

SLOVENSKI STANDARD

SIST EN 14411:2016

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Nadomešča:
SIST EN 14411:2013

Keramične ploščice - Definicije, razvrstitev, lastnosti, vrednotenje skladnosti in označevanje

Ceramic tiles - Definition, classification, characteristics, evaluation of conformity and marking

Keramische Fliesen und Platten - Definitionen, Klassifizierung, Eigenschaften, Konformitätsbewertung und Kennzeichnung

Carreaux céramiques - Définitions, classification, caractéristiques, évaluation de la conformité et marquage

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Ta slovenski standard je istoveten z: **EN 14411:2016**

ICS:

91.100.23	Keramične ploščice	Ceramic tiles
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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 14411

July 2016

ICS 91.100.23

Supersedes EN 14411:2012

English Version

**Ceramic tiles - Definition, classification, characteristics,
assessment and verification of constancy of performance
and marking**

Carreaux céramiques - Définitions, classification,
caractéristiques, évaluation et vérification de la
constance de performance et marquage

Keramische Fliesen und Platten - Definitionen,
Klassifizierung, Eigenschaften, Konformitätsbewertung
und Kennzeichnung

This European Standard was approved by CEN on 13 May 2016.

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

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

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European foreword

This document (EN 14411:2016) has been prepared by Technical Committee CEN/TC 67 "Ceramic tiles", 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of an identical text or by endorsement, at the latest by January 2017, and conflicting national standards shall be withdrawn at the latest by April 2018.

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

This document supersedes EN 14411:2012.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

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

The changes with respect to the previous edition include:

Errors (editorial):

- Skipping Annex I, because ceramic tiles that comply with the requirements of EN 14411, have to include specific marking on the boxes. One of the requirements of this marking is to indicate the reference to the standard and the annex it complies with. Previous editions of EN 14411 all skipped the reference to Annex I, and only the 2012 edition included it by error. This also affects the numbering of annexes which go after I (J, K, L,...) since these all shift one letter downwards. If this is not corrected, manufacturers will need to update the marking and change all the boxes. Furthermore, the letter of the annex has traditionally been connected with a specific group or type of ceramic tile, and the change will create confusion. In order to avoid all these unnecessary consequences, and increased costs, it is requested, like it has been done in the past with previous editions, to skip Annex I, and adapt the successive annexes accordingly.
- Renumbering of Annexes J to P (previous I to O)
- Annex C – dimensional tolerance limits for surface flatness were incorrect (see EN 14411:2006)
- Annex K – Eliminated note 'o' since it was duplicated (same as note 'n')
- Updated references to annexes throughout the text

Changes (technical):

- Exclusion of ceramic decorative pieces, trims and accessories (not included in mandate)
- Exclusion of meshed backed products (these are considered systems or kits, involving other non-ceramic materials, thus not covered by this standard)
- New Clause 6 on assessment and verification of the constancy of performance (previous evaluation of conformity clause) according to Doc. TF N 548 Rev 1 Guidance document.

- Clause 8 on marking: addition of text for special consideration of marking on small size tiles
- Table 2, clause *B.10d*): elimination of ‘mortar’ in the bond strength characteristic (the reference to test standard EN 1015-12 is not appropriate since it is not used to determine the adhesion properties of ceramics but of renders and plastering mortars on substrates). Eliminated references throughout the text.
- New Annex ZA according to CPR (including Delegated Regulation EU 157/2014 relative to DoP on websites and Delegated Regulation EU 574/2014 relative to model of DoP).

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.

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1 Scope

This European Standard defines terms and specifies characteristics for ceramic tiles, including mosaics (i.e. any piece that can fit into a square area of 49 cm²) produced by extrusion or dry-pressing techniques, used for internal and/or external floorings (including stairs) and/or walls. Furthermore, it provides the level of requirements for these characteristics and references to the test methods applied as well as provisions for the assessment and verification of the constancy of performance.

This European Standard is not applicable to:

- meshed backed products;
- ceramic decorative accessories or trims (such as edges, corners, skirting, capping, coves, beads, curved tiles and other accessory pieces);
- ceramic tiles made by processes other than extrusion or dry-pressing;
- dry-pressed unglazed ceramic tiles with water absorption greater than 10 %;
- ceramic tiles used for floorings on external road finishes;
- ceramic tiles used in ceiling finishes or suspended ceilings.

