



DRAFT EAST AFRICAN STANDARD

Sawn softwood timber grading — Part 1: General requirements

EAST AFRICAN COMMUNITY

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Foreword

Development of the East African Standards has been necessitated by the need for harmonizing requirements governing quality of products and services in the East African Community. It is envisaged that through harmonized standardization, trade barriers that are encountered when goods and services are exchanged within the Community will be removed.

The Community has established an East African Standards Committee (EASC) mandated to develop and issue East African Standards (EAS). The Committee is composed of representatives of the National Standards Bodies in Partner States, together with the representatives from the public and private sector organizations in the community.

East African Standards are developed through Technical Committees that are representative of key stakeholders including government, academia, consumer groups, private sector and other interested parties. Draft East African Standards are circulated to stakeholders through the National Standards Bodies in the Partner States. The comments received are discussed and incorporated before finalization of standards, in accordance with the Principles and procedures for development of East African Standards.

East African Standards are subject to review, to keep pace with technological advances. Users of the East African Standards are therefore expected to ensure that they always have the latest versions of the standards they are implementing.

The committee responsible for this document is Technical Committee EASC/TC 022, Wood, timber and their products

Attention is drawn to the possibility that some of the elements of this document may be subject of patent rights. EAC shall not be held responsible for identifying any or all such patent rights.

This second edition cancels and replaces the first edition (EAS 23:2000), which has been technically revised

EAS 23 consists of the following parts, under the general title *Sawn softwood timber grading*

- — *Part 1: General requirements*
- — *Part 2: Stress graded structural timber and timber for frame wall construction*
- — *Part 3: Industrial timber*
- — *Part 4: Brandering and battens*

Sawn softwood timber grading — Part 1: General requirements

1 Scope

This Draft East Africa Standard specifies requirements, sampling and test methods for visually, mechanically and proof-graded sawn softwood timber, for use as structural timber, brandering and batten, for frame wall construction and for structural purposes derived from the trees of genus *Pinus*, *Cupressus*, *Podocarpus*, *Araucaria* and any other commercial softwood species available.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

US EAS 325, *Wood preservatives and treated timber — Guide to sampling and preparation of wood preservatives and treated timber for analysis*

US EAS 326, *Copper/chromium/arsenic composition for the preservation of timber — Specification*

ISO/IEC 17065, *Conformity assessment — Requirements for bodies certifying products, processes and services*

DEAS 23-2, *Sawn softwood timber — Part 2: Stress graded structural timber and timber for frame wall construction — Specification*

DEAS 23-3, *Sawn softwood timber grading — Part 3: Industrial timber — Specification*

DEAS 23-4, *Sawn softwood timber — Part 4: Brandering and battens — Specification*

US 1535, *Guidelines for the manufacture of finger-jointed structural timber*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3.1

acceptable

agreeable to the authority administering this standard, or to the parties concluding the purchase contract, as relevant

3.2

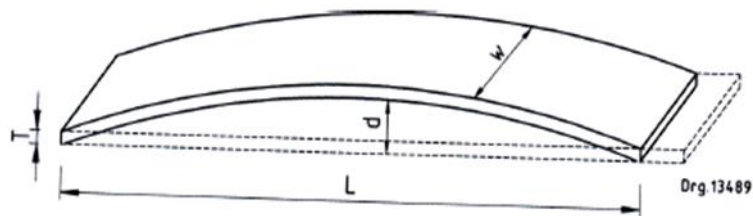
arris

sharp edge formed by the meeting of two wooden surfaces

3.3

bow

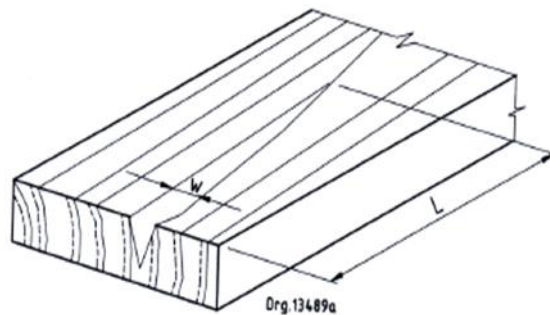
longitudinal curvature of a face of a piece



3.4

check

separation of the wood fibres along the grain of the wood that forms a crack or fissure but does not extend through a piece from one face to the opposite face



3.5

Constant mass

Condition reached when the masses of the specimen determined at intervals of 6 h do not differ by more than 0.1% from each other

3.6

cup

curvature that occurs in the transverse section of a piece of timber



3.7

density

mass, per unit volume of timber, at a moisture content of 12%, in kilograms per cubic metre

