BS EN 14411:2016

BSI Standards Publication

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

bsi.

National foreword

This British Standard is the UK implementation of EN 14411:2016. It supersedes BS EN 14411:2012 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/539, Ceramic tiles and other rigid tiling.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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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

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COMITÉ EUROPÉEN DE NORMALISATION
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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of an identical text or by endorsement, at the latest by January 2017, and conflicting national standards shall be withdrawn at the latest by April 2018.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.

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 cm^2) 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

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.

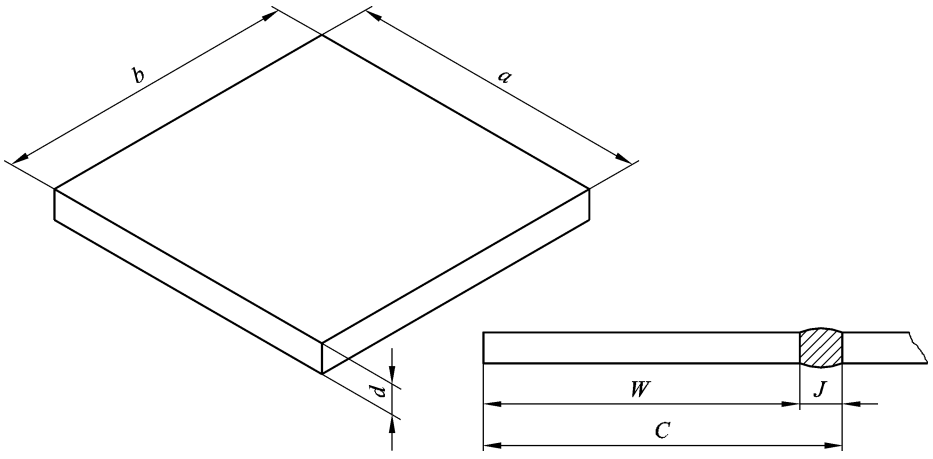
Note 2 to entry: Dry-pressed tiles may be made with other spacer lug systems and, in such cases, the manufacturer's work size applies.

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

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.

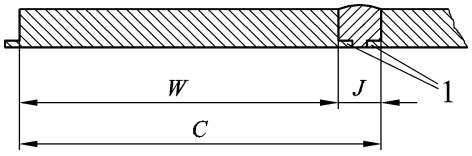


Key

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 mm^2

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 $AII_{a\text{-}1}$ [a] (see Annex B) Group $AII_{a\text{-}2}$ [a] (see Annex C)	Group $AII_{b\text{-}1}$ [a] (see Annex D) Group $AII_{b\text{-}2}$ [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	*Flexural tensile strength or Modulus of rupture*	*X*	*X*	*X*	*X*	EN ISO 10545-4
B.4 a)	*Resistance to deep abrasion – unglazed tiles*	*X*	*X*			EN ISO 10545-6
B.4 b)	*Resistance to surface abrasion – glazed tiles*	*X*	*X*			EN ISO 10545-7
B.5	*Linear thermal expansion* [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	*Resistance to crazing* [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] ***– cementitious adhesives***			***X***	***X***	EN 12004:2007+A1: 2012, 4.1
B.10 b)	***Bond strength/adhesion*** [i] ***– dispersion adhesives***			***X***	***X***	EN 12004:2007+A1: 2012, 4.2
B.10 c)	***Bond strength/adhesion*** [i] ***– reaction resin***			***X***	***X***	EN 12004:2007+A1:

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.

b Not applicable for ceramic tiles having curved shapes.

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.

6.2.2 Test samples, testing and compliance criteria

The sampling and basis for acceptance shall be in accordance with EN ISO 10545-1. For the characteristics of bond strength and tactility, refer to the relevant standard, that is, EN 12004 for bond strength and CEN/TS 15209 for tactility.

6.2.3 Test reports

The results of the determination of the product group shall be documented in test reports. All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of the ceramic tile to which they relate.

6.2.4 Shared other party results

A manufacturer may use the results of the product type determination obtained by someone else (e.g. by another ceramic tile manufacturer, as a common service to manufacturers, or by a product developer), to justify his own declaration of performance regarding a ceramic tile that is manufactured according to the same design (e.g. dimensions) and with raw materials, constituents and manufacturing methods of the same kind, provided that:

— the results are known to be valid for ceramic tiles with the same essential characteristics relevant for the product performance;

— in addition to any information essential for confirming that the product has such same performances related to specific essential characteristics, the other party who has carried out the determination of the product type concerned or has had it carried out, has expressly accepted (by license, contract, or any other type of written consent) to transmit to the manufacturer the results and the test report to be used for the latter's product type determination, as well as information regarding production facilities and the production control process that can be taken into account for FPC;

— the manufacturer using other party results accepts to remain responsible for the product having the declared performances and he also:

— ensures that the product has the same characteristics relevant for performance as the one that has been subjected to the determination of the product type, and that there are no significant differences with regard to production facilities and the production control process compared to that used for the product that was subjected to the determination of the product type; and

— keeps available a copy of the determination of the product type report that also contains the information needed for verifying that the product is manufactured according to the same design and with raw materials, constituents and manufacturing methods of the same kind.

6.3 Factory production control (FPC)

6.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that the ceramic tiles placed on the market comply with the declared performances of their characteristics.

The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the ceramic tiles.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures.

This factory production control system documentation shall ensure a common understanding of the evaluation of the constancy of performance and enable the achievement of the required ceramic tile performances and the effective operation of the production control system to be checked. Factory production control therefore brings together operational techniques and all measures allowing maintenance and control of the compliance of the product with the declared performances of the essential characteristics.

In case the manufacturer has used shared product type results, the FPC shall also include the appropriate documentation as foreseen in 6.2.4.

6.3.2 Requirements

6.3.2.1 General

The manufacturer is responsible for organizing the effective implementation of the FPC system in line with the content of this product standard. Tasks and responsibilities in the production control organization shall be documented and this documentation shall be kept up-to-date.

The responsibility, authority and the relationship between personnel that manages, performs or verifies work affecting product constancy, shall be defined. This applies in particular to personnel that need to initiate actions preventing product non-constancies from occurring, actions in case of non-constancies and to identify and register product constancy problems.

Personnel performing work affecting the constancy of performance of the ceramic tile shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

In each factory the manufacturer may delegate the action to a person having the necessary authority to:

— identify procedures to demonstrate constancy of performance of the ceramic tile at appropriate stages;

— identify and record any instance of non-constancy;

— identify procedures to correct instances of non-constancy.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process. The FPC system should achieve an appropriate level of confidence in the constancy of performance of the product. This involves:

a) the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the technical specification to which reference is made;

b) the effective implementation of these procedures and instructions;

c) the recording of these operations and their results;

d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of non-constancy of performance.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfil his responsibilities according to this European standard.

If the manufacturer has part of the ceramic tile designed, manufactured, assembled, packed, processed and/or labelled by subcontracting, the FPC of the subcontractor may be taken into account, where appropriate for the product in question.

The manufacturer who subcontracts all of his activities may in no circumstances pass the above responsibilities on to a subcontractor.

NOTE Manufacturers having an FPC system, which complies with EN ISO 9001 standard and which addresses the provisions of the present European standard are considered as satisfying the FPC requirements of the Regulation (EU) No 305/2011.

6.3.2.2 Equipment

6.3.2.2.1 Testing

All weighing, measuring and testing equipment shall be calibrated and regularly inspected according to documented procedures, frequencies and criteria.

6.3.2.2.2 Manufacturing

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer's written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

6.3.2.3 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their compliance. In case supplied kit components are used, the constancy of performance system of the component shall be that given in the appropriate harmonized technical specification for that component.

6.3.2.4 Controls during manufacturing process

The manufacturer shall plan and carry out production under controlled conditions.

6.3.2.5 Product testing and evaluation

The manufacturer shall carry out all final inspection and testing in accordance with the quality control plan or documented procedures to complete the evidence of compliance of the ceramic tiles to the specified requirements and to ensure that the stated values of the declared characteristics are maintained.

For the given characteristics, the tests shall be carried out with the minimum frequency as given in Table 3. For all remaining characteristics listed in Table 2, the minimum frequencies of testing shall be defined in the manufacturer's quality control plan taking into account the production organization.

Nevertheless, each of these characteristics should be controlled more often, if possible, and with the appropriate parameter(s) related to such characteristics (e.g. composition), according to relevant direct or indirect test or assessment method(s). All these should be specified in the manufacturer's quality control plan.

Indirect testing or the use of test methods different from those used for type testing is allowed, if a relationship correlation between the result of the FPC test method and that of the type test method (e.g. controls carried out on the production line) is established, which ensures the compliance of the ceramic tiles to the specified requirements.

Whenever practicable, the repetition of tests on the same ceramic tiles within one family shall be avoided, in order to check as many different tiles as possible among the ones manufactured during the control period.

