



SLOVENSKI STANDARD

SIST EN 12057:2015

01-maj-2015

Nadomešča:
SIST EN 12057:2004

Proizvodi iz naravnega kamna - Ploščice - Zahteve

Natural stone products - Modular tiles - Requirements

Natursteinprodukte - Fliesen - Anforderungen

Produits en pierre naturelle - Plaquettes modulaires - Exigences
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ICS:

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EUROPEAN STANDARD

EN 12057

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March 2015

ICS 91.100.15

Supersedes EN 12057:2004

English Version

Natural stone products - Modular tiles - Requirements

Produits en pierre naturelle - Plaquettes modulaires -
Exigences

Natursteinprodukte - Fliesen - Anforderungen

This European Standard was approved by CEN on 3 January 2015.

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.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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EN 12057:2015 (E)**Foreword**

This document (EN 12057:2015) has been prepared by Technical Committee CEN/TC 246 "Natural stones", the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by September 2015, and conflicting national standards shall be withdrawn at the latest by December 2016.

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 12057:2004.

EN 12057:2015 includes the following significant technical changes with respect to EN 12057:2004:

- durability, resistance to thermal and moisture cycling, skid resistance, direct airborne sound insulation, thermal conductivity, release of dangerous substances added to requirements;
- sampling at the point of delivery added to the sampling;
- assessment and verification of constancy of performance added;
- Annex ZA substantially changed.

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

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For relationship with the Regulation, see informative Annex ZA, which is an integral part of this document.

This European Standard is one of a series of standards for specifications of natural stone products which includes the following:

- EN 1467, *Natural stone — Rough blocks — Requirements*;
- EN 1468, *Natural stone — Rough slabs — Requirements*;
- EN 1469, *Natural stone products — Slabs for cladding — Requirements*;
- EN 12057, *Natural stone products — Modular tiles — Requirements*;
- EN 12058, *Natural stone products — Slabs for floors and stairs — Requirements*;
- EN 12059, *Natural stone products — Dimensional stone work — Requirements*.

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

1 Scope

This European Standard specifies requirements for flat modular tiles of natural stone which are made for internal (including enclosed public transport premises) and/or external uses as floorings, stairs and wall and ceiling finishes. This European Standard does not cover mineral aggregates and artificial agglomerated stone material and does not cover installation.

2 Normative references

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

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

EN 1925, *Natural stone test methods — Determination of water absorption coefficient by capillarity*

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*

EN 12670:2001, *Natural stone — Terminology* EN 12057:2015

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 13755, *Natural stone test methods — Determination of water absorption at atmospheric pressure*

EN 14066, *Natural stone test methods — Determination of resistance to ageing by thermal shock*

EN 14157, *Natural stone test methods — Determination of the abrasion resistance*

EN 16306, *Natural stone test methods — Determination of resistance of marble to thermal and moisture cycles*

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

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

CEN/TS 15209, *Tactile paving surface indicators produced from concrete, clay and stone*

CEN/TS 16165:2012, *Determination of slip resistance of pedestrian surfaces — Methods of evaluation*

NOTE Besides the European Standards for test methods mentioned in this clause, there exist further standards which can be used for scientific examinations, but which are not relevant for the application in practice according to this standard.

EN 12057:2015 (E)

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12670:2001 and the following apply.

3.1 modular tile
flat piece of natural stone square or rectangular shapes, obtained by cutting or splitting at a nominal thickness ≤ 12 mm

3.2 dimensions of modular tiles
length l , width b and thickness d , given in the stated sequence in millimetres (see Figure 1)

