



SLOVENSKI STANDARD

oSIST prEN 302-2:2021

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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'essais - Partie 2 : Détermination
de la résistance à la délamination

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Ta slovenski standard je istoveten z: prEN 302-2

ICS:

83.180	Lepila	Adhesives
91.080.20	Lesene konstrukcije	Timber structures

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en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

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prEN 302-2

September 2021

ICS 83.180

Will supersede EN 302-2:2017

English Version

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

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

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

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

If this draft becomes a European Standard, 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.

This draft European Standard was established by CEN 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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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

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

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European foreword

This document (prEN 302-2:2021) has been prepared by Technical Committee CEN/TC 193 “Adhesives”, the secretariat of which is held by UNE.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 302-2:2017.

In comparison with the previous edition, the following technical modifications have been made:

- list of standards in Introduction updated;
- two new standards, EN 17334 and EN 17418, have been included in the scope;
- two new clauses (Terms and definitions and Symbols) are introduced;
- the Bibliography has been deleted.

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prEN 302-2:2021 (E)**Introduction**

This document is one of a series dealing with adhesives for use with timber structures, and is published in support of EN 1995, *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 polymerised 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 loaded perpendicular to the glue line (Glasshouse 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 polymerized 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 user of the standard take care to carry out an appropriate disposal of the wastes, according to local regulations.

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prEN 302-2:2021 (E)**1 Scope**

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

It is suitable for 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 is not applicable for 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 923, *Adhesives - Terms and definitions*

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3 Terms and definitions

<https://standards.iteh.ai/catalog/standards/sist/918415ad-94cb-41bb-a92b-515b7836a784/osist-pren-302-2-2021>

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

ISO and IEC maintain terminological 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, achieved by using spacers

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 $(0,8 \pm 0,1) \text{ N/mm}^2$ without additional grooves, spacers or similar devices.

4 Symbols

- D* delamination
 l_1 total delamination length
 l_2 total nominal length of the glue lines

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 7.4.2) in the following climate condition:

- a) 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 ± 5) %; and
- b) for high temperature procedure (type I adhesive) a temperature of (65 ± 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 accuracy of ± 1 g.

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

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 ± 25) kg/m³ at (12 ± 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*).

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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 approval for 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 ± 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) %.

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 ± 5) mm wide, (30 ± 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.

Table 1 — Preparation of the bonded members

Parameters	Members 1 and 2	Members 3 and 4
Adhesive spread, single sided (can be 2 faces for hardwood) Mixed and/or separate	For aminoplastic and phenolic adhesives: 250 g/m ² For other adhesives as recommended by the adhesive manufacturer	For aminoplastic and phenolic adhesives: 400 g/m ² For other adhesives as recommended by the adhesive manufacturer
Air temperature	(20 ± 2) °C	(20 ± 2) °C
Open assembly time	Maximum 5 min ^c	Maximum 5 min ^c
Closed assembly time	Minimum ^d	Maximum ^d
Pressure (conifers) ^a	($0,6 \pm 0,1$) N/mm ²	($0,6 \pm 0,1$) N/mm ²
Pressure time ^b	As recommended ^b	As recommended ^b
^a For hardwood species, larch, Douglas fir and pines with coloured heartwood, the pressure shall be that recommended by the adhesive manufacturer. ^b As recommended by the adhesive manufacturer for a curing temperature of (20 ± 2) °C. ^c Or as recommended by the adhesive manufacturer. ^d As recommended by the adhesive manufacturer at standard climate.		

If the adhesive system is intended for only separate application, then premixed adhesive and hardener shall not be tested by this standard.

After bonding and pressing and before cutting and testing, condition the assembly for 7 days to 14 days in the standard climate [20/65].