BS EN 771-5:2011+A1:2015

BSI Standards Publication

Specification for masonry units

Part 5: Manufactured stone masonry units

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National foreword

This British Standard is the UK implementation of EN 771-5:2011+A1:2015. It supersedes BS EN 771-5:2011, which is withdrawn.

EN 771-5:2011+A1:2015 is a "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 Regulation (Regulation (EU) No 305/2011).

EN 771-5 was the subject of transitional arrangements agreed under the Commission mandate. In the UK, the corresponding national standard was:

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

which was withdrawn in 2007.

BS 1217:1997, *Specification for cast stone*, contained product specification content that overlapped with the scope of EN 771-5. As a result, BS 1217:1997 was revised to remove this material and published as a new edition (BS 1217:2008).

The UK participation in its preparation was entrusted by Technical Committee B/519, Masonry and associated testing, to Subcommittee B/519/1, Masonry units.

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 but permitting all the traditional designations of manufactured stone units available throughout Europe. 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 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.

Masonry units conforming to this standard need to be CE marked in accordance with the procedures in Annex ZA. 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 Regulation. 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. BS 1217 covers

the materials for units having any coordinating dimension exceeding 650mm (excluding the thickness of any profile or non-planar face).

— 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 a unit, 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, where national provisions exist, for a declaration on release and/or content of dangerous substances.

— A requirement for the manufacturer to establish product conformity with its declared properties is included in this standard. This requires both product type determination and the operation of continuing factory production control procedures that have to be fully documented. An outline for these requirements is given in clause 8.

— 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.

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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Compliance with a British Standard cannot confer immunity from legal obligations.

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Amendments/corrigenda issued since publication

Date	Text affected
31 March 2016	Implementation of CEN amendment 1:2015. National Foreword and National Annex NA also updated

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 771-5:2011+A1

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English Version

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

Spécifications pour éléments de maçonnerie - Partie 5: Eléments de maçonnerie en pierre reconstituée

Festlegungen für Mauersteine - Teil 5: Betonwerksteine

This European Standard was approved by CEN on 17 March 2011 and includes Amendment 1 approved by CEN on 11 January 2015.

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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

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European foreword

This document (EN 771-5:2011+A1:2015) 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 February 2016, and conflicting national standards shall be withdrawn at the latest by May 2017.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes [A1] EN 771-5:2011 [A1].

This document includes Amendment 1 approved by CEN on 2015-01-11.

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1] [A1].

[A1] This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports basic requirements for construction works of the EU Construction Products Regulation (Regulation (EU) No 305/2011).

For relationship with EU Regulation/Directive(s), see informative Annex ZA, which is an integral part of this document. [A1]

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

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*

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the 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 EN 771-3.

It defines the performance related to e.g. strength, density, dimensional accuracy, surface appearance and provides for the ⟩A1⟩ assessment and verification of constancy of performance (AVCP) ⟨A1⟨ 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

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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, autoclaved aerated 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 net 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 772-16:2011, *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 aggregate concrete, manufactured stone and natural stone masonry units*

EN 1052-2, *Methods of test for masonry — Part 2: Determination of flexural strength*

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

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

EN 13501-1, *Fire classification of construction products and building elements — Part 1: Classification using 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 document, 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
specially 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

EXAMPLE Tongue and groove systems.

3.13
recess
depression or indentation in one or more surfaces of a masonry unit

EXAMPLE Mortar pocket, rendering keyway.

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 %

NOTE 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

3.22
consignment
shipment from the supplier

3.23
product group
products from one manufacturer having common values for one or more characteristic

4 Materials

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 subclauses relate to ▌A1⟩ product type determination ⟨A1▐ (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 %.

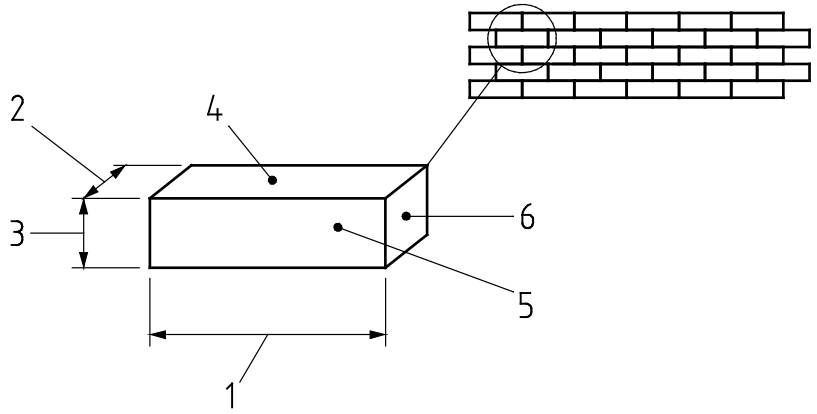
For production evaluation the manufacturer shall define the conformity criteria in the factory production control documentation (see 8.3).

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 (see 5.2.2.1).

Dimensions in millimetres



Key

1 Length 3 Height 5 Face

2 Width 4 Bed 6 Header

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

Figure 1 — Dimensions and surfaces

They shall be given in terms of work size.

NOTE In addition the co-ordinating size can be given.

They shall not exceed 650 mm in any co-ordinating dimension excluding the thickness of any profile on a non-planar face.

5.2.2 Dimensional tolerances

5.2.2.1 Tolerances

The actual dimensions of individual regular units shall conform to the declared work size dimensions subject to the tolerance given in Table 1, except where surfaces are deliberately non-planar, in which case the manufacturer shall declare the tolerances. The manufacturer may declare closer tolerances for one or more dimensions.

Table 1 — Limit deviations in millimetres

Tolerance category	D1	D2	D3
Length	+3 −5	+1 −3	Declared values
Width	+3 −5	+1 −3	
Height	+3 −5	+1 −3	

Tolerances for specially shaped and accessory units shall be declared by the manufacturer.

If sampled in accordance with A.2 and tested in accordance with EN 772-16, the mean value of the measurements taken of any one dimension of a single unit shall not vary from the manufacturer's work size by more than the tolerances given above for the declared tolerance category.

5.2.2.2 Flatness of bed faces

When manufactured stone masonry units are intended to be used with thin layer mortar, the manufacturer shall declare the maximum deviation from flatness of the bed faces**.**

If sampled in accordance with A.2 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 Parallelism of bed faces

When manufactured stone masonry units are intended to be used with thin layer mortar, the manufacturer shall also declare the maximum deviation from plane parallelism of the bed faces.

If sampled in accordance with A.2 and tested in accordance with EN 772-16:2011 Method d), the deviation from plane parallelism shall not exceed the declared value.

5.3 Configuration and appearance

5.3.1 General

Units may be homogenous or two-part, but, in the case of two-part masonry units, the facing mix shall have a thickness of not less than 20 mm. There shall be no delamination between the facing and the backing concretes.

5.3.2 Configuration

When relevant to the uses for which manufactured stone masonry units are put on the market, the configuration shall be declared, including the maximum area of voids on a bed face as a percentage of the length × width of the unit. The declaration may be made using a drawing or an illustration.