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 12004:2007+A1:2012, *Adhesives for tiles - Requirements, evaluation of conformity, classification and designation*

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

CEN/TS 16165, *Determination of slip resistance of pedestrian surfaces - Methods of evaluation*

EN ISO 10545-1, *Ceramic tiles - Part 1: Sampling and basis for acceptance (ISO 10545-1)*

EN ISO 10545-2, *Ceramic tiles - Part 2: Determination of dimensions and surface quality (ISO 10545-2)*

EN ISO 10545-3, *Ceramic tiles - Part 3: Determination of water absorption, apparent porosity, apparent relative density and bulk density (ISO 10545-3)*

EN ISO 10545-4, *Ceramic tiles - Part 4: Determination of modulus of rupture and breaking strength (ISO 10545-4)*

EN ISO 10545-5, *Ceramic tiles - Part 5: Determination of impact resistance by measurement of coefficient of restitution (ISO 10545-5)*

EN ISO 10545-6, *Ceramic tiles - Part 6: Determination of resistance to deep abrasion for unglazed tiles (ISO 10545-6)*

EN ISO 10545-7, *Ceramic tiles - Part 7: Determination of resistance to surface abrasion for glazed tiles (ISO 10545-7)*

EN ISO 10545-8, *Ceramic tiles - Part 8: Determination of linear thermal expansion (ISO 10545-8)*

EN ISO 10545-9, *Ceramic tiles - Part 9: Determination of resistance to thermal shock (ISO 10545-9)*

EN ISO 10545-10, *Ceramic tiles - Part 10: Determination of moisture expansion (ISO 10545-10)*

EN ISO 10545-11, *Ceramic tiles - Part 11: Determination of crazing resistance for glazed tiles (ISO 10545-11)*

EN ISO 10545-12, *Ceramic tiles - Part 12: Determination of frost resistance (ISO 10545-12)*

EN ISO 10545-13, *Ceramic tiles - Part 13: Determination of chemical resistance (ISO 10545-13)*

EN ISO 10545-14, *Ceramic tiles - Part 14: Determination of resistance to stains (ISO 10545-14)*

EN ISO 10545-15, *Ceramic tiles - Part 15: Determination of lead and cadmium given off by glazed tiles (ISO 10545-15)*

EN ISO 10545-16, *Ceramic tiles - Part 16: Determination of small colour differences (ISO 10545-16)*

ISO 1006:1983, *Building construction — Modular coordination — Basic module*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1006:1983 and the following apply.

3.1

ceramic tile

tile made from clays and/or other inorganic raw materials

3.2

porcelain ceramic tile

fully vitrified ceramic tile with water absorption of 0,5 % or less

3.3

glaze

vitrified covering on ceramic tile

3.4

engobed surface

clay-based covering with a matt finish which can be permeable or impermeable

3.5

polished surface

surface of a glazed or unglazed ceramic tile which has been given a glossy finish by mechanical polishing carried out after firing

3.6

extruded ceramic tile

ceramic tile whose body is shaped in the plastic state in an extruder, the column obtained being cut into tiles of pre-determined dimension

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3.7

dry-pressed tile

tile formed from a finely milled body mixture and shaped by pressing

3.8

spacer lug

projection which is located along certain edges of tiles so that when two tiles are placed together, in line, the lugs on adjacent edges separate the tiles by a distance not less than the specified width of the joint

Note 1 to entry: Lugs are positioned so that the joint between the tiles may be filled with grout without the lugs remaining exposed.

Note 2 to entry: Dry-pressed tiles may be made with other spacer lug systems and, in such cases, the manufacturer's work size applies.

Note 3 to entry: Figure 1 illustrates a ceramic tile without spacer lugs and Figure 2 ceramic tile with spacer lugs.

