SLOVENSKI STANDARD
SIST EN 15803:2010

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Ohranjanje kulturne dediġļ ine - Preskusne metode - Doloļ anje prepustnosti vodne pare (ŭp)

Conservation of cultural property - Test methods - Determination of water vapour permeability (ŭp)

Erhaltung des kulturellen Erbes - Pr¿fverfahren - Bestimmung des Wasserdampfleitkoeffizienten (ŭp)

Conservation des biens culturels - M®thodes d'essai - D®termination de la perm®abilit®¨ la vapeur d'eau (ŭp)

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97.195	Umetniški in obrtniški izdelki	Items of art and handicrafts

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Conservation of cultural property - Test methods - Determination of water vapour permeability (δ_p)

Conservation des biens culturels - Méthodes d'essai - Détermination de la perméabilité à la vapeur d'eau (δ_p)

Erhaltung des kulturellen Erbes - Prüfverfahren - Bestimmung des Wasserdampfleitkoeffizienten (δ_p)

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 15803:2009) has been prepared by Technical Committee CEN/TC 346 “Conservation of cultural property”, the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by June 2010 and conflicting national standards shall be withdrawn at the latest by June 2010.

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Introduction

This test method can be applied if it does not change the value of the cultural property and follows relevant ethical codes of conservation practice.

1 Scope

This European Standard specifies a method for determining the water vapour permeability (WVP) of porous inorganic materials used for and constituting cultural property. The method may be applied to porous inorganic materials either untreated or subjected to any treatment or ageing.

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 15898:2009, *Conservation of cultural property — Main general terms and definitions concerning conservation of cultural property*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 15898:2009 and the following apply.

3.1
porous inorganic materials
materials including natural stones, e.g. sandstone, limestone, marble, as well as artificial materials, such as mortar, plaster, brick and others

3.2
water vapour flow rate
G
mass of water vapour transferred through the specimen per time

3.3
density of water vapour flow rate
vapour transmission rate
g
mass of water vapour transferred through the specimen per time and per unit area

3.4
water vapour permeance
W_p
value of the mass of water vapour diffused through a specimen, induced by a partial vapour pressure gradient through the specimen, per unit area, time and partial vapour pressure difference

3.5
water vapour permeability
δ_p
product of the water vapour permeance and the thickness of a homogeneous specimen

3.6
water vapour permeability of air
δ_a
water vapour permeability of air δ_a is defined by the Schirmer equation:

$$\delta_a = 0{,}000\,023\,1\ (p_o/(p \times R \times T)) \times (T/273\ K)^{1{,}81}\ kg/(m{\cdot}s{\cdot}Pa) \qquad (1)$$

where

p_o is the standard barometric pressure (= 1 013,25 hPa);

p is the barometric pressure (hPa);

T is the temperature (K);

R is the gas constant for water vapour (= 462 Nm/(kg·K))

3.7
water vapour diffusion resistance coefficient
μ
water vapour permeability of air divided by that of the material concerned

3.8
water vapour diffusion-equivalent air layer thickness
s_d
value of a specimen which indicates the thickness of a motionless air layer that has the same water vapour resistance as the specimen of thickness D.

The s_d value can be obtained in two ways:

i) by multiplication of the μ-value with the thickness D of the specimen;

ii) from the water vapour permeability of air δ_a divided by the water vapour permeance of the specimen Wp

4 Principle

Determination of the water vapour flow through the specimen subjected to different partial water vapour pressures.

5 Symbols and abbreviations

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

m mass of specimen and cup assembly, in kg

D mean thickness of specimen, in m

A test surface area, in m²

t time, in s

G water vapour flow rate through specimen, in kg/s

g density of water vapour flow rate, in kg/(m²·s)

Δp_v water vapour pressure difference across the specimen, in Pa

W_p water vapour permeance with respect to partial vapour pressure, in kg/(m²·s·Pa)

δ_p water vapour permeability with respect to partial vapour pressure, in kg/(m·s·Pa)

δ_a water vapour permeability of air, in kg/(m·s·Pa)

μ water vapour diffusion resistance coefficient (-)

s_d water vapour diffusion-equivalent air layer thickness, in m

6 Test equipment

6.1 Test set-ups: two types of cup systems are possible as presented in Figure 1 and Figure 2.

The cup's weight should be compatible with the measurement method which needs the use of an analytical balance.

Test cups shall be resistant to corrosion from the desiccant or salt solutions. Typically cups are made of glass, metal or PVC.

For certain cups and sealing methods, a template, with shape and size corresponding to that of the test cup, is used when applying the sealant to give a sharply defined, reproducible test area. The template shall have an area of at least 90 % of the specimen to limit non-linear vapour flow. The sealant, which is impermeable to water vapour, should neither undergo changes during the test nor bring about changes to the test surface of the specimen.

NOTE Circular cups can be easier to seal. Transparent cups enable observing the test in progress; thus, the saturated state of the salt solutions can be monitored.

Examples of suitable sealants:

— a mixture of 90 % microcrystalline wax and 10 % plasticizer;

— a mixture of 60 % microcrystalline wax and 40 % refined crystalline paraffin.