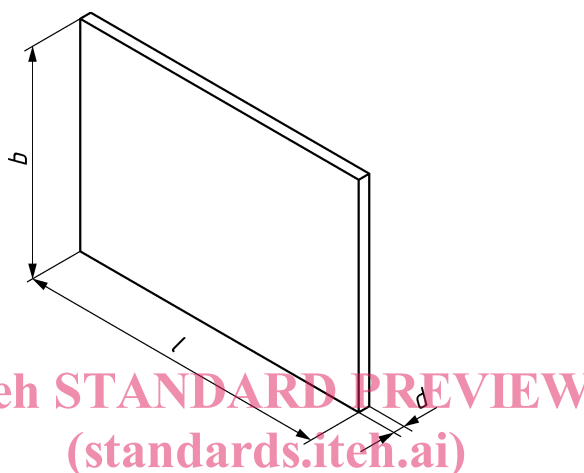


Figure 1 — Dimensions of a modular tile
SIST EN 12057:2015

3.3 calibrated tile
tile which fulfil stricter tolerances for thickness, flatness and squareness
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3.4 lower expected value
lower expected value (E_L) corresponds to the 5 %-quantile of a logarithmic normal distribution for a confidence level of 75 %

3.5 higher expected value
higher expected value (E_H) corresponds to the 95 %-quantile of a logarithmic normal distribution for a confidence level of 75 %

4 Characteristics of natural stone modular tiles

4.1 Geometrical characteristics

4.1.1 General

All measurements shall be carried out in accordance with EN 13373 and all measured values of individual units shall fall within the required tolerances.

4.1.2 Dimensions

The deviations for dimensions, flatness and squareness shall be as given in Table 1. Table 1 is not valid for modular tiles having natural cleft/riven faces, for which deviations on dimensions, flatness or squareness shall be set out by the manufacturer.

Table 1 — Tolerances on dimensions and shape

Property		Tolerances on dimensions and shape	
		Not calibrated tiles	Calibrated tiles ^a
Dimensions	<i>l, b</i>	±1 mm	±1 mm
	<i>d</i>	±1,5 mm	±0,5 mm
Flatness (for honed and polished surface only) ^b		0,15 %	0,10 %
Squareness ^b		0,15 %	0,10 %
^a Calibrated tiles indicate a product submitted to specific mechanical finishing in order to obtain more precise dimensions; they might be suitable to be fixed by thin mortar bed or adhesives ^b in accordance with EN 13373			

4.1.3 Surface finish

4.1.3.1 General

Surface finishes shall extend uniformly to the edges of the modular tiles.

The surface finishing of some types of stones may typically involve the use of patching, fillers or other similar products for natural holes, faults or cracks; this is to be considered as part of the normal processing. In such cases the type of treatment, as well as the type and nature of additional materials, shall be declared.

4.1.3.2 Requirements for surfaces after surface finishing

Surfaces shall be worked to achieve the specified finish and shall have a regular appearance as a result of the finishing process (e.g. making reference to samples, see 4.2.3). For definitions of surface finishes, see EN 12670.

4.2 Physical and mechanical characteristics

4.2.1 General

Whenever stone processing is likely to change the characteristics of the raw material (e.g. as a consequence of the type of processing or because the use of patching, fillers or other similar products for natural holes, faults, cracks and similar), then this has to be considered when determining the characteristics requested by this document.

The following characteristics shall be declared where requested by this document or with reference to the use conditions.

EN 12057:2015 (E)**4.2.2 Denomination**

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

NOTE The place of origin can be given by GPS coordinates.

The petrographic definition shall be determined in accordance with EN 12407.

4.2.3 Visual appearance**4.2.3.1 General**

The colour, veining, texture, etc. of the stone shall be identified visually, typically by a reference sample of the same stone suitable for providing a general description of visual appearance. The reference sample shall be provided by the supplier.

4.2.3.2 Reference sample, visual inspection and acceptance criteria

A reference sample shall be an adequate number of pieces of natural stone of sufficient size to indicate the general appearance of the finished work. The dimensions of individual pieces shall be at least 0,01 m² (typical values are between 0,01 m² and 0,25 m² in face area but may be more), and shall indicate the range of appearance regarding the colouring, the vein pattern, the physical structure and the surface finish. In particular the reference sample shall show specific characteristics of the stone, such as typical holes, glass seams, spots and crystalline veins.

