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**Lepila za nosilne lesene konstrukcije - Preskusne metode - 3. del: Ugotavljanje vpliva kislinskih poškodb lesnih vlaken, nastalih zaradi cikličnih obremenitev s temperaturo in vlago, na prečno natezno trdnost**

Adhesives for load-bearing timber structures - Test methods - Part 3: Determination of the effect of acid damage to wood fibres by temperature and humidity cycling on the transverse tensile strength

Klebstoffe für tragende Holzbauteile - Prüfverfahren - Teil 3: Bestimmung des Einflusses von Säureschädigung der Holzfasern durch Temperatur- und Feuchtezyklen auf die Quersugfestigkeit

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Adhésifs pour structures portantes en bois - Méthodes d'essai - Partie 3 : Détermination de l'influence de l'attaque d'acide des fibres de bois, résultant de traitements cycliques en température et humidité sur la résistance à la traction transversale

**Ta slovenski standard je istoveten z: EN 302-3:2023**

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**ICS:**

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## Adhesives for load-bearing timber structures - Test methods - Part 3: Determination of the effect of acid damage to wood fibres by temperature and humidity cycling on the transverse tensile strength

Adhésifs pour structures portantes en bois - Méthodes d'essai - Partie 3 : Détermination de l'influence de l'attaque d'acide des fibres de bois, résultant de traitements cycliques en température et humidité sur la résistance à la traction transversale

Klebstoffe für tragende Holzbauteile - Prüfverfahren - Teil 3: Bestimmung des Einflusses von Säureschädigung der Holzfasern durch Temperatur- und Feuchtezyklen auf die Querkzugfestigkeit

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

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
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## European foreword

This document (EN 302-3:2023) 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of an identical text or by endorsement, at the latest by August 2023, and conflicting national standards shall be withdrawn at the latest by August 2023.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 302-3:2017.

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

- a) two new standards, EN 17334 and EN 17418, have been included in the list of standards in the Introduction;
- b) two new Clauses (Terms and definitions and Symbols) have been introduced.

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 302-3:2023 (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 document 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.

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SIST EN 302-3:2023

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**EN 302-3:2023 (E)****1 Scope**

This document specifies a method for determining the effect on bond strength of damage to wood fibres caused by the action of acids from the adhesive or primer used in the gluing process during climatic cycling.

It is applicable to the following applications:

- a) for assessing the compliance of adhesives with EN 301, EN 15425 and EN 16254;
- b) for assessing the suitability and quality of adhesives for load-bearing timber structures;
- c) for determining if the adhesive after bonding has a damaging influence on the strength of the wood due to chemical action.

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 test is carried out on Norway spruce (*Picea abies* L.) or Beech (*Fagus sylvatica* L.).

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

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

EN 923, *Adhesives - Terms and definitions*

EN 1245, *Adhesives - Determination of pH*

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*

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

**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

## 4 Symbols

For the purposes of this document, the following symbols apply.

$f_{t,90,max}$  transverse tensile strength, in newtons per square millimetre (N/mm<sup>2</sup>)

$F_{max}$  applied load at failure, in newtons (N)

$A$  bonded test surface, in square millimetres (mm<sup>2</sup>)

## 5 Principle

A joint between wooden adherents is submitted to defined temperature and humidity cycles and then strained to failure by a transverse tensile load.

## 6 Apparatus

**6.1 Testing machine**, which shall be either:

- a) a constant rate of loading machine, capable of maintaining a rate of loading of  $(5 \pm 1)$  kN/min; or
- b) a constant rate of traverse machine as described in ISO 5893.

Special mounts are required (see Figure 1). One or both mounts shall be attached to the straining heads by a coupling, which permits self-alignment of the mounts whilst the test pieces are being pulled.

**6.2 Climatic cabinets**, which are enclosures with air circulation capable of maintaining the test pieces under the following conditions:

- a)  $(10 \pm 2)$  °C at approximately  $(87,5 \pm 2,5)$  % relative humidity;
- b)  $(50 \pm 2)$  °C at approximately  $(87,5 \pm 2,5)$  % relative humidity;
- c)  $(50 \pm 2)$  °C with relative humidity lower than 20 %.

NOTE The velocity of the air circulation at a level of 0,5 m/s to 1,0 m/s has been shown to be suitable.

**6.3 Airtight glass enclosure**, such as a desiccator with a lid is required, with the following dimensions:

- a) volume 2 l to 10 l;
- b) ratio of height to width between 1/1 and 2/1.

## 7 Method

### 7.1 Selection of timber

Carry out this test using Norway spruce (*Picea abies* L.) having a density of  $(450 \pm 25)$  kg/m<sup>3</sup> measured at 12 % moisture content.

