SLOVENSKI STANDARD
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Barve in laki - Premazi in premazni sistemi za zunanjo zaġļito lesa - 5. del: Ocenjevanje prepustnosti vode

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

Beschichtungsstoffe - Beschichtungsstoffe und Beschichtungssysteme für Holz im Außenbereich - Teil 5: Beurteilung der Wasserdurchlässigkeit

Peintures et vernis - Produits de peinture et systemes de peinture pour le bois en extérieur - Partie 5 : Détermination de la perméabilité a l'eau liquide

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Peintures et vernis - Produits de peinture et systèmes de peinture pour le bois en extérieur - Partie 5 : Détermination de la perméabilité à l'eau liquide

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Foreword

This document (EN 927-5:2006) has been prepared by Technical Committee CEN/TC 139 "Paints and varnishes", the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by June 2007, and conflicting national standards shall be withdrawn at the latest by June 2007.

This document supersedes EN 927-5:2000.

EN 927 consists of the following parts under the general title: *Paints and varnishes — Coating materials and coating systems for exterior wood*

— *Part 1: Classification and selection*

— *Part 2: Performance specification*

— *Part 3: Natural weathering test*

— *Part 5: Assessment of the liquid water permeability*

— *Part 6: Exposure of wood coatings to artificial weathering using fluorescent UV lamps and water*

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

The treatment of exterior wood surfaces has both aesthetic and protective functions. A vital purpose of a coating system is to protect the wood against aesthetic deterioration (e.g. blue stain attack) and dimensional changes. Because such attacks are mainly caused by high moisture contents in the wood, a knowledge of the relative water permeability properties of coating materials applied to exterior wood is helpful in selecting products for particular end-use applications, as described in EN 927-1.

1 Scope

This part of EN 927 specifies a test method for assessing the liquid water permeability of coating systems for exterior wood.

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.

prEN ISO 2808:2004, *Paints and varnishes — Determination of film thickness (ISO/DIS 2808:2004)*

ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

[EN 927-1]

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

4 Principle

Water permeability is assessed by measuring the water uptake over a 72 h period of a coated test panel exposed to liquid water.

The coating under test is applied to the face of a defined test panel where the remaining face and sides are carefully sealed using a sealer of a defined mandatory low permeability.

Results are expressed as water absorption of coated wood panels in grams per square metre test surface per 72h.

5 Test panels

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 inclination of the growth rings to the test face shall be (45 ± 10)°. See Figure 1.

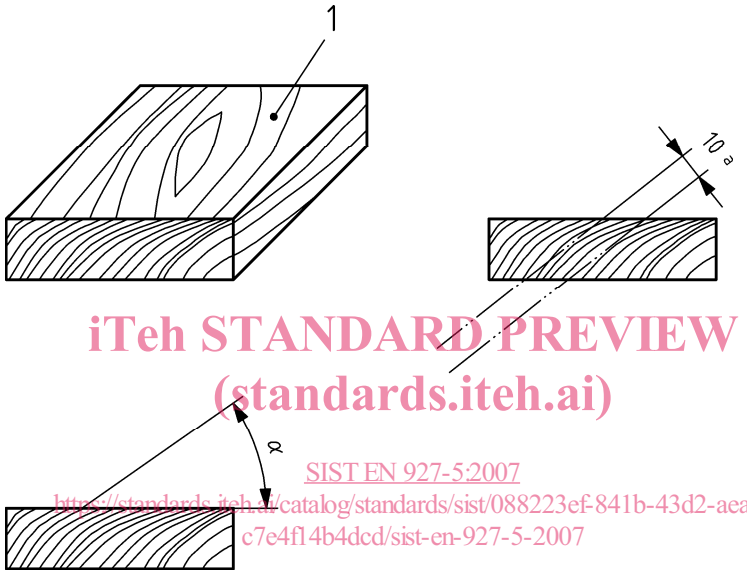
The wood shall be free from blue stain and evidence of surface or bulk infection. Abnormal porosity (caused by bacterial attack) shall be avoided.

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 panel.

The density of the wood shall be between 0,4 g/cm³ and 0,5 g/cm³ when measured at an equilibrium moisture content of approximately 12 %. The measured density shall be recorded.

Condition the wood prior to conversion into test panels in accordance with ISO 554 at (20 ± 2) °C and a relative humidity of (65 ± 5) %.

Dimensions in millimetres



Key

1 Front of panel (test face)
a Min. 3, max. 8 growth rings/10 mm.
α Angle of growth rings to test face min. 35°, max. 55°.

