
Lesene konstrukcije - Konstrukcijski les in lepljeni lamelirani les - Ugotavljanje strižne trdnosti in mehanskih lastnosti pravokotno na lesna vlakna

Timber structures - Structural timber and glued laminated timber - Determination of shear strength and mechanical properties perpendicular to the grain

Holzbauwerke - Bauholz für tragende Zwecke und Brettschichtholz - Bestimmung der Scherfestigkeit und der mechanischen Eigenschaften rechtwinklig zur Faserrichtung

Structures en bois - Bois de charpente et bois lamellé-collé - Détermination de la résistance au cisaillement et des propriétés mécaniques perpendiculaires aux fibres

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Ta slovenski standard je istoveten z: EN 1193:1997

ICS:

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

SIST EN 1193:2000**en**

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EUROPEAN STANDARD

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Descriptors: timber construction, wood, laminated board, timber frames, tests, determination, physical properties, mechanical properties, tensile strength, compressive strength, modulus of elasticity, shear strength

English version

Timber structures - Structural timber and glued laminated timber - Determination of shear strength and mechanical properties perpendicular to the grain

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Brettschichtholz - Bestimmung der Scherfestigkeit und der
mechanischen Eigenschaften rechtwinklig zur
Faserrichtung

This European Standard was approved by CEN on 2 October 1997.

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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
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 124 "Timber Structures", the secretariat of which is held by DS.

NOTE: It is considered desirable to maintain the same clause numbering throughout this series of standards. Consequently, some clauses are empty but it is envisaged that future editions may need to include text in these clauses.

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 April 1998, and conflicting national standards shall be withdrawn at the latest by April 1998.

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This standard specifies test methods for determining:

- tensile and compressive strengths perpendicular to the grain of structural timber and glued laminated timber, and
- tensile and compressive moduli of elasticity perpendicular to the grain of structural timber and glued laminated timber, and
- shear strength parallel to the grain of structural timber and of the laminates used in glued laminated timber.

2 Normative references

None.

3 Definitions

For the purposes of this standard, the following definitions apply:

- 3.1 compressive strength perpendicular to the grain:** Stress corresponding to the load which occurs at the intersection of the line of the load/deformation curve and line 2 of figure 3.

3.2 modulus of elasticity in compression perpendicular to the grain: Property relating to the inclination of the straight line joining two points in figure 3 corresponding to the loads $0,1 F_{c,90,max}$ and $0,4 F_{c,90,max}$.

3.3 shear strength parallel to the grain: Maximum test load (F_{max}) per unit area of the test piece, multiplied by a factor of 0,97 (i.e. $\cos 14^\circ$).

4 Symbols

b	test piece width, in millimetres;
$E_{c,90}$	modulus of elasticity in compression perpendicular to the grain, in newtons per square millimetre;
$E_{t,90}$	modulus of elasticity in tension perpendicular to the grain, in newtons per square millimetre;
F	applied load, in newtons;
$F_{c,90}$	compressive load perpendicular to the grain, in newtons;
$F_{c,90,max}$	maximum compressive load perpendicular to the grain, in newtons;
$F_{c,90,max,est}$	estimated maximum compressive load perpendicular to the grain, in newtons;
$F_{t,90}$	tensile load perpendicular to the grain, in newtons;
$F_{t,90,max}$	maximum tensile load perpendicular to the grain, in newtons;
F_{max}	maximum load applied by test machine, in newtons;
$f_{c,90}$	compressive strength perpendicular to the grain, in newtons per square millimetre;
$f_{t,90}$	tensile strength perpendicular to the grain, in newtons per square millimetre;
f_v	shear strength parallel to the grain, in newtons per square millimetre;
h	test piece height, in millimetres;
h_0	gauge length, in millimetres;
l	test piece length, in millimetres;
t	plate thickness, in millimetres;
w	deformation, in millimetres.

5 Determination of dimensions of test piece

The dimensions of the test pieces shall be measured to an accuracy of 1 %. All measurements shall be made when the test pieces are conditioned as specified in clause 7, and planed.

NOTE: If the width or length vary, then these dimensions should be recorded as the average of three measurements on the height of the test piece.

6 Determination of density of test pieces

The density of the test pieces shall be determined prior to test from the measurements of mass and volume of the whole test piece.

7 Conditioning of test pieces

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7.1 General

The tests shall be carried out on test pieces which are conditioned at the standard environment of $(20 \pm 2) ^\circ\text{C}$ and $(65 \pm 5) \%$ relative humidity. The test piece is conditioned when it attains constant mass. Constant mass is considered to be attained when the results of two successive weighings, carried out at an interval of 6 h, do not differ by more than 0,1 % of the mass of the test piece.

