SLOVENSKI STANDARD
SIST EN 15425:2009

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Lepila - Enokomponentni poliuretan za nosilne lesene konstrukcije - Razvrstitev in zahteve kakovosti

Adhesives - One component polyurethane for load bearing timber structures - Classification and performance requirements

Klebstoffe - Einkomponenten-Klebstoffe auf Polyurethanbasis für tragende Holzbauteile - Klassifizierung und Leistungsanforderungen

Adhésifs - Adhésifs polyuréthane monocomposants pour charpentes en bois portantes - Classification et exigences relatives a la performance

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Adhesives - One component polyurethane for load bearing timber structures - Classification and performance requirements

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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 Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (EN 15425:2008) has been prepared by Technical Committee CEN/TC 193 “Adhesives”, the secretariat of which is held by AENOR.

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of an identical text or by endorsement, at the latest by August 2008, and conflicting national standards shall be withdrawn at the latest by August 2008.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This European Standard is one of a series dealing with one component polyurethane adhesives for use in prefabricated components for timber structures. It is published in support of Eurocode 5. The series consists of: classification and performance requirements for polyurethane adhesive for use in different climatic conditions (EN 15425), six test methods to assess the performance of adhesives after specified heat and humidity treatments (EN 302: Part 1 to 4, EN 15416-2 and EN 15416-3), and two test methods to characterize the working properties of the adhesive (EN 15416-4 and EN 15416-5).

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard establishes a classification for one component polyurethane adhesives according to their suitability for use in pre-fabricated timber components for structural use in defined climatic exposure conditions, and specifies performance requirements for such adhesives for the industrial manufacture of load-bearing timber structures only.

The performance requirements of this European Standard apply to the adhesive only, not to the structure. This European Standard does not primarily cover the performance of adhesives for the production of wood-based panels.

This European Standard is primarily intended for the use of adhesive manufacturers and for the use in timber structures bonded with adhesives, to assess or control the quality of adhesives. This European Standard only specifies the performance of an adhesive for use in an environment corresponding to the defined conditions.

Such an adhesive meeting the requirements of this European Standard for its type is adequate for use in a load-bearing timber structure, provided that the bonding process has been carried out according to an appropriate product standard.

2 Normative references

The following referenced documents are indispensable for the application 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 302-1, *Adhesives for load-bearing timber structures - Test methods - Part 1: Determination of bond strength in longitudinal tensile shear strength*

EN 302-2, *Adhesives for load-bearing timber structures - Test methods - Part 2: Determination of resistance to delamination*

EN 302-3, *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*

EN 302-4, *Adhesives for load-bearing timber structures - Test methods - Part 4: Determination of the effects of wood shrinkage on the shear strength*

EN 923:2005, *Adhesives - Terms and definitions*

EN 1995-1-1, *Eurocode 5: Design of timber structures – Part 1-1: General - Common rules and rules for buildings*

EN 15416-2, *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*

EN 15416-3, *Adhesives for load bearing timber structures other than phenolic and aminoplastic - Test methods - Part 3: Creep deformation test at cyclic climate conditions with specimens loaded in bending shear*

EN 15416-4, *Adhesives for load bearing timber structures other than phenolic and aminoplastic - Test methods - Part 4: Determination of open assembly time for one component polyurethane adhesives*

EN 15416-5, *Adhesives for load bearing timber structures other than phenolic and aminoplastic - Test methods - Part 5: Determination of conventional pressing time*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 923:2005 apply.

4 Classification

Adhesives for structural use shall produce joints of such strength and durability that the integrity of the bond is maintained in the assigned service class throughout the expected life of the structure.

Two types of adhesives, I and II, are classified according to their suitability for use in the climatic conditions given in Table 1.

Table 1 — Adhesive types for use in different climatic conditions

Adhesive type	Temperature	Climatic equivalent to: [a)]	Examples	Equivalent to EN 1995-1-1 service classes:
I	> 50 °C	Not specified	Prolonged exposure to high temperature.	1,2,3
I	≤ 50 °C	> 85 % RH at 20 °C	Full exposure to weather.	1,2,3
II	≤ 50 °C	≤ 85 % RH at 20 °C	Heated and ventilated building. Exterior protected from weather. Short periods of exposure to weather.	1,2

[a)] 85 % RH at 20 °C will result in a moisture content of ca. 20 % in softwoods and most hardwoods, and a lower moisture content in wood-based panels.

5 Requirements

5.1 General

Adhesives conforming to this European Standard shall meet the performance requirements specified in 5.2 to 5.7 when tested in accordance with Clause 6 of this European Standard.

The bondline thickness shall be limited to a maximum of 0,3 mm.