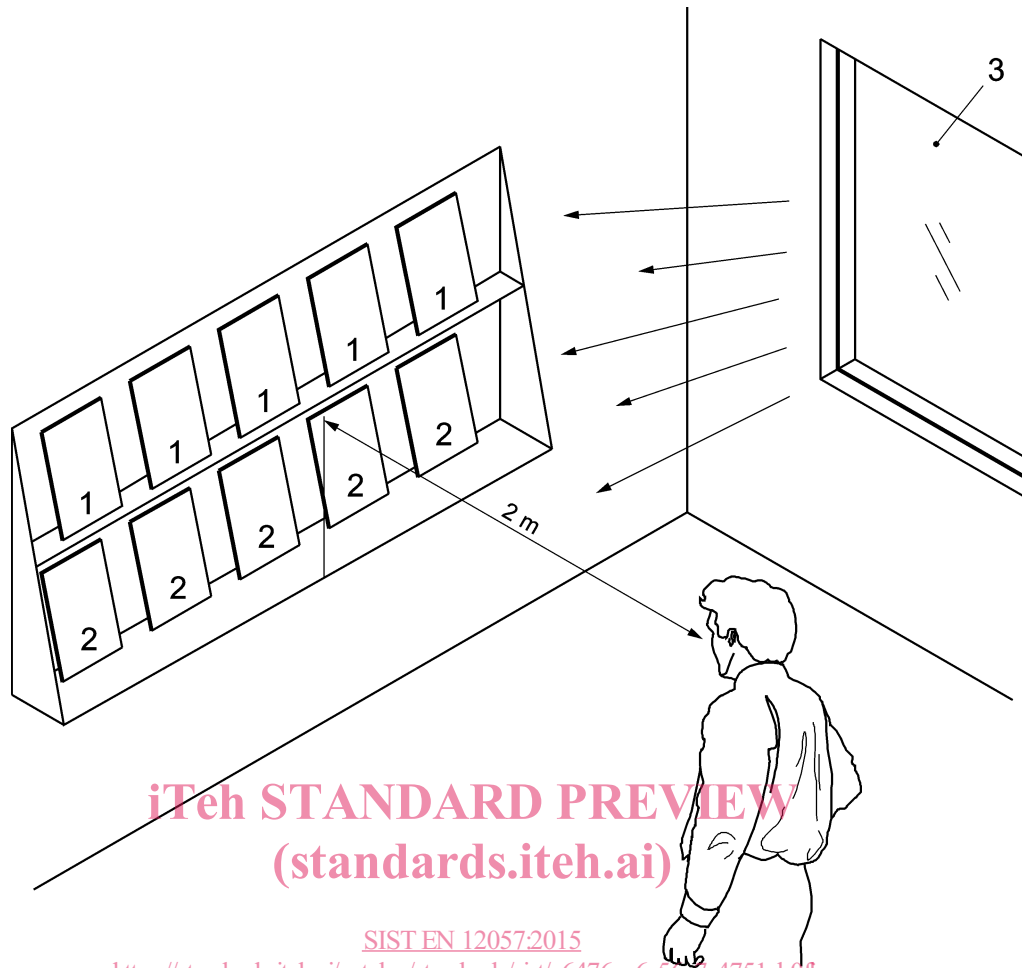
The reference sample does not imply strict uniformity between the sample itself and the actual supply; natural variations may always occur.

If the processing of the stone involves the use of patching, fillers or other similar products for natural holes, faults or cracks, then the reference sample shall similarly display the impact of the same on the finished surface.

All the characteristics as shown by the reference sample shall be considered typical of the stone and not as flaws, therefore they shall not become a reason for rejection, unless their concentration becomes excessive and the typical character of the stone is lost.

The name and address of the producer or the supplier, as well as the denomination of the stone in accordance with 4.2.2 above, shall be indicated on the reference sample.

Any comparison between production sample and reference sample shall be carried out by placing the reference sample against the production samples and viewing them at a distance of about two metres under normal daylight conditions and recording any visible differences in the characteristics of the stones (see Figure 2).



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Key

- 1 reference sample
- 2 production sample
- 3 daylight

Figure 2 — Comparison between production sample and reference sample

4.2.4 Flexural strength

When required the flexural strength shall be determined using the test method in EN 12372 and the mean value, lower expected value and standard deviation shall be declared. Where the surface finish of the delivered product has an influence on the characteristic, the test shall be carried out with this finish, in accordance with the technological tests defined in EN 12372.

