SLOVENSKI STANDARD
SIST EN 1015-19:1999

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Metode preskušanja zidarskih malt - 19. del: Ugotavljanje prepustnosti grobega in finega ometa za vodno paro

Methods of test for mortar for masonry - Part 19: Determination of water vapour permeability of hardened rendering and plastering mortars

Prüfverfahren für Mörtel für Mauerwerk - Teil 19: Bestimmung der Wasserdampfdurchlässigkeit von Festmörteln aus Putzmörteln

Méthodes d'essai des mortiers pour maçonnerie - Partie 19: Détermination de la perméabilité a la vapeur d'eau des mortiers d'enduits durcis

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ICS:

91.100.10	Cement. Mavec. Apno. Malta	Cement. Gypsum. Lime. Mortar

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Methods of test for mortar for masonry - Part 19: Determination of water vapour permeability of hardened rendering and plastering mortars

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This European Standard was approved by CEN on 4 September 1998.

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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.

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

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Foreword

This European Standard has been prepared by Technical Committee CEN/TC 125 "Masonry", the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by March 1999, and conflicting national standards shall be withdrawn at the latest by September 2000.

This European standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports the essential requirements of the EU Construction Products Directive (89/106/EEC) and includes the performance requirements referred to in the Eurocode for masonry Structures.

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.

1 Scope

This European Standard specifies a method for determining the steady state water vapour permeability of rendering and plastering mortars in accordance with **prEN 998-1** at the upper and lower part of the hygroscopic range. The test method is applicable to mortars from which disc shaped specimens of uniform thickness between 10 mm and 30 mm can be made.

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.

pr EN 998-1	Specification for mortar for masonry - Part 1: Rendering and plastering mortar with inorganic binding agents
pr EN 1015-2	Methods of test for mortar for masonry - Part 2: Sampling of mortars and preparation of test mortars
pr EN 1015-3	Methods of test for mortar for masonry - Part 3: Determination of consistence of fresh mortar (by flow table)
pr EN 1015-11	Methods of test for mortar for masonry - Part 11: Determination of flexural and compressive strength of hardened mortar

3 Principle

Specimens to be tested are sealed on the open mouth of circular cups in which the water vapour pressure is maintained constant at appropriate levels by means of saturated salt solutions. The cups are placed in a temperature controlled environment with a constant water vapour pressure different from that inside the cups. The rate of moisture transfer is determined from the change in weight of the cups under steady state conditions.

4 Definitions and symbols

4.1 Definitions

For the purposes of this standard the following definitions apply:

4.1.1 water vapour permeance: The water vapour flux passing through a unit area under equilibrium conditions per unit difference in water vapour pressure between the two sides of the material.

4.1.2 water vapour permeability: The water vapour permeance multiplied by the thickness of the specimen.

4.2 Symbols

A is the area of the open mouth of the test cup, (m^2)

Δ_p is the difference in water vapour pressure between the ambient air and the salt solution and is taken from appropriate tables, (Pa)

$\Delta G/\Delta t$ is the water vapour flux, (kg/s)

Λ is the water vapour permeance, ($kg/m^2.s.Pa$)

R_A is the water vapour resistance of the air gap between the specimen and the salt solution, ($0{,}048 \times 10^9$ Pa m^2s/kg per 10 mm air gap).

5 Apparatus and reagents

5.1 Circular test cup made of corrosion resistant material and with an open mouth with an area of approximately 0,02 m^2 to which the test specimen is sealed, see **figure 1**.

5.2 Weighing instrument capable of weighing up to 2 kg with an accuracy of 1 mg.

5.3 An appropriate **sealant** which is impermeable and whose mass remains unchanged during the period of the test.

5.4 Saturated solution of potassium nitrate (KNO_3).

NOTE: This provides a relative humidity of 93,2 % at a temperature of 20 °C.

5.5 Saturated solution of lithium chloride (LiCl).

NOTE: This provides a relative humidity of 12,4 % at a temperature of 20 °C.

5.6 Storage chambers capable of maintaining a temperature of 20 °C ± 2 °C and relative humidities of 95% ± 5% and/or 50 % ± 5 % (see **7.2**).

5.7 Trowel or palette knife

5.8 Cotton gauze

6 Sampling, preparation and storage of test samples

6.1 Sampling

The fresh mortar test sample shall have a minimum volume of 1,5 l or at least 1,5 times the quantity needed to perform the test, whichever is the greater, and shall either be obtained by reduction of the bulk test sample (see pr **EN 1015-2**) using a sample divider or by quartering or by preparation from dry constituents and water in the laboratory. The flow value of the mortar in the bulk test sample shall be determined in accordance with **pr EN 1015-3** and reported.

Laboratory mixed test samples shall, before testing, be brought to a defined flow value as specified in **pr EN 1015-2.**

Ready to use mortars (factory-made wet mortars which are retarded), and pre-batched air-lime/sand wet mortars when not gauged with hydraulic binders, shall be tested within their specified workable life.

The length of mixing period shall be measured from the moment all the constituents are introduced into the mixer.

Before testing, the batch shall be gently stirred by hand using a trowel or palette knife (**5.7**) for 5 s to 10 s to counteract any false setting etc., but without any additional mixing of the batch

Any deviation from the mixing procedure shall be noted.

One test sample shall be tested.

