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Methods of test for masonry units - Part 14: Determination of moisture movement of aggregate concrete and manufactured stone masonry units

Prüfverfahren für Mauersteine - Teil 14: Bestimmung der feuchtebedingten Formänderung von Mauersteinen aus Beton und Betonwerksteinen

Méthode d'essai pour des éléments de maçonnerie - Partie 14: Détermination de la variation dimensionnelle due a l'humidité des éléments de maçonnerie en béton de granulats et en pierre reconstituée

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**Ta slovenski standard je istoveten z: EN 772-14:2001**

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**ICS:**

91.100.30      Beton in betonski izdelki      Concrete and concrete products

**SIST EN 772-14:2002**

**en**

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EUROPEAN STANDARD

**EN 772-14**

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2001

ICS 91.100.30

English version

## Methods of test for masonry units - Part 14: Determination of moisture movement of aggregate concrete and manufactured stone masonry units

Méthode d'essai pour des éléments de maçonnerie - Partie:  
14 détermination de la variation due à l'humidité des  
éléments de maçonnerie en béton de granulats et en pierre  
reconstituée

Prüfverfahren für Mauersteine - Teil 14: Bestimmung der  
feuchtebedingten Formänderung von Mauersteinen aus  
Beton und Betonwerksteinen

This European Standard was approved by CEN on 13 October 2001.

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, 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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**EN 772-14:2001 (E)**

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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 May 2002, and conflicting national standards shall be withdrawn at the latest by March 2004.

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.

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**EN 772-14:2001 (E)****1 Scope**

This European Standard specifies a method of measuring the moisture movement of aggregate concrete and manufactured stone masonry units between two specified extreme moisture conditions.

**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).

prEN 771-3, *Specification for masonry units - Part 3: Aggregate concrete masonry units (dense and lightweight aggregates)*.

prEN 771-5, *Specification for masonry units - Part 5: Manufactured stone masonry units*.

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**3 Principle**

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This test measures, on masonry units of the same concrete compositions and the same sampling:

- a) the expansion between the initial condition and after soaking in water for 4 days;
- b) the shrinkage between the initial condition and after drying for 21 days in a ventilated oven at 33 °C.

**4 Symbols**

$l_{0i}$  is the initial distance between gauge location pads, (mm)

$l_{1i}$  is the distance between gauge location pads after soaking, (mm)

$l_{2i}$  is the distance between gauge location pads after drying, (mm)

$\Delta l_g / l$  is the mean moisture expansion coefficient, (mm/m)

$\Delta l_r / l$  is the mean drying shrinkage coefficient, (mm/m)

$\Delta l_c / l$  is the total movement coefficient, (mm/m)

$\Delta l_{gi}/l$  is the individual moisture expansion coefficient, (mm/m)

$\Delta l_{ri}/l$  is the individual drying shrinkage coefficient, (mm/m)

$m_{o,s}$  is the mass of specimen before drying, (g)

$m_{dry,s}$  is the mass of specimen after drying, (g)

$w_s$  is the moisture content, (%) by mass

## 5 Apparatus

### 5.1 Gauge location pads.

**5.2 Adhesive** appropriate for use under the conditions given in 5.4 and 5.5.

**5.3 Measuring device** suitable for measuring changes in length with an accuracy of at least 0,002 mm.

**5.4 Ventilated oven** with a volume of at least 9 times the volume of the specimens to be dried at one time, capable of being maintained at a temperature of  $33\text{ °C} \pm 3\text{ °C}$ . The oven is ventilated top and bottom for free convection or by a forced system that ensures at least 3 air changes per hour.

**5.5 Tank of water**, maintained at a temperature of  $20\text{ °C} \pm 2\text{ °C}$  and of sufficient volume to hold all the specimens to be soaked at one time and to ensure free access of the water to all faces.