Units intended for use in structural applications shall contain not more than 60 % by volume of all formed voids and may be provided with or without recesses or interlocking features. Such units containing not more than 25 % by volume of formed voids and having no single void greater than 12,5 % of the total volume of the unit may be declared as Group 1 masonry units, in accordance with the requirements of EN 1996-1-1.

When conformity with the declared configuration cannot be assessed by visual inspection, masonry units shall be sampled in accordance with A.2, measured in accordance with EN 772-16 and the values calculated.

5.3.3 Surface appearance

The exposed surfaces of manufactured stone masonry units shall be plain, profiled or textured as declared by the manufacturer. Compliance of textured or profiled surfaces may be established on the basis of comparison with any approved samples. Comparison shall be made from a distance of 3 m in normal daylight conditions.

5.3.4 Flatness of surfaces

Where the surfaces of the unit are declared by the manufacturer to be plain (see 5.3.3), they shall not deviate from a plane by more than $(0{,}1\sqrt{L_d})$ mm or 2 mm whichever is the greater, where Ld is the length of the diagonal of the surface declared plain. If sampled in accordance with A.2 and tested in accordance with EN 772-20, no individual measurement of the deviation from a plane shall exceed the value given above.

5.4 Density

When relevant to the uses for which the unit is put on the market, and in all cases for masonry units intended to be used in elements subject to acoustic requirements, the manufacturer shall declare its gross dry density. For two-part units the net dry density of each part shall be declared.

NOTE This declaration can be made for the evaluation of:

— loading;

— sound insulation;

— thermal insulation;

— fire resistance.

The deviation from the manufacturer's declared mean gross dry density and mean net dry density shall not be more than 7,5 %.

For the gross dry density of homogeneous units and of two-part units, whole units or representative samples shall be used. For the net dry density of the constituent concretes of two-part units samples of the unformed mix may be taken and moulded in a manner to obtain a level of compaction similar to that attained in the units.

If sampled in accordance with A.2 and tested in accordance with EN 772-13, the mean value of the dry density (gross or net) of the six units tested shall be within 7,5 % of the manufacturer's declared value.

5.5 Compressive strength

5.5.1 Declared value

The normalised strength of the manufactured stone masonry units in compression shall be declared by the manufacturer (declared value — for definition see 3.15). Either the mean or the characteristic (5 % fractile) value may be declared but it shall be clearly stated which has been declared. The declaration shall relate to and indicate the intended orientation(s) of the masonry units as tested, the method(s) of bedding the units and whether any voids present are intended to be fully filled with mortar. In addition the manufacturer shall declare whether the manufactured stone masonry unit is classified as Category I or Category II (see ZA.2).

The manufacturer shall declare the conditioning regime and the surface preparation to be used in establishing compliance with the declared compressive strength of the units [A1] *deleted text* [A1].

The procedure for normalising the compressive strength of a unit is given in Annex B.

The compressive strength shall be determined by testing either whole masonry units or cubes of dimension 100 mm or 150 mm. Cubes may be cut from a unit or may be prepared from samples of the unformed mix moulded in a manner to obtain a level of compaction similar to that attained in the unit.

If sampled in accordance with A.2 and tested in accordance with EN 772-1, then:

— Conformity with the declared Mean Value of the normalised compressive strength shall be met if the mean of the normalised compressive strengths of the six units tested is not less than the manufacturer's declared value and no individual normalised compressive strength is less than 0,8 × the declared value;

— Conformity with the declared Characteristic Value of the normalised compressive strength shall be met if the individual normalised compressive strengths of the first six units tested are not less than the declared value except that if only one of the tested units is less than the declared value but not less than 0,9 × the declared value, the remaining 6 units shall be tested and all of the individual normalised compressive strengths of the six units shall be not less than the declared value.

5.5.2 Minimum value

The minimum strength of manufactured stone masonry units meeting the requirements of this standard shall be as given in Table 2.

Table 2 — Normalised compressive strength of manufactured stone masonry units[a]

Type of masonry unit	Mean compressive strength N/mm^2	Characteristic compressive strength N/mm^2
Homogeneous	20	17,5
Two-part:		
facing mix	20	17,5
backing mix	15	13
NOTE 1 The compressive strength values in this table are based on durability and other considerations.		
NOTE 2 When the compressive strength of two-part units is required to establish the strength of walls in accordance with design codes, only results obtained from testing whole masonry units should be used.		
[a] For the normalised compressive strength, see Annex B.		

5.6 Thermal properties

When relevant to the uses for which the unit is put on the market and in all cases for masonry units intended to be used in elements subject to thermal insulation requirements, the manufacturer shall provide the mean $\lambda_{10,dry,unit}$-value and the determination model as prescribed in EN 1745, or alternatively the unit density and configuration.

Additionally another fractile may be provided. In such cases both the additional fractile and the corresponding $\lambda_{10,dry,unit}$-value shall be given.

When manufactured stone masonry units are sampled in accordance with Annex A and tested in accordance with EN 1745 following the model provided, the λ-value of the specified number of manufactured stone masonry units shall not be greater than the λ-value provided.

When relevant to the uses for which units are put on the market, the value of specific heat capacity given in EN 1745 may be provided.

5.7 Durability

When relevant to the uses for which the units are put on the market the manufacturer shall evaluate and declare the freeze/thaw resistance of the units by reference to the provisions valid in the intended place of use of the units until an appropriate European Standard is available.

5.8 Water absorption by capillarity

5.8.1 Declared value

The manufacturer shall declare the water absorption due to capillary action of the exposed face of a manufactured stone masonry unit. Units shall be sampled in accordance with A.2 and tested in accordance with EN 772-11 with an immersion time of (10 ± 0,2) min.

5.8.2 Maximum value

The water absorption due to capillary action of the exposed face of a unit shall not exceed 9,0 g/m^{2}s.

5.9 Moisture movement

When relevant to the uses for which the unit is put on the market, and in all cases for masonry units intended to be used in elements subject to structural requirements, the moisture movement of manufactured stone masonry units shall be declared by the manufacturer. When sampled in accordance with A.2 and tested in accordance with EN 772-14, the mean value of the moisture movement shall not exceed the manufacturer's declared value.

5.10 Water vapour permeability

When relevant to the uses for which the unit is put on the market, the manufacturer shall provide information on the water vapour permeability through the water vapour diffusion coefficient tabulated values given in EN 1745, or determined in accordance with EN ISO 12572.

5.11 Reaction to fire

For units intended to be used in elements subject to fire requirements the manufacturer shall declare the reaction to fire classification of the masonry unit.

For masonry units containing a mass or volume fraction of ≤ 1,0 % (whichever is the most onerous) of homogeneously distributed organic materials, the declaration may be fire Class A1 without the need to test.

Masonry units containing a mass or volume fraction of > 1,0 % (whichever is the most onerous) of homogeneously distributed organic materials shall be classified in accordance with EN 13501-1 and the appropriate reaction to fire class declared.

NOTE Attention is drawn to the Commission Decision 96/603/EC, amended by Commission Decision 2000/605/EC, in which non-combustible masonry units containing not more than a mass or volume fraction of 1,0 % (whichever is the more onerous) of homogeneously distributed organic materials are classified as reaction to fire Class A1 without testing.

