
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 Querkzugfestigkeit

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

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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

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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.

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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
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Foreword

This document (prEN 302-3:2015) has been prepared by Technical Committee CEN/TC 193 “Adhesives”, the secretariat of which is held by AENOR.

This document is currently submitted to the CEN enquiry.

This document will supersede EN 302-3:2013.

Compared to EN 302-3:2013 the following modification has been made:

- a) specification of beech for test pieces for gap filling adhesives in 5.1;
- b) preparation of test pieces for gap filling adhesives added in 5.2;
- c) description of climate cycling test in 5.5 completed.

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SIST EN 302-3:2017

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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 three classification and performance requirements for adhesives for load-bearing timber structures, phenolic and aminoplastic adhesives (EN 301), one component polyurethane adhesives (EN 15425) and emulsion polymerized isocyanate adhesives (EN 16254), and all together 11 test methods (EN 302-1, EN 302-2, EN 302-3, EN 302-4, EN 302-5, EN 302-6 and EN 302-7 and EN 15416-2, 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 15425, *Adhesives — One component polyurethane for load bearing — Classification and performance requirements*

EN 16254, *Adhesives — Emulsion polymerized isocyanate (EPI) 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*

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

- *Part 2: Static load test of multiple bondline specimens in compression shear*
- *Part 3: Creep deformation test at cyclic climate conditions with specimens loaded in bending shear*
- *Part 4: Determination of open assembly time for one component polyurethane adhesives*
- *Part 5: Determination of conventional pressing time*

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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1 Scope

This European Standard 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 suitable for 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.).

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

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1245, *Adhesives — Determination of pH* SIST EN 302-3:2017

ISO 5893, *Rubber and plastics test equipment — Tensile, flexural and compression types (constant rate of traverse) — Specification* https://standards.jtech.ai/catalog/standards/sist/b6c60d42-6092-4c50-a5ce-48123102c878/-en-302-3-2017

3 Principle

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

4 Apparatus

4.1 Testing machine, which shall be either:

- a) a constant rate of loading machine, capable of maintaining a rate of loading of (5 ± 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.

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

- a) (10 ± 2) °C at approximately $(87,5 \pm 2,5)$ % relative humidity;

- b) (50 ± 2) °C at approximately $(87,5 \pm 2,5)$ % relative humidity;
- c) (50 ± 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 shown to be suitable.

4.3 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.

5 Method

5.1 Selection of timber

Carry out this test using Norway spruce (*Picea abies* L.) having a density of (450 ± 25) kg/m³ measured at 12 % moisture content.

Carry out the test using beech having a density of (700 ± 50) kg/m³ measured at 12 % moisture content, for gap filling adhesives (GF).

Prepare one piece of spruce 60 mm x 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.

5.2 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] to constant mass. Constant mass is defined as the mass attained when the results of two successive weighings over an interval of 24 h differ by not more than 0,1 % of the mass of the specimen.

Condition the timber in standard atmosphere [20/65] ((20 ± 2) °C and (65 ± 5) % relative humidity) for at least 7 days prior to bonding, to achieve a moisture content of (12 ± 1) %.

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 glue line thickness shall be 0,5 mm by using 0,5 mm thick spacers.