Where the timber to be tested is not readily conditionable to the above standard environment (e.g. for hardwoods with high densities), that fact shall be reported.

7.2 Test area environment

Unless otherwise protected, test pieces shall not be removed from the conditioning environment more than one hour before testing.

NOTE: Test pieces can be stored in the test area for up to 24 h provided they are close piled and wrapped in vapour tight sheeting.

8 Determination of tension and compression strengths perpendicular to the grain

8.1 Requirements for test pieces

8.1.1 **Fabrication.** The fabrication of the test pieces shall be such as will allow for the application of the loads to the test piece.

NOTE 1: Suitable arrangements are shown in annexes A and B.

For tension tests, the test piece shall be glued to steel plates. The gluing process shall be capable of ensuring the specified position of the test piece during testing.

NOTE 2: A suitable adhesive for fixing the steel plates to the timber test piece is a two-part epoxy. Immediately prior to gluing, the surfaces to be joined should be prepared by planing the timber test piece surfaces and sandblasting the steel plates.

8.1.1.1 Surface preparation. The loaded surfaces shall be accurately prepared to ensure that they are plane and parallel to each other and perpendicular to the test piece axis. This preparation shall be carried out after conditioning.

8.1.1.2 Structural timber. The test pieces shall have the dimensions given in table 1 and be as shown in figure 1a).

8.1.1.3 Glued laminated timber. The test pieces shall have the dimensions given in table 1, with the object of achieving a volume of 0,01 m³ for tension test pieces, and be as shown in figure 1b).

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Table 1: Dimensions of structural timber or glued laminated timber test pieces

<i>Structural timber</i>			<i>Glued laminated timber</i>			
<i>b (mm)</i>	<i>h (mm)</i>	<i>l (mm)</i>	Volume	$b \times l$ (mm ²)	$b \geq$ (mm)	<i>h (mm)</i>
Tension						
45	180	70	0,01 m ³	25 000	100	400
Compression						
45	90	70	-	25 000	100	200
The symbols are as given in clause 4						
The permissible tolerances of the test piece dimensions <i>b</i> , <i>h</i> and <i>l</i> shall be 1 %						

8.2 Procedure

The test piece shall be mounted vertically between the test machine platens and the appropriate compression or tension loads applied. The gauge length, h_0 (approximately 0,6 *h*), shall be located centrally in the test piece height and not closer than $b/3$ to the loaded ends of the test piece, see figure 2.

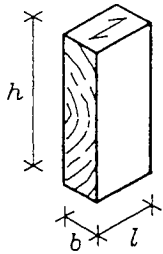
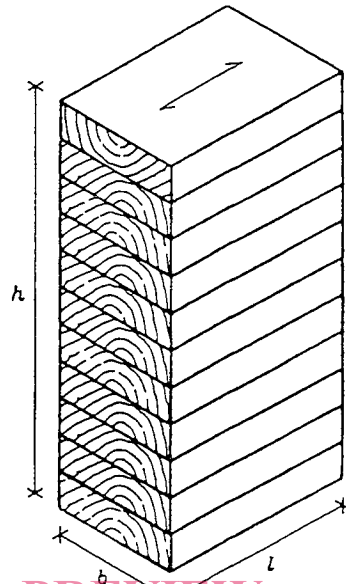


Figure 1a): Structural timber test piece



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Figure 1b): Glued laminated timber test piece

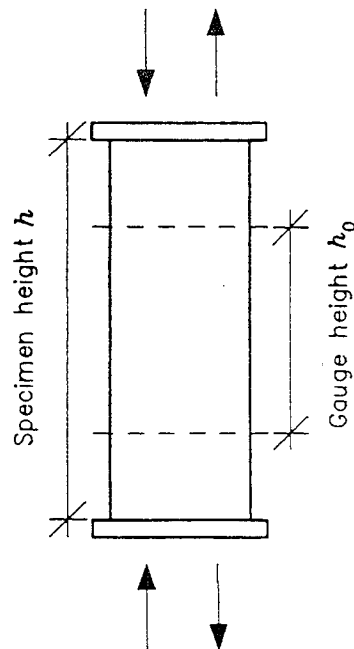


Figure 2: Test principle

The loading equipment used shall be capable of measuring the load to an accuracy of 1 % of the load applied to the test piece or, for loads less than 10 % of the maximum load, with an accuracy of 0,1 % of the maximum load.