

SLOVENSKI STANDARD
SIST EN 302-2:1998**01-februar-1998**

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

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

Klebstoffe für tragende Holzbauteile - Prüfverfahren - Teil 2: Bestimmung der Delaminierungsbeständigkeit (Labor-Verfahren)

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

Ta slovenski standard je istoveten z: EN 302-2:1992

ICS:

83.180	Lepila	Adhesives
91.080.20	Lesene konstrukcije	Timber structures

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EUROPEAN STANDARD

EN 302-2:1992

NORME EUROPÉENNE

EUROPÄISCHE NORM

June 1992

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Descriptors: Adhesives, timber construction, phenoplasts, aminoplasts, joining, adhesive bonded joints, laboratory tests, cyclic tests, physical tests, adhesive strength

English version

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

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

Klebstoffe für tragende Holzbauteile -
Prüfverfahren - Teil 2: Bestimmung der
Delaminierungsbeständigkeit (Labor-Verfahren)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

The European Standards exist 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 Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

This European Standard was prepared by Technical Committee 103, Adhesives for Wood and Derived Timber Products.

This standard is one of a series dealing with adhesives for use with timber structures, and is published in support of Eurocode No. 5, 'Common unified rules for timber structures'. The series consists of a classification and performance requirements for two types of phenolic and aminoplastic adhesive for use in different climatic conditions (EN 301), and four test methods (EN 302: Parts 1 to 4) used to assess the performance of the adhesives after specified heat and humidity treatments.

The other tests used in the classification of adhesives for timber structures are given in:

EN 302: Part 1 Determination of bond strength in longitudinal tensile shear

EN 302: Part 3 Determination of the effect of acid damage to wood by temperature and humidity cycling on the transverse tensile strength (fibre damage)

EN 302: Part 4 Determination of the influence of shrinkage on the shear strength

No existing European Standard is superseded.
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National standards identical to this European Standard shall be published at the latest by 1992-12-31 and conflicting national standards shall be withdrawn at the latest by 1992-12-31.

According to the CEN/CENELEC Common Rules, the following countries are bound to implement this European Standard : Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This Part of EN 302 describes a method for determining the resistance to delamination of adhesively bonded joints. It is suitable for the following applications:

- a) for assessing the compliance of adhesives with EN 301;
- 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 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 numerical design data and does not necessarily represent the performance of the bonded member in service. It is not intended to be used to assess the suitability of adhesives for the manufacture of wood-based panels.

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2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

- EN 301: Adhesives, phenolic and aminoplastic, for load-bearing timber structures: Classification and performance requirements.

3 Principle

Bonded, laminated specimens are subjected to one of two impregnation-drying regimes. The specimens are impregnated with water by immersing them and applying alternating high and low (vacuum) pressures. They are then dried rapidly at low humidity in a high velocity air stream. The extent of glue-line delamination as a result of these treatments is measured and compared with the total length of glue-line at each end-grain face of the specimen.

4 Apparatus

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

4.2 *Vacuum pump* or similar device capable of reducing the pressure in the vessel (4.1) to below 30 kPa absolute (70 kPa below nominal atmospheric pressure).

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

4.4 *Air-circulating oven* or chamber (or ovens or chambers) capable of maintaining:

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- a) a temperature of $(28 \pm 1) ^\circ\text{C}$ and of circulating the air within the chamber at a velocity of $(2,25 \pm 0,25)$ m/s and of maintaining a constant relative humidity of (30 ± 5) % and;
- b) a temperature of $(65 \pm 5) ^\circ\text{C}$ and of circulating the air within the chamber at a velocity of $(2,25 \pm 0,25)$ m/s, and of maintaining a relative humidity of less than 15 %.

5 Method

5.1 Preparation of the bonded members

Make four laminated members out of spruce (*Picea abies* L.). If the adhesive is to be used on wood from broad-leaved species and/or on chemically treated wood, also make four laminated members using representative samples of that wood.

Condition the timber according to the adhesive supplier's instructions. If no other instructions are given, condition the timber in the standard atmosphere, $((20 \pm 2) ^\circ\text{C}$ and (65 ± 5) % r.h) for 7 days prior to bonding.

