SLOVENSKI STANDARD
SIST EN 13183-3:2005

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Delež vlage v žaganem lesu – 3. del: Ocena z metodo kapacitivnosti

Moisture content of a piece of sawn timber - Part 3: Estimation by capacitance method

Feuchtegehalt eines Stückes Schnittholz - Teil 3: Schätzung durch kapazitives Messverfahren

Teneur en humidité d'une piece de bois scié - Partie 3: Estimation par méthode capacitive

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79.040	Les, hlodovina in žagan les	Wood, sawlogs and sawn timber

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EUROPEAN STANDARD

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Moisture content of a piece of sawn timber - Part 3: Estimation by capacitance method

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This European Standard was approved by CEN on 3 February 2005.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (EN 13183-3:2005) has been prepared by Technical Committee CEN/TC 175 “Round and sawn timber”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2005, and conflicting national standards shall be withdrawn at the latest by September 2005.

This document is one of a series, dealing with methods of measurement for round timber and sawn timber.

Other standards in this series are:

EN 13183-1, *Moisture content of a piece of sawn timber - Part 1: Determination by oven dry method*

EN 13183-2, *Moisture content of a piece of sawn timber - Part 2: Estimation by electrical resistance method*

EN 1309-1, *Round and sawn timber - Method of measurement of dimensions - Part 1: Sawn timber*

EN 1310, *Round and sawn timber - Method of measurement of features*

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EN 1311, *Round and sawn timber - Method of measurement of biological degrade*

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This document includes a Bibliography.

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1 Scope

This document specifies a non destructive method for estimating the moisture content of a piece of sawn timber. The standard describes the conditions which shall be met by a capacitance measuring system to derive a moisture content estimate for individual pieces of timber.

The standard applies to sawn timber and timber which has been planed or surfaced by other means.

2 Normative references

The following referenced documents are indispensable for the application 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.

EN 844-1:1995, *Round and sawn timber - Terminology - Part 1: General terms common to round timber and sawn timber*

EN 844-3:1995, *Round and sawn timber - Terminology - Part 3: General terms relating to sawn timber*

EN 844-4:1997, *Round and sawn timber –Terminology - Part 4: Terms relating to moisture content*

EN 844-6:1997, *Round and sawn timber - Terminology - Part 6: Terms relating to dimensions of sawn timber*

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EN 844-7:1997, *Round and sawn timber - Terminology - Part 7: Terms relating to anatomical structure of timber*

EN 844-9:1997, *Round and sawn timber - Terminology - Part 9: Terms relating to features of sawn timber*

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EN 844-12:2000, *Round and sawn timber - Terminology - Part 12: Additional terms and general index*

EN 13183-1, *Moisture content of a piece of sawn timber - Part 1: Determination by oven dry method*

EN ISO/IEC 17025, *General requirements for the competence of testing and calibration laboratories (ISO/IEC 17025:1999)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 844-1:1995, EN 844-3:1995, EN 844-4:1997, EN 844-6:1997, EN 844-7:1997, EN 844-9:1997 and EN 844-12:2000 apply.

4 Moisture content estimation with hand-held capacitance moisture meters

4.1 Limits of application

This method is suitable for estimating the average moisture content of a piece of timber having a moisture content between approximately 7 % and 30 %.

NOTE Any type of bipolar preservative, flame retardant, chemical or surface treatment may affect the accuracy of the measurement and requires special calibration of the instrument for each type of treatment.

The estimated moisture content can be strongly affected by the type and reach of the moisture sensing system, the moisture content distribution and the wood density under the sensor, the operating modus, the dimensions of the piece of timber to be measured and the operator skills.

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Any air gap between the timber surface and the sensing unit will strongly influence the reading. Very rough sawn or uneven surfaces can only be measured if the shape of the condensator plate or probe secures good contact.

4.2 Apparatus

Hand-held capacitance moisture meter equipped with a flat shaped condensator plate surface, surface spring electrodes or special non-invasive measuring probes, graduated up to at least 30 % in units of maximum 1 % moisture content.

NOTE Normally capacitance moisture meters are equipped with a setting for correction for density and are applicable or adjustable for different thicknesses. Density correction may also be carried out by using special tables or formulas provided by the suppliers of the instrument.

4.3 Initial type testing

The accuracy of the measuring system and its operating instructions shall be tested in accordance with Annex A of this document by a laboratory compliant with EN ISO/IEC 17025. The results of these tests shall be made available with the apparatus.

4.4 Procedure

Before taking measurements the capacitance moisture meter shall be checked according to the instructions provided by the supplier of the instrument. Set the moisture measuring unit to its basic settings with the assistance of a check block.

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The capacitance moisture meter shall be adjusted for density. If the actual density of the timber to be measured is unknown, an average density for the species to be measured may be selected from the operating manual provided by the supplier of the instrument.

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Ensure that the instrument being used is adjusted or applicable for the thickness of the timber being measured.

