

**Hygrothermal performance of building materials and products - Determination of water absorption coefficient by partial immersion**

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## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 15148:2003 sisaldab Euroopa standardi EN ISO 15148:2002 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 15.04.2003 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 15148:2003 consists of the English text of the European standard EN ISO 15148:2002.</p> <p>This document is endorsed on 15.04.2003 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p><b>Käsitlusala:</b></p> <p>This European Standard specifies a method for determining, by partial immersion with no temperature gradient, the short-term liquid water absorption coefficient. It is intended to assess the rate of absorption of water, by capillary action from continuous or driving rain during on site storage or construction, by insulating and other materials, which are normally protected. The method is suitable for renders or coatings tested in conjunction with the substrate on which they are normally mounted</p>	<p><b>Scope:</b></p> <p>This European Standard specifies a method for determining, by partial immersion with no temperature gradient, the short-term liquid water absorption coefficient. It is intended to assess the rate of absorption of water, by capillary action from continuous or driving rain during on site storage or construction, by insulating and other materials, which are normally protected. The method is suitable for renders or coatings tested in conjunction with the substrate on which they are normally mounted</p>
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**Võtmesõnad:** construction, construction materials, definition, definitions, determination, facades, measuring techniques, moisture, physical testing, testing, thermal protection, water absorption, water absorption coefficient, water absorption tests, water- absorption tests

**English version**

**Hygrothermal performance of building materials and products**

Determination of water absorption coefficient by partial immersion  
(ISO 15148 : 2002)

Performance hygrothermique des  
matériaux et produits pour le bâti-  
ment – Détermination du coefficient  
d'absorption d'eau par immersion  
partielle (ISO 15148 : 2002)

Wärme- und feuchtetechnisches  
Verhalten von Baustoffen und  
Bauprodukten – Bestimmung des  
Wasseraufnahmekoeffizienten bei  
teilweisem Eintauchen  
(ISO 15148 : 2002)

This European Standard was approved by CEN on 2002-06-24.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

The European Standards exist 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, the Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, the Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom.

**CEN**

European Committee for Standardization  
Comité Européen de Normalisation  
Europäisches Komitee für Normung

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## Foreword

This document EN ISO 15148:2002 has been prepared by Technical Committee CEN/TC 89 "Thermal performance of buildings and building components", the secretariat of which is held by SIS, in collaboration with Technical Committee ISO/TC 163 "Thermal insulation".

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 2003, and conflicting national standards shall be withdrawn at the latest by June 2003.

This standard is one of a series of standards which specify test methods for the thermal and moisture related properties of building materials and products.

NOTE Normative references to International Standards are listed in annex ZA (normative).

Annex A is informative, annex ZA is normative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

## Introduction

The movement of moisture within hygroscopic capillary building materials is a combination of vapour and liquid flows which have complex interactions with the temperature and humidity gradients and the properties of the materials present. Three stages can be identified.

- a) At very low humidities transport is by vapour diffusion alone and the permeability can be derived from dry-cup tests, defined in ISO 12572.
- b) At higher relative humidities in the hygroscopic region, up to about 95 % relative humidity, there is a mixture of gas and water filled pores with simultaneous flows of vapour and liquid. The increasing liquid flow causes the exponentially increasing permeability measured by cup tests under isothermal conditions. However, under practical, non-isothermal conditions this liquid flow could increase, or decrease, the total mass flow.
- c) Above about 95 % relative humidity, depending on the material, the total mass transport is governed by transport in the liquid phase. This is the situation that arises when a material is dipped in water or severely wetted e.g. by driving rain. The water moves under the hydraulic pressure, the negative suction pressure. After the water source is removed, the hydraulic pressure ceases and the liquid is redistributed within the material at a different rate (stages b) and c) do not necessarily apply to all hygroscopic materials).

Methods are currently being developed in research laboratories to quantify capillary transport and measure the relevant coefficients. At present, however, these involve sophisticated measuring techniques such as gamma ray and neutron absorption or Nuclear Magnetic Resonance (NMR) spectroscopy together with complex mathematical methods to analyse the results: comparisons between laboratories have shown that further work is needed to develop standard techniques. It will, therefore, be a number of years before it is possible to standardise such methods - see annex A for further information.

At present it is possible to standardise the measurement of the absorption of liquid water into the surface of a material, which gives an indicator of its liquid transport performance.

## 1 Scope

This European Standard specifies a method for determining, by partial immersion with no temperature gradient, the short-term liquid water absorption coefficient. It is intended to assess the rate of absorption of water, by capillary action from continuous or driving rain during on site storage or construction, by insulating and other materials, which are normally protected. The method is suitable for renders or coatings tested in conjunction with the substrate on which they are normally mounted.

It is not intended to assess the absorption of water by materials used under water or in overall contact with saturated ground, where a total immersion test is more appropriate.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

ISO 9346, *Thermal insulation - Mass transfer - Physical quantities and definitions*.

## 3 Terms and definitions

### 3.1 Definitions

For the purposes of this European Standard, the terms and definitions given in ISO 9346 and the following apply.

#### 3.1.1

##### **water absorption coefficient**

mass of water absorbed by a test specimen per face area and per square root of time

NOTE See equation (2) in clause 8.

#### 3.1.2

##### **homogeneous material**

material the properties of which are uniform on a macroscopic scale

### 3.2 Symbols and units

Symbol	Quantity	Unit
$A$	face area	$\text{m}^2$
$A_w$	water absorption coefficient	$\text{kg}/(\text{m}^2 \cdot \text{s}^{0.5})$
$A_{wt}$	water absorption coefficient related to a specific time, $t$ , in seconds	$\text{kg}/(\text{m}^2 \cdot \text{s}^{0.5})$
$\Delta m_t$	mass gain per face area after time $t$	$\text{kg}/\text{m}^2$
$M_i$	initial mass of specimen	$\text{kg}$
$m_t$	mass of specimen after time $t$	$\text{kg}$
$t$	time	$\text{s}$ or $\text{h}$
$W_w$	water absorption coefficient	$\text{kg}/(\text{m}^2 \cdot \text{h}^{0.5})$
$W_{wt}$	water absorption coefficient related to a specific time, $t$ , in hours	$\text{kg}/(\text{m}^2 \cdot \text{h}^{0.5})$

NOTE Water absorption coefficient is defined in terms of seconds in EN ISO 9346. The alternative definition in terms of hours is widely used.