

ICS 91.100.30

English version

## Specification for masonry units – Part 1: Clay masonry units

Spécification pour éléments de maçonnerie – Partie 1:  
Briques de terre cuite

Festlegungen für Mauersteine – Teil 1: Mauerziegel

This European Standard was approved by CEN on 2 October 2002.

This amendment A1 modifies the European Standard EN 771-1:2003; it was approved by CEN on 29 December 2004.

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

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## **Foreword**

This document (EN 771-1:2003) has been prepared by Technical Committee CEN/TC 125 "*Masonry*", the secretariat of which is held by BSI, following initial preparation by Working Group 1.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2003, and conflicting national standards shall be withdrawn at the latest by January 2005.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports the essential requirements of the EU Construction Products Directive (89/106/EEC).

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

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

Annexes A and C of this document are normative, annexes B and ZA are informative.

EN 771 Specification for masonry units consists of:

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

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

## Foreword of the Amendment A1

This document (EN 771-1:2003/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 771-1:2003 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 for masonry units manufactured from clay for use in masonry construction (e.g. facing and rendered masonry, loadbearing or non-loadbearing masonry structures, including internal linings and partitions, for building and civil engineering).

This European Standard is intended to apply to two groups of fired-clay masonry units:

LD units (see 3.4 and 5.2) comprising:

clay masonry units with a gross dry density of less than or equal to  $1000 \text{ kg/m}^3$  for use in protected masonry.

HD units (see 3.5 and 5.3) comprising:

- a) all clay masonry units for use in unprotected masonry;
- b) clay masonry units with a gross dry density of greater than  $1000 \text{ kg/m}^3$  for use in protected masonry.

This European Standard includes those clay masonry units of an overall non-rectangular parallelepiped shape.

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

It provides for the evaluation of conformity of the product to this European Standard.

The marking requirement for products covered by this European Standard is included.

This document does not specify standard sizes for clay masonry units, nor does it specify standard work dimensions, angles and radii of specially shaped clay masonry units. This document does not include method of measurement, tolerance and range requirements for dimensions, angles and radii characteristics of specially shaped clay masonry units.

This European Standard does not cover requirements for the following: units for paving, flue liners and storey height clay units and clay masonry units with an incorporated thermal insulation material bonded to the faces of the unit susceptible to be exposed to fire. It does, however, include clay units for external chimney masonry.

## **2 Normative references**

This European Standard incorporates by dated and 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 772-1:2000*, Methods of test for masonry units – Part 1: Determination of compressive strength

*EN 772-3*, Methods of test for masonry units – Part 3: Determination of net volume and percentage of voids of clay masonry units by hydrostatic weighing

*EN 772-5*, Methods of test for masonry units – Part 5: Determination of the active soluble salts content of clay masonry units

*EN 772-7*, Methods of test for masonry units – Part 7: Determination of water absorption of clay masonry damp proof course units by boiling in water

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

*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 net and gross dry density of masonry units (except for natural stone)

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

*EN 772-19*, Methods of test for masonry units – Part 19: Determination of moisture expansion of large horizontally perforated clay masonry units

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

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

### **3 Terms and definitions**

For the purpose of this European standard, the following terms and definitions apply.

NOTE Annex B to this European standard is informative and gives descriptions of such matters as applications, exposure, and durability.

#### **3.1 masonry unit**

preformed component intended for use in masonry construction

#### **3.2 clay masonry unit**

masonry unit made from clay or other argillaceous materials with or without sand, fuel or other additives fired at a sufficiently high temperature to achieve a ceramic bond

#### **3.3 protected masonry**

masonry which is protected against water penetration. It can either be masonry in external walls which is protected, (e.g. by a layer of suitable render or by cladding), or it can be the inner leaf of a cavity wall or it can be an internal wall. It may or may not be loadbearing

#### **3.4 LD unit**

clay masonry unit with a low gross dry density for use in protected masonry

### **3.5 HD unit**

clay masonry unit for unprotected masonry as well as clay masonry unit with a high gross dry density for use in protected masonry

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

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

### **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, e.g. tongue and groove systems

### **3.13 vertical perforation**

formed void that passes completely through a masonry unit perpendicular to the bed face

### **3.14 horizontal perforation**

formed void that passes completely through a masonry unit parallel to the bed face

### **3.15 cell**

formed void that does not pass through a masonry unit

### **3.16 frog**

depression formed in one or both bed faces of a unit, the total volume of all such depressions which does not exceed a certain limit of the overall volume of the unit, i.e. length × width × height

### **3.17 recess**

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

### **3.18 grip hole**

a formed void that passes completely through a masonry unit perpendicular to the bed face for the purpose of handling the masonry unit

### **3.19 shell**

peripheral material between a perforation and the surface of a masonry unit



### **3.20 web**

solid material between the perforations in a masonry unit

### **3.21 declared value**

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

### **3.22 mean compressive strength of masonry units**

arithmetic mean of the compressive strengths of masonry units

### **3.23 normalised compressive strength**

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

### **3.24 damp proof course unit**

clay masonry unit which when laid in two courses with broken bond in a strong cementitious mortar, will resist rising damp in masonry

### **3.25 high precision clay masonry unit**

clay masonry unit with small dimensional tolerance especially in unit height

### **3.26 vertically perforated or hollow clay masonry unit**

clay masonry unit with one or more formed voids that pass completely through a masonry unit perpendicular to the bed face

### **3.27 horizontally perforated or hollow clay masonry unit**

clay masonry unit with one or more formed voids that pass completely through a masonry unit parallel to the bed face

### **3.28 clay masonry unit for concrete or mortar infill**

clay masonry unit with special perforation suitable for concrete or mortar infill

### **3.29 clay masonry unit for masonry panels**

clay masonry unit suitable for production of reinforced masonry or masonry storey height panels with vertical channels for mortar or concrete infill

### **3.30 clay masonry subject to severe exposure**

masonry or elements of masonry which under end use conditions are subjected to saturation with water (driving rain, ground water) combined with frequent freeze/thaw-cycling, due to climatic conditions and absence of protective features

### **3.31 clay masonry subject to moderate exposure**

masonry or elements of masonry which under end use conditions are exposed to moisture and freeze/thaw-cycling, excluding constructions subjected to severe exposure

### **3.32 clay masonry subject to passive exposure**

masonry or elements of masonry which under end use conditions are not intended to be exposed to moisture and freezing conditions

### **3.33 Category I masonry units**

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

### **3.34 Category II masonry units**

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

### **3.35 Combined thickness of webs and shells**

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

## **4 Materials and manufacture**

See 3.2 and 8.3.2.

## **5 Requirements for clay masonry units**

### **5.1 General**

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

NOTE It should be noted that the test methods are not usually applicable to specially shaped and accessory units as defined in 3.10 and 3.11.

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

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

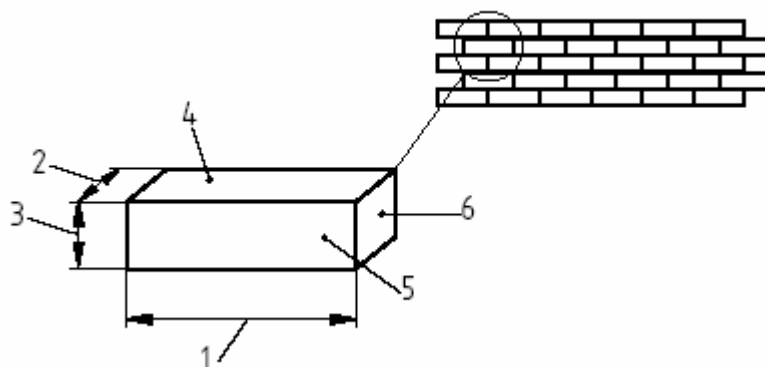
The manufacturer shall declare whether the unit fulfils the requirements for LD-units (see Figure 2) or HD-units (see Figure 3).

### **5.2 LD-units**

#### **5.2.1 Dimensions and tolerances (LD units)**

**5.2.1.1 Dimensions (LD units)** The dimensions of a clay masonry unit shall be declared by the manufacturer in mm for length, width, and height, in that order (see Figure 1). They shall be given in terms of work size.

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



**Key**

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

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

**Figure 1 – Dimensions and surfaces**

The following measurement procedure shall be used:

- when at least two of the work dimensions of the unit are not greater than 250 mm, 125 mm and 100 mm for length, width and height respectively procedure **b)** as described in EN 772-16 shall be followed using a calliper with overlapping jaws with the jaws aligning with the dotted lines in Fig. 1 b) of EN 772-16:2000 with the exception for the measurement of the height which is determined as the average of two measurements, where the second measurement is transverse to the dotted line at the middle of the unit. The width of the jaws shall be not less than 5 and not greater than 10 mm.
- for all other units procedure **a)** as described in EN 772-16 shall be followed."

**5.2.1.2 Dimensional tolerances (LD units)**

**5.2.1.2.1 Tolerances (LD units)**

The manufacturer shall also declare which of the tolerance categories for mean values in 5.2.1.2.2 the clay masonry units fulfil.