Table 3 — Test methods and minimum frequency of FPC testing for ceramic tiles

Characteristic	**Test method**	**Requirements** a	**Minimum frequency**
Breaking strength [c]	EN ISO 10545-4	B.2	Once a month
Resistance to thermal shock [b]	EN ISO 10545-9	B.6	Once a year
Freeze–thaw resistance [b]	EN ISO 10545-12	B.8	Once a year
Slipperiness [d]	CEN/TS 16165 [e]	B.9	Once a year [f]
Tactility [d]	CEN/TS 15209 [e]	B.15	Once a year [g]
Bond strength/adhesion [b], for:			
a) cementitious adhesives b) dispersion adhesives c) reaction resin adhesives	EN 12004	B.10 a) B.10 b) B.10 c)	Once per product group
Reaction to fire	–	B.14	–
Release of other dangerous substances [d] of:			
- Lead and Cadmium	EN ISO 10545–15	C.3 a), b)	Once a year

a For reference to the requirement see relevant Tables A.1 to M.1

b Testing for a product group.

c Testing for a family in a group of products (group of absorption, dimensions and thickness).

d Testing for a family in a group of products (finish surface characteristics, same composition and properties).

e 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 (as long as a consolidated European test method is not available).

f For floorings on pedestrian circulation areas (where required by regulation).

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

6.3.2.6 Non-complying products

The manufacturer shall have written procedures which specify how non-complying products shall be dealt with. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the manufacturer's written procedures.

Where the ceramic tile fails to satisfy the acceptance criteria, the provisions for non-complying products shall apply, the necessary corrective action(s) shall immediately be taken and the ceramic tile or batches not complying shall be isolated and properly identified.

Once the fault has been corrected, the test or verification in question shall be repeated.

The results of controls and tests shall be properly recorded. The product description, date of manufacture, test method adopted, test results and acceptance criteria shall be entered in the records under the signature of the person responsible for the control/test.

With regard to any control result not meeting the requirements of this European standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, and throwing away or putting right of product) shall be indicated in the records.

6.3.2.7 Corrective action

The manufacturer shall have documented procedures that instigate action to eliminate the cause of non-conformities in order to prevent recurrence.

6.3.2.8 Handling, storage and packaging

The manufacturer shall have procedures providing methods of product handling and shall provide suitable storage areas preventing damage or deterioration.

6.3.3 Product specific requirements

The FPC system shall address this European Standard and ensure that the products placed on the market comply with the declaration of performance.

The FPC system shall include a product specific FPC, which identifies procedures to demonstrate compliance of the product at appropriate stages, i.e.:

a) the controls and tests to be carried out prior to and/or during manufacture according to a frequency laid down in the FPC test plan,

and/or

b) the verifications and tests to be carried out on finished products according to a frequency laid down in the FPC test plan.

If the manufacturer uses only finished products, the operations under b) shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) may be reduced and partly replaced by operations under a). Generally, the more parts of the production that are carried out by the manufacturer, the more operations under b) may be replaced by operations under a).

In any case the operation shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

NOTE Depending on the specific case, it can be necessary to carry out the operations referred to under a) and b), only the operations under a) or only those under b).

The operations under a) refer to the intermediate states of the product as on manufacturing machines and their adjustment, and measuring equipment etc. These controls and tests and their frequency shall be chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters etc.

The manufacturer shall establish and maintain records that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years.

6.3.4 Procedure for modifications

If modifications are made to the ceramic tiles, production process or FPC system that could affect any of the ceramic tile characteristics declared according to this standard, then all the characteristics for which the manufacturer declares performance, which may be affected by the modification, shall be subject to the determination of the product type, as described in 6.2.

Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects, which may be affected by the modification.

All assessments and their results shall be documented in a report.

6.3.5 One-off products, pre-production products (e.g. prototypes) and products produced in very low quantity

The ceramic tiles produced as a one-off, prototypes assessed before full production is established, and products produced in very low quantities shall be assessed as follows.

For type assessment, the provisions of 6.2.1, 3rd paragraph apply, together with the following additional provisions:

— in case of prototypes, the test samples shall be representative of the intended future production and shall be selected by the manufacturer;

— on request of the manufacturer, the results of the assessment of prototype samples may be included in a certificate or in test reports issued by the involved third party.

The FPC system of one-off products and products produced in very low quantities shall ensure that raw materials and/or components are sufficient for production of the product. The provisions on raw materials and/or components shall apply only where appropriate. The manufacturer shall maintain records allowing traceability of the product.

Once series production is fully established, the provisions of 6.3 shall apply.

7 Designation

Where required, the symbols, specified in Annex P, may be used for indication of the intended use of ceramic tiles as well as for the expressions of the names and/or performances of some of their characteristics.

8 Marking

Each ceramic tile covered by this European Standard shall bear on its reverse side or edge, the indication of the country where the tile was manufactured, except for mosaics where this is not possible due to their small size.

Furthermore, each packaging of ceramic tiles shall bear the following marking information:

a) manufacturer's mark and/or trademark and indication of the country where the tile was manufactured, that is, the country where the tile was first fired;

b) indication of quality designation, when relevant (see 5.1);

c) reference to the appropriate annex of this European Standard, i.e. EN 14411, and classification ("Precision" or "Natural"), where applicable;

d) nominal and work sizes;

e) nature of the surface, i.e. glazed (GL) or unglazed (UGL);

f) surface treatment applied after firing, if any;

g) maximum total dry weight of a packaging of ceramic tiles.

EXAMPLE 1 Ceramic tile of 1st quality EN 14411, Annex A, Precision

25 cm × 12,5 cm (W 240 mm × 115 mm × 10 mm) GL

Polished, Max. dry weight: … kg

EXAMPLE 2 Ceramic tile of the 1st quality EN 14411, Annex A, Natural

15 cm × 15 cm (W 150 mm × 150 mm × 12 mm) UGL

Max. dry weight: … kg

Where regulatory marking provisions require information on some or all items listed in this clause, the provisions of this clause concerning those common items are deemed to be met and the information needs not be repeated for the purpose of this clause.

Annex A
(normative)

Requirements for extruded ceramic tiles of Group AI_b (0,5 % < E_b ≤ 3 %)

Requirements for dimensions and surface quality and for physical and chemical properties of this group of ceramic tiles shall be in accordance with Table A.1.

Table A.1 — Requirements for extruded ceramic tiles, Group AI_b, (0,5 % < E_b ≤ 3 %)

Characteristics	Requirements for		Test method
	Precision	Natural	
A) DIMENSIONS AND SURFACE QUALITY			
A.1 Length and width			
The work size shall be chosen as follows for:			
a) modular tiles:	in order to allow a nominal joint width of between 3 and 11 mm [a]		–
b) non-modular tiles:	so that the difference between the work size and the nominal size is not more than ±3 mm		–
The permissible deviation, of the average size for each tile (2 or 4 sides) from the work size (*W*)	±1,0 % to a maximum of ± 2 mm	±2,0 % to a maximum of ± 4 mm	EN ISO 10545-2
The permissible deviation of the average size for each tile (2 or 4 sides) from the average size of 10 test specimens (20 or 40 sides)	±1,0 %	±1,5 %	EN ISO 10545-2
A.2 Thickness			
a) The thickness shall be specified	Declared thickness		–
b) The permissible deviation, of the average thickness of each tile from the work size thickness	±10 %	±10 %	EN ISO 10545-2
A.3 Straightness of sides [b] (facial sides)			
The maximum permissible deviation from straightness, related to the corresponding work sizes.	±0,5 %	±0,6 %	EN ISO 10545-2
A.4 Rectangularity [b]			
The maximum permissible deviation from rectangularity, related to the corresponding work sizes	±1,0 %	±1,0 %	EN ISO 10545-2

