SLOVENSKI STANDARD
SIST EN 927-6:2007

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Barve in laki - Premazi in premazni sistemi za zunanjo zaģļ ito lesa - 6. del: Izpostava premazov za les umetnemu staranju s fluorescentnimi UV svetilkami in vodo

Paints and varnishes - Coating materials and coating systems for exterior wood - Part 6: Exposure of wood coatings to artificial weathering using fluorescent UV lamps and water

Beschichtungsstoffe - Beschichtungsstoffe und Beschichtungssysteme für Holz im Außenbereich - Teil 6: Künstliche Bewitterung von Holzbeschichtungen mit fluoreszierenden UV-Lampen und Wasser

Peintures et vernis - Produits de peinture et systèmes de peinture pour bois en extérieur - Partie 6 : Vieillissement artificiel des revetements pour bois par exposition a des lampes UV fluorescentes et a de l'eau

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ICS:

71.100.50	Kemikalije za zaģļ ito lesa	Wood-protecting chemicals
87.040	Barve in laki	Paints and varnishes

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Paints and varnishes - Coating materials and coating systems for exterior wood - Part 6: Exposure of wood coatings to artificial weathering using fluorescent UV lamps and water

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Beschichtungsstoffe - Beschichtungsstoffe und Beschichtungssysteme für Holz im Außenbereich - Teil 6: Künstliche Bewitterung von Holzbeschichtungen mit fluoreszierenden UV-Lampen und Wasser

This European Standard was approved by CEN on 26 June 2006.

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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.

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Contents

Foreword

This document (EN 927-6:2006) 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of an identical text or by endorsement, at the latest by February 2007, and conflicting national standards shall be withdrawn at the latest by February 2007.

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

Coatings from paints, varnishes and similar materials are weathered in a laboratory in order to simulate ageing processes which occur from natural weathering. Generally, a valid correlation between ageing during artificial and natural weathering cannot be expected due to a large number of influencing factors. Certain relationships can only be expected if the effect of the important parameters (spectral distribution of the irradiance in the photochemically relevant range, temperature of the specimen, type of wetting, wetting cycle relative humidity) on the coating is known. However, unlike natural weathering, testing in the laboratory is carried out taking into consideration a limited number of variables which can be controlled and therefore the results are more reproducible.

1 Scope

This part of EN 927 specifies a method for determining the resistance of wood coatings to artificial weathering performed in an apparatus equipped with fluorescent UV lamps, condensation and water spray devices.

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

EN ISO 2409, *Paints and varnishes — Cross-cut test (ISO 2409:1992)*

EN ISO 2808, *Paints and varnishes — Determination of film thickness (ISO 2808:1997)*

EN ISO 2813, *Paints and varnishes — Determination of specular gloss of non-metallic paint films at 20°, 60° and 85° (ISO 2813:1994, including Technical Corrigendum 1:1997)*

EN ISO 4628-1:2003, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 1: General introduction and designation system (ISO 4628-1:2003)*

EN ISO 4628-2, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 2: Assessment of degree of blistering (ISO 4628-2:2003)*

EN ISO 4628-4, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 4: Assessment of degree of cracking (ISO 4628-4:2003)*

EN ISO 4628-5, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 5: Assessment of degree of flaking (ISO 4628-5:2003)*

EN ISO 4628-6, *Paints and varnishes — Evaluation of degradation of paint coatings — Designation of intensity, quantity and size of common types of defect - Part 6: Rating of degree of chalking by tape method (ISO 4628-6:1990)*

prEN ISO 11507:2005, *Paints and varnishes — Exposure of coatings to artificial weathering — Exposure to fluorescent UV and water (ISO/DIS 11507:2005)*

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

ISO 7724-1, *Paints and varnishes — Colorimetry — Part 1: Principles*

ISO 7724-2, *Paints and varnishes — Colorimetry — Part 2: Colour measurement*

3 Principle

Artificial weathering of coatings using fluorescent UV lamps, condensation or water spray is carried out in order to produce a certain radiant exposure or mutually agreed total number of operation hours, based on a given degree of a change in a property or properties. The properties of the exposed coatings are compared with those of unexposed coatings, which are prepared from the same coating materials under identical conditions or with coatings whose degradation properties are known.

Radiation, temperature and humidity all contribute to the ageing process. Therefore, the apparatus specified in this standard simulates all three factors.

The results obtained by this method do not necessarily directly relate to the results obtained under natural exposure conditions. The relationship between these results needs to be established before the method can be used to predict performance.

The standard test substrate is pine sapwood with the back side of panels coated. However, supplementary information on coating performance may be obtained by conducting optional tests on additional wood species, on pine, modified or impregnated by industrial processes or without coating the back side of the panels.

4 Apparatus

4.1 Test chamber

The test chamber consists of an enclosure made from corrosion-resistant material which houses the lamps, a heated water tray, spray nozzles and test panel racks.

4.2 Lamps

A UV lamp emits UV light from a low pressure mercury arc. The required spectral distribution is achieved by careful selection of the type of phosphor coating on the inner surface of the lamp and the nature of the glass used in the construction of the tubes.

The lamp shall be of the following type:

Lamp, commonly called UV-A 340, with a peak emission at 340 nm and the following relative spectral irradiance (see prEN ISO 11507:2005, lamp type 2):

Table 1 — Relative spectral irradiance of lamp

Wavelength nm	**Relative spectral irradiance**[a] %
290 < λ ≤ 400	100
λ ≤ 290 290 < λ ≤ 300 Note: Broader band pass below 300 < λ ≤ 320 320 < λ ≤ 340 340 < λ ≤ 360 360 < λ ≤ 380 380 < λ ≤ 400	0,0 0,2 6,2 to 8,6 27,1 to 30,7 34,2 to 35,4 19,5 to 23,7 6,6 to 7,8
[a] The spectral irradiance between 290 nm and 400 nm is defined as 100 %.	