4.2.5 Bond strength/adhesion

This standard does not consider fixing by means of mortar and adhesives.

NOTE The value of the bond strength adhesion and the durability depend on several influences, e.g. the type of adhesive/mortar, the surfaces being bonded and the climatic conditions.

EN 12057:2015 (E)**4.2.6 Water absorption at atmospheric pressure**

When required this characteristic shall be determined using the test method in EN 13755 and the higher expected value (E_H) shall be declared.

4.2.7 Reaction to fire

When required this characteristic shall be declared.

Natural stone tiles may be considered reaction to fire Class A1¹⁾ with the following exceptions.

- Natural stones containing asphalt at greater than 1 % by mass or volume, whichever is the more onerous, and having a final use subject to fire regulations, shall be tested for reaction to fire and classified in accordance with EN 13501-1.
- Whenever processing of natural stones involves the use of organic patching, fillers or other similar products for natural holes, faults, cracks or similar, at greater than 1 % by mass or volume, whichever is the more onerous and the same stones have a final use subject to fire regulations, then they shall be tested for reaction to fire and classified in accordance with EN 13501-1.

4.2.8 Water absorption by capillarity

When required (e.g. when the modular tile is to be used for elements in contact with a horizontal surface where water may be present) this characteristic shall be determined using the test method in EN 1925 and the higher expected value (E_H) shall be declared.

For stone having an open porosity less than 1,0 % this test shall not be performed.

4.2.9 Apparent density and open porosity [SIST EN 12057:2015](#)

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When required the apparent density and open porosity shall be determined using the test method in EN 1936 and the mean values of the results declared.

4.2.10 Durability**4.2.10.1 Durability of flexural strength against freeze thaw**

When required the frost resistance shall be determined using the test method in EN 12371 and the results declared:

- as the value of the flexural strength without frost and after 56 cycles of freeze/thaw for flooring and after 14 freeze/thaw cycles for wall finishes by giving the mean value;
- or in case the stone failed before 56 cycles or 14 cycles, respectively, as the number of cycles necessary to initiate cracks, rupture, etc.

For some specific uses it may be appropriate to use different test cycles, for example freezing in water, freezing to a lower temperature, or testing specimens embedded in non-porous siliceous granules or a different number of cycles. In these cases national specification standards may be followed but these variations shall be clearly stated in the test report and in the product marking.

NOTE The selection of the stone is subjected to climatic zone and/or to codes of practice.

¹⁾ Commission Decision 96/603/EC, as amended.

When the mean value of flexural strength decreases by less than 20 %, this should not be considered as significant because of the variability of natural stone.

4.2.10.2 Abrasion resistance

When required, this characteristic shall be declared, for tiles for flooring and stairs only, and shall be determined using the test method in EN 14157 and the higher expected value (E_H) shall be declared and expressed in millimetres when under method A or in $\text{cm}^3/50 \text{ cm}^2$ under method B.

4.2.10.3 Resistance to thermal and moisture cycling

The resistance of marble to thermal and moisture cycling shall be declared upon request only for marble intended for cladding of building facades and determined according to EN 16306.

For scientific definition of marble, see EN 12670:2001, 2.1.243 a.

4.2.11 Thermal shock resistance

When required this characteristic shall be declared and determined using the test method in EN 14066 and the changes both in mass and in flexural strength expressed accordingly.

4.2.12 Water vapour permeability

This characteristic shall be declared when the tile is to be used in a location subject to vapour control requirements.

The permeability coefficient shall be tested or given as tabulated values in accordance with EN ISO 12572 and/or EN ISO 10456.

4.2.13 Slip resistance

This characteristic shall be declared, for tiles for flooring and stairs only, where subject to regulatory requirements or upon request and when the roughness of the surface is less than 1 mm measured following EN 13373.

The slip resistance shall be determined using test methods in CEN/TS 16165:2012, Annex C and the results expressed accordingly.

