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Two-component epoxy and polyurethane adhesives for on-site repair of cracked timber structures - Testing, requirements and repair strength verification

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English Version

**Two-component epoxy and polyurethane adhesives for
on-site repair of cracked timber structures - Testing,
requirements and repair strength verification**

Adhésifs bicomposants polyuréthanes et époxydiques
pour la réparation sur site de structures en bois
fissurées - Essais, exigences et vérification de la
résistance des réparations

Zwei-Komponenten-Epoxid und Zwei-Komponenten-
Polyurethan-Klebstoffe zur Reparatur von
beschädigten Holzbauteilen auf der Baustelle -
Prüfung, Anforderungen und Nachweis der Reparatur-
Festigkeit

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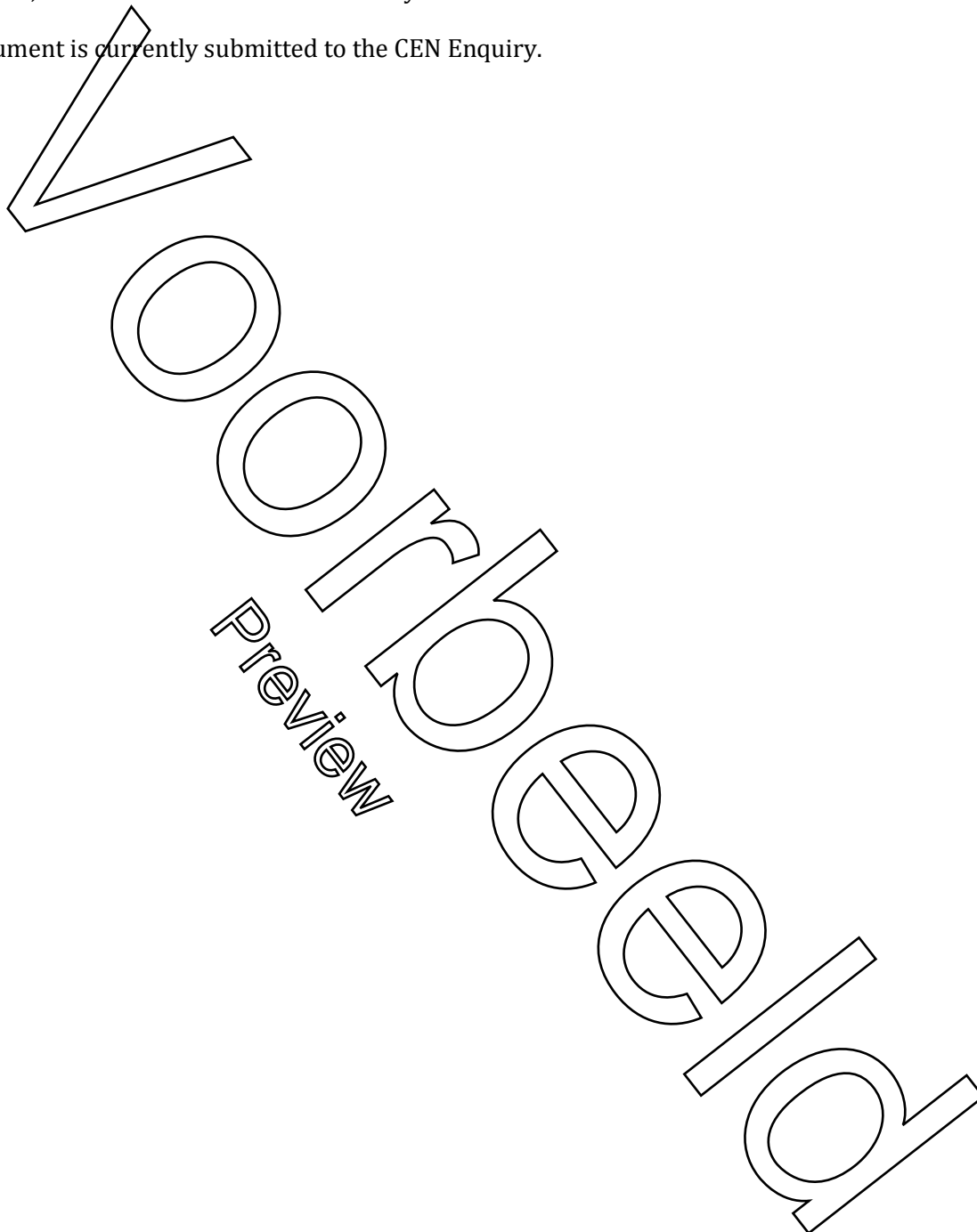
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European foreword

This document (prEN 17418:2019) has been prepared by Technical Committee CEN/TC 193 “Adhesives”, the secretariat of which is held by UNE.

This document is currently submitted to the CEN Enquiry.



1 Scope

This document specifies test methods for the determination of the suitability of two-component epoxy and polyurethane adhesives for on-site repair of cracks in timber structures made of solid wood, finger-jointed solid wood, glued solid timber and glued laminated timber made of softwood species by injection of the repair adhesive. The adhesive can also be used to rehabilitate cracks in the area of joints made by nails, screws, dowel-type fasteners and dowels with threads. The adhesive can also be used to fill gaps between the faces of structural components. This document specifies minimum requirements on bond strength and integrity and dimensions of fissures, cracks and openings. This document provides also minimum on-site repair provisions and specifies quality control tests at the structures repaired by bonding.

