



**SLOVENSKI STANDARD**  
**SIST EN 205:1998**

**01-februar-1998**

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**Preskusne metode za lepila za les za nekonstrukcijsko uporabo - Ugotavljanje natezno strižne trdnosti stikov s preklopom**

Test methods for wood adhesives for non-structural applications - Determination of tensile shear strength of lap joints

Prüfverfahren für Holzklebstoffe für nichttragende Bauteile - Bestimmung der Klebfestigkeit von Längsklebung im Zugversuch

Méthodes d'essai des colles pour bois a usages non structuraux - Détermination du pouvoir adhésif des collages longitudinaux par l'essai de cisaillement

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**Ta slovenski standard je istoveten z: EN 205:1991**

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**ICS:**

83.180

Lepila

Adhesives

**SIST EN 205:1998**

**en**

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EUROPEAN STANDARD

REPUBLIKA SLOVENIJA  
 MINISTRSTVO ZA ZNANOST IN TEHNOLOGIJO  
 Urad RS za standardizacijo in meroslovje  
 LJUBLJANA

EN 205:1991

NORME EUROPEENNE

SIST..... EN 205 .....

EUROPAISCHE NORM

PREVZET PO METODI RAZGLASITVE

-02- 1998 May 1991

UDC: 665.93:674:691.11:692.241.3:692.8:684:620.179.4:620.172

Descriptors: Adhesive, wood, wood products, bonding, choice, dimensions, dimensional tolerances, test pieces, tests, tensile tests, shear tests, test atmospheres, determination, adhesive strength, results

English version

Test methods for wood adhesives for non-structural applications - Determination of tensile shear strength of lap joints.

Méthodes d'essai des colles pour bois à usages non structuraux - Détermination du pouvoir adhésif des collages longitudinaux par l'essai de cisaillement.

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CEN

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

Central Secretariat: rue de Stassart 36, B-1050 Brussels

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Ref. No. EN 205:1991 E

**Foreword**

This European Standard has been worked out by the Technical Committee CEN/TC 103 "Adhesives for wood and derived timber products".

In accordance with the Common CEN/CENELEC Rules, 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**

European Standards giving test methods and a common classification with respect to durability classes for wood adhesives will allow considerable improvement in consumer protection and provide greater legal security in any future product liability system with regard to properties guaranteed by the adhesive manufacturer.

Note: see also:

ISO 6237 : 1987 Adhesives - Wood-to-wood adhesive bonds - Determination of shear strength by tensile loading

ISO 6238 : 1987 Adhesives - Wood-to-wood adhesive bonds - Determination of shear strength by compression loading

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## Dimensions in mm

## 1 Scope

This European Standard describes tests for adhesives for wood and derived timber products for the assessment of their resistance to various physical effects. It does not apply to adhesives for structural use nor to the manufacture of particle boards, fibre boards, and plywood. It does not replace specific tests or tests on finished products.

The method described in this standard is suitable for the following and other applications

- assessing the usability and quality of adhesives for wood and derived timber products;
- classifying these adhesives into the durability classes D 1 to D 4 of EN 204;
- assessing effects on the bond strength resulting from the bonding conditions chosen, the various conditioning sequences and the treatment of the test pieces before and after bonding;
- assessing the bond strength of bonds with thin or thick bond line;

## 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 204 Evaluation of non-structural adhesives for joining of wood and derived timber products
- ISO 554 Standard atmospheres for conditioning and/or testing - Specifications

## 3 Joint components

## 3.1 Selection of wood

Prepare two unsteamed, planed, straight-grained beech boards <sup>1)</sup> (*fagus sylvatica* L) 130 mm wide (see figure 1) one 5 mm thick, the other (5 + a) mm where 'a' is the thickness of the bond line. For a thin bond line (a = 0,1 mm) use 2 boards of 5 mm thickness. The minimum density of the wood *fagus sylvatica* L. shall be (700 ± 100) kg/m<sup>3</sup> when measured on wood having a moisture content of 12 %.

