



SLOVENSKI STANDARD
kSIST FprEN 16581:2014

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**Ohranjanje kulturne dediščine - Zaščita površine poroznih anorganskih materialov
- Laboratorijske preskusne metode za vrednotenje učinkovitosti vodoodbojnih
sredstev**

Conservation of Cultural Heritage - Surface protection for porous inorganic materials -
Laboratory test methods for the evaluation of the performance of water repellent
products

Erhaltung des kulturellen Erbes - Oberflächenschutz für poröse anorganische Materialien
- Laborprüfverfahren für die Ermittlung der Wirksamkeit von wasserabweisenden
Produkten

Conservation du patrimoine culturel - Protection de surface des matériaux inorganiques
poreux - Méthodes d'essai en laboratoire pour l'évaluation des performances des
produits hydrofuges

Ta slovenski standard je istoveten z: FprEN 16581

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97.195	Umetniški in obrtniški izdelki	Items of art and handicrafts

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**Conservation of Cultural Heritage - Surface protection for porous
inorganic materials - Laboratory test methods for the evaluation
of the performance of water repellent products**

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des matériaux inorganiques poreux - Méthodes d'essai en
laboratoire pour l'évaluation des performances des produits
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poröse anorganische Materialien - Laborprüfverfahren für
die Ermittlung der Wirksamkeit von wasserabweisenden
Produkten

This draft European Standard is submitted to CEN members for formal vote. It has been drawn up by the Technical Committee CEN/TC 346.

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

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Foreword

This document (FprEN 16581:2014) has been prepared by Technical Committee CEN/TC 346 “Conservation of Cultural Heritage”, the secretariat of which is held by UNI.

This document is currently submitted to the Formal Vote.

Introduction

As part of the conservation of built heritage, a variety of surface treatments can be carried out to delay the decay processes.

This document focuses on water repellent treatments of porous inorganic materials. The main goal of a water repellent is to reduce the penetration of liquid water and the substances dissolved in the water into porous material by changing its surface properties.

A water repellent product when applied to the surface of a material decreases its surface tension and prevents wetting of the surface. The water repellent treatment is applied to the surface and penetrates into the pores of the material, the depth of penetration being dependent on the capillary properties of the material, the properties of the hydrophobic treatment and the type and duration of application.

Many deterioration mechanisms result from the presence of water and therefore the reduction of water absorption may positively influence the preservation of porous inorganic materials.

Coatings including varnishes and paints are not considered within this European Standard.

A water repellent should fulfil the following requirements to:

- reduce the absorption of liquid water in the substrate,
- minimize change of water vapour permeability of the substrate,
- minimize change in colour and gloss of the substrate,
- produce no harmful by-products after the application,
- maintain its physical and chemical stability.

Water repellent products should be applied on the surface of heritage objects only after they have been tested on representative samples of porous inorganic materials in the laboratory.

This European Standard for the evaluation of water repellent treatments is based on the measurement of appropriate parameters to assess the performance of the product using standardized test methods.

In situ application methods include brushing, spraying, immersion, capillary rise absorption and poultice. Due to the dimensions of samples and the requirements to perform reproducible treatment procedures for laboratory testing, the capillarity method is specified. Where a treatment cannot be applied according to the standard method (for example when an emulsion is used) the application method should be clearly described in the test report.

Technical and chemical data sheets of treatment under evaluation should be provided; the data sheets which detail at least the chemical formulas of the active substances and concentrations, the names and the ratio of solvents, if applicable.

In order to evaluate the durability and in service performance of a water repellent product applied on the substrate, ageing tests representing the environment in which the porous inorganic material is located can be carried out.

1 Scope

This European Standard specifies the methodology for laboratory evaluation of the performance of water repellent products on porous inorganic materials.

It is based on the measurement of several parameters which assess the performance of the product using standard test methods before and after ageing.

Acceptable performance within the laboratory does not constitute a blanket endorsement of application in every situation. The particular context of the heritage object, including such factors as material designation, condition, exposure, salt content and problems related to water ingress requires further investigation.

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 15801, *Conservation of cultural property - Test methods - Determination of water absorption by capillarity*

EN 15802, *Conservation of cultural property - Test methods - Determination of static contact angle*

EN 15803, *Conservation of cultural property - Test methods - Determination of water vapour permeability (δp)*

EN 15886, *Conservation of cultural property - Test methods - Colour measurement of surfaces*

EN 15898, *Conservation of cultural property - Main general terms and definitions*

EN 16085, *Conservation of Cultural property - Methodology for sampling from materials of cultural property - General rules*

EN 16302, *Conservation of cultural heritage - Test methods - Measurement of water absorption by pipe method*

EN 16322, *Conservation of Cultural Heritage - Test methods - Determination of drying properties*

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)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 15898 and the following apply.

3.1

water-repellency

ability of the substrate to resist the ingress of liquid water

3.2

water repellent product

product increasing the water-repellency of the treated surface of porous inorganic materials

3.3

water repellent treatment

application of a water repellent product to the surface of a material by a specified methodology

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- 3.4 protection degree by capillarity**
reduction of the amount of water absorption by capillarity before and after the treatment
- 3.5 protection degree by pipe**
reduction of the amount of water absorption by pipe before and after the treatment
- 3.6 specular gloss**
ratio of the luminous flux reflected from an object in the specular direction for a specified source and receptor angle to the luminous flux reflected from glass with a refractive index of 1,567 in the specular direction

4 Symbols and abbreviations

For the purposes of this document, the following symbols and abbreviations apply:

m_{0B}	dry mass after characterization tests and before the treatment, in kg;
m_{0A}	dry mass after the treatment, in kg;
t_i	time elapsed from the beginning of the test, in s;
Q_i	water absorbed by capillarity per unit area, in kg/m^2 ;
AC	capillary water absorption coefficient, in $\text{kg}/(\text{m}^2 \cdot \text{s}^{1/2})$;
Q_p	water repellent product absorbed, as a mass %;
PD_{Ci}	Protection Degree by capillarity at time t_i , as a mass %;
Q_{Bi}	amount of absorbed water by capillarity of untreated specimen at time t_i , in kg/m^2 ;
Q_{Ai}	amount of absorbed water of treated specimen at time t_i , in kg/m^2 ;
$\bar{\delta}_p$	water vapour permeability, in $\text{kg}/\text{m s Pa}$;
$\bar{\delta}_{pB}$	water vapour permeability before treatment, in $\text{kg}/\text{m s Pa}$;
$\bar{\delta}_{pA}$	water vapour permeability after treatment, in $\text{kg}/\text{m s Pa}$;
$\bar{\delta}_{p\text{red}}$	reduction of water vapour permeability, as a %;
L^*	lightness coordinate. The scale for L^* ranges from 0 (black) to 100 (white);
a^*	red/green coordinate, with $+a^*$ indicating redness and $-a^*$ indicating greenness;
b^*	yellow/blue coordinate, with $+b^*$ indicating yellowness and $-b^*$ indicating blueness;
L^*_B	Lightness coordinate before treatment;
L^*_A	Lightness coordinate after treatment;
a^*_B	red/green coordinate before treatment;
a^*_A	red/green coordinate after treatment;
b^*_B	yellow/blue coordinate before treatment;
b^*_A	yellow/blue coordinate after treatment;
ΔE^*	total colour difference;
PD_{LP}	Protection Degree by pipe method, as a %;
$(W_f)_B$	amount of absorbed water by pipe method at the end of the test before the treatment, in ml/cm^2 ;
$(W_f)_A$	amount of absorbed water by pipe method at the end of the test after the treatment, in ml/cm^2 ;