



SLOVENSKI STANDARD

SIST EN 302-1:2023

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Lepila za nosilne lesene konstrukcije - Preskusne metode - 1. del: Ugotavljanje vzdolžne natezne strižne obremenitve

Adhesives for load-bearing timber structures - Test methods - Part 1: Determination of longitudinal tensile shear strength

Klebstoffe für tragende Holzbauteile - Prüfverfahren - Teil 1: Bestimmung der Längszugscherfestigkeit

Adhésifs pour structures en bois - Méthodes d'essais - Partie 1: Détermination de la résistance du joint au cisaillement en traction longitudinale

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ICS:

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EUROPEAN STANDARD

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Adhesives for load-bearing timber structures - Test methods - Part 1: Determination of longitudinal tensile shear strength

Adhésifs pour structures portantes en bois - Méthodes d'essais - Partie 1 : Détermination de la résistance au cisaillement en traction longitudinale

Klebstoffe für tragende Holzbauteile - Prüfverfahren - Teil 1: Bestimmung der Längszugscherfestigkeit

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

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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.

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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 (EN 302-1:2023) 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of an identical text or by endorsement, at the latest by August 2023, and conflicting national standards shall be withdrawn at the latest by August 2023.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 302-1:2013.

EN 302-1:2023 includes the following significant technical changes with respect to EN 302-1:2013:

- 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) thick glue line is now prepared with thicknesses between 0,3 mm and 4,0 mm depending on type of adhesive;
- d) Table 1 — Type and duration of treatment prior to shear testing; A6, A7 and A8 duration has been changed from 72 h to 24 h;
- e) a new indent has been added to 9.2, h) location of the grooves for the 4 mm thick glue lines;
- f) 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 302-1:2023 (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 302-1:2023

<https://standards.iteh.ai/catalog/standards/sist/ba85a12f-392b-472b-ac2d-64c2224c37ef/sist-en-302-1-2023>

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

This document specifies a method for determining the shear strength of adhesive bonds in close contact glue line and thick glue line.

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.

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 for use to provide 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 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*

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

ISO 6344-2, *Coated abrasives — Determination and designation of grain size distribution — Part 2: Macrogrit sizes P12 to P220*

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 in the range of 0,3 mm to 4,0 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/mm² without additional grooves, spacers or similar devices.

4 Symbols

A	bonded test surface, in mm ²
f_v	shear strength, in N/mm ²
F_{\max}	the applied load at failure, in N
h	depth of groove for thick glue line, 0,3 mm, 0,5 mm, 1,0 mm, 2,0 mm or 4,0 mm
α	angle between the annual rings and glue line, 30° to 85°
l_1	length of test pieces, (150 ± 5) mm
l_2	length of overlap (length of tested surface), $(10,0 \pm 0,1)$ mm
l_3	width of groove for thick glue line, ≈ 14 mm
b	width of test pieces, $(20,0 \pm 0,1)$ mm
t	thickness of panel for close contact glue line, $(5,0 \pm 0,1)$ mm
$t + h$	thickness of panel outside the grooves for thick glue line, in mm

EN 302-1:2023 (E)**5 Principle**

The shear strength of adhesive bonds is determined by applying a longitudinal tensile force to a single lap joint with close contact or thick glue lines between two rectangular wooden adherents made of beech (*Fagus sylvatica* L.). The joints are loaded to rupture.

6 Apparatus

The testing machine shall be either:

- a) capable of maintaining a constant rate of loading of $(2,0 \pm 0,5)$ kN/min; or
- b) capable of maintaining constant crosshead speed as specified in ISO 5893.

The jaws of the testing machine shall grip the test pieces firmly and prevent slippage during loading. The grip shall be fixed in hinged manner.

7 Method**7.1 Preparation of panels**

By planing, prepare a sufficient number (see 7.4) of panels to be bonded, with or without 14 mm wide grooves as shown in Figure 1, from an untreated straight-grained board of beech (*Fagus sylvatica* L.) with a density of (700 ± 50) kg/m³ at (12 ± 1) % moisture content. Ensure that the angle, α , between the annual rings and the surface to be bonded, see Figure 3 a), is between 30° and 85°.

Cut the panels across the direction of the grain to a length of at least 300 mm with the necessary allowance for cross-cutting (saw blade thickness) and along the grain to a width of at least 130 mm with the necessary allowance for the width of cut as shown in Figure 1. For tests on close contact glue lines, use two panels of $(5,0 \pm 0,1)$ mm. For tests on thick glue lines, use one $(5,0 \pm 0,1)$ mm thick panel and one $[(5,0 \pm 0,1) + h]$ mm thick panel. Make grooves with a depth h between 0,3 mm and 4,0 mm and a width of approximately 14 mm that end 5 mm from the side edges (see Figure 1).

For test of glue line thickness > 1 mm two panels of $(5,0 \pm 0,1) + h/2$ with grooves in both panels can be used.

Condition the panels at a temperature of (20 ± 2) °C and (65 ± 5) % RH, referred to subsequently as “the standard climate”.