



# SLOVENSKI STANDARD

## SIST EN 927-3:2012

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**Barve in laki - Premazi in premazni sistemi za zaščito lesa v zunanji uporabi - 3.  
del: Preskus s staranjem v naravnih razmerah**

Paints and varnishes - Coating materials and coating systems for exterior wood - Part 3:  
Natural weathering test

Lacke und Anstrichstoffe - Beschichtungsstoffe und Beschichtungssysteme für Holz im  
Außenbereich - Teil 3: Freibewitterung

Peintures et vernis - Produits de peinture et systèmes de peinture pour bois en extérieur  
- Partie 3: Essais de vieillissement naturel

**Ta slovenski standard je istoveten z: EN 927-3:2012**

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**ICS:**

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

**SIST EN 927-3:2012**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN 927-3**

July 2012

ICS 87.040

Supersedes EN 927-3:2006

English Version

## Paints and varnishes - Coating materials and coating systems for exterior wood - Part 3: Natural weathering test

Peintures et vernis - Produits de peinture et systèmes de  
peinture pour bois en extérieur - Partie 3: Essais de  
vieillessement naturel

Beschichtungsstoffe - Beschichtungsstoffe und  
Beschichtungssysteme für Holz im Außenbereich - Teil 3:  
Freibewitterung

This European Standard was approved by CEN on 9 June 2012.

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**EN 927-3:2012 (E)****Foreword**

This document (EN 927-3:2012) 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of an identical text or by endorsement, at the latest by January 2013, and conflicting national standards shall be withdrawn at the latest by January 2013.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 927-3:2006.

The main technical changes are:

- a) Precision data were added in an informative Annex G;
- b) Using the multi-blade cutting tool for cross-cut test is allowed.

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 organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

## 1 Scope

This European Standard specifies a natural weathering test for exterior wood coating systems mainly intended for decoration and protection of planed and sawn wood.

The test provides a means of evaluating the performance of a wood coating system during outdoor exposure. It forms the basis for the performance specification in accordance with EN 927-2.

## 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 ISO 1513, *Paints and varnishes — Examination and preparation of test samples (ISO 1513)*

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

EN ISO 2431, *Paints and varnishes — Determination of flow time by use of flow cups (ISO 2431)*

EN ISO 2808:2007, *Paints and varnishes — Determination of film thickness (ISO 2808:2007)*

EN ISO 2810, *Paints and varnishes — Natural weathering of coatings — Exposure and assessment (ISO 2810)*

EN ISO 2813, *Paints and varnishes — Determination of specular gloss of non-metallic paint films at 20°, 60° and 85° (ISO 2813)*

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)*

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)*

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)*

EN ISO 4628-6, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 6: Assessment of degree of chalking by tape method (ISO 4628-6)*

EN ISO 11664-4, *Colorimetry — Part 4: CIE 1976  $L^*a^*b^*$  Colour space (ISO 11664-4)*

EN ISO 15528, *Paints, varnishes and raw materials for paints and varnishes — Sampling (ISO 15528)*

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

## EN 927-3:2012 (E)

### 3 Principle

The resistance to natural weathering of the coating system under test, applied to a wood substrate, is assessed. Durability is evaluated by determining the changes in decorative and protective properties of coatings after 12 months of exposure.

The standard test substrate selected was *Pinus sylvestris* (European redwood or Scots pine, subsequently referred to as pine) in order to obtain relevant results more rapidly. The sapwood, which is usually present in joinery timber, was chosen for use instead of heartwood because paint failure is more evident on the former.

Differences in quality of wood, and in the weather and site conditions, are recognised and allowed for in the method by comparing the test with a reference system. The composition of the reference system (designated as "Internal Comparison Product" or "ICP") is specified in Annex A.

The standard test substrate is pine sapwood with the rear side of panels untreated. 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, by using a pine panel containing a water trap in its exposed face, or by coating the rear side of the panels.

Optional tests are described in Annex E. It is emphasised that they can serve only to provide additional information.

### 4 Apparatus and materials

**4.1 Exposure racks**, inclined at an angle of 45° to the horizontal, on which the specimens are facing towards the equator in accordance with EN ISO 2810.

**4.2 Glossmeter**, for the measurement of specular gloss in accordance with EN ISO 2813, at 60° geometry.

**4.3 Tristimulus colorimeter or spectrophotometer**, for the measurement of colour and calculation of colour difference in CIELAB colour coordinates in accordance with EN ISO 11664-4.