When relevant to the uses for which the unit is put on the market, the manufacturer shall also declare which of the range categories in 5.2.1.2.3 a given consignment of the clay masonry units fulfils.

NOTE This additional declaration may be made for example in relation to:

- achievement of the required accuracy (planarity, bonds and thin layer joints) of the masonry;
- use of detailed project drawings to achieve these requirements.

**5.2.1.2.2 Tolerances of the mean value (LD units)**

When clay masonry units are sampled from a consignment in accordance with annex A and tested in accordance with EN 772-16 using the measurement procedure stated in 5.2.1.1, the difference for all dimensions between the declared value and the mean value derived from measurements of the test sample shall be not greater than the declared one of the following categories, where the value shall be rounded to whole mm:

T1:  $\pm 0,40 \sqrt{(\text{work size dimension})}$  mm or 3 mm whichever is the greater

T1+:  $\pm 0,40 \sqrt{(\text{work size dimension})}$  mm or 3 mm for length and width whichever is the greater and

$\pm 0,05 \sqrt{(\text{work size dimension})}$  mm or 1 mm for the height whichever is the greater

T2:  $\pm 0,25 \sqrt{(\text{work size dimension})}$  mm or 2 mm whichever is the greater

T2+:  $\pm 0,25 \sqrt{(\text{work size dimension})}$  mm or 2 mm for length and width whichever is the greater and

$\pm 0,05 \sqrt{(\text{work size dimension})}$  mm or 1 mm for the height whichever is the greater

or Tm: a deviation in mm declared by the manufacturer (may be wider or closer than the other categories).

#### **5.2.1.2.3 Range (LD units)**

When declared and regular shaped clay masonry units are sampled from a consignment in accordance with annex A and tested in accordance with EN 772-16 using the measurement procedure in 5.2.1.1, the maximum range for any given dimension (i.e. the difference between the largest and smallest determined dimensions on individual units) to be found within the test sample shall be within the declared one of the three categories indicated below, where the value shall be rounded to whole mm:

Category      Maximum range

R1:  $0,6 \sqrt{(\text{work size dimension})}$  mm

R1+:  $0,6 \sqrt{(\text{work size dimension})}$  mm for length and width and 1,0 mm for the height

R2:  $0,3 \sqrt{(\text{work size dimension})}$  mm

R2+:  $0,3 \sqrt{(\text{work size dimension})}$  mm for length and width and 1,0 mm for the height

or Rm: a range in mm declared by the manufacturer (may be wider or closer than the other categories)

#### **5.2.1.2.4 Flatness of bed faces (LD units)**

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

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

#### **5.2.1.2.5 Plane parallelism of bed faces (LD units)**

When clay masonry units are intended to be used with thin layer mortar, the manufacturer shall declare the maximum deviation from plane parallelism of the bed faces. When regular shaped clay masonry units are sampled from a consignment in accordance with Annex A and tested in accordance with EN 772-16 by procedure d), the deviation from plane parallelism of the bed faces shall not exceed the declared value.

## 5.2.2 Configuration (LD units)

### 5.2.2.1 General (LD units)

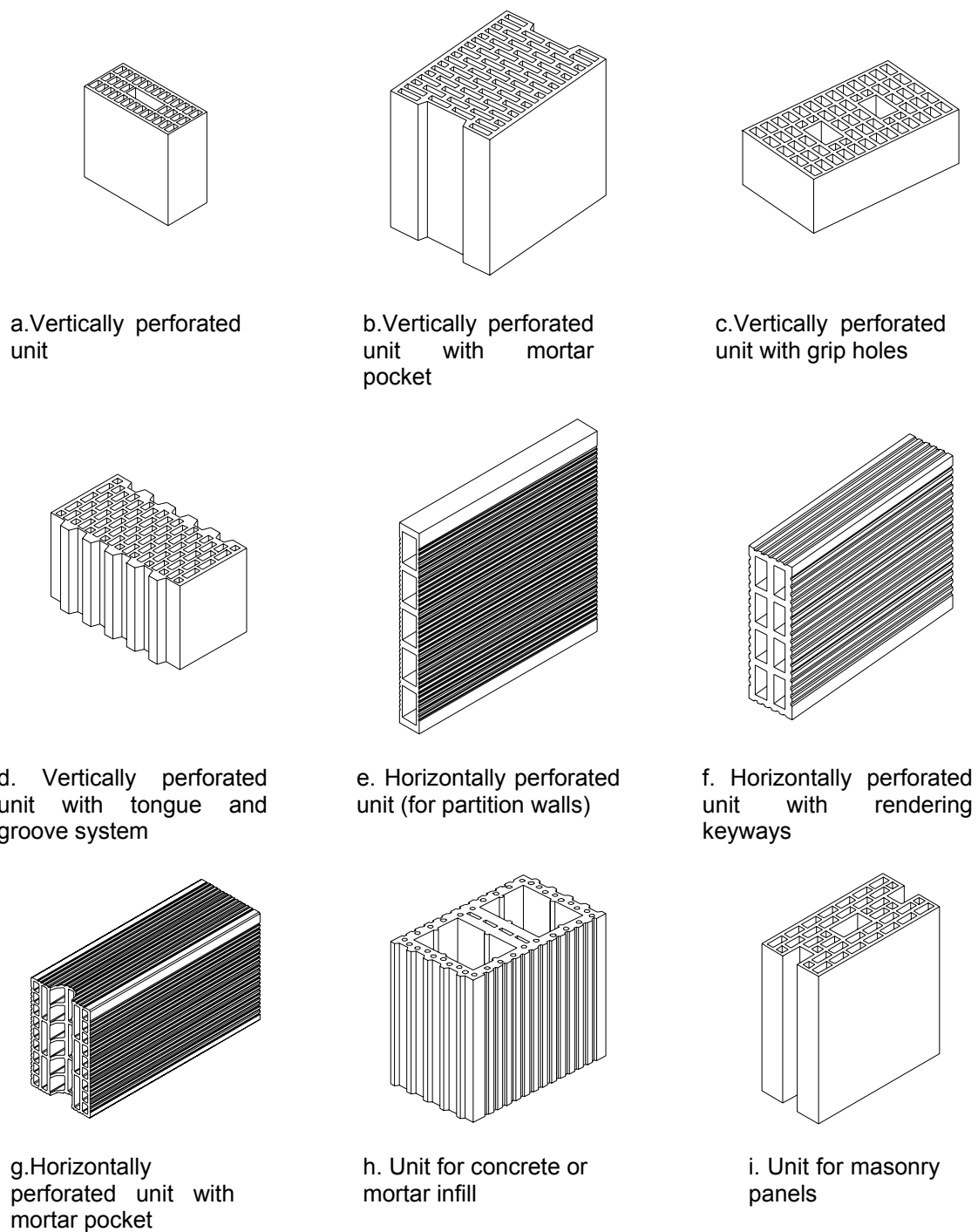


Figure 2 – Examples of LD units

**EN 771-1:2003 (E)**  
**+ A1:2005 (E)**

When relevant to the uses, for which clay masonry (LD) units are put on the market, the configuration shall be declared. The declaration may be made by reference to one or another of the groups defined in EN 1996-1-1 or EN 1996-1-2 and/or it may include one or more items such as those in the following list, as relevant:

- shape and features, including the direction of perforations (by means of a drawing or illustration, when relevant);
- volume of all formed voids as a percentage of the length x width x height of the unit;
- volume of the largest of any formed voids as a percentage of the length x width x height of the unit;
- volume of grip holes as a percentage of the length x width x height of the unit;
- thickness of webs;
- thickness of shells;
- combined thickness of webs and shells from face to face;
- combined thickness of webs and shells from header to header;
- area of voids on a bed face as a percentage of the length x width of the unit;

NOTE The header of clay masonry units may have interlocking features, e.g. mortar pockets, tongue and groove systems. The face of clay masonry units may have a surface-profile (rendering keyways).

Each declared value shall be stated as either an upper limit or a lower limit or as a range of values. When clay masonry units are sampled from a consignment in accordance with Annex A and tested in accordance with EN 772-16, EN 772-9 and EN 772-3, as specified below, the mean value derived from measurements of the test sample shall be within the range or limit declared.

#### **5.2.2.2 Thickness of shells and webs (LD units)**

If relevant for vertically or horizontally perforated loadbearing clay masonry units, the manufacturer shall declare the thickness of shells and webs.

For clay masonry unit for concrete or mortar infill the minimum thickness of shells in the facing and of shells in the header and of webs shall be declared by the manufacturer.

NOTE For clay masonry units intended to establish storey height channels to be filled with concrete or mortar experience shows that a minimum thickness of shells in the facing of 20 mm and a minimum thickness of shells in the header and of webs of 14 mm are sufficient.

#### **5.2.2.3 Grip hole (LD units)**

If relevant for vertically perforated loadbearing clay masonry units, the manufacturer shall declare the area of grip holes.

#### **5.2.2.4 Channel for concrete/mortar infill (LD units)**

The perforation shall be arranged in such a way, that a vertically continuous channel is established if clay masonry units are set in bonds. The channel for concrete/mortar infill shall be arranged axial in direction of the unit's width. The channel for concrete/mortar infill shall have a minimum area of 1500 mm<sup>2</sup> and a minimum dimension of 30 mm.