**5.6 Weighing instrument** capable of weighing the specimens with an accuracy of 0,1 %.

**5.7 Calibration rods** of Invar steel.

**5.8 Four support pads** per specimen of  $1\text{ cm}^2$  maximum cross-section and with a minimum height of 10 mm.

## 6 Preparation of specimens

### 6.1 Sampling

The test specimens shall consist of whole masonry units or be cut from whole masonry units. In every case the samples shall be sealed in airtight bags immediately after sampling until they are prepared for test. The dates of manufacturing and sampling shall be declared. The age of the specimens at the beginning of the test shall be 28 days unless otherwise is specified.

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The method of sampling shall be stated in the test report. The minimum number of specimens shall be six, but a larger minimum number may be specified in the product specification, in which case that larger number shall be used.

**6.2 Conditioning**

Unless otherwise is specified, remove the specimens from the airtight bags after 14 days and store them for a further 14 days in the laboratory under the following conditions:

Temperature	≥ 15 °C
Relative humidity	≤ 65 %

In the laboratory store the specimens so that each one is similarly exposed.

At the end of the 14 day laboratory storage weigh every specimen and number them 1 to 6 from the lightest to the heaviest ( $m_{0,s}$ ).

The test shall be deemed to have begun at the end of the 14 day laboratory conditioning period following the 14 days in airtight bags.

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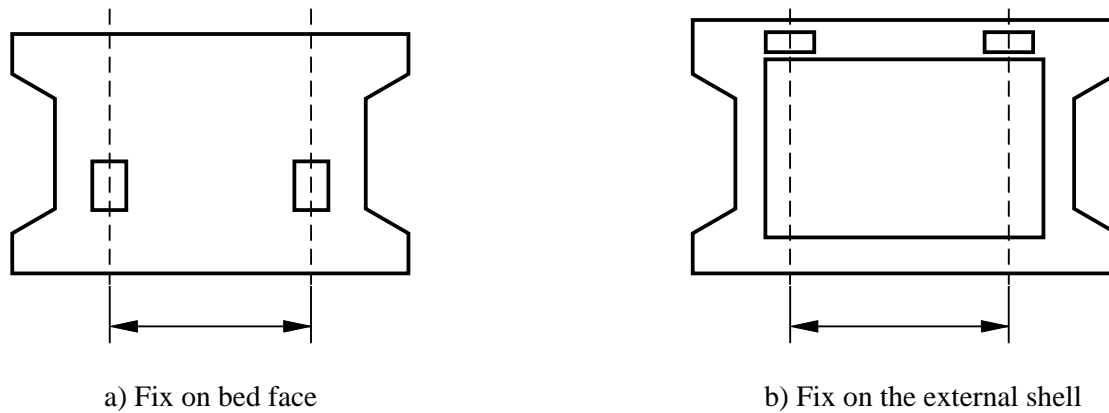
**6.3 Preparation for measurements**

Fix two gauge location pads (5.1) using appropriate adhesive glue (5.2) to each of the specimens at an appropriate gauge length apart (see Table 1) in an appropriate position (see Figure 1) and mark one of the pads on each specimen with a distinctive sign. A suitable template should be used to space the pads.

**Table 1 - Gauge length for specimens**

Dimensions in millimetres	
Length of specimen	Minimum gauge length
100 to 200	80
201 to 300	180
over 300	280





**Figure 1 - Positioning of gauge location pads**

a) For specimens which are whole units without voids passing right through, fix the gauge location pads on the bed face.

b) For specimens which are whole masonry units with voids passing right through, fix the gauge location pads on the shell.

c) For specimens which are parts of masonry units fix the gauge location pads on a surface which would be a bed face, see a) above.

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## 7 Procedure

### 7.1 General

Carry out the test in laboratory maintained at a temperature of  $20\text{ °C} \pm 2\text{ °C}$  and a relative humidity of 50 % to 65 %.

Before taking any measurements calibrate the measuring device using the Invar calibration rods (5.7).

### 7.2 Initial measurement

Keep the specimen in the laboratory for 6 h before taking the first measurements. Measure the initial distance  $l_{0j}$  between the pads on the 6 specimens, taking care to place the mobile end of the gauge on the marked pad.

Record the results in mm at least to the nearest 0,002 mm.