

**Paints and varnishes - Coating materials and coating systems for exterior masonry and concrete - Part 6: Determination of carbon dioxide permeability**

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## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN 1062-6:2002 sisaldab Euroopa standardi EN 1062-6:2002 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 18.10.2002 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN 1062-6:2002 consists of the English text of the European standard EN 1062-6:2002.</p> <p>This document is endorsed on 18.10.2002 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 two methods for determining the carbon dioxide permeability of coatings, coating systems and related products, intended for exterior masonry and concrete. The methods are applicable to coatings and coating systems on porous substrates such as plaster, concrete etc</p>	<p><b>Scope:</b></p> <p>This European Standard specifies two methods for determining the carbon dioxide permeability of coatings, coating systems and related products, intended for exterior masonry and concrete. The methods are applicable to coatings and coating systems on porous substrates such as plaster, concrete etc</p>
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ICS 87.040

**Võtmesõnad:** classifications, definitions, exterior areas, exterior coatings, exterior finishes, lacquers, masonry, mineral, painting, paints, permability, permeability, physical properties, plasters, resin impregnated plasters, subsoil, testing, varnishes

ICS 87.040

English version

**Paints and varnishes - Coating materials and coating systems  
for exterior masonry and concrete - Part 6: Determination of  
carbon dioxide permeability**

Peintures et vernis - Produits de peinture et systèmes de  
revêtement pour maçonnerie et béton extérieur - Partie 6:  
Détermination de la perméabilité au dioxyde de carbone

Beschichtungsstoffe - Beschichtungsstoffe und  
Beschichtungssysteme für mineralische Untergründe und  
Beton im Außenbereich - Teil 6: Bestimmung der  
Kohlenstoffdioxid-Diffusionsstromdichte (Permeabilität)

This European Standard was approved by CEN on 26 March 2002.

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.

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 Management Centre has the same status as the official versions.

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



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

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## Foreword

This document EN 1062-6:2002 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 2003, and conflicting national standards shall be withdrawn at the latest by January 2003.

This European Standard was prepared jointly by CEN/TC 139, Paints and varnishes (Secretariat: DIN Deutsches Institut für Normung e. V.) and CEN/TC 104/SC 8, Protection and repairs of concrete structures (Secretariat: DIN Deutsches Institut für Normung e. V.), after considerable preparatory work by CEN/TC 139/WG 1 "Coating systems for masonry" (Convenor: R. Michel, France) which had formed a Joint Group with CEN/TC 104/SC 8/WG 1 "Surface protection" (Convenor: Dr. R. Stenner, Germany).

EN 1062 consists of the following parts under the general title *Paints and varnishes – Coating materials and coating systems for exterior masonry and concrete*:

*Part 1: Classification*

*Part 2: Determination and classification of water-vapour transmission rate (permeability)<sup>1)</sup>*

*Part 3: Determination and classification of liquid-water transmission rate (permeability)*

*Part 6: Determination of carbon dioxide permeability*

*Part 7: Determination of crack-bridging properties – Test methods and classification*

*Part 11: Methods of conditioning before testing*

The annex A, B and C of this European Standard are 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

This is one of a number of Parts of EN 1062 dealing with test methods for coating materials and coating systems for exterior masonry and concrete. It should be read in conjunction with EN 1062-1.

## 1 Scope

This European Standard specifies two methods for determining the carbon dioxide permeability of coatings, coating systems and related products, intended for exterior masonry and concrete.

The methods are applicable to coatings and coating systems on porous substrates such as plaster, concrete etc.

## 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).

EN 1062-1:1996, *Paints and varnishes – Coating materials and coating systems for exterior masonry - Part 1: Classification*.

EN 1062-11, *Paints and varnishes – Coating materials and coating systems for exterior masonry and concrete – Part 11: Methods of conditioning before testing*.

EN ISO 15528, *Paints and varnishes and raw materials for paints and varnishes – Sampling (ISO 15528:2000)*.

