except that in the cases of hardwood timber species it shall not exceed 15 % (m/m). E.g. of hardwood timber species includes the following:

<table>
<thead>
<tr>
<th>Swahili name</th>
<th>Botannic name</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mkangazi</td>
<td><em>(Khaya anthotheca)</em></td>
</tr>
<tr>
<td>Mkongo</td>
<td><em>(Afzelia quanzensis)</em></td>
</tr>
<tr>
<td>Mvule</td>
<td><em>(Milicia excelsa)</em></td>
</tr>
<tr>
<td>Mninga</td>
<td><em>(Pterocarpus angolensis)</em></td>
</tr>
<tr>
<td>Msaji/Teak</td>
<td><em>(Tectona grandis)</em></td>
</tr>
<tr>
<td>Mkurungu/Mkula</td>
<td><em>(Pterocarpus tinctorius)</em></td>
</tr>
<tr>
<td>Mbanga</td>
<td><em>(Pericopsis angolensis)</em></td>
</tr>
<tr>
<td>Msekekeke</td>
<td><em>(Bobgunnia madagascariensis)</em></td>
</tr>
<tr>
<td>Mnangu</td>
<td><em>(Hymenaea verrucosa)</em></td>
</tr>
<tr>
<td>Mpingo</td>
<td><em>(Dalbergia melanoxylon)</em></td>
</tr>
<tr>
<td>Mpangapanga</td>
<td><em>(Millettia stuhlmannii)</em></td>
</tr>
</tbody>
</table>

**NOTE** -- Including other hardwood tree species which meet the minimum requirement

4.9.2 Timber intended for use in a higher-moisture region

The moisture content, determined in accordance with 6.2, shall not exceed 15 % (m/m).

4.10 Moisture gradient

In the case of pieces of thickness greater than 40 mm, in addition to complying with the relevant requirements of 3.9, the distribution of the moisture in the pieces shall be such that the moisture gradient, when determined in accordance with 6.3, does not exceed 3 %.

4.11 Density

The density of the timber, determined in accordance with 6.4, shall be at least 400 kg/m$^3$ (0.40 g/cm$^3$) at a moisture content of 12 % (m/m), or shall be as agreed upon between supplier and purchaser.

4.12 Preservative treatment

The timber may have been preservative treated. Treated boards shall comply with the relevant requirements of TZS 1347 for exposure class H2 and H3, as relevant.

**NOTE**-- Users of preservative treated timber should ensure that the surface treatment intended for the finished timber product is compatible with the preservative used, and that the solvent of the preservative has evaporated before the surface coating is applied.

5 Packing and marking

5.1 Packing

When the timber is dispatched bundled, only pieces of the same species, grade, and nominal thickness shall be packed together in a bundle, and each bundle shall be so secured as to withstand normal handling hazards.

5.2 Marking

5.2.1 Pieces supplied in bundles

One piece of timber in each bundle shall be legibly and indelibly marked with the following information:
a) the manufacturer’s name or trade name or trade mark;
b) the appropriate grade letters given in the appropriate colour (see 5.2.3).

5.2.2 Other pieces
One end (or one face within 300 mm of an end) of each piece of timber shall be legibly and indelibly marked with the information given in 5.2.1(a) and (b).

5.2.3 Grade colours and letters
The letters of the grade identification markings shall be as follows:

<table>
<thead>
<tr>
<th>Grade</th>
<th>Grade letters</th>
<th>Description</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>First or Prime Grade</td>
<td>H E.A.T</td>
<td>A circle containing the letters H.E.A.T</td>
<td>Signal-red</td>
</tr>
<tr>
<td>Second or selected</td>
<td>H E.A.T</td>
<td>A triangle containing the letters H.E.A.T</td>
<td>Strong blue</td>
</tr>
<tr>
<td>Grade</td>
<td></td>
<td>A square containing the letters H.E.A.T</td>
<td>Emerald green</td>
</tr>
</tbody>
</table>

6 Sampling and compliance with the specification

6.1 Sampling
The following sampling procedure shall be applied in determining whether a lot complies with the relevant requirements of the specification. The sample so drawn shall be deemed to represent the lot.

After inspecting for compliance with 5.1 and 5.2, draw at random from the lot (taking, in the case of pieces supplied in bundles, not more than one-third of the number of pieces in a bundle) the number of pieces given in column 2 of table 2 relative to the appropriate lot size given in column 1.