#### **5.2.2.5 Percentage of voids (LD units)**

The determination of the percentage of voids shall be obtained in accordance to EN 772-3.

For the determination of the percentage of voids for vertically perforated clay masonry units the grip holes shall be considered, but not the mortar pockets and the rendering keyways.

For the determination of the percentage of voids for clay masonry units intended to establish storey height channels to be filled with concrete or mortar infill the canals for concrete/mortar infill shall be considered, but not the rendering keyways (recesses).

### **5.2.3 Density (LD units)**

#### **5.2.3.1 Gross dry density (LD units)**

The gross dry density shall be declared by the manufacturer and shall be equal to or less than 1000 kg/m<sup>3</sup>.

NOTE 1 The manufacturer may also inform in what way the declared gross dry density fits into a national classification system. The manufacturer shall also declare which of the deviation categories in 5.2.3. 3 applies.

NOTE 2 This declaration may be made for evaluation of

- loading;
- airborne sound insulation;
- resistance to fire;
- thermal insulation.

In addition, the manufacturer may declare the minimum and maximum individual values of gross dry density.

#### **5.2.3.2 Net dry density (LD units)**

When relevant to the uses for which the unit is put on the market, the net dry density shall be declared by the manufacturer.

NOTE 1 The manufacturer may also inform in what way the declared net dry density fits into a national classification system.

In addition, the manufacturer may declare the minimum and maximum individual values of net dry density.

#### **5.2.3.3 Tolerances (LD units)**

When clay masonry units are sampled from a consignment in accordance with annex A and tested in accordance with EN 772-13, the mean gross and net dry density derived from measurements of the test sample shall not differ from the manufacturer's declared dry density by more than one of the following categories:

D1: 10 %

D2: 5 %

or

Dm: a deviation in % declared by the manufacturer (may be wider or closer than the other categories).

### **5.2.4 Compressive strength (LD units)**

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 mean compressive strength shall be declared by the manufacturer. The manufacturer shall also declare the normalized compressive strength when relevant.

NOTE 1 The manufacturer may also inform in what way the declared compressive strength fits into a national classification system.

## **EN 771-1:2003 (E) + A1:2005 (E)**

NOTE 2 EN 772-1 gives instructions on how to convert the unit compressive strength into the normalized compressive strength.

In addition, the manufacturer shall declare whether the clay masonry unit is Category I or Category II.

When the clay masonry units are sampled from a consignment in accordance with Annex A and tested in accordance with EN 772-1 using the surface preparation method described in 7.2.4 of EN 772-1: 2000 and conditioned in accordance with 7.3.2 of EN 772-1: 2000 then

- mean compressive strength of the specified number of clay masonry units from a consignment shall be not less than the declared compressive strength;
- individual strengths of specimens measured within the test sample shall be not less than 80% of the declared value.

The declaration shall relate to and indicate the orientation(s) of the clay masonry units as tested, the methods of bedding the units and whether any voids present are intended to be fully filled with mortar. If the grinding process significantly alters the contact area of the faces tested and the capping procedure is thereby used this shall be declared.

NOTE 3 The requirements for compressive strength given in this clause are not necessarily applicable to specially shaped and accessory masonry units.

### **5.2.5 Thermal properties (LD units)**

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 information on the thermal properties of the masonry unit. When this is the case it shall be done by reference to EN 1745. It shall be declared whether the declaration is based on a table, test or calculation.

### **5.2.6 Durability (LD units)**

NOTE When the intended use of the product provides a complete protection against water penetration (e.g. thick layer of suitable render, cladding, inner leaf of a cavity wall, internal walls) no reference to freeze/thaw resistance is required (F0).

When the intended use of the product only provides limited protection (e.g. thin layer of render), in countries where there is a requirement for freeze/thaw resistance, it shall be evaluated and declared according to the provisions valid in the intended place of use of the units.

### **5.2.7 Water absorption (LD units)**

NOTE Because of the intended use of LD masonry units there are no requirements taking into account the water absorption.

### **5.2.8 Active soluble salts content (LD units)**

When the intended use of the product only provides limited protection (e.g. thin layer of render) the content of active water soluble salts shall be declared by the manufacturer on the basis of the categories given in Table 1. When clay masonry units are sampled from the consignment in accordance with annex A and tested in accordance with EN 772-5 the content of water soluble salts shall not be greater than the declared active soluble salts content.



**Table 1 – Active soluble salts content categories**

Category	Total % by mass not greater than	
	Na <sup>+</sup> + K <sup>+</sup>	Mg <sup>2+</sup>
S 0	No requirement	No requirement
S 1	0,17	0,08
S 2	0,06	0,03

NOTE 1 When the intended use of the product provides a complete protection against water penetration (e.g. thick layer of suitable render, cladding, inner leaf of a cavity wall, internal walls) no requirement for active soluble salts content (S0).

NOTE 2 See B.4 for further information.

### 5.2.9 Moisture movement (LD units)

In countries where there is a requirement for moisture movement, it shall be declared in accordance with EN 772-19 for clay units with horizontal perforation, which have one dimension equals or greater than 400 mm and a shell thickness less than 12 mm and which are intended to be rendered respectively by reference to the provisions valid in the intended place of use of the units.

### 5.2.10 Reaction to fire (LD units)

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  $\leq 1,0$  % by mass or volume (whichever is the most onerous) of homogeneously distributed organic materials the declaration may be fire class A.1 without the need to test.

Masonry units containing  $> 1,0$  % by mass or volume (whichever is the most onerous) of homogeneously distributed organic materials shall be classified in accordance with EN 13501-1 and the appropriate fire classification 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 1,0 % (by mass or volume whichever is the more onerous) of homogeneously distributed organic materials are classified as reaction to fire Class A1 without testing.

### 5.2.11 Water vapour permeability (LD units)

For units intended to be used in external elements, the manufacturer shall provide information on the water vapour permeability through the water vapour diffusion coefficient tabulated values given in EN 1745.

### 5.2.12 Bond strength (LD units)

#### 5.2.12.1 General (LD units)

For clay masonry units intended to be used in elements subjected to structural requirements the 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 5.2.12.2 below or tests as in 5.2.12.3 below. 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.

### **5.2.12.2 Declaration based on fixed values (LD units)**

When no declaration is made under 5.2.12.3 the characteristic initial shear strength of the unit in combination with mortar may be declared by reference to EN 998-2: 2003, annex C.

### **5.2.12.3 Declaration based on tests (LD units)**

The characteristic initial shear strength of the unit in combination with a specific type of mortar specified in accordance with EN 998-2 may be declared based on tests on clay masonry units sampled from a consignment 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.

## **5.3 HD units**

### **5.3.1 Dimensions and tolerances (HD units)**

#### **5.3.1.1 Dimensions (HD units)**

The dimensions of a clay masonry unit shall be declared by the manufacturer in mm for length, width, and height, in that order (see Figure 1). They shall be given in terms of work size.

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

The following measurement procedure shall be used:

- when at least two of the work dimensions of the unit are not greater than 250 mm, 125 mm and 100 mm for length, width and height respectively procedure **b)** as described in EN 772-16 shall be followed using a calliper with overlapping jaws with the jaws aligning with the dotted lines in Fig. 1 b) of EN 772-16:2000 with the exception for the measurement of the height which is determined as the average of two measurements, where the second measurement is transverse to the dotted line at the middle of the unit. The width of the jaws shall be not less than 5 and not greater than 10 mm.
- for all other units procedure **a)** as described in EN 772-16 shall be followed.

#### **5.3.1.2 Dimensional tolerances (HD units)**

##### **5.3.1.2.1 Tolerances (HD units)**

The manufacturer shall also declare which of the tolerance categories for mean values in 5.3.1.2.2 the clay masonry units fulfil.

When relevant to the uses for which the unit is put on the market, the manufacturer shall also declare which of the range categories in 5.3.1.2.3 a given consignment of the clay masonry units fulfils.

NOTE This additional declaration may be made for example in relation to:

- achievement of the required accuracy (planarity, bonds and thin layer joints) of the masonry;
- use of detailed project drawings to achieve these requirements.

##### **5.3.1.2.2 Tolerance on the mean value (HD units)**

When clay masonry units are sampled from a consignment in accordance with Annex A and tested in accordance with EN 772-16 using the measurement procedure stated in 5.3.1.1 the difference for all

dimensions between the declared value and the mean value derived from measurements of the test sample shall be not greater than the declared one of the following categories, where the value shall be rounded to whole mm:

T1:  $\pm 0,40 \sqrt{(\text{work size dimension})}$  mm or 3 mm whichever is the greater

T2:  $\pm 0,25 \sqrt{(\text{work size dimension})}$  mm or 2 mm whichever is the greater

or Tm: a deviation in mm declared by the manufacturer (may be wider or closer than the other categories).