4.3 Device for wetting the test panels

The test panels shall be wetted by condensation from the heated water tray and by spray. To prevent spotting on to the test panels, water with a pH value between 5,0 and 7,5 and an electrical conductivity of maximum 2 mS/m, measured at (25 ± 1) °C shall be used. See Annex D.

4.4 Black panel thermometer

Set the apparatus to operate at the specified parameters. The temperature shall be monitored by a remote sensor attached to the black panel. The black panel thermometer shall be exposed to the same exposure conditions as the specimens. Black panel thermometers shall be calibrated in accordance with the manufacturer's recommendations.

4.5 Irradiance control

The irradiance at 340 nm shall be set to 0,89 W/(m²nm) (see 6.3.1).

Apparatus equipped with an irradiance control system shall be calibrated in accordance with the manufacturer's recommendations.

Lamps within the apparatus without an irradiance control system need to be rotated and replaced in accordance with the manufacturer's recommendations to compensate for lamp ageing.

5 Test panels

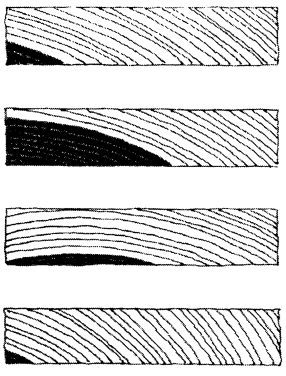
5.1 Wood

The wood shall be Scots Pine (*Pinus sylvestris*) that has been selected free of knots, cracks and resinous streaks, to be straight-grained and of normal growth rate (i.e. 3 to 8 annual rings per 10 mm). The inclination of the growth rings to the face shall be 5° to 45° (see Figure 1).

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

The panels shall be selected to give a sapwood test surface on the convex side of the growth rings, with no heartwood (if present), closer than 10 mm to the test surface. If the presence of heartwood in the selected pine cannot be detected by a difference in the colour in the wood, it shall be checked using the test described in Annex C.

The wood shall be conditioned at (20 ± 2) °C and a relative humidity of (65 ± 5) % (in accordance with ISO 554) to constant mass.



The topside of the panels is the exposed side, the bottom is the rear face

Key

a) Example of a panel fulfilling the demands of growth ring orientation (5º to 45º) at the front side. No heartwood is closer than 10 mm to the test surface.

b) This panel does not meet the specification because the heartwood is too close to the front side.

c) This panel does not meet the specification because the growth ring orientation is not within the (5º to 45º) band. The growth rings incline at -10º on the left of the panel and 30º on the right. Consequently a part of the surface contains a tangentially cut wood surface (growth ring inclination 0º), with considerable risk of crack formation.

d) This panel does not meet the specification because the growth ring orientation is not within the (5º to 45º) band and the growth rings incline 45º on the left of the panel and 70º on the right.

Figure 1 — Cross section of panels

5.2 Preparation and selection of wood panels

The panels shall be nominally (150 ± 2) mm × (74 ± 1) mm and (18 ± 1) mm thick. The panels shall be planed to a smooth and uniform finish.

Any panels showing surface splitting shall be rejected. Where the presence of some minor defects in the test area are unavoidable, their position should be noted and their influence excluded during assessment of coating performance.

Mark the back of the panels to ensure that they can be identified during subsequent operations.

5.3 Preparation of coated panels

5.3.1 Wood conditioning

Prior to coating, condition the panels at (20 ± 2) °C with a relative humidity of (65 ± 5) % until the constant mass is in accordance with ISO 554. Keep the panels under the same conditions during drying of the coating system, and during subsequent storage of test panels before exposure. Panels may be transferred for brief periods to other ambient conditions where this is required for the conduct of specific operations or assessments.

5.3.2 Preparation of panels for the test coating

For each system select four panels from the available supply. Three panels shall be used for exposure and the fourth shall serve as an unexposed reference. In order to remove oleophilic films immediately before coating, the panels shall be hand sanded (mesh 150). Rounding of edges is not permitted.

Apply the coating system to all surfaces of each panel including end grain.

Apply the coating system using the method specified by the manufacturer to give a wet film thickness corresponding to the mean value (± 20 %) of the manufacturer's recommended spreading rate.

Record the quantity of coating material applied to each test panel and subsequently calculate a mean value for the four panels. The values should preferably be stated in g/m^2, but may also be expressed as wet film thickness, in micrometres (see EN ISO 2808). The determination of the quantity of applied coating by weighing is the preferred method.

5.3.3 Conditioning

After the coating application age the panels for approximately 7 days in a controlled environment at (20 ± 2) °C and a relative humidity of (65 ± 5) % before carrying out the initial panels examinations.

6 Procedure

6.1 Examination before exposure

Before exposure carry out the following measurements:

— gloss;

— colour;

— dry film thickness (only reference panels);

— Adhesion (only reference panels).

As wood is a natural material, unexpected defects can be detected in the coated panels just before exposure, even though the wood material has been selected, inspected and prepared in keeping with the guidelines of 5.1 and 5.2. Exceptionally, if such panels are exposed, the type, size and position of the defects shall be noted so as to avoid any influence on the assessment after exposure.

For further details see annex A.

6.2 Mounting the test panels

Secure the test panels in the sample holders (whenever possible) with two exposure windows of approximately 95 mm × 64 mm. All spaces in the apparatus shall be occupied by test panels and any vacant spaces shall be occupied by blanks.

6.3 Exposure

6.3.1 Exposure cycle

An exposure cycle of one week consists of a condensation period followed by a sub-cycle of water spray and UV-A 340 irradiation as given in Table 2.