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Specification for masonry units - Part 6: Natural stone masonry units

Festlegungen für Mauersteine - Teil 6: Natursteine

Spécifications pour éléments de maçonnerie - Partie 6 : Eléments de maçonnerie en pierre naturelle

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EUROPEAN STANDARD
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Specification for masonry units - Part 6: Natural stone masonry units

Spécifications pour éléments de maçonnerie - Partie 6 :
Éléments de maçonnerie en pierre naturelle

Festlegungen für Mauersteine - Teil 6: Natursteine

This European Standard was approved by CEN on 3 March 2011.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

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EN 771-6:2011 (E)**Foreword**

This document (EN 771-6:2011) has been prepared by Technical Committee CEN/TC 125 "Masonry", the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2011, and conflicting national standards shall be withdrawn at the latest by November 2011.

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

This document supersedes EN 771-6:2005.

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 Construction Products Directive (89/106/EEC).

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

This European Standard also takes into account the general rules for unreinforced and reinforced masonry in EN 1996-1-1.

EN 771, *Specification for masonry units* consists of:

- *Part 1: Clay masonry units* [SIST EN 771-6:2011](https://standards.iteh.ai/catalog/standards/sist/1bf13ea1-927b-492b-be9d-a4ef9568c2bf/sist-en-771-6-2011)
- *Part 2: Calcium silicate masonry units* <https://standards.iteh.ai/catalog/standards/sist/1bf13ea1-927b-492b-be9d-a4ef9568c2bf/sist-en-771-6-2011>
- *Part 3: Aggregate concrete masonry units (Dense and light weight aggregates)*
- *Part 4: Autoclaved aerated concrete masonry units*
- *Part 5: Manufactured stone masonry units*
- *Part 6: Natural stone masonry units*

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

1 Scope

This European Standard specifies the characteristics and performance requirements of masonry units manufactured from natural stone the width of which is equal to or greater than 80 mm, for which the main intended uses are common, facing or exposed masonry units in loadbearing or non-loadbearing building and civil engineering applications. These units are suitable for all forms of coursed or random masonry walling, including single leaf, cavity, partition, retaining and the external masonry to chimneys. They can provide fire protection, thermal insulation, sound insulation and sound absorption.

This European Standard includes natural stone masonry units of an overall non-rectangular parallelepiped shape, specially shaped and accessory units for internal and external application.

It defines the performance related to e.g. strength, petrographic description, density, porosity, dimensional accuracy, thermal conductivity, water absorption, and frost resistance and provides for the evaluation of conformity of the product to this European Standard. The marking requirements for products covered by this European Standard are also included.

This European Standard does not cover storey height panels, natural stone for paving, chimney flue linings nor units intended for use as damp proof course.

2 Normative references

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

EN 772-1:2011, *Methods of test for masonry units — Part 1: Determination of compressive strength*
[SIST EN 771-6:2011](#)

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

EN 772-16:2011, *Methods of test for masonry units — Part 16: Determination of dimensions*

EN 772-20, *Methods of test for masonry units — Part 20: Determination of flatness of faces of aggregate concrete, manufactured stone and natural stone masonry units*

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

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

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

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

EN 1936, *Natural stone test methods — Determination of real density and apparent density, and of total and open porosity*

EN 12371, *Natural stone test methods — Determination of frost resistance*

EN 12372, *Natural stone test methods — Determination of flexural strength under concentrated load*

EN 12407, *Natural stone test methods — Petrographic examination*

EN 12440, *Natural stone — Denomination criteria*

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EN ISO 10456, *Building materials and products - Hygrothermal properties - Tabulated design values and procedures for determining declared and design thermal values (ISO 10456:2007)*

EN 13373, *Natural stone test methods — Determination of geometric characteristics on units*

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

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

3 Terms and definitions

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

- 3.1
apparent density**
ratio between the mass of the dry specimen and its apparent volume
- 3.2
masonry unit**
prefabricated component intended for use in masonry construction
- 3.3
face**
exposed surface of natural stone masonry units
- 3.4
natural stone masonry unit**
masonry unit manufactured from natural stone
- 3.5
dimensions and surfaces**
defined by reference to figure 1 relates to the name of the dimensions and surfaces for dimensioned stone and squared rubble stone
- 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
rubble stone**
masonry unit squared or not of any shape with variable dimensions, whose face is rough or worked
- 3.10
squared rubble stone**
rubble stone which is squared and worked to dimensions declared by the manufacturer