#### 5.3.1.2.3 Range (HD units)

When declared and regular shaped clay masonry units are sampled from a consignment in accordance with Annex A and tested in accordance with EN 772-16 using the measurement procedure stated in 5.3.1.1, the maximum range for any given dimension (i.e. the difference between the largest and smallest determined dimensions on individual units) to be found within the test sample shall be within the declared one of the three categories indicated below, where the value shall be rounded to whole mm:

Category	Maximum range
----------	---------------

R1:	$0,6 \sqrt{(\text{work size dimension})}$ mm
-----	--

R2:	$0,3 \sqrt{(\text{work size dimension})}$ mm
-----	--

or Rm: a range in mm declared by the manufacturer (may be wider or closer than the other categories)

NOTE For some types of facing masonry where different production batches are mixed to achieve an overall consistent appearance, the category Rm may be satisfactory.

#### 5.3.1.2.4 Flatness of bed faces (HD units)

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

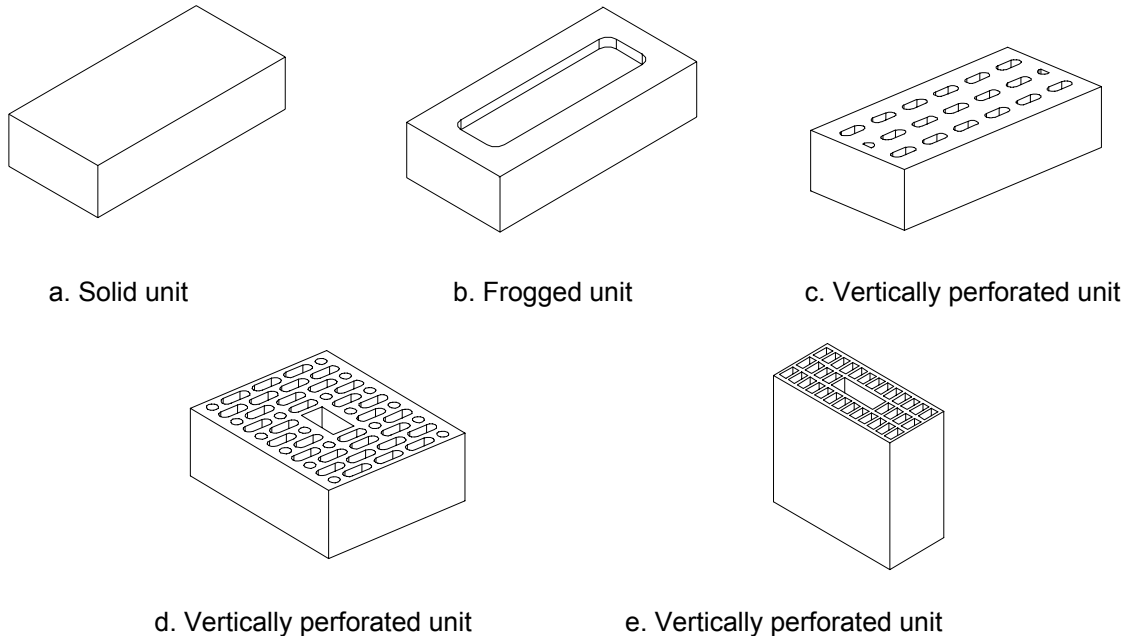
When regular shaped clay masonry units are sampled from a consignment in accordance with Annex A and tested in accordance with EN 772-20, the deviation from flatness of the bed faces shall not exceed the declared value.

#### 5.3.1.2.5 Plane parallelism of bed faces (HD units)

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

When regular shaped clay masonry units are sampled from a consignment in accordance with Annex A and tested in accordance with EN 772-16 by procedure **d**), the deviation from plane parallelism shall not exceed the declared value.

### 5.3.2 Configuration (HD units)



**Figure 1 – Examples of HD units**

When relevant to the uses, for which clay masonry (HD) units are put on the market, the configuration shall be declared. The declaration may be made by reference to one or another of the groups defined in EN 1996-1-1 or EN 1996-1-2 and/or it may include one or more items such as those in the following list, as relevant:

- shape and features, including the direction of perforations (by means of a drawing or illustration, when relevant);
- volume of all formed voids as a percentage of the length x width x height of the unit;
- volume of the largest of any formed voids as a percentage of the length x width x height of the unit;
- volume of grip holes as a percentage of the length x width x height of the unit;
- thickness of webs;
- thickness of shells;
- combined thickness of webs and shells from face to face;
- combined thickness of webs and shells from header to header;
- area of voids on a bed face as a percentage of the length x width of the unit.

The total volume of frogs shall not exceed 20% of the overall volume of the unit, i.e. length × width × height.

NOTE The header of clay masonry units may have interlocking features. e.g. mortar pockets, tongue and groove systems. The face of clay masonry units may have a surface-profile (rendering keyways).

Each declared value shall be stated as either an upper limit or a lower limit or, alternatively, given as a range of values. When clay masonry units are sampled from a consignment in accordance with Annex A and tested in accordance with EN 772-16, EN 772-9 and EN 772-3, the mean value derived from measurements of the test sample shall be within the range or limit declared.

### **5.3.3 Density(HD units)**

#### **5.3.3.1 Gross dry density (HD units)**

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 gross dry density of clay masonry units shall be declared by the manufacturer.

NOTE 1 The manufacturer may also provide information to show how the declared gross dry density fits into a national classification system.

When the gross dry density is declared the manufacturer shall also declare which of the deviation categories in 5.3.3.3 applies.

NOTE 2 This declaration may be made for evaluation of

- loading;
- airborne sound insulation;
- resistance to fire;
- thermal insulation.

In addition, the manufacturer may declare the minimum and maximum individual values of gross dry density.

#### **5.3.3.2 Net dry density (HD units)**

When relevant to the uses for which the unit is put on the market, the net dry density of clay masonry units shall be declared by the manufacturer.

NOTE 1 The manufacturer may also provide information to show how the declared net dry density fits into a national classification system.

When the net dry density is declared the manufacturer shall also declare which of the deviation categories in 5.3.3.3 applies.

In addition, the manufacturer may declare the minimum and maximum individual values of net dry density.

#### **5.3.3.3 Tolerances (HD units)**

When clay masonry units are sampled from a consignment in accordance with annex A and tested in accordance with EN 772-13, the mean gross and net dry density derived from measurements of the test sample shall not differ from the manufacturer's declared dry density by more than one of the following categories:

D1: 10 %

D2: 5 %

or

Dm: a deviation in % declared by the manufacturer (may be wider or closer than the other categories).

### **5.3.4 Compressive strength (HD units)**

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 mean compressive strength shall be declared

**EN 771-1:2003 (E)**  
**+ A1:2005 (E)**

by the manufacturer. When relevant, the manufacturer shall also declare the normalised compressive strength.

NOTE 1 EN 772-1 gives instructions on how to convert the unit compressive strength into the normalized compressive strength.

In addition, the manufacturer shall declare whether the clay masonry unit is Category I or Category II.

When the clay masonry units are sampled from a consignment in accordance with Annex A and tested in accordance with EN 772-1: using the surface preparation method described in 7.2.4 of EN 772-1:2000 and conditioned in accordance with 7.3.2 of EN 772-1:2000 then:

- mean compressive strength of the specified number of clay masonry units from a consignment shall be not less than the declared compressive strength;
- individual strengths of specimens measured within the test sample shall be not less than 80% of the declared value.

The declaration shall relate to and indicate the orientation(s) of the clay masonry units as tested, the methods of bedding the units and whether any voids present are intended to be fully filled with mortar. If the grinding process significantly alters the contact area of the faces tested and the capping procedure is thereby used this shall be declared. Where it is not practicable to prepare units by grinding, e.g. high strength units, the surface preparation may be carried out by capping as described in 7.2.5 of EN 772-1:2000. The procedure used shall be declared.

NOTE 2 The manufacturer may provide information to show how the declared compressive strength fits into a national classification system.

NOTE 3 The requirements for compressive strength given in this clause are not necessarily applicable to specially shaped and accessory masonry units.

### **5.3.5 Thermal properties (HD units)**

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 information on the thermal properties of the masonry unit. When this is the case it shall be done by reference to EN 1745. It shall be declared whether the declaration is based on a table, test or calculation.

### **5.3.6 Durability (HD units)**

The freeze/thaw resistance category of a clay masonry unit shall be declared by the manufacturer by reference to its applicability to masonry or elements subjected to passive, moderate, and severe exposure. (See annex B.3).

F0 - Passive exposure

F1 – Moderate -

F2 – Severe -

Until an European Method of test is available, the freeze/thaw resistance shall be evaluated and declared to the provisions valid in the intended place of use of the units.

### 5.3.7 Water absorption (HD units)

#### 5.3.7.1 External element (HD units)

For clay masonry units intended to be used in external elements with the face of the unit being exposed the water absorption of a consignment shall be declared by the manufacturer. When clay masonry units are sampled from the consignment in accordance with annex A and tested in accordance with the water absorption test prescribed in annex C the mean water absorption of the specified number of clay masonry units shall be not greater than the declared water absorption.

