SLOVENSKI STANDARD
SIST EN 338:1996

01-avgust-1996

Konstrukcijski les - Trdnostni razredi

Structural timber - Strength classes

Bauholz für tragende Zwecke - Festigkeitsklassen

Bois de structure - Classes de résistance

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Contents

Foreword

This European Standard has been prepared by the Technical Committee CEN/TC 124 "Timber structures" of which the secretariat 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of an identical text or by endorsement, at the latest by August 1995, and conflicting national standards shall be withdrawn at the latest by August 1995.

In accordance with the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

Introduction

Due to variations in the type and quality of timber available, the variety of end uses and the size of production output of the local timber industry, many different combinations of species and strength grade exist with different strength properties which therefore complicate the design and specification of timber structures.

A strength class system groups together grades and species with similar strength properties thus making them interchangeable. This then permits an engineer to specify a chosen strength class and use the characteristic strength values of that class in design calculations.

Advantages of the strength class system are:

Additional species/grades can be incorporated into the system at any time without affecting existing specifications for structural timber.

At the time of carrying out design calculations an engineer need not be aware of the costs and availability of alternative species and grades. He can simply design using the strength values of a particular class and then specify that class; he can then use the tenders to select the most suitable and economic species/grade on offer. Note that, where a particular species is not acceptable (e.g. for reasons of durability) for a project, the specification needs to make this clear.

Suppliers can offer their material to meet more specifications than would be possible if species and grades are specified.

1 Scope

This standard establishes a system of strength classes for general use in structural codes.

It gives characteristic strength and stiffness properties and density values for each class and the rules for the allocation of timber populations (i.e. combinations of species, source and grade) to the classes.

This standard applies to all softwood and hardwood timber for structural use.

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.

EN 384 Structural timber - Determination of characteristic values of mechanical properties and density.

EN 518 Structural timber - Grading - Requirements for visual strength grading standards.

EN 519 Structural timber - Grading - Requirements for machine strength graded timber and grading machines.

3 Definitions

For the purposes of this standard, the following definition applies:

population: Material for which the characteristic values are relevant. The population is defined by parameters such as species or species grouping, source and strength grade.

4 Symbols

$E_{0,mean}$ mean characteristic value of modulus of elasticity parallel to grain, in newtons per square millimetre

$E_{0,05}$ 5-percentile characteristic value of modulus of elasticity parallel to grain, in newtons per square millimetre

$E_{90,mean}$ mean characteristic value of modulus of elasticity perpendicular to grain, in newtons per square millimetre

$f_{c,0,k}$ characteristic value of compressive strength parallel to grain, in newtons per square millimetre

$f_{c,90,k}$ characteristic value of compressive strength perpendicular to grain, in newtons per square millimetre

$f_{m,k}$ characteristic value of bending strength, in newtons per square millimetre

$f_{t,0,k}$ characteristic value of tensile strength parallel to grain, in newtons per square millimetre

$f_{t,90,k}$ characteristic value of tensile strength perpendicular to grain, in newtons per square millimetre

$f_{v,k}$ characteristic value of shear strength, in newtons per square millimetre

G_{mean} mean characteristic value of shear modulus, in newtons per square millimetre

ρ_k characteristic value of density, in kilogrammes per cubic metre

5 Classification of structural timber

This standard provides for a number of strength classes, each designated by a number indicating the value of bending strength in newtons per square millimetre.

The characteristic values of strength, stiffness and density for the strength classes are given in table 1.

6 Allocation of a timber population to a strength class

6.1 Grading

6.1.1 Visually graded timber. Visually graded timber shall be to a grading standard that meet the requirements of EN 518.

6.1.2 Machine graded timber. Machine graded timber shall meet the requirements of EN 519.

6.2 Classification

6.2.1 Characteristic values. The characteristic values of the timber population concerned shall be determined in accordance with EN 384.

6.2.2 Allocation to a strength class. If the characteristic values of bending strength, density and mean modulus of elasticity parallel to the grain, for a timber population are greater or equal to the values for a strength class given in table 1, then the timber population may be assigned to that strength class.

NOTE: Provided information is available a grading machine may be set to grade directly to the strength class strength values. Timber graded in this way should be referred to by the strength class number and marked according to EN 519.

Table 1: Strength classes - Characteristic values

		Poplar and conifer species									Deciduous species					
		C14	C16	C18	C22	C24	C27	C30	C35	C40	D30	D35	D40	D50	D60	D70
Strength properties in N/mm²																
Bending	$f_{m,k}$	14	16	18	22	24	27	30	35	40	30	35	40	50	60	70
Tension parallel	$f_{t,0,k}$	8	10	11	13	14	16	18	21	24	18	21	24	30	36	42
Tension perpendicular	$f_{t,90,k}$	0,3	0,3	0,3	0,3	0,4	0,4	0,4	0,4	0,4	0,6	0,6	0,6	0,6	0,7	0,9
Compression parallel	$f_{c,0,k}$	16	17	18	20	21	22	23	25	26	23	25	26	29	32	34
Compression perpendicular	$f_{c,90,k}$	4,3	4,6	4,8	5,1	5,3	5,6	5,7	6,0	6,3	8,0	8,4	8,8	9,7	10,5	13,5
Shear	$f_{v,k}$	1,7	1,8	2,0	2,4	2,5	2,8	3,0	3,4	3,8	3,0	3,4	3,8	4,6	5,3	6,0
Stiffness properties in kN/mm²																
Mean modulus of elasticity parallel	$E_{0,mean}$	7	8	9	10	11	12	12	13	14	10	10	11	14	17	20
5 % modulus of elasticity parallel	$E_{0,05}$	4,7	5,4	6,0	6,7	7,4	8,0	8,0	8,7	9,4	8,0	8,7	9,4	11,8	14,3	16,8
Mean modulus of elasticity perpendicular	$E_{90,mean}$	0,23	0,27	0,30	0,33	0,37	0,40	0,40	0,43	0,47	0,64	0,69	0,75	0,93	1,13	1,33
Mean shear modulus	G_{mean}	0,44	0,50	0,56	0,63	0,69	0,75	0,75	0,81	0,88	0,60	0,65	0,70	0,88	1,06	1,25
Density in kg/m³																
Density	ρ_k	290	310	320	340	350	370	380	400	420	530	560	590	650	700	900
Average density	ρ_{mean}	350	370	380	410	420	450	460	480	500	640	670	700	780	840	1080