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BSI Standards Publication

Paints and varnishes — Coating materials and coating systems for exterior wood — Assessment of end grain sealing performance

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National foreword

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A list of organizations represented on this committee can be obtained on request to its secretary.

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English Version

Paints and varnishes - Coating materials and coating systems for exterior wood - Assessment of end grain sealing performance

Peintures et vernis - Produits de peinture et systèmes de peinture pour bois en extérieur - Évaluation des performances du colmatage des bois de bout

Beschichtungsstoffe - Beschichtungsstoffe und Beschichtungssysteme für Holz im Außenbereich - Beurteilung des Leistungsverhaltens von Hirnholzversielgelungen

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European foreword

This document (CEN/TS 16969:2016) has been prepared by Technical Committee CEN/TC 139 “Paints and varnishes”, the secretariat of which is held by DIN.

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1 Scope

This Technical Specification specifies a test method to evaluate the ability of coating materials to seal the end grain of wood against ingress of water.

This procedure is relevant for joinery or wood based cladding materials whose service life can depend on the control of water penetration through the coated end-grain.

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 927-5:2006, *Paints and varnishes - Coating materials and coating systems for exterior wood - Part 5: Assessment of the liquid water permeability*

EN ISO 4618, *Paints and varnishes - Terms and definitions (ISO 4618)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 4618 and the following apply.

3.1
water absorption
ability of a coated or uncoated wood sample to absorb water from liquid or vapour

[SOURCE: EN 927-5:2006, 3.1]

3.2
water permeability
ability of a coating system to allow the transmission of water as liquid or vapour

[SOURCE: EN 927-1:2013, 3.13]

3.3
stable mass
mass achieved when the difference between two subsequent weighings within 24 h does not exceed 0,2 %

[SOURCE: EN 927-5:2006, 3.3]

3.4
end grain sealer
system applied on the end grain

4 Principle

Water permeability is assessed by measuring the water uptake over a 72 h period of coated test pieces exposed to liquid water. The coating under test is applied to the end grain surface of a defined test piece where the remaining sides are carefully sealed using a sealer of a defined mandatory low water

permeability. Results are expressed as water absorption of coated wood samples in grams per square meter test surface per 72 h.

5 Sample preparation

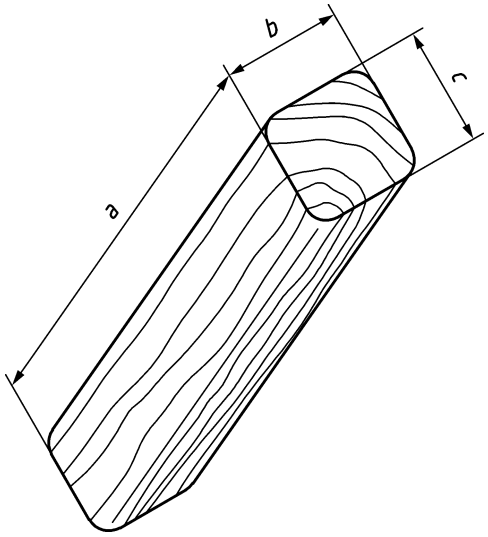
5.1 Wood

The wood shall be spruce (*Picea abies*) that has been selected to be free from knots and cracks, to be straight-grained and of normal growth rate (i.e. between 3 and 8 annual rings per 10 mm). The wood shall be free from blue stain and evidence of surface or bulk infection. Abnormal porosity (caused by bacterial attack) shall be avoided. Abnormally porous wood can be detected qualitatively by the rapid absorption of a drop of propan-2-ol (isopropanol) applied to the surface; the drop should not be absorbed in less than 30 s by normal wood. The test should be carried out at not less than six places, widely separated on the rear face of the test sample.

The density of the wood shall be between 0,4 g/cm^3 and 0,5 g/cm^3 when measured at an equilibrium moisture content of approximately 12 %. The measured density shall be recorded.

Condition the wood prior to conversion into test samples at (20 ± 2) °C and a relative humidity of (65 ± 5) %.

Convert the conditioned wood into samples (45 ± 2) mm × (45 ± 2) mm × (150 ± 2) mm in size. The samples shall be planed all round to a smooth and uniform finish. The end grain shall be cut with a sharp circular saw to obtain a smooth surface without visible defects from cutting. Any samples showing surface splitting shall be rejected. The longitudinal edges shall be rounded with 3 mm radius. For illustration, see Figure 1.



Key

a = (150 ± 2) mm

b = (45 ± 2) mm

c = (45 ± 2) mm

Figure 1 — Size of test samples

5.2 Preparation of coated samples and sealed controls

5.2.1 Wood conditioning

Prior to coating, condition the samples to constant mass at (20 ± 2) °C and a relative humidity of (65 ± 5) %. Samples shall be weighed at intervals of not less than one day until they have reached a stable mass (see 3.3).

5.2.2 Sample selection

Select five samples for each of the coatings to be tested. Select also five samples for testing the sealer product; this set of samples will serve as sealed controls.