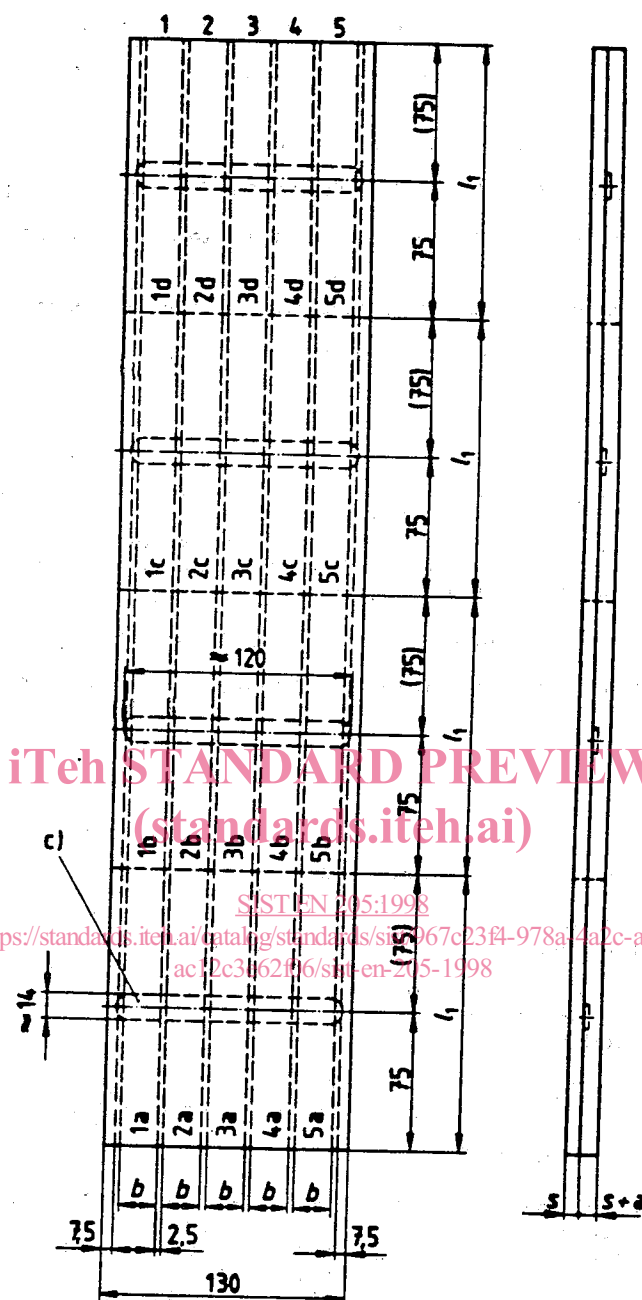
The wood shall be conditioned in accordance with ISO 554:  
(23 ± 2) °C/(50 ± 5) relative humidity or  
(20 ± 2) °C/(65 ± 5) relative humidity.

The length of the panels shall be a multiple of ≈ 300 mm, for example ≈ 600 mm, and the angle between the growth ring surfaces and the surfaces to be bonded shall be between 30° and 90°.

Limit deviations in thickness: ± 0,1 mm.

If the behaviour of an adhesive applied in a thick bond line is to be compared with its behaviour when applied in a thin bond line care shall be taken that the beech boards for both types of bond are cut from the same piece in the direction of the grain and one directly after the other. To achieve this, cut the boards in the following order: a 5 mm strip for testing the thin bond line, followed by a 5 mm strip for testing the thick bond line, followed by a 5 mm strip for testing the thin bond line, followed by a (5 + a) mm strip for testing the thick bond line.

<sup>1)</sup> When using other species of wood, special agreements are required. For a list of suitable species of wood, see annex B of ISO 6238.



Note: All dimensions are approximate.

