



SLOVENSKI STANDARD

SIST EN 789:2005

01-april-2005

Nadomešča:
SIST EN 789:1996

Lesene konstrukcije - Preskusni postopki - Ugotavljanje mehanskih lastnosti lesnih plošč

Timber structures - Test methods - Determination of mechanical properties of wood based panels

Holzbauwerke - Prüfverfahren - Bestimmung der mechanischen Eigenschaften von Holzwerkstoffen

Structures en bois - Méthodes d'essai - Détermination des propriétés mécaniques des panneaux a base de bois

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ICS:

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91.080.20	Lesene konstrukcije	Timber structures

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

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Timber structures - Test methods - Determination of mechanical properties of wood based panels

Structures en bois - Méthodes d'essai - Détermination des propriétés mécaniques des panneaux à base de bois

Holzbauwerke - Prüfverfahren - Bestimmung der mechanischen Eigenschaften von Holzwerkstoffen

This European Standard was approved by CEN on 1 April 2004.

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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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EUROPÄISCHES KOMITEE FÜR NORMUNG

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EN 789:2004 (E)

Foreword

This document (EN 789:2004) has been prepared by Technical Committee CEN/TC 124 "Timber Structures", the secretariat of which is held by SFS.

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of an identical text or by endorsement, at the latest by April 2005, and conflicting national standards shall be withdrawn at the latest by April 2005.

This document supersedes EN 789:1995.

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, 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

The following amendments have been made to EN 789:1995:

- Certain descriptions of test methods and expressions of the test results have been improved.
- Following further research, the panel and planar shear test methods have been revised and moved from the annexes to the main part of the document.
- A method for compression perpendicular to the plane of the panel has been added, as Annex D.

These changes are based on the results and experience of research carried out at a number of European laboratories.

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EN 789:2004 (E)**1 Scope**

This document specifies test methods for determining some mechanical properties of commercial wood-based panel products for use in load-bearing timber structures. These properties are intended for the calculation of characteristic values for use in obtaining material design values.

For each type and grade of load-bearing panel product, as defined in the Harmonised Standard for wood-based panels (EN 13986), it is necessary to determine characteristic values of mechanical properties to enable it to be used for structural purposes. This document details the testing required to establish characteristic values. The tests need only be carried out once for each product, unless there is a reason to suspect a significant change has occurred in the properties of the product.

NOTE For certain types and grades of panel, characteristic values are given in EN 12369 and these may be used for appropriate panels without further testing to this document.

This document is not intended to be used for quality control testing, for which smaller test pieces than specified herein, are adequate.

Due to the limited experience in use, the test method for compression perpendicular to the plane of the panel (bearing) is included in Annex D (informative).

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 322, *Wood-based panels - Determination of moisture content*

EN 323, *Wood-based panels - Determination of density*

EN 325, *Wood-based panels - Determination of dimensions of test pieces*

EN 14358, *Structural timber – Calculation of characteristic 5-percentile value*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1**specimen**

piece of the panel from which a test piece will be fabricated

3.2**test piece**

specimen of aggregate of parts from a sample fabricated to the size and shape required for testing

4 Symbols and abbreviations

A full cross-sectional area, equal to bt , in square millimetres;

b measured width of test piece, in millimetres;

E modulus of elasticity, in newtons per square millimetre;

F load, in newtons;

f strength, in newtons per square millimetre;

G	shear modulus of rigidity, in newtons per square millimetre;
I	second moment of area, equal to $bt^3/12$. In millimetres to the fourth power;
l	length of test piece, in millimetres;
l_1	gauge length, in millimetres;
l_2	distance between an inner load point and the nearest support, in millimetres;
M	moment, in newton millimetres;
t	measured thickness of test piece, in millimetres;
t_1	measured thickness of panel being tested, in millimetres;
u	deflection or deformation, in millimetres;
W	section modulus, equal to $bt^2/6$, in cubic millimetres.

Subscripts applied to loads, capacities, strengths, stiffness, and moduli of elasticity;

c	compression;
m	bending;
max.	maximum;
v	panel shear;
r	planar shear;
t	tension;
perp	perpendicular to the plane of the panel.

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5 Sampling

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5.1 Sampling of panels

All panels in a sample shall be of the same type, grade, thickness range and composition or lay-up. The method of sampling and the number of panels required is given in EN 14358.

