



# SLOVENSKI STANDARD

## SIST EN 302-2:2023

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**Lepila za nosilne lesene konstrukcije - Preskusne metode - 2. del: Ugotavljanje odpornosti lepljenega stika proti razslojevanju (delaminaciji)**

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

Klebstoffe für tragende Holzbauteile - Prüfverfahren - Teil 2: Bestimmung der Delaminierungsbeständigkeit

Adhésifs pour structures portantes en bois - Méthodes d'essai - Partie 2 : Détermination de la résistance à la délamination

**Ta slovenski standard je istoveten z: EN 302-2:2023**

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**ICS:**

83.180	Lepila	Adhesives
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EUROPEAN STANDARD

EN 302-2

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## Adhesives for load-bearing timber structures - Test methods - Part 2: Determination of resistance to delamination

Adhésifs pour structures portantes en bois - Méthodes d'essai - Partie 2 : Détermination de la résistance à la délamination

Klebstoffe für tragende Holzbauteile - Prüfverfahren - Teil 2: Bestimmung der Delaminierungsbeständigkeit

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

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## European foreword

This document (EN 302-2:2023) 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of an identical text or by endorsement, at the latest by August 2023, and conflicting national standards shall be withdrawn at the latest by August 2023.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 302-2:2017.

Compared to EN 302-2:2017, the following modifications have been made:

- a) the list of standards in the Introduction has been updated;
- b) two new standards, EN 17334 and EN 17418, have been included in the Scope;
- c) two new clauses (Terms and definitions and Symbols) have been introduced;
- d) for preservative treated wood the test with pine also covers fir and spruce;
- e) 2 mm glue line thickness has been replaced by thick glue lines;
- f) nominal glue line thickness of test pieces has been included under 9.2;
- g) the Bibliography has been deleted.

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 302-2:2023 (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 and EN 302-8 and 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  
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SIST EN 302-2:2023

<https://standards.iteh.ai/catalog/standards/sist/918415ad-94cb-41bb-a92b-515b7836a784/sist-en-302-2-2023>

**EN 302-2:2023 (E)****1 Scope**

This document specifies a method for determining the resistance to delamination in glue lines.

It is applicable to the following applications:

- a) for assessing the compliance of adhesives with EN 301, EN 15425, EN 16254, EN 17334 and EN 17418;
- b) for assessing the suitability and quality of adhesives for load-bearing timber structures;
- c) for comparing the effects on the bond strength resulting from the choice of bonding conditions, from different climatic conditioning and from the treatment of the test pieces before and after bonding.

This test does not apply to modified and stabilized wood with strongly reduced swelling and shrinkage properties, such as acetylated wood, heat-treated wood and polymer impregnated wood.

This test is intended primarily to obtain performance data for the classification of adhesives for load-bearing timber structures according to their suitability for use in defined climatic environments.

This method is not intended to provide data for structural design and does not necessarily represent the performance of the bonded member in service.

**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 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****glue line**

adhesive layer between the wood members

**3.2****thick glue line**

glue line of nominal thickness of more than 0,1 mm, at the time of bonding

Note 1 to entry: Thick glue lines are achieved by using spacers, grooves or similar devices when two plain members are glued together.



### 3.3

#### close contact glue line

glue line of thickness maximum 0,1 mm

Note 1 to entry: Close contact glue line can be achieved by pressing together two plane wood members with a clamping pressure of  $(0,8 \pm 0,1)$  N/mm<sup>2</sup> without additional grooves, spacers or similar devices.

Note 2 to entry: A clamping pressure of  $(0,6 \pm 0,1)$  N/mm<sup>2</sup> is considered a sufficient pressure to form close contact glue line in this test.

## 4 Symbols

<i>D</i>	delamination
<i>l</i> <sub>1</sub>	total delamination length on both end-grain surfaces
<i>l</i> <sub>2</sub>	total nominal length of the glue lines on both end-grain surfaces
<i>m</i> <sub>0</sub>	original mass of the test piece
<i>t</i>	nominal thickness of the thick glueline

## 5 Principle

Bonded, laminated specimens are subjected to an impregnation-drying procedure. The specimens are impregnated with water by immersing them and applying alternating high and low (vacuum) pressure. They are then dried rapidly in a specified air stream at low humidity (see 6.4). The extent of open glue lines, delamination, as a result of these treatments is measured and compared with the total length of glue lines on both end-grain faces of the specimen.

## 6 Apparatus

**6.1 Autoclave or similar pressure vessel** designed to safely withstand a pressure of at least 625 kPa absolute (525 kPa above nominal atmospheric pressure).

**6.2 Vacuum pump or similar device**, capable of reducing the pressure in the vessel (6.1) to below 20 kPa absolute (80 kPa below nominal atmospheric pressure).

**6.3 Pump or similar device**, for obtaining a pressure of at least 600 kPa absolute (500 kPa above nominal atmospheric pressure).

**6.4 Air-circulating oven(s) or chamber(s)**, capable of drying the test pieces (see 7.4) in the following climate condition:

- for low temperature procedure (type II adhesive) a temperature of  $(27,5 \pm 2,5)$  °C, circulating the air within the chamber, maintaining a constant relative humidity of  $(30 \pm 5)$  %; and
- for high temperature procedure (type I adhesive) a temperature of  $(65 \pm 3)$  °C, circulating the air within the chamber, maintaining a relative humidity of  $(12,5 \pm 2,5)$  %.

NOTE Air speed velocity of 2 m/s to 3 m/s in empty chamber has shown to be suitable to achieve drying times according to 7.4.2 and 7.4.3.

**6.5 Balance**, allowing measurements with an uncertainty of measurement of  $\pm 1$  g.

**6.6 Wood chisel and hammer**, or similar devices capable of opening the glue lines.

## EN 302-2:2023 (E)

## 7 Method

### 7.1 Selection of timber

Use 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  $(12 \pm 1)$  % 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. The test with Norway spruce also covers approval of Silver fir (*Abies alba*) and Scots pine (*Pinus sylvestris*).

If the adhesive is to be used on wood from other conifer species like larch (*Larix decidua*), Douglas fir (*Pseudotsuga menziesii*) and pines with coloured heartwood [other than Scots pine (*Pinus sylvestris*)], from hardwood species and/or on preservative treated wood, also prepare four laminated members using representative samples of this wood species, using wood with mean density.

For preservative treated wood the test with Scots pine (*Pinus sylvestris*) also covers the bonding of Silver fir (*Abies alba*) and Norway spruce (*Picea abies* L.).

NOTE The effectiveness of the preservative treatment is not dealt with in this document.

Condition the timber in the standard climate [20/65]  $(20 \pm 2)$  °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  $(12 \pm 1)$  %.

### 7.2 Preparation of the bonded members

#### 7.2.1 Bonded members with thin glue lines

Make four laminated members, two with short assembly time and two with long assembly time. For each laminated member, prepare six lamellae at least  $(150 \pm 5)$  mm wide,  $(30 \pm 1)$  mm thick and approximately 500 mm long from six different boards. The desired thickness can be achieved by planing for example 38 mm thick lamellae. Store the lamellae in standard climate [20/65] before planing and gluing. Bond the lamellae in accordance with Table 1, within 8 h of planing. Within each assembly, ensure that the six lamellae present the same growth ring symmetry.