



# SLOVENSKI STANDARD

## SIST EN 302-5:2023

01-april-2023

---

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

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

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

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

**Ta slovenski standard je istoveten z: EN 302-5:2023**

---

**ICS:**

83.180	Lepila	Adhesives
91.080.20	Lesene konstrukcije	Timber structures

**SIST EN 302-5:2023**

**en,fr,de**



EUROPEAN STANDARD

EN 302-5

NORME EUROPÉENNE

EUROPÄISCHE NORM

February 2023

ICS 83.180

Supersedes EN 302-5:2013

English Version

## Adhesives for load-bearing timber 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 Wartezeit bei Referenzbedingungen

This European Standard was approved by CEN on 18 December 2022.

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.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.



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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

<b>Contents</b>	<b>Page</b>
European foreword.....	3
Introduction .....	4
1 Scope.....	6
2 Normative references.....	6
3 Terms and definitions .....	6
4 Symbols.....	6
5 Principle .....	7
6 Apparatus.....	7
7 Procedure.....	7
7.1 General.....	7
7.1.1 Stages.....	7
7.1.2 Selection of timber.....	7
7.1.3 Preparation of the bonded members.....	7
7.1.4 Glue spread level.....	7
7.2 Screening test .....	8
7.2.1 General.....	8
7.2.2 Adhesive application.....	8
7.2.3 Lay-up.....	8
7.2.4 Pressing time .....	8
7.2.5 Conditioning.....	8
7.2.6 Procedure and evaluation of the screening test .....	8
7.3 Final test.....	9
7.3.1 General.....	9
7.3.2 Pressing time .....	9
7.3.3 Conditioning.....	9
7.4 Delamination test procedures.....	9
7.4.1 Preparation of the test pieces.....	9
7.4.2 Testing for delamination .....	9
7.5 Measurement and evaluation of delamination .....	9
8 Expression of results.....	10
9 Requirement.....	10
9.1 Screening test .....	10
9.2 Final test.....	10
10 Test report.....	10
10.1 Adhesives .....	10
10.2 Preparation of test pieces and testing procedure .....	10
10.3 Test results .....	11

## European foreword

This document (EN 302-5:2023) has been prepared by Technical Committee CEN/TC 193 “Adhesives”, the secretariat of which is held by UNE.

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 August 2023, and conflicting national standards shall be withdrawn at the latest by August 2023.

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

This document supersedes EN 302-5:2013.

The main changes compared to the previous edition are listed below:

- a) the list of standards in the Introduction has been updated;
- b) one new clause (Symbols) has been introduced;
- c) Clause 10 has been changed.

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

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

**EN 302-5:2023 (E)****Introduction**

This document is one of a series dealing with adhesives for use with timber structures, and is published in support of the EN 1995 series, *Eurocode 5: Design of timber structures*. The series consists of five classification and performance requirements for adhesives for load-bearing timber structures, phenolic and aminoplastic adhesives (EN 301), one component polyurethane adhesives (EN 15425), emulsion polymer isocyanate adhesives (EN 16254), two component epoxy and polyurethane adhesives for glued in rods (EN 17334) and for on-site repair of cracked timber structures (EN 17418) and all together twelve test methods (EN 302-1, EN 302-2, EN 302-3, EN 302-4, EN 302-5, EN 302-6, EN 302-7, EN 302-8, EN 15416-1, EN 15416-3, EN 15416-4 and EN 15416-5).

These European Standards 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 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*
- *Part 8: Static load test of multiple bond line specimens in compression shear*

EN 15416, *Adhesives for load bearing timber structures other than phenolic and aminoplastic — Test methods:*

- *Part 1: Long-term tension load test perpendicular to the bond line at varying climate conditions with specimens perpendicular to the glue line (Glass house test)*
- *Part 3: Creep deformation test at cyclic climate conditions with specimens loaded in bending shear*
- *Part 4: Determination of open assembly time under referenced conditions*
- *Part 5: Determination of minimum pressing time under referenced conditions*

EN 15425, *Adhesives — One component polyurethane (PUR) for load-bearing timber structures — Classification and performance requirements*

EN 16254, *Adhesives — Emulsion polymer isocyanate (EPI) for load-bearing timber structures — Classification and performance requirements*

EN 17334, *Glued-in rods in glued structural timber products — Testing, requirements and bond shear strength classification*

EN 17418, *Two-component epoxy and polyurethane adhesives for on-site repair of cracked timber structures — Testing, requirements and repair strength verification*

#### **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 a negative environmental impact. As technological advantages lead to better alternatives for these materials, they will be eliminated from this standard to the greatest extent possible.