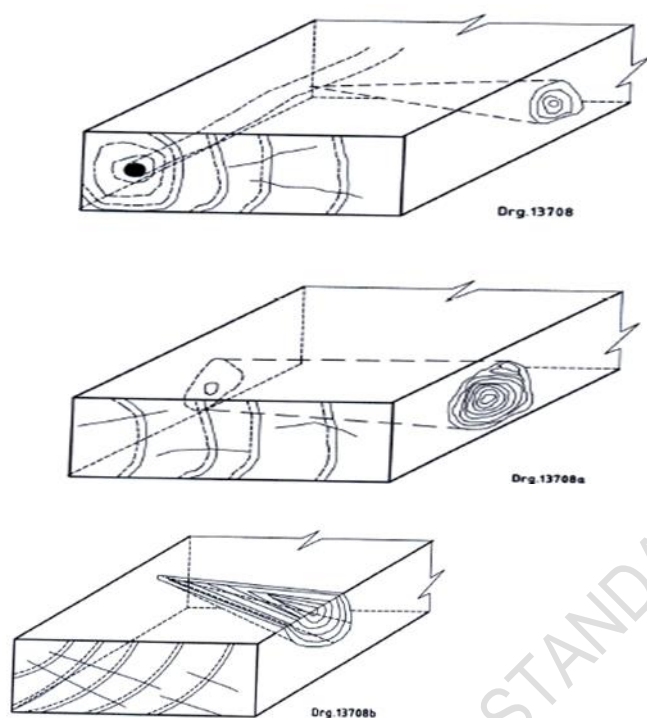
3.8

discoloration
fungal stain

change in the original shade of wood or any variation from the natural colour, due to action of environment e.g temperature, sunlight or oxygen, and micro-organisms 3.9

edge knot/edge knot hole

knot or knot hole of which a cross section occurs on an edge of a piece and that extends at least two thirds across or through it



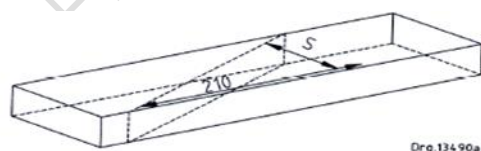
NOTE 1 This definition is not applicable to brandering and battens (see DEAS 23-4).

NOTE 2 A knot that has been so cut that it penetrates the timber to a depth exceeding one-eighth of the thickness of the piece and that extends at least two-thirds across or through the board, will be judged as an edge knot in DEAS 23-2.

3.10

general slope of grain

slope of grain (as observed over a distance of at least 600 mm) on the face or the edge that is furthest away from the pith and tangential to a growth ring



3.11

In bark

bark of thickness exceeding 1 mm (usually associated with a knot) that has been partially or wholly enclosed by the growth of a tree

3.12

knot hole/knot cavity

hole or cavity formed in a piece as a result of the absence of a knot or part of a knot

3.13

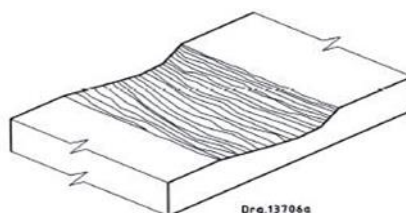
loose knot

knot that has shrunk away from the surrounding wood completely on one face and 40 % or more on the opposite face

3.14

Machine skip

area on the surface of a piece of regularized timber that failed to surface clean and can appear in a series with surface cleaned areas in between



3.15

Moisture content

in a piece of timber, the mass of water (bound and free) per oven-dry mass of wood, in percentage

3.16

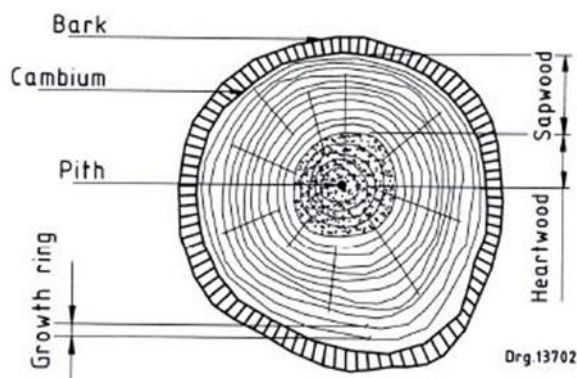
Moisture gradient

gradation in the moisture content, in the transverse section of a piece

3.17

pith

centre core of a stem, consisting mainly of soft tissue

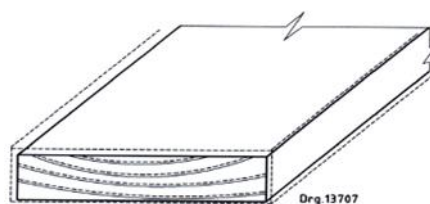


3.18

regularize

process whereby a piece of timber, of rectangular cross-section, is machined throughout its length to a uniform thickness or width (or both)

NOTE This can be done through planing or fine sawing



3.19

softwood timber

timber derived from coniferous trees

3.20

Sound knot

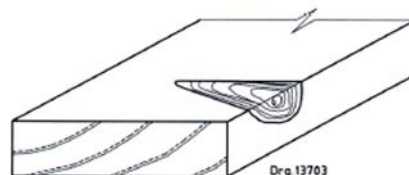
knot that is free from decay, insect damage and in-bark, and that is firmly attached along at least two-thirds of its periphery to the surrounding wood on one face of a piece and that might be shrunk away completely from the surrounding wood on the opposite face

3.21

splay knot

a knot cut approximately perpendicular to its longitudinal axis such that the exposed section is definitely

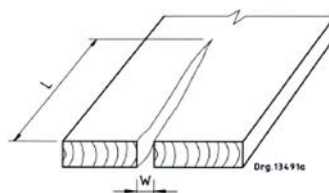
elongated



3.22

split

separation of the wood fibres along the grain of the wood that forms a crack or fissure that extends through a piece from one face to the opposite face

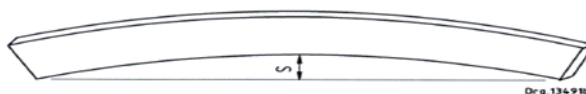


3.23

spring

longitudinal curvature of an edge of a piece

NOTE This is not applicable in the case of 38 × 38 (square cross-sections) timber.