**4.4 Tape and cutting tool**, for the assessment of adhesion in accordance with EN ISO 2409.

**4.5 Microscope**, with a magnification of ×10 for the assessment of surface defects.

**4.6 Microscope**, for measurement of film thickness in accordance with ISO 2808:2007, method 6A.

**4.7 Self-adhesive, transparent tape**, in accordance with EN ISO 4628-6 for the assessment of chalking.

**4.8 Climate chamber**.

### 5 Sampling

Take a representative sample of the product tested or of each product in the case of a multi-coat system, as described in EN ISO 15528.

Examine and prepare each sample for testing as described in EN ISO 1513.



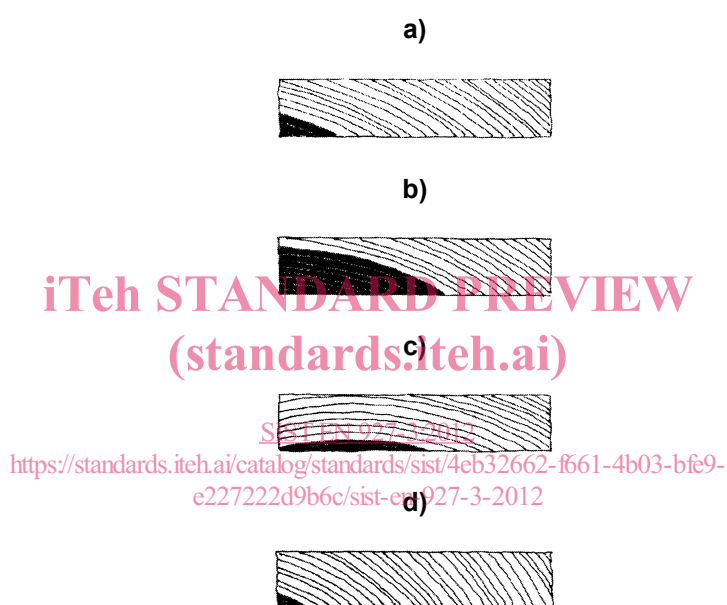
## 6 Test panels

### 6.1 Wood

The wood shall be pine that has been selected to be free from knots, cracks and resinous streaks and 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  $5^\circ$  to  $45^\circ$  (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 B, Clause B.10).

The wood shall be conditioned at  $(20 \pm 2)^\circ\text{C}$  and a relative humidity of  $(65 \pm 5)\%$  (in accordance with ISO 554) to an equilibrium moisture content of  $(13 \pm 2)\%$ .



#### Key

- a) Example of a panel with no heartwood (if present) closer than 10 mm to the test surface fulfilling the requirement for growth ring orientation ( $5^\circ$  to  $45^\circ$ ) at the front side.
- 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  $5^\circ$  to  $45^\circ$  band. The growth rings incline  $-10^\circ$  at the left of the panel and  $30^\circ$  at the right. Consequently a part of the surface contains tangentially cut wood surface (growth ring inclination  $0^\circ$ ), with considerable risk of crack formation.
- d) This panel does not meet the specification because the growth ring orientation is not within the  $5^\circ$  to  $45^\circ$  band. The growth rings incline  $45^\circ$  at the left of the panel and  $70^\circ$  at the right.

NOTE The top side of panels is the exposed side; the bottom is the rear face.

**Figure 1 — Cross section of panels**

**EN 927-3:2012 (E)****6.2 Preparation and selection of wood panels**

The panels shall be cut from boards planed all round and shall be nominally  $(375 \pm 2)$  mm  $\times$   $(78 \pm 3)$  mm and  $(20 \pm 2)$  mm thick. For details of panel preparation see Figure 2. The panels shall be planed to a smooth and uniform finish. In order to avoid aged wood surface, the panels shall be hand sanded (mesh 150) immediately before coating. Rounding of edges is not permitted.

The panels shall be selected to give a sapwood test surface on the convex side of the growth rings, with any heartwood confined to a zone no closer than 10 mm from the front side. Heartwood shall be checked with the reagent described in B.11, at both ends of each panel.

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

**6.3 Preparation of coated panels****6.3.1 Wood conditioning**

Prior to coating, condition the panels at  $(20 \pm 2)$  °C and a relative humidity of  $(65 \pm 5)$  % until constant mass 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.

**6.3.2 Preparation of panels for the test coating**

For each system, select four panels on a random basis from the available supply. Three panels shall be used for exposure and the fourth shall be for unexposed reference.

Apply the coating system to the front and side faces of each panel. The front side of the panel is the side facing the bark of the tree. The back of the panel and end-grains shall be left uncoated.

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

Record the quantity of coating applied to each test panel and subsequently calculate a mean value for the four panels. The values should be stated preferably in  $\text{g/m}^2$ , but may also be expressed as wet film thickness (in micrometres).