Characteristics	Requirements for		Test method
	Precision	Natural	
A.5 Surface flatness			
The maximum permissible deviation from flatness:			
a) centre curvature, related to diagonal calculated from the work sizes	±0,5 %	±1,5 %	EN ISO 10545-2
b) edge curvature, related to the corresponding work sizes	±0,5 %	±1,5 %	EN ISO 10545-2
c) warpage related to diagonal calculated from the work sizes	±0,8 %	±1,5 %	EN ISO 10545-2
A.6 Surface quality [c]	A minimum of 95 % of the tiles shall be free from visible defects that would impair the appearance of a major area of tiles		EN ISO 10545-2
B) PHYSICAL PROPERTIES			
B.1 Water absorption (% by mass)	**0,5 % < E_b ≤ 3,0 %** Individual max. 3,3 %	**0,5 % < E_b ≤ 3,0 %** Individual max. 3,3 %	EN ISO 10545-3
B.2 Breaking strength, for:			
a) Thickness ≥ 7,5 mm	Not less than 1 100 N	Not less than 1 100 N	EN ISO 10545-4
b) Thickness < 7,5 mm	Not less than 600 N	Not less than 600 N	EN ISO 10545-4
B.3 Flexural tensile strength or modulus of rupture [d]	Average minimum 23 N/mm² Individual minimum 18 N/mm²	Average minimum 23 N/mm² Individual minimum 18 N/mm²	EN ISO 10545-4
B.4 Abrasion resistance, as:			
a) Resistance to deep abrasion of unglazed tiles: removed volume	Maximum 275 mm³	Maximum 275 mm³	EN ISO 10545-6
b) Resistance to surface abrasion of glazed tiles intended for use on floors [e]	Abrasion class and cycles passed	Abrasion class and cycles passed	EN ISO 10545-7
B.5 Coefficient of linear thermal expansion:			
– from ambient temperature to 100 °C	Declared value [f]	Declared value [f]	EN ISO 10545-8
B.6 Thermal shock resistance	Pass according to EN ISO 10545-1 [g]		EN ISO 10545-9
B.7 Crazing resistance: glazed tiles [h]	Pass according to EN ISO 10545-1 [g]		EN ISO 10545-11 [h]
B.8 Frost resistance	Pass according to EN ISO 10545-1 [g]		EN ISO 10545-12
B.9 Slipperiness	Declared value(s) g		CEN/TS 16165 [i]

Characteristics	Requirements for		Test method
	Precision	Natural	
B.10 Bond strength/adhesion [j], for:			
a) cementitious adhesives [k]	Declared value(s)		EN 12004:2007 +A1:2012, 4.1 [l]
b) dispersion adhesives [k]	Declared value(s)		EN 12004:2007 +A1:2012, 4.2 [l]
c) reaction resin adhesives [k]	Declared value(s)		EN 12004:2007 +A1:2012, 4.3 [l]
B.11 Moisture expansion (in mm/m)	Declared value [f]		EN ISO 10545-10
B.12 Small colour differences [f] for:			
a) Glazed tiles	$\Delta E_{cmc} < 0{,}75$		EN ISO 10545-16
b) Unglazed tiles	$\Delta E_{cmc} < 1{,}0$		EN ISO 10545-16
B.13 Impact resistance, as:			
– Coefficient of restitution (COR)	Declared value [f]		EN ISO 10545-5
B.14 Reaction to fire	(Class A1 or $A1_{FL}$) [m]		–
B.15 Tactility [n]	Declare surface description [g]		CEN/TS 15209 [i]
C) CHEMICAL PROPERTIES			
C.1 Resistance to staining, for:			
a) Glazed tiles	Minimum Class 3	Minimum Class 3	EN ISO 10545-14
b) Unglazed tiles	Declared value [f]		EN ISO 10545-14
C.2 Resistance to chemicals:			
a) Resistance to low concentrations of acids and alkalis	Declared value [f]		EN ISO 10545-13
b) Resistance to high concentrations of acids and alkalis	Declared value [f]		EN ISO 10545-13
c) Resistance to household chemicals and swimming pool salts	Minimum class B	Minimum class B	EN ISO 10545-13
C.3 Release of dangerous substances			
a) Cadmium (in mg/dm^2)	Declared value [g]		EN ISO 10545-15
b) Lead (in mg/dm^2)	Declared value [g]		EN ISO 10545-15
c) other dangerous substances [o]	Declared value		As relevant

Characteristics	Requirements for		Test method
	Precision	Natural	

[a] Similar joint widths may be used to apply to traditional systems based on non-metric sizes.

[b] Not applicable for tiles having curved shapes.

[c] Because of firing, slight variations from the standard colour are unavoidable. This does not apply to intentional irregularities of colour variation of the face of tiles (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area which is characteristic of the given tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect.

[d] Not applicable to ceramic tiles with breaking strength > 3 000 N.

[e] Where required, the abrasion class resistance according to Annex N may be declared.

[f] See Annex O Additional information on applicability.

[g] See Table 2 for uses where it is applicable.

[h] Certain decorative effects may have a tendency to craze. They are to be identified by the manufacturer, in which case the crazing test given in EN ISO 10545-11 is not applicable.

[i] 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 (as long as a consolidated European test method is not available).

[j] For intended uses subject to requirements against accidental fall of objects on to transit areas only. Tests are to be performed using the actual tiles and suitable adhesive.

[k] For the types of adhesives, defined in EN 12004:2007+A1:2012 only.

[l] The proposed test methods are intended to determine the adhesion strength of adhesive and have not been developed to determine ceramic tile characteristics. Thus, there might be no correlation between the declared bond strength and the performance of the tile in use (other factors like proper installation techniques and type of background support will influence the final performance).

[m] Ceramic, as a homogeneously distributed material used for ceramic tiles, is considered a material of known and stable performance with respect to the reaction to fire performance as it does not consist of any organic material. As such, it does not contribute to the fire and it may be considered without the need for testing (CWT) as the Class A1 material [1)] The reaction to fire performance of ceramic tiles may also be classified also as Class A1 according to EN 13501–1.

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

[o] When relevant, see Tables ZA.1.1 and ZA.1.2, note b, for the performance of the product concerning this characteristic, if any to be declared.

1) Commission Decision 96/603/EC, as amended (see Bibliography, [1]).

Annex B
(normative)

Requirements for extruded ceramic tiles of Group AII_{a-1} (3 % < E_b ≤ 6 %)

Requirements for dimensions and surface quality and for physical and chemical properties of this group of ceramic tiles shall be in accordance with Table B.1.

Table B.1 — Requirements for extruded ceramic tiles, Group AII_{a-1}, (3 % < E_b ≤ 6 %)

Characteristics	Requirements for		Test method
	Precision	Natural	
A) DIMENSIONS AND SURFACE QUALITY			
A.1 Length and width			
The work size shall be chosen as follows for:			
a) modular tiles:	in order to allow a nominal joint width of between 3 and 11 mm [a]		–
b) non-modular tiles:	so that the difference between the work size and the nominal size is not more than ±3 mm		–
The permissible deviation, of the average size for each tile (2 or 4 sides) from the work size (*W*)	±1,25 % to a maximum of ± 2 mm	±2,0 % to a maximum of ± 4 mm	EN ISO 10545-2
The permissible deviation of the average size for each tile (2 or 4 sides) from the average size of 10 test specimens (20 or 40 sides)	±1,0 %	±1,5 %	EN ISO 10545-2
A.2 Thickness			
a) The thickness shall be specified	Declared thickness		–
b) The permissible deviation, of the average thickness of each tile from the work size thickness	±10 %	±10 %	EN ISO 10545-2
A.3 Straightness of sides [b] (facial sides)			
The permissible maximum deviation from straightness, related to the corresponding work sizes	±0,5 %	±0,6 %	EN ISO 10545-2
A.4 Rectangularity [b]			
The maximum permissible deviation from rectangularity, related to the corresponding work sizes	±1,0 %	±1,0 %	EN ISO 10545-2

Characteristics	Requirements for		Test method
	Precision	Natural	
A.5 Surface flatness			
The maximum permissible deviation from flatness:			
a) centre curvature, related to diagonal calculated from the work sizes	±0,5 %	±1,5 %	EN ISO 10545-2
b) edge curvature, related to the corresponding work sizes	±0,5 %	±1,5 %	EN ISO 10545-2
c) warpage related to diagonal calculated from the work sizes	±0,8 %	±1,5 %	EN ISO 10545-2
A.6 Surface quality [c]	A minimum of 95 % of the tiles shall be free from visible defects that would impair the appearance of a major area of tiles		EN ISO 10545-2
B) PHYSICAL PROPERTIES			
B.1 Water absorption (% by mass)	**3 % < E_b ≤ 6 %** Individual max 6,5 %	**3 % < E_b ≤ 6 %** Individual max 6,5 %	EN ISO 10545-3
B.2 Breaking strength, for:			
a) Thickness ≥ 7,5 mm	Not less than 950 N	Not less than 950 N	EN ISO 10545-4
b) Thickness < 7,5 mm	Not less than 600 N	Not less than 600 N	EN ISO 10545-4
B.3 Flexural tensile strength or modulus of rupture [d]	Average minimum 20 N/mm² Individual minimum 18 N/mm²	Average minimum 20 N/mm² Individual minimum 18 N/mm²	EN ISO 10545-4
B.4 Abrasion resistance, as:			
a) Resistance to deep abrasion of unglazed tiles: removed volume	Maximum 393 mm³	Maximum 393 mm³	EN ISO 10545-6
b) Resistance to surface abrasion of glazed tiles intended for use on floors [e]	Abrasion class and cycles passed	Abrasion class and cycles passed	EN ISO 10545-7
B.5 Coefficient of linear thermal expansion:			
– from ambient temperature to 100 °C	Declared value [f]	Declared value [f]	EN ISO 10545-8
B.6 Thermal shock resistance	Pass according to EN ISO 10545-1 [g]		EN ISO 10545-9
B.7 Crazing resistance: glazed tiles [h]	Pass according to EN ISO 10545-1 [g]		EN ISO 10545-11 [h]
B.8 Frost resistance	Declared value [g]		EN ISO 10545-12
B.9 Slipperiness	Declared value(s) [g]		CEN/TS 16165 [i]