5.12 Shear bond strength

5.12.1 General

For manufactured stone masonry units intended to be used in elements subjected to structural requirements the shear bond strength of the unit in combination with mortar shall be declared in terms of the characteristic initial shear strength in accordance with EN 1052-3. The declaration may be made either on the basis of fixed values as in 5.12.2 or tests as in 5.12.3. The manufacturer shall declare whether the value of bond strength has been obtained from the fixed values or from test.

NOTE In most cases it is expected that the use of fixed values will be sufficient.

5.12.2 Declaration based on fixed values

When no declaration is made in accordance with 5.12.3, the characteristic initial shear strength of the unit in combination with mortar may be declared by reference to EN 998-2:2010, Annex C.

5.12.3 Declaration based on tests

The characteristic initial shear strength of the unit in combination with one or more specific mortars in accordance with EN 998-2 may be declared based on tests on masonry units sampled in accordance with

Annex A and tested in accordance with EN 1052-3. The characteristic initial shear strength shall not be less than the declared value.

NOTE Bond strength depends on the mortar, the masonry unit and the workmanship.

5.13 Flexural bond strength

When relevant for the intended place of use and the intended application, the flexural bond strength of units and mortar shall be declared. The declaration shall give the characteristic flexural strength of the masonry either in the plane of failure perpendicular to the bed joints or the plane of failure parallel to the bed joints or both, as relevant together with the mortar specification for which the declaration is valid.

When manufactured stone masonry units are sampled in accordance with Annex A and tested in accordance with EN 1052-2, the characteristic flexural strength shall not be less than the value declared.

〈A1〉

5.14 Dangerous substances

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets.

In the absence of European harmonized test methods, verification and declaration of release/content should be done taking into account national provisions in the place of use.

NOTE An informative database covering European and national provisions on dangerous substances is available at the Construction web site on EUROPA accessed through: http://ec.europa.eu/enterprise/construction/cpd-ds/. 〈A1〉

6 Description, designation and classification of manufactured stone masonry units

6.1 Description and designation

The description and designation of a manufactured stone masonry unit shall comprise at least the following:

a) the number, title and date of issue of this European Standard;

b) work size dimensions and tolerance category (see 5.2);

c) configuration, shape and features including whether homogeneous or two-part, description of surface and if units are Group 1 (see 5.3);

d) normalized compressive strength of unit or materials and whether mean or characteristic value (see 5.5);

When relevant to the uses for which the unit is put on the market, the description and designation shall include:

e) mean gross dry density (see 5.4);

f) mean net dry density (of each concrete for two-part units) (see 5.4);

g) moisture movement (see 5.9);

h) thermal properties (see 5.6);

i) durability (see 5.7).

6.2 Classification

Specification of the properties of manufactured stone masonry units may be given by reference to classification systems provided those systems are based only on single properties included in this standard and do not themselves constitute a barrier to trade.

This does not remove the requirement that all manufacturers claiming compliance with this standard shall state declared values of the properties of their products, when required.

7 Marking

The following particulars shall be clearly marked on one of the following: the packaging, the delivery note, any certificate supplied with the masonry units, or 5 % of the units with a maximum of 4 per pack:

a) the name, trademark or other means of identification of the manufacturer;

b) a means of identifying the date of manufacture;

c) means of identifying the masonry units and relating them to their description and designation.

NOTE For CE-marking and labelling, ZA.3 applies. Where ZA.3 requires the CE-marking to be accompanied by the same information as required by this clause, the requirements of this clause can be considered to have been met.

8 [A1] Assessment and verification of constancy of performance (AVCP) [A1]

8.1 General

The manufacturer shall demonstrate compliance for his product with the requirements of this European Standard and with the declared [A1] performance [A1] for the product properties by carrying out both:

— [A1] product type determination [A1] (see 8.2), which can be physical testing, calculation, reference to tabulated values or combinations of these methods;

— factory production control (see 8.3).

Alternative methods of test to the reference methods specified in this European Standard may be adopted except for the [A1] product type determination tests [A1] and in case of dispute, provided that these alternative methods satisfy the following:

a) a correlation can be shown to exist between the results from the reference method and those from the alternative method; or

b) a safe relationship can be demonstrated when using the alternative method compared to the reference methods and

c) the information on which the relationship is based is available.

8.2 [A1] Product type determination [A1]

[A1] After completion of the development of a new product type and before placing on the market, appropriate product type determination shall be carried out to confirm that the properties predicted from the development meet the requirements of this standard and the performance of the characteristics to be declared for the product.

Whenever a major change in the source, blend, or nature of raw materials occurs, or when there is a change in processing conditions, leading to what the manufacturer considers will constitute a new product type being produced, the appropriate product type determination shall be repeated. 〈A1〉

The manufacturer may define product groups. The product group may differ according to the characteristics in question.

〈A1〉 In the product type determination process a manufacturer may take into consideration pre-existing results.

A manufacturer may use the product type determination results carried out by someone else (e.g. another manufacturer or a Research, Technology & Development service provider) to justify his own declaration of performance regarding a product that is manufactured according to the same design and with raw materials, constituents and manufacturing methods of the same kind, provided that permission is given by the owner of the results, and the results are valid for both products. 〈A1〉

〈A1〉 *deleted text* 〈A1〉

The tests to be conducted shall be the tests or calculations as described in Table A.1 for the properties selected from the following list relevant to the manufacturer's declaration for the product type's intended use:

— dimensions;

— dimensional tolerances, including flatness and plane parallelism of bed faces;

— configuration;

— dry density and tolerances;

— compressive strength;

— thermal properties;

— durability;

— water absorption;

— water vapour permeability;

— flatness of surfaces;

— moisture movement;

— reaction to fire;

— bond strength.

〈A1〉 Sampling for product type determination shall be in accordance with Annex A.

The results of product type determination shall be recorded. 〈A1〉

〈A1〉 NOTE For the performance characteristics to be determined in order to address the Declaration of Performance and CE marking provisions, see Table ZA.1. 〈A1〉

8.3 Factory production control

8.3.1 General

The manufacturer shall establish, document and maintain a factory production control system to enable continuing conformity with this European Standard and the declared ▌A1⟩ performance of the characteristics ⟨A1▌ of the products placed on the market.

The factory production control system may consist of procedures related to the process only (full process control and consequently no finished product testing, i.e. 8.3.6 does not apply), to finished products only (consequently no process control, i.e. 8.3.5 does not apply) or any combination of both. Consequently conformity criteria depend on the individual factory production procedures.

As appropriate, the responsibility, authority and interrelation of all personnel who manage, perform and verify work affecting the quality of masonry unit products shall be established.

The factory production control system shall describe the control procedure of production, the regular checks by the manufacturer and his testing, depending on the combination of the procedures related to process control and/or finished product testing. Controls and tests may include the characteristics of raw materials and finished products, the procedure of production, the production equipment or the production machines, the test equipment or the testing instruments and the marking of the product.

The test results shall be recorded.

