
Lepila (razen fenolnih ali aminskih) za nosilne lesene konstrukcije - Preskusne metode - 5. del: Ugotavljanje potrebnega časa stiskanja

Adhesives for load bearing timber structures other than phenolic and aminoplastic - Test methods - Part 5: Determination of conventional pressing time

Klebstoffe für tragende Holzbauteile ausgenommen Phenolharzklebstoffe und Aminoplaste - Prüfverfahren - Teil 5: Bestimmung der Mindestpresszeit

Adhésifs pour structures portantes en bois de type autre que phénolique et aminoplaste - Méthodes d'essai - Partie 5 : Détermination de la durée conventionnelle sous pression

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Ta slovenski standard je istoveten z: EN 15416-5:2006

ICS:

83.180	Lepila	Adhesives
91.080.20	Lesene konstrukcije	Timber structures

SIST EN 15416-5:2006**en**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 15416-5

August 2006

ICS 83.180

English Version

**Adhesives for load bearing timber structures other than phenolic
and aminoplastic - Test methods - Part 5: Determination of
conventional pressing time**

Adhésifs pour structures portantes en bois de type autre
que phénolique et aminoplaste - Méthodes d'essai - Partie
5 : Détermination de la durée conventionnelle sous pression

Klebstoffe für tragende Holzbauteile ausgenommen
Phenolharzklebstoffe und Aminoplaste - Prüfverfahren -
Teil 5: Bestimmung der Mindestpresszeit

This European Standard was approved by CEN on 18 May 2006.

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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Foreword

This document (EN 15416-5:2006) has been prepared by Technical Committee CEN/TC 193 "Adhesives", the secretariat of which is held by AENOR.

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 February 2007, and conflicting national standards shall be withdrawn at the latest by February 2007.

This document is one of a series dealing with test methods for adhesives for use in load bearing timber structures. The document is published in support of Eurocode 5, Common unified rules for timber structures. The series consists of seven test methods to assess the performance of adhesives after specified heat and humidity treatments:

EN 302-1, Adhesives for load-bearing timber structures – Test methods – Part 1: Determination of bond strength in longitudinal tensile shear strength;

EN 302-2, Adhesives for load-bearing timber structures - Test methods - Part 2: Determination of resistance to delamination;

EN 302-3, Adhesives for load-bearing timber structures - Test methods - Part 3: Determination of the effect of acid damage to wood fibres by temperature and humidity cycling on the transverse tensile strength;

EN 302-4, Adhesives for load-bearing timber structures - Test methods - Part 4: Determination of the effects of wood shrinkage on the shear strength;

prEN 15416-1, Adhesives for load bearing timber structures other than phenolic and aminoplastic - Test methods - Part 1: Static load test of single bondline specimens in compression shear;

prEN 15416-2, Adhesives for load bearing timber structures other than phenolic and aminoplastic - Test methods - Part 2: Static load test of multiple bondline specimens in compression shear;

prEN 15416-3, Adhesives for load bearing timber structures other than phenolic and aminoplastic - Test methods - Part 3: Creep deformation test at cyclic climate conditions with specimens loaded in bending shear;

and two test methods to characterize the working properties of the adhesive:

EN 15416-4, Adhesives for load bearing timber structures other than phenolic and aminoplastic - Test methods- Part 4: Determination of open assembly time for one component polyurethane adhesives;

EN 15416-5, Adhesives for load bearing timber structures other than phenolic and aminoplastic - Test methods - Part 5: Determination of conventional pressing time.

Requirements for the adhesives are stated in other standards, for instance requirements for one component polyurethane adhesives for load bearing timber structures are given in prEN 15425.

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

EN 15416-5:2006 (E)**SAFETY STATEMENT**

Persons using this document should be familiar with the normal laboratory practice, in principle. This document does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any regulatory conditions.

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1 Scope

This document specifies a method of determining the conventional pressing time at three temperatures and three wood moisture contents.

This document is intended to determine the conventional pressing time for one component polyurethane adhesives using a defined procedure for obtaining a reliable base for comparison of conventional pressing time between adhesives. The method gives a result that cannot be applied to the safe manufacture of timber structures without taking into account the influence of factors such as timber density/moisture content, factory temperature and relative air humidity.

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 302-1:2004, *Adhesives for load bearing timber structures - Test methods - Part 1: Determination of bond strength in longitudinal tensile shear strength*

EN 923:2005, *Adhesives – Terms and definitions*

ISO 5893, *Rubber and plastics test equipment – Tensile, flexural and compression types (constant rate of traverse) – Specification*

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3 Terms and definitions

SIST EN 15416-5:2006

For the purposes of this document, the definitions given in EN 923:2005 and the following apply.

3.1

conventional pressing time

shortest pressing time (expressed as the mean of 10 individual results) that gives tensile shear strength of at least 4 N/mm² at a given temperature and wood moisture content with the test procedure being that described in this standard.