Characteristics	Requirements for		Test method
	Precision	Natural	
B.10 Bond strength/adhesion [j], for:			
a) cementitious adhesives [k]	Declared value(s)		EN 12004:2007+A 1:2012, 4.1 [l]
b) dispersion adhesives [k]	Declared value(s)		EN 12004:2007+A 1:2012, 4.2 [l]
c) reaction resin adhesives [k]	Declared value(s)		EN 12004:2007+A 1:2012, 4.3 [l]
B.11 Moisture expansion (in mm/m)	Declared value [f]		EN ISO 10545-10
B.12 Small colour differences [f] for:			
a) Glazed tiles	$\Delta E_{cmc} < 0,75$		EN ISO 10545-16
b) Unglazed tiles	$\Delta E_{cmc} < 1,0$		EN ISO 10545-16
B.13 Impact resistance, as:			
– Coefficient of restitution (COR)	Declared value [f]		EN ISO 10545-5
B.14 Reaction to fire	(Class A1 or $A1_{FL}$) [m]		–
B.15 Tactility [n]	Declare surface description [g]		CEN/TS 15209 [i]
C) CHEMICAL PROPERTIES			
C.1 Resistance to staining, for:			
a) Glazed tiles	Minimum Class 3	Minimum Class 3	EN ISO 10545-14
b) Unglazed tiles	Declared value [f]		EN ISO 10545-14
C.2 Resistance to chemicals:			
a) Resistance to low concentrations of acids and alkalis	Declared value [f]		EN ISO 10545-13
b) Resistance to high concentrations of acids and alkalis	Declared value [f]		EN ISO 10545-13
c) Resistance to household chemicals and swimming pool salts	Minimum class B	Minimum class B	EN ISO 10545-13
C.3 Release of dangerous substances			
a) Cadmium (in mg/dm^2)	Declared value [g]		EN ISO 10545-15
b) Lead (in mg/dm2)	Declared value [g]		EN ISO 10545-15
c) other dangerous substances [o]	Declared value		As relevant

Characteristics	Requirements for		Test method
	Precision	Natural	

[a] Similar joint widths may be used to apply to traditional systems based on non-metric sizes.

[b] Not applicable for tiles having curved shapes.

[c] Because of firing, slight variations from the standard colour are unavoidable. This does not apply to intentional irregularities of colour variation of the face of tiles (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area which is characteristic of the given tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect.

[d] Not applicable to ceramic tiles with breaking strength > 3 000 N.

[e] Where required, the abrasion class resistance according to Annex N may be declared.

[f] See Annex O Additional information on applicability.

[g] See Table 2 for uses where it is applicable.

[h] Certain decorative effects may have a tendency to craze. They are to be identified by the manufacturer, in which case the crazing test given in EN ISO 10545-11 is not applicable.

[i] 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 (as long as a consolidated European test method is not available).

[j] For intended uses subject to requirements against accidental fall of objects on to transit areas only. Tests are to be performed using the actual tiles and suitable adhesive.

[k] For the types of adhesives, defined in EN 12004:2007+A1:2012 only.

[l] The proposed test methods are intended to determine the adhesion strength of adhesive and have not been developed to determine ceramic tile characteristics. Thus, there might be no correlation between the declared bond strength and the performance of the tile in use (other factors like proper installation techniques and type of background support will influence the final performance).

[m] Ceramic, as a homogeneously distributed material used for ceramic tiles, is considered as material of known and stable performance with respect to the reaction to fire performance as it does not consist of any organic material. As such, it does not contribute to the fire and it may be considered without the need for testing (CWT) as the Class A1 material [2)]. The reaction to fire performance of ceramic tiles may also be classified also as Class A1 according to EN 13501–1.

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

[o] When relevant, see Tables ZA.1.1 and ZA.1.2, note b, for the performance of the product concerning this characteristic, if any to be declared.

2) Commission Decision 96/603/EC, as amended (see Bibliography, [1]).

Annex C
(normative)

Requirements for extruded ceramic tiles of Group AII_{a-2} (3 % < E_b ≤ 6 %)

Requirements for dimensions and surface quality and for physical and chemical properties of this group of ceramic tiles shall be in accordance with Table C.1.

Table C.1 — Requirements for extruded ceramic tiles, Group AII_{a-2}, (3 % < E_b ≤ 6 %)

Characteristics	Requirements for		Test method
	Precision	Natural	
A) DIMENSIONS AND SURFACE QUALITY			
A.1 Length and width			
The work size shall be chosen as follows for:			
a) modular tiles:	in order to allow a nominal joint width of between 3 and 11 mm [a]		–
b) non-modular tiles:	so that the difference between the work size and the nominal size is not more than ±3 mm		–
The permissible deviation, of the average size for each tile (2 or 4 sides) from the work size (*W*)	±1,5 % to a maximum of ± 2 mm	±2,0 % to a maximum of ± 4 mm	EN ISO 10545-2
The permissible deviation of the average size for each tile (2 or 4 sides) from the average size of 10 test specimens (20 or 40 sides)	±1,5 %	±1,5 %	EN ISO 10545-2
A.2 Thickness			
a) The thickness shall be specified	Declared thickness		–
b) The permissible deviation, of the average thickness of each tile from the work size thickness	±10 %	±10 %	EN ISO 10545-2
A.3 Straightness of sides [b] (facial sides)			
The maximum permissible deviation from straightness, related to the corresponding work sizes	±1,0 %	±1,0 %	EN ISO 10545-2
A.4 Rectangularity [b]			
The maximum permissible deviation from rectangularity, related to the corresponding work sizes	±1,0 %	±1,0 %	EN ISO 10545-2

Characteristics	Requirements for		Test method
	Precision	Natural	
A.5 Surface flatness			
The maximum permissible deviation from flatness:			
a) centre curvature, related to diagonal calculated from the work sizes	±1,0 %	±1,5 %	EN ISO 10545-2
b) edge curvature, related to the corresponding work sizes	±1,0 %	±1,5 %	EN ISO 10545-2
c) warpage related to diagonal calculated from the work sizes	±1,5 %	±1,5 %	EN ISO 10545-2
A.6 Surface quality [c]	A minimum of 95 % of the tiles shall be free from visible defects that would impair the appearance of a major area of tiles		EN ISO 10545-2
B) PHYSICAL PROPERTIES			
B.1 Water absorption (% by mass)	**3 % < E_b ≤ 6 %** Individual maximum 6,5 %	**3 % < E_b ≤ 6 %** Individual maximum 6,5 %	EN ISO 10545-3
B.2 Breaking strength, for:			
a) Thickness ≥ 7,5 mm	Not less than 800 N	Not less than 800 N	EN ISO 10545-4
b) Thickness < 7,5 mm	Not less than 600 N	Not less than 600 N	EN ISO 10545-4
B.3 Flexural tensile strength or modulus of rupture [d]	Average minimum 13 N/mm² Individual minimum 11 N/mm²	Average minimum 13 N/mm² Individual minimum 11 N/mm²	EN ISO 10545-4
B.4 Abrasion resistance, as:			
a) Resistance to deep abrasion of unglazed tiles: removed volume	Maximum 541 mm³	Maximum 541 mm³	EN ISO 10545-6
b) Resistance to surface abrasion of glazed tiles intended for use on floors [e]	Abrasion class and cycles passed	Abrasion class and cycles passed	EN ISO 10545-7
B.5 Coefficient of linear thermal expansion:			
– from ambient temperature to 100 °C	Declared value [f]	Declared value [f]	EN ISO 10545-8
B.6 Thermal shock resistance	Pass according to EN ISO 10545-1 [g]		EN ISO 10545-9
B.7 Crazing resistance: glazed tiles [h]	Pass according to EN ISO 10545-1 [g]		EN ISO 10545-11 [h]
B.8 Frost resistance	Declared value [g]		EN ISO 10545-12
B.9 Slipperiness	Declared value(s) [g]		CEN/TS 16165 [i]