Actions to be taken when the control test values or criteria do not meet those specified should be documented by the manufacturer.

For Category I masonry units the factory production control system shall be designed so that the probability of failure to reach the declared compressive strength is not exceeding 5 % corresponding to 95 % confidence level.

8.3.2 Testing and measuring equipment

All relevant weighing, measuring and testing equipment, that has an influence on the declared values, shall be verified and regularly inspected.

8.3.3 Production equipment

When the factory production control system includes process control procedures all production equipment, that forms part of these procedures and has an influence on the declared values, shall be regularly inspected.

8.3.4 Raw materials

As appropriate, the manufacturer shall define the acceptance criteria of raw materials and the procedures operated to ensure that these are met.

8.3.5 Production process

As appropriate, the relevant features of the production processes shall be defined giving the frequency of the manufacturer’s checks together with the required criteria. Actions to be taken when the criteria are not achieved shall be specified by the manufacturer.

8.3.6 Finished product testing

As appropriate, the factory production control system shall incorporate a sampling plan and the frequency of testing of the finished product. The results of sampling and testing shall be recorded.

The sample shall be representative of the production.

Guidance on testing frequencies for the characteristics of the finished products is given in Table C.1. The guidance should only be used if no better information is available.

Depending on the corrective measure nonconformities may result in higher frequencies of testing than the ones used.

8.3.7 Statistical techniques

When reasonably practicable and applicable, the results of checks and testing shall be interpreted by means of statistical techniques, by attributes or by variables, to verify the product characteristics and to determine if the production conforms to the compliance criteria and the product conforms to the declared values.

NOTE One method of satisfying this conformity criterion is to use the approach given in ISO 12491.

8.3.8 Marking and stock control of products

The marking and stock control shall be documented. Individual products or/and a defined quantity of products (e.g. a consignment of products) should be identifiable and traceable.

8.3.9 Traceability

As appropriate, systems of traceability shall be given in the factory production control system.

8.3.10 Nonconforming products

〚A1〉 The procedure for dealing with nonconforming products shall be documented. Products that do not conform with the requirements or the performance of the product type shall be segregated and marked accordingly. However, these products may be reassessed by the manufacturer and assigned to a different product type. 〈A1〛

The manufacturer shall take action to avoid a reoccurrence of the nonconformity.

Annex A
(normative)

[A1] Sampling for determination of product type and for independent testing of consignments [A1]

A.1 General

This sampling procedure shall apply [A1] for product type determination [A1] and in the event that there is a requirement for an assessment of product compliance. For independent testing, representatives of all parties shall have the opportunity to be present at the time of sampling.

Only those [A1] characteristics [A1] declared by the manufacturer shall be assessed by this procedure.

The number of units required to determine compliance with the specification shall be sampled from a consignment of up to 100 m^3 or part thereof (see Table A.1).

NOTE Masonry units manufactured to this European Standard which have been the subject of third party inspection of their [A1] assessment and verification of constancy of performance [A1] procedures are not normally subjected to independent testing of consignments after delivery.

A.2 Sampling procedure

A.2.1 General

NOTE The choice of the method of sampling will normally be dictated by the physical form of the consignment in question.

A.2.2 Random sampling

Whenever possible, the random sampling method shall be used, in which every masonry unit in the consignment has an equal chance of being selected for the sample. The appropriate number of units shall be selected at random from positions throughout the consignment without any consideration being given to the quality of those selected except that units damaged in transit shall not be selected.

NOTE In practice, random sampling is normally only convenient either when the masonry units forming the consignment are being moved in a loose (unpacked) form from one place to another or when they have been split into a large number of small stacks, e.g. on scaffolding awaiting laying.

A.2.3 Representative sampling

A.2.3.1 General

When random sampling is impracticable or not convenient, e.g. when the masonry units form a large stack or stacks with ready access to only a limited number, a representative sampling procedure shall be used.

A.2.3.2 Sampling from a stack

The consignment shall be divided into at least six real or imaginary sections, each of a similar size. An equal number of masonry units shall be selected at random from within each section in order to give the required

number without any consideration being given to the quality of those selected except that units damaged in transit shall not be selected.

NOTE It will be essential to remove some sections of the stack or stacks in order to gain access to masonry units within the body of such stacks when taking samples.

A.2.3.3 Sampling from a consignment formed of packs

At least six packs shall be selected at random from the consignment. The packaging shall be removed and an equal number of masonry units shall be sampled at random from within each of the opened packs in order to give the required number without any consideration being given to the quality of those selected except that units damaged in transit shall not be selected.

A.2.4 Dividing the sample

When the sample is to provide masonry units for more than one test, the total number shall be collected together and then divided by taking units at random from within the total sample to form each successive sub-sample.

A.2.5 Number of units required for testing

The sample size shall be in accordance with Table A.1.

Table A.1 — Number of units required for a test

Property	Clause number	Test method	Number of units[a]	
Dimensions	5.2 and 5.3.2	EN 772-16	6	
Flatness of bed faces	5.2.2.2	EN 772-20	3	
Plane parallelism of bed faces	5.2.2.3	EN 772-16	3	
Flatness of surfaces	5.3.4	EN 772-20	6	
Net and gross dry density	5.4	EN 772-13	6	
Compressive strength (mean)	5.5.1	EN 772-1	6	
Compressive strength (characteristic)	5.5.1	EN 772-1	12	
Water absorption	5.8	EN 772-11	3	
Thermal properties	5.6	EN 1745	3 when obtained by testing	
Water vapour permeability	5.10	EN ISO 12572 or EN 1745		
Reaction to fire	5.11	EN 13501-1	3 except for Euroclass A1 without testing	
Moisture movement	5.9	EN 772-14	6	
〈A1〉 Bond strength	5.12	EN 1052-3	Type I specimen	Type II specimen
		Procedure A	27	18
		Procedure B	18	12 〈A1〉

[a] If appropriate, e.g. when units are not affected by a test procedure, the same units may be used for different tests.

Annex B
(normative)

Normalised compressive strength

The value of mechanical strength called up in 5.5 is the normalised compressive strength.

To reach this from the value obtained by testing in accordance with EN 772-1, it shall be brought to the air dry equivalent if conditioned by immersion, by multiplying by 1,2, and then further multiplied by the factor δ given in Table B.1 to allow for the height and width of the specimens tested.

Table B.1 — Values of factor δ

Height of unit mm	**Least horizontal dimension of unit** mm				
	50	**100**	**150**	**200**	**250 or greater**
50	0,85	0,75	0,70	—	—
65	0,95	0,85	0,75	0,70	0,65
100	1,15	1,00	0,90	0,80	0,75
150	1,30	1,20	1,10	1,00	0,95
200	1,45	1,35	1,25	1,15	1,10
250 or greater	1,55	1,45	1,35	1,25	1,15
NOTE Linear interpolation is permitted.					