3.9

water absorption (E_b)

percentage (by mass) of water absorbed by the ceramic body

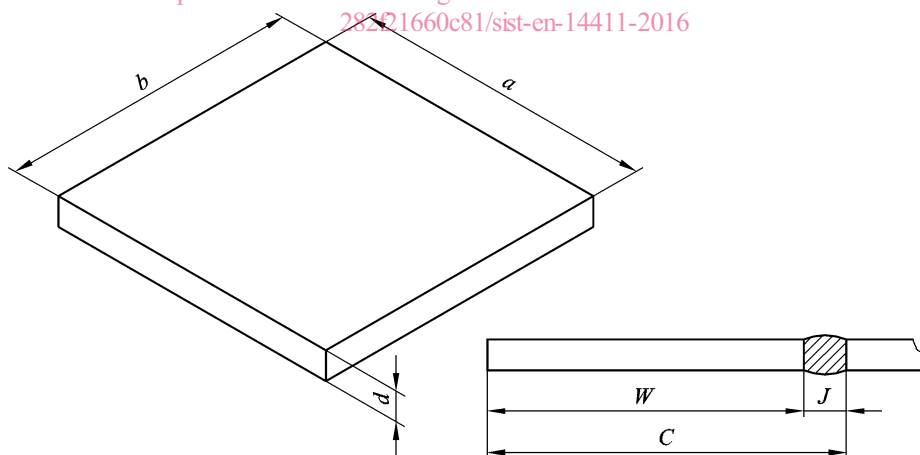
3.10

nominal size (N)

size used to describe the ceramic tile

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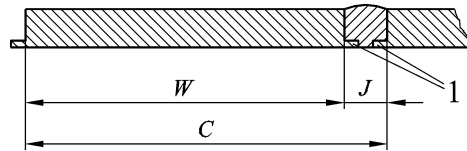
Note 1 to entry: This and the following sizes are only defined for rectangular tiles. If the sizes of non-rectangular tiles are required, they are defined by the smallest rectangle into which they fit.

**Key**

coordinating size (C) = work size (W) + joint (J)

work size (W) = dimension of the visible face (a), (b) and thickness (d)

Figure 1 — Ceramic tile

**Key**

1 spacer lugs

coordinating size (C) = work size (W) + joint (J)

work size (W) = dimension of the visible face (a), (b) and thickness (d)

Figure 2 — Ceramic tile with spacer lug

3.11**work size (W)**

size of a tile specified for manufacturing to which the actual size conforms within specified permissible deviations

3.12**actual size**

size obtained by measuring the face of the tile

3.13**coordinating size (C)**

work size plus the joint width

3.14**modular size**

dimensions based on the modules M , and also their multiples or subdivisions, except for tiles with a surface area of less than 9 000 mm²

Note 1 to entry: See ISO 1006, where 1 M = 100 mm.

3.15**non-modular size**

size not based on module M

Note 1 to entry: See ISO 1006, where 1 M = 100 mm.

3.16**tolerance**

permissible deviation from work size

3.17**product group**

ceramic tiles manufactured through a defined process (extrusion or dry pressing) and featuring a specific water absorption (see Table 1)

3.18**family in a product group**

ceramic tiles manufactured for which the test results of any tile within the family are valid for all other tiles within the family

Note 1 to entry: Families can be defined in terms of body characteristics (same composition, size and thickness) or surface finish characteristics (same glaze and/or decoration composition and properties).

4 Classification of ceramic tiles

Tiles are usually shaped by extruding or dry-pressing at room temperature followed by drying and firing at temperatures sufficient to develop the required properties. They can also be formed by other processes, but these are not covered by this European Standard.

According to this European Standard, ceramic tiles shall be classified into groups according to two parameters: by their method of manufacture (also referred to 'shaping') that is, by extrusion (expressed as group "A" tiles) or dry-pressing (expressed as group "B" tiles), and by their water absorption level (see 3.9 and Table 1). The groups do not presuppose the usage of the products. The requirements for each product group shall be as given in Annexes A to M.

For the purpose of classification, the test method used to determine water absorption level is the boiling method according to EN ISO 10545-3.

Furthermore, extruded tiles can be classified as "precision" or "natural". The classification is dependent upon the different technical characteristics as listed in Annexes A to F and M.

Traditional terms used for extruded tiles are "split tiles" and "quarry tiles". They commonly indicate double extruded and single extruded tiles, respectively. The term "quarry tiles" only refers to extruded tiles with a water absorption coefficient of a mass fraction not exceeding 6 %.

Tiles can be glazed (GL) or unglazed (UGL). A tile with an engobed surface is regarded as an unglazed tile.

Ceramic tiles in groups AI_a and BI_a can be designated as porcelain tiles (see definition in 3.2).