4 Principle

Standard beech lap joints are tested in tensile shear after various curing times until it is found that a shear strength of at least 4 N/mm² is achieved at a given temperature and wood moisture content.

5 Apparatus

5.1 Climate cabinets

Climatic cabinet capable of maintaining a temperature of (20 ± 2) °C and a relative humidity of (50 ± 5) %, (65 ± 5) % or (75 ± 5) % to enable conditioning of the beech panels to a wood moisture content of 9 %, 12 % or 15 % respectively.

Temperature cabinets capable of maintaining air temperature of (15 ± 2) °C, (20 ± 2) °C and (30 ± 2) °C respectively.

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NOTE It is important to test at these temperatures although EN 386 specifies a higher temperature during the curing of structural adhesives.

5.2 Testing machine

The testing machine shall be either:

- a) constant rate of loading machine capable of maintaining a rate of loading of $(2,0 \pm 0,5)$ kN/min; or,
- b) constant rate of traverse machine as described in ISO 5893.

The jaws of the testing machine shall grip the test pieces with a wedge action, ensure self-aligning of the test piece and prevent from slippage during loading.

6 Procedure

Sufficient beech panels shall be prepared in accordance with EN 302-1:2004, clause 6.1 to enable 15 sets each of at least 10 test specimens with $(0,3 \pm 0,1)$ mm glue lines to be manufactured.

After conditioning three sets to (12 ± 1) %, one set to (9 ± 1) % and one set to (15 ± 1) % wood moisture content in the climate cabinet, the panels with (12 ± 1) % shall be divided into 3 equal groups one for each of the 3 test temperature given in Table 1 and all the five groups shall be wrapped airtight to prevent further change in their moisture content. Each group of the panels shall be transferred to an atmosphere at one of the test temperatures described in Table 1. The adhesive to be used shall also be stored under these three temperatures respectively.

Table 1 — Examples of pressing time and nominal climatic conditions

Wood moisture content (%)	Temperature (°C)	SIST EN 15416-5:2006 Pressing time (h)		
		1	2	4
9	20	1	2	4
12	15	1	2	4
12	20	1	2	4
12	30	1	2	3
15	20	1	2	3

After at least 12 h conditioning at the test temperature, the panels shall be glued and pressed. The test pieces shall not be removed from the test temperature during the pressing periods. Unless otherwise stated by the manufacturer, the clamping pressure shall be $0,8$ N/mm². Table 1 gives the pressing time for each pair of panels.

Immediately after the pressing time has elapsed, the panels shall be unclamped and 10 test specimens cut from each of the bonded panels according to EN 302-1:2004, clause 6.2. They shall be tested according to EN 302-1:2004, clause 6.5 without delay. Test values obviously influenced by factors like lack of adhesive or local defects in the wood shall be discarded.

The conventional pressing time shall be calculated by linear interpolation of those pressing times and their related tensile shear strength that are most near to the time corresponding to a tensile shear strength of 4 N/mm². The tensile shear strength at the shortest pressing time for each temperature and moisture content shall be less than 4 N/mm². If recommended by the adhesive manufacturer, shorter or longer pressing times

than those given in Table 1 can be used. The calculated conventional pressing time shall be expressed to the nearest 15 min rounded off to the next higher value.

EXAMPLE A pressing time of 2 h gives a mean tensile strength of 2 N/mm², while the mean tensile shear strength for 4 h pressing time is 5 N/mm². The result of the linear interpolation for 4 N/mm² is 3 h 20 min. This calculated value would be rounded off to 3 h 30 min.

7 Expression of results

Calculate the shear strength of every test piece according to the following formula:

$$s = \frac{F}{a}$$

Where

s is the shear strength in Newton per square millimetre (N/mm²)

F is the load at failure in Newton (N)

a is the area of the tested surface (200 mm²)

Express the result of the test as the mean of the shear strength [N/mm²] of the valid tests and the coefficient of variation of each test series. Express the wood failure as a mean of the valid test results.

8 Test report

The following information about preparation of test pieces and testing procedure shall be included in the test report:

- a) statement that the tests were carried out in accordance with this standard.
- b) date on which the tests were carried out and the date of the report.
- c) chemical nature and origin of the sample of adhesive tested.
- d) manufacturer's name and batch number or other means of uniquely identifying the sample.
- e) details of the preparation and method of application of the adhesive including date of gluing.
- f) density of the wood in kg/m³ at 12 % moisture content.
- g) temperature, pressure and duration of pressure used to produce the test joints.
- h) average glue line thickness measured on 2 samples from each test set.
- i) minimum, maximum, mean, standard deviation and coefficient of variation of the measurements taken in each series of tests.
- j) individual results from each test piece. Failing stresses should be expressed to the nearest 0,1 N/mm². Where appropriate the percentage of the fracture surface covered with wood fibre should be estimated to the nearest 10 %.