Whenever results indicate an insufficient slip resistance of tiles for stairs, then adequate provisions shall be adopted in order to improve this parameter. This may be achieved by mechanical reworking of the surface, or by inserting anti-slip products e.g. rubber profiles, carborundum strips, metal bars or similar.

4.2.14 Skid resistance

This characteristic shall be declared only, where subject to regulatory requirements or upon request and when the roughness of the surface is less than 1 mm measured following EN 13373.

The skid resistance shall be determined as slip resistance (see 4.2.13).

4.2.15 Tactility

This characteristic shall be declared, for tiles for flooring and stairs only, where subject to regulatory requirements or upon request.

The tactility is expressed by a description of surface corrugation obtained by mechanical finishes.

NOTE Specifications for tactile paving surface indicators are given in CEN/TS 15209.

EN 12057:2015 (E)**4.2.16 Direct airborne sound insulation**

When required this characteristic shall be declared and expressed as density and determined using the test method in EN 1936 and expressed as mean value.

4.2.17 Thermal conductivity

Where required this characteristic shall be declared and determined using the test method in EN 1745 and expressed as mean value.

4.2.18 Release of dangerous substances**4.2.18.1 Emission of radioactivity**

There is evidence that for finished product no dangerous concentration of radioactivity exists. National regulations on emission of radioactivity may require verification and declaration on emission of radioactivity when construction products covered by this standard are placed on those markets.

In the absence of a European harmonized test method²⁾ verification and declaration on emission should be done taking into account national provisions in the place of use.

4.2.18.2 Other dangerous substances

National regulations on dangerous substances may require, verification and declaration on release, and sometimes content, of other dangerous substances, in addition to those dealt with in other clauses, when construction products covered by this standard are placed on those markets.

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

NOTE An informative database covering European and national provisions on dangerous substances is available at the Construction website on EUROPA accessed through: http://ec.europa.eu/enterprise/sectors/construction/legislation/index_en.htm.

5 Testing, assessment and sampling methods**5.1 Testing**

References to the test methods are given in Clause 4.

5.2 Sampling**5.2.1 General**

This clause specifies methods for obtaining samples of natural stone from quarries, or plants or buildings. Sampling from buildings may be necessary if the delivered natural stone product is already applied in a building.

The aim of sampling is to obtain a bulk sample that is representative of the average properties of the batch and of its variability.

The methods described are based on manual procedures. The methods described are limited to building and civil engineering purposes.

²⁾ CEN/TS 00351014 is under preparation.

It is important that samplers are accordingly trained in the application of the methods set out in this document.

In case of dispute or if tests are to be done by more than one organization all interested parties shall have the opportunity to observe the sampling and shall agree upon the number of sampling increments to be taken.

5.2.2 Principles of sampling

Proper and careful sampling and sample transport is a prerequisite for an analysis that will give reliable results. An adequate number of samples shall be taken to obtain a good estimation of the natural heterogeneity of the batch.

The sampler shall be informed of the aim of the sampling.

5.2.3 Taking bulk samples

The number and sizes of samples depend on the test methods for which they are taken. The number and shape of specimens are given in the relevant test methods.

5.2.4 Preparing a sampling plan

A sampling plan shall be prepared, prior to sampling, taking into account the following:

- the type of the natural stone (following EN 12440 and EN 12670);
- the aim of the sampling including a list of the properties to be tested;
- the identification of sampling points;
- the approximate size of samples;
- the number of samples;
- the sampling apparatus to be used;
- the methods of sampling;
- the marking, packaging and dispatch of the samples.

5.2.5 Sampling apparatus

Any suitable cutting equipment for natural stone may be used for sampling. In addition, drills, which are suitable for taking drill cores, may be used.

5.2.6 Sampling methods

5.2.6.1 General

The sampling methods will inevitably involve the samplers working at a quarry, plant or building. Regulations for safety and ergonomics shall be followed.

5.2.6.2 Sampling from quarries

5.2.6.2.1 General

The sample shall be taken by a qualified specialist, experienced in the examination of natural stone deposits. The main objective of sampling from such deposits is to establish, the average, the range of variations and the