Table 1 — Classification of ceramic tiles with respect to water absorption and shaping

Shaping	Water absorption (E_b)			
	Group I $E_b \leq 3 \%$	Group II _a $3 \% < E_b \leq 6 \%$	Group II _b $6 \% < E_b \leq 10 \%$	Group III $E_b > 10 \%$
Method A Extruded	Group AI _a $E_b \leq 0,5 \%$ (see Annex M) Group AI _b $0,5 \% < E_b \leq 3 \%$ (see Annex A)	Group AII _{a-1} ^a (see Annex B) Group AII _{a-2} ^a (see Annex C)	Group AII _{b-1} ^a (see Annex D) Group AII _{b-2} ^a (see Annex E)	Group AIII (see Annex F)
Method B Dry-pressed	Group BI _a $E_b \leq 0,5 \%$ (see Annex G) Group BI _b $0,5 \% < E_b \leq 3 \%$ (see Annex H)	Group BII _a (see Annex J)	Group BII _b (see Annex K)	Group BIII ^b (see Annex L)

^a Groups AII_a and AII_b are divided into two parts (Parts 1 and 2) with different product specification. Part 1 covers most of the tiles in the group; Part 2 covers certain specific products, which are manufactured under different names (e.g. terre cuite in France and Belgium, cotto in Italy and baldosin catalán in Spain).

^b Group BIII covers glazed ceramic tiles only. There is a low quantity of dry-pressed unglazed tiles produced with water absorption greater than 10 % that are not covered by this European Standard.

5 Requirements

5.1 General

All ceramic tiles shall comply with the requirements of Annex ZA.

Furthermore, those tiles complying with the requirements in Annexes A to M can be classified as first quality tiles.

5.2 Characteristics

The characteristics of ceramic tiles relevant for different applications shall be as given in Table 2.

Requirements for these characteristics, i.e. for dimensional and surface quality as well as those for physical and chemical properties shall be as given in the specific annex according to the product group (Annexes A to M).

Characteristics given in Table 2 in “plain” text are relevant to all intended uses, while those in “italics” are additionally relevant for specific intended use(s) only. Characteristics, given in “bold” text, are the mandated essential characteristics or the corresponding proxy characteristics (for CE marking, see Annex ZA) and those in “normal” text, the voluntary characteristics (not for CE marking).

Table 2 — Characteristics of ceramic tiles required for different applications

Characteristics ^a		Floorings		Walls		Test method
A)	Dimensions and surface quality	Interior	Exterior	Interior	Exterior	Reference
A.1	Length and width	X	X	X	X	EN ISO 10545-2
A.2	Thickness	X	X	X	X	EN ISO 10545-2
A.3	Straightness of sides (i.e. facial sides) ^b	X	X	X	X	EN ISO 10545-2
A.4	Rectangularity ^b	X	X	X	X	EN ISO 10545-2
A.5	Surface flatness (curvature and warpage)	X	X	X	X	EN ISO 10545-2
A.6	Surface quality	X	X	X	X	EN ISO 10545-2
B)	Physical properties	Interior	Exterior	Interior	Exterior	Reference
B.1	Water absorption	X	X	X	X	EN ISO 10545-3
B.2	Breaking strength	X	X	X	X	EN ISO 10545-4
B.3	<i>Flexural tensile strength or Modulus of rupture</i>	X	X	X	X	EN ISO 10545-4
B.4 a)	<i>Resistance to deep abrasion – unglazed tiles</i>	X	X			EN ISO 10545-6
B.4 b)	<i>Resistance to surface abrasion – glazed tiles</i>	X	X			EN ISO 10545-7
B.5	<i>Linear thermal expansion</i> ^c	X	X	X	X	EN ISO 10545-8
B.6	Resistance to thermal shock ^d	X	X	X	X	EN ISO 10545-9
B.7	<i>Resistance to crazing</i> ^e	X	X	X	X	EN ISO 10545-11
B.8	Freeze-thaw resistance ^f		X		X	EN ISO 10545-12
B.9	Slipperiness ^g	X	X			CEN/TS 16165 ^h
B.10 a)	Bond strength/adhesion ⁱ – <i>cementitious adhesives</i>			X	X	EN 12004:2007+A1:2012, 4.1
B.10 b)	Bond strength/adhesion ⁱ – <i>dispersion adhesives</i>			X	X	EN 12004:2007+A1:2012, 4.2
B.10 c)	Bond strength/adhesion ⁱ – <i>reaction resin</i>			X	X	EN 12004:2007+A1:

