
Lepila - Ugotavljanje odprtega časa plastomernih lepil za les za nekonstrukcijsko uporabo

Adhesives - Determination of the open assembly time for thermoplastic wood adhesives for non-structural applications

Klebstoffe - Bestimmung der offenen Wartezeit bei thermoplastischen Holzklebstoffen für nicht tragende Anwendungen

Adhésifs - Détermination du temps d'assemblage ouvert des adhésifs thermoplastiques pour bois pour applications non structurales

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ICS:

83.180

Lepila

Adhesives

SIST EN 16556:2015**en,fr,de**

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 16556

November 2014

ICS 83.180

English Version

**Determination of the maximum open time for thermoplastic wood
adhesives for non-structural applications**

Détermination du temps ouvert maximal des adhésifs
thermoplastiques pour bois pour applications non
structurales

Bestimmung der maximalen offenen Wartezeit bei
thermoplastischen Holzklebstoffen für nicht tragende
Anwendungen

This European Standard was approved by CEN on 20 September 2014.

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 CEN-CENELEC Management Centre 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 CEN-CENELEC Management Centre 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 document (EN 16556:2014) 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of an identical text or by endorsement, at the latest by May 2015 and conflicting national standards shall be withdrawn at the latest by May 2015.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

Safety statement

Persons using this document should be familiar with the normal laboratory practice, if applicable. This document cannot 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.

Environmental statement

It is understood that some of the material permitted in this standard can have negative environmental impact. As technological advantages lead to better alternatives for these materials, they will be eliminated from this standard to the extent possible.

At the end of the test, it is recommended that the user of the standard take care to carry out an appropriate disposal of the wastes, according to local regulation.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

EN 16556:2014 (E)

1 Scope

This European Standard defines the test method for the determination of the maximum open time for thermoplastic wood adhesives for non-structural applications by tensile shear strength. It is carried out on standardized test pieces glued with increasing open times.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 923, *Adhesives - Terms and definitions*

EN 1067, *Adhesives - Examination and preparation of samples for testing*

EN ISO 15605, *Adhesives - Sampling (ISO 15605)*

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

3 Terms and definitions

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

3.1
maximum open time the longest time within which two wooden adherends, where the adhesive is applied, can remain decoupled ensuring a tensile force value $\geq 10 \text{ N/mm}^2$ and a wood failure $> 0 \%$

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Note 1 to entry: The open time is expressed in minutes (min).

4 Symbols and abbreviations

A	bonded test surface, in square millimetres (mm^2);
a	thickness of bond-line, in millimetres (mm);
α	angle between growth ring and surfaces to be bonded, in grades ($^\circ$);
b	width of test piece, in millimetres (mm);
F_{max}	the applied load at failure, in Newton (N);
l_1	length of test piece, in millimetres (mm);
l_2	length of overlap (length of tested surface), in millimetres (mm);
s	thickness of the panels, in millimetres (mm);
τ	shear strength, in Newton (N).

5 Sampling

Samples of the adhesive shall be taken according to EN ISO 15605 and prepared for testing according to EN 1067.

6 Principle

A symmetrical bonded single lap joint between two wooden adherends glued with increasing open times, is strained to rupture by a tensile force parallel to the grain.

7 Apparatus

- a) Conditioning room capable of ensuring to the test pieces the temperature at $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity or $(20 \pm 2) ^\circ\text{C}$ and $(65 \pm 5) \%$.
- b) Notched trowel suitable to apply on the surface of the boards the required adhesive amount.
- c) The testing machine shall be a constant-rate-of-traverse machine as described in ISO 5893. The machine shall be capable to apply a rate of 50 mm/min. The machine shall apply a force of at least $5 \text{ kN} \pm 2\%$.
- d) The jaws shall grip the test pieces with a wedge action and permit self alignment whilst the test pieces are being pulled.
- e) Apparatus suitable to obtain individual test pieces from the boards coupled as reported in 8.2, for example a circular saw fitted with blade having a thickness of cut of about 2,5 mm.
- f) Press suitable to glue two boards (8.1) as indicated in 8.2 with the required pressure.

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8 Procedure

8.1 General

Cut two panels (see Figure 1) from a thick unsteamed, conditioned, straight-grained board of beech (*Fagus sylvatica* L.) with a density of $(700 \pm 50) \text{ kg/m}^3$ when the moisture content is $(12 \pm 1) \%$.

Ensure that the angle between the growth rings and the surface to be bonded is between 30° and 90° .

Condition the boards for at least 7 days in 7 a) conditions. The adhesive shall be conditioned for at least 24 h.

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 ISO 6344-2 is recommended). Remove any dust carefully. Do not touch or soil the prepared surfaces.