<table>
<thead>
<tr>
<th>Lot size (pieces)</th>
<th>Sample size (pieces)</th>
<th>Grade requirements</th>
<th>Dimensions</th>
<th>Finish</th>
<th>Moisture content plus moisture gradient</th>
<th>Density</th>
</tr>
</thead>
<tbody>
<tr>
<td>51 - 500</td>
<td>50</td>
<td>5</td>
<td>7</td>
<td>5</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>501 - 1 200</td>
<td>80</td>
<td>10</td>
<td>10</td>
<td>8</td>
<td>5</td>
<td>2</td>
</tr>
<tr>
<td>1 201 - 3 200</td>
<td>125</td>
<td>14</td>
<td>14</td>
<td>12</td>
<td>7</td>
<td>3</td>
</tr>
<tr>
<td>3 201 - 10 000</td>
<td>200</td>
<td>21</td>
<td>21</td>
<td>18</td>
<td>12</td>
<td>5</td>
</tr>
</tbody>
</table>

6.2 Compliance with the specification
The lot shall be deemed to comply with the relevant requirements of the specification if, after inspection and testing of the sample taken in accordance with 6.1, the numbers of defectives found do not exceed the relevant acceptance numbers given in columns 3 to 7 (inclusive) of table 2.
Note: This section applies to the sampling for inspection and testing before acceptance or rejection of single lots (consignments) in cases where no information about the implementation of quality control or testing during manufacture is available to help in assessing the quality of the lot. It is also used as the procedure for adjudicating in cases of dispute.

7 Inspection and methods of test

7.1 Inspection

7.1.1 General

Inspect the sample taken in accordance with 6.1 for compliance with the relevant requirements of 4.3, 4.4, 4.5, 4.7, and 4.8. Visually examine and measure (using the appropriate methods given in 7.1.2 to 7.1.5 (inclusive))

a) the defects in, and the dimensions and squareness of, each piece of timber of a basic grade, and

b) the defects in, and the dimensions of, each graded portion of each piece of timber of cutting grade.

NOTE 1 --Base selection of a "worst face" and a "worst 1 m length" on the size(s) of the specific defect being considered.

NOTE 2 -- See also note to 4.3.1 regarding assessment of the presence of honeycombing.

7.1.2 Knots and knot-cavities

Measure, to the nearest 1 mm, the size of knots and knot-cavities. Observe the following rules:

a) When round, oval, and splay sound knots are measured, measure the distance that the knot extends across the width of the face of the piece and take this as the size of the knot.

b) Measure dead, decayed, or loose knots and knot-cavities in the same manner as sound knots are measured.

c) Include inbark associated with a knot or knot-cavity in the dimension of the knot or knot cavity.

d) When a knot is hard to define or to outline, take its limit as the outer growth ring obviously belonging to the branch concerned.

7.1.3 Permissible defects

a) Sapwood; Measure sapwood to the nearest 5 % of the area of the face on which it occurs.

b) End splits; Measure, to the nearest 2 mm, the length of each end split in the piece.

c) Checks; Measure the sum of the lengths of checks to the nearest 10 mm and the maximum width of each check to the nearest 0.1 mm. When adjacent checks are separated by more than 5 mm of sound wood, regard them as separate checks.

d) General slope of grain; Measure, to the nearest 1 mm, the general slope of grain over a length (along the piece) of 210 mm.

e) Wane; Measure the width and depth of wane to the nearest 0.5 mm, and the sum of the lengths of wane to the nearest 10 mm.

f) Warp

i) Twist. Measure twist to the nearest 1°.

ii) Bow; Allow the two ends of the face-side or back (whichever is concave) of the piece to rest on a level surface. Measure bow at the worst position to the nearest 1 mm.
iii) **Spring**: Allow the two ends of the concave edge of the piece to rest on a level surface. Measure spring at the worst position to the nearest 1 mm.

iv) **Cup**: Measure cup at the worst position to the nearest 0.1 mm.

### 7.1.4 Dimensions

Measure the length and the maximum and the minimum widths, and thicknesses. Take these measurements as follows:

a) **Length**: To the nearest 5 mm provided that no under-tolerance results.

b) **Width and thickness**: To the nearest 1 mm.

### 7.1.5 Squareness

Use the following procedure to measure out-of-squareness between adjacent faces and, in the case of square-sawn ends, between faces and ends. In the case of pieces of a cutting grade, measure out-of-squareness at exposed arrises of cutting grade portions only.

Use a square, with the inner edge of the stock placed across or along (as relevant) a face of the piece and the inner edge of the blade touching the adjacent face or end (as relevant) to measure, to the nearest 1 mm, the maximum gap between the blade and the face (or end) of the piece.