3.24

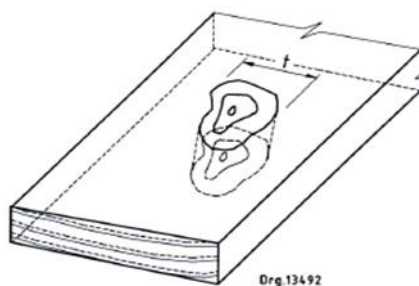
through

descriptive of a defect that penetrates from a face through to the opposite face

3.25

through face knot

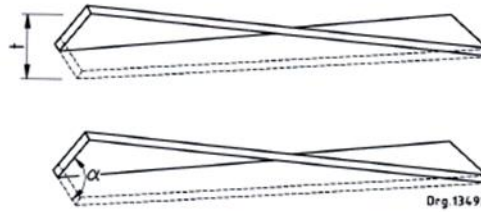
knot that penetrates a piece of timber from the face side to the back but is not exposed on an arris



3.26

twist

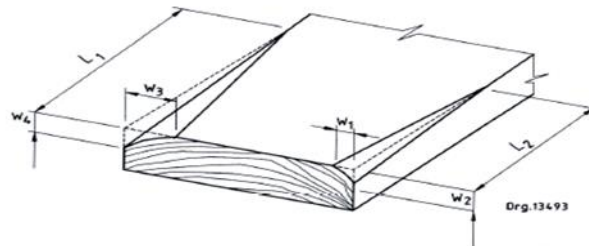
form of warp that appears as lengthwise spiral distortion in a piece



3.27

wane

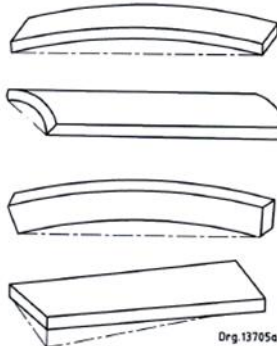
original surface of a tree, with or without bark, visible on a piece of square-sawn timber



3.28

warp

any departure (in the form of bow, cup, spring or twist, or any combination of these) from a true or plane surface of a piece



3.29

dead knot

knot that has lost its fibrous connection with the surrounding wood. It can easily loosen and fall out or be knocked out

3.30

decayed knot

knot infested with wood-destroying fungi

3.31

face splay knot

splay knot that occurs on the face-side or back of a piece

3.32

hair check

very fine check, of width not exceeding 0.5 mm

3.33

knot cluster

four or more knots that are so close together that they cause a multiple distortion of the grain at the site of the knot

3.34

knot whorl

four or more closely associated knots that occur on at least two faces of a piece and that originate ostensibly at the same point of unexposed pith

3.35

machine offset

deviation from parallelism between the face-side and back or between the edges of a piece

3.36

pitch pocket

cavity that contains or contained resin

3.37

Planed All Round (PAR)

piece of timber that has been planed on all four faces without machine skips or other damage

3.38

sized

piece of timber that has been planed, abraded, sanded, or otherwise so processed that a surface equivalent to a planed surface has been obtained

3.39

lot

not fewer than 50 and not more than 10 000 pieces of timber of the same cross-section and grade, graded (or stress-graded) by the same method, from one manufacturer, and presented at any one time for inspection and testing

defective

piece that fails in one or more respects to comply with the relevant requirements of this standard

3.41

piece

unit of timber, visually or stress-graded, and intended for use as structural timber, brandering and battens, studs, or as industrial timber

4 Requirements

4.1 Grade requirements

Sawn softwood shall be derived from trees of the *Genus Pinus Cupressus, Podocarpus, and Araucaria and any other commercial softwood species available*. Imported structural timber shall comply with the protocol requirements in Annex A.

4.2 Physical requirements

4.2.1 Moisture content

At the time of grading, not more than 10 % of pieces in a lot (see 3.39) shall have a moisture content, determined in accordance with C.6, that exceeds 15%, and the moisture content shall not exceed 17% in any cross-section of a piece. In the case of brandering and battens, not more than 10 % of pieces shall have a moisture content that exceeds 17%, and in no piece shall the moisture content exceed 18%.

4.2.2 Moisture gradient

NOTE This sub-clause is not applicable to brandering and battens.

Table 1 — Requirements for moisture gradient in sawn softwood timber

1	2
Timber thickness mm	Maximum moisture gradient %
38	2
$38 < x \leq 50$	3
>50	5 ^a
^a The moisture gradient for softwood for frame wall construction shall not exceed 4%.	

4.2.3 Preservative treatment

When so required, timber shall have been preservative-treated in accordance with US EAS 325 and US EAS 326 and it shall comply with the relevant national requirements.

4.2.4 Finger-jointing

When so required, timber shall be finger-jointed.

5 Inspection and test methods

Inspect and, when necessary, measure (using the methods given in Annex C) the inherent defects that occur on the worst face of each piece in the sample (taken in accordance with Annex B) for compliance with the relevant requirements of Clause 4.