- a = thickness of bond line
- b = width of test piece
- c) = grooves for thick bond line
- $l_1$  = length of test pieces
- s = thickness of test piece

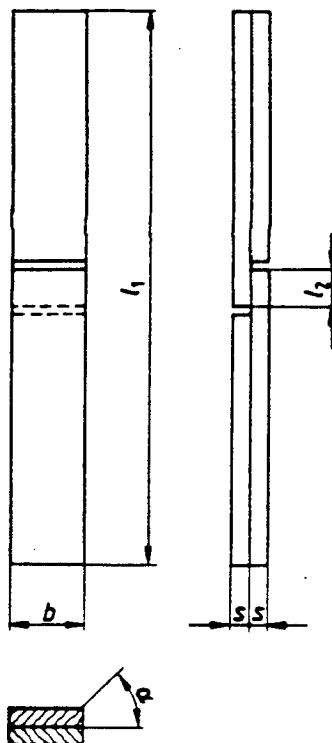
Figure 1. Partition and marking of the bonded assemblies (lap joints) in for example 5 x 4 individual test pieces (1a - 1d to 5a - 5d)

### 3.2 Bonding of the joint components

The bonding conditions specified by the adhesive manufacturer shall be used.

Prepare boards for use with a thin bond line, and, if the adhesive manufacturer specifies it, also for use with thick bond lines of 0,5 mm or 1,0 mm as required.

## 3.2.1 Thin bond lines



$\alpha$  = angle between growth ring surfaces and surfaces to be bonded =  $30^\circ$  up to  $90^\circ$

$b$  = width of test piece (width of test surface) =  $(20 \pm 0,1)$  mm

$l_1$  = total length of test piece =  $(150 \pm 1)$  mm

$l_2$  = length of overlap (length of test surface) =  $(10 \pm 0,1)$  mm

$s$  = thickness of jointing parts =  $(5 \pm 0,1)$  mm

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Figure 2. Lap joint test piece with thin bond line

Bond two 5 mm thick beech boards as shown in figure 2, with the grains running in the same direction. Distribute the pressure uniformly over the bonding surface so that 10 mm thick bonded assemblies are formed. Comply with the processing requirements specified by the adhesive manufacturer, including whether the adhesive is applied to one or both sides, the specific quantity to be applied the open and closed assembly time and the pressing conditions. The pressure applied shall be in accordance with the adhesive manufacturer's instructions and/or information contained in quality standards.

Immediately before bonding, prepare the wooden surfaces to be bonded by either planing (the preferred method) or with abrasive paper of grain size 150 complying with the FEPA standard <sup>2)</sup>. Do not touch or soil the prepared surface. Indicate on the test report if the surface has been treated in a different way.

## 3.2.2 Thick bond lines

Such tests are carried out in order to test the behaviour of adhesives in thick bond lines, which might be caused by poor fit or by surface irregularities arising from processing techniques.

As can be seen from figures 1 and 3, the  $(5 + a)$  mm thick board is provided with grooves of depth  $a = 0,5$  mm or  $a = 1$  mm and width about approximately 14 mm. Apply the adhesive to the grooved board and work it well into the grooves so that they are completely filled allowing for squeezeout. Bond  $(5 + a)$  mm thick grooved boards to 5 mm thick ungrooved boards to obtain  $(10 + a)$  mm thick bonded assemblies for the preparation of the test pieces.

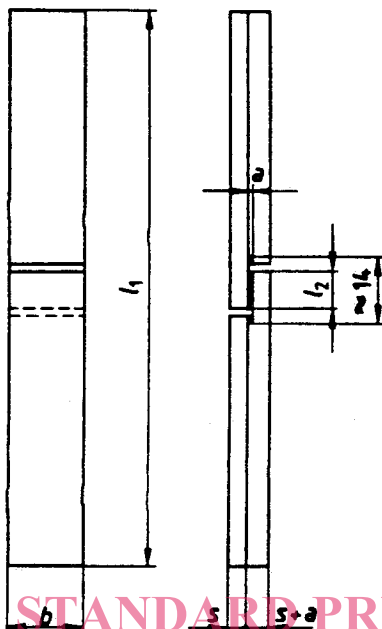
<sup>2)</sup> Fédération européenne des fabricants de produits abrasifs; the FEPA-Standard 43-1984 is available from:

