SLOVENSKI STANDARD
oSIST prEN 17224:2018

01-junij-2018

Ugotavljanje tlačne strižne trdnosti lesnih lepil pri povišanih temperaturah

Determination of compressive shear strength of wood adhesives at elevated temperatures

Bestimmung der Druck-Scherfestigkeit von Holzklebstoffen bei erhöhten Temperaturen

Détermination de la résistance des adhésifs de bois au cisaillement par compression à températures elevées

Ta slovenski standard je istoveten z: **prEN 17224**

ICS:

83.180 Lepila Adhesives

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English Version

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Détermination de la résistance des adhésifs de bois au cisaillement par compression à températures elevées

Bestimmung der Druck-Scherfestigkeit von Holzklebstoffen bei erhöhten Temperaturen

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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (prEN 17224:2018) 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.

Introduction

Safety statement

Persons using this document should be familiar with the normal laboratory practice, if applicable. This document cannot address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any regulatory conditions.

Environmental statement

It is understood that some of the material permitted in this standard may have negative environmental impact. As technological advantages lead to better alternatives for these materials, they will be eliminated from this standard to the extent possible.

At the end of the test, the user of the standard should take care to carry out an appropriate disposal of the wastes, according to local regulation.

1 Scope

This document specifies a test method for determining the comparative compression shear strength of adhesive bonds and solid wood at both ambient temperature and elevated temperature. The maximum load of the test pieces at ambient temperature and after exposure to a defined elevated temperature for a specified duration of time is evaluated. It is applicable to adhesives used in load bearing timber structures and to other wood adhesives.

It is suitable for assessing the influence of elevated temperatures on the compression shear strength of the adhesive bond.

This method is intended primarily to obtain performance data for the influence of elevated temperatures on the behaviour of adhesive bonds. It can be used for the assessment of adhesives for load bearing timber structures and as well for the assessment of non load-bearing wood adhesives with respect to their suitability for forming bonds in defined climatic environments, at elevated temperatures.

This method is not intended to provide data for structural design, and does not necessarily represent the performance of the bonded member in service.

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 14080, *Timber structures - Glued laminated timber and glued solid timber - Requirements*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

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

4 Principle

Solid wood test pieces and adhesively bonded test pieces are prepared. Both types of test pieces are tested in a compression shear test according to EN 14080 at ambient temperature and after exposure to an elevated temperature. The compression shear strength of the solid wood test pieces and the adhesively bonded test pieces at ambient temperature and elevated temperature is compared in order to evaluate the shear strength of the adhesive at elevated temperature.

5 Apparatus

5.1 Test jig

The test equipment described in EN 14080 is suitable for the performance of the shear test.

5.2 Climate chamber or oven

A climate chamber or oven capable of maintaining the targeted temperature to within ± 1 % and with sufficient air circulation to provide constant temperature conditions within the oven interior for the heating of the test pieces.

5.3 Thermocouples

Thermocouples capable of measuring the temperature in the test pieces.

5.4 Testing machine

A universal testing machine is required for the performance of the shear tests.

6 Test specimens

6.1 Selection of wood

Norway spruce (*Picea abies L.*) with a density of (450 ± 25) kg/m³ at 12 % moisture content shall be used. The material shall be straight-grained and free from knots, reaction wood, machining defects (such as chipped grain, dubbed ends, feed roll polish, coarse knife marks and feed roll compression) and any drying defects such as case hardening, collapse, splits or checks. The raw material for the preparation of the test pieces shall have dimensions of at least 150 mm (width) × 50 mm (height) and a length of at least 300 mm.

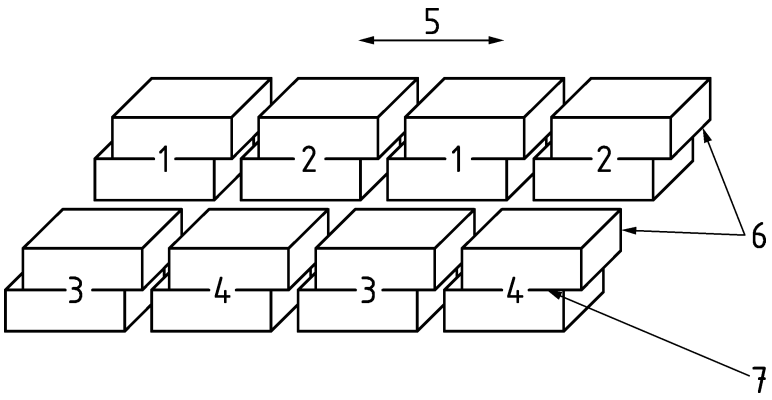
The angle of the annual rings to the surface, as measured from the wide face, shall be between 45° and 90°.

Condition the wood at (20 ± 2) °C and a relative humidity of (65 ± 5) % until a moisture content of (12 ± 1) % has been obtained.

Plane each lamination not more than 8 h before the bonding of the test pieces.

6.2 Preparation of test pieces

Solid wood block shear test pieces and adhesively bonded block shear test pieces shall be produced. To ensure that all test pieces have a comparable wood quality, the solid wood test pieces and the adhesively bonded test pieces shall be produced using the same raw material following the principle as shown in Figure 1. At least four test pieces, two solid wood test pieces for testing at ambient temperature and elevated temperature and two adhesively bonded test pieces for testing at ambient temperature and elevated temperature, shall be produced from one board.