5.2 Bond strength in longitudinal tensile shear strength

When tested in accordance with 6.2 of this European Standard, the tensile shear strength values of glue line thickness 0,1 mm (thin glue line) and glue line thickness of 0,5 mm shall meet the requirements given in Table 2.

Table 2 — Minimum mean tensile shear strength, N/mm², of 0,1 mm and 0,5 mm thick glue lines after treatment according to Annex A

Treatment (see Annex A)	0,1 mm thick glue line Type I	0,1 mm thick glue line Type II	0,5 mm thick glue line Type I	0,5 mm thick glue line Type II
A1	10	10	9	9
A2	6	6	5	5
A3	8	8	7,2	7,2
A4	6	NR[a)]	5	NR[a)]
A5	8	NR[a)]	7,2	NR[a)]
A6	NR[a)]	9,5	NR[a)]	7,2
A7	8	NR[a)]	6,5	NR[a)]
[a)] Treatment cycle not required.				

5.3 Resistance to delamination

When tested in accordance with 6.3 of this European Standard the limits on delamination shall be those specified in Table 3.

Table 3 — Resistance to delamination after treatment according to Annex B

Treatment (see Annex B)	Maximum delamination of any test sample (% of total glue line length) Adhesive type I	Adhesive type II
B1	NR[a)]	< 10
B2	< 5	NR[a)]
[a)] Treatment cycle not required.		

5.4 Tensile strength perpendicular to the bondline after climatic treatment

When tested in accordance with 6.4 of this European Standard the average tensile strength of the untreated reference samples shall not be lower than 5 N/mm^2. The average tensile strength after cyclic treatment shall not be lower than 80 % of the average tensile strength of the untreated reference samples. The test is mandatory for all adhesives without regard to pH-value.

5.5 Effect of wood shrinkage on the shear strength

When tested in accordance with 6.5 of this European Standard the average shear strength after climatic treatment shall not be lower than 1,5 N/mm^2.

5.6 Static load test of multiple bondline specimens in compression shear

When tested in accordance with 6.6 of this European Standard, not more than one of the six samples are allowed to fail during the test period.

The mean creep deformation of the glue lines in each of the remaining test samples shall not exceed 0,05 mm after the test.

5.7 Creep deformation test at cyclic climate conditions with specimens loaded in bending shear

When tested in accordance with 6.7 of this European Standard, the average ratio of the relative creep values of all five matched bending specimen pairs shall be evaluated after t = 26 weeks.

$$RC_{mean}(26\ weeks) = \frac{1}{5}\sum_{1}^{5} RCi\ (26\ weeks)$$

RC_{mean}: mean value of the ratio of relative creep of the five pairs of matched bending specimen

RCi: ratio of relative creep of one matched pair of bending specimens, i

RC_{mean} (26 weeks) shall not be higher than 1,12. If the requirement is fulfilled, the test is completed.

If a larger average ratio is obtained, the test may be continued for a second period of 26 weeks and a second assessment shall be performed after a total of 52 weeks under load. The average ratio of the relative creep value after 52 weeks, RC_{mean} (52 weeks), shall not be larger than 1,15. The load must not be removed from the samples between the two test periods.

6 Test methods

6.1 General

The following test methods shall be used for establishing the requirements given in Clause 5 of this European Standard.

6.2 Determination of bond strength in longitudinal tensile shear strength

Tests shall be made in accordance with EN 302-1 with glue line thickness 0,1 mm and 0,5 mm instead of 0,1 mm and 1,0 mm as stated in EN 302-1. Climatic treatments shall be performed according to Annex A.

Test samples subject to climatic treatment A6 and A7 shall be wrapped airtight before treatment to reduce moisture loss. The samples shall be tested immediately after removal from the climate chamber in a testing machine supplied with a temperature-controlled chamber.

6.3 Determination of resistance to delamination

Tests shall be made in accordance with EN 302-2.

6.4 Determination of tensile strength perpendicular to the bondline after climatic treatment

The test shall be made in accordance with the principles described in EN 302-3, but with samples made from untreated beech wood (Fagus sylvatica L.) with a density at (12 ± 1) % moisture content of (700 ± 50 kg/m³).

NOTE To ensure that no adhesive is lost from the test area, both sides of one of the two pieces of wood to be bonded together can be prepared with small wooden ledges made from beech wood as shown in Figure 1. The wooden ledges are glued on both sides of the wood with suitable equipment using a PVAC- adhesive. Care should be taken during the gluing of the ledges to avoid the PVAC- adhesive polluting the later glue line area.

After curing of the PVAC-adhesive, the test pieces are bonded and produced as described in EN 302-3.