Characteristics	Requirements for		Test method
	Precision	Natural	
B.10 Bond strength/adhesion [j], for:			
a) cementitious adhesives [k]	Declared value(s)		EN 12004:2007+ A1:2012, 4.1 [l]
b) dispersion adhesives [k]	Declared value(s)		EN 12004:2007+ A1:2012, 4.2 [l]
c) reaction resin adhesives [k]	Declared value(s)		EN 12004:2007+ A1:2012, 4.3 [l]
B.11 Moisture expansion (in mm/m)	Declared value [f]		EN ISO 10545-10
B.12 Small colour differences [f] for:			
a) Glazed tiles	$\Delta E_{cmc} < 0,75$		EN ISO 10545-16
b) Unglazed tiles	$\Delta E_{cmc} < 1,0$		EN ISO 10545-16
B.13 Impact resistance, as:			
– Coefficient of restitution (COR)	Declared value [f]		EN ISO 10545-5
B.14 Reaction to fire	(Class A1 or $A1_{FL}$) [m]		–
B.15 Tactility [n]	Declare surface description [g]		CEN/TS 15209 [i]
C) CHEMICAL PROPERTIES			
C.1 Resistance to staining, for:			
a) Glazed tiles	Minimum Class 3	Minimum Class 3	EN ISO 10545-14
b) Unglazed tiles	Declared value [f]		EN ISO 10545-14
C.2 Resistance to chemicals:			
a) Resistance to low concentrations of acids and alkalis	Declared value [f]		EN ISO 10545-13
b) Resistance to high concentrations of acids and alkalis	Declared value [f]		EN ISO 10545-13
c) Resistance to household chemicals and swimming pool salts	Minimum class B	Minimum class B	EN ISO 10545-13

Characteristics	Requirements for		Test method
	Precision	Natural	
C.3 Release of dangerous substances			
a) Cadmium (in mg/dm^2)	Declared value [g]		EN ISO 10545-15
b) Lead (in mg/dm^2)	Declared value [g]		EN ISO 10545-15
c) other dangerous substances [o]	Declared value		As relevant

[a] Similar joint widths may be used to apply to traditional systems based on non-metric sizes.

[b] Not applicable for tiles having curved shapes.

[c] Because of firing, slight variations from the standard colour are unavoidable. This does not apply to intentional irregularities of colour variation of the face of tiles (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area which is characteristic of the given tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect.

[d] Not applicable to ceramic tiles with breaking strength > 3 000 N.

[e] Where required, the abrasion class resistance according to Annex N may be declared.

[f] See Annex O Additional information on applicability.

[g] See Table 2 for uses where it is applicable.

[h] Certain decorative effects may have a tendency to craze. They are to be identified by the manufacturer, in which case the crazing test given in EN ISO 10545-11 is not applicable.

[i] 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 (as long as a consolidated European test method is not available).

[j] For intended uses subject to requirements against accidental fall of objects on to transit areas only. Tests are to be performed using the actual tiles and suitable adhesive.

[k] For the types of adhesives, defined in EN 12004:2007+A1:2012 only.

[l] The proposed test methods are intended to determine the adhesion strength of adhesive and have not been developed to determine ceramic tile characteristics. Thus, there might be no correlation between the declared bond strength and the performance of the tile in use (other factors like proper installation techniques and type of background support will influence the final performance).

[m] Ceramic, as a homogeneously distributed material used for ceramic tiles, is considered as material of known and stable performance with respect to the reaction to fire performance as it does not consist of any organic material. As such it does not contribute to the fire and it may be considered without the need for testing (CWT) as the Class A1 material [3)]. The reaction to fire performance of ceramic tiles may also be classified also as Class A1 according to EN 13501–1.

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

[o] When relevant, see Tables ZA.1.1 and ZA.1.2, note b, for the performance of the product concerning this characteristic, if any to be declared.

3) Commission Decision 96/603/EC, as amended (see Bibliography, [1]).

Annex D
(normative)

Requirements for extruded ceramic tiles of Group AII_{b-1} (6 % < E_b ≤ 10 %)

Requirements for dimensions and surface quality and for physical and chemical properties of this group of ceramic tiles shall be in accordance with Table D.1.

Table D.1 — Requirements for extruded ceramic tiles, Group AII_{b-1}, 6 % < E_b ≤ 10 %

Characteristics	Requirements for		Test method
	Precision	Natural	
A) DIMENSIONS AND SURFACE QUALITY			
A.1 Length and width			
The work size shall be chosen as follows for:			
a) modular tiles:	in order to allow a nominal joint width of between 3 and 11 mm [a]		–
b) non-modular tiles:	so that the difference between the work size and the nominal size is not more than ±3 mm		–
The permissible deviation, of the average size for each tile (2 or 4 sides) from the work size (*W*)	±2,0 % to a maximum of ± 2 mm	±2,0 % to a maximum of ± 4 mm	EN ISO 10545-2
The permissible deviation of the average size for each tile (2 or 4 sides) from the average size of 10 test specimens (20 or 40 sides)	±1,5 %	±1,5 %	EN ISO 10545-2
A.2 Thickness			
a) The thickness shall be specified	Declared thickness		–
b) The permissible deviation, of the average thickness of each tile from the work size thickness	±10 %	±10 %	EN ISO 10545-2
A.3 Straightness of sides [b] (facial sides)			
The maximum permissible deviation from straightness, related to the corresponding work sizes	±1,0 %	±1,0 %	EN ISO 10545-2

Characteristics	Requirements for		Test method
	Precision	Natural	
A) DIMENSIONS AND SURFACE QUALITY			
A.4 Rectangularity [b]			
The maximum permissible deviation from rectangularity, related to the corresponding work sizes	±1,0 %	±1,0 %	EN ISO 10545-2
A.5 Surface flatness			
The maximum permissible deviation from flatness:			
a) centre curvature, related to diagonal calculated from the work sizes	±1,0 %	±1,5 %	EN ISO 10545-2
b) edge curvature, related to the corresponding work sizes	±1,0 %	±1,5 %	EN ISO 10545-2
c) warpage related to diagonal calculated from the work sizes	±1,5 %	±1,5 %	EN ISO 10545-2
A.6 Surface quality [c]	A minimum of 95 % of the tiles shall be free from visible defects that would impair the appearance of a major area of tiles		EN ISO 10545-2
B) PHYSICAL PROPERTIES			
B.1 Water absorption (% by mass)	**6 % < E_b ≤ 10 %** Individual maximum 11 %	**6 % < E_b ≤ 10 %** Individual maximum 11 %	EN ISO 10545-3
B.2 Breaking strength	Not less than 900 N	Not less than 900 N	EN ISO 10545-4
B.3 Flexural tensile strength or modulus of rupture [d]	Average minimum 17,5 N/mm^2 Individual minimum 15 N/mm^2	Average minimum 17,5 N/mm^2 Individual minimum 15 N/mm^2	EN ISO 10545-4
B.4 Abrasion resistance, as:			
a) Resistance to deep abrasion of unglazed tiles: removed volume	Maximum 649 mm^3	Maximum 649 mm^3	EN ISO 10545-6
b) Resistance to surface abrasion of glazed tiles intended for use on floors [e]	Abrasion class and cycles passed	Abrasion class and cycles passed	EN ISO 10545-7
B.5 Coefficient of linear thermal expansion:			
– from ambient temperature to 100 °C	Declared value [f]	Declared value [f]	EN ISO 10545-8
B.6 Thermal shock resistance	Pass according to EN ISO 10545-1[g]		EN ISO 10545-9

Characteristics	Requirements for		Test method
	Precision	Natural	
B.7 Crazing resistance: glazed tiles [h]	Pass according to EN ISO 10545-1[g]		EN ISO 10545-11 [h]
B.8 Frost resistance	Declared valued [g]		EN ISO 10545-12
B) PHYSICAL PROPERTIES			
B.9 Slipperiness	Declared value(s) [g]		CEN/TS 16165 [i]
B.10 Bond strength/adhesion [j], for:			
a) cementitious adhesives [k]	Declared value(s)		EN 12004:2007+ A1:2012, 4.1 [l]
b) dispersion adhesives [k]	Declared value(s)		EN 12004:2007+ A1:2012, 4.2 [l]
c) reaction resin adhesives [k]	Declared value(s)		EN 12004:2007+ A1:2012, 4.3 [l]
B.11 Moisture expansion (in mm/m)	Declared value [f]		EN ISO 10545-10
B.12 Small colour differences [f] for:			
a) Glazed tiles	$\Delta E_{cmc} < 0{,}75$		EN ISO 10545-16
b) Unglazed tiles	$\Delta E_{cmc} < 1{,}0$		EN ISO 10545-16
B.13 Impact resistance, as:			
– Coefficient of restitution (COR)	Declared value [f]		EN ISO 10545-5
B.14 Reaction to fire	(Class A1 or $A1_{FL}$) [m]		–
B.15 Tactility [n]	Declare surface description [g]		CEN/TS 15209 [i]
C) CHEMICAL PROPERTIES			
C.1 Resistance to staining, for:			
a) Glazed tiles	Minimum Class 3	Minimum Class 3	EN ISO 10545-14
b) Unglazed tiles	Declared value [f]		EN ISO 10545-14
C.2 Resistance to chemicals:			
a) Resistance to low concentrations of acids and alkalis	Declared value [f]		EN ISO 10545-13
b) Resistance to high concentrations of acids and alkalis	Declared value [f]		EN ISO 10545-13
c) Resistance to household chemicals and swimming pool salts	Minimum class B	Minimum class B	EN ISO 10545-13
C.3 Release of dangerous substances			

Characteristics	Requirements for		Test method
	Precision	Natural	
a) Cadmium (in mg/dm^2)	Declared value [g]		EN ISO 10545-15
b) Lead (in mg/dm^2)	Declared value [g]		EN ISO 10545-15
c) other dangerous substances [o]	Declared value		As relevant

[a] Similar joint widths may be used to apply to traditional systems based on non-metric sizes.