6 Packing

The packing of timber members dispatched in bundles shall be such that the members are protected from damage during normal handling and transportation, and shall be as agreed upon between the supplier and the purchaser.

Purchasers shall comply with the requirements in Annex D.

7 Marking

When so required, the following shall apply:

- if preservative treatment is required (see 4.2.3), the timber shall be marked accordingly; and
- when finger-jointing is required (see 4.2.4), the timber shall be marked in accordance with US 1535
- is the result of the division.

Annex A **(normative)**

Protocol

A.1 General

This protocol only provides for structural timber that is to be mechanically stress-graded by a machine acceptable to the accredited certification body (see A.2.5). The intention is to extend this protocol to include visual grading and hardwood species

A.2 Requirements

A.2.1 Foreign exporting companies and local East Africa importing companies shall comply with the requirements in A.2.2 to A.2.5.

A.2.2 Solid structural timber (excluding jointed timber) with a minimum nominal cross-sectional dimension of 38 mm × 90 mm, of similar species to the *Pinus* species and grown in a similar manner, and graded (visually or by an approved stress-grading machine) shall comply with the strength characteristics and stress-grade requirements as required by the design criteria as well as the requirements for preservative treatment specified in the relevant East Africa standards.

A.2.3 Such structural timber shall be of the nominal dimensions as given in Table 1 of DEAS 23-2.

A.2.4 Development testing shall be carried out to establish strength characteristics of the species/location combination.

A.2.5 The following information shall be provided to the local certification body (accredited in accordance with ISO/IEC 17065) chosen to certify the timber:

- a) country of origin
- b) species of timber or group of very similar species;
- c) geographical areas from which the timber originates, including maps indicating the distribution of the species given in b);
- d) silvicultural regimes used in the forest or plantation compartments where the timber is harvested;
- e) cross-sectional dimension of the timber to be imported;
- f) intended stress grade(s), and
- g) any additional information required by the accredited certification body

A.3 Sampling

A.3.1 General

The sampling plans given in A.3.2 and A.3.3 shall be used to obtain the test specimens needed to determine the permeability and strength characteristics respectively of the timber species to be imported. When so

required by the accredited certification body, the sampling plans given in A.3.2 and A.3.3 can be extended in order to be more representative of the species and geographical diversity

A.3.2 Sample for determination of the permeability characteristics of the species

Take a sample of at least 50 test specimens of each species from representative geographical areas where the supplying organization sources its logs, and provide these to a certification body in East Africa to determine whether the species has the permeability required.

A.3.3 Sample for determination of the strength characteristics of the species

A.3.3.1 Take a sample that complies with the requirements in A.2, and provide any additional information [see A.2.5 (g)] required by the accredited certification body.

A.3.3.2 Draw at random a minimum sample for testing in bending, tension and compression parallel to the grain, as given in the sampling plan in Table A.1.

A.3.3.3 This may include additional sampling for additional strength characteristics (such as compression perpendicular to the grain and shear parallel to the grain) if so required by the accredited certification body

Table A.1 — Minimum sampling plan

1	2
Test mode	Number of test specimens per cross-sectional dimension and stress grade, min
Bending ^a	200
Tension parallel to the grain	200
Compression parallel to the grain	100
Shear parallel to the grain ^b	50
Compression perpendicular to the grain ^b	50
^a Use the same sample for the determination of both modulus of elasticity/stiffness (MOE) and modulus of rupture/bending strength (MOR).	
^b Additional strength characteristics if so required by the accredited body (see A.3.3.2).	

A.4 Verification of sample and test facilities

The accredited certification body shall, through witnessing in the exporting country, and at the test facility, as appropriate, verify the following:

- sampling plan;
- that the sample is representative with regard to species, silvicultural regimes and geographical area;
- competency of the test facility, including the calibration of test equipment;
- identification of the test specimens and the traceability of each test specimen to its geographical area;
- that the sample was sampled in at least three approximately equal batches during a production period of at least three months; and
- calibration, setting up and repeatability of the relevant grading machine.

A.4 Verification of sample and test facilities

The accredited certification body shall, through witnessing in the exporting country, and at the test facility, as appropriate, verify the following:

- a) sampling plan;
- b) that the sample is representative with regard to species, silvicultural regimes and geographical area;
- c) competency of the test facility, including the calibration of test equipment;
- d) identification of the test specimens and the traceability of each test specimen to its geographical area;
- e) that the sample was sampled in at least three approximately equal batches during a production period of at least three months; and
- f) calibration, setting up and repeatability of the relevant grading machine.

A.5 Test procedure

A.5.1 Preparation of sample

Before subjecting the sample to testing, season it to comply with the moisture content requirements of this part of DEAS 23, and regularize it to comply with the dimensional requirements given in Table 1 and Table 2 of DEAS 23-2. Determine and record the moisture content of each test specimen in accordance with one of the acceptable methods given in C.6.A.5.2 Machine stress grading of sample.

A.5.2.1 General

A.5.2.1.1 Ensure that each test specimen in the sample taken in accordance with A.3 complies with all the physical requirements in 4.2 and in DEAS 23-2, excluding the knot requirements given in Table 3 of DEAS 23-2.

A.5.2.1.2 Machine stress grade each test specimen, using the grading limits supplied by the accredited certification body for each cross-sectional dimension and stress grade required. Record the mechanical grading result of each test specimen.

