SLOVENSKI STANDARD
SIST EN 14251:2004

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Okrogli konstrukcijski les – Preskusne metode

Structural round timber - Test methods

Rundholz für tragende Zwecke - Prüfverfahren

Bois de structure rond - Méthodes d'essai

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ICS:

79.040	Les, hlodovina in žagan les	Wood, sawlogs and sawn timber
91.080.20	Lesene konstrukcije	Timber structures

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Structural round timber - Test methods

Bois de structure rond - Méthodes d'essai

Rundholz für bauliche Zwecke - Prüfverfahren

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 14251:2003) has been prepared by Technical Committee CEN/TC 124, Timber Structures, the secretariat of which is held by DS.

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of an identical text or by endorsement, at the latest by June 2004, and conflicting national standards shall be withdrawn at the latest by June 2004.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This standard applies for structural round wood timber other than specified in EN 12509.

This test standard specifies test methods for determining the following properties of structural round timber; the bending strength, modulus of elasticity in bending; the compressive strength parallel to the grain and modulus of elasticity in compression parallel to the grain.

In addition, the determination of dimensions, moisture content and density is specified. The methods apply to debarked round timber.

This standard is not intended for quality-control test purposes.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

Not applicable.

3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply:

3.1
minimum diameter
minimum diameter of the pole at the section of measurement

3.2
maximum diameter
maximum diameter of the pole at the section of measurement

3.3
apparent diameter
diameter of a circle with the same circumference as the actual circumference at the section of measurement

3.4
nominal diameter
a) largest apparent diameter for poles with 5% or less ovality
b) largest minimum diameter for poles with more than 5% ovality

3.5
ovality
difference between the maximum and minimum diameter at a cross section expressed as a percentage of the minimum diameter

3.6
sweep
deviation of the longitudinal axis from a straight line

3.7
taper
gradual change in diameter along the length

4 Symbols and abbreviations

A cross-sectional area, in square millimetres

a distance between loading position and nearest support in bending test, in millimetres

d_{nom} nominal diameter of round timber beam at either end grain face, in millimetres

d_h diameter of round timber perpendicular to the direction of load at mid span, in millimetres

d_v diameter of round timber in the direction of load at mid span, in millimetres

$E_{m,0}$ modulus of elasticity in bending, in Newton per square millimetre

$E_{c,0}$ modulus of elasticity in compression parallel to the grain, in Newton per square millimetre

F load, in Newton

F_{max} maximum load, in Newton

$f_{c,0}$ compressive strength parallel to the grain, in Newton per square millimetre

$f_{m,0}$ bending strength, in Newton per square millimetre

h height of compression parallel to grain test piece, in millimetres

h_0 gauge length of compression parallel to grain test piece, in millimetres

I second moment of area, in millimetres to the fourth power

l span in bending, in millimetres

l_1 gauge length for the determination of modulus of elasticity in bending, in millimetres

w deflection or displacement in compression, in millimetres.

5 Determination of the moisture content of test pieces

The tests shall be carried out on pieces which are conditioned at the standard environment of $(20 \pm 2)^0$ C and (65 ± 5)% relative humidity. A test piece is conditioned when it attains constant mass. Constant mass is considered to be attained when the results of two successive weightings, carried out with an interval of 6 h, do not differ by more than 0.1 % of the mass of the test piece.

When other conditions apply they shall be reported.

NOTE Besides that it takes a long time to dry the solid round timber as to the standard environment this will also result in substantial cracks**.** When tested in a wet condition this aspect should be taken care of in the derivation of characteristic and design strength and stiffness values.

6 Determination of density of test pieces

The density is measured from a disk (minimum thickness 75mm), taken from the test specimen. The section shall be of full cross-section, free from knots and resin pockets

The dimensions of the test specimen shall be measured with a device with an accuracy of 1 %. All measurements shall be made when the test pieces are conditioned as specified in Clause 5. Deviations from a constant cross-section along the grain direction shall be recorded.

7 Determination of dimensions of test pieces

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8 Determination of the modulus of elasticity parallel to the grain

8.1 Test procedure

The test piece shall be symmetrically loaded in bending at two points over a span of 18 times the nominal diameter of the round timber. The loading heads shall be placed at the third points of the span. The test piece shall be simply supported and the direction of the sweep, if any, should be in the direction of the load.

If the test piece or the equipment does not permit these conditions to be achieved exactly, the distance between the loading points and supports may be changed by an amount not greater than 1,5 times the nominal diameter measured between the span. The span may be changed by an amount not greater than three times the nominal diameter, while maintaining the symmetry of the test set-up.

