SLOVENSKI STANDARD
SIST EN 772-13:2002

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Methods of test for masonry units - Part 13: Determination of net and gross dry density of masonry units (except for natural stone)

Prüfverfahren für Mauersteine - Teil 13: Bestimmung der Netto- und Brutto-Trockenrohdichte von Mauersteinen (außer Natursteinen)

Méthodes d'essai des éléments de maçonnerie - Partie 13: Détermination de la masse volumique absolue seche et de la masse volumique apparente seche des éléments de maçonnerie (excepté les pierres naturelles)

Ta slovenski standard je istoveten z: **EN 772-13:2000**

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91.100.15	Mineralni materiali in izdelki	Mineral materials and products

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EUROPEAN STANDARD

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English version

Methods of test for masonry units - Part 13: Determination of net and gross dry density of masonry units (except for natural stone)

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of an identical text or by endorsement, at the latest by December 2000, and conflicting national standards shall be withdrawn at the latest by December 2000.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

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1 Scope

This European Standard specifies a method of determining the net and gross dry density of masonry units (except for natural stone masonry units).

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 771-1	Specification for masonry units - Part 1 : Clay masonry units
prEN 771-2	Specification for masonry units - Part 2 : Calcium silicate masonry units
prEN 771-3	Specification for masonry units - Part 3 : Aggregate concrete masonry units (dense and lightweight aggregates)
prEN 771-4	Specification for masonry units - Part 4: Autoclaved aerated concrete masonry units
prEN 771-5	Specification for masonry units - Part 5 : Manufactured stone masonry units
prEN 772-3	Methods of test for masonry units - Part 3 : Determination of net volume and percentage of voids of clay masonry units, by hydrostatic weighing
prEN 772-9	Methods of test for masonry units - Part 9 : Determination of volume and percentage of voids and net volume of calcium silicate masonry units, by sand filling
prEN 772-16	Methods of test for masonry units - Part 16 : Determination of dimensions

3 Principle

After drying to constant mass and calculating the net and gross volume, the net and gross dry density of the masonry units are calculated.

4 Definitions and symbols

4.1 Definitions

4.1.1 gross dry density - the mass per unit gross volume after drying to constant mass

4.1.2 gross volume - the volume of the unit derived from the length, width and height with a deduction of the volume of perforations, voids, recesses or indentations intended to be filled with mortar.

4.1.3 net dry density - the mass per unit net volume after drying to constant mass.

4.1.4 net volume - the gross volume of the unit less the volume of any perforations or voids not intended to be filled with mortar.

4.2 Symbols

l_u is the unit length, (mm)

w_u is the unit width, (mm)

h_u is the unit height, (mm)

$m_{o,u}$ is the mass of a whole unit specimen prior to drying, (g)

$m_{o,p,tot}$ is the combined mass of a group of three representative portions of a whole unit specimen prior to drying, (g)

$m_{dry,p}$ is the mass of one individual representative portion of the three portions of a whole unit specimen after drying to constant mass, (g)

$m_{dry,p,tot}$ is the combined mass of a group of three representative portions of a whole unit specimen after drying to constant mass, (g)

$m_{dry,u}$ is the mass of a whole unit specimen (or corresponding whole unit where representative portions have been taken) after drying to constant mass, (g)

W_p is the moisture content of a group of three representative portions of a whole unit specimen

$V_{n,u}$ is the net volume of unit, (mm^3)

$V_{g,u}$ is the gross volume of unit, (mm^3)

$V_{g,p}$ is the gross volume of parts of units, (mm^3)

$\rho_{n,u}$ is the net dry density, (kg/m^3)

$\rho_{n,p}$ is the net dry density of parts of unit, (kg/m^3)

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$\rho_{g,u}$ is the gross dry density, (kg/m^3)

5 Apparatus

5.1 Ventilated oven capable of maintaining a temperature of 105° C ± 5 ° C for use with clay, calcium silicate and autoclaved aerated concrete units.

5.2 Ventilated oven capable of maintaining a temperature of 70° C ± 5 ° C for use with aggregate concrete and manufactured stone units.

5.3 Weighing instrument capable of weighing the whole unit or portions of it to an accuracy of 0,1 % of their mass.

6 Sampling

The method of sampling shall be in accordance with the relevant part of **prEN 771**. 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.

7 Procedure

7.1 Determination of dry mass

7.1.1 Whole unit specimens

Dry the test specimens to constant mass $m_{dry,u}$ in a ventilated oven at a temperature of
70 ° C ± 5 ° C (5.2) for aggregate concrete and manufactured stone masonry units or
105 ° C ± 5 ° C (5.1) for clay, calcium silicate and autoclaved aerated concrete masonry units.
Constant mass is reached, if during the drying process in two subsequent weighings with a
24 h interval, the loss in mass between the two determinations is not more than 0,2 % of the
total mass. Record the mass $m_{dry,u}$

7.1.2 Portions of whole unit specimens

Where representative portions are used then first weigh each whole unit specimen and record
the mass ($m_{o,u}$). Then obtain three representative solid portions, i.e containing no enclosed or
exposed formed voids, of at least 100 g from each whole unit specimen and weigh each group
of three together. Record the mass of each group ($m_{o,p,tot}$).

Dry each group of three portions to constant mass following the procedure of **7.1.1** above.
Record the mass of each group ($m_{dry,p,tot}$).

Calculate the moisture content of each group of three portions using equation (1):

$$w_p = \frac{m_{o,p,tot} - m_{dry,p,tot}}{m_{dry,p,tot}}$$ (1)

Calculate the corresponding dry mass of the whole unit ($m_{dry,u}$) using equation (2):

$$m_{dry,u} = \frac{m_{o,u}}{1 + w_p}$$ (2)

7.2 Net dry density

7.2.1 Whole units

Determine the net volume using one of the following methods as appropriate:

a) for clay masonry units, by weighing in water as indicated in **prEN 772-3** ;

b) for calcium silicate masonry units, by using sand filling as indicated in **prEN 772-9** ;

c) for manufactured stone and solid aggregate concrete masonry units, by subtracting the volume of all recesses or indentations, determined using a suitable measuring device, from the volume ($length \times width \times height$) determined in accordance with **prEN 772-16**. Express the net volume $V_{n,u}$ to the nearest 10^4 mm^3.

d) for aggregate concrete masonry units with formed voids, by the method of c) above, but in addition subtracting the volume of all voids. Express the net volume $V_{n,u}$ to the nearest 10^4 mm^3.

Determine the net dry density of the masonry unit $\rho_{n,u}$ using equation (3):

$$\rho_{n,u} = \frac{m_{dry,u}}{V_{n,u}} \times 10^6 \, (kg / m^3)$$ (3)

Calculate the net dry density of each whole unit specimen to the nearest 5 kg/m^3 for densities up to 1000 kg/m^3 and to the nearest 10 kg/m^3 for densities over 1000 kg/m^3. Calculate the mean of the net dry densities of the specimens.

7.2.2 Representative portions of whole unit specimens

Determine the net dry density of the parts as follows:

- determine the dry mass of each portion of the whole unit specimen $m_{dry,p}$ by drying according to **7.1.2**;

- determine the volume of the parts $V_{g,p}$ by measuring length, width and height to the nearest 1 mm;