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Paints and varnishes - Coating materials and coating systems for exterior masonry and concrete - Part 3: Determination and classification of liquid-water transmission rate (permeability)

Lacke und Anstrichstoffe - Beschichtungsstoffe und Beschichtungssysteme für mineralische Untergründe und Beton im Außenbereich - Teil 3: Bestimmung und Einteilung der Durchlässigkeitsrate für flüssiges Wasser (Permeabilität)

Peintures et vernis - Produits de peinture et systemes de revetements pour maçonnerie et béton extérieurs - Partie 3: Détermination et classification de la perméabilité a l'eau liquide

Ta slovenski standard je istoveten z: EN 1062-3:1998

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English version

**Paints and varnishes - Coating materials and coating systems
for exterior masonry and concrete - Part 3: Determination and
classification of liquid-water transmission rate (permeability)**

Peintures et vernis - Produits de peinture et systèmes de
revêtements pour maçonnerie et béton extérieurs - Partie 3:
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Lacke und Anstrichstoffe - Beschichtungsstoffe und
Beschichtungssysteme für mineralische Untergründe und
Beton im Außenbereich - Teil 3: Bestimmung und
Einteilung der Durchlässigkeitsrate für flüssiges Wasser
(Permeabilität)

This European Standard was approved by CEN on 9 October 1998.

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 Central Secretariat 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 Central Secretariat 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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Foreword

This European Standard 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 April 1999, and conflicting national standards shall be withdrawn at the latest by April 1999.

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 for conditioning and testing

¹⁾ Published as EN ISO 7783-2

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This European standard deals with test methods for coating materials and coating systems for masonry and concrete. It should be read in conjunction with EN 1062-1.

1 Scope

This European Standard specifies a method for determining the liquid-water transmission rate of coatings, coating systems and related products, intended for exterior masonry and concrete.

The method is applicable to coatings and coating systems on porous substrates such as brick, concrete and renderings.

The method is not applicable to coatings and coating systems having a coefficient of liquid-water transmission rate w of less than $0,05 \text{ kg}/(\text{m}^2 \cdot \text{h}^{0,5})$.

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.

EN 1062-1	1996	Paints and varnishes – Coating materials and coating systems for exterior masonry and concrete – Part 1: Classification
EN 21512		Paints and varnishes – Sampling of products in liquid or paste form (ISO 1512 : 1991)
EN 23270		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)

3 Principle

Exterior masonry coatings play an important role in preventing rain water penetrating into porous mineral substrates. This transmission rate for liquid water is evaluated using blocks of highly porous mineral substrates which are coated by the coating or coating system on one of their faces. The test specimens are immersed under controlled conditions in water and weighed at suitable intervals of time. The liquid-water transmission rate is determined from the change in mass when this change has become directly proportional to the square root of the time.



4 Apparatus

4.1 Container of suitable size, for deionized water or fresh tap water (potable water), provided with supports for the test specimens.

4.2 Oven, capable of being maintained at a temperature of $(50 \pm 2) ^\circ\text{C}$.

4.3 Balance, capable of weighing 2000 g to 0,01 g.

5 Sampling

Take a representative sample of the product to be tested (or of each product in the case of a multi-coat system), as described in EN 21512.

Examine and prepare each sample for testing, as described in EN ISO 1513.

6 Test specimens

6.1 General

The liquid-water transmission rate of a coating depends on its water absorption and its permeability, and on the same properties of the substrate.

For the determination of the liquid-water transmission rate of a coating or coating system the substrate shall have a significantly higher water absorption than the coating or coating system to be tested.

6.2 Substrate

Specimens cut from calcium silicate bricks, clay bricks or mortar slabs have been found suitable for the determination of the liquid-water transmission rate of coatings and coating systems for exterior masonry and concrete. Unless otherwise agreed, such specimens shall be used as the substrate.

The specimens shall have a coefficient of liquid-water transmission rate w of more than $5 \text{ kg}/(\text{m}^2 \cdot \text{h}^{0.5})$ and a density of $1500 \text{ kg}/\text{m}^3$ to $2000 \text{ kg}/\text{m}^3$.

The specimens shall be at least 200 cm^2 in surface area and at least 2,5 cm in thickness.

6.3 Preparation and coating

The specimens used as the substrate shall be clean and dry. It is important that the original porosity is taken into account by using new specimens for each determination.

Coat the cut surface of the substrate by applying the coating or coating system to be tested at the specified thickness in accordance with the recommendations of the manufacturer of the coating material(s). The coating shall be free of visible defects. Dry the coating for at least one week.

