



# SLOVENSKI STANDARD

## SIST EN 302-7:2004

01-oktober-2004

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### Lepila za nosilne lesene konstrukcije - Preskusne metode - 7. del: Določanje dobe trajanja

Adhesives for load-bearing timber structures - Test methods - Part 7: Determination of the conventional working life

Klebstoffe für tragende Holzbauteile - Prüfverfahren - Teil 7: Bestimmung der Gebrauchsdauer

Adhésifs pour structures portantes en bois - Méthodes d'essai - Partie 7 : Détermination de la durée conventionnelle d'utilisation

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Ta slovenski standard je istoveten z: **EN 302-7:2004**

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#### **ICS:**

83.180	Lepila	Adhesives
91.080.20	Lesene konstrukcije	Timber structures

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

EN 302-7

July 2004

ICS 83.180

English version

Adhesives for load-bearing timber structures - Test methods -  
Part 7: Determination of the conventional working life

Adhésifs pour structures portantes en bois - Méthodes  
d'essai - Partie 7 : Détermination de la durée  
conventionnelle d'utilisation

Klebstoffe für tragende Holzbauteile - Prüfverfahren - Teil 7:  
Bestimmung der Gebrauchsdauer

This European Standard was approved by CEN on 16 April 2004.

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. 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.

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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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## Contents

	page
Foreword.....	3
1 Scope .....	4
2 Normative references .....	4
3 Terms and definitions .....	4
4 Principle .....	4
5 Safety .....	4
6 Apparatus .....	5
7 Procedure .....	5
8 Expression of results .....	6
9 Test report .....	7

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## Foreword

This document (EN 302-7:2004) 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 January 2005, and conflicting national standards shall be withdrawn at the latest by January 2005.

No existing European Standard is superseded.

This document 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 adhesives for use in different climatic conditions (EN 301), four test methods (EN 302 Parts 1 to 4) used to assess the performance of adhesives after specified heat and humidity treatments, and three test methods (ENV 302-5 and EN 302 Parts 6 and 7) to characterise the working properties of the adhesive.

EN 301 and EN 302 Parts 1 to 4 and Parts 6 and 7 have the following titles.

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

EN 302 *Adhesives for load-bearing timber structures — Test methods —*

Part 1: *Determination of bond strength in 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 6: *Determination of the conventional pressing time*

Part 7: *Determination of the conventional working life*

ENV 302-5:2001 has the title '*Adhesives for load-bearing timber structures — Test methods — Part 5: Determination of the conventional assembly time*'.

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

**EN 302-7:2004 (E)****1 Scope**

This part of EN 302 specifies a method for determining the conventional working life for adhesives for load-bearing timber structures, by a viscosity test.

This method is not suitable for determining the conventional working life of a multi-component adhesive whose actual working life is very short.

This document is only intended for obtaining a reliable basis for comparison between adhesives. The method gives results which cannot be applied to the safe manufacture of timber structures without modifications for the influences of factory temperature and relative air humidity.

**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 923:1998, *Adhesives — Terms and definitions*

EN ISO 2555:1999, *Plastics — Resins in the liquid state or as emulsions or dispersions — Determination of apparent viscosity by the Brookfield test method (ISO 2555:1989)*

**3 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN 923:1998 and the following apply.

**3.1****conventional working life**

period of time at 20 °C during which an adhesive, prepared for application, increases in apparent viscosity to 25 000 mPa·s

NOTE The test procedure is that described in this document.

**4 Principle**

The viscosity of a specified volume of adhesive at 20 °C is monitored using a Brookfield type viscometer, until it reaches 25 000 mPa·s.

**5 Safety**

Persons using this document shall be familiar with normal laboratory practice.

This document does not purport to address all the safety problems, if any, associated with its use.

It is the responsibility of the user to establish safety and health practices and to ensure compliance with any European or national regulatory conditions.

## 6 Apparatus

**6.1 Beaker**, approximately 850 ml capacity, (90 to 95) mm internal diameter, (115 to 160) mm height with a wall thickness not exceeding 1 mm. The beaker shall be made of a material ensuring a good heat conductivity and that does not react with the adhesive.

NOTE A stainless steel beaker is suitable for most of the commercial adhesives used for the gluing of load-bearing timber structures.

**6.2 Brookfield type viscometer**, type A

The detailed operating principle of this apparatus, its description and characteristics are given in EN ISO 2555.