A.5.2.2 Determination of the strength characteristics

A.5.2.2.1 Randomly divide the sample taken in accordance with A.3.3 into the different test mode samples. Make sure that each group is representative of the original sample composition (when long lengths of timber are available, test specimens for more than one test mode may be randomly selected from a single piece of timber. However, no two sections taken from one piece shall be subjected to the same test mode).

A.5.2.2.2 When additional strength characteristic values are required (see A.3.3.2), use acceptable methods for the determination of such values.

A.5.2.2.3 Test the specimens from each test mode sample in accordance with the relevant method. In respect of the selection of the position of test and the selection of the tension edge of bending specimens. Select at random the position of all test specimens within the sample lengths of timber. Also select at random the tension edge for bending tests. In the case of compression parallel to the grain, select the general position at random, but move the ends of the test specimen slightly to ensure that these ends are clear, parallel grained timber in so far as the test specimen allows.

A.5.2.2.4 For each mode of test, select a proof-load level such that at least 20 % of the sample is loaded to failure. (This can be achieved either by initially selecting a rather high proof-load and reducing this when it is

perceived that the proportion of failures exceeds 20 %, or by calculating a proof-load that is 12 % to 15 % higher than the load equivalent to the 5th percentile target value).

A.5.2.2.5 Record the data and results of each test specimen.

A.5.3 Density

Determine and record the density of each test specimen in accordance with one of the acceptable methods given in C.8.

A.6 Analysis of results

A.6.1 Record all the results obtained from the different test modes on an electronic spreadsheet and submit them to the relevant accredited certification body for analysis. Analyse and evaluate the data recorded by the accredited certification body, in accordance with acceptable standard methods.

A.6.2 Include, on the spreadsheet, the following information for each test specimen:

- a) test specimen number;
- b) unique identification for traceability to a specific geographical area;
- c) species;
- d) mechanical stress grade as determined in A.5.2;
- e) in the case of compression and tension parallel to the grain, the proof-load or maximum failure load obtained;
- f) in the case of stiffness (MOE) and bending strength (MOR), the Δ load and Δ deflection values and the proof-load and maximum failure load, respectively;
- g) in the case of bending and tensile tests, the span length;
- h) length and cross-sectional dimensions;
- i) density of each test specimen;
- j) moisture content of each test specimen; and
- k) whether pith is present or not.

A.6.3 Retain and store all test material in a safe and dry, clean place until the accredited certification body has completed the analysis and authorizes its release. In the event of problems with the analysis of the results, it might be necessary to refer to the test material to clarify matters, and failure to be able to do so could lead to an expensive repetition of the entire test work.

A.7 Test report

Report the following information

- a) date(s) of the test(s);
- b) all information necessary for identification of the sample tested;
- c) confirmation that the test(s) was/were carried out in accordance with this part of DEAS 23;

- d) reference to this East Africa standard;
- e) reference to other test methods/standards used;
- f) any deviation from this part of DEAS 23;
- g) country of origin and the geographical areas from which the timber originates (including maps indicating the distribution of the species);
- h) species of timber or group of very similar species;
- i) silvicultural regimes used in the forest or plantation compartments where the timber is harvested;
- j) cross-sectional dimension of the timber;
- k) stress grade(s);
- l) 5th percentile values of all MOR test results;
- m) 5th percentile and average values of the stiffness (MOE) test results;
- n) minimum and average values of the density test results;
- o) maximum and average values of the moisture content test results;
- p) equipment used and calibration status; and
- q) any additional information required by the accredited certification body or the client.

Test report to be reviewed

Review test report to delete c), d) , and f) in the report

A.8 On-going surveillance/verification

A.8.1 General

The strength characteristics of the timber from a specific country or region shall be verified on an ongoing basis, and shall be done in accordance with either A.8.2 or A.8.3 as relevant.

A.8.2 Verification at mark holder in exporting country

When the manufacturer chooses to become certified by East Africa-based certification body, ISO/IEC 17065 accreditation with the normal application, approval and surveillance audit requirements shall apply. The specific permit conditions or contract between the accredited certification body and the certification holder will provide for an ongoing strength-testing programme. The East Africa-based certification body may choose to appoint an accredited certification body in the exporting country to perform the surveillance product audits at the manufacturer.

A.8.3 Verification at mark holder in East Africa

The normal conditions and procedures for a local manufacturer shall apply

Annex B (normative)

Quality verification of timber units and assessment of compliance

B.1 Quality verification

B.1.1 When a purchaser requires ongoing verification of the quality of timber units, it is suggested that, instead of concentrating solely on the evaluation of the final product, he also directs his attention to the manufacturer's quality system. Thus, it should be noted that ISO 9001 covers the provision of an integrated quality system.

B.1.2 If no information about the implementation of quality control or testing during manufacture is available to help in assessing the quality of a lot, and a purchaser wishes to establish, by inspection and testing of samples of the final product, whether a lot (see 3.39) of the product complies with the relevant part of the standard, use the sampling plan given in B.2 and Table B.1.

B.1.3 In cases of dispute, the lot shall be available for inspection by the authority administering this standard.

NOTE The sampling plan applies to the final product only.

B.2 Assessment of compliance

B.2.1 The sampling procedure below shall be used to determine whether or not a lot complies with the requirements of this standard. The sample so taken shall be deemed to represent the lot for the respective properties.