EN 23270:1991, *Paints and varnishes and their raw materials – Temperatures and humidities for conditioning and testing (ISO 3270:1984)*.

EN ISO 1513, *Paints and varnishes – Examination and preparation of samples for testing (ISO 1513:1992)*.

EN ISO 2808:1999, *Paints and varnishes – Determination of film thickness (ISO 2808:1997)*.

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<sup>1)</sup> Published as EN ISO 7783-2.

EN ISO 7783-1:1999, *Paints and varnishes – Determination of water-vapour transmission rate – Part 1: Dish method for free films (ISO 7783-1:1996, including Technical Corrigendum 1:1998)*.

### 3 Terms and definitions

For the purposes of this European Standard, the following terms and definitions apply.

#### 3.1 carbon dioxide permeability $i$

amount of carbon dioxide in grams (g) that will diffuse in one day (d) through one square metre of the coating under the action of a defined partial pressure or difference in concentration. It is expressed in  $\text{g}/(\text{m}^2 \cdot \text{d})$

#### 3.2 diffusion-equivalent air layer thickness $s_d$

thickness of a static air layer that possesses, under the same conditions, the same carbon dioxide permeability as the coating. It is expressed in m

#### 3.3 diffusion resistance number $\mu$

number indicating how many times more a coating is impermeable to carbon dioxide than a static air layer of the same thickness under the same conditions

### 4 Principle

#### 4.1 Method A: Gravimetric method

The coated side of a test piece is exposed to the measuring gas, and the diffused carbon dioxide is determined quantitatively. The test piece seals a test cell containing an absorbant for carbon dioxide so that the cell is gas-tight to the surroundings. The test cell is kept in a dry carbon dioxide/air atmosphere at  $(23 \pm 2)^\circ\text{C}$  and weighed at regular intervals. The carbon dioxide permeability is calculated from the increase of mass. The determination is completed when a steady state is reached, i.e. when the increase of mass no longer changes with time.

For control purposes, a reference film (standard) of known carbon dioxide permeability is measured in each series of determinations.

#### 4.2 Method B: Carrier gas method

A coated test piece is clamped between two halves of a permeation cell and the two halves are made gas-tight to each other and to the surroundings. Through one half of the permeation cell the measuring gas passes, whilst through the other half a carrier gas stream (preferably nitrogen or air, free from carbon dioxide) passes. This carrier gas stream transports the diffused carbon dioxide to a detection system, based on infrared spectrometry or gas chromatography. The determination is carried out at  $(23 \pm 2)^\circ\text{C}$  and is completed when a steady state is reached, i.e. when the carbon dioxide permeability no longer changes with time.

Both gases (measuring gas and carrier gas) can be humidified as required.

For control purposes, a reference film (standard) of known carbon dioxide permeability is measured in each series of determinations.

Both methods are carried out isostatically, i.e. the test piece is not subjected to a difference in absolute pressure but to a difference in partial pressure.

NOTE When using method A, only a dry carbon dioxide/air mixture can be used because the absorbent would react with humidity from the measuring gas. Therefore, if the carbon dioxide permeability is to be known at a different humidity level, for example at 50 % relative humidity, only method B is suitable.

### 5 Apparatus and materials

#### 5.1 For methods A and B

**5.1.1 Carbon dioxide gas analyzer**, for measuring the carbon dioxide concentration of the measuring and carrier gases in the range 0 % to 20 % (V/V) carbon dioxide.

**5.1.2 Device for measuring film thickness**, suitable for measurements to a limit deviation of at least 3 % of the thickness of the substrate.

**5.1.3 Barometer**, for measuring the atmospheric pressure to a limit deviation of  $\pm 400$  Pa.

**5.1.4 Measuring gas**, containing  $(10 \pm 0,5)$  % (V/V) carbon dioxide, prepared by mixing 1 part by volume of carbon dioxide and 9 parts by volume of dry air.

**5.1.5 Reference film (standard)**, of thickness  $(50 \pm 5)$   $\mu\text{m}$ , for use as a calibration film for the measurement device.