Annex C
(informative)

Guidance for test frequencies for designing a FPC system to demonstrate conformity of finished products with the requirements of the standard and the declaration of the manufacturer

Table C.1 — Checking of finished products

Subject	Purpose of checking	Reference method	Frequency of checking by the manufacturer for a product group
Dimensions	Conformity with the declared dimensions and the permissible dimensional deviations determined by EN 771-5	EN 772-16	— 6 units/week of production or — As given in the FPC documentation
Configuration	Conformity with the declared values according to EN 771-5	— Shell thickness and frogs according to EN 772-16 — Holes according to EN 772-16	— 6 units at appropriate time intervals or — As given in the FPC documentation
Flatness of bed faces[b]	Conformity with the declared value and the deviation determined by EN 771-5	EN 772-20	— 3 units/week of production or — As given in the FPC documentation
Plane parallelism of bed faces[b]	Conformity with the declared value and the deviation determined by EN 771-5	EN 772-16	— 3 units/week of production or — As given in the FPC documentation
Gross dry density	Conformity with the declared gross dry density and the permissible deviations determined by EN 771-5	EN 772-13	— 6 units/week of production or — As given in the FPC documentation
Net dry density	Conformity with the declared net dry density and the permissible deviations determined by EN 771-5	EN 772-13	— 6 units/week of production or — As given in the FPC documentation
Compressive strength	Conformity with the declared compressive strength as determined by EN 771-5	EN 772-1	— At least 6 units/week of production or — As given in the FPC documentation
Durability	Conformity with the declared freeze/thaw resistance according to EN 771-5	Reference to the provisions valid in the intended place of use of the units	— Once a year or — As given in the FPC documentation
Flatness of surfaces	Conformity with the flatness of surfaces declared according to EN 771-5	EN 772-20	— As given in the FPC documentation
Thermal resistance or thermal conductivity[a]	Conformity with declared value	EN 1745	— Once a year or — As given in the FPC documentation
Bond	Conformity with declared value	EN 1052-3	— As given in the FPC documentation

Subject	Purpose of checking	Reference method	Frequency of checking by the manufacturer for a product group
strength[a]			
Water absorption[a]	Conformity with the declared water absorption coefficient according to EN 771-5	EN 772-11	— As given in the FPC documentation
Water vapour permeability[a]	Conformity with declared value	EN ISO 12572	— Once a year or — As given in the FPC documentation
Reaction to fire[a]	Conformity with declared value	EN 13501-1	— Every 5 years or — As given in the FPC documentation
Moisture movement[a]	Conformity with declared moisture movement according to EN 771-5	EN 772-14	— Once a year or — As given in the FPC documentation

[a] Only when declared by the manufacturer based on testing.

The manufacturer does not necessarily have to declare a value against every property and some may be on the basis of, for example, a tabulated values. When the declared value is from a tabulated value, no testing is required. In these cases certification can be based on evidence that the tables are being used correctly.

[b] Applies only where units are intended to be used with thin layer mortar.

The tests should be carried out in accordance with the reference methods mentioned in the standard or by applying alternative test methods with a proven correlation or a safe relationship to the reference methods.

Annex ZA
(informative)

A1 Clauses of this European Standard addressing the provisions of the EU Construction Products Regulation

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under a mandate M/116 (as amended) Masonry and related products given to CEN by the European Commission and the European Free Trade Association.

If this European standard is cited in the Official Journal of the European Union (OJEU), the clauses of this standard, shown in this annex, are considered to meet the provisions of the relevant mandate, under the Regulation (EU) No. 305/2011.

This annex deals with the CE marking of manufactured stone masonry units intended for the uses indicated in Table ZA 1 and shows the relevant clauses applicable.

This annex has the same scope as in Clause 1 of this standard related to the aspects covered by the mandate and is defined by Table ZA.1.

Table ZA.1 — Relevant clauses for manufactured stone masonry units in masonry walls, columns and partitions

Product:	Manufactured stone masonry units
Intended use:	In masonry walls, columns and partitions

Essential Characteristics	Clauses in this European Standard related to essential characteristics	Regulatory levels and/or classes	Notes
Dimensions and dimensional tolerances (for units intended to be used in elements subject to structural requirements)	5.2.1 Dimensions 5.2.2 Dimensional tolerances	None	Declared values, in mm, and tolerance category
Configuration (for units intended to be used in elements subject to structural requirements)	5.3.2 Configuration	None	Declared configuration as illustrated or described
Compressive strength (for units intended to be used in elements subject to structural requirements)	5.5 Compressive strength	None	Declared value, in N/mm^2 (with indication of mean or characteristic, preparation, direction of load and unit category)
Dimensional stability (for units intended to be used in elements subject to structural requirements)	5.9 Moisture movement	None	Declared value of moisture movement, in mm/m
Bond strength (for units intended to be used in elements subject to structural requirements)	5.12 Shear bond strength	None	Fixed value; or Declared value of initial shear strength, in N/mm^2
	5.13 Flexural bond strength	None	Declared value[a]

Product:	Manufactured stone masonry units			
Intended use:	In masonry walls, columns and partitions			
Essential Characteristics	**Clauses in this European Standard related to essential characteristics**		**Regulatory levels and/or classes**	**Notes**
Reaction to fire (for units intended to be used in elements subject to fire requirements)	5.11	Reaction to fire	Euroclass A1 to F	Declared reaction to fire Class A1 to F
Water absorption (for units intended to be used in damp proof courses or in external elements with exposed face)	5.8.1	Water absorption by capillarity	None	Declared value, in $g/m^2 \cdot s$
Water vapour permeability (for units intended to be used in external elements)	5.10	Water vapour permeability	None	Declared coefficient
Direct airborne sound insulation (in end use conditions)/ [Density and configuration] (for units to be used in elements subject to acoustic requirements)	5.4	Density	None	Declared value of gross density in kg/m^3 and tolerance category
	5.3.2	Configuration		Declared configuration as illustrated or described
	5.2	Dimensions and tolerances		
Thermal resistance/ [Density and configuration] (for units intended to be used in elements subject to thermal insulation requirements)	5.6	Thermal properties	None	Declared value of thermal conductivity in W/mK and the means of evaluation or configuration and density (see 5.3 and 5.4)
Durability against freeze-thaw	5.7	Durability	None	Declared value[a]
Dangerous substances	5.14	Dangerous substance	None	

[a] As requested by assessment method used.

The declaration of the product performance related to certain essential characteristics is not required in those Member States (MS) where there are no regulatory requirements on these essential characteristics for the intended use of the product.

In this case, manufacturers placing their products on the market of these MS are not obliged to determine nor declare the performance of their products with regard to these essential characteristics and the option “No performance determined” (NPD) in the information accompanying the CE marking and in the declaration of performance (see ZA.3) may be used for those essential characteristics.

ZA.2 Procedure(s) for AVCP of manufactured stone masonry units

ZA.2.1 System(s) of AVCP

The AVCP system(s) of manufactured stone masonry units indicated in Table ZA.1. established by EC Decision 97/740/EC of 14.10.1997 (OJ L 299 of 4.11.1997) as amended by the Commission Decision 2001/596/EC of 8 January 2001 published in the OJEU as L209 (page 33) of 2.8.2001 is shown in Table ZA.2 for the indicated intended use(s) and relevant level(s) or class(es) of performance.