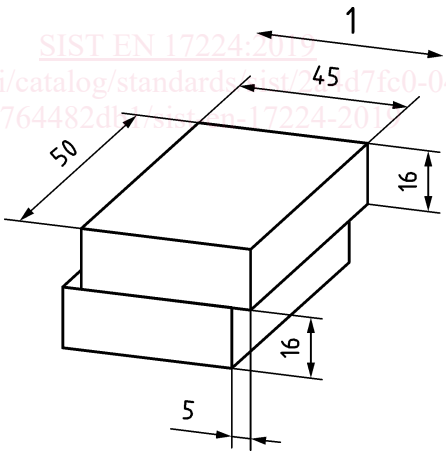
Key

1	solid ambient temperature	5	grain direction
2	solid elevated temperature	6	side-matched specimens
3	bonded ambient temperature	7	bondline
4	bonded elevated temperature		

Figure 1 — Principle for production of side-matched test pieces

20 bonded test pieces shall be prepared in accordance with Figure 2. In addition, 20 solid wood control test pieces shall be produced with the same dimensions as the bonded test pieces. The bonded test pieces and the matched solid wood test pieces shall be produced as 20 pairs. Care shall be taken to ensure the same annual ring orientation when bonding the laminations together into a bonded assembly.

Dimensions in millimetres



Key

1 grain direction

Figure 2 — Form and dimensions of the final block shear test pieces

The bonded test pieces shall be prepared from laminations (16,0 ± 0,1) mm thick (after planing) by (60,0 ± 0,1) mm wide. The adhesive preparation and the bonding procedure shall follow the adhesive manufacturer's recommendation.

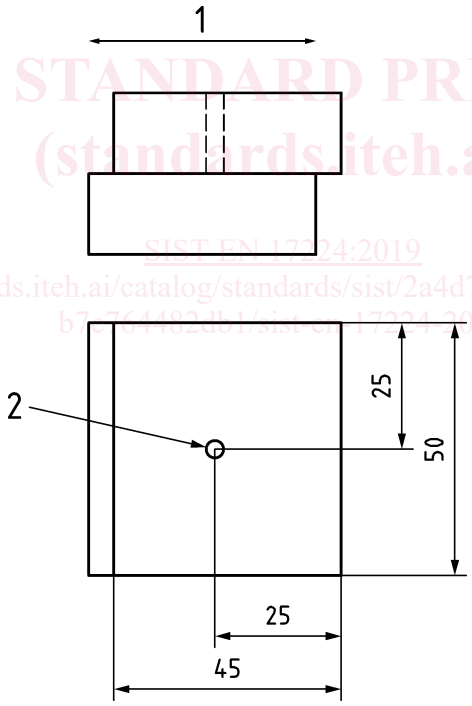
After the bonding process, the bonded laminations shall be conditioned for a minimum of 14 days in standard climate 20 °C and 65 % relative humidity. After the conditioning period, the bonded test pieces shall be planed and cut from the bonded laminations to the final dimensions before the test is started. The shear area of the test pieces shall be (40,0 ± 0,1) mm × (50,0 ± 0,1) mm, see Figure 2.

One bonded test piece intended for testing at elevated temperature and one solid wood test piece intended for testing at elevated temperature are equipped with a thermocouple for measuring the temperature in the bond line area and in the centre of the test piece, respectively. For inserting the thermocouple into the test piece, a hole shall be drilled through one lamination at a 90° angle to the bondline and reaching to within 1,5 mm of the bond line. The drilled hole shall allow the thermocouple to fit snugly inside the hole, with the exposed portion of the thermocouple wire touching the bondline of the bonded test piece or the geometric centre (shear plane) of the matched solid wood control specimen, see Figure 3. The tip of the thermocouple wire shall have a maximum of 1 mm of insulation removed. After inserting the thermocouple, the drilled hole shall be backfilled with a suitable insulation material.

NOTE 1 Drilling a hole with a diameter of 4,5 mm and using a one-component polyurethane adhesive for insulation and closure of the hole after inserting the thermocouple has proven to be a suitable method for inserting the thermocouple into the test piece.

NOTE 2 It is assumed that the difference in temperature increase between individual test pieces is rather small, as long as the temperature within the oven is constant. Under this assumption, it is sufficient to control the temperature increase within the test piece for only one bonded test piece and one solid wood test piece, respectively. In case of doubts concerning the temperature increase within the test pieces, more test pieces can be equipped with a thermocouple to control the temperature increase.

Dimensions in millimetres



Key

1 grain direction

2 hole for thermocouple

Figure 3 — Inserting of the thermocouple in a bonded test piece

After final preparation and before the drying of the test pieces is started, the mass of all specimens shall be recorded. Following that, all specimens shall be oven-dried for 48 h at (60 ± 2) °C and afterwards placed in an atmosphere, such as a desiccator, to allow for cooling in dry conditions without any further change in wood moisture content. The test pieces are to be kept in the desiccator until the start of the test.