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

iTeh STANDARD PREVIEW  
(standards.iteh.ai)

SIST EN 302-5:2023

<https://standards.iteh.ai/catalog/standards/sist/f6bddc6d-8b50-43b3-a4ba-55b0b3d74800/sist-en-302-5-2023>

## EN 302-5:2023 (E)

### 1 Scope

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

This document is applicable to obtaining a reliable base of comparison of the maximum assembly time between adhesives at referenced conditions.

### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 302-2:2023, *Adhesives for load-bearing timber structures - Test methods - Part 2: Determination of resistance to delamination*

EN 384:2016+A2:2022, *Structural timber - Determination of characteristic values of mechanical properties and density*

EN 923, *Adhesives - Terms and definitions*

### 3 Terms and definitions

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

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at <https://www.iso.org/obp>

— IEC Electropedia: available at <https://www.electropedia.org/>

#### 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**

time interval after which an adhesive coat loses its bonding ability

### 4 Symbols

$D$  delamination

$l_1$  total delamination length on both end-grain surfaces

$l_2$  total length of the glue lines on both end-grain surfaces



## 5 Principle

Delamination test pieces similar to EN 302-2 are produced with different assembly times for individual glue lines by using 5 mm spacers in the corners. A delamination test is performed to evaluate the maximum assembly time at which the highest allowed delamination value is exceeded.

## 6 Apparatus

- 6.1 **Autoclave or similar pressure vessel**, as specified in EN 302-2.
- 6.2 **Vacuum pump or similar device**, as specified in EN 302-2.
- 6.3 **Pump or similar device**, as specified in EN 302-2.
- 6.4 **Air-circulating oven(s) or chamber(s)**, as specified in EN 302-2.
- 6.5 **Balance**, as specified in EN 302-2.
- 6.6 **Wood chisel and hammer**, or similar devices capable of opening the glue lines.
- 6.7 **Spacers**, made of wood or hard plastic with a thickness of 5 mm.

## 7 Procedure

### 7.1 General

#### 7.1.1 Stages

This test method has two stages: screening test (7.2) and final test (7.3).

#### 7.1.2 Selection of timber

Make laminated members out of flat-sawn, straight-grained Norway spruce (*Picea abies* L.), free of reaction wood, with a density of  $(450 \pm 25)$  kg/m<sup>3</sup> at 12 % moisture content. Preferably, knot-free wood should be used, but allowances are made for boards with knots up to a maximum of 15 mm in diameter, but splay (spike) knot is not allowed.

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

#### 7.1.3 Preparation of the bonded members

For each laminated member, prepare six lamellae  $(150 \pm 5)$  mm wide,  $(30 \pm 1)$  mm thick and approximately 500 mm long. The desired thickness can be achieved by planing for example 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  $(20 \pm 1)$  °C and  $(65 \pm 2)$  % relative humidity. 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 maximum assembly time. The circulation of air should be as low as possible.

#### 7.1.4 Glue spread level

The assembly time is determined with two levels of glue spread: 250 g/m<sup>2</sup> and 400 g/m<sup>2</sup>.

**EN 302-5:2023 (E)****7.2 Screening test****7.2.1 General**

For each level of glue spread (7.1.4) make one laminated member of six lamellae giving five glue lines with different assembly time for each glue line.

**7.2.2 Adhesive application**

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

**7.2.3 Lay-up**

Start to apply the adhesive on the top surface of the lamellae number 2. After 2 min open assembly time, place 5 mm thick spacers in each corner and cover the glue line by placing lamellae number 1 on top of lamellae number 2.

Then continue to apply the adhesive on the top surface of lamellae number 3. After 2 min open assembly time, add 5 mm spacers in each corner and cover the glue line with the assembly consisting of lamellae number 1 and number 2. Continue the same procedure with lamellae number 4, 5 and 6.

If the expected assembly time is 30 min then use 5 min intervals between the glue lines; for expected assembly time 30 min to 60 min, use 10 min intervals; and for expected assembly time  $\geq 60$  min, use 15 min intervals.

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

**7.2.4 Pressing time**

After the elapsed time of the assembly times, remove the spacers from the corners and press the laminated member at  $(20 \pm 2)$  °C and  $(65 \pm 5)$  % relative humidity with a pressure of 0,6 N/mm<sup>2</sup>. The pressing time shall be as recommended by the adhesive manufacturer.

**7.2.5 Conditioning**

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

**7.2.6 Procedure and evaluation of the screening test**

Prepare the test pieces and follow the test procedure as specified in 7.4. 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 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 of the three test pieces can be concluded to indicate the maximum assembly time, then make the final test.