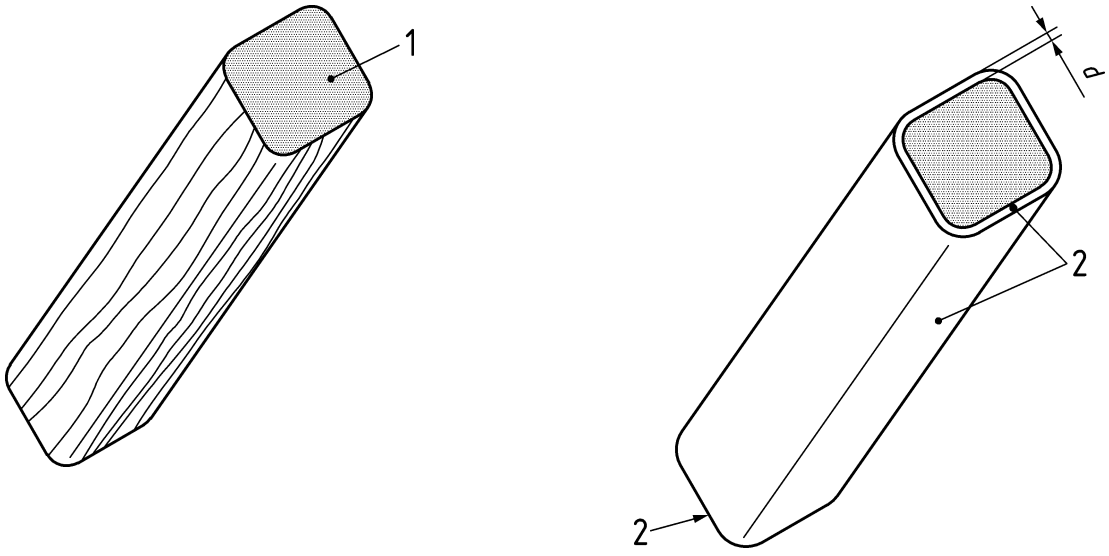
5.2.3 Coating application

Coating systems shall be applied according to the manufacturer's specifications. Apply each test coating system to one end grain surface only. Record applied quantity of each coating layer by weighing the samples before and after coating application.

5.2.4 Sealing and conditioning

Samples shall be sealed in the same way whether they are applied for test coatings or control of sealer. Seal all sides and the uncoated end-grain of the samples against water entry using at least two coats of a flexible moisture-impermeable coating, for example a solvent-free epoxy or polyurethane paint. The liquid water permeability of the sealer tested according to EN 927-5 shall not exceed 30 g/m² in 72 h.

The sealer shall cover the edges completely and overlap the test face by 2 mm (see Figure 2). Apply the sealer to the uncoated end grain so many times that a closed and uniform film is obtained.



Key

1 coating application on one end grain

2 sealing of all sides and the opposite end grain

d overlap of sealer on test face, *d* = 2 mm

Figure 2 — Coating and sealing of the test samples

6 Apparatus

6.1 Conditioning room, of appropriate size, controlled at a temperature of (20 ± 2) °C and a relative humidity of (65 ± 5) %.

6.2 Container, for deionized water, of size sufficient to hold the all the samples under test.

6.3 Balance, capable of weighing to the nearest 0,01 g.

7 Procedure

7.1 Pre-Conditioning

After coating application, sealing and drying of coating materials the samples shall be stored in controlled environment (see 6.1) at (20 ± 2) °C and a relative humidity of (65 ± 5) %, until a stable mass is achieved.

NOTE Usually 28 days is used as a suitable time period for drying and curing.

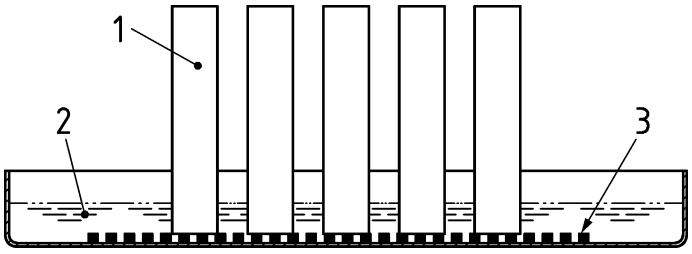
7.2 Absorption cycle

Weigh the test samples to the nearest 0,01 g and record the initial mass (m_0).

Fill the container (6.2) with deionized water and place it in the conditioning room (6.1). The water shall have reached stable temperature in the conditioned room, i.e. (20 ± 2) °C. Immerse the test samples with the coated end grain surface under test down into the water ensuring that the whole of the test face is fully wetted. Use a sample holder and load the samples with weight to ensure that the test surfaces are (10 ± 3) mm under the water surface.

After 72 h remove the test samples from the water, blot lightly to remove any water droplets and weigh. Record the elapsed time and mass (m_1).

All handling of the samples shall be carried out in the conditioning room (6.1). An example for the test set up see Figure 3.



Key

1 Samples with end grain sealer under test facing downwards

2 water

3 grid to ensure full wetting of test face

Figure 3 — Example for test set up

7.3 Optional testing of weathered samples

If required, end grain sealers may be subjected to a weathering test before or after measurement of liquid water permeability.

8 Calculation and expression of results

At the end of the test, calculate the water uptake $m_1 - m_0$, in grams for the five coated samples with the end grain sealer under test and the five sealed control samples.

Calculate the water absorption per square metre of test surface for the five coated samples with the end grain sealer under test and the five sealed control samples by dividing the water uptake by the nominal test area of each of the five test samples. From the five values for the water absorption mean value and standard deviation shall be stated in the test report.

9 Test report

The test report shall contain at least the following information:

a) all details necessary to identify the product tested;

b) a reference to this Technical Specification;

c) the name and address of the testing laboratory;

d) the identification number of the test report;

e) the name and address of the organization or the person who ordered the test;

f) the mean water absorption value and standard deviation for the coated and the sealed control samples, as indicated in Clause 8;

g) the density of the wood used for the test samples;

h) the applied amount of coating materials under test;

i) any deviation from the test method specified;

j) the authorization date of the test report.

Bibliography

EN 927-1:2013, *Paints and varnishes - Coating materials and coating systems for exterior wood - Part 1: Classification and selection*

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