This document also covers the repair of surface treated wood. It does not cover the repair of modified and stabilized wood with considerably reduced swelling and shrinkage properties, e.g. such as acetylated wood, heat treated wood, polymer impregnated wood and preservative treated wood.

The adhesive is intended for the repair of load bearing timber structures not subjected to temperatures more than 60 °C over a longer time in service classes 1 and 2, see EN 1995-1-1 which are loaded predominantly static or quasi-static, see EN 1990 and EN 1991-1-1. A verification of quality and glue line integrity of the on-site repair bonding is given in an informative Annex A.

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 302-1, *Adhesives for load-bearing timber structures — Test methods — Part 1: Determination of longitudinal tensile shear strength*

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

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 302-5, *Adhesives for load-bearing timber structures — Test methods — Part 5: Determination of maximum assembly time under referenced conditions*

EN 302-6, *Adhesives for load-bearing timber structures — Test methods — Part 6: Determination of the minimum pressing time under referenced conditions*

EN 302-7, *Adhesives for load-bearing timber structures — Test methods — Part 7: Determination of the working life under referenced conditions*

EN 302-8, *Adhesives for load-bearing timber structures — Test methods — Part 8: Static load test of multiple bond line specimens in compression shear*

EN 383, *Timber Structures — Test methods — Determination of embedment strength and foundation values for dowel type fasteners*

EN 408, *Timber structures — Structural timber and glued laminated timber — Determination of some physical and mechanical properties*

EN 14080:2013, *Timber structures — Glued laminated timber and glued solid timber, Requirements*

EN 14358, *Timber structures — Calculation and verification of characteristic values*

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EN 13183-2, *Moisture content of a piece of sawn timber - Part 2: Estimation by electrical resistance method*

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 terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <http://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1**two component epoxy adhesive**

thermosetting synthetic resin derived from a exothermic polymerization reaction of an epoxide group with amines, acid anhydrides, phenols, alcohols or thiols

3.2**two component polyurethane (PUR) adhesive**

urethane polymers which are cross-linked by the reaction between polyol or polyamine with isocyanate

3.3**service class 1**

climatic conditions characterized by a moisture content in the materials corresponding to a temperature of 20 °C and the relative humidity of the surrounding air only exceeding 65% for a few weeks per year

Note 1 to entry: In service class 1, which comprises typical indoor conditions, the average moisture content in most soft-woods will not exceed 12 %.

[SOURCE: EN 1995-1-1:2004, 2.3.1.3]

3.4**service class 2**

climatic conditions characterized by a moisture content in the materials corresponding to a temperature of 20 °C and the relative humidity of the surrounding air only exceeding 85% for a few weeks per year

Note 1 to entry: In service class 2, to which most covered exterior conditions belong, the average moisture content in most softwoods will not exceed 20 %.

[SOURCE: EN 1995-1-1:2004, 2.3.1.3]

3.5**glue line**

adhesive layer between the wood members

[SOURCE: EN 301:2017, 3.7]

3.6**thick glue line**

glue line of nominal thickness in the range of 0,3 mm to 8,0 mm at the time of bonding

Note 1 to entry: Thick glue lines are achieved by using spacers, grooves or similar devices with a thickness of 0,3 mm to 8,0 mm when two plain members are glued together.

[SOURCE: EN 301:2017, 3.8, modified — Maximum thickness has been increased to 8 mm.]

3.7

close contact glue line

glue line thickness of maximum 0,1 mm

Note 1 to entry: Close contact glue line is achieved by pressing together two plane wood members with a clamping pressure of $(0,8 \pm 0,1)$ N/mm² without grooves, spacers or similar device.

[SOURCE: EN 301:2017, 3.9]

4 Symbols

b	specimen width of the net cross-section, in millimetres (mm)
b_1	specimen width, in millimetres (mm)
b_2	specimen width of the net cross-section, in millimetres (mm)
d	nominal rod diameter, in millimetres (mm)
$f_{c,app}$	apparent compression strength, in Newtons per square millimetre (N/mm ²)
$f_{h,app}$	apparent embedment strength, in Newtons per square millimetre (N/mm ²)
$f_{t,app}$	apparent tensile strength, in Newtons per square millimetre (N/mm ²)
$f_{v,app}$	apparent shear strength, in Newtons per square millimetre (N/mm ²)
$F_{c,max}$	compression test failure load, in Newtons (N)
F_{max}	embedment test failure load, in Newtons (N)
$F_{t,max}$	tensile test failure load, in Newtons (N)
F_u	ultimate load, in Newtons (N)
$F_{v,max}$	shear test failure load, in Newtons (N)
H	specimen height, in millimetres (mm)
H_w	component height, in millimetres (mm)
t	specimen thickness of the net cross section, in millimetres (mm)
t_B	glue line thickness, in millimetres (mm)
$\sigma_{m,n}$	bending stress, in Newtons per square millimetre (N/mm ²)
$\sigma_{t,90,u}$	tensile stress perpendicular to grain, in Newtons per square millimetre (N/mm ²)
τ_n	shear stress, in Newtons per square millimetre (N/mm ²)

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