[b] Not applicable for tiles having curved shapes.

[c] Because of firing, slight variations from the standard colour are unavoidable. This does not apply to intentional irregularities of colour variation of the face of tiles (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area which is characteristic of the given tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect.

[d] Not applicable to ceramic tiles with breaking strength > 3 000 N.

[e] Where required, the abrasion class resistance according to Annex N may be declared.

[f] See Annex O Additional information on applicability.

[g] See Table 2 for uses where it is applicable.

[h] Certain decorative effects may have a tendency to craze. They are to be identified by the manufacturer, in which case the crazing test given in EN ISO 10545-11 is not applicable.

[i] 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 (as long as a consolidated European test method is not available).

[j] For intended uses subject to requirements against accidental fall of objects on to transit areas only. Tests are to be performed using the actual tiles and suitable adhesive.

[k] For the types of adhesives, defined in EN 12004:2007+A1:2012 only.

[l] The proposed test methods are intended to determine the adhesion strength of adhesive and have not been developed to determine ceramic tile characteristics. Thus, there might be no correlation between the declared bond strength and the performance of the tile in use (other factors like proper installation techniques and type of background support will influence the final performance).

[m] Ceramics, as a homogeneously distributed material used for ceramic tiles, is considered as material of known and stable performance with respect to the reaction to fire performance as it does not consist of any organic material. As such it does not contribute to the fire and it may be considered without the need for testing (CWT) as the Class A1 material [4)]. The reaction to fire performance of ceramic tiles may also be classified also as Class A1 according to EN 13501–1.

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

[o] When relevant, see Tables ZA.1.1 and ZA.1.2, note b, for the performance of the product concerning this characteristic, if any to be declared.

4) Commission Decision 96/603/EC, as amended (see Bibliography, [1]).

Annex E
(normative)

Requirements for extruded ceramic tiles of Group AII$_{b-2}$ (6 % < E_b ≤ 10 %)

Requirements for dimensions and surface quality and for physical and chemical properties of this group of ceramic tiles shall be in accordance with Table E.1.

Table E.1 — Requirements for extruded ceramic tiles, Group AII$_{b-2}$ (6 % < E_b ≤ 10 %)

Characteristics	Requirements for		Test method
	Precision	Natural	
A) DIMENSIONS AND SURFACE QUALITY			
A.1 Length and width			
The work size shall be chosen as follows for:			
a) modular tiles:	in order to allow a nominal joint width of between 3 and 11 mm [a]		–
b) non-modular tiles:	so that the difference between the work size and the nominal size is not more than ±3 mm		–
The permissible deviation, of the average size for each tile (2 or 4 sides) from the work size (W)	±2,0 % to a maximum of ± 2 mm	±2,0 % to a maximum of ± 4 mm	EN ISO 10545-2
The permissible deviation of the average size for each tile (2 or 4 sides) from the average size of 10 test specimens (20 or 40 sides)	±1,5 %	±1,5 %	EN ISO 10545-2
A.2 Thickness			
a) The thickness shall be specified	Declared thickness		–
b) The permissible deviation, of the average thickness of each tile from the work size thickness	±10 %	±10 %	EN ISO 10545-2
A.3 Straightness of sides [b] (facial sides)			
The maximum permissible deviation from straightness, related to the corresponding work sizes	±1,0 %	±1,0 %	EN ISO 10545-2
A.4 Rectangularity [b]			
The maximum permissible deviation from rectangularity, related to the corresponding work sizes	±1,0 %	±1,0 %	EN ISO 10545-2

Characteristics	Requirements for		Test method
	Precision	Natural	
A.5 Surface flatness			
The maximum permissible deviation from flatness:			
a) centre curvature, related to diagonal calculated from the work sizes	±1,0 %	±1,5 %	EN ISO 10545-2
b) edge curvature, related to the corresponding work sizes	±1,0 %	±1,5 %	EN ISO 10545-2
c) warpage related to diagonal calculated from the work sizes	±1,5 %	±1,5 %	EN ISO 10545-2
A.6 Surface quality [c]	A minimum of 95 % of the tiles shall be free from visible defects that would impair the appearance of a major area of tiles		EN ISO 10545-2
B) PHYSICAL PROPERTIES			
B.1 Water absorption (% by mass)	**6 % < E_b ≤ 10 %** Individual maximum 11 %	**6 % < E_b ≤ 10 %** Individual maximum 11 %	EN ISO 10545-3
B.2 Breaking strength	Not less than 750 N	Not less than 750 N	EN ISO 10545-4
B.3 Flexural tensile strength or modulus of rupture [d]	Average minimum 9 N/mm² Individual minimum 8 N/mm²	Average minimum 9 N/mm² Individual minimum 8 N/mm²	EN ISO 10545-4
B.4 Abrasion resistance, as:			
a) Resistance to deep abrasion of unglazed tiles: removed volume	Maximum 1 062 mm³	Maximum 1 062 mm³	EN ISO 10545-6
b) Resistance to surface abrasion of glazed tiles intended for use on floors [e]	Abrasion class and cycles passed	Abrasion class and cycles passed	EN ISO 10545-7
B.5 Coefficient of linear thermal expansion:			
– from ambient temperature to 100 °C	Declared value [f]	Declared value [f]	EN ISO 10545-8
B.6 Thermal shock resistance	Pass according to EN ISO 10545-1 [g]		EN ISO 10545-9
B.7 Crazing resistance: glazed tiles [h]	Pass according to EN ISO 10545-1 [g]		EN ISO 10545-11 [h]
B.8 Frost resistance	Declared value [g]		EN ISO 10545-12
B) PHYSICAL PROPERTIES			
B.9 Slipperiness	Declared value(s) [g]		CEN/TS 16165 [i]
B.10 Bond strength/adhesion [j], for:			

Characteristics	Requirements for		Test method
	Precision	Natural	
a) cementitious adhesives [k]	Declared value(s)		EN 12004:2007+ A1:2012, 4.1 [l]
b) dispersion adhesives [k]	Declared value(s)		EN 12004:2007+ A1:2012, 4.2 [l]
c) reaction resin adhesives [k]	Declared value(s)		EN 12004:2007+ A1:2012, 4.3 [l]
B.11 Moisture expansion (in mm/m)	Declared value [f]		EN ISO 10545-10
B.12 Small colour differences [f] for:			
a) Glazed tiles	$\Delta E_{cmc} < 0,75$		EN ISO 10545-16
b) Unglazed tiles	$\Delta E_{cmc} < 1,0$		EN ISO 10545-16
B.13 Impact resistance, as:			
– Coefficient of restitution (COR)	Declared value [f]		EN ISO 10545-5
B.14 Reaction to fire	(Class A1 or $A1_{FL}$) [m]		–
B.15 Tactility [n]	Declare surface description [g]		CEN/TS 15209 [i]
C) CHEMICAL PROPERTIES			
C.1 Resistance to staining, for:			
a) Glazed tiles	Minimum Class 3	Minimum Class 3	EN ISO 10545-14
b) Unglazed tiles	Declared value [f]		EN ISO 10545-14
C.2 Resistance to chemicals:			
a) Resistance to low concentrations of acids and alkalis	Declared value [f]		EN ISO 10545-13
b) Resistance to high concentrations of acids and alkalis	Declared value [f]		EN ISO 10545-13
c) Resistance to household chemicals and swimming pool salts	Minimum class B	Minimum class B	EN ISO 10545-13
C.3 Release of dangerous substances			
a) Cadmium (in mg/dm²)	Declared value [g]		EN ISO 10545-15
b) Lead (in mg/dm²)	Declared value [g]		EN ISO 10545-15
c) other dangerous substances [o]	Declared value		As relevant