Figure 1 — Selection of wood

5.2 Preparation and selection of test panels

Convert the conditioned wood into panels (340 ± 2) mm × (70 ± 2) mm × (20 ± 2) mm in size. It is intended that after coating one panel 150 mm in length will be cut from each end of this 340 mm long panel. This will leave an off-cut C_c approximately 40 mm in length from the middle of the panel, to be used in due course for the determination of film thickness (see 5.3.5 and Figure 2).

The panels shall be planed all round to a smooth and uniform finish. Any panels showing surface splitting shall be rejected.

5.3 Preparation of coated and uncoated panels

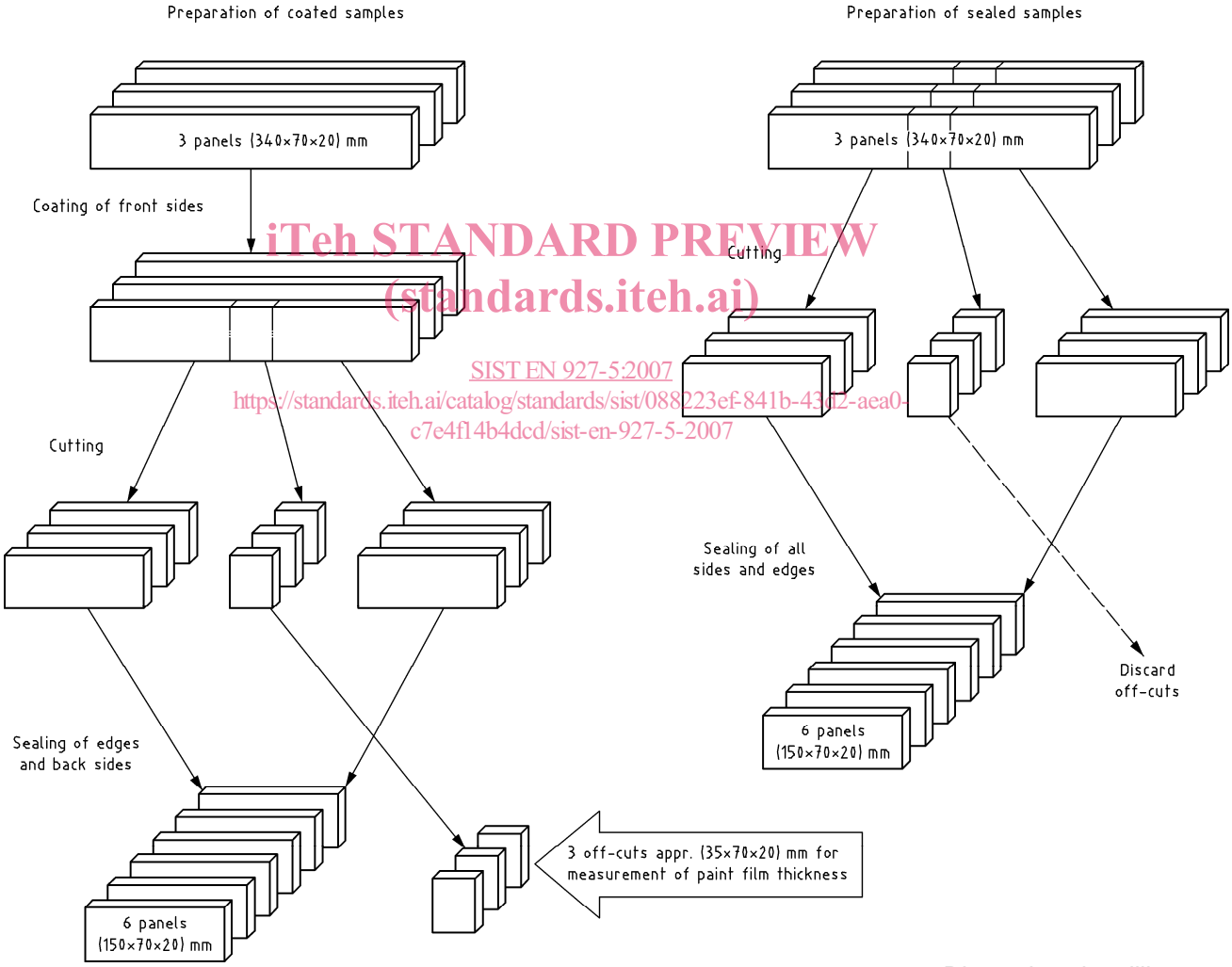
5.3.1 Wood conditioning

Prior to coating, condition the panels to constant mass in accordance with ISO 554 at (20 ± 2) °C and a relative humidity of (65 ± 5) %. Panels shall be weighed at intervals of not less than one day until they have reached a stable mass (see 3.3).

