

# Specification for masonry units —

## Part 2: Calcium silicate masonry units

The European Standard EN 771-2:2003, with the incorporation of amendment A1:2005, has the status of a British Standard

ICS 73.020; 91.100.15

National foreword

This British Standard is the official English language version of EN 771-2:2003, including amendment A1:2005. It supersedes BS EN 771-2:2001 which is withdrawn.

The start and finish of text introduced or altered by CEN amendment is indicated in the text by tags A1 A1. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by A1 A1.

EN 771-2 is a candidate “harmonized” European Standard and fully takes into account the requirements of the European Commission mandate M116, Masonry and related products, given under the EU Construction Products Directive (89/106/EEC), and is intended to lead to CE marking. The date of applicability of EN 771-2 as a “harmonized” European Standard, i.e. the date after which this standard may be used for CE marking purposes, is subject to an announcement in the *Official Journal of the European Communities*.

The Commission in consultation with Member States has agreed a transition period for the co-existence of “harmonized” European Standards and their corresponding national standard(s). It is intended that this period will comprise a period, usually nine months, after the date of availability of the European Standard, during which any required changes to national regulations are to be made, followed by a further period, usually of 12 months, for the implementation of CE marking. At the end of this co-existence period, the national standard(s) will be withdrawn.

EN 771-2:2003 is the subject of transitional arrangements agreed under the Commission mandate. In the UK, the corresponding national standards are:

- BS 187:1978, *Specification for calcium silicate (sandlime and flintlime) bricks*;
- BS 6649:1985, *Specification for clay and calcium silicate modular bricks*;

and based on this transition period of twenty-one months, the above mentioned national standards will be withdrawn in April 2006.

NOTE This date is approximate. Users of this standard should contact BSI Customer Services for confirmation of withdrawal.

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

- aid enquirers to understand the text;
- present to the responsible international/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.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

This British Standard, was published under the authority of the Standards Policy and Strategy Committee on 29 September 2003

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Amendments issued since publication

| Amd. No. | Date             | Comments                                                                                        |
|----------|------------------|-------------------------------------------------------------------------------------------------|
| 15974    | 28 November 2005 | Incorporation of CEN amendment A1:2005 and revision of national annex NA and national foreword. |
|          |                  |                                                                                                 |
|          |                  |                                                                                                 |

EN 771-2 specifies the characteristics and performance requirements for calcium silicate masonry units available throughout the CEN member countries. It aims to do so in product performance terms, avoiding as far as possible prescriptive requirements and all the traditional designations of calcium silicate units available throughout Europe. Current products, however, will continue to be manufactured, traded and used, even though they are not referred to by name in this European Standard. The concept of the declared value has been introduced. This is the value for the various properties referred to in this standard that the manufacturer claims for the product. There are other notable differences to which the national annex will refer, in particular the supporting test methods are different and in respect of compressive strength, calcium silicate masonry units are designated either Category I or Category II.

One particular variety of calcium silicate brick available in the UK is the Class 3: Special Purpose (or SP3), whose characteristics are described later in the national annex.

The UK National Annex NA attached to this standard provides an informative commentary on the differences between EN 771-2 and BS 187. Nothing in this annex should be construed as specifying requirements other than those contained in the normative parts of this European Standard.

If CE marking is performed, the procedures in Annex ZA will apply. The significance of the CE marking is that the product manufacturer claims compliance with the “harmonized” requirements given in the normative text of the product standard. These relate to the essential requirements of the EU Construction Products Directive. Not all product characteristics need necessarily be given on the CE marking, but those product characteristics covered by regulations in force in each EU Member State, where the manufacturer intends that the product will be used, do need to be stated.

It cannot be assumed that the declared value of a performance characteristic given for a masonry unit conforming to one part of EN 771 can be directly compared with the same performance characteristic for a masonry unit conforming to another part of EN 771.

### **Cross-references**

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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### **Summary of pages**

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 39 and a back cover.

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English version

## Specification for masonry units - Part 2: Calcium silicate masonry units

(includes amendment A1:2005)

Spécifications pour éléments de maçonnerie - Partie 2:  
Éléments de maçonnerie en silico-calcaire  
(inclut l'amendement A1:2005)

Festlegungen für Mauersteine - Teil 2: Kalksandsteine  
(enthält Änderung A1:2005)

This European Standard was approved by CEN on 2 October 2002; amendment A1:2005 was approved by CEN on 29 December 2004.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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## Foreword

This document (EN 771-2:2003) 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 October 2003, and conflicting national standards shall be withdrawn at the latest by January 2005.