#### 5.3.7.2 Damp proof courses (HD units)

The water absorption of clay units intended to be used in damp proof courses shall be declared by the manufacturer. When clay masonry units are sampled from a consignment in accordance with annex A and tested in accordance with EN 772-7 the mean water absorption of the specified number of clay masonry units shall be not greater than the declared water absorption.

NOTE There is no general relationship between water absorption and compressive strength or durability.

### 5.3.8 Initial rate of water absorption (HD units)

When relevant for the intended use the initial rate of water absorption of a consignment of clay masonry units shall be declared by the manufacturer. If so and when clay masonry units are sampled from the consignment in accordance with annex A and tested in accordance with EN 772-11 using an immersion period of  $60 \pm 2$  sec the mean initial rate of water absorption of the specified number of clay masonry units shall be not greater than the declared initial rate of water absorption.

### 5.3.9 Active soluble salts content (HD units)

When the intended use of the product only provides limited protection (e. g. thin layer of render) or the product in the intended use is exposed to weather the content of active water soluble salts shall be declared by the manufacturer on the basis of the categories given in Table 2. When clay masonry units are sampled from the consignment in accordance with annex A and tested in accordance with EN 772-5 the content of water soluble salts shall not be greater than the declared active soluble salts content.

**Table 2 – Active soluble salts content categories**

Category	Total % by mass not greater than	
	Na <sup>+</sup> + K <sup>+</sup>	Mg <sup>2+</sup>
S 0	No requirement	No requirement
S 1	0,17	0,08
S 2	0,06	0,03

NOTE 1 When the intended use of the product provides a complete protection against water penetration (e.g. thick layer of suitable render, cladding, inner leaf of a cavity wall, internal walls) there is no requirement for active soluble salts content (S0).

NOTE 2 See B.4 for further information.

### 5.3.10 Moisture movement (HD units)

In countries where there is a requirement for moisture movement, it shall be evaluated and declared to the provisions valid in the intended place of use of the units.

### **5.3.11 Reaction to fire (HD units)**

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  $\leq 1,0$  % by mass or volume (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  $> 1,0$  % by mass or volume (whichever is the most onerous) of homogeneously distributed organic materials shall be classified in accordance with EN 13501-1 and the appropriate fire classification declared.

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

### **5.3.12 Water vapour permeability (HD units)**

For units intended to be used in external elements, the manufacturer shall provide information on the water vapour permeability through the water vapour diffusion coefficient tabulated values given in EN 1745.

### **5.3.13 Bond strength (HD units)**

#### **5.3.13.1 General (HD units)**

For clay masonry units intended to be used in elements subjected to structural requirements the 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 5.3.13.2 below or tests as in 5.3.13.3 below. 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.

#### **5.3.13.2 Declaration based on fixed values (HD units)**

When no declaration is made under 5.3.13.3 the characteristic initial shear strength of the unit in combination with mortar may be declared by reference to EN 998-2: 2003, annex C.

#### **5.3.13.3 Declaration based on tests (HD units)**

The characteristic initial shear strength of the unit in combination with a specific type of mortar specified in accordance with EN 998-2 may be declared based on tests on clay masonry units sampled from a consignment 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.

## **6 Description, designation and classification of clay masonry units**

### **6.1 Description and designation**

#### **6.1.1 LD units**

A description and designation of a clay masonry unit shall comprise at least the following:

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



- b) type of unit (see 5.1);
- c) dimensions and tolerances, (mean value)(see 5.2.1);
- d) gross dry density and tolerances (see 5.2.3);

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

- e) compressive strength (see 5.2.4);
- f) configuration (see 5.2.2);
- g) tolerances (see 5.2.1);
- h) net dry density and tolerances (see 5.2.3);
- i) thermal properties (see 5.2.5);
- j) freeze/thaw resistance category and its basis, (see 5.2.6);
- k) category of active soluble salts, (see 5.2.8);
- l) moisture movement and its basis, (see 5.2.9);
- m) reaction to fire, (see 5.2.10);
- n) water vapour permeability, (see 5.2.11);
- o) bond strength, (see 5.2.12).

### **6.1.2 HD units**

A description and designation of a clay masonry unit shall comprise at least the following:

- a) the number and date of issue of this European Standard;
- b) type of unit (see 5.1);
- c) dimensions and tolerances, (mean value)(see 5.3.1);
- d) freeze/thaw resistance category and its basis (see 5.3.6);

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

- e) compressive strength, (see 5.3.4);
- f) configuration (see 5.3.2);
- g) tolerances (range) (see 5.3.1);
- h) gross and net dry density and tolerances (see 5.3.3);
- i) initial rate of water absorption (see 5.3.8);
- j) thermal properties (see 5.3.5);
- k) category of active soluble salts, (see 5.3.9);

l) moisture movement and its basis, (see 5.3.10);

m) reaction to fire, (see 5.3.11);

n) water vapour permeability, (see 5.3.12);

o) bond strength, (see 5.3.13).

## **6.2 Classification**

Specification of the properties of clay 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.

NOTE Details of classification systems in current use may be given in informative national annexes.

## **7 Marking**

The following particulars shall be clearly marked on one of the following: the units, the packaging, delivery note or any certificate supplied with the clay masonry units:

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

b) Means of identifying the clay masonry units and relating them to their description and designation.

NOTE For CE-marking and labelling ZA.3 of annex ZA applies. When annex 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 Evaluation of conformity**

### **8.1 General**

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

— initial type testing of the product (see 8.2);

— 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 initial type tests and in case of dispute, provided that these alternative methods satisfy the following:

a) a relationship can be shown to exist between the results from the reference test and those from the alternative test; and

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

### **8.2 Initial type tests**

After completion of the development of a new product type and before commencement of manufacture and offering for sale, appropriate initial type tests shall be carried out to confirm that the properties predicted from the development meet the requirements of this standard and the values 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 initial type test shall be repeated.

NOTE For the performance characteristics to be determined in order to address the CE marking provisions, see Table ZA.1.

The tests to be conducted shall be the tests or calculations as described in Table A.1 or A.2 in annex A 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;
- Freeze/thaw resistance;
- Water absorption;
- Initial rate of water absorption;
- Active soluble salts content;
- Moisture movement;
- Reaction to fire;
- Bond strength.

Sampling for initial type testing shall be in accordance with annex A.

The results of initial type tests shall be recorded.

## **8.3 Factory production control**

### **8.3.1 General**

A factory production control system shall be established and documented. The factory production control system shall consist of procedures for internal control of the production to ensure that such products placed on the market are to conform to this standard and the declared values.

For Category I masonry units the factory production control system shall be designed so that the probability of compliance with the declaration of compressive strength reaches a confidence level of 95 %.

### **8.3.2 Raw materials**

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

### **8.3.3 Production process**

As appropriate, the relevant features of the plant and production process shall be defined giving the frequency of the inspections, checks and tests, together with the values or criteria required, both on equipment and on work in progress. The action to be taken when control values or criteria are not achieved shall be given. Weighing and measuring equipment shall be verified and the procedure, frequency and criteria documented.

#### **8.3.4 Finished product test**

##### **1) Tests on the finished product**

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

The frequency of sampling and testing shall be determined from statistical principles, ensuring that the corresponding production conforms to the compliance criteria in this standard and the declared values for the clay masonry unit.

##### **2) Test equipment**

Test equipment having a bearing on test results shall be calibrated. The calibration criteria shall be given in the documents.

#### **8.3.5 Traceability**

As appropriate, systems of traceability and control of raw materials and the use of materials shall be given in the documents. The stock control system of manufactured products shall be given in the documents. This should include the method of treating non-conforming products.

## Annex A. (normative)

### Sampling for initial type testing and for independent testing of consignments

#### A.1 General

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

Only those properties declared by the manufacturer shall be assessed by this procedure.

The required number of clay masonry units to determine compliance with specification shall be sampled from a consignment of masonry units not more than 20 m<sup>3</sup> (see Table A.1).

NOTE Clay masonry units manufactured to this European Standard which have been the subject of third party inspection of their conformity control procedures are not normally subjected to independent testing of consignments after delivery.

#### A.2 Sampling procedure

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

##### A.2.1 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 masonry units shall be selected at random from positions throughout the consignment without any consideration being given to the condition or 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.2.2 Representative sampling

**A.2.2.1 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.2.2.2 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 not more than four clay 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 condition or quality of those selected except that units damaged in transit shall not be selected.

NOTE 1 It will be necessary 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.

NOTE 2 Sampling from a stack may not be satisfactory when testing for active soluble sulfates because contamination from the ground or other sources may occur.

**A.2.2.3 Sampling from a consignment formed of banded packs**

At least six packs shall be selected at random from a consignment. The band around one blade or slice in each pack shall be removed and an equal number of not more than four units shall be sampled at random from within each of the broken blades or slices in order to give the required number without any consideration being given to the condition or quality of those selected except that units damaged in transit shall not be selected.

**A.2.3 Dividing the sample**

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

The exact number of clay masonry units required for the test(s) as given in Table A.1 and Table A.2 shall be taken at random from those sampled from the consignment by one of the methods given in A.2.2.