Carry out the test using beech (*Fagus sylvatica* L.) having a density of  $(700 \pm 50)$  kg/m<sup>3</sup> measured at 12 % moisture content, for gap filling adhesives (application area GF according to EN 301).

**EN 302-3:2023 (E)**

Prepare one piece of wood, at least 60 mm × 60 mm in cross section and at least 1 600 mm in length or two pieces with a length of 800 mm that are free from knots, straight-grained and with growth rings not wider than 2 mm and at 30° to 60° to the surfaces of the specimen.

**7.2 Preparation of the bonded assemblies**

Cut the piece of wood lengthwise into two equal pieces of rectangular cross section and store them in standard climate [20/65] [(20 ± 2) °C and (65 ± 5) % relative humidity] at least for 7 days to achieve constant mass or moisture content of (12 ± 1) %. Constant mass is defined as the mass attained when the results of two successive weighing's over an interval of 24 h differ by not more than 0,1 % of the mass of the specimen.

Not more than 8 h before bonding, plane each surface to be bonded to the final thickness of 25 mm. Remove any dust carefully. Do not touch or soil the prepared surface.

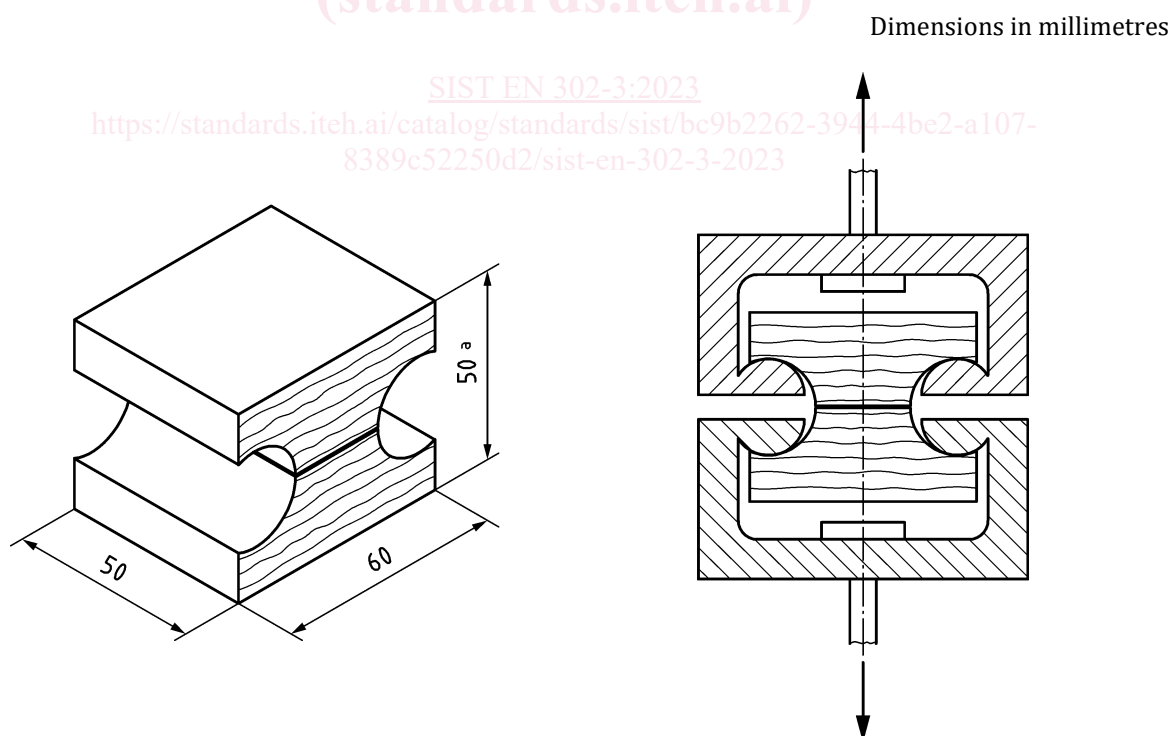
For glue mixes, adhesive and hardener blended before application, the nominal glue line thickness shall be 0,5 mm by using 0,5 mm thick spacers.

For gap filling adhesives (GF), the nominal glue line thickness shall be 2,0 mm by using 2,0 mm thick spacers.

For separate application of adhesive and hardener, the nominal glue line thickness shall be 0,1 mm by using 0,1 mm thick spacers.

For finger jointing adhesives (FJ) according to EN 301, EN 15425 and EN 16254, the glue line thickness shall be close contact without use of spacers.

For adhesives class SD (small dimension) according to EN 16254, the nominal glue line thickness shall be 0,3 mm by using 0,3 mm thick spacers.

**Key**

a 50 mm + glue line thickness

**Figure 1 — Test piece and mounts for assessing the transverse tensile strength of bonded wooden assemblies**