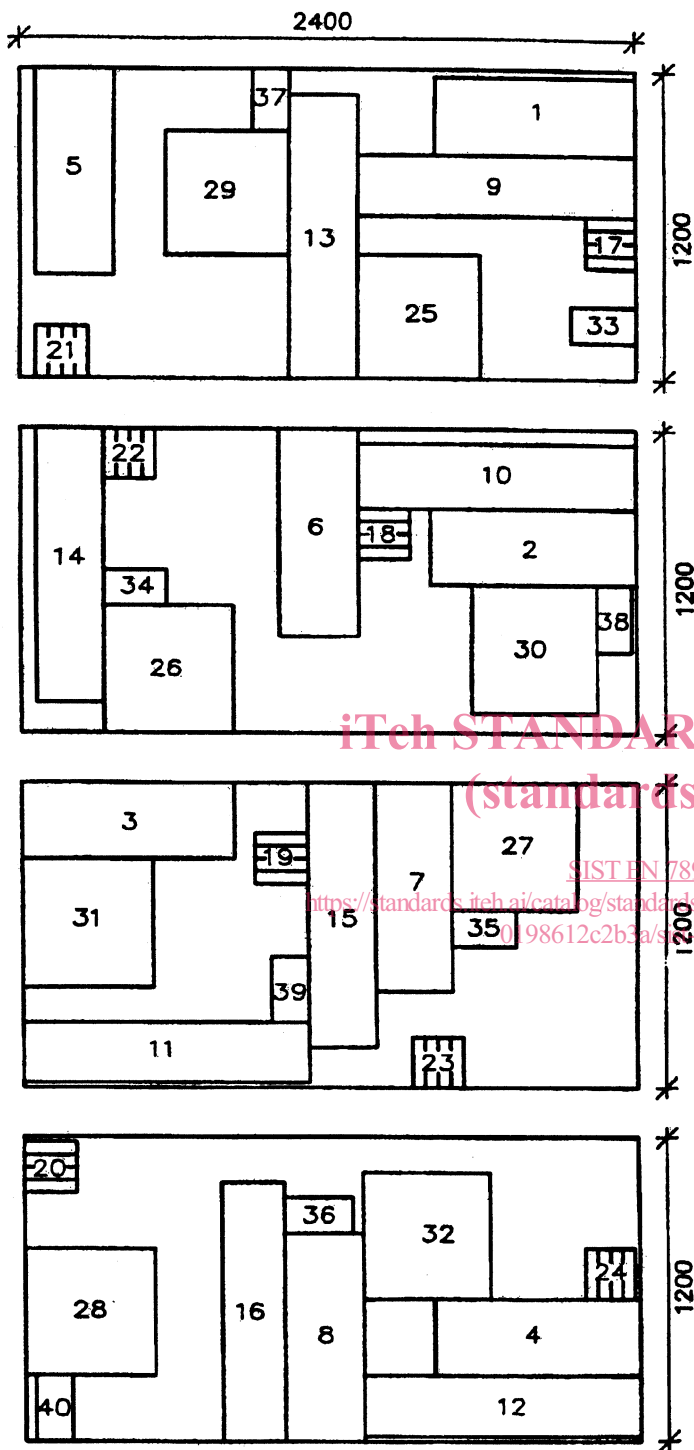
5.2 Sampling of specimens

The specimens for each type of test in each direction shall not be from the same position in different panels of the same sample and shall not number more than one from each panel. For in-plane compression test pieces, see Annex A (normative). The position of the specimens within the panels shall be selected to ensure an unbiased sample.

NOTE 1 An example of a cutting schedule based on a sample of four panels, each with a minimum area of 1 200 mm x 2 400 mm, is given in Figure 1.

NOTE 2 For quality control purposes, it may be necessary to establish correlations between the results from the test methods listed here and those used in the factory. If this is the case, consideration should be given to modifying the cutting plan to allow for the additional test pieces to be included on a "side-matched" basis.

Dimensions in millimetres



Test	Specimen number
Bending	
longitudinal	1 to 4
lateral	5 to 8
Tension	
longitudinal	9 to 12
lateral	13 to 16
Compression	
longitudinal	17 to 20
lateral	21 to 24
Panel shear	
longitudinal	25 to 28
lateral	29 to 32
Planar shear	
longitudinal	33 to 36
lateral	37 to 40

Figure 1 - Example of a cutting schedule

6 Preparation of test pieces

6.1 Conditioning

All test pieces shall be conditioned to constant mass in an atmosphere of relative humidity $(65 \pm 5) \%$ and temperature $(20 \pm 2) ^\circ\text{C}$.

The constant mass is considered to have been reached when the results of two successive weighing operations, carried out at an interval of 24 h do not differ by more than 0,1% of the mass of the test piece.

If the ambient conditions of testing are not the same as those in the conditioning chamber, tests shall be undertaken immediately after the test pieces have been removed from the conditioning chamber.

NOTE The test methods specified in this document may also be used in other testing climates.

6.2 Dimensions of test pieces

6.2.1 Methods of measurement

The dimensions shall be determined in accordance with EN 325

6.2.2 Measurements to be taken

The thickness of the test pieces shall be measured at four points, two on each edge 80 mm from mid-length, but 25 mm in the case of the in-plane compression test pieces, and the average thickness t recorded. The width of the test pieces shall be measured at two points, generally 80 mm from mid-length, but 25 mm in the case of the in-plane compression test pieces, and the average width b recorded.