Before conditioning, seal the reverse side and the edges of the test specimens against water, for example by applying two coats of a two-component coating material based on epoxy resin, overlapping the test surface by at least 5 mm but not more than 10 mm. A thixotropic coating system is recommended.

6.4 Drying and conditioning

6.4.1 Drying

Unless otherwise agreed, dry the test specimens for a further 24 days with free circulation of air at $(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity (see also EN 23270).

6.4.2 Conditioning

The liquid-water transmission rate is influenced by the volatile and/or water-soluble components of the coating. Since in practice these components can evaporate from the coating during outdoor exposure or be washed out by water (rain), the coating is to be aged prior to the determination of the liquid-water transmission rate. Subject the test specimens to 3 cycles comprising the following conditions:

- 24 h storage in water (potable water) of $(23 \pm 2) ^\circ\text{C}$
- 24 h drying at $(50 \pm 2) ^\circ\text{C}$

If the coatings are thermoplastic at $50 ^\circ\text{C}$, the test specimens shall be suspended and/or suitably placed in the oven, ensuring that they do not adhere to the parts of the oven and/or to each other.

During weekends, or interruption of the conditioning for other reasons, store the test specimens in the standard atmosphere as defined in EN 23270 [$(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity].

Afterwards, condition the test specimens in the standard atmosphere as defined in EN 23270 $[(23 \pm 2) ^\circ\text{C}$ and $(50 \pm 5) \%$ relative humidity] for at least 24 h and no longer than 3 days before carrying out the test.

6.4.3 Dry film thickness

Determine the average dry film thickness of individual coats by calculating it from the consumption and the non-volatile matter content in accordance with 5.3 of EN 1062-1 : 1996, or by other suitable methods.

7 Procedure

Carry out the determination in triplicate at $(23 \pm 2) ^\circ\text{C}$, unless otherwise agreed.

Weigh the test specimen to the nearest 0,01 g. Fill the container (see 4.1) with deionized water or fresh tap water (potable water) and allow the temperature of the water to attain a temperature of $(23 \pm 2) ^\circ\text{C}$. Support the test specimen on a plastic or metal rack with the coated surface under test facing downwards so that this face is 1 cm below the surface of the water. After 1 h, 2 h, 3 h, 6 h and 24 h remove the test specimen from the water, wipe it carefully dry using absorbent paper, and weigh the test specimen to the nearest 0,01 g.

NOTE: If it is known that the slope of the curve (see clause 8) is constant for more than 24 h, weighing can start 24 h after immersing the test specimen.

8 Expression of results

Plot the mass increase of the test specimen as a function of square root of time. The slope of the linear part of the curve is the coefficient of liquid-water transmission rate w , in kilograms per square metres per square root of hours. To obtain the coefficient w it is necessary to plot the mass increase divided by the area, in square metres, or to divide the slope by the area. The area will be the area of the test surface not covered by the overlapping sealing coating (see 6.3).

Normally, w is calculated from the 24 h measurement. If the linear part of the curve corresponds to less than 24 h, the number of hours shall be indicated as an index for w , for example w_6 .

9 Precision

9.1 Repeatability

The value below which the absolute difference between two single test results, each the mean of triplicates, obtained on identical material by one operator in one laboratory within a short interval of time using the standardized test method, can be expected to lie with a 95 % probability, is 10 % (relative to the mean of the two test results).

9.2 Reproducibility

The value below which the absolute difference between two single test results, each the mean of triplicates, obtained on identical material by operators in different laboratories using the standardized test method, can be expected to lie with a 95 % probability, is 15 % (relative to the mean of the two test results).

10 Classification

Classification by liquid-water transmission rate shall be by the following categories.

Table 1: Classification by liquid-water transmission rate

Class	Liquid-water transmission rate w $\text{kg}/(\text{m}^2 \cdot \text{h}^{0,5})$
I [high*])	$> 0,5$
II [medium*])	0,1 to 0,5
III [low*])	$< 0,1$
*) Classification in accordance with EN 1062-1.	

11 Test report

The test report shall contain at least the following information:

- a) all details necessary to identify the product tested;
- b) a reference to this part of EN 1062 (EN 1062-3);
- c) the number of test specimens (replicates);
- d) the method of application, applied mass, number of coats, drying time;
- e) the dry film thickness, in micrometres, of the coating or coating system;
- f) the nature and thickness, in centimetres, of the substrate;
- g) the results of the test, as indicated in clause 8;
- h) the class, as indicated in clause 10;
- i) particular observations;
- j) any deviation from the test method specified;
- k) the date of the test.

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