



SLOVENSKI STANDARD

SIST EN 384:2004

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Nadomešča:
SIST EN 384:1996

Konstruktivski les - Ugotavljanje značilnih vrednosti mehanskih lastnosti in gostote

Structural timber - Determination of characteristic values of mechanical properties and density

Bauholz für tragende Zwecke - Bestimmung charakteristischer Werte für mechanische Eigenschaften und Rohdichte

Bois de structure - Détermination des valeurs caractéristiques des propriétés mécaniques et de la masse volumique

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ICS:

91.080.20 Lesene konstrukcije Timber structures

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

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Supersedes EN 384:1995

English version

Structural timber - Determination of characteristic values of mechanical properties and density

Bois de structure - Détermination des valeurs caractéristiques des propriétés mécaniques et de la masse volumique

Bauholz für tragende Zwecke - Bestimmung charakteristischer Werte für mechanische Eigenschaften und Rohdichte

This European Standard was approved by CEN on 20 February 2003.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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

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Foreword

This document (EN 384:2004) 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 July 2004, and conflicting national standards shall be withdrawn at the latest by July 2004.

This document supersedes EN 384:1995.

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

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Introduction

In this revised edition the method for determining characteristic values from tests on small clear specimens is now only permitted for hardwoods. Changes to factor k_v and other minor changes have also been made.

Structural codes can only function effectively if standard methods of determining the mechanical and physical properties exist.

Whilst total accuracy of characteristic values for any defined population is an aim, it is recognized that this is not achievable. A major aim of the procedures given in this standard is to produce characteristic values that are comparable in terms of the populations they represent. It is also important that the standard permits the use of as much existing test data as possible from various sampling and testing techniques.

Where methods are given to permit characteristic values to be determined from a less than ideal amount of structural size test data or from small, clear, defect-free specimen test data, reduction factors to reflect a lower degree of confidence are employed.

This standard covers the stages of population definition, sampling, testing and analysis of data in the determination of characteristic values.

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1 Scope

This standard gives a method for determining characteristic values of mechanical properties and density, for defined populations of timber of visual and/or mechanical strength grades.

A method is also given for checking the strength of a timber sample against its designated value.

The values determined in accordance with this standard for mechanical properties and density are suitable for assigning grades and species to the strength classes of EN 338.

NOTE For assigning grades and species to the strength classes in EN 338 only three characteristic values, i.e. bending strength, mean modulus of elasticity parallel to grain and density need to be determined, other properties may be taken from the table in EN 338.

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).

EN 408:2003, *Timber structures - Structural timber and glued laminated timber - Determination of some physical and mechanical properties*

prEN 14081-1, *Timber structures – Strength graded structural timber with rectangular cross section – Part 1: General requirements*

ISO 3131:1975, *Wood - Determination of density for physical and mechanical tests.*

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3 Terms and definitions

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

3.1

characteristic value

generally a value that corresponds to a fractile of the statistical distribution of a timber property. For strength properties, modulus of elasticity and density the fractile is the 5-percentile. For modulus of elasticity, the mean value is also a characteristic value.

3.2

p-percentile

value for which the probability of getting lower values is p%.

3.3

population

material for which the characteristic values are relevant.

NOTE The population is defined by parameters such as species or species grouping, source and strength grade.

3.4

sample

a number of specimens of one cross section size and from one population.

3.5

small clear test

test to determine mechanical properties of small defect-free specimens.

EN 384:2004**3.6****specimen**

piece of timber for testing.

3.7**thickness**

lesser dimension perpendicular to the longitudinal axis of a piece of timber.

3.8**width**

greater dimension perpendicular to the longitudinal axis of a piece of timber.

3.9**depth**

dimension perpendicular to the longitudinal axis of a timber beam, in the plane of the bending forces.

4 Symbols and abbreviations

a_f	distance between the inner load points of the bending test (in mm)
\bar{E}	mean modulus of elasticity for one sample (in N/mm ²)
$E_{0,mean}$	mean characteristic value of modulus of elasticity parallel to grain (in N/mm ²)
$E_{0,05}$	5-percentile characteristic value of modulus of elasticity parallel to grain (in N/mm ²)
$E_{90,mean}$	mean characteristic value of modulus of elasticity perpendicular to grain (in N/mm ²)
f	strength property
$f_{c,0,k}$	characteristic value of compression strength parallel to grain (in N/mm ²)
$f_{c,90,k}$	characteristic value of compression strength perpendicular to grain (in N/mm ²)
f_k	characteristic value of strength (in N/mm ²)
$f_{m,k}$	characteristic value of bending strength (in N/mm ²)
f_{mean}	sample mean value of strength (in N/mm ²)
f_r	5-percentile ranked test value (in N/mm ²)
$f_{t,0,k}$	characteristic value of tensile strength parallel to grain (in N/mm ²)
$f_{t,90,k}$	characteristic value of tensile strength perpendicular to grain (in N/mm ²)
f_{05}	5-percentile value for each sample (in N/mm ²)
\bar{f}_{05}	the mean value of f_{05} for several samples (in N/mm ²)
$f_{v,k}$	characteristic value of shear strength (in N/mm ²)
G_{mean}	mean characteristic value of shear modulus (in N/mm ²)
h	depth of a bending specimen or width of a tension specimen (in mm)
k_g	factor used for determining characteristic values of tension and compression parallel to grain and shear
k_h	factor for adjusting f_k when h is different from 150 mm
k_l	factor for adjusting length;

k_n	factor for obtaining characteristic value from mean value;
k_q	factor for use when checking the quality of a graded sample
k_s	factor for adjusting number and size of samples
k_v	factor for adjusting machine grading
l	span (in mm)
l_{es}	effective length for the standard test procedure (in mm)
l_{et}	effective length for the test (in mm)
n	number of specimens in a sample
s	standard deviation
$\bar{\rho}$	sample mean value of density (in N/mm ²)
ρ	density (in kg/m ³)
ρ_k	characteristic density (5-percentile) (in kg/m ³)
ρ_{05}	5-percentile density for a sample (in kg/m ³)

5 Mechanical properties determined from full-size specimens

5.1 Sampling

SIST EN 384:2004

Samples shall be selected from the population of timber graded visually or by machine to the requirements given in prEN 14081-1. The population shall be capable of being identified at all stages of production and supply, including the construction site.

The test material shall be representative of the population. The timber shall represent the timber source, sizes, and quality that will be graded in production. Each sample shall be from one source.

NOTE 1 Any known or suspected difference in the mechanical properties of the population distribution due to growth regions, sawmills, tree size or method of conversion should be represented within the number of samples selected, by a similar proportion to their frequency in the population. This should be the major influence in determining the number and size of samples.

The number of specimens in each sample shall be not less than 40.

NOTE 2 Where samples are small and/or few in number the characteristic values will be penalized, see 5.4.

The cross section size of specimens shall be the same within a sample, but different for other samples, reflecting the range of sizes to which the grading rules are applicable. However, if the size effect for the grading rule has been established for a similar species, then fewer sizes may be tested.

Test specimens for shear, tension perpendicular to grain and compression perpendicular to grain strengths are comparatively small and therefore shall be free of strength reducing characteristics, but must represent the full range of growth areas, density and rates of growth.

5.2 Testing

Testing shall be carried out in accordance with EN 408:2003. Except for the strength properties of shear, tension perpendicular to grain and compression perpendicular to grain, a critical section shall be selected in each piece of timber. This section is the position at which failure is expected to occur, based on a visual examination and any other information such as measurements from a strength grading machine. The critical section shall be in a position