

Methods of test for masonry units —

Part 15: Determination of water vapour permeability of autoclaved aerated concrete masonry units

The European Standard EN 772-15:2000 has the status of a
British Standard

ICS 91.080.30; 91.100.30

National foreword

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The UK participation in its preparation was entrusted by Technical Committee B/519, Masonry and associated tests, to Subcommittee B/519/1, Masonry units, which has the responsibility to:

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- present to the responsible 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.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 7 and a back cover.

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Methods of test for masonry units - Part 15: Determination of water vapour permeability of autoclaved aerated concrete masonry units

Méthodes d'essai des éléments de maçonnerie - Partie 15:
Détermination de la perméabilité à la vapeur d'eau des
éléments de maçonnerie en béton cellulaire autoclavé

Prüfverfahren für Mauersteine - Teil 15: Bestimmung der
Wasserdampfdurchlässigkeit von Porenbetonsteinen

This European Standard was approved by CEN on 25 February 2000.

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of an identical text or by endorsement, at the latest by September 2000, and conflicting national standards shall be withdrawn at the latest by September 2000.

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 of determining the steady state water vapour permeability of autoclaved aerated concrete masonry units at the upper and lower part of the hygroscopic range. The test method is limited to products from which disc shaped specimens of uniform thickness can be made.

No requirements are given for conditioning of the specimens. However, it will take longer for the test arrangement to reach equilibrium if the specimens are not in an approximately air dry condition at the start of the test.

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.

prEN 771-4 Specification for masonry units - Part 4: Autoclaved aerated concrete masonry units.

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 inside the cups. The rate of moisture transfer is determined from the weight change of the cups under steady conditions.

4 Definitions

For the purposes of this standard, the following definitions apply.

4.1 water vapour permeance: water vapour flux passing through unit area under equilibrium conditions under unit difference in water vapour pressure between the two sides of the material

4.2 water vapour permeability: the water vapour permeance multiplied by the thickness of the specimen

5 Symbols

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

Δp is the difference in water vapour pressure between the ambient air and the salt solution, (Pa)

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

$\frac{\Delta G}{\Delta t}$ is the water vapour flux, in kg/s.

P_{wv} is the water vapour permeance, [$\text{kg}/(\text{Pa}\cdot\text{m}^2\cdot\text{s})$]

6 Apparatus and reagents

6.1 Circular test cup, made of corrosion resistant material with an open mouth of approximately $0,02 \text{ m}^2$ to which the test specimen may be sealed, (see Figure 1).

6.2 Weighing instrument, capable of weighing to an accuracy of 0,001 g.

Note: An instrument capable of weighing up to 2 kg should be sufficient.

6.3 Appropriate sealant, or sealing ring with time constant mass.

6.4 Saturated solution of potassium nitrate (KNO_3), giving a relative humidity of 93,2 % at a temperature of $20 \text{ }^\circ\text{C}$.

6.5 Saturated solution of lithium chloride ($\text{LiCl}\cdot\text{H}_2\text{O}$), giving a relative humidity of 12,4 % at a temperature of $20 \text{ }^\circ\text{C}$.

6.6 Controlled constant temperature and humidity enclosure, capable of maintaining a temperature of $20 \text{ }^\circ\text{C} \pm 2 \text{ }^\circ\text{C}$ and relative humidity of $50 \% \pm 5 \%$.

7 Preparation of specimen

7.1 Form of specimens

Circular specimens should be used where possible. These may be cut from hardened material or they may be moulded. Where moulded specimens are used, the curing conditions of the specimens should be reported.

The thickness of the specimens should be appropriate to its permeability; 8 mm to 10 mm may be appropriate for relatively impermeable specimens and 20 mm to 50 mm for more permeable specimens.

The thickness shall be measured using calipers and shall be reported.

7.2 Sampling

The method of sampling shall be in accordance with **prEN 771-4**. The minimum number of specimens shall be three, but a larger minimum number may be specified in the product specification, in which case that larger number shall be used.