**A.2.4 Number of units required for testing**

The sample size for each test shall be in accordance with Table A.1 and Table A.2.

**Table A.1 – Number of LD units required for a test**

Property	Clause number	Test method(s)	<sup>a)</sup> Number of units
Dimensions	5.2.1	EN 772-16	10
Flatness of bed faces	5.2.1.2.4	EN 772-20	3
Plane parallelism of bed faces	5.2.1.2.5	EN 772-16	3
Configuration	5.2.2	EN 772-16 EN 772-3 EN 772-9	10
Gross dry density	5.2.3	EN 772-13	10
Net dry density	5.2.3	EN 772-13	10
Compressive strength	5.1 and 5.2.4	EN 772-1	10
Thermal resistance	5.2.5	EN 1745	-
Freeze/thaw resistance	5.2.6	<sup>b)</sup>	<sup>c)</sup>
Moisture movement	5.2.9	<sup>b)</sup>	<sup>c)</sup>
Active soluble salts content	5.2.8	EN 772-5	10
Reaction to fire	5.2.10	EN 13501-1	-
Bond strength	5.2.12	EN 1052-3	27

<sup>a)</sup> If appropriate e.g. when the units are not affected by a test procedure, the same test units may be used for different tests.  
<sup>b)</sup> Test in according to provisions valid in the intended place of use of the units.  
<sup>c)</sup> The used provisions give the number to be tested.

Table A.2 – Number of HD units required for a test

Property	Clause number	Test method(s)	a) Number of units
Dimensions	5.3.1	EN 772-16	10
Flatness of bed faces	5.3.1.2.4	EN 772-20	3
Plane parallelism of bed faces	5.3.1.2.5	EN 772-16	3
Configuration	5.3.2	EN 772-16 EN 772-3 EN 772-9	10
Gross dry density	5.3.3	EN 772-13	10
Net dry density	5.3.3	EN 772-13	10
Compressive strength	5.1 and 5.3.4	EN 772-1	10
Thermal resistance	5.3.5	EN 1745	-
Freeze/thaw resistance	5.3.6	b)	c)
Water absorption	5.3.7	Annex C (external elements)	10
		EN 772-7 (damp-proof course units)	10
Initial rate of water absorption	5.3.8	EN 772-11	10
Moisture movement	5.3.10	b)	c)
Active soluble salts content	5.3.9	EN 772-5	10
Reaction to fire	5.3.11	EN 13501-1	-
Bond strength	5.3.13	EN 1052-3	27
<p>a) If appropriate e.g. when the units are not affected by a test procedure, the same test units may be used for different tests.</p> <p>b) Test in according to provisions valid in the intended place of use of the units.</p> <p>c) The used provisions give the number to be tested.</p>			

## Annex B (informative)

### Additional information

#### B.1 The use of clay masonry units

Clay units are used for a large variety of applications, and each requires performance levels to be specified. Some applications are traditional and the related specification is laid down in standards or traditional rules for good practice. These rules often have a local character, due to climate, building traditions, locally available materials, maintenance traditions etc. Other applications might be new and non-traditional, and formulation of the performance levels for materials and execution are in that case the responsibility of the designer.

Particular applications are:

— **Common masonry**

Masonry used outside or inside having no claim to an attractive appearance. It may or may not be loadbearing.

— **Protected masonry**

Masonry which is protected against water penetration. It can either be masonry in external walls which is protected by a suitable layer of render or by a cladding or it can be the inner leaf of a cavity wall or it can be an internal wall. It may or may not be loadbearing.

— **Rendered/plastered masonry**

Masonry used outside or inside which will be rendered/plastered. It may or may not be loadbearing.

— **Thermal insulating masonry**

Masonry which in itself significantly contributes to the thermal insulation function of an external. The masonry consists mainly of highly perforated clay masonry units. It may or may not be loadbearing.

— **Facing masonry**

Masonry used outside or inside that is intended to have an attractive appearance. It is constructed from attractive masonry units using a standard of workmanship and mortar joint finish appropriate to the masonry unit type. It may or may not be loadbearing.

— **Civil engineering masonry**

Masonry used in civil engineering works, e.g. drainage works, earth retaining walls etc., in which masonry units with a high level of durability and compressive strength and a low level of water absorption are sometimes used.

— **Structural masonry**

Masonry used outside or inside that resists loads other than its self weight. This expression is usually used in situations where the structural design of the masonry has been carried out by an appropriately qualified person. Structural masonry may be facing, common, rendered, or civil engineering masonry. Structural masonry may also be earthquake resistant.

In connection with the applications cited above the masonry has such performances as

- Fire resistance
- Sound insulation
- Thermal insulation

which, if needed, requires additional specifications to be made.



Masonry units should be sufficiently durable to resist local exposure conditions so as to maintain the structural and operational integrity of the building.

## **B.2 Durability**

European codes of practice have not yet been prepared dealing with architectural design and workmanship, encompassing the specification and use of masonry units to ensure that satisfactory durability in service in the finished masonry is achieved. Until such time as these codes become available, it has been found necessary to attach this annex which relates the grades specified for such properties as freeze/thaw resistance and soluble sulfates content to service conditions, including the degree of exposure and risk of saturation.

## **B.3 Freeze/thaw resistance**

### **B.3.1 General**

When making a choice as to which level of freeze/thaw resistance of a masonry unit should be specified for particular elements of clay masonry, it is necessary to assess the likely degree of exposure to which the units are to be subjected, including the protection against saturation of the masonry construction.

The exposure (severe, moderate, and passive) express the risk of the masonry being exposed to a high water content coincident with cycles of freezing and thawing, due to local climatic conditions in combination with the design of the construction. The factors forming part of the exposure evaluation are temperature and moisture conditions as well as the occurrence of any aggressive substances. In the evaluation it is necessary to take account of local or national experiences.

The influence of various surface coatings (plastering, painting) should be evaluated particularly in connection with thin layer coatings. A surface coating may in areas with typical temperate coastal climates result in tightened demands for the construction.

The examples given in the following are only indicative to help the user to choose the appropriate materials and are not exhaustive.

### **B.3.2 Masonry subjected to severe exposure**

In the following examples are given for masonry or masonry elements subjected to severe exposure:

- Unrendered masonry near to external ground level (approximately two courses above and below) where saturation with freezing can occur.
- Unrendered parapets where saturation with freezing can occur, e.g. where the parapet is not provided with an effective coping.
- Unrendered external chimney masonry where saturation with freezing can occur.
- Cappings, copings, and sills in areas where freezing conditions can occur.
- Freestanding boundary and screen walls where saturation with freezing can occur, for example if the wall is not provided with an effective coping.
- Earth retaining walls where saturation with freezing will occur for example where the wall has not been provided with an effective coping or a water proofing treatment on the retaining face.

### **B.3.3 Masonry subjected to moderate exposure**

In the following suitable measures to prevent saturation of the masonry are given:

- Protection to wall heads by roof overhangs or copings.
- Projecting throated sills.
- Damp proof courses at the top or base of walls.

### **B.3.4 Masonry subjected to passive exposure**

In the following examples are given for masonry or masonry elements subjected to passive exposure:

- Masonry in external walls if provided with suitable protection, the extent of which depends on climatic conditions. In some parts of Europe, experience suggests that a thick layer of suitable external render provides such a protection. In situations where there is risk of wetting accompanied by freezing, the protection should take the form of an impermeable cladding.
- Masonry in internal walls and the inner leaves of cavity walls.

### **B.4 Sulfate action on mortars and plasters**

Sulfate attack on masonry mortars is principally caused by the reaction between sulfate in solution and the tricalcium aluminate (C3A) constituent of Portland cement which forms calcium sulphoaluminate (or ettringite). This reaction only occurs if there is an appreciable C3A content, found in ordinary Portland cement. The risk is greatly reduced by the use of sulfate resisting Portland cement, where the C3A content is limited.

Sulfate attack occurs only if there is a considerable amount of water movement through the masonry. Diffusion alone will not carry sufficient amounts of sulfate to the hydrated cement in the mortar. Water movement may occur by percolation of water through the masonry under the action of gravity, such as in freestanding walls, or below clay masonry unit sills where effective damp-proof courses have not been provided. Movement of water may also be brought about by evaporation and capillary action, for example, through retaining walls which are not waterproofed on the retaining face, or in external walls between ground level and the damp-proof course.

The specification of the level of soluble sulfates content of clay masonry units with the appropriate grade of mortar is a complex matter which may be dealt with in national design codes.

The risk of saturation can be deduced from the exposure categories mentioned in relation to freeze/thaw resistance in this annex.

The requirement to declare the active soluble salts content category given in 5.10 is intended to ensure that under particular service conditions, damage to the masonry units, mortar or render (if any) will not occur. The three categories given in Table 1 specify the maximum contents of water soluble sulfates (those of sodium, potassium and magnesium) for use in service conditions where the risks of saturation differ, ranging from expectations of prolonged saturation (S 2 with ordinary Portland cement in the mortar or S1 with sulfate resisting cement in the masonry mortar or render undercoat), normal exposure to the weather where the masonry is protected by the design detailing of the building (S 1) to completely dry (S 0). In addition, soluble sulfates, especially magnesium sulfate may cause damage to the units themselves, an effect sometimes known as "cryptoefflorescence", and for this reason separate requirements for magnesium are given.

