



SLOVENSKI STANDARD
SIST EN 772-19:2000

01-september-2000

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Methods of test for masonry units - Part 19: Determination of moisture expansion of large horizontally perforated clay masonry units

Prüfverfahren für Mauersteine - Teil 19: Bestimmung der Feuchtedehnung von horizontal gelochten großen Mauerziegeln

Méthodes d'essai des éléments de maçonnerie - Partie 19: Détermination de la dilatation à l'humidité des grands éléments de maçonnerie en terre cuite perforés horizontalement

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91.100.15 Mineralni materiali in izdelki Mineral materials and products

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en

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 772-19

March 2000

ICS 91.100.15

English version

Methods of test for masonry units - Part 19: Determination of
moisture expansion of large horizontally perforated clay masonry
units

Méthodes d'essai des éléments de maçonnerie - Partie 19:
Détermination de la dilatation à l'humidité des grands
éléments de maçonnerie en terre cuite perforés
horizontalement

Prüfverfahren für Mauersteine - Teil 19: Bestimmung der
Feuchtedehnung von horizontal gelochten großen
Mauerziegeln

This European Standard was approved by CEN on 17 February 2000.

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

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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.

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1 Scope

This European Standard specifies an accelerated method of determining the moisture expansion of large clay units with horizontal perforations that have one dimension equal to or greater than 400 mm and shell thicknesses less than 12 mm.

2 Normative references

This European Standard incorporates by dated or undated reference, provision 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

3 Principle

This test measures the length change of test specimens caused by subjecting them to boiling water for a 24 h period.

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4 Symbols

- | | |
|----------|--|
| l_i | is the initial length an individual specimen after kiln refiring and cooling at ambient temperature, (mm) |
| R_{in} | is the reading from the invar reference bar using the direct reading gauge, (mm) |
| l_{s1} | is the first deviation which is the difference between the first reading from an individual specimen (R_{s1}) after kiln refiring and cooling to ambient temperature and the reading from the invar reference bar (R_{in}), in (mm) |
| l_{s2} | is the second deviation which is the difference between the second reading from an individual specimen (R_{s2}) after kiln refiring, cooling to ambient temperature and subsequent 3h hold and the reading from the invar reference bar (R_{in}), (mm) |
| l_{m1} | is the mean initial deviation of an individual specimen, (mm) |
| l_{s3} | is the third deviation which is the difference between the third reading from an individual specimen (R_{s3}) 1h after cooling following boiling water treatment and the reading from the invar reference bar (R_{in}), (mm) |
| l_{s4} | is the fourth deviation which is the difference between the fourth reading from an individual specimen (R_{s4}) 24 h after the third reading(R_{s3}) and the reading from the invar reference bar (R_{in}), (mm) |

- l_{m2} is the mean final deviation of an individual specimen, (mm)
- e_s is the moisture expansion of an individual specimen, (mm/m)
- e_m is the mean value of moisture expansion, (mm/m)

5 Apparatus

5.1 Reference bars of nickel steel (invar) of the approximate length of the test specimens.

5.2 Kiln capable of maintaining a rate of rise of temperature of approximately 50°C/h and a temperature of 600°C ± 15°C.

5.3 Suitable type of measuring frame fitted with a dial gauge, a transducer or similar device, with an accuracy of at least 0,01 mm, (See example in figure 1)

5.4 Vernier callipers or other suitable apparatus for linear measurement to the nearest 0,1 mm.

5.5 Special measurement reference pads and adhesive, if necessary.

5.6 Apparatus for maintaining the test specimens in boiling water for 24 h.

5.7 Desiccator capable of holding all the specimens.

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6 Sampling

The method of sampling shall be in accordance with prEN 771-1. The minimum number of specimens shall be six, but a larger number may be specified in the product specification in which case that larger number shall be used.