8 Test procedure

Note: Although there are no requirements for conditioning specimens before testing, it will take longer for the test to reach equilibrium if the specimens are far from being in an air dry condition at the start of the test.

Set all the specimens in test cups (6.1) and seal the edges with an appropriate sealant (6.3) or sealing ring. If not previously done, determine the area of the specimen.

For the upper hygroscopic range (wet cup method), control the water vapour pressure using the potassium nitrate solution (KNO₃) (6.4). For the lower hygroscopic range (dry cup method), control the water vapour pressure using the lithium chloride solution (LiCl.H₂O) (6.5).

In each case leave a small air-gap of approximately 10 mm between the specimen and the surface of the solution, (see Figure 1).

Place the cups in an enclosure (6.6) with a temperature of 20 °C ± 2 °C and a relative humidity of 50 % ± 5 % r.h. and which is large enough to ensure good air circulation.

Weigh the cups at appropriate time intervals. Draw a graph with 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.

9 Expression of test results

From each graph determine the water vapour flux, $\frac{\Delta G}{\Delta t}$. Calculate the water vapour permeance using the following equation:

$$P_{\text{wv}} = \frac{1}{\frac{A\Delta p}{\left(\frac{\Delta G}{\Delta t}\right)} - R_A}$$

where:

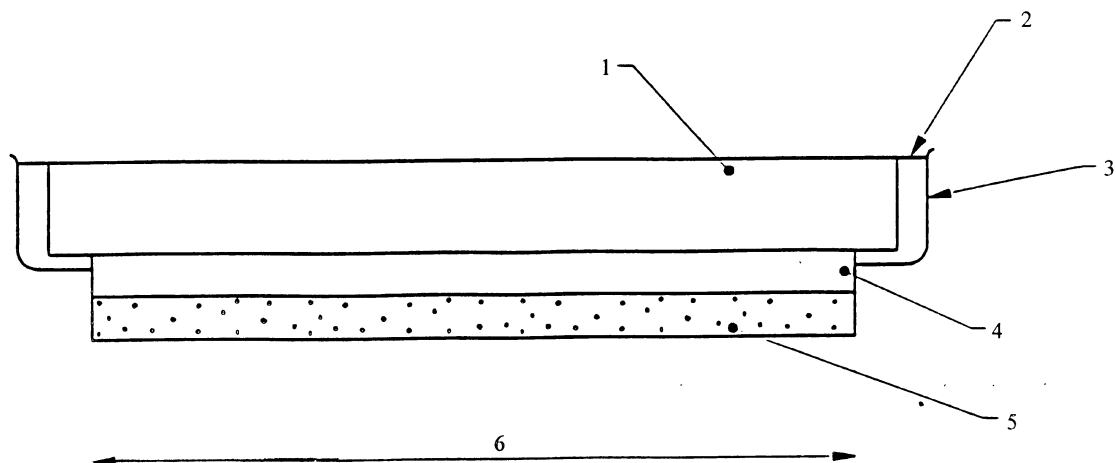
Δp is taken from appropriate tables, (Pa).

The water vapour permeability is given as the mean value to the nearest 1 % for the water vapour permeance multiplied by the thickness of specimen in metres to the nearest 1 %.

10 Test report

The test report shall provide the following information:

- a) the number, title and date of issue of this European Standard;
- b) the name of the organization that carried out the sampling and the method used;
- c) the date of testing;
- d) the type, origin and designation of the masonry unit by reference to **prEN 771-4**;
- e) the number of specimens in the sample;
- f) the date of receipt of the specimens in the testing laboratory;
- g) part of hygroscopic range tested;
- h) identification of the specimen and its thickness;
- i) curing regime for moulded specimens;
- j) individual and mean water vapour permeance and the water vapour permeability to the nearest 1 %;
- k) any other information of importance for the evaluation of the test results;
- l) remarks, if any.



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

Figure 1: Test cup (6.1) with test specimen

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