Characteristics	Requirements for		Test method
	Precision	Natural	
[a] Similar joint widths may be used to apply to traditional systems based on non-metric sizes. [b] Not applicable for tiles having curved shapes. [c] Because of firing, slight variations from the standard colour are unavoidable. This does not apply to intentional irregularities of colour variation of the face of tiles (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area which is characteristic of the given tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect. [d] Not applicable to ceramic tiles with breaking strength > 3 000 N. [e] Where required, the abrasion class resistance according to Annex N may be declared. [f] See Annex O Additional information on applicability. [g] See Table 2 for uses where it is applicable. [h] Certain decorative effects may have a tendency to craze. They are to be identified by the manufacturer, in which case the crazing test given in EN ISO 10545-11 is not applicable. [i] 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 (as long as a consolidated European test method is not available). [j] For intended uses subject to requirements against accidental fall of objects on to transit areas only. Tests are to be performed using the actual tiles and suitable adhesive. [k] For the types of adhesives, defined in EN 12004:2007+A1:2012 only. [l] The proposed test methods are intended to determine the adhesion strength of adhesive and have not been developed to determine ceramic tile characteristics. Thus, there might be no correlation between the declared bond strength and the performance of the tile in use (other factors like proper installation techniques and type of background support will influence the final performance). [m] Ceramic, as a homogeneously distributed material used for ceramic tiles, is considered as material of known and stable performance with respect to the reaction to fire performance as it does not consist of any organic material. As such it does not contribute to the fire and it may be considered without the need for testing (CWT) as the Class A1 material [5]. The reaction to fire performance of ceramic tiles may also be classified also as Class A1 according to EN 13501–1. [n] For tactile paving surfaces only i.e. when required for blind or vision impaired persons. [o] When relevant, see Tables ZA.1.1 and ZA.1.2, note b, for the performance of the product concerning this characteristic, if any to be declared.			

5) Commission Decision 96/603/EC, as amended (see Bibliography, [1]).

Annex F
(normative)

Requirements for extruded ceramic tiles of Group AIII (E_b > 10 %)

Requirements for dimensions and surface quality and for physical and chemical properties of this group of ceramic tiles shall be in accordance with Table F.1.

Table F.1 — Requirements for extruded ceramic tiles, Group AIII (E_b > 10 %)

Characteristics	Requirements for		Test method
	Precision	Natural	
A) DIMENSIONS AND SURFACE QUALITY			
A.1 Length and width			
The work size shall be chosen as follows for:			
a) modular tiles:	in order to allow a nominal joint width of between 3 and 11 mm [a]		–
b) non-modular tiles:	so that the difference between the work size and the nominal size is not more than ±3 mm		–
The permissible deviation, of the average size for each tile (2 or 4 sides) from the work size (W)	±2,0 % to a maximum of ± 2 mm	±2,0 % to a maximum of ± 4 mm	EN ISO 10545-2
The permissible deviation of the average size for each tile (2 or 4 sides) from the average size of 10 test specimens (20 or 40 sides)	±1,5 %	±1,5 %	EN ISO 10545-2
A.2 Thickness			
a) The thickness shall be specified	Declared thickness		–
b) The permissible deviation, of the average thickness of each tile from the work size thickness	±10 %	±10 %	EN ISO 10545-2
A.3 Straightness of sides [b] (facial sides)			
The maximum permissible deviation from straightness, related to the corresponding work sizes	±1,0 %	±1,0 %	EN ISO 10545-2
A.4 Rectangularity [b]			
The maximum permissible deviation from rectangularity, related to the corresponding work sizes	±1,0 %	±1,0 %	EN ISO 10545-2

Characteristics	Requirements for		Test method
	Precision	Natural	
A.5 Surface flatness			
The maximum permissible deviation from flatness:			
a) centre curvature, related to diagonal calculated from the work sizes	±1,0 %	±1,5 %	EN ISO 10545-2
b) edge curvature, related to the corresponding work sizes	±1,0 %	±1,5 %	EN ISO 10545-2
c) warpage related to diagonal calculated from the work sizes	±1,5 %	±1,5 %	EN ISO 10545-2
A.6 Surface quality [c]	A minimum of 95 % of the tiles shall be free from visible defects that would impair the appearance of a major area of tiles		EN ISO 10545-2
B) PHYSICAL PROPERTIES			
B.1 Water absorption (% by mass)	**E_b > 10 %**	**E_b > 10 %**	EN ISO 10545-3
B.2 Breaking strength	Not less than 600 N	Not less than 600 N	EN ISO 10545-4
B.3 Flexural tensile strength or modulus of rupture [d]	Average minimum 8 N/mm^2 Individual minimum 7 N/mm^2	Average minimum 8 N/mm^2 Individual minimum 7 N/mm^2	EN ISO 10545-4
B.4 Abrasion resistance, as:			
a) Resistance to deep abrasion of unglazed tiles: removed volume	Maximum 2 365 mm^3	Maximum 2 365 mm^3	EN ISO 10545-6
b) Resistance to surface abrasion of glazed tiles intended for use on floors [e]	Abrasion class and cycles passed	Abrasion class and cycles passed	EN ISO 10545-7
B.5 Coefficient of linear thermal expansion:			
– from ambient temperature to 100 °C	Declared value [f]	Declared value [f]	EN ISO 10545-8
B.6 Thermal shock resistance	Pass according to EN ISO 10545-1 [g]		EN ISO 10545-9
B.7 Crazing resistance: glazed tiles [h]	Pass according to EN ISO 10545-1 [g]		EN ISO 10545-11 [h]
B.8 Frost resistance	Declared value [g]		EN ISO 10545-12
B.9 Slipperiness	Declared value(s) [g]		CEN/TS 16165 [i]
B.10 Bond strength/adhesion [j] for:			
a) cementitious adhesives [k]	Declared value(s)		EN 12004:2007+A1: 2012, 4.1 [l]

Characteristics	Requirements for		Test method
	Precision	Natural	
b) dispersion adhesives [k]	Declared value(s)		EN 12004:2007+A1: 2012, 4.2 [l]
c) reaction resin adhesives [k]	Declared value(s)		EN 12004:2007+A1: 2012, 4.3 [l]
B.11 Moisture expansion (in mm/m)	Declared value [f]		EN ISO 10545-10
B.12 Small colour differences [f] for:			
a) Glazed tiles	$\Delta E_{cmc} < 0{,}75$		EN ISO 10545-16
b) Unglazed tiles	$\Delta E_{cmc} < 1{,}0$		EN ISO 10545-16
B.13 Impact resistance, as:			
– Coefficient of restitution (COR)	Declared value [f]		EN ISO 10545-5
B.14 Reaction to fire	(Class A1 or $A1_{FL}$) [m]		–
B.15 Tactility [n]	Declare surface description [g]		CEN/TS 15209 [i]
C) CHEMICAL PROPERTIES			
C.1 Resistance to staining, for:			
a) Glazed tiles	Minimum Class 3	Minimum Class 3	EN ISO 10545-14
b) Unglazed tiles	Declared value [f]		EN ISO 10545-14
C.2 Resistance to chemicals:			
a) Resistance to low concentrations of acids and alkalis	Declared value [f]		EN ISO 10545-13
b) Resistance to high concentrations of acids and alkalis	Declared value [f]		EN ISO 10545-13
c) Resistance to household chemicals and swimming pool salts	Minimum class B	Minimum class B	EN ISO 10545-13
C.3 Release of dangerous substances			
a) Cadmium (in mg/dm^2)	Declared value [g]		EN ISO 10545-15
b) Lead (in mg/dm^2)	Declared value [g]		EN ISO 10545-15
c) other dangerous substances [o]	Declared value		As relevant

Characteristics	Requirements for		Test method
	Precision	Natural	

[a] Similar joint widths may be used to apply to traditional systems based on non-metric sizes.

[b] Not applicable for tiles having curved shapes.

[c] Because of firing, slight variations from the standard colour are unavoidable. This does not apply to intentional irregularities of colour variation of the face of tiles (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area which is characteristic of the given tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect.

[d] Not applicable to ceramic tiles with breaking strength > 3 000 N.

[e] Where required, the abrasion class resistance according to Annex N may be declared.

[f] See Annex O Additional information on applicability.

[g] See Table 2 for uses where it is applicable.

[h] Certain decorative effects may have a tendency to craze. They are to be identified by the manufacturer, in which case the crazing test given in EN ISO 10545-11 is not applicable.

[i] 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 (as long as a consolidated European test method is not available).

[j] For intended uses subject to requirements against accidental fall of objects on to transit areas only. Tests are to be performed using the actual tiles and suitable adhesive.

[k] For the types of adhesives, defined in EN 12004:2007+A1:2012 only.

[l] The proposed test methods are intended to determine the adhesion strength of adhesive and have not been developed to determine ceramic tile characteristics. Thus, there might be no correlation between the declared bond strength and the performance of the tile in use (other factors like proper installation techniques and type of background support will influence the final performance).