7 Procedure

7.1 Preparation

Cut a specimen out of a shell from each masonry unit parallel to the perforations. The length shall be as great as possible between 150 mm to 250 mm, depending on the reference bars (5.1). The minimum width shall be 40 mm. Prepare the ends of the specimens as necessary so that the measuring device bears onto flat surfaces perpendicular to the axis of the specimen.

Note: Special end preparation may have to be carried out on the specimens before being measured, e.g. special adhesive measurement reference pads (5.5) or depressions cut in ends of specimen as appropriate.

7.2 Refiring

If the specimens have been wetted during preparation then store them for 24 h at ambient temperature.

Refire the specimens in a kiln (5.2), maintaining a temperature rise of 50°C/h until a temperature of 600°C \pm 15°C has been reached. Maintain this temperature for 4 h.

Allow the specimens to cool inside the kiln. When the temperature has fallen to 70°C remove the specimens and keep them in a desiccator (5.7) at ambient temperature for at least 20 h.

7.3 Initial measurement

7.3.1 Initial measurement of total length (l_i)

Determine and record the length (l_i) of each specimen to the nearest 0,1 mm using vernier callipers (5.4) or other suitable apparatus. Choose the invar reference bar accordingly.

7.3.2 Measurement of first and second deviations (l_{s1} and l_{s2}) and mean initial deviations (l_{m1})

The readings required by this sub-clause are made using the measuring frame (5.3) and to the nearest 0,01 mm.

Take and record the reading of the invar reference bar (R_{in}).

Take and record the first reading of each specimen after kiln refiring and cooling to ambient temperature ($R_{\delta 1}$). Calculate and record, for each specimen, the first deviation (l_{s1}), i.e. the difference between $R_{\delta 1}$ and R_{in} to the nearest 0,01 mm.

Take and record the second reading of each specimen after kiln refiring, cooling to ambient temperature and subsequent 3 h hold ($R_{\delta 2}$). Calculate and record, for each specimen, the second deviation (l_{s2}), i.e. the difference between $R_{\delta 2}$ and R_{in} to the nearest 0,01 mm. Examples of deviations are illustrated in figure 2.

For each specimen, record the initial deviation (l_{m1}) as the mean of (l_{s1}) and (l_{s2}) to the nearest 0,01 mm.

7.4 Boiling water treatment

Immerse the specimens in boiling water (5.6) for 24 h. The test specimens shall be supported clear of the base of the tank and shall not be in contact with the sides.

Remove the test specimens and allow them to cool at room temperature.

7.5 Measurement of third and fourth deviations (l_{s3} and l_{s4}) and mean final deviations (l_{m2})

The readings required by this sub clause are made using the measuring frame and to the nearest 0,01 mm.

Take and record the reading of the invar reference bar (R_{in}).

Take and record the third reading of each specimen 1 h after cooling following boiling water treatment ($R_{\delta 3}$). Calculate and record, for each specimen, the third deviation (l_{s3}), i.e. the difference between $R_{\delta 3}$ and R_{in} to the nearest 0,01 mm.

Take and record the fourth reading of each specimen ($R_{\delta 4}$) 24 h after the third reading ($R_{\delta 3}$). Calculate and record, for each specimen, the fourth deviation (l_{s4}), i.e. the difference between $R_{\delta 4}$ and R_{in} to the nearest 0,01 mm.

For each specimen, record the final deviation (l_{m2}) as the mean of (l_{s3}) and (l_{s4}) to the nearest 0,01 mm.

8 Expression of results

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For each specimen calculate the moisture expansion due to the boiling water treatment (e_s) to the nearest 0,1 mm/m as follows:

$$e_s = \frac{|l_{m2} - l_{m1}|}{l_i} \times 1000 (\text{mm} / \text{m})$$

From the individual values (e_s) calculate the mean value of the moisture expansion (e_m) to the nearest 0,1 mm/m.

9 Test report

The test report shall contain the following information:

- the number, title and date of issue of this European Standard,
- the name of the organisation that carried out the sampling and the method used;
- the date of testing;
- the type, origin and designation of the masonry unit by reference to prEN 771-1;
- the number of specimens in the sample;