### 7.2 Moisture content

#### 7.1.6 General

Determine the moisture content to the nearest 1 %. In the case of preservative-treated timber, use the xylol extraction method. In other cases use the oven-dry method detailed in 7.2.2 for this determination, or use by agreement between purchaser and supplier the electric moisture-meter method given in 6.2.3.

#### 7.1.7 Oven-dry method

a) **Test specimens**: From a position not less than 300 mm away from the end of each piece take a test specimen that embodies the full cross-section of the piece, and that has a mass of at least 75 g and a width (measured in the direction of the grain of the wood) of at least 20 mm.

b) **Procedure**: Within 10 min of cutting, determine the mass, A, of the test specimen to the nearest 0.1 g. Dry it to constant mass, B, in an oven, maintained at a temperature of 102 °C ± 3 °C, and calculate the moisture content as follows:

\[ \text{Moisture content, } \% = \frac{A - B}{B} \times 100 \]

#### 7.1.8 Electric moisture-meter method

a) Calibrate the meter for the thickness and species of timber to be tested and adjust the control settings according to the manufacturer's instructions.

b) Check all electrical connections and ensure that the instrument is in good working order.

c) When a moisture meter fitted with insulated electrodes and capable of measuring to a depth greater than 19 mm is used, proceed as follows: Select a defect-free point that is at least 300 mm from the adjacent end of the piece and, avoiding pith and infiltrates, drive the electrodes into the piece to a depth of 6 mm and take a reading. Then drive the electrodes to a depth of approximately half the thickness of the piece and take a second reading. Take the arithmetic mean of the two readings as the moisture content.

d) When determining the moisture content of pieces of thickness greater than 38 mm by means of a meter other than of the type described in (c) above, proceed as follows: Take, as in (c) above, a reading at a depth of 6 mm. Then cut off a specimen by cross-cutting the piece at a position at least 300 mm from the adjacent end. Deep-cut this specimen near the centre and, within
10 min of deep cutting, read the moisture content of the freshly exposed inner surface near the end that was freshly cross-cut. Take the arithmetic mean of the two readings as the moisture content.

7.3 Moisture gradient

7.3.1 General

Determine the moisture gradient to the nearest 1%. Use the oven-dry method given in 7.3.2, or use, by agreement between supplier and purchaser, the electric moisture-meter method given in 7.3.3.

7.3.2 Oven-dry method

a) Test specimens: From a position at least 300 mm from the adjacent end of the piece cut one specimen (of mass at least 75 g and width, measured in the direction of the grain of the wood, at least 20 mm) from the face-side or back of the piece by deep cutting at a position at least 12 mm (but not more than one-third of the thickness of the piece) from that face. By further deep cutting obtain a second test specimen of the same dimensions as those of the first, and such that its longitudinal axis coincides with that of the piece.

b) Procedure: Determine the moisture content of each test specimen as detailed in 7.2.2(b), and take the difference between the moisture content of the two specimens as the moisture gradient.

7.3.3 Electric moisture-meter method

Take the difference between the two readings obtained in 7.2.3(c) or (d), as relevant, as the moisture gradient.

7.4 Density

From each end of each piece in the sample cut off and discard a 300 mm length, and then determine the mass and the volume of the remainder. Calculate the density at a moisture content of 12 %, applying if necessary one of the following corrections:

a) Moisture content greater than 12 % but not greater than 30 %. For each 1 % by which the moisture content exceeds 12 %, subtract 0.004 g/cm$^3$ in the case of wood of density not greater than 0.700 g/cm$^3$, and 0.005 g/cm$^3$ in the case of wood of density over 0.700 g/cm$^3$.

b) Moisture content less than 12 %. For each 1 % by which the moisture content is less than 12 %, add 0.004 g/cm$^3$ in the case of wood of density not greater than 0.700 g/cm$^3$, and 0.005 g/cm$^3$ in the case of wood of density over 0.700 g/cm$^3$. 
Appendix A

Notes to purchasers

A.1 The following requirements must be specified in tender invitations and in each order or contract:

a) the species (see 4.1);

b) the grade (see 4.2);

c) the extent of sapwood if other than as specified (see second footnote to table 1);

d) the plus tolerance on width, if other than 10 mm (see 4.6);

e) when relevant, that preservative treatment is required (see 3.12), and the type of preservative to be used (TZS 1347).

A.2 The following must be agreed upon between supplier and purchaser:

a) that timber of cutting grade be supplied (see 4.2);

b) the nominal dimensions (see 4.5);

c) the type and finish of ends if other than square-sawn (see 4.8);

d) when relevant, the density (see 4.11);

e) when relevant, the use of an electric moisture meter to determine the moisture content and, when relevant, the moisture gradient (see 7.2.1 and 7.3.1).