Table ZA.2 — System(s) of AVCP

Product(s)	Intended use(s)	Regulatory levels and/or classes	AVCP system(s)
Masonry Units. Category I	In walls, columns and partitions	—	2+
Masonry Units. Category II	In walls, columns and partitions	—	4
System 2+: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.3 amended by the Regulation (EU) No 568/2014 including certification of the factory production control by a notified production control certification body on the basis of initial inspection of the manufacturing plant and of factory production control as well as of continuous surveillance, assessment and evaluation of factory production control. System 4: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.5 amended by the Regulation (EU) No 568/2014.			

The AVCP of the manufactured stone masonry units in Table ZA.1 shall be based on the AVCP procedures indicated in Table ZA.3.1 and Table ZA.3.2 resulting from application of the clauses of this or other European Standard indicated therein. The content of tasks of the notified body shall be limited to those essential characteristics as provided for, if any, in Annex III of the relevant mandate and to those that the manufacturer intends to declare.

Table ZA.3.1 — Assignment of AVCP tasks for Category I manufactured stone masonry units (system 2+)

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1 relevant for the declared intended use	8.3
	Determination of the product-type on the basis of type testing(including sampling), type calculation, tabulated values or descriptive documentation of the product	Parameters related to essential characteristics of Table ZA.1 relevant for the declared intended use	8.2
	Further testing of samples taken at factory according to the prescribed test plan	Essential characteristics of Table ZA.1 relevant for the declared intended use	8.3
Tasks for the notified factory production control certification body	Initial inspection of the manufacturing plant and of FPC	Parameters related to essential characteristics of Table ZA.1, relevant for the declared intended use. Documentation of the FPC.	8.3
	Continuous surveillance, assessment and evaluation of FPC.	Parameters related to essential characteristics of Table ZA.1, relevant for the declared intended use, namely Compressive strength Dimensional stability Bond strength Documentation of the FPC.	8.3

Table ZA.3.2 — Assignment of AVCP tasks for Category II manufactured stone masonry units (system 4)

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1. relevant for the declared intended use	8.3
	Determination of the product-type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product	Essential characteristics of Table ZA.1 relevant for the declared intended use	8.2

ZA.2.2 Declaration of performance (DoP)

ZA.2.2.1 General

The manufacturer draws up the DoP and affixes the CE marking on the basis of the different AVCP systems set out in Annex V of the Regulation (EU) No 305/2011 amended by the Regulation (EU) No 568/2014:

In case of products under system 2+

— the determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product; the factory production control and the testing of samples taken at the factory according to the prescribed test plan, carried out by the manufacturer; and

— the certificate of conformity of the factory production control, issued by the notified production control certification body on the basis of:

  — initial inspection of the manufacturing plant and of factory production control and

  — continuous surveillance, assessment and evaluation of factory production control.

In case of products under system 4

— the factory production control carried out by the manufacturer;

— the determination by the manufacturer of the product-type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product.

ZA.2.2.2 Content

The model of the DoP is provided in Annex III of the Regulation (EU) No 305/2011 amended by the Regulation (EU) No 574/2014.

According to this Regulation, the DoP shall contain, in particular, the following information:

— the reference of the product-type for which the declaration of performance has been drawn up;

— the AVCP system or systems of the construction product, as set out in Annex V of the CPR amended by the Regulation (EU) No 568/2014;

— the reference number and date of issue of the harmonized standard which has been used for the assessment of each essential characteristic;

— where applicable, the reference number of the Specific Technical Documentation used and the requirements with which the manufacturer claims the product complies.

The DoP shall in addition contain:

(a) the intended use or uses for the construction product, in accordance with the applicable harmonized technical specification;

(b) the list of essential characteristics, as determined in the harmonized technical specification for the declared intended use or uses;

(c) the performance of at least one of the essential characteristics of the construction product, relevant for the declared intended use or uses;

(d) where applicable, the performance of the construction product, by levels or classes, or in a description, if necessary based on a calculation in relation to its essential characteristics determined in accordance with the Commission determination regarding those essential characteristics for which the manufacturer shall declare the performance of the product when it is placed on the market or the Commission determination regarding threshold levels for the performance in relation to the essential characteristics to be declared.

(e) the performance of those essential characteristics of the construction product which are related to the intended use or uses, taking into consideration the provisions in relation to the intended use or uses where the manufacturer intends the product to be made available on the market;

(f) for the listed essential characteristics for which no performance is declared, the letters “NPD” (No Performance Determined).

Regarding the supply of the DoP, article 7 of the Regulation (EU) No 305/2011 applies.

The information referred to in Article 31 or, as the case may be, in Article 33 of Regulation (EC) No 1907/2006, (REACH) shall be provided together with the DoP.

ZA.2.2.3 Examples of DoP

ZA.2.2.3.1 General

The following are examples of completed DoPs for manufactured stone masonry units

ZA.2.2.3.2 Example A

DECLARATION OF PERFORMANCE
No. MS C50

1. Unique identification code of the product-type:

MS C50

2. Intended use or uses:

In walls, columns and partitions

3. Manufacturer:

AnyCo SA,
Any Street 1
B-1050 Brussels, Belgium
Tel. +32987654321
Fax: +32123456789
e-mail: anyco.sa@provider.be

4. System of AVCP:

System 2+

5. Harmonized standard:

EN 771-5: 2011+A1:2015

6. Notified body

NB 9999
Anyone Ltd
Flower Street 24
West Hamfordshire
UK 589645
Tel: +44987654321
Email: info@anyone.co.uk

7. Declared performance

Essential characteristics		Performance
Dimensions (1)	Length	440 mm
	Width	100 mm
	Height	215 mm
	Tolerance category	D2
Configuration (1)	Shape and features	NPD
	Group according EN 1996-1-1 (EC6)	Group 1
Compressive strength (1)	Normalized compressive strength	20 N/mm^2
	Direction of load	Perpendicular to bed faces
	Unit category	Category I
Dimensional stability (1)		≤ 0,45 mm/m
Bond strength (1)	Shear bond strength	0,15 N/mm^2 (Tabulated value)
	Flexural bond strength	NPD
Reaction to fire (2)		A1
Water absorption (3)		< 3 g/m^2s
Water vapour permeability (4)		5/15 (Tabulated value)
Direct airborne sound	Gross density	2000 kg/m^3

Essential characteristics		Performance
insulation (5)(in end use conditions)/[Density and configuration]	Configuration; dimensions and tolerances	See configuration
Thermal resistance/[density and configuration] (for units intended to be used in elements subject to thermal insulation requirements)		Thermal conductivity ($\lambda_{10,dry,\ unit}$)1,00 (Model S1)
Durability against freeze/thaw		For external use
Dangerous substances		NPD
(1) for units intended to be used in elements subject to structural requirements (2) for units intended to be used in elements subject to fire requirements (3) for units intended to be used in damp proof courses or in external elements with exposed face (4) for units intended to be used in external elements (5) for units to be used in elements subject to acoustic requirements		

The performance of the product identified above is in conformity with the declared performance.

