



SLOVENSKI STANDARD
SIST EN 16254:2014+A1:2016
01-junij-2016

Lepila - Emulzijsko polimerizirani izocianat (EPI) za nosilne lesene konstrukcije - Razvrstitev in zahtevane lastnosti

Adhesives - Emulsion polymerized isocyanate (EPI) for load-bearing timber structures - Classification and performance requirements

Klebstoffe - Emulsionspolymerisiertes Isocyanat (EPI) für tragende Holzbauteile - Klassifizierung und Leistungsanforderungen

Adhésifs - Isocyanate polymérisé en émulsion (EPI) pour structures portantes en bois - Classification et exigences de performance

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EUROPEAN STANDARD
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Adhesives - Emulsion polymerized isocyanate (EPI) for load-bearing timber structures - Classification and performance requirements

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exigences de performance

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für tragende Holzbauteile - Klassifizierung und
Leistungsanforderungen

This European Standard was approved by CEN on 22 June 2013 and includes Amendment 1 approved by CEN on 9 February 2016.

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COMITÉ EUROPÉEN DE NORMALISATION
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Contents	Page
European foreword.....	3
Introduction	4
1 Scope	5
2 Normative references	5
3 Terms and definitions	6
4 Classification.....	7
5 Requirements	9
5.1 General.....	9
5.2 Bond strength in longitudinal tensile shear	9
5.3 Resistance to delamination	10
5.4 Tensile strength perpendicular to the glue line after climatic treatment (acid damage test).....	11
5.5 Effect of wood shrinkage on the shear strength.....	11
5.6 Static load test of multiple glue line specimens in compression shear	11
5.7 Creep deformation test at cyclic climate conditions with specimens loaded in bending shear	12
5.8 Long term sustained load test at cyclic climate conditions with specimens loaded perpendicular to the glue line ("Glass house test").....	12
6 Test methods	12
6.1 General.....	12
6.2 Determination of bond strength in longitudinal tensile shear	12
6.3 Determination of resistance to delamination.....	12
6.4 Determination of tensile strength perpendicular to the glue line after climatic treatment (acid damaged test).....	12
6.5 Determination of the effect of wood shrinkage on the shear strength.....	13
6.6 Static load test of multiple glue line specimens in compression shear	13
6.7 Creep deformation test with specimens loaded in bending shear	14
6.8 Long term sustained load test at cyclic climate conditions with specimens loaded perpendicular to the glue line ("Glass house test")	14
7 Working properties of the adhesive.....	14
7.1 General.....	14
7.2 Determination of working life under reference conditions	14
7.3 Determination of open assembly time under reference conditions.....	14
7.4 Determination of pressing time under reference conditions	14
Annex A (normative) Climatic treatment prior to shear test.....	15
Annex B (normative) Glass house test.....	16
Annex C (informative) Product limitations and glulam production control for beams produced with Small Dimension adhesives.....	19
Bibliography.....	20

European foreword

This document (EN 16254:2013+A1:2016) 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 October 2016, and conflicting national standards shall be withdrawn at the latest by October 2016.

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This document supersedes EN 16254:2013.

The start and finish of text introduced or altered by amendment is indicated in the text by tags A1 A1.

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Introduction

This document is one of a series dealing with emulsion polymerised isocyanate (EPI) adhesives for use with timber structures, and is published in support of product standards for bonded load-bearing timber structures.

The series consists of:

- one standard for classification and performance requirements (EN 16254),
- seven test methods (EN 302-1, EN 302-2, EN 302-3, EN 302-4, EN 15416-2, EN 15416-3 and the method given in Annex B of this standard (“Glass house”)) used to assess the performance of adhesives after specified heat and humidity treatments, and
- three test methods (EN 302-7, EN 15416-4 and EN 15416-5) to characterise the working properties of the adhesive.

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1 Scope

This European Standard establishes a classification for emulsion polymerised isocyanate (EPI) adhesives according to their suitability for use in load-bearing timber structures in defined climatic exposure conditions, and specifies performance requirements for such adhesives for the industrial manufacture of load-bearing timber structures only.

A1) The performance requirements of this European Standard apply to the adhesives only, not to the timber structure. This European Standard does not cover the performance of adhesives for on-site gluing (except for factory-like conditions) nor the production of wood-based panels, except solid wood panels, or modified and stabilized wood with considerably reduced swelling and shrinkage properties, e.g. such as acetylated wood, heat treated wood and polymer impregnated wood. **A1)**

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 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 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 302-3, *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 302-7, *Adhesives for load-bearing timber structures — Test methods — Part 7: Determination of the working life under referenced conditions*

EN 923:2005+A1:2008, *Adhesives — Terms and definitions*

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 16254:2013+A1:2016 (E)

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+A1:2008, and the following, apply.

**3.1
emulsion polymerised isocyanate (EPI) adhesive**
water based emulsion polymer or a mixture of water based emulsion polymers cross-linked with an isocyanate as hardener

**3.2
service class 1**
climatic conditions characterised 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

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

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 %.

**3.3
service class 2**
climatic conditions characterised 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

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

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

**3.4
service class 3**
climatic conditions leading to higher moisture contents than in service class 2

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

Note 1 to entry: Exterior conditions typically belong to service class 3.

**3.5
glue line**
adhesive layer between the wood members

**3.6
close contact glue line (cc)**
glue line of thickness 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 groves, spacers or similar device.

3.7

thick glue line

glue line of nominal thickness 0,3 mm to 2,0 mm

Note 1 to entry: Thick glue lines can be achieved by using spacers, grooves or similar devices.