For each laminated member prepare at least six lamellae (150 ± 5) mm wide, (30 ± 1) mm thick and approximately 500 mm long. The desired thickness is achieved by planing 38 mm thick lamellae. Bond the lamellae in accordance with table 1, within 24 h of planing. Do not use radial-cut lamellae. Within each assembly, ensure that the six lamellae present the same growth ring orientation.

After bonding and pressing, and before cutting and testing, condition the assembly for a minimum of 7 days in the standard atmosphere ($(20 \pm 2) ^\circ\text{C}$ and $(65 \pm 5) \% \text{ r.h.}$).

NOTE: A longer conditioning time may be used if recommended by the adhesive manufacturer.

Table 1: Preparation of the bonded members

Parameters	Members 1 and 2	Members 3 and 4
Adhesive spread (2 faces)	As recommended*	As recommended*
Air temperature	$(23 \pm 3) ^\circ\text{C}$	$(23 \pm 3) ^\circ\text{C}$
Open assembly time	≤ 5 min	≤ 5 min
Closed assembly time	Minimum*	Maximum*
Pressure (conifers)*	$(0,6 \pm 0,1)$ MPa	$(0,6 \pm 0,1)$ MPa
Pressure time*	As recommended*	As recommended*
<p>* For broad-leaved species, the pressure shall be that recommended by the adhesive manufacturer.</p> <p>+ As recommended by the adhesive manufacturer for a curing temperature of $(23 \pm 3) ^\circ\text{C}$, an open time of 5 min and a pressure of 0,6 MPa.</p>		

5.2 Preparation of the test pieces

From a full cross-section of each of the four laminated members to be tested, cut two test pieces using a sharp saw or other tool that produces a smooth surface. Remove sections 75 mm long by cutting perpendicularly to the surface of the assembly and not less than 50 mm from either end of the member.

Record the time elapsed between the preparation of the test pieces and testing.

5.3 Test procedures

5.3.1 General

Place the test pieces in the pressure vessel and secure them to prevent them from floating. Add water at a temperature of $(15 \pm 5) ^\circ\text{C}$ to submerge completely the test pieces. Separate the test pieces by at least 5 mm using stickers, wire screens or other means in such a way that all end-grain surfaces are freely exposed to the water, then carry out either the high temperature procedure according to 5.3.2 for testing compliance with the requirement for type I adhesives for use in severe climatic conditions, or the low temperature procedure according to 5.3.3 for testing compliance with the requirement for type II adhesives for use in moderate climatic conditions.

5.3.2 High temperature procedure (for type I adhesives)

Reduce the pressure in the vessel to (25 ± 5) kPa absolute and maintain that pressure for 5 min. Then release the vacuum and apply a pressure of (600 ± 25) kPa absolute for 1 h. With the test pieces still completely immersed, repeat this vacuum-pressure cycle once more to give a two-cycle impregnating period requiring a total of about 130 min.

Dry the test pieces for 22 h in air at $(65 \pm 5) ^\circ\text{C}$ and a relative humidity not greater than 15 % and circulating at a velocity of $(2,25 \pm 0,25)$ m/s. During drying, place the test pieces at least 50 mm apart with the end-grain surfaces parallel to the air stream.

Repeat the entire impregnating-drying cycle twice more to comprise a total test period of just over 3 days.

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5.3.3 Low temperature procedure (for type II adhesives)

Reduce the pressure in the vessel to (25 ± 5) kPa absolute and maintain that pressure for 15 min. Then release the vacuum and apply a pressure of (600 ± 25) kPa absolute for 2 h. With the test pieces still completely immersed, repeat this vacuum-pressure cycle once more to give a two-cycle impregnating period requiring a total of about 4 h 30 min.

Dry the test pieces for 91 h 30 min in air at $(28 \pm 1) ^\circ\text{C}$ and $(30 \pm 5) \%$ relative humidity, and circulating at a velocity of $(2,25 \pm 0,25)$ m/s. During drying, place the test pieces at least 50 mm apart with the end-grain surfaces parallel to the air stream.

Repeat the entire impregnating-drying cycle once more to comprise a total test period of 8 days.