This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer:

(name)

At Concretetown, **on 30.06.2014**

(signature) ……

ZA.2.2.3.3 Example B

DECLARATION OF PERFORMANCE
No. MS C60

1. Unique identification code of the product-type:

MS C60

2. Intended use: In walls, columns and partitions

3. Manufacturer

AnyCo SA, Any Street 1
B-1050 Brussels, Belgium
Tel. +32987654321
Fax: +32123456789
e-mail: anyco.sa@provider.be

4. Authorized Representative:

Not applicable

5. Harmonized standard:

EN 771-5: 2011+A1:2015

6. AVCP

System 4

7. Declared performance

Essential characteristics		Performance
Dimensions (1)	Length	440 mm
	Width	100 mm
	Height	215 mm
	Tolerance category	D1
Configuration (1)	Shape and features	NPD
	Group according EN 1996-1-1 (EC6)	Group 1
Compressive strength (1)	Normalized compressive strength	20 N/mm^2
	Direction of load	Perpendicular to bed faces
	Unit category	Category II
Dimensional stability (1)		≤ 0,45 mm/m
Bond strength (1)	Shear bond strength	NPD
	Flexural bond strength	NPD
Reaction to fire (2)		A1
Water absorption (3)		< 6 g/m^{2}s
Water vapour permeability (4)		5/15 (Tabulated value)
Direct airborne sound insulation (5) (in end use conditions)/ [Density and configuration]	Gross density	2 000 kg/m^3
	Configuration; dimensions and tolerances	See configuration
Thermal resistance/ [density and configuration] (for units intended to be used in elements subject to thermal insulation requirements)		NPD
Durability against freeze/thaw		For external use
Dangerous substances		NPD

Essential characteristics	Performance
(1) for units intended to be used in elements subject to structural requirements	
(2) for units intended to be used in elements subject to fire requirements	
(3) for units intended to be used in damp proof courses or in external elements with exposed face	
(4) for units intended to be used in external elements	
(5) for units to be used in elements subject to acoustic requirements	

The performance of the product identified above is in conformity with the declared performance.

This declaration of performance is issued, in accordance with Regulation (EU) No 305/2011, under the sole responsibility of the manufacturer identified above.

Signed for and on behalf of the manufacturer:

(name)

At Concretetown, **on 30.06.2014**

(signature) ……

ZA.3 CE marking and labelling

The CE marking symbol shall be in accordance with the general principles set out in Article 30 of Regulation (EC) No 765/2008 and shall be affixed visibly, legibly and indelibly:

— to the manufactured stone masonry unit

or

— to a label attached to it.

Where this is not possible or not warranted on account of the nature of the product, it shall be affixed:

— to the packaging

or

— to the accompanying documents.

The CE marking shall be followed by:

— the last two digits of the year in which it was first affixed;

— the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity;

— the unique identification code of the product-type;

— the reference number of the declaration of performance [see example of DoP];

— the level or class of the performance declared;

— the reference to the harmonised technical specification applied;

— the identification number of the notified body, [only for products under system 2+];

— the intended use as laid down in the harmonized technical specification applied.

The CE marking shall be affixed before the construction product is placed on the market. It may be followed by a pictogram or any other mark notably indicating a special risk or use.

Figure ZA.1 gives an example of CE marking for manufactured stone masonry units:

CE	*CE marking, consisting of the "CE"-symbol*
13	*Last two digits of the year in which the marking was first affixed*
NB 9999	*Identification number of the notified factory production control certification body*
AnyCo Ltd Any Street 1 B-1050, Brussels, Belgium	*name and the registered address of the manufacturer, or identifying mark*
MS C50	*Reference number of the DoP*
EN 771-5:2011+A1:2015	*No. of European standard applied, as referenced in OJEU*
Product : MS C50	*Unique identification code of the product-type*
Intended use : In masonry walls, columns and partitions	*Intended use or use(s)*
Dimensions L×W×H:	440 × 100 × 215 mm
Configuration:	Group 1
Tolerances:	D2
Category I	*Level or class of the performance declared*
Normalized compressive strength:	20 N/mm^2
Direction of load:	perpendicular to bed faces
Moisture movement:	≤ 0,45 mm/m
Bond strength:	0,15 N/mm^2(tabulated values)
Reaction to fire:	A1
Water absorption:	< 3 g/m^{2}s
Water vapour permeability:	5/15 (tabulated value)
Gross dry density:	2 000 kg/m^3
Thermal resistance:	λ10,dry.unit 1,00 S1
Durability:	For external use
Dangerous substances:	NPD
Other information: www.anyco.com/DoP/MS C50	

Figure ZA.1 — Example CE marking information of products under AVCP system 2+ corresponding to DoP example A ⟨A1⟩

Bibliography

[1] EN 998-2:2010, *Specification for mortar for masonry — Part 2: Masonry mortar*

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

[3] ISO 12491, *Statistical methods for quality control of building materials and components*

[4] 96/603/EC: Commission Decision of 4 October 1996 establishing the list of products belonging to Classes A 'No contribution to fire' provided for in Decision 94/611/EC implementing Article 20 of Council Directive 89/106/EEC on construction products, OJ L 267, 19.10.1996, p. 23-26

[5] 2000/605/EC: Commission Decision of 26 September 2000 amending Decision 96/603/EC establishing the list of products belonging to Classes A 'No contribution to fire' provided for in Decision 94/611/EC implementing Article 20 of Council Directive 89/106/EEC on construction products (notified under document number C(2000) 2640), OJ L 258, 12.10.2000, p. 36-37

National Annex (informative)

Commentary on the differences between EN 771-5:2011+A1:2015 and BS 6457:1984

NA.1 General

This national annex provides informative commentary on the differences between EN 771-5:2011+A1:2015 and BS 6457 and should not be construed as specifying requirements other than those given in the normative parts of this European Standard.

Changes made to this National Annex in response to CEN amendment 1 are indicated in the text by [A1] 〈A1〉. Minor editorial changes are not tagged.

NA.2 Sizes

This standard retains the same maximum dimension of a unit that is given in BS 6457. When ordering blocks or bricks it is important to specify the size required in the order of length, width (thickness) and height which is at variance with previous UK practice of length, height and thickness (width). In the case of broken bond masonry the length and height of units in a delivered batch will vary.

NA.3 Requirements for manufactured stone masonry units (see EN 771-5:2011+A1:2015, Clause 5)

NA.3.1 Tolerances (see EN 771-5:2011+A1:2015, 5.2.2)

There are three different classes of tolerance in this standard to cover all sizes of unit, but none of them is identical to the class for units in BS 6457. Class D1 is the most appropriate for common applications. The manufacturer is required to declare the tolerance class, but there is also the opportunity to declare closer tolerances than those given.

Manufacturers supplying units specifically for use with this layer mortar (typically 3 mm joints) will need to declare the deviation from flatness of bed faces and deviation from plane parallelism of bed faces.

NA.3.2 Configuration and appearance (see EN 771-5: 2011+A1:2015, 5.3)

BS 6457 does not mention voided or hollow units because in the UK all units are solid. However, EN 771-5 takes into account European practice and permits voids up to 60 % of the bed face area of the unit for structural applications. This covers units within the definition of Groups 1 and 2, in EN 1996-1-1. It should be noted that EN 1996-1-1 does not cover the design of broken bond masonry.