For masonry completely protected against water penetration, category S 0 is assumed to be appropriate. That means no requirement for the content of active soluble salts is necessary.

### **B.5 Efflorescence and staining**

The appearance of efflorescence in a building is a result of wet masonry drying out and may be due to excessive wetting during construction, or due to inadequate protection and design detailing, allowing water to percolate through parts of the completed construction. In addition, soluble materials from the mortar or from any adjacent concrete, may contribute to the amount of staining and efflorescence observed in practice.

### **B.6 General guidance on the appearance of facing clay masonry units**

The appearance of masonry units and the assessment should be the subject of purchase contract. The requirement will vary according to the use to which the masonry units are to be put, and their inherent characteristics, e.g. common facing and handmade should be taken into account. As a guide special attention should be paid to deep or extensive cracks, damage to edges and corners, pebbles and to expansive particles of lime.

## Annex C (normative)

### Determination of water absorption

Ten units are to be tested and these shall be dried in an oven at  $105 \pm 5$  °C to a constant mass. Weigh the specimens and record their dry mass,  $m_d$ . Constant mass shall be considered to have been reached if, during the drying process in subsequent weighings with not less than a 24 h interval, the loss in mass between the two determinations is less than 0,2 % of the total mass. Allow the specimens to cool to ambient temperature before they are weighed.

Each unit is placed in the tank of water at room temperature. That water is to be in contact with all faces of the unit and this may be achieved by resting the units on small pads which act as spacers. Leave the units submerged for 24 h. Take the units from the tank and remove any surplus water from their surfaces using a damp cloth or sponge.

Weigh the specimens and record their wet mass,  $m_w$ .

Calculate the water absorption  $w_m$  of each of the units to the nearest 1 %.

$$w_m = \frac{m_w - m_d}{m_d} \times 100 \%$$

Calculate the mean water absorption to the nearest 1 %.

## Annex ZA (informative)

### Clauses of this European standard addressing the provisions of the EU Construction Products Directive

#### ZA.1 Scope and relevant characteristics

This European standard has been prepared under a mandate M/116 "Masonry and related products" given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European standard shown in this annex meet the requirements of the mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the products covered by this annex for the intended uses indicated herein; reference shall be made to the information accompanying the CE marking.

**WARNING:** Other requirements and other EU Directives, not affecting the fitness for intended uses, can be applicable to the construction products falling within the scope of this European Standard.

NOTE In addition to any specific clauses relating to dangerous substances contained in this Standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply. (Note: an informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (CREATE, accessed through <http://europa.eu.int>).")

This annex establishes the conditions for the CE marking of the clay masonry units intended for the uses indicated in Tables ZA.1.1 and ZA.1.2 and shows the relevant clauses applicable:

The scope of this annex is defined by Tables ZA.1.1 and ZA.1.2

**Table ZA.1.1 – Scope and relevant clauses for LD units**

<b>Product:</b> LD-units as covered in clause 1 of this standard			
<b>Intended use:</b> in masonry walls, columns and partitions as covered by the Scope of this standard			
<b>Essential Characteristics</b>	<b>Requirement clauses in this European Standard(s)</b>	<b>Levels and/or classes</b>	<b>Notes</b>
Dimensions and dimensional tolerances (for units intended to be used in elements subject to structural requirements)	5.2.1.1 Dimensions 5.2.1.2 Dimensional tolerances	None	Declared value in mm, and tolerance category
Configuration (for units intended to be used in elements subject to structural requirements)	5.2.2 Configuration	None	Declared configuration as illustrated or described
Compressive strength (for units intended to be used in elements subject to structural requirements)	5.2.4 Compressive strength	None	Declared value, in $N/mm^2$ (with indication of direction of load and unit category)
Dimensional stability (for units intended to be used in elements subject to structural requirements)	5.2.9 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)	5.2.12 Bond strength	None	Fixed value; or Declared value of initial shear strength, in $N/mm^2$
Active soluble salts content (for units intended to be used in elements subject to structural requirements)	5.2.8 Active soluble salts content	None	Declared value of active water soluble salts content on the basis of technical classes S0, S1, S2
Reaction to fire (for units intended to be used in elements subject to fire requirements)	5.2.10 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)	5.2.7 Water absorption	None	Declared text: "Not to be left exposed"
Water vapour permeability (for units intended to be used in external elements)	5.2.11 Water vapour permeability	None	Declared value (Tabulated water vapour diffusion coefficient)
Direct airborne sound insulation (in end conditions)/ [Density and configuration] (for units to be used in elements subject to acoustic requirements)	5.2.3.1 Density	None	Declared value of gross density in $kg/m^3$ and tolerance category; and
	5.2.2 Configuration		Declared configuration as illustrated or described
	5.2.1 Dimensions and tolerances		
Thermal resistance/ [Density and configuration] (for units intended to be used in elements subject to thermal insulation requirements)	5.2.5 Thermal properties	None	Declared value of thermal resistance in $m^2K/W$ or equivalent thermal conductivity in $W/m \cdot K$ , and means of evaluation used
Durability against freeze-thaw	5.2.6.1 Freeze-thaw resistance	None	Declared text: "Not to be left exposed"; or Declared value (1)
Dangerous substances	ZA.1 Note above	None	According to ZA.3 (Paragraph before last)

(1) As requested by assessment method used.

Table ZA.1.2 – Scope and relevant clauses for HD units

<b>Product:</b>		HD-units as covered in clause 1 of this standard		
<b>Intended use:</b>		in masonry walls, columns and partitions as covered by the Scope of this standard		
Essential Characteristics	Requirement clauses in this European Standard(s)	Levels and/or classes	Notes	
Dimensions and dimensional tolerances (for units intended to be used in elements subject to structural requirements)	5.3.1.1 Dimensions 5.3.1.2 Dimensional tolerances	None	Declared value 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)	5.3.4 Compressive strength	None	Declared value in N/mm <sup>2</sup> (with indication of direction of load and unit category)	
Dimensional stability (for units intended to be used in elements subject to structural requirements)	5.3.10 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)	5.3.13 Bond strength	None	Fixed value; or Declared value of initial shear strength in N/mm <sup>2</sup>	
Active soluble salts content (for units intended to be used in elements subject to structural requirements)	5.3.9 Active soluble salts content	None	Declared value of active water soluble salts content on the basis of technical classes S0, S1, S2	
Reaction to fire (for units intended to be used in elements subject to fire requirements)	5.3.11 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)	5.3.7.1 External elements	None	Declared value, in %	
	5.3.7.2 Damp-proof courses			
Water vapour permeability (for units intended to be used in external elements)	5.3.12 Water vapour permeability	None	Declared value (Tabulated water vapour diffusion coefficient)	
Direct airborne sound insulation (in end conditions) [Density and configuration] (for units to be used in elements subject to acoustic requirements)	5.3.3 Density	None	Declared value of gross density in kg/m <sup>3</sup> and tolerance category; and	
	5.3.2 Configuration 5.3.1 Dimensions and tolerances		Declared configuration as illustrated or described	
Thermal resistance/ [Density and configuration] (for units intended to be used in elements subject to thermal insulation requirements)	5.3.5 Thermal properties	None	Declared value of thermal resistance in m <sup>2</sup> K/W or equivalent thermal conductivity in W/m·K, and means of evaluation used	
Durability against freeze/thaw	5.3.6 Freeze-thaw resistance	None	Intended exposure and declared value of freeze/thaw resistance (a)	
Dangerous substances	ZA.1 Note above	None	According to ZA.3 (Paragraph before last)	
(a) As requested by assessment method used.				

The requirement on a certain characteristic is not applicable in those Member States (MSs) where there are no regulatory requirements on that characteristic for the intended use of the product. In this case, manufacturers placing their products on the market of these MSs are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option "No performance determined" (NPD) in the information accompanying the CE marking (see ZA.3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level.

## ZA.2 Procedure(s) for attestation of conformity of clay masonry units

### ZA.2.1 System(s) of attestation of conformity

The system(s) of attestation of conformity of the clay masonry units included in Table ZA.1, in accordance with the Decision of the Commission 97/740/EC of 14.10.1997 as given in Annex III of the mandate for "Masonry and related products", is shown in Table ZA.2 for the indicated intended use(s) and relevant level(s) or class(es):

**Table ZA.2 – System(s) of attestation of conformity**

Product(s) [6]	Intended use(s)	Level(s) or class(es)	Attestation of conformity system(s)
Masonry Units. Category I	In walls, columns and partitions	--- -	2+
Masonry Units. Category II	In walls, columns and partitions	--	4
<p>System 2+: See CPD, Annex III.2.(ii), First possibility, including certification of the factory production control by an approved body on the basis of initial inspection of factory and of factory production control as well as of continuous surveillance, assessment and approval of factory production control.</p> <p>System 4: See CPD, Annex III.2.(ii), Third possibility.</p>			

The attestation of conformity of the clay masonry units in Tables ZA.1.1 and ZA.1.2 shall be based on the evaluation of conformity procedures indicated in Table(s) ZA.3a and ZA.3b resulting from application of the clauses of this or other European standard indicated therein.