B.2.2 From the lot, draw, at random, the number of pieces of timber given in column 2 of Table B.1 relative to the appropriate lot size given in column 1.

Table B.1 — Sampling of a lot

1	2	3	4	5	6	7	8
Lot size pieces	Sample size pieces	Acceptance number					
		Grade requirement ^a	Twist ^b	Dimensions and finish	Moisture content and gradient	Density	Manufacturing and grade defects in finger- jointed areas and longitudinal glue joint quality
50 - 500	50	5	2	5	3	2	3
501 - 1 200	60	7	3	7	5	3	5
1 201 - 3 200	125	10	5	10	7	5	7
3 201 - 10 000	200	14	7	14	10	7	10
^a Other than twist except in the case of brander and battens as specified in DEAS 23-4.							
^b Not applicable to brander and battens (see column 3).							

B.3 Criteria of compliance

The lot shall be deemed to comply with the relevant requirements of the standard if, after inspection and testing of the sample taken in accordance with B.2.1 and B.2.2, the number of defects found does not exceed the relevant acceptance numbers given in columns 3 to 8 (inclusive) of Table B.1.

NOTE For criteria for each of the various types of timber, see the relevant part of this standard

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Annex C **(normative)**

Test methods

C.1 General

Submit each piece in the sample, taken in accordance with B.2.1 and B.2.2 of Annex B, to the relevant tests given in C.2 to C.9.

C.2 Knots and knot holes in structural timber (visually stress-graded timber)

C.2.1 Measure, to the nearest 1 mm, the sizes of knots and knot holes (or, in the case of brandering and battens, all knots and knot holes larger than 6 mm) that appear on the relevant faces of the worst 150 mm (or, in the case of brandering and battens, the worst 75 mm) length of the piece.

NOTE 1 See DEAS 23-2.

NOTE 2 If part of a knot falls within this 150 mm length (75 mm in the case of brandering and battens; see DEAS 23-4) on the face where it is assessed, include the full size of the knot in the assessment.

C.2.2 Observe the following rules:

- a) when a round, oval or edge splay sound knot is measured, measure the distance that it extends across the width of the face side, back or edge of the piece, as relevant, and take this as the size of the knot;
- b) measure the size of loose knots, knot holes and knot cavities in the same way;
- c) include in bark associated with a knot or knot hole in the dimension of the knot or knot hole;
- d) when a knot is hard to define or outline, take its limits as the outer growth ring obviously belonging to the branch; and
- e) do not regard as a defect a knot that occurs in the over tolerance on the length of a piece.

NOTE This is applicable only to DEAS 23-3.

C.3 Defects other than knots and knot holes

C.3.1 Checks

Measure the sum of the lengths of checks to the nearest 10 mm and their width to the nearest 0.1 mm. When adjacent checks are separated by more than 5 mm of sound wood, regard them as separate checks.

C.3.2 Discoloration

This is not applicable to sawn softwood timber

C.3.3 Slope of grain

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

C.3.4 Splits

Measure the length of each split to the nearest 10 mm.

NOTE This sub-clause is not applicable to brandering and battens.

C.3.5 Wane

C.3.5.1 Measure the width of wane to the nearest 1 mm and the sum of the lengths of wane to the nearest 10 mm.

C.3.5.2 For brandering and battens, measure the width of wane around the arris, as follows:

- a) determine, to the nearest 1 mm, the sum of the widths of the relevant faces. Deduct, from this value, the sum of the widths of surface without wane on these faces. Take this difference as the amount of wane measured around the arris; and
- b) measure, to the nearest 10 mm, the sum of the lengths of wane.

C.3.6 Warp

C.3.6.1 Twist

Determine twist by so placing the piece on a level surface that three corners are in contact with that surface and by measuring:

- a) to the nearest degree, the angle between the level surface and the line joining the fourth corner to the other corner at that end of the piece, or
- b) to the nearest millimetre, the gap between the fourth corner and the level surface.

C.3.6.2 Bow

Allow the two ends of the concave face of the piece to rest on a level surface. Measure bow, to the nearest 1 mm, as the maximum gap between that surface and the concave face.

C.3.6.3 Spring

Allow the two ends of the concave edge of the piece to rest on a level surface. Measure spring, to the nearest 1 mm, as the maximum gap between that surface and the concave edge.

C.3.6.4 Cup

This is not applicable to brandering and battens.

C.3.7 Defects in finger-joints

Measure the length, to the nearest 5 mm, and the width, to the nearest 0.1 mm, of checks and splits in fingers

C.4 Dimensions

Measure the length and the maximum and minimum width and thickness of each piece. Take these measurements as follows:

- a) length, when required, to the nearest 10 mm, provided that no under tolerance results; and
- b) width and thickness, to the nearest 1 mm.

C.5 Squareness

On a part of a piece that is free from wane, place the inner edge of the stock of an engineer's square across a face that the inner edge of the blade is in contact with the adjacent face of the piece. Then, using a feeler gauge, measure, to the nearest 0.1 mm, the maximum gap between the blade and the face of the piece. Test two diagonally opposite arrises in this manner.

NOTE This is applicable to DEAS 23-4 only.

C.6 Moisture content

WARNING: The use of an electric moisture meter on timber treated with salt-based type WCCA preservative could result in an incorrect reading.