4 Classification

Adhesives for structural purpose 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.

EPI-adhesives according to EN 16254 are classified by **Type** (climate condition in use), **Maximum test temperature** and **Maximum glue line thickness in use**. These three subclasses are subdivided as follows:

Type I: To be used in service class 1 and 2.

Type II: To be used in service class 1 only.

Maximum test temperature: 50 °C, 70 °C or 90 °C.

Maximum glue line thickness in use: 0,1 mm, 0,2 mm and 0,3 mm.

Depending on the maximum glue line thickness in use, the adhesives are assigned to different application areas as described below and shown in Table 1.

- **General purpose adhesives:** to be used for glue lines between laminations (maximum glue line thickness 0,3 mm) and for finger joints in laminations.
- **Small dimension adhesives:** to be used in beams with a maximum cross section 45 000 mm² (maximum glue line thickness 0,2 mm) and for finger joints in laminations. The beam width shall not exceed 180 mm and the beam height shall not exceed 300 mm.
- **Finger jointing adhesives:** to be used for finger jointing of laminations and structural timber only (maximum glue line thickness 0,1 mm).

The application of EPI shall always be in mixed state. These adhesives shall be applied according to the manufacturer`s instructions.

NOTE The definition of **General purpose** and **Type** could be different in other standards.

Table 1 — Adhesive classes

Adhesive type designation	Application area	Max. test temperature ^a °C	Max. glue line thickness mm		Service classes
			Test	Use	
EN 16254 I 70 0,3	Normal use General purpose	70	0,5	0,3	1, 2
EN 16254 I 90 0,3	Special use General purpose	90	0,5	0,3	1, 2
EN 16254 I 90 0,2	Small dimension	90	0,3	0,2	1, 2
EN 16254 I 90 0,1	Finger jointing	90	0,3	0,1	1, 2
EN 16254 I 70 0,2	Small dimension	70	0,3	0,2	1, 2
EN 16254 I 70 0,1	Finger jointing	70	0,3	0,1	1, 2
EN 16254 II 50 0,3	General purpose	50	0,5	0,3	1
EN 16254 II 50 0,2	Small dimension	50	0,3	0,2	1
EN 16254 II 50 0,1	Finger jointing	50	0,3	0,1	1

^a Tested according to EN 15416-2 and Annex A in this standard, designation A6, A7 and A8.

Table 2 specifies the tests which shall be performed for each application area. References are given to the actual subclause in this standard and to which standard the tests are based on.

Table 2 — Necessary tests for adhesive use in difference application areas

Application area	Glue line thickness in test mm	EN 302-1 (based on 6.2) ^a	EN 302-2 (based on 6.3)	EN 302-3 (based on 6.4)	EN 302-4 (based on 6.5)	EN 15416-2 (based on 6.6) ^b	EN 15416-3 (based on 6.7)	Annex B in this standard (based on 6.8)
General Purpose	0,1	X	X			X		X
	0,3						X	
	0,5	X		X	X			X
Small dimension	0,1	X	X			X		X
	0,2						X	
	0,3	X		X	X			X
Finger jointing	0,1	X	X	X		X	X	X
	0,3	X						

^a Climate treatment A1 to A5 and A6 or A7 or A8, depending on maximum test temperature (see Table 1 and Annex A).

^b Maximum test temperature according to Table 1.

5 Requirements

5.1 General

Adhesives complying with this European Standard shall meet the performance requirements specified in 5.2 to 5.8 when tested in accordance with the following test methods:

- a) The tensile shear test (see 5.2 and 6.2) using bonded test pieces made from beech (*Fagus sylvatica* L.).
- b) The delamination test (see 5.3 and 6.3) on bonded test pieces made from Norway spruce (*Picea abies* L.). If the adhesive is to be used on wood from other conifers species like larch (*Larix decidua*), douglas fir (*Pseudotsuga menziesii*) and pines with coloured heartwood other than scots pine (*Pinus sylvestris*), from hardwood species and/or preservative treated wood, also prepare four laminated members using representative samples from those species or wood treated that way.
- c) Tensile strength perpendicular to the glue line after climatic treatment (see 5.4 and 6.4) on bonded test pieces made from Norway spruce (*Picea abies* L.). The test will only be mandatory if the pH value in the mixed adhesive is lower than 3,0.
- d) The shrinkage stress test (see 5.5 and 6.5) on bonded test pieces made from Norway spruce (*Picea abies* L.).
- e) Static load test (see 5.6 and 6.6) on bonded test pieces made from beech (*Fagus sylvatica* L.).
- f) Creep deformation under bending shear (see 5.7 and 6.7) on test pieces made from Norway spruce (*Picea abies* L.).
- g) Long term sustained load test (see 5.8 and 6.8) under cyclic climate conditions perpendicular to the glue line on test pieces made from beech (*Fagus sylvatica* L.).

All these tests are to be carried out with ready for use glue mixes, i.e. adhesive and hardener mixed immediately before application. These adhesives shall be applied according to the manufacturer's instructions.

NOTE For application area **Small dimension**, requirements regarding product limitations and internal factory control by glulam production are given in the informative Annex C of this European Standard. The adhesives in questions are EN 16254 I 70 02, EN 16254 I 90 02 and EN 16254 I I 50 02.

5.2 Bond strength in longitudinal tensile shear test

When tested in accordance with 6.2, the tensile shear strength values of close contact glue lines, 0,3 mm and 0,5 mm thick glue lines shall meet the requirements given in Table 3.