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3.11**regular shaped masonry unit**

masonry unit with an overall rectangular parallelepiped shape

3.12**specially shaped masonry unit**

masonry unit which is not rectangular parallelepiped

3.13**accessory masonry unit**

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

3.14**dimensioned stone**

stone worked on all faces to declared dimensions

3.15**extra width**

width exceeding the work size, to be adjusted to work-size width after application of the unit on site

3.16**declared value**

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

3.17**indicative samples**

piece of natural stone of sufficient size to indicate the appearance of the finished work, regarding the colouring, the vein pattern, the physical structure and face finish

3.18**Category I masonry units**

units with a declared compressive strength with a probability of failure to reach it not exceeding 5 %

NOTE

This may be determined via the mean or characteristic value.

3.19**Category II masonry units**

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

3.20**normalised compressive strength of masonry units**

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

3.21**mean compressive strength of masonry units**

arithmetic mean of the compressive strengths of masonry units

3.22**characteristic compressive strength of masonry units**

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

3.23**product group**

products from one manufacturer having common values for one or more characteristics

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4 Materials of natural stone

Natural stone is a natural product obtained by mining or by quarrying and made into masonry units by a manufacturing process.

The following groups of materials are considered as natural stone:

- **Magmatic or igneous rocks:** Rocks formed by the cooling and solidification of the magma, e.g. granite, basalt, diorite, porphyry.
- **Sedimentary rocks:** Rocks formed by deposition (generally in water) and consolidation of organic or inorganic particles. For example limestone, sandstone, travertine.
- **Metamorphic rocks:** Transformed rocks resulting from action of heat and/or pressure on the pre-existing rocks. For example slate, gneiss, quartzite, marble.

5 Requirements for natural stone masonry units

5.1 General

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

It should be noted that the test methods are not always applicable to specially shaped and accessory units as defined in 3.9 and 3.10.

The conformity criteria given in the following subclauses relate to initial type tests (see 8.2) and to consignment testing (see Annex A). For the compressive strength of Category I units use a 50 % fractile ($p = 0,50$) for mean values or 5 % fractile ($p = 0,05$) for characteristic values and a confidence level of 95 %.

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

5.2 Denomination

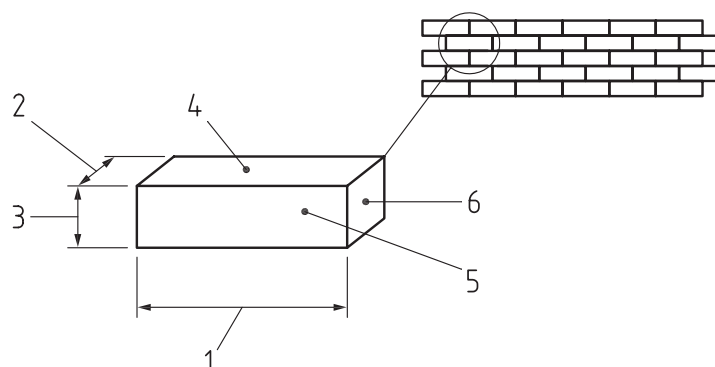
The denomination shall be declared in accordance with EN 12440 (meaning traditional name, petrological family, typical colour and place of origin).

The petrographic name shall be declared in accordance with EN 12407.

5.3 Dimensions and tolerances

5.3.1 Dimensions

The dimensions of a natural stone masonry unit shall be declared (by the manufacturer/supplier) in mm for length, width and height in that order. They shall be given in terms of work size and in addition the coordinating size may be given. The assembly dimensions may also be given.

**Key**

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

Figure 1 — Dimensions and surfaces for dimensioned stone and squared rubble stone**5.3.2 Dimensional tolerances**

The permissible deviations for individual masonry units shall be as given in Table 1. The manufacturer shall also declare which tolerance category the dimensioned natural stone masonry units shall fulfil. The manufacturer may declare closer tolerances for one or more dimensions.