This document 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).

For relationship with EU Directive(s), see informative annex ZA, which is an integral part of this document.

It also takes into account the general rules for reinforced and unreinforced masonry in Eurocode 6.

The annexes A, B and C of this document are normative, the annexes D and ZA are informative.

This document supersedes EN 771-2:2000.

EN 771 *Specification for masonry* units consists of:

- Part 1: Clay masonry units
- Part 2: Calcium silicate masonry units
- Part 3: Aggregates concrete masonry units (dense and light-weight aggregates)
- Part 4: Autoclaved aerated concrete masonry units
- Part 5: Manufactured stone masonry units
- Part 6: Natural stone masonry units

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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

## Foreword to Amendment A1

This document (EN 771-2:2003/A1:2005) has been prepared by Technical Committee CEN/TC 125 “*Masonry*”, the Secretariat of which is held by BSI.

This Amendment to the European Standard EN 771-2:2003 shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2005, and conflicting national standards shall be withdrawn at the latest by August 2005.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see modifications to informative Annex ZA, which is an integral part of this document.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

## 1 Scope

This document specifies the characteristics and performance requirements of calcium silicate masonry units for which the main intended uses are inner walls, outer walls, cellars, foundations and external chimneymasonry.

This document is intended to apply to all calcium silicate masonry units, including those of an overall nonrectangular parallelepiped shape, specially shaped and accessory units.

It defines the performance related to e.g. strength, density and dimensional accuracy, measured according to the corresponding test methods contained in separate European Standards.

It provides for the evaluation of conformity of the product to this European Standard. The marking requirement for products covered by this document is also included.

This document does not specify standard sizes for calcium silicate masonry units, nor standard work dimensions and angles of specially shaped and accessory units.

It does not cover units with more than 60 % volume of voids, nor products made from shale as a major raw material.

It does not cover storey height panels.

It does not cover units intended for use as a damp proof course, nor units with an incorporated thermal insulation material bonded to the faces of the unit susceptible to be exposed to fire nor chimney flue 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 (including amendments).

EN 772-1, *Methods of test for masonry units — Part 1: Determination of compressive strength*

EN 772-2, *Methods of test for masonry units — Part 2: Determination of percentage area of voids in masonry units (by paper indentation)*

EN 772-9, *Methods of test for masonry units — Part 9: Determination of volume and percentage of voids and net volume of clay and calcium silicate units by sand filling*

EN 772-13, *Methods of test for masonry units — Part 13: Determination of net and gross dry density of masonry units (except for natural stone)*

EN 772-16, *Methods of test for masonry units — Part 16: Determination of dimensions* 

EN 772-18:2000, *Methods of test for masonry units — Part 18: Determination of freeze/thaw resistance of calcium silicate masonry units*

EN 772-20, *Methods of test for masonry units — Part 20: Determination of flatness of faces of masonry units* 

EN 1052-3, *Methods of test for masonry — Part 3: Determination of initial shear strength*

EN 1745, *Masonry and masonry products — Methods for determining design thermal values*

EN ISO 12572, *Hygrothermal performance of building materials and products Determination of water vapour transmission properties (ISO 12572:2001)*

EN 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using test data from reaction to fire tests*

EN 1996-1-1, *Eurocode 6: Design of masonry structures — Part 1-1: Common rules for reinforced and unreinforced masonry structures*

EN 1996-1-2, *Eurocode 6: Design of masonry structures — Part 1-2: General rules — Structural fire design* 

### **3 Terms and definitions**

For the purposes of this European Standard, the following terms and definitions apply.