- British Abrasive Federation, Fair Green House, Sawbridgeworth, Herts DM 21 9AJ

- Fachverband Elektrokorund- und Siliziumkarbid-Hersteller e. V. (FES), Karistraße 21, D-6000 Frankfurt 1

#### 4 Test pieces

Take five pieces with a width of  $b = 20$  mm from the bonded assemblies according to the location of the cuts as indicated in figure 1 after removing the long edges and identify for example by serial numbers from 1 to 5. After identification (see figure 1) divide into test pieces with a length of  $l_1 = 150$  mm. Make saw cuts in the test assemblies symmetrically about the centre of the lap as shown in figure 3. This defines a test surface  $l_2 = 10$  mm length. Care take that the cuts completely cut through the bonding surface of the samples. As thin adhesive joints are only a few hundredths of a millimetre thick, take care that the cuts only penetrate as little as possible into the other part of the joint.



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Figure 3. Lap joint test piece with thick bond line  
(angle between growth ring surfaces and surfaces to be bonded =  $30^\circ$  to  $90^\circ$ )

#### 5 Conditioning and number of test pieces

After bonding the test pieces, condition them. The nature and duration of this conditioning depend on the requirements to be met by the adhesive.

The sequences of conditioning are given in table 2 of EN 204.

At least 20 test pieces are required for any conditioning or conditioning sequence for each strength test. Test the test pieces immediately after the ending of the last conditioning to avoid further changes in the moisture content.

#### 6 Tensile shear test

At least 1 week shall pass between bonding and testing of the test pieces. This period shall be prolonged if specified by the manufacturer.

Test the test pieces shown in figures 2 and 3 in a tensile testing machine.

Clamp the ends of the test pieces in the jaws of the tensile testing machine up to a length of 40 mm to 50 mm. Ensure that the force is applied centrally and in the plane of the bond. Load the test piece until breakage. Determine the maximum force  $F_{max}$  occurring during this procedure.

For comparative tests of adhesives and for assigning an adhesive to the durability classes according to EN 204 conduct the test at a rate of traverse of approximately 50 mm/min.



## 7 Expression of results

The following is applicable to tests according to clause 6:

The strength  $T$  in  $N/mm^2$  is calculated according to the following formula:

$$T = \frac{F_{max}}{A} = \frac{F_{max}}{l \cdot b}$$

Explanations:

$F_{max}$  = maximum force in N  
 $A$  = bonded test surface in  $mm^2$   
 $l$  = length of the bonded test surface in mm  
 $b$  = width of the bonded test surface in mm

## 8 Test report

The following items shall be reported:

Data about the adhesive

- type and origin of the adhesive
- batch number of the adhesive used
- number of components and working methods (procedure of precoating and mixing)
- length of overlap  $l_2$
- durability class (for information only)

Preparation of the test pieces and testing

- species of wood with botanic name
- moisture content of wood, relative to oven-dry mass
- characteristic data relating to the bonding procedure (for instance information about pressing power, pressing temperature, pressing time)
- time between the termination of pressing and the cutting out of the test pieces
- special treatment of the surface of the boards to be bonded
- indication whether test pieces with a thin (0,1 mm) adhesive line or with a thick (0,5 mm or 1 mm) bond line have been used respectively
- number of test pieces
- conditioning sequences applied (serial number as given in EN 204, table 2)
- testing speed

Test results and data about the durability class

- strength  $T$  in  $N/mm^2$ , rounded to 0,1  $N/mm^2$ , i.e. minimum value, maximum value and mean value
- standard variation  $s$  in  $N/mm^2$
- coefficient of variation  $V$  in %
- appearance of the surfaces of the break
- indication of the estimated portion of wood failure or wood breakage (the indications are to be graded as follows: 0, 25, 50, 75, 100 % breakage of wood) in % (mean value of all test pieces)
- description of further peculiarities of the appearance of the break
- if necessary, deviations from this standard
- indication of durability class according to EN 204, if required
- date of the test