
Lepila za nosilne lesene konstrukcije - Preskusne metode - 5. del: Določanje najdaljšega časa za montažo (sestavo) pri referenčnih pogojih

Adhesives for load-bearing structures - Test methods - Part 5: Determination of maximum assembly time under referenced conditions

Klebstoffe für tragende Holzbauteile - Prüfverfahren - Teil 5: Bestimmung der maximalen Antrockenzeit bei Referenzbedingungen

Adhésifs pour structures portantes en bois - Méthodes d'essai - Partie 5: Détermination du temps d'assemblage maximal dans des conditions de référence

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**Adhesives for load-bearing structures - Test methods - Part 5:
Determination of maximum assembly time under referenced
conditions**

Adhésifs pour structures portantes en bois - Méthodes
d'essai - Partie 5: Détermination du temps d'assemblage
maximal dans des conditions de référence

Klebstoffe für tragende Holzbauteile - Prüfverfahren - Teil 5:
Bestimmung der maximalen Antrockenzeit bei
Referenzbedingungen

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 193.

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

Management Centre: Avenue Marnix 17, B-1000 Brussels

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Foreword

This document (prEN 302-5:2011) has been prepared by Technical Committee CEN/TC 193 “Adhesives for wood and derived timber products”, the secretariat of which is held by AENOR.

This document is currently submitted to the CEN Enquiry.

This document will supersede ENV 302-5:2001.

This document is one of a series dealing with adhesives for use with timber structures, and is published in support to EN 1995 *Eurocode 5: Design of timber structures*. The series consists of a classification and performance requirements for phenolic and aminoplastic polycondensation adhesives for use in different climatic conditions (EN 301), five test methods (EN 302 Parts 1 to 4 and EN 15416-2) used to assess the performance of adhesives after specified heat and humidity treatments, and three test methods (EN 302 Parts 5 to 7) to characterize the working properties of the adhesive.

EN 301, EN 302 Parts 1 to 7 and EN 15416-2 have the following titles.

EN 301, *Adhesives, phenolic and aminoplastic, for load-bearing timber structures — Classification and performance requirements*

EN 302, *Adhesives for load-bearing timber structures — Test methods*

— *Part 1: Determination of longitudinal tensile shear strength*

— *Part 2: Determination of resistance to delamination*

— *Part 3: Determination of the effect of acid damage to wood fibres by temperature and humidity cycling on the transverse tensile strength*

— *Part 4: Determination of the effects of wood shrinkage on the shear strength*

— *Part 5: Determination of the maximum assembly time under referenced conditions*

— *Part 6: Determination of the minimum pressing time under referenced conditions*

— *Part 7: Determination of the working life under referenced conditions*

EN 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.*

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 may 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.

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

iTeh STANDARD PREVIEW
(standards.iteh.ai)

SIST EN 302-5:2013

<https://standards.iteh.ai/catalog/standards/sist/b5f0cc9a-88a9-4358-9af0-2be0602bbff5/sist-en-302-5-2013>

1 Scope

This part of EN 302 specifies a laboratory method of determining the maximum assembly time at two spread rate levels in standard atmosphere [20/65].

This standard is intended for obtaining a reliable base of comparison of the maximum assembly time between adhesives at referenced conditions.

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, *Adhesives, phenolic and aminoplastic, for load-bearing timber structures — Classification and performance requirements*

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

EN 923, *Adhesives — Terms and definitions*

3 Terms and definitions

For the purposes of this part of EN 302, the definitions given in EN 923 and the following definition apply.

3.1

assembly time

time interval under specified conditions from spread of adhesive on the lamellae until the cramping pressure is applied

3.2

maximum assembly time

maximum assembly time interval after which an adhesive bond loses its bonding ability

4 Principle

Delamination test pieces similar to EN 302-2 are produced with different assembly times for individual bond lines by using 5 mm spacers in the corners until the highest allowed delamination value is exceeded.

5 Apparatus

5.1 Autoclave or similar pressure vessel, as described in EN 302-2.

5.2 Vacuum pump or similar device, as described in EN 302-2.

5.3 Pump or similar device, as described in EN 302-2.

5.4 Air-circulating oven(s) or chamber(s), as described in EN 302 2.

5.5 Balance, as described in EN 302-2.

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5.6 Metal wedge and wooden hammer, or similar devices capable of opening the glue lines.

5.7 Spacers, made of wood or hard plastic with a thickness of 5 mm.

6 Procedure

6.1 General

This test method has two stages, screening test, 6.5, and final test, 6.6.

6.2 Selection of timber

Make laminated members out of flat-sawn, straight-grained spruce (*Picea abies* L.), free of reaction wood, with a density of (450 ± 25) kg/m³ at 12 % moisture content. Preferably knot-free wood should be used, but allowances are made for boards with knots up to a maximum of 20 mm in diameter, but splay (spike) knot is not allowed.

Condition the timber in the standard atmosphere (20 ± 2) °C and a relative humidity of (65 ± 5) % for at least 7 days prior to bonding, ensuring that the timber has a moisture content of (12 ± 1) %.