#### **3.1**

##### **masonry unit**

preformed component intended for use in masonry construction

#### **3.2**

##### **calcium silicate masonry unit**

masonry unit made predominantly from lime and siliceous materials, hardened by high pressure steam

#### **3.3**

##### **shale**

fine grained sedimentary rock, finely laminated and consisting of mainly quartz and clay minerals

#### **3.4**

##### **co-ordinating size**

size of the co-ordinating space allocated to a masonry unit including allowances for joints and tolerances

#### **3.5**

##### **work size**

size of a masonry unit specified for its manufacture, to which the actual size conforms within permissible deviations

#### **3.6**

##### **actual size**

size of a masonry unit as measured

#### **3.7**

##### **regular shaped masonry unit**

masonry unit with an overall rectangular parallelepiped shape

#### **3.8**

##### **specially shaped masonry unit**

masonry unit which is not a rectangular parallelepiped

**3.9****accessory unit**

masonry unit which is shaped to provide a particular function, e.g. to complete the geometry of the masonry. It may be obtained by cutting a large unit

**3.10****interlocking feature**

shaped matched projections and indentations on masonry units, e.g. tongue and groove systems

**3.11****hole**

formed void which may or may not pass completely through a masonry unit

**3.12****perforation**

formed void which passes completely through a masonry unit

**3.13****cell**

formed void which does not pass through a masonry unit

**3.14****frog**

depression formed in one or  $\lfloor A_1 \rfloor$  both bed faces  $\langle A_1 \rangle$  of a unit, the total volume of all such depressions which does not exceed a certain limit of the overall volume of the unit i.e. length  $\times$  width  $\times$  height

**3.15****recess**

a depression or indentation in one or more surfaces of a masonry unit (e.g. mortar pocket, rendering keyway, grip hole)

**3.16****shell**

peripheral material between the hole(s) and the outer surfaces of a masonry unit

**3.17****web**

solid material between the holes in a masonry unit

**3.18****normalized compressive strength of masonry units**

compressive strength of masonry units converted to the air dry compressive strength of an equivalent 100 mm wide and 100 mm high masonry unit

NOTE See procedure given in Annex A of EN 772-1:2000

**3.19****mean compressive strength of masonry units**

arithmetic mean of the compressive strengths of masonry units

**3.20****characteristic compressive strength of masonry units**

compressive strength corresponding to the 5 % fractile of the compressive strength of masonry units

**3.21****declared value**

value that a manufacturer is confident of achieving, bearing in mind the precision of the test and the variability of the manufacturing process

### 3.22

#### Category I masonry units

units with a declared compressive strength with a probability of failure to reach it not exceeding 5 %. This may be determined via the mean or characteristic value

### 3.23

#### Category II masonry units

units not intended to comply with the level of confidence of Category I units

### **A1** 3.24

#### combined thickness of webs and shells

sum of the thicknesses of the shells and webs from one face or header of a masonry unit to the opposite face or header respectively along whichever path, via the formed voids, gives the smallest value, expressed as a percentage of the unit width or length respectively **A1**

## 4 Materials and manufacture

Calcium silicate masonry units are produced predominantly from a mixture of lime and natural siliceous materials (sand, crushed or uncrushed siliceous gravel or rock or a mixture thereof), hardened by high pressure steam.

Calcium silicate masonry units produced with a majority of other siliceous materials are permitted if these materials have no deleterious effect on the properties of the product. The presence of such a material shall be declared.

## 5 Requirements for calcium silicate masonry units

### 5.1 General

The requirements and properties specified in this European Standard shall be defined in terms of the test methods and other procedures referred to in this European Standard.

It should be noted that the test methods are not always applicable to specially shaped and accessory units as defined in 3.8. and 3.9.

The conformity criteria given in the following sub-clauses relate to initial type testing (see 8.2) and, when relevant, to consignment testing (see annex A). For the compressive strength of Category I units use a 50 %-fractile ( $p=0,50$ ) for mean values and a confidence level of 95 %.

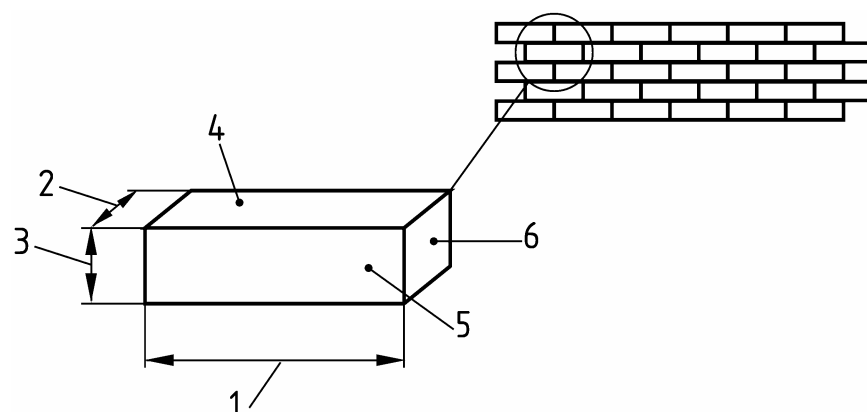
For production evaluation the manufacturer shall define the conformity criteria in the factory production control documentation (see 8.3).

