

Specification for masonry units —

Part 5: Manufactured stone masonry units

The European Standard EN 771-5:2003, with the incorporation of amendment A1:2005, has the status of a British Standard

ICS 91.100.30

National foreword

This British Standard is the official English language version of EN 771-5:2003, including amendment A1:2005.

The start and finish of text introduced or altered by 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 771-5 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 771-5 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 At the end of this co-existence period, the national standard(s) will be withdrawn.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 771-5:2003 is the subject of transitional arrangements agreed under the Commission mandate. In the UK, the corresponding national standard is:

— BS 6457:1984, *Reconstructed stone masonry units*;

and based on this transition period of twenty-one months, the above mentioned national standard will be withdrawn in April 2006.

In addition, BS 1217:1997 Specification for cast stone is partially superseded. It will be amended to remove the product specification content that overlaps with the scope of EN 771-5.

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

Amendments issued since publication

Amd. No.	Date	Comments
15999	21 November 2005	Incorporation of CEN amendment A1:2005 and revision of national annex NA and national foreword

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 18 March 2004

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ISBN 0 580 43558 X

The UK participation in its preparation was entrusted by Technical Committee B/519, Masonry and associated testing, to 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.

EN 771-5 specifies the characteristics and performance requirements for manufactured stone 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 manufactured stone 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, manufactured stone masonry units are designated either Category I or Category II.

The UK National Annex NA attached to this standard provides an informative commentary on the differences between EN 771-5 and BS 6457. 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.

This standard has been written as a performance standard unlike BS 6457 which was a combination of performance and recipe leading to the following changes.

- This standard covers two-part units (units with different facing and backing concretes) that are excluded from BS 6457, but not those containing reinforcement or fixings for which the materials are covered by BS 1217.
- The order in which the dimensions of units are specified has been changed from “length, height and thickness” to “length, width (previously called thickness) and height”.
- Tolerance categories on the manufacturer’s declared dimensions are specified.
- The manufacturer is required to declare the gross dry density of a unit and when appropriate the net dry density of the concretes in two-part units. The tolerance on these declared values is given.
- The manufacturer is required to declare the normalized compressive strength of the units and separate minimum values have been put in for facing and backing mixes in two-part units.
- The limit on drying shrinkage has been removed and replaced by a requirement for manufacturers to declare the moisture movement value when units are marketed for structural purposes.

- When relevant the manufacturer has to declare the thermal properties, freeze/thaw durability, water absorption by capillarity and water vapour permeability of units.
- The manufacturer has to declare the reaction to fire class of the units, and when intended to be used in structural masonry, its bond strength.
- A requirement for flexural bond strength of masonry units in combination with mortar has been included and is applicable only when required by national provisions valid in the intended place of use and relevant to the application.
- A requirement for the manufacturer to establish the conformity of his production with its declared properties is included in this standard. This requires both initial type testing and the operation of continuing factory production control procedures that have to be fully documented. An outline for this is included in 8.3.
- An informative annex, Annex ZA, is included which indicates those clauses which form the “harmonized” standard and the procedures to be followed in order to CE mark a product.

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.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN title page, pages 2 to 30, an inside back cover and a back cover.

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ICS 91.100.30

English version

Specification for masonry units - Part 5: Manufactured stone masonry units

(includes amendment A1:2005)

Spécifications pour éléments de maçonnerie - Partie 5:
Éléments de maçonnerie en pierre reconstituée
(inclut l'amendement A1:2005)

Festlegungen für Mauersteine - Teil 5: Betonwerksteine
(enthält Änderung A1:2005)

This European Standard was approved by CEN on 3 November 2003; 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.



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Foreword

This document prEN 771-5:2003 has been prepared by Technical Committee CEN/TC 125 "Masonry", the secretariat of which is held by BSI.

This document is currently submitted to the second Formal Vote.

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 informative Annex ZA, which is an integral part of this document.

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

Annex A and annex B of this European Standard are normative.