The viscometer comprises the following elements:

- the viscometer body;
- seven removable, interchangeable spindles, numbered 1 to 7;
- a support which holds the viscometer and moves it into the vertical plane;
- a removable guard stirrup which is not used in this method.

NOTE A RVF model is suitable for most of the commercial adhesives used for the gluing of load-bearing timber structures.

**6.3 Temperature regulated water bath**, capable of maintaining the mixture to be tested at 20 °C with an accuracy of  $\pm 2$  °C.

**6.4 Thermometer**, graduated to 0,1 °C, to measure the temperature of the adhesive being tested.

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## 7 Procedure

**7.1** Handle the adhesive components in accordance with the instructions of the manufacturer of the adhesive. Ensure that, at the start of the test, all the components have a temperature of  $(20 \pm 0,5)$  °C. Ensure that during the test, the relative humidity of the air in the testing room remains at  $(65 \pm 5)$  %.

NOTE It is a common practice to store the components at  $(20 \pm 2)$  °C for 1 night before testing.

**7.2** Set up, calibrate and operate the viscometer in accordance with the instructions of the instrument manufacturer. Choose a rotational frequency of  $20 \text{ min}^{-1}$ . Spindles shall be chosen such that the instrument reading is in the range from 20 % to 95 % of the full scale value.

**7.3** Prepare a sufficient amount of the glue mix in the beaker (6.1) to fill 2/3 of its volume, in accordance with the specifications of the manufacturer. Start to record the time at the moment ( $t_0$ ) the component that initiates the reaction is added.

**7.4** Gently stir the mixture manually for 5 min at  $(20 \pm 2)$  °C. In order to allow any exothermic reaction to proceed normally, do not place the beaker in the water bath during this operation and avoid heating the mixture by body heat through the hand.

**7.5** Place the beaker in the water bath (6.3) adjusted at  $(20 \pm 2)$  °C for the rest of the procedure. Adjust the water level of the water bath so that it is slightly above that of the adhesive in the beaker (6.1). Keep the beaker uncovered throughout the test.

**7.6** Determine the viscosity of the adhesive system at 15 min intervals from the initial time  $t_0$ . About one minute before each reading, gently stir the sample for 15 s to ensure homogeneity.

**EN 302-7:2004 (E)**

**7.7** Remove the beaker from the water bath, hold the spindle at an angle of about 45° to the surface of the adhesive and immerse it in the product, taking care not to introduce air bubbles. Orientate the spindle vertically and connect it to the shaft of the apparatus. Check that the spindle is vertical using the bubble level and that the spindle is immersed to the underside of the mark on its shaft. Allow the instrument to run for 30 s and read the torque meter to the nearest 0,25 % of the maximum value indication at the pre-set time. Lock the needle and stop the motor to take the reading. Immerse the thermometer (6.4) into the sample and record the temperature. Place the beaker back into the water bath (6.3).

**7.8** After each measurement, detach the spindle from the instrument, wash it thoroughly in a suitable solvent and dry it before re-use.

**7.9** Continue determining the viscosity of the sample at 15 min intervals until the viscosity exceeds 25 000 mPa·s.

**NOTE** In order to increase the accuracy of the determination of the conventional working life, it is advisable to reduce the time interval between two readings in the final stage of the reaction.

**8 Expression of results**

Calculate the apparent viscosity, in millipascal seconds (mPa·s), of the adhesive system tested, using the formula:

$$\eta = k \times l$$

where

$\eta$  is viscosity in millipascal seconds; **(standards.iteh.ai)**

$k$  is a coefficient depending on the rotational frequency-spindle combination used; in the case of apparatus as specified in 6.2 of this document and in B.3 of EN ISO 2555:1999, the values of  $k$  are as shown in Table 1; <https://standards.iteh.ai/catalog/standards/sist/84d47fc6-63fe-4a84-a525-5f89817123f2/sist-en-302-7-2004>

$l$  is the value read on the scale.

**Table 1 — Coefficient  $k$  (scale 0 to 100) for each spindle and a rotational frequency of 20 min<sup>-1</sup>**

Spindle number	1	2	3	4	5	6	7
Coefficient $k$	5	20	50	100	200	500	2 000

Plot the change of apparent viscosity with time (in minutes).

Record the conventional working life of the adhesive as the time between  $t_0$  (see 7.3) and the time that the apparent viscosity reaches 25 000 mPa·s.