[m] Ceramic, as a homogeneously distributed material used for ceramic tiles, is considered as material of known and stable performance with respect to the reaction to fire performance as it does not consist of any organic material. As such it does not contribute to the fire and it may be considered without the need for testing (CWT) as the Class A1 material [6)]. The reaction to fire performance of ceramic tiles may also be classified also as Class A1 according to EN 13501–1.

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

[o] When relevant, see Tables ZA.1.1 and ZA.1.2, note b, for the performance of the product concerning this characteristic, if any to be declared.

6) Commission Decision 96/603/EC, as amended (see Bibliography, [1]).

Annex G
(normative)

Requirements for dry-pressed ceramic tiles with low water absorption of Group BI_a ($E_b \leq 0{,}5$ %)

Requirements for dimensions and surface quality and for physical and chemical properties of this group of ceramic tiles shall be in accordance with Table G.1.

Table G.1 — Requirements for dry-pressed ceramic tiles with low water absorption, Group BI_a ($E_b \leq 0{,}5$ %)

Characteristics	Requirements for nominal size *N*				Test method
	N **< 7cm**	**7 cm ≤ *N* < 15 cm**	***N*** **≥ 15 cm**		
	(mm)	(mm)	(%)	(mm)	
A) DIMENSIONS AND SURFACE QUALITY					
A.1 Length and width					
The work size shall be chosen as follows for:					
a) modular tiles:	Not applicable	in order to allow a nominal joint width of between 2 and 5 mm [a]			–
b) non-modular tiles:	Not applicable	so that the difference between the work size and the nominal size is not more than 2 % (maximum ±5 mm)			–
The permissible deviation of the average size for each tile (2 or 4 sides) from the work size (*W*)	±0,5 mm	±0,9 mm	±0,6 %	±2,0 mm	EN ISO 10545-2
A.2 Thickness					
a) The thickness shall be specified	Declared thickness				
b) The permissible deviation, of the average thickness of each tile from the work size thickness	±0,5 mm	±0,5 mm	±5 %	±0,5 mm	EN ISO 10545-2
A.3 Straightness of sides [b] (facial sides)					
The maximum permissible deviation from straightness, related to the corresponding work sizes	Without testing	±0,75 mm	±0,5 %	±1,5 mm	EN ISO 10545-2
A.4 Rectangularity [b]					

Characteristics	Requirements for nominal size *N*				Test method
	***N* < 7cm**	**7 cm ≤ *N* < 15 cm**	***N* ≥ 15 cm**		
	(mm)	(mm)	(%)	(mm)	
The maximum permissible deviation from rectangularity related to the corresponding work sizes.	Without testing	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
A.5 Surface flatness					
The maximum permissible deviation from flatness:					
a) centre curvature, related to diagonal calculated from the work sizes;	Without testing	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
b) edge curvature, related to the corresponding work sizes;	Without testing	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
c) warpage, related to diagonal calculated from the work sizes.	Without testing	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
A.6 Surface quality [c]	A minimum of 95 % of the tiles shall be free from visible defects that would impair the appearance of a major area of tiles				EN ISO 10545-2
B) PHYSICAL PROPERTIES					
B.1 Water absorption (in % by mass)	$E_b \leq 0,5$ % Individual maximum 0,6 %				EN ISO 10545-3
B.2 Breaking strength, for:					
a) Thickness ≥ 7,5 mm	Not less than 1 300 N				EN ISO 10545-4
b) Thickness < 7,5 mm	Not less than 700 N				EN ISO 10545-4
B.3 Flexural tensile strength or modulus of rupture [d]	Average minimum 35 N/mm^2 Individual minimum 32 N/mm^2				EN ISO 10545-4
B.4 Abrasion resistance					
a) Resistance to deep abrasion of unglazed tiles: removed volume	Maximum 175 mm^3				EN ISO 10545-6
b) Resistance to surface abrasion of glazed tiles intended for use on floors [e]	Abrasion class and cycles passed				EN ISO 10545-7
B.5 Coefficient of linear thermal expansion:					
– from ambient temperature to 100 °C	Without testing	Declared value [f]			EN ISO 10545-8
B.6 Thermal shock resistance	Pass according to EN ISO 10545-1 [g]				EN ISO 10545-9

Characteristics	Requirements for nominal size *N*				Test method
	N **< 7cm**	**7 cm ≤ *N* < 15 cm**	***N*** **≥ 15 cm**		
	(mm)	(mm)	(%)	(mm)	
B.7 Crazing resistance glazed tiles [h]	Pass according to EN ISO 10545-1 [g]				EN ISO 10545-11[h]
B.8 Frost resistance	Pass according to EN ISO 10545-1 [g]				EN ISO 10545-12
B.9 Slipperiness	Declared value(s) [g]				CEN/TS 16165 [i]
B.10 Bond strength/adhesion [j] for:					
a) cementitious adhesives [k]	Declared value(s)				EN 12004:2007+A1: 2012, 4.1 [l]
b) dispersion adhesives [k]	Declared value(s)				EN 12004:2007+A1: 2012, 4.2 [l]
c) reaction resin adhesives [k]	Declared value(s)				EN 12004:2007+A1: 2012, 4.3 [l]
B.11 Moisture expansion (in mm/m)	Without testing	Declared value [f]			EN ISO 10545-10
B.12 Small colour differences [f] for:					
a) Glazed tiles	$\Delta E_{cmc} < 0{,}75$				EN ISO 10545-16
b) Unglazed tiles	$\Delta E_{cmc} < 1{,}0$				EN ISO 10545-16
B.13 Impact resistance, as:					
– Coefficient of restitution (COR)	Declared value [f]				EN ISO 10545-5
B.14 Reaction to fire	(Class A1 or $A1_{FL}$) [m]				–
B.15 Tactility [n]	Declare surface description [g]				CEN/TS 15209 [i]
C) CHEMICAL PROPERTIES					
C.1 Resistance to staining, for:					
a) Glazed tiles	Minimum Class 3				EN ISO 10545-14
b) Unglazed tiles	Declared value [f]				EN ISO 10545-14
C.2 Resistance to chemicals					
a) Resistance to low concentrations of acids and alkalis	Declared value [f]				EN ISO 10545-13
b) Resistance to high concentrations of acids and alkalis	Declared value [f]				EN ISO 10545-13
c) Resistance to household chemicals and swimming pool salts	Minimum class B				EN ISO 10545-13

Characteristics	Requirements for nominal size *N*				Test method
	N **< 7cm**	**7 cm ≤ *N* < 15 cm**	***N*** **≥ 15 cm**		
	(mm)	(mm)	(%)	(mm)	
C.3 Release of dangerous substances					
a) Cadmium (in mg/dm²)	Declared value [g]				EN ISO 10545-15
b) Lead (in mg/dm²)	Declared value [g]				EN ISO 10545-15
c) other dangerous substances [o]	Declared value				As relevant

[a] Similar joint widths may be used to apply to traditional systems based on non-metric sizes.

[b] Not applicable for tiles having curved shapes.

[c] Because of firing, slight variations from the standard colour are unavoidable. This does not apply to intentional irregularities of colour variation of the face of tiles (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area which is characteristic of the given tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect.

[d] Not applicable to ceramic tiles with breaking strength > 3 000 N.

[e] Where required, the abrasion class resistance according to Annex N may be declared.

[f] See Annex O Additional information on applicability.

[g] See Table 2 for uses where it is applicable.

[h] Certain decorative effects may have a tendency to craze. They are to be identified by the manufacturer, in which case the crazing test given in EN ISO 10545-11 is not applicable.

[i] 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 (as long as a consolidated European test method is not available).

[j] For intended uses subject to requirements against accidental fall of objects on to transit areas only. Tests are to be performed using the actual tiles and suitable adhesive and/or mortar.

[k] For the types of adhesives, defined in EN 12004:2007+A1:2012 only.

[l] The proposed test methods are intended to determine the adhesion strength of adhesive and have not been developed to determine ceramic tile characteristics. Thus, there might be no correlation between the declared bond strength and the performance of the tile in use (other factors like proper installation techniques and type of background support will influence the final performance).

[m] Ceramic, as a homogeneously distributed material used for ceramic tiles, is considered as material of known and stable performance with respect to the reaction to fire performance as it does not consist of any organic material. As such it does not contribute to the fire and it may be considered without the need for testing (CWT) as the Class A1 material [7]. The reaction to fire performance of ceramic tiles may also be classified also as Class A1 according to EN 13501–1.

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

[o] When relevant, see Notes 1 and 2 in ZA.1 for the performance of the product concerning this characteristic, if any to be declared.

7) Commission Decision 96/603/EC, as amended (see Bibliography, [1]).

Annex H
(normative)

Requirements for dry-pressed ceramic tiles with low water absorption of Group BI_b (0,5 % < E_b ≤ 3 %)

Requirements for dimensions and surface quality and for physical and chemical properties of this group of ceramic tiles shall be in accordance with Table H.1.

Table H