6.3 Preparation of the bonded members

For each laminated member prepare at least six lamellae (150 ± 5) mm wide, (30 ± 1) mm thick and approximately 500 mm long. The desired thickness is achieved by planing 38 mm thick lamellae. Bond the lamellae within 8 h of planing. Within each laminated member assembly, ensure that the six lamellae present the same growth ring orientation. The assembly is produced in climate (20 ± 1) °C and (65 ± 2) % RH. A strict climate control is very important as small changes in air temperature and relative humidity will highly influence the drying tendency of the applied adhesive and thus influence the conventional assembly time.

6.4 Glue spread level

The assembly time is determined with two levels of glue spread: 250 g/m² and 400 g/m².

6.5 Screening test

For each level of glue spread (6.4) make one laminated member of six lamellae giving five glue lines with different assembly time for each glue line.

6.5.1 Adhesive application

Apply the adhesive on one side of the lamellae in accordance with the adhesive manufacturer recommendation, as a glue mix or as separate spread of adhesive and hardener by separate application.

6.5.2 Lay-up

After spread of the first lamellae then cover the glue line after 2 min open assembly time with another lamellae by using 5 mm spacers in each corner. Then continue with the glue spread on the rest of the lamellae.

If the expected assembly time is 30 min then use 5 min intervals between the glue lines, for expected assembly time 30-60 min then use 10 min intervals, and for expected assembly time ≥ 60 min then use 15 min intervals.

If the expected assembly time is 50 min, then start with 30 min assembly time and continue with 40-50-60 min and end with 70 min assembly time.

6.5.3 Pressing time

After the elapsed time of the assembly times remove the spacers from the corners and press the laminated member at 20°C and 65% RH with a pressure of 0,6 N/mm². The pressing time shall be as recommended by the adhesive manufacturer.

6.5.4 Conditioning

After bonding and pressing, but before cutting and testing, condition the assembly for 7 days in at (20 ± 2) °C and (65 ± 5)% relative humidity. A longer or shorter conditioning time may be used if recommended by the adhesive manufacturer.

6.5.5 Screening test result

Prepare the test pieces as described in 6.7, if the first screening test does not give a clear indication of the maximum assembly time, all glue lines pass the requirement (delamination less than 2 - 4%), none of the glue lines pass the requirement or the time intervals for the assembly time between glue lines is too long or too short, then make a second screening test with more appropriate time settings.

When the screening test result of two test pieces can be concluded to indicate the max assembly time, then make the final test.

6.6 Final test

For each level of glue spread (6.4), prepare two bonded members with the same assembly time for all glue lines, as determined from the screening test result (6.5.5).

6.6.1 Pressing time

After the assembly time has been reached, remove the spacers from the corners and press the laminated member at 20°C and 65%RH with a pressure 0,6N/mm².

NOTE Pressing time as recommended by the adhesive manufacturer.

6.6.2 Conditioning

After bonding and pressing, but before cutting and testing, condition the assemblies for 7 days in standard atmosphere (20 ± 2) °C and (65 ± 5) % relative humidity.

6.7 Delamination test procedures

6.7.1 Preparation of the test pieces

From a full cross-section of the laminated member, plane the sides to remove excess of glue and cut three test pieces using a sharp saw or other tool that produces a smooth surface. From the end remove 100 mm and subsequently cut the test pieces, 75 mm long, as described in EN 302-2. Record the time elapsed between the preparation of the test pieces and testing.

6.7.2 Testing for delamination

Weigh and record the weight of the test pieces (three for the screening test and six for the final test) to the nearest gram. Place the test pieces in the pressure vessel and secure them to prevent them from floating. Add water at a temperature of (10 to 25) °C to submerge completely the test pieces. Separate the test pieces

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by using at least 5 mm thick stickers, wire screens or other means in such a way that all end-grain surfaces are freely exposed to the water. Carry out the high temperature procedure for testing compliance with the requirements for type I adhesives as described in EN 302-2.

6.8 Measurement and evaluation of delamination

The delamination measurement and the evaluation of the test pieces shall take place within 1 h. after the final drying treatment. The total delamination and the total length of the glue lines on both end-surfaces shall be measured in millimetres.

In the screening test the delamination in each glue line shall be calculated and reported.

For evaluation of delamination see the criteria Clause 5.5 a) to g) in EN 302-2.

NOTE It is advisable to open the delaminated glue lines for a more careful examination of the results.

7 Expression of results

The delamination shall be expressed in percentage and shall be calculated for each of the test pieces. It shall be rounded off to the nearest 0,1 % point. Delamination is calculated using the following formula:

$$D = \frac{l_1}{l_2} \times 100$$

where

D = the delamination in percent;

l_1 = the total delamination length on both end-grain surfaces (one glue line in screening test);

l_2 = the total length of the glue lines on both end-grain surfaces (one glue line in screening test).

8 Requirement

All test pieces from the final test shall pass the requirement given in EN 301 regarding maximum delamination. The longest assembly time used for fulfilling these requirements is the maximum assembly time under referenced conditions.

9 Report

The test report shall contain the following information:

- a) a reference to this part of EN 302 (EN 302-5);
- b) the identification of the adhesive system tested;
- c) the proportions taken when mixing the adhesive for use;
- d) mixed or separate application;
- e) the value of the maximum assembly times under referenced conditions for the two glue spread levels;
- f) the date of testing.