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

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

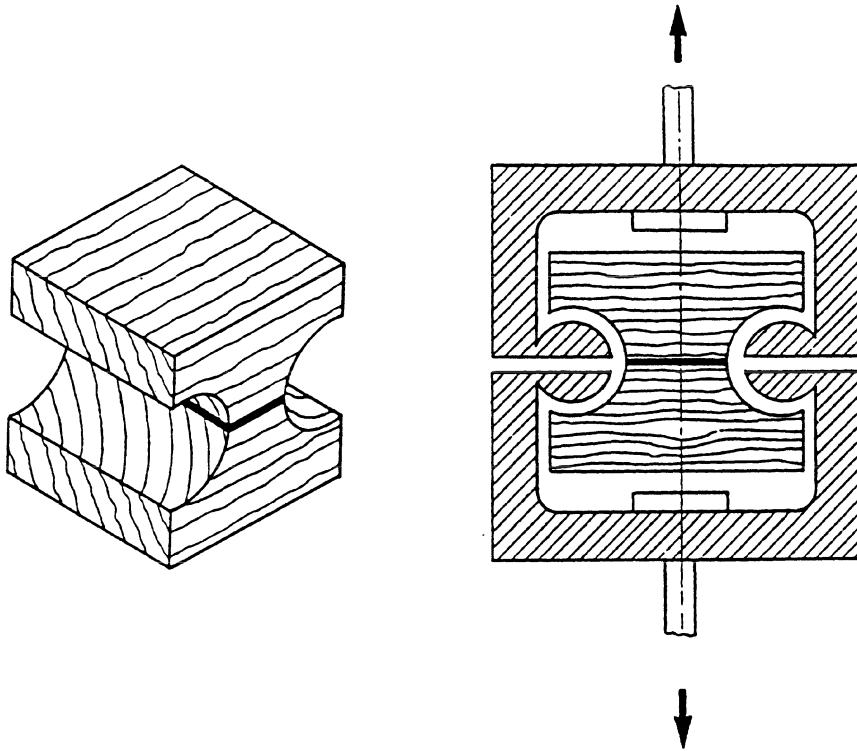


Figure 1 — Test piece and mounts for assessing the transverse tensile strength of bonded wooden assemblies

Dimensions in millimetres

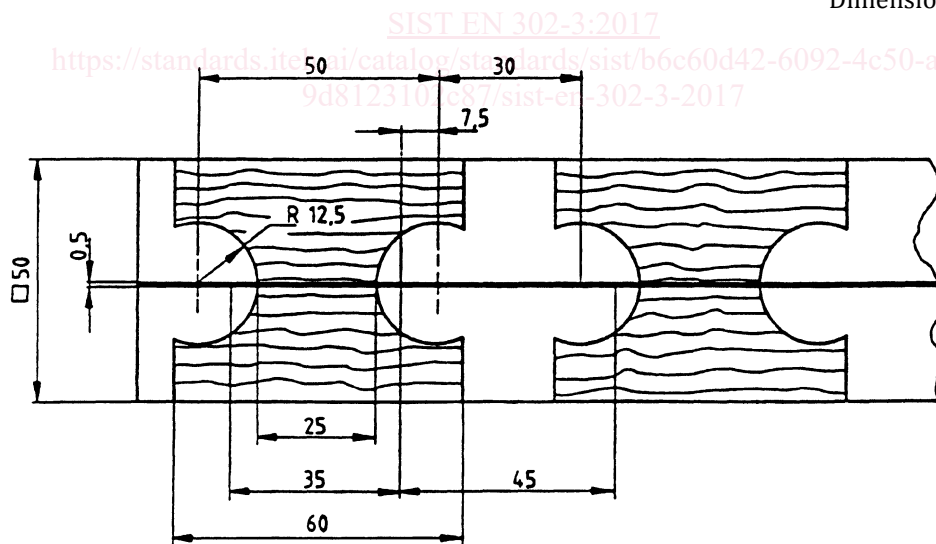


Figure 2 — Tensile test pieces cut out of the bonded wooden assembly

Prepare sufficient spacers 60 mm x 45 mm x (0,5 ± 0,05) mm or 60 mm x 45 mm x (0,1 ± 0,02) mm or 60 mm x 45 mm x (2,0 ± 0,1) mm. (At least 10 spacers will be required for a piece of wood 800 mm long.) Lay these on the cut surface of the wood spaced (35,0 ± 0,5) mm apart with the lengths across the width of the cut surface. Fill the gaps between the spacers with adhesive. Ensure that adhesive is not lost from the test area. Clamp the pieces of wood together with the same orientation with respect to each other as they had before cutting. Apply a pressure of (0,6 ± 0,1) MPa relative to the area of the