### 5.2 Dimensions and tolerances

#### 5.2.1 Dimensions

The dimensions of a calcium silicate masonry unit shall be declared in mm for length, width and height, in that order. They shall be given in terms of work size.

NOTE In addition the co-ordinating size may be given. see Figure 1.



Key

|   |        |   |       |   |        |
|---|--------|---|-------|---|--------|
| 1 | Length | 2 | Width | 3 | Height |
| 4 | Bed    | 5 | Face  | 6 | Header |

NOTE This relates to the normal use of the masonry unit in the wall.

**Figure 1 — Dimensions and surfaces**

When a specified number of calcium silicate masonry units is sampled from a consignment in accordance with annex A and tested in accordance with EN 772-16 the tolerances shall be as indicated in **Table 1** 5.2.2.1. **Table 1** The determination of length, width and height shall be by one measurement taken approximately in the centre of each specimen (7.1 of EN 772-16:2000 method b)). When there is a need to exclude irregular surfaces (tongues and grooves, grip holes, etc.) in providing the dimension, method a) shall be used.

Dimensions and tolerances for accessory units shall be as given in annex C.

## 5.2.2 **Table 1** Dimensional tolerances

### 5.2.2.1 Tolerances

The dimensional tolerance category shall be declared in accordance with Table 1. The actual deviations for the mean length, width and height and the actual deviations for individual length, width and height shall be not greater than the permissible deviations as specified in Table 1 for the declared dimensional tolerance category. **Table 1**

Closer tolerances may be declared for one or more dimensions.

Actual deviations for the mean are differences between declared work sizes and the mean measured values. Actual deviations for individual values are differences between the mean measured values and the measured individual values.

These dimensional tolerances shall not apply to the direction perpendicular to the face of fracturing in a one-side sliced unit.

**Table 1 — Dimensional tolerance categories and tolerances for calcium silicate masonry units (in millimetres)**

| Dimensions                                        | Calcium silicate masonry units for use with joints made of: |                                 |                            |
|---------------------------------------------------|-------------------------------------------------------------|---------------------------------|----------------------------|
|                                                   | general purpose mortar or light-weight mortar               | thin layer mortar               |                            |
|                                                   | GPLM                                                        | TLM                             | TLMP                       |
| Mean height of sample                             | work size height $\pm 2$                                    | work size height $\pm 1$        |                            |
| Mean length of sample                             | work size length $\pm 2$                                    | work size length $\pm 2$        | work size length $\pm 2$   |
| Mean width of sample                              | work size width $\pm 2$                                     | work size width $\pm 2$         | work size width $\pm 2$    |
| Individual height                                 | mean height of sample $\pm 2$                               | mean height of sample $\pm 1,0$ | work size height $\pm 1,0$ |
| Individual length                                 | mean length of sample $\pm 2$                               | mean length of sample $\pm 2$   | work size length $\pm 3$   |
| Individual width                                  | mean width of sample $\pm 2$                                | mean width of sample $\pm 2$    | work size width $\pm 3$    |
| NOTE For definition of mortar types see EN 998-2. |                                                             |                                 |                            |

#### 5.2.2.2 Flatness of bed faces

When calcium silicate masonry units are declared as tolerance category TLMP for use with thin layer mortar, the manufacturer shall declare the maximum deviation from flatness of the bed faces.

When calcium silicate masonry units are sampled from a consignment in accordance with Annex A and tested in accordance with EN 772-20, the deviation from flatness of the bed faces shall not exceed the declared value.

#### 5.2.2.3 Plane parallelism of bed faces

When calcium silicate masonry units are declared as tolerance category TLMP for use with thin layer mortar, the manufacturer shall declare the maximum deviation from plane parallelism of the bed faces.

When calcium silicate masonry units are sampled from a consignment in accordance with Annex A and tested in accordance with EN 772-16 by procedure **d)**, the deviation from plane parallelism shall not exceed the declared value.  $\overline{A_1}$