NOTE If the thicknesses of individual plies or layers in plywood or composite panels are required, then each should be measured to the nearest 0,1 mm at the four edges of the test piece, and averaged.

6.3 Moisture content

6.3.1 Method of measurement

The moisture content shall be determined in accordance with EN 322.

6.3.2 Measurements to be taken

The moisture content shall be determined from at least one test piece per panel and measured at the time of testing.

6.4 Density

6.4.1 Method of measurement

The density shall be determined in accordance with EN 323.

6.4.2 Measurements to be taken

The density shall be determined from at least one test piece per panel and measured at the time of testing.

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7 Bending properties

7.1 Test piece

The test piece shall be rectangular in cross-section.

The depth of the test piece shall be equal to the thickness of the panel and the width shall be (300 ± 5) mm, but see also the NOTE in 7.3.

The length of the test piece will depend on the nominal thickness of the panel, see Figure 2.

7.2 Loading equipment

The loading equipment shall be capable of measuring the load to an accuracy of 1%.

NOTE Since the test piece may twist under load, the loading equipment should be appropriately chosen.

7.3 Loading method

The application of the loads shall be as shown in Figure 2 with the load and reaction forces applied by rollers of (30 ± 1) mm diameter. The distance between the load points and the supports, l_2 , shall be 16 times the nominal thickness, but not more than 400 mm and not less than 240 mm with an accuracy of ± 1 mm.

NOTE Large deflections may occur when test pieces with small bending stiffness are tested to failure, thus alternative test arrangements may be required. In general, the test configuration described in this section is suitable for a test piece with a thickness greater than 9 mm (corresponding to a bending stiffness per unit width of about $300 \text{ kN mm}^2/\text{mm}$). Smaller thicknesses may be tested by using smaller diameter rollers and proportionally reducing the distances between them.

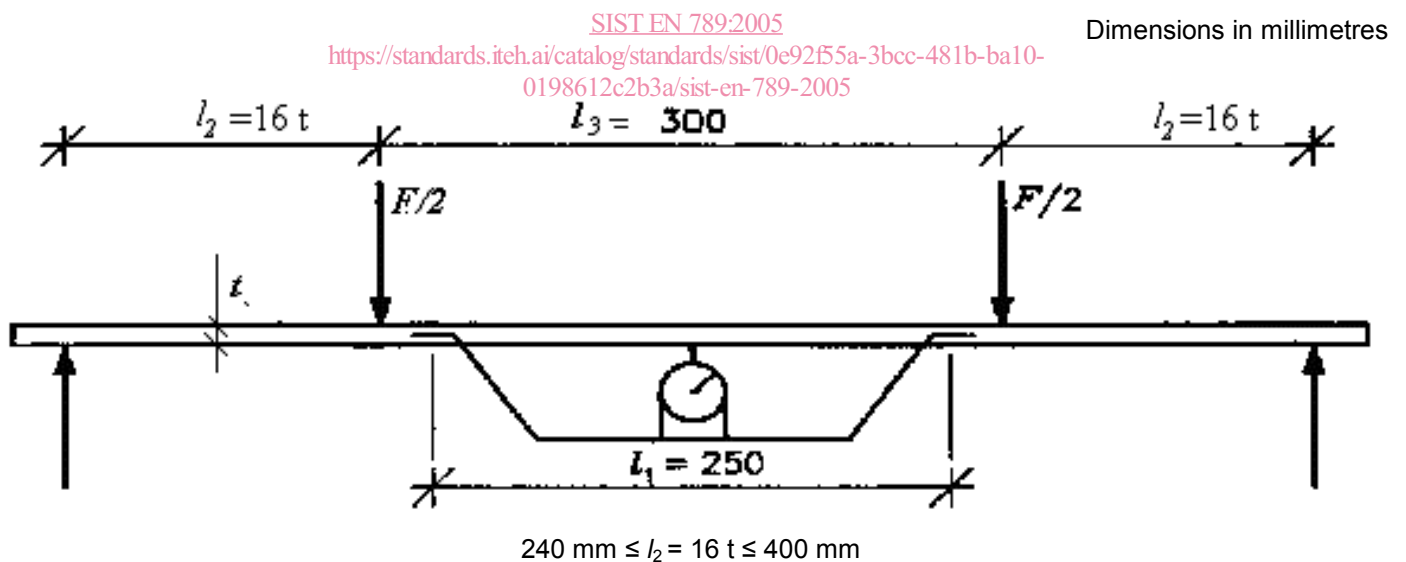


Figure 2 - Arrangement for bending test

7.4 Test procedure

7.4.1 Rate of application of load

Load F shall be applied at a continuous rate of loading adjusted so that the maximum load is reached within (300 ± 120) s, and with a mean value of about 300 s for a sample.