When sampled in accordance with Annex A and tested in accordance with EN 772-16:2011 using measurement method a), the deviation from the declared dimensions shall not exceed the tolerances for the dimensions in question taken from Table 1 or any closer tolerance the manufacturer has declared.

In addition the definition of dimensioned stone (finished units) includes the requirement that the faces and headers are plane without a separate declaration and that the bed faces of category D3 masonry units are suitable for use with thin layer mortar. When sampled in accordance with Annex A and tested in accordance with EN 772-20, the flatness shall meet the requirements of Table 1. When sampled in accordance with Annex A and tested in accordance with EN 13373, the out-of-squareness shall meet the requirements of Table 1.

When dimensioned stone masonry units category D3, intended for use with thin layer mortar, are sampled in accordance with Annex A and tested in accordance with EN 772-16:2011 by procedure d), the deviation from plane parallelism shall not exceed the values given in Table 1.

Table 1 — Dimensional tolerances for natural stone masonry units

Dimensions	Dimensioned stone			Squared rubble stone	Rubble stone
	Sawn faces			Faces roughly cut	
	D1	D2	D3		
Length	± 5 mm	± 2 mm	± 2 mm	± 15 mm	No requirement
Width ^a	± 5 mm	± 2 mm	± 2 mm	No requirement	No requirement
Height	± 5 mm	± 2 mm	± 1 mm	± 15 mm	No requirement
Flatness	0,5 % of the longest dimension of the face	0,3 % of the longest dimension of the face	0,3 % of the longest dimension of the face and not more than ± 1mm for the bed face	± 1,5 % for longest straight edge of the face	No requirement
Squareness	0,5 % for the longest straight edge of the face	0,3 % for the longest straight edge of the face	0,3 % for the longest straight edge of the face	± 1,5 % for longest straight edge of the face	No requirement
Plane parallelism			≤ 1,0 mm		

^a Not in the case of extra width.

EN 771-6:2011 (E)**5.4 Configuration****5.4.1 General**

The geometry, shape and features of natural stone masonry units shall be declared by the manufacturer.

The test shall be carried out according to EN 772-16.

5.4.2 Surface appearance

An indicative sample shall show the general tonality and finish of the natural stone, but does not imply any total uniformity in colour, and veins between the sample and supply.

Indicative samples shall also show the surface finish proposed.

NOTE Indicative samples should be delivered to the customer as an indication of specific characteristics such as glass seams, spots, holes for travertine, worm holes for marble, crystalline veins, rust stains, geodes, lens etc. which should not be considered as flaws.

When an indicative sample cannot exhibit sufficiently the characteristic features of the stone, at least three specimens shall be delivered.

One specimen out of three should indicate the average appearance and the other two the extreme appearance.

5.5 Apparent density

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The manufacturer shall declare the apparent density of six specimens sampled in accordance with Annex A and tested in accordance with EN 1936.

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NOTE The term apparent density used in relation to natural stone units is the same property declared as gross density in EN 771-1 to EN 771-5.

5.6 Mechanical strengths**5.6.1 Compressive strength**

The manufacturer shall declare the mean normalised compressive strength (fb). In addition the manufacturer may declare the characteristic compressive strength (5 % fractile). In addition, the manufacturer shall declare whether the natural stone masonry unit is classified as Category I or Category II.

The normalised compressive strength procedure of a natural stone masonry unit is given in EN 772-1:2011, Annex A.

When the natural stone masonry units are sampled from a consignment in accordance with Annex A and tested in accordance with EN 772-1 and conditioned in accordance with EN 772-1:2011, 7.3.2 a), the mean compressive strength of the specified number (at least 10 specimen) of natural stone masonry units from a consignment shall be not less than the declared compressive strength and no individual unit shall have a compressive strength of less than 80 % of the declared mean value.

When it is not convenient to test whole units the test specimen may be cubes with (100 ± 5) mm (70 ± 5) mm or (50 ± 5) mm edge or right circular cylinders with diameter and height which are equal to (100 ± 5) mm (70 ± 5) mm or (50 ± 5) mm.

The number of specimen shall be at least 10.

Sawn test specimens shall be representative of the original unit section.