**6.3.3 Preparation of panels for the Internal Comparison Product (ICP)**

Prepare four panels by applying the ICP to the front and side faces of each panel. The back of the panel and end-grains shall be left uncoated. Apply the ICP by brushing in three coats, allowing 16 h to 24 h drying between coats. The spreading rate shall correspond to a total of  $(150 \pm 30)$   $\text{g/m}^2$  wet film. The dry film thickness shall be  $(50 \pm 10)$   $\mu\text{m}$  on pine.

One set of ICP panels exposed at the same time may serve as the comparison for one or more test coatings.

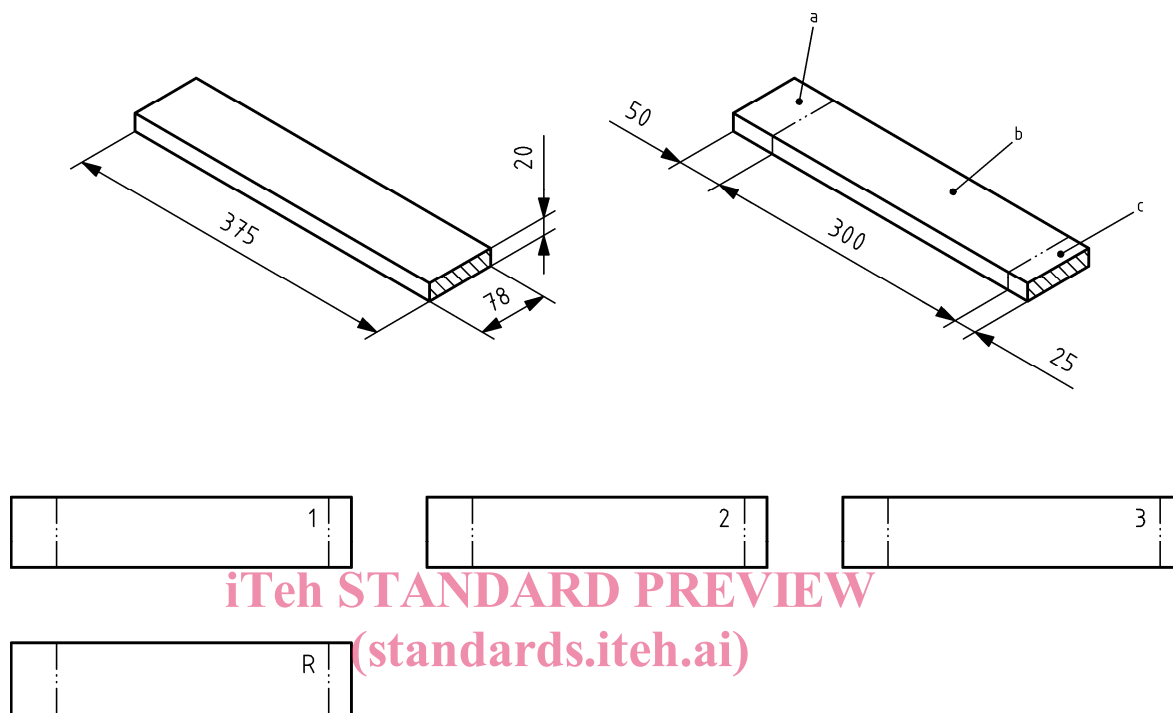
**6.3.4 Sealing and ageing**

When the test coatings and ICP have dried, seal thoroughly the ends of the panels with at least two coats of a flexible, moisture-impermeable white paint, for example of long-oil alkyd type, and capable of withstanding 2 years of natural exposure without breakdown. The sealer may be applied by brushing or dipping. The sealer shall be applied to the bands marked "a" and "c" at the ends of the panel shown in Figure 2. It is important that the sealer is applied all round, i.e. that front, sides, end grains and rear face of the bands are coated.

After sealing, age the panels for approximately 7 days in the controlled environment at  $(20 \pm 2) ^\circ\text{C}$  and a relative humidity of  $(65 \pm 5) \%$  (in accordance with ISO 554), before carrying out initial panel examinations.

Exposure shall start at the latest 28 days after completion of sealing.

Dimensions in millimetres



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**Key**

- 1, 2 and 3 Exposure panels
- R Unexposed reference panel
- a Sealed end (may be used for numbering of test panels)
- b Section for application of coating system
- c Sealed end

NOTE The figure is not to scale.

**Figure 2 — Details of test panels**

### 6.3.5 Thickness of the coating

Determine the dry film thickness of the ICP and the test coating using the unexposed reference panels. Examine three small chips of coated wood removed from each reference panel by microscopy in accordance with EN ISO 2808:2007, method 6A. The three chips shall be removed at three different places spaced evenly across the panel width. Make five measurements on each of the three chips and calculate and record the mean value in micrometres.

The thickness is stated in micrometres and refers to 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.