A shaped wooden or wood based block to fit the round timber, of length not greater than the nominal diameter of the round timber may be inserted between the test piece and the loading heads or supports to minimise local indentation.

NOTE The blocks under the loading heads and the supports may differ in thickness as to take account of the tapering of the test piece.

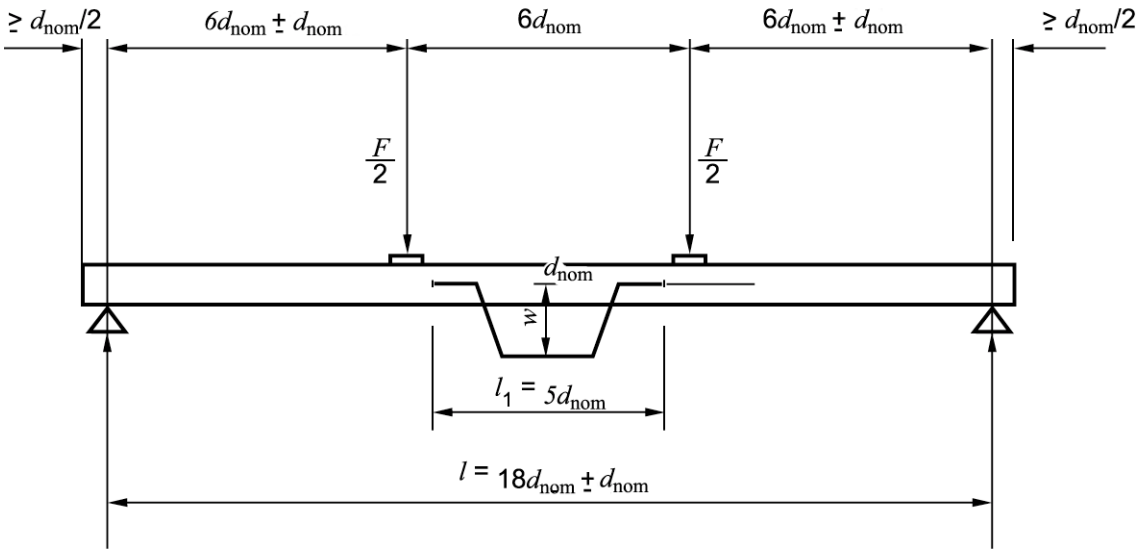

Figure 1 - Test arrangement for the determination of the modulus of elasticity

The test arrangement shall maintain the loading forces equal.

The load shall be applied at a constant rate. The rate of movement of the loading heads is determined from the results of preliminary bending strength tests according to 9.2. The measuring device used shall be capable of measuring the load to an accuracy of 1% of the load applied to the test piece.

The maximum load shall not exceed the proportional limit load or cause damage to the piece.

At mid-span the diameter in the direction of the load d_v and perpendicular to the load d_h are recorded.

The deformation w shall be taken as the average of the measurements on both faces at the neutral axis, and shall be measured at the centre of the central gauge length of five times the nominal diameter, d_{nom} at mid-span in the direction of the load, see Figure 1.

The measurements shall be determined with accuracy of 1% or, for deformations less than 2 mm, with an accuracy of 0.02 mm.

8.2 Expression of the results

The modulus of elasticity in bending parallel to the grain $E_{m,0}$ is determined by :

$$E_{m,0} = \frac{(M_1 - M_2)c^4}{6(w_1 - w_2)I_1}\left[- \frac{1}{(c + l_1/2)^2} - \frac{D}{2} + \frac{1}{c^2} \right]$$

$$\text{with} \quad c = \frac{l_1 d_1}{(d_2 - d_1)} \quad \text{and} \quad D = \left(\frac{1}{c^2} - \frac{1}{(c + l_1)^2} \right)$$

where

$M_1 - M_2$ is the increment of bending moment on the straight-line portion of the load deformation curve, in Newton millimetres

$w_1 - w_2$ is the increment of displacement, in millimetres

d_1 is the smallest apparent diameter along the gauge length, in millimetres

d_2 is the biggest apparent diameter along the gauge length, in millimetres

I_1 is the smallest second moment of area along the gauge length, in millimetres to the fourth power

l is the gauge length, in millimetres

If $E_{m,0}$ is calculated from a bending moment/deformation linear regression the square of the correlation coefficient should be greater than 0.99.