

Paints and varnishes — Coating materials and coating systems for exterior masonry and concrete —

Part 6: Determination of carbon dioxide permeability

The European Standard EN 1062-6:2002 has the status of a
British Standard

ICS 87.040

National foreword

This British Standard is the official English language version of EN 1062-6:2002.

The UK participation in its preparation was entrusted by Technical Committee STI/28, Paint systems for non-metallic substrates, to Subcommittee STI/28/1, Masonry and emulsion paints, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 13 and a back cover.

The BSI copyright date displayed in this document indicates when the document was last issued.

This British Standard, having been prepared under the direction of the Materials and Chemicals Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 5 August 2002

Amendments issued since publication

Amd. No.	Date	Comments

© BSI 5 August 2002

ISBN 0 580 40210 X

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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)¹⁾

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)*.

¹⁾ 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 μ

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 ± 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 ± 5) μm , for use as a calibration film for the measurement device.