6.2 Preparation and storage of test samples

Produce test specimens by applying mortar to a substrate of autoclaved aerated concrete with a density of 550 kg/m^3 ± 50 kg/m^3. Place two layers of cotton gauze on the substrate before application.

For each hygroscopic range prepare five test specimens of the required thickness, somewhat larger than the diameter of the test cups (**5.1**) and cure for 28 d prior to testing.

Place the test specimens in the storage chamber (**5.6**) at a relative humidity of 95% ± 5%, or seal in plastic bags, and store at a temperature of 20 °C ± 2 °C (moist curing) for a the period specified in **table 1**. After the specified period unseal any plastic bags and separate the mortar specimens from the substrate and store at a temperature of 20 °C ± 2 °C and a relative humidity of 50 % ± 5 % for the remainder of the 28 d total curing and storage period (see **table 1**).

Then cut circular specimens to a diameter matching the test cup dimensions.

Table 1 : Storage and curing conditions for test specimens

Type of mortar	Storage time (days)	
	Curing conditions:	
	20 °C ± 2 °C and 95% ± 5% RH[1)]	20 °C ± 2 °C and 50% ± 5% RH[1)]
Retarded mortars	5	23
Air-lime mortars	5	23
Air-lime/cement mortars with cement mass not exceeding 50% of the total binder mass	5	23
Cement and other air-lime/cement mortars with mass of air-lime not exceeding 50% of the total binder mass	2	26
Mortars with other hydraulic binders	2	26
1) relative humidity		

7 Procedure

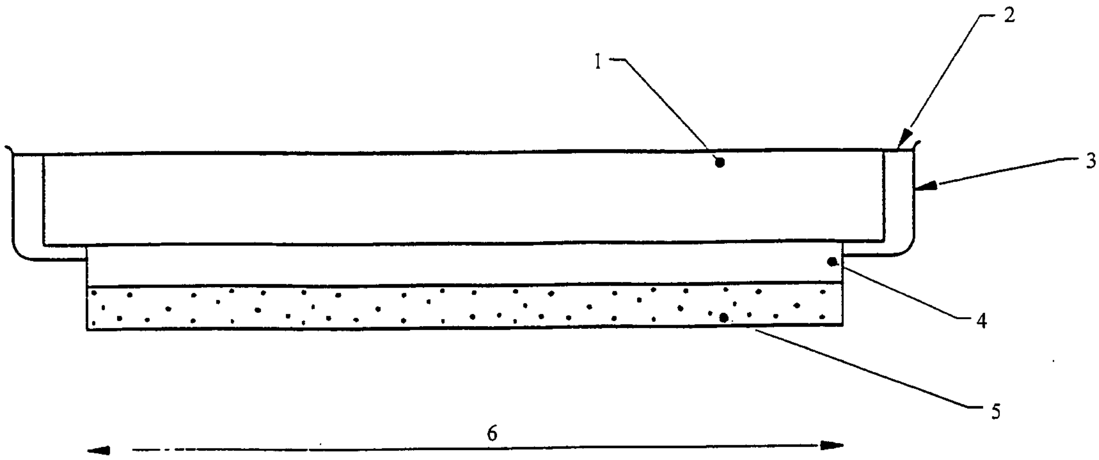
Set the circular specimens, (prepared under the appropriate conditions described in **table 1**), in test cups (**5.1**) and seal the edges with an appropriate sealant (**5.3**).

For the upper hygroscopic range, control the water vapour pressure within the cup using a saturated solution of potassium nitrate (KNO_3) (**5.4**) . For the lower hygroscopic range, control the water vapour pressure within the cup using a saturated solution of lithium chloride (LiC1) (**5.5**).

In each case leave a small air-gap of 10 mm ± 5 mm between the specimen and the surface of the solution (see **figure 1**).

Place the test cups in the storage chamber (**5.6**) at 20 °C ± 2 °C and relative humidity of 50 % ± 5 %.

Weigh the test cups at appropriate time intervals[1]. Draw a graph of the mass of the cup against time. If three points can be placed on one straight line the conditions are considered to be stable i.e. the quantity of water vapour passing through the specimen per unit time is constant.



Key:		1	Specimen
2	Sealant	3	Circular test cup
4	Air gap (≈ 10 mm)	5	Saturated salt solution
6	Area (≈ 0,02 m^2)		

Figure 1 : Test cup (5.1) with test specimen

8 Calculation and expression of results

From the graph for each hygroscopic range determine the water vapour flux, ΔG/Δt. Calculate the water vapour permeance (Λ) from the following formula :

$$\Lambda = \frac{1}{A\,\Delta_p / (\Delta G/\Delta t) - R_A} \quad \text{in kg/m2.s.Pa}$$

Calculate the mean water vapour permeance from the values for the five individual specimens expressed to two significant figures.

Calculate the water vapour permeability from the mean value for the water vapour permeance by multiplying this by the specimen thickness.

9 Test report

The test report shall provide the following information :

a) the number, title and date of issue of this European Standard;

b) the place, date and time of taking the bulk test sample[2];

Note : This is the sample taken from the bulk supply that is to be used for all of the tests in **pr EN1015.**

[1] Appropriate time intervals can be chosen from experience.
[2] This information is contained on the certificate of sampling (see **pr EN 1015-2**)