Table ZA.3a – Assignment of evaluation of conformity tasks for Category I clay masonry units

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks for the manufacturer	Factory production control (F.P.C)	Parameters related to all relevant characteristics of Table ZA.1.1 or Table ZA.1.2	8.3
	Initial type testing	All relevant characteristics of Table ZA.1.1 or Table ZA.1.2	8.2
Tasks for the notified body	Certification of F.P.C on the basis of	Initial inspection of factory and of F.P.C  <i>Compressive strength</i> <i>Dimensional stability</i> <i>Bond strength</i> <i>Active soluble salt contents</i>	8.3
		Continuous surveillance, assessment and approval of F.P.C.  <i>Compressive strength</i> <i>Dimensional stability</i> <i>Bond strength</i> <i>Active soluble salt contents</i>	8.3



**Table ZA.3b – Assignment of evaluation of conformity tasks for Category II clay masonry (system 4)**

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks for the manufacturer	Factory production control (F.P.C)	Parameters related to all relevant characteristics of Table ZA.1.1 or Table ZA.1.2	8.3
	Initial type testing	All relevant characteristics of Table ZA.1.1 or Table ZA.1.2	8.2

### ZA.2.2 EC Certificate and Declaration of conformity

Clay masonry units under system 2+: When compliance with the conditions of this annex is achieved, and once the notified body has drawn up the certificate mentioned below, the manufacturer or his agent established in the EEA shall prepare and retain a declaration of conformity, which entitles the manufacturer to affix the CE marking. This declaration shall include:

- name and address of the manufacturer, or his authorised representative established in the EEA, and the place of production;
- description of the product (type, identification, use, ...), and a copy of the information accompanying the CE marking;
- provisions to which the product conforms (Annex ZA of EN 771-1: 2003);
- particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions, etc);
- the number of the accompanying factory production control certificate;
- name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.
- The declaration shall be accompanied by a factory production control certificate, drawn up by the notified body, which shall contain, in addition to the information above, the following:
  - name and address of the notified body;
  - the number of the factory production control certificate;
  - conditions and period of validity of the certificate, where applicable;
  - name of, and position held by, the person empowered to sign the certificate.

Clay masonry units under system 4: When compliance with this Annex is achieved, the manufacturer or his agent established in the EEA shall prepare and retain a declaration of conformity (EC Declaration of conformity), which entitles the manufacturer to affix the CE marking. This declaration shall include:

- name and address of the manufacturer, or his authorised representative established in the EEA, and place of production;
- description of the product (type, identification, use,...), and a copy of the information accompanying the CE marking;
- provisions to which the product conforms (annex ZA of EN 771-1: 2003);
- particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions, etc.);
- name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or of his authorised representative.

The above mentioned declarations shall be presented in the official language or languages of the Member State in which the product is to be used.

### **ZA.3 CE marking and labelling**

The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking. The CE marking symbol to affix shall be in accordance with Directive 93/68/EC and shall be shown on the clay masonry unit (or when not possible it may be on the accompanying label, the packaging or on the accompanying commercial documents e.g. a delivery note). The following information shall accompany the CE marking symbol:


- identification number of the certification body (only for products under systems 2+);
- name or identifying mark and registered address of the producer;
- the last two digits of the year in which the marking is affixed;
- number of the EC Certificate of conformity or factory production control certificate (if relevant);
- reference to this European Standard;
- description of the product: generic name, material, dimensions, ... and intended use;
- information on the relevant essential characteristics listed in Table ZA.1. presented as :
  - declared values and, where relevant, level or class to declare for each essential characteristic as indicated in "Notes" in Table ZA.1;and;
  - "No performance determined" for characteristics where this is relevant.

The "No performance determined" (NPD) option may not be used where the characteristic is subject to a threshold level. Otherwise, the NPD option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements in the Member State of destination.

In addition to any specific information relating to dangerous substances shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE European legislation without national derogations need not be mentioned.

Figure ZA.1 gives examples of the information to be provided with the CE marking in the accompanying documents (e.g. delivery note)



<p><b>AnyCo Ltd, PO Box 21, B-1050</b></p> <p><b>02</b></p>
<p style="text-align: center;"><b>EN 771-1</b></p> <p>Category II, LD, xxx·yyy·zz mm clay masonry unit  <b>Dimensions:</b> length (mm), width (mm), height (mm)</p> <p><b>Dimensional tolerances:</b>  Tolerance category: T1  Range category: NPD  Flatness: NPD  Plane parallelism: NPD</p> <p><b>Configuration:</b> As in attached drawing</p> <p><b>Compressive strength: mean:</b> ..... xx N/mm<sup>2</sup> (⊥ bedface), xx N/mm<sup>2</sup> (⊥ header). (Cat II)</p> <p><b>Dimensional stability: moisture movement:</b>     × mm/m  <b>Bond strength:</b> Fixed value ..... xx (N/mm<sup>2</sup>)  <b>Active soluble salt content:</b> ..... NPD (S0)  <b>Reaction to fire:</b> Euroclass ..... A1  <b>Water absorption:</b>                                     Not to be left exposed  <b>Water vapour diffusion coefficient:</b>     xxx  <b>Direct airborne sound insulation:</b>  <u>Gross dry density</u> ..... xxxx (D1) kg/m<sup>3</sup>  <u>Configuration</u>   As above  <b>Equivalent thermal conductivity:</b> .. xx W/mK (λ<sub>10,dry</sub>)  <b>Durability against freeze-thaw:</b> ..... NPD  <b>Dangerous substances:</b> (1) ..... see Note below</p>

<p><i>CE conformity marking, consisting of the</i></p> <p><i>“CE”-symbol given in directive</i></p> <p><i>93/68/EEC.</i></p> <p>a)</p>
<p><i>Name or identifying mark and registered</i></p> <p><i>address of the producer</i></p> <p><i>Last two digits of the year in which the</i></p> <p><i>marking was affixed</i></p>
<p><i>No. of European standard</i></p> <p><i>Description of product</i></p> <p><i>and</i></p> <p><i>information on regulated</i></p> <p><i>characteristics</i></p>

NOTE Information on dangerous substances will only be given when and where required and in the appropriate form (see ZA.3).

Example of the information for an LD clay masonry unit of Category II intended for all uses with general purpose mortar and to be placed on markets where there are no regulations for active soluble salts content nor for durability against freeze-thaw

Figure ZA.1 – Examples CE marking information (continued overleaf)

  01234
AnyCo Ltd, PO Box 21, B-1050  <b>02</b>  01234-CPD-00234
<p style="text-align: center;"><b>EN 771-1</b></p> <p>Category I, HD, xxx-yyy-zz mm clay masonry unit  <b>Dimensions:</b> length (mm), width (mm), height (mm)</p> <p><b>Dimensional tolerances:</b>                  Tolerance category: T1                  Range category: R1                  Flatness: 1,0 mm                  Plane parallelism: 1,0 mm</p> <p><b>Configuration:</b> As in attached drawing (Group 1 structural)</p> <p><b>Compressive strength: mean</b> ..... xx N/mm<sup>2</sup> (⊥ bedface), xx N/mm<sup>2</sup> (⊥ header) (Cat I)</p> <p><b>Dimensional stability: moisture movement:</b> NPD</p> <p><b>Bond strength:</b> Fixed value ..... xx (N/mm<sup>2</sup>)</p> <p><b>Active soluble salt content:</b> ..... NPD (S0)</p> <p><b>Reaction to fire: Euroclass</b> ..... A1</p> <p><b>Water absorption:</b> ..... xx%</p> <p><b>Water vapour diffusion coefficient:</b> xxx</p> <p><b>Direct airborne sound insulation:</b>  <u>Gross dry density</u> ..... xxx (D1) kg/m<sup>3</sup>  <u>Configuration</u> As above</p> <p><b>Equivalent thermal conductivity:</b> xx W/mK (λ<sub>10,dry</sub>)</p> <p><b>Durability against freeze-thaw:</b> .. F2</p> <p><b>Dangerous substances:</b> ..... See Note below</p>

*CE conformity marking, consisting of the “CE”-symbol given in directive 93/68/EEC.*

*Identification number of the certification body*

a)

*Name or identifying mark and registered address of the producer*

*Last two digits of the year in which the marking was affixed*

*Certificate number b)*

*No. of European standard*

*Description of product*

*and*

*information on regulated characteristics*

[a) The identification of the notified body is only relevant for system 2+

b) Reference to the Certificate number shall only be made under systems 2+]

NOTE Information on dangerous substances will only be given when and where required and in the appropriate form (see ZA.3).

Example of the information for an HD clay masonry unit of Category I intended for all possible uses, including in damp proof courses, and to be placed on markets where there are no regulations for active soluble salts content nor for drying shrinkage

**Figure ZA.1 – Examples CE marking information (concluded)**