8.2 Preparation of test pieces

All the adhesive application procedures shall be carried out in the standard atmosphere (see 7a)). Assembly instructions:

- The adhesive application shall be on one adherend only.
- The adhesive spread shall be $(150 \pm 10) \text{ g/m}^2$. The distribution of the adhesive shall be uniformly done over the whole surface of the board.
- Immediately after the adhesive application has been completed, the measurement of the open time shall start.
- The closed assembly time shall be $(180 \pm 30) \text{ s}$.
- The pressing pressure shall be $(0,8 \pm 0,1) \text{ N/mm}^2$.

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— The pressing time shall be a minimum of 2 h.

Assemble the boards at increasing open times (see note) or according to the manufacturer's instructions (range of the maximum open time to be tested and the interval).

NOTE e.g. 0-3-6-9-12 min.

The glued boards shall be conditioned for 7 days in standard atmosphere (see 7a)).

Cut five strips of width $b = (20 \pm 0,2)$ mm from each bonded assembly along the grain, avoiding areas within 7,5 mm of the outside long edges of the panel as shown in Figure 1. Cut these strips into test pieces of length $l_1 = (150 \pm 5)$ mm as shown in Figure 2.

Make flat bottomed cuts of $(2,5 \pm 0,5)$ mm wide in the bonded sections across the grain so that an overlap of length $l_2 = (10,0 \pm 0,2)$ mm is defined in the middle section (see Figure 2). The cuts are to separate the wood layers. Take care that the cuts completely cut through the bond line but only penetrate as little as possible into the other part of the joint.

For a screening test only (e.g. to determine a rough value of the open time), single lap joint specimens (e.g: see EN 205:2003, Annex A), may be used.

8.3 Number of test pieces

Test a sufficient number of test pieces to provide 10 valid results for each of the open times selected.

Results from tests in which failure occurred in the wood (100 % of wood failure) at values $\leq 10 \text{ N/mm}^2$ shall be invalid.

8.4 Tensile shear test

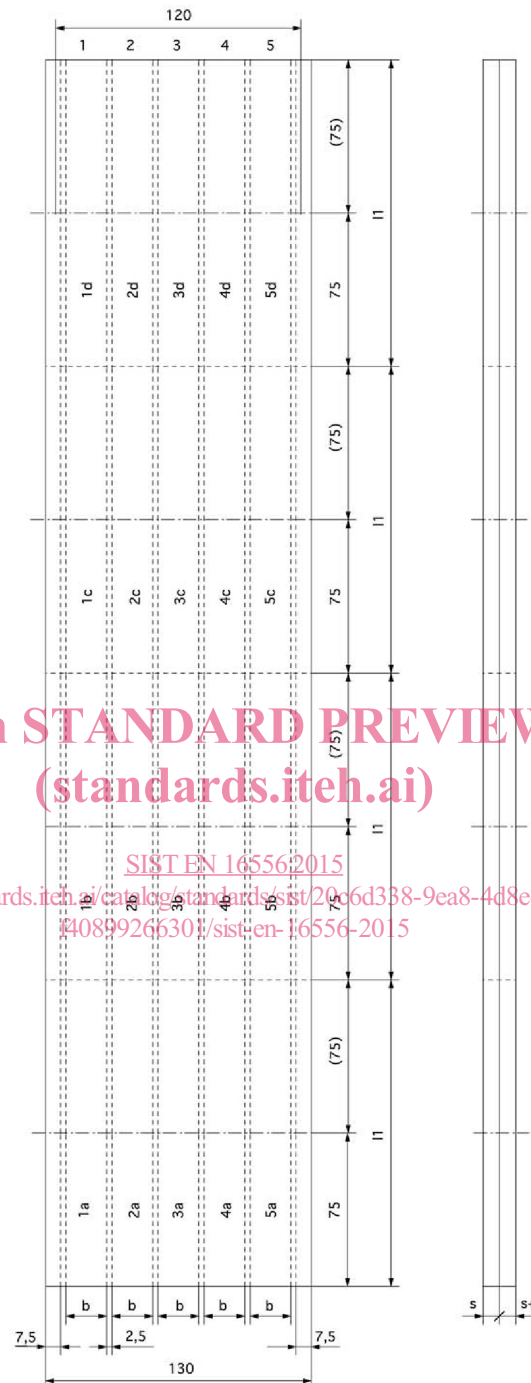
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Test the test pieces shown in Figure 2 in the tensile testing machine (see 7 c)).

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 rupture. Record the applied maximum force F_{\max} in Newton (N).

Dimensions in mm

**Key**

- | | | | |
|-------|-----|---------------------|-------------------------|
| a | $=$ | $(1,0 \pm 0,1)$ mm | thickness of bond-line |
| b | $=$ | $(20,0 \pm 0,2)$ mm | width of test piece |
| l_1 | $=$ | (150 ± 5) mm | length of test piece |
| s | $=$ | $(5,0 \pm 0,1)$ mm | thickness of the panels |

Figure 1 — Example of a bonded panel marked for division into individual test pieces using 2,5 mm saw cuts.