Air gaps or bad contact between the condensator plates and the wood surface shall be avoided.

The measurement area shall be free from features affecting the measurement such as bark, knots, resin pockets, wetted surface or checks.

The measurement shall be taken at a point 300 mm from one of the ends of the piece. If this position contains any of the defects detailed above the measurement shall be taken on the nearest defect free point towards the centre of the piece. For pieces less than 600 mm long, measure at mid-length.

4.5 Expression of results

The estimation results shall be expressed at least to the nearest one percentage point.

5 Moisture content estimation with in-line capacitance moisture meters

5.1 Limits of application

This method is suitable for estimating the average moisture content of a piece of timber having a moisture content between approximately 7 % and 30 %.

NOTE Any type of bipolar preservative, flame retardant, chemical or surface treatment may affect the accuracy of the measurement and requires special calibration of the instrument for each type of treatment.

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The estimated moisture content can be strongly affected by the type and reach of the moisture sensing system, the moisture content distribution and the wood density in the sensor reach, the operating modus, the geometry of the measuring set up and variations in the dimensions of the piece of timber to be measured.

The air gap between the timber surface and the sensing unit will strongly influence the reading. To reduce this influence, caused by twisted and bowed boards, vibration or unstable transport conditions, a press device securing a constant distance to the sensor(s) is recommended.

5.2 Apparatus and measuring set-up

A moisture measuring unit consisting of a fixed framework carrying one or several sensing units, through which the timber is passed lengthwise or transversal to the direction of travel, connected to an evaluation unit.

The sensing unit(s) shall be installed at a position in the production line that is easy to access, to keep clean and free of vibrations. The sensing unit(s) and the corresponding cabling shall be shielded to avoid electromagnetic interference. The measuring area shall be kept free of dust or dirt by means of an appropriate system (e.g. pressurised air nozzles).

The read-out from the equipment shall be graduated up to at least 30 % in units of maximum 1 % moisture content.

5.3 Initial type testing

The accuracy of the measuring system and its operating instructions shall be tested in accordance with Annex A of this document by a laboratory compliant with EN ISO/IEC 17025. The results of these tests shall be made available with the apparatus.

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5.4 Calibration

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Before an in-line measuring system can be used the system shall be calibrated according to the instructions of the supplier.

NOTE 1 Calibration involves the collection of in-line moisture content readings from a number of individual boards with the same dimension and approximately the same moisture gradient. For each of the instrument reading positions on these boards the moisture content is determined by the oven-dry method according to EN 13183-1. Features such as bark, knots etc should be avoided. This data forms the basis for a linear regression, the coefficients of which are stored by the system forming a measuring programme for the individual dimension and species being measured.

NOTE 2 The accuracy of capacitance moisture meters is affected by local density variations. If these density variations within the timber to be measured result in an unacceptable accuracy, a density measuring unit can be connected to the moisture measuring unit. This density measuring unit should be calibrated separately according to the instructions of the supplier.

5.5 Procedure

Set the moisture measuring unit to its basic settings with the help of a check block. Select an appropriate measuring programme before changing to the measurement mode.

5.6 Expression of results

The estimation results shall be expressed at least to the nearest one percentage point.

NOTE The indicated moisture content of each board passing through the system is normally the result of various individual measurements which have undergone a filtering and averaging algorithm.

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Annex A
(normative)

Procedure for assessing the accuracy of capacitance moisture meters

A.1 Introduction

This procedure shall be followed by laboratories when testing the accuracy of capacitance meter estimations of moisture content in comparison with an oven dry measurement of moisture content taken at the same position on a piece of timber.

A.2 Test material

The test shall be conducted on three individual named species samples representing pines, spruces and hardwood. The samples shall have a sawn surface finish.

Each sample shall contain a minimum of 50 pieces of 50 mm nominal thickness and equal width. The moisture content range shall be comparable with that claimed by the manufacturer as measurable by the apparatus.

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A.3 Measurements to be taken

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A.3.1 The moisture content for each piece shall be estimated using the capacitance moisture meter under test according to the manufacturer's instructions.

A.3.2 The oven dry moisture content for each piece shall be measured in accordance with EN 13183-1 at the same position as that estimated by the capacitance moisture meter. In the case of in-line meters with longitudinal throughput which indicate an estimate of the average moisture content of longer sections of sawn timber, one defect free oven-dry test slice per metre shall be taken along the measuring distance of the instrument. No slice shall be taken nearer than 300 mm from the end of the piece.

A.3.3 The oven dry density shall be calculated for each slice taken to establish oven dry moisture content. Pieces with a density that varies more than ± 40 kg/m³ from the density mean of the whole species sample shall be discarded.

A.4 Expression of results

A.4.1 Each species sample shall be divided into three overlapping classes dependent on the moisture content of its constituent pieces measured by the oven dry method. These classes are:

Class A: 7 % to 12 % moisture content

Class B: 10 % to 18 % moisture content

Class C: 14 % to 25 % moisture content