This clause also covers surface appearance and gives permissible tolerances on the flatness of plane surfaces.

NA.3.3 Density (see EN 771-5:2011+A1:2015, 5.4)

This standard requires the manufacturer to declare the gross dry density and for two-part units, the net dry density of each part and gives the permissible tolerances on the declared values. BS 6457 had no requirement for stating gross and net dry density, but manufacturers had values available in their literature or on request.

Gross and net dry density and configuration are provided to enable thermal and acoustic properties to be established as an alternative to testing or using the manufacturer's declared value.

NA.3.4 [A1] Compressive strength [A1] (see EN 771-5:2011+A1:2015, 5.5)

Recognizing that a large proportion of the units conforming to EN 771-5 are intended for broken bond masonry, EN 771-5 requires the normalized values of compressive strength to be declared. The normalized strength of a unit is its strength adjusted to that of an equivalent 100 mm wide by 100 mm high unit tested dry. The adjustment to be made can be found in Annex B.

EN 771-5 gives a minimum strength of a homogeneous unit and the facing and backing concretes of two-part units. It requires the manufacturer to declare:

a) whether the strength is the mean or the characteristic value;

b) the category of the unit (see the definitions 3.18 and 3.19); and

c) the conditioning regime and surface preparation.

It should be noted that while meeting the minimum values in Table 2 are a requirement for compliance with this standard they are not a requirement for CE marking to this standard.

NA.3.5 Thermal properties (see EN 771-5:2011+A1:2015, 5.6)

This standard requires the manufacturer to provide information on the thermal properties of the unit when relevant to the uses for which the product is put on the market. While units can be used in situations where this is not relevant, boundary walls, internal partitions etc., most units will be put on the market without restriction on their use. This means that thermal information is required, and in particular details of all formed voids if configuration and density are declared.

NA.3.6 Durability (see EN 771-5:2011+A1:2015, 5.7)

Freeze/thaw resistance is not a property covered by BS 6457. The national provisions for the selection of manufactured stone units in the UK are given in PD 6697, which gives density, aggregate type or unit compressive strength required for durable masonry. All units conforming to EN 771-5 are durable when assessed using these criteria.

NA.3.7 Water absorption by capillarity (see EN 771-5:2011+A1:2015, 5.8)

This is another property that was not required by BS 6457. It is used in some European countries to indicate the ability of a unit to resist the absorption of rain and is a requirement of EN 771-5. It should be noted that while meeting the maximum value in 5.8.2 is a requirement of conformity to EN 771-5, it is not a requirement for CE marking to EN 771-5. [A1] *Text deleted* [A1]

This property is measured using the same test method as for products conforming to EN 771-3 but the results are not comparable with those for products covered by other parts of EN 771 as the test methods for them differ.

This is not a regulatory requirement in the UK hence the option of "no performance determined" may be used for CE marking A1 *Text deleted* A1.

NA.3.8 Moisture movement (see EN 771-5:2011+A1:2015, 5.9)

The limit on drying shrinkage in BS 6457 is not in this standard, but is replaced by the manufacturer's declaration of moisture movement. This is required when relevant, and in all cases for units intended for structural applications. If a unit is put on the market with no indication of a limit on its use this property has to be declared.

This property is measured using the same test method as for products conforming to EN 771-3 but the results are not comparable with those for products covered by other parts of EN 771 as the test methods for them differ.

This is not a regulatory requirement in the UK hence the option of "no performance determined" may be used for CE marking A1 *Text deleted* A1.

NA.3.9 Water vapour permeability (see EN 771-5:2011+A1:2015, 5.10)

This property was not included in BS 6457, but this standard requires it to be declared. The value is only useful for units built into walls at risk from interstitial condensation, however, it is required to be declared for all units built into external elements. For example, it would not be required if a product was marketed for internal partitions only, but it would for units built into boundary walls.

This is not a regulatory requirement in the UK hence the option of "no performance determined" may be used for CE marking A1 *Text deleted* A1.

NA.3.10 Reaction to fire (see EN 771-5:2011+A1:2015, 5.11)

BS 6457 did not require this property to be declared. Concrete masonry units in the UK have always been considered to be the equivalent of Class A1 whether or not they contained any organic material.

NA.3.11 Shear bond strength (see EN 771-5:2011+A1:2015, 5.12)

BS 6457 did not require this value to be declared and it is not required for design conforming to BS 5628, BS 8103-2 or EN 1996-1-1. Declarations are anticipated to be based on fixed values (see 5.12.2). The multitude of variable factors in use prevent a meaningful comparison between laboratory tests and site conditions.

This is not a regulatory requirement in the UK hence the option of "no performance determined" may be used for CE marking A1 *Text deleted* A1.

NA.3.12 Flexural bond strength (see EN 771-5:2011+A1:2015, 5.13)

There are no national provisions covering flexural bond strength in the UK. It is also not a characteristic that has been referenced in UK masonry product standards such as BS 6073-1. It is legal requirement only in Finland, this being the reason for its incorporation in EN 771-5. As there are no national provisions covering flexural bond strength in the UK, this requirement is not valid in the UK.

[A1] NA.3.13 Dangerous substances (see EN 771-5:2011+A1:2015, 5.14)

BS 6073-1 did not require such a declaration. There are no substances released from masonry units to EN 771-5 requiring such a declaration in the UK. [A1]

NA.3.14 [A1] Assessment and verification of constancy of performance (AVCP) [A1] (see EN 771-5:2011+A1:2015, Clause 8)

In order to meet the requirements of a "harmonized" standard there is a clause on the [A1] assessment and verification of constancy of performance [A1] that requires a manufacturer to establish product conformity by both [A1] product type determination [A1] and having and operating a documented factory production control system. In order to claim compliance with EN 771-5 all the clauses in the standard need to be complied with unless the manufacturer limits the uses for which the product is put on the market. [A1] However, when [A1] CE marking in accordance with EN 771-5, there is the option of declaring "no performance determined" for properties not subject to regulation in the country of sale. [A1] *Text deleted* [A1]

Subclause 8.2 gives the information for [A1] product type determination [A1], which is the manufacturer's sole responsibility, and subclause 8.3 give an outline [A1] factory [A1] production control system. For Category I products it is required that an approved third party (notified body) certify the system being used and subject it to continuing assessment. For Category II products this is not required. Guidance on test frequencies for a factory production control scheme are given in Annex C. This guidance is similar to that given on other parts of EN 771. For manufactured stone units test frequencies will need to be tailored to reflect batch sizes, groupings of product types and frequency of manufacture.

The conformity criteria for [A1] product type determination [A1] are given in the standard but the conformity criteria for production control testing have to be included in the manufacturer's documented system.

NA.3.15 Clauses in this European Standard addressing the provision of the EU Construction Products [A1] Regulation [A1] (see EN 771-5:2011+A1:2015, Annex ZA)

[A1] Figure ZA.1 gives an example of CE marking. [A1]

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