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Characteristics ^a		Floorings		Walls		Test method
	adhesives					2012, 4.3
B.11	Moisture expansion ^j	X	X	X	X	EN ISO 10545-10
B.12	Small colour differences ^k	X	X	X	X	EN ISO 10545-16
B.13	Impact resistance ^l	X	X			EN ISO 10545-5
B.14	Reaction to fire ^m	X		X	X	WT
B.15	Tactility ⁿ	X	X			CEN/TS 15209 ^g
C)	Chemical properties	Interior	Exterior	Interior	Exterior	Reference
C.1 a)	Resistance to staining – glazed tiles ^o	X	X	X	X	EN ISO 10545-14
C.1 b)	Resistance to staining – unglazed tiles ^o	X	X	X	X	EN ISO 10545-14
C.2 a)	Resistance to acids and alkalis of low concentration ^p	X	X	X	X	EN ISO 10545-13
C.2 b)	Resistance to acids and alkalis of high concentration ^p	X	X	X	X	EN ISO 10545-13
C.2 c)	Resistance to household cleaning agents and swimming pool chemicals ^p	X	X	X	X	EN ISO 10545-13
C.3 a)	Release of cadmium – glazed tiles ^r	X	X	X	X	EN ISO 10545-15
C.3 b)	Release of lead – glazed tiles ^r	X	X	X	X	EN ISO 10545-15
C.3 c)	Release of other dangerous substances ^q	X	X	X	X	As relevant

^a Requirements for these characteristics are given in Annexes A to M:2016

^b Not applicable for ceramic tiles having curved shapes.
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^c See 0.2.2.

^d For ceramic tiles, whose intended use is subject to localized thermal shock.

^e For glazed ceramic tiles only.

^f For ceramic tiles that are intended to be used where frost may apply.

^g For floorings on pedestrian circulation areas (where required by regulations).

^h Unless a different test method is required by national regulations in the market of the relevant Member State(s) for the intended use, in which case the test method and results shall be declared as given therein.

ⁱ For walls when performing the test with actual ceramic tiles and suitable adhesive(s) only.

^j See 0.2.3.

^k See 0.2.6.

^l See 0.2.1.

^m For ceramic tiles intended to be used for internal floorings and for internal and external walls only.

ⁿ For tactile paving surfaces only i.e. when required for blind or vision impaired persons.

^o See 0.2.5.

^p See 0.2.4.

^q When relevant, see Tables ZA.1.1 and ZA.1.2, note b, for release of other dangerous substances, if any.

^r For glazed ceramic tiles only, when intended to be used on worktops and on wall surfaces where food preparation takes place and food may be in direct contact with the glazed tile surface. As indicative limits, reference could be made to Directive 2005/31/CE.

6 Assessment and verification of constancy of performance (AVCP)

6.1 General

The compliance of ceramic tiles with the requirements of this European Standard and with the performances declared (i.e. classes, levels) by the manufacturer in the DoP shall be demonstrated by:

- determination of product type or group (through type testing);
- factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performance(s).

6.2 Type testing

6.2.1 General

All performances related to characteristics included in this standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives provisions for declaring them without performing tests (e.g. use of previously existing data, CWFT and conventionally accepted performance).

Assessment previously performed in accordance with the provisions of this standard, may be taken into account provided that they were made to the same or a more rigorous test method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

For the purposes of assessment, ceramic tiles may be grouped into families, where it is considered that the results for one or more characteristics from any ceramic tile within the family are representative for that same characteristic for all ceramic tiles within that same family.

NOTE Products may be grouped in different families for different characteristics.

Reference to the assessment method standards should be made to allow the selection of a suitable representative sample.

In addition, type testing shall be performed for the declared characteristics:

- at the beginning of the production of a new or modified ceramic tile (unless a member of the same family), or
- at the beginning of a new or modified manufacturing process (where this may affect the stated properties); or

they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the ceramic tile design, in the raw material or in the supplier of the components, or in the method of production (subject to the definition of a family), which would affect significantly one or more of the characteristics.

Where components are used whose characteristics have already been determined, by the component manufacturer, on the basis of assessment methods of other product standards, these characteristics need not be re-assessed. The specifications of these components shall be documented.

Products bearing regulatory marking in accordance with Annex ZA of this harmonized standard may be presumed to have the performances declared in the DoP, although this does not replace the responsibility on the ceramic tile manufacturer to ensure that the ceramic tile as a whole is correctly manufactured.