
Lepila (razen fenolnih ali aminskih) za nosilne lesene konstrukcije Preskusne metode - 4. del: Ugotavljanje odprtega časa enokomponentnih poliuretanskih lepil

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

Klebstoffe für tragende Holzbauteile ausgenommen Phenolharzklebstoffe und Aminoplaste - Prüfverfahren - Teil 4: Bestimmung der offenen Wartezeit für Einkomponenten-Klebstoffe auf Polyurethanbasis

Adhésifs pour structures portantes en bois de type autre que phénolique et aminoplaste - Méthodes d'essai - Partie 4 : Détermination du temps d'assemblage ouvert pour les adhésifs à base de polyuréthane monocomposants

Ta slovenski standard je istoveten z: EN 15416-4:2006

ICS:

83.180	Lepila	Adhesives
91.080.20	Lesene konstrukcije	Timber structures

SIST EN 15416-4:2006**en**

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 15416-4:2006

<https://standards.iteh.ai/catalog/standards/sist/08a96801-9528-46c8-9994-977438d6b9b9/sist-en-15416-4-2006>

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 15416-4

August 2006

ICS 83.180

English Version

**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**

Adhésifs pour structures portantes en bois de type autre
que phénolique et aminoplaste - Méthodes d'essai - Partie
4 : Détermination du temps d'assemblage ouvert pour les
adhésifs à base de polyuréthane monocomposants

Klebstoffe für tragende Holzbauteile ausgenommen
Phenolharzklebstoffe und Aminoplaste - Prüfverfahren -
Teil 4: Bestimmung der offenen Wartezeit für
Einkomponenten-Klebstoffe auf Polyurethanbasis

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.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

Contents		Page
Foreword.....		3
1	Scope	5
2	Normative references	5
3	Terms and definitions	5
4	Principle.....	5
5	Apparatus	5
6	Procedure	6
7	Expression of results	7
8	Test report	7
Bibliography.....		9

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 15416-4:2006

<https://standards.iteh.ai/catalog/standards/sist/08a96801-9528-46c8-9994-977438d6b9b9/sist-en-15416-4-2006>

Foreword

This document (EN 15416-4:2006) 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 standard 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 documents, 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 15416-4:2006 (E)

SAFETY STATEMENT

Persons using this document should be familiar with the normal laboratory practice, if applicable. 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.

**iTeh STANDARD PREVIEW
(standards.iteh.ai)**

SIST EN 15416-4:2006

<https://standards.iteh.ai/catalog/standards/sist/08a96801-9528-46c8-9994-977438d6b9b9/sist-en-15416-4-2006>

1 Scope

This document specifies a method of determining the open assembly time in a standard climate.

This document is intended to determine the open assembly time for one component polyurethane adhesives using a defined procedure for obtaining a reliable base for comparison of open assembly 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 301:2006, *Adhesives, phenolic and aminoplastic, for load-bearing timber structures - Classification and performance requirements*

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*

3 Terms and definitions

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

3.1

open assembly time

longest open assembly time (expressed as the mean of 10 individual results) that gives a tensile shear strength of at least 10 N/mm² in a standard climate (20 °C and 65 % RH) with normal coefficient of variation and normal failure mode compared to the results obtained under optimal conditions.

4 Principle

Standard beech lap joints are tested in tensile shear after various open assembly times until it is found that the shear strength value is below 10 N/mm², the coefficient of variation increases considerably or the failure mode changes considerably.

5 Apparatus

The testing machine shall be either:

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

EN 15416-4:2006 (E)

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**6.1 General**

Sufficient beech panels shall be prepared in accordance with EN 302-1:2004, clause 6.1 to enable 6 sets each of at least 10 test specimens with thin glue lines (0,1 mm) to be manufactured.

6.2 Preparation of bonded assemblies

After conditioning to (12 ± 1) % moisture content in the standard climate the panels shall be divided into 6 equal groups of samples, one for each of the 6 test series given in Table 1.

Table 1 — Time intervals for open assembly times at 20 °C and 65 % RH

Test series (nr)	1	2	3	4	5	6
Assembly time (min)	5	15	30	40	50	60

In case the result of the test with open assembly times as given in Table 1 exceeds 60 min or the maximum open assembly time is shorter than 30 min, the open assembly time given in Table 1 shall be adjusted adequately. The adjustment shall be such that at least a total of 6 test series covering the time range between minimum assembly time (test series 1) and expected maximum assembly time (test series 6) is tested.

Not more than 24 h before bonding either lightly plane or lightly sand each surface to be bonded (using an abrasive paper of grain size P100 complying with FEPA-43). Remove any dust carefully. Do not touch or soil the prepared surfaces.

An adhesive spread of 200 g/mm² on one side only shall be used unless another amount is requested by the manufacturer. Comply with the adhesive manufacturer's instructions regarding the processing conditions, including the preparation and application of the adhesive and report them in the test report. After adhesive application, the board is open assembled in standard atmosphere (20 °C and 65 % RH) from 5 min to 60 min (Table 1) before bonded together. Before pressure application, the board shall be laid together as shown in EN 302-1:2004, Figure 1, ensuring that the matching board is used to produce the bonded assembly joint.

6.3 Preparation of samples for testing

After bonding and pressing and before testing, conditioning the assembly for 7 days in the standard atmosphere (20 °C and 65 % RH). The test pieces shall be cut 3 days or more after bonding.

NOTE A longer conditioning time may be used if recommended by the adhesive manufacturer.

Cut five strips of width $b = 20$ mm from each bonded assembly along the grain, avoiding areas within 7,5 mm of the outside long edges of the panel (EN 302-1:2004, Figure 1). Cut these strips into test pieces with length $l_1 = (150 \pm 5)$ mm (EN 302-1:2004, Figure 2).

Make flat bottomed cuts of $\geq 2,5$ mm width in the bonded section across the grain so that an overlap of width $l_2 = (10,0 \pm 0,1)$ mm is defined in the middle section. The cuts are to separate the wood layers and the adhesive layer, but they shall not go beyond the adhesive layer.

Before the test two pieces of each test series are used to measure the glue line thickness.

6.4 Test procedure

Test ten test pieces for each of the open assembly times given in Table 1. Results from tests in which failure occurred in the wood at values below 10 N/mm² (EN 301:2006, Table 2, A1), rather than at the bond, or in which visual examination shows that the adhesive was not correctly applied, are invalid. All results, valid or invalid, shall be reported.

Insert the test piece symmetrically in the jaws of the testing machine so that the distance between the jaws is within the range of 50 mm to 90 mm. Grip tightly so that the specimen is aligned with its long axis parallel to the direction of the load. Apply a tensile force until the test piece fails.

The tests shall be carried out at either:

a) rate of load increase of $(2,0 \pm 0,5)$ kN/min; or

b) constant rate of jaw separation not exceeding 5 mm/min such that the time required to reach failure is between 30 s - 90 s.

Record the load at failure in Newtons. For every tested test piece, by visual inspection estimate and record the percentage wood failure to the nearest 10 % and the failure mode.

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 ten valid tests and the coefficient of variation of each test series. Express the wood failure as a mean of the ten valid test results.

8 Test report

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

- statement that the tests were carried out in accordance with this standard.
- date on which the tests were carried out and the date of the report.
- chemical nature and origin of the sample of adhesive tested.
- manufacturer's name and batch number or other means of uniquely identifying the sample.
- details of the preparation and method of application of the adhesive including date of gluing.