5.3.2 Panel selection

Select three panels for each of the coatings to be tested. Select also three panels for testing the sealer product; this set of panels will serve as sealed controls (see Figure 2).

Mark each panel to identify the test face as that convex to the annual rings.



Dimensions in millimetres

Figure 2 — Cutting of test panels

5.3.3 Coating application

Coating systems shall be applied according to the manufacturers specifications.

Apply each test coating system to the test face only (convex side of the panels).

Each coating system under test requires 3 test panels (340 mm × 70 mm ×20 mm).

When the coating systems have dried, cut a test panel 150 mm in length from both ends of each long panel (see Figure 2).

The three small coated off-cuts C_c are used for the determination of film thickness.

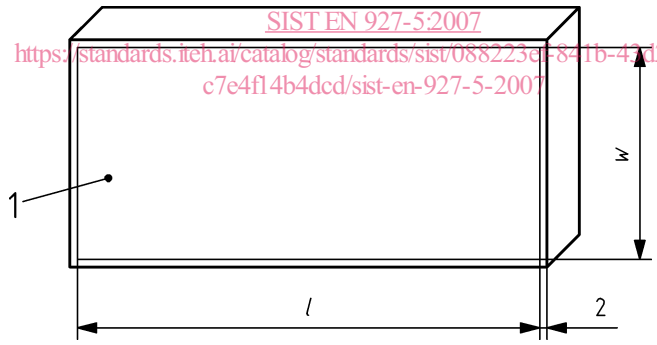
Three additional panels are required to check the test face with the selected sealer. This sealer and the number of layers should be identical with the later on used sealer for sealing the test panels (150 mm × 70 mm ×20 mm). The liquid water permeability of the sealer shall not exceed 30 g/m² in 72 h (see Figure 2).

Additional information is given in Annex B.

5.3.4 Sealing and conditioning

Panels shall be sealed in the same way whether they are applied for test coatings or control of sealer. Seal the sides, end-grains and reverse faces of the panels against water entry using at least two coats of a flexible moisture-impermeable coating, for example a solvent-free epoxy or polyurethane paint. The sealer shall cover the edges completely and overlap the test face by 2 mm (see Figure 3). Apply the sealer to the end grain so many times that a closed and uniform film is obtained.

Dimensions in millimetres



Key

1 Test face.
2 2 mm
l Length of the test face
w Width of the test face

Figure 3 — Sealing of panels

After sealing, condition the panels in the controlled environment (see 5.3.1) until constant mass is achieved (for typically 7 to 28 days). After drying of the sealer measure and record the actual test area of each panel (see Figure 3).

5.3.5 Dry film thickness

Determine the dry film thickness of the coating on the off-cuts (see Figure 2) of the test panels. Remove one small chip of coated wood from each of the off-cuts and examine by microscopy in accordance with prEN ISO 2808:2004, method 6A. Make 5 measurements on each chip and calculate and record the mean value in micrometres.

The dry film thickness is defined as the thickness of the layer on (above) the wood surface. Systems may penetrate the wood material to some extent, but this part is not included in the determination.

6 Apparatus

6.1 Microscope for measurement of dry film thickness in accordance with prEN ISO 2808:2004, method 6A.

6.2 Conditioning room, of appropriate size, controlled at a temperature of (20 ± 2) °C and a relative humidity of (65 ± 5) %, in accordance with ISO 554.

6.3 Container for deionized water, of size sufficient to hold the all the panels under test.

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

7 Procedure

7.1 Pre-conditioning

It is known that the water permeability of some types of coating can change markedly during a relatively short period of exposure to water. For such coatings the values of water permeability obtained during a short period of contact with water might not be representative of those obtained during long-term service. For this reason all panels shall be subjected to a leaching procedure before commencement of the absorption cycle.

This procedure shall be carried out twice as follows:

— 24 h floating face down in deionized water, such that the test face is fully submerged;

— 3 h drying at (20 ± 2) °C and a relative humidity of (65 ± 5) % in accordance with ISO 554;

— 3 h drying at 50 °C;

— 18 h drying at (20 ± 2) °C and a relative humidity of (65 ± 5) % in accordance with ISO 554.

All panels shall be handled together.

After preconditioning, the test panels shall be conditioned by returning them to the controlled environment (see 6.2) in accordance with ISO 554 at (20 ± 2) °C and a relative humidity of (65 ± 5) %, until a stable mass is achieved once more.

7.2 Absorption cycle

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

Fill the container (6.3) with deionized water and place it in the conditioning room (6.2). The water shall have reached stable temperature in the conditioned room, i.e. (20 ± 2) °C.

Float the test panels face down on the surface of the water ensuring that the whole of the test face is fully wetted.