EN 771 *Specification for masonry units* consists of:

- *Part 1: Clay masonry units.*
- *Part 2: Calcium silicate masonry units.*
- *Part 3: Aggregate 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.*

Foreword to amendment A1

This document (EN 771-5:2003/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 771-5:2003 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 European Standard specifies the characteristics and performance requirements of manufactured stone masonry units for which the main intended uses are facing or exposed masonry in load bearing or non-load bearing building and civil engineering applications. The units are suitable for all forms of coursed or random masonry walling, including single leaf, cavity, partition, retaining and the external masonry to chimneys. They can provide fire protection, thermal insulation, sound insulation and sound absorption.

This standard covers concrete masonry units manufactured to resemble natural stone using casting or pressing techniques with or without textured surfaces produced, by casting, splitting, washing, blasting or tooling and with or without variable outline effects. It covers homogeneous masonry units and those consisting of different facing and backing concrete mixes but excludes those manufactured with an adhesive bonded decorative face. This standard does not cover masonry units intended to conform to prEN 771-3.

It defines the performance related to e.g. strength, density, dimensional accuracy, surface appearance and provides for the evaluation of conformity of the product to this European Standard. The marking requirements for products covered by this European Standard are also included.

This European Standard does not apply to storey height panels, masonry units used for chimney flues or units manufactured with an adhesive bonded decorative face. It does not include products intended to be used as a damp proof course nor does it specify standard sizes for manufactured stone masonry units or work dimensions and angles of specially shaped units. It does not cover units with an incorporated thermal insulation material bonded to the faces of the unit susceptible to be exposed to fire.

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 772-11, *Methods of test for masonry units — Part 11: Determination of water absorption of aggregate concrete, manufactured stone and natural stone masonry units due to capillary action and the initial rate of water absorption of clay masonry units*.

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

EN 772-14, *Methods of test for masonry units — Part 14: Determination of moisture movement of aggregate concrete and manufactured stone masonry units*.

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

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

EN 998-2, *Specification for mortar for masonry — Part 2: Masonry mortar*. 

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

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

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

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

facing masonry unit

masonry unit intended for use with one or more faces visible in use which may or may not be exposed

3.3

exposed face

face intended to be exposed to external climatic conditions

3.4

manufactured stone masonry unit

facing masonry unit having at least one exposed face with a close structure formed from either one or two homogeneous mixtures of aggregate, cementitious binder and other materials moulded under pressure and/or vibration and with or without further processing, intended to resemble and be used as an alternative to natural stone

3.5

two-part masonry unit

masonry unit manufactured with different facing and backing concretes

3.6

co-ordinating size

size of the co-ordinating space allocated to a masonry unit including an allowance for joints

3.7

work size

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

3.8

actual size

size of a masonry unit as measured

3.9

regular shaped masonry unit

masonry unit with an overall rectangular parallelepiped shape

3.10

specialty shaped masonry unit

masonry unit which is not a rectangular parallelepiped

3.11

accessory unit

masonry unit which is shaped to provide a particular function, e.g. to complete the geometry of the masonry

3.12

interlocking features

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

3.13

recess

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

3.14

normalised compressive strength of masonry units

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

NOTE See procedure given in annex B of this standard.

3.15

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

3.16

profiled surface

surface with pronounced relief

3.17

textured surface

surface which, either during or after manufacture, is subjected to mechanical, physical or chemical processing

3.18

Category I masonry units

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

3.19

Category II masonry units

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

3.20

mean compressive strength of masonry units

arithmetic mean of the compressive strengths of masonry units

3.21

characteristic compressive strength of masonry units

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

4 Materials

4.1 General

The specifications of the materials to be used shall be included in the production control documentation. If appropriate European Standards are available, they shall be used except that aggregate need not comply with the grading requirements. If not available, the manufacturer shall specify the materials and have data on their suitability.

5 Requirements for manufactured stone 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 standard test methods are not always applicable to specially shaped masonry units and accessory units as defined in 3.10 and 3.11 respectively.

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 or 5 % fractile ($p = 0,05$) for characteristic 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 manufacturer shall declare the dimensions of the manufactured stone masonry units in millimetres for length, width and height, in that order (see Figure 1), and shall declare the tolerance category $\boxed{A_1}$ (see 5.2.2.1) $\boxed{A_1}$.