C.6.1 General

Determine the moisture content of a piece to the nearest 1%. Use the oven-dry method given in C.6.2 for this determination or, if so agreed upon, the electric moisture meter method given in C.6.3.

C.6.2 Oven-dry method

C.6.2.1 Test specimen

From a position at least 300 mm from the end of a piece, cut a test specimen that is free from knots and resin infiltration and that is a full cross-section of the piece, of length at least 20 mm, measured in the direction of the grain of the wood. Place the specimen in an airtight container.

C.6.2.2 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 $102\text{ }^{\circ}\text{C} \pm 3\text{ }^{\circ}\text{C}$.

C.6.2.3 Calculation

Calculate the moisture content, in percentage, as follows:

$$\frac{A - B}{B} \times 100$$

C.6.3 Electric moisture meter method

C.6.3.1 Check all electrical connections and ensure that the instrument is in good working order.

C.6.3.2 Calibrate the meter for the thickness and species of timber to be tested and adjust the control settings in accordance with the manufacturer's instructions

C.6.3.3 When using a moisture meter fitted with insulated electrodes that are capable of taking measurements at a depth greater than half the thickness of a piece, proceed as follows: Select a defect-free point that is at least 300 mm from the end of the test specimen and, avoiding pith and resin infiltrates, drive the electrodes into the piece to a depth of about 6 mm. Take a reading, then drive the electrodes to a depth of approximately half the thickness of the test specimen and take a second reading. Take the arithmetic mean of the two readings as the moisture content.

C.6.3.4 When using a moisture meter not fitted with insulated electrodes, take the first reading as in C.6.3.3. Then cross-cut the test specimen near the point tested and, within 10 min of crosscutting, determine, in the same way as in C.6.3.3, the moisture content in the centre of the exposed cross-section. Take, as the moisture content, the arithmetic mean of the two readings.

C.7 Moisture gradient

C.7.1 General

Determine the moisture gradient of a cross-section of a piece to the nearest 1%. Use the oven dry method (see C.7.2) or, if so agreed upon, the electric moisture meter method (see C.7.3).

C.7.2 Oven-dry method

C.7.2.1 Test specimen

Cut a specimen in accordance with C.6.2.1. From this specimen, cut two further specimens A and B. Cut test specimen A to a thickness of at least 12 mm, but not more than one-third of the thickness of the piece. Cut test specimen B to the same dimensions as test specimen A, but ensure that its centre coincides with the centre of the original piece.

C.7.2.2 Procedure

Determine the moisture content of test specimen A and test specimen B as in C.6.2.2. Take, as the moisture gradient, the difference between the moisture content of the two specimens.

C.7.3 Electric moisture meter method

Take, as the moisture gradient, the difference between the two readings obtained in C.6.3.3 or C.6.3.4, as relevant.

C.8 Density

C.8.1 General

Determine the moisture content of a piece by the relevant method described in C.6. Then determine the density of the remainder of the piece by the method described in C.8.2 or C.8.3 and correct the results, if necessary, to a moisture content of 12% by applying the appropriate correction factor given in C.8.4.

C.8.2 Mass/volume method

Determine the mass of the remainder of the piece to the nearest gram. Determine its volume accurately by measurement and calculate its density, in kilograms per cubic metre

C.8.3 Immersion method

C.8.3.1 Apparatus

C.8.3.1.1 Container, that consists of a 1.25 m length of pipe of nominal internal diameter 90 mm, that has one end sealed and an overflow tube fitted, by means of a water-tight joint, in a hole drilled in the wall of the pipe, about 100 mm below the open end

C.8.3.1.2 Measuring cylinder, graduated, made of glass and with a volume of 1 000 ml

C.8.3.2 Test specimens

From the remainder of the piece, cut representative test specimens, each of length approximately 1 m and width and thickness not exceeding 30 mm. Avoid the inclusion of excessive knots, resin concentrations and reaction wood in the specimens. Determine the mass of each specimen to the nearest gram and then coat them as thinly as possible with wax or other water-impervious material.

C.8.3.3 Procedure

Secure the container in a vertical position, fill it with water to overflow level, and then so position the measuring cylinder under the mouth of the overflow tube that it will collect all the water that overflows during the test. Slowly lower a test specimen into the container, push it down until it is completely immersed, and then measure, to the nearest 5 ml, the volume of water displaced into the cylinder.

Use this volume as the volume of the specimen and calculate its density, in kilograms per cubic metre.

C.8.4 Correction factors

Apply the following correction factors to measured densities:

- a) moisture content of 10% to 14% (inclusive): no correction;
- b) moisture content of less than 10%: increase the density measured by 2.4 kg/m^3 for each 1% that the moisture content is below 10%; and
- c) moisture content exceeding 14%: decrease the density measured by 2.4 kg/m^3 for each 1% that the moisture content exceeds 14%.

C.9 Proof-grading

C.9.1 Principle

A load is applied at the centre of a fixed test span and over the width of a piece but, in the case of a regularized piece of nominal square cross-section (for example, nominally 38 mm x 38 mm), on one of the regularized faces. The piece is so moved through the proof-grading machine that each part of the length of the piece, other than the end sections, is subjected, in turn, to the load.

NOTE In the case of a regularized piece of bandering or batten of nominally square cross-section, the regularized width is usually smaller than the thickness of the piece.

C.9.2 Proof-grading machine

C.9.2.1 Ensure that the proof-grading machine is such that

- a) the appropriate test load (see C.9.3) can be applied consecutively to each part of the length of a piece under test, at a point midway (subject to a tolerance of ± 3 mm) between the bearers or supports. The appropriate test span is as given in Table C.1;
- b) each bearer or support extends across the full width of the face that is to be loaded or supported, as relevant, and its contact face is rounded to a diameter of at least 60 mm;
- c) no torsional forces are imposed on the test piece; and
- d) the grading speed does not exceed 50 m/min.

C.9.2.2 If another type of proof-grading machine is developed (for example, a machine that makes use of a different test span or grading speed (or both)), it shall be checked to ensure that it gives results equivalent to those given by the machine currently in use.

Table C.1 — Test span

1	2
Dimension mm	Test span mm
Branding and battens	
38 x 38	600
38 x 50	600
50 x 50	600
50 x 75	600
Structural timber	
38 x 50	600
38 x 75	600
38 x 100	1 200
38 x 150	1 200
50 x 50	600
50 x 75	600
50 x 100	1 200

C.9.3 Test loads

Use the appropriate of the test loads given in Table C.2.

Table C.2 — Test loads

1	2	3	4	5
Nominal size of pieces mm	Static load N			
	Branding and battens	Stress grade 5	Stress grade 7	Stress grade 10
38 x 38	775	-	-	-
38 x 50	1 376	1 225	1 675	2 475

38 x 75	-	2 825	3 850	5 625
38 x 100	-	4 775	6 500	9 600
38 x 150	-	8 450	11 550	17 575
50 x 50	1 825	1 625	2 200	3 250
50 x 75	-	3 725	5 075	7 500
50 x 100	-	6 275	6 550	12 650
NOTE A dash (-) means "not applicable".				

C.9.4 Procedure

C.9.4.1 Feed the timber into the proof-grading machine in such a way that:

- the force is applied to an edge of the piece; and
- the worst edge is on the tension side.

C.9.4.2 During testing, ensure that the indicated load does not vary by more than 2.5 %. If any visible fractures develop during quality control grading, remove such defects by cross-cutting.

C.10 Quality of glued edge joints

C.10.1 Apparatus

C.10.1.1 Block, that is of hardwood and of a suitable size

C.10.1.2 Cold chisel, that has a blade of width at least 25 mm, or a hatchet, suitably sharpened

C.10.1.3 Hammer

C.10.1.4 Autoclave, or a similar vessel that is designed to withstand a pressure of at least 535 kPa and equipped with both a vacuum pump capable of reducing the pressure in the vessel to -85 kPa and a pump for producing a positive pressure of 520 kPa \pm 15 kPa

C.10.2 Test specimen

From each test sample, cut a test specimen of length approximately 25 mm (measured in the general direction of the grain) that embodies the full cross-section of the piece.

C.10.3 Procedure

C.10.3.1 In the case of test specimens glued with a class 1 or class 2 adhesive, pre-treat the specimens by subjecting them to C.10.3.1.1.

C.10.3.1.1 Place the specimens in the autoclave, keeping them separate from each other by inserting slips of timber between them, and so load them that they will not float in the water. Add enough water at a temperature of 18 °C to 27 °C to cover the specimens completely. Reduce the pressure in the autoclave to -85 kPa and maintain it at this value for 5 min. Then release the vacuum and apply a pressure of 520 kPa \pm 15 kPa for 1 h. Drain the autoclave and remove the specimen.

C.10.3.1.2 In the case of specimens glued with any adhesive other than with a class 1 or class 2 adhesive, follow the same procedure, but use dry specimens

C.10.3.2 Place each specimen under test on the block with the glue lines in a vertical position. Position the chisel or hatchet vertically on each glue line in turn, and separate the laminations by delivering a blow to the chisel or hatchet. Examine each fracture to determine the percentage of wood failure.

NOTE C.10 is applicable to DEAS 23-3 only

Annex D

(informative)

Notes to purchasers

D.1 The following requirements shall be specified on tender invitations and in each order or contract when relevant, that:

- a) preservative treatment is required (see 4.2.3), and
- b) the timber is to be finger-jointed (see 4.2.4).

D.2 The use of an electric moisture meter to determine moisture content (see 4.2.1 and C.6 of Annex C) and moisture gradient (see 4.2.2 and C.7 of Annex C) may be specified by the purchaser, but only if so approved by the authority administering this standard

Bibliography

- [1] SANS 1349:2009, *Phenolic, aminoplastic and one-part polyurethane resin adhesives for the laminating and finger-jointing of timber, and for furniture and joinery*
- [2] SANS 1783-3:2009, *Sawn softwood timber — Part 3: Industrial timber*
- [3] SANS 1783-4:2009, *Sawn softwood timber — Part 4: Brandering and battens.*
- [4] SANS 6122:2009, *Qualification testing of solid structural timber and laminated structural timber (glulam) for verifying timber grading systems in accordance to a given standard*
- [5] SANS 10163-1:2009, *The structural use of timber — Part 1: Limit-states design*
- [6] SANS 10163-2 (SABS 0163-2):2009, *The structural use of timber — Part 2: Allowable stress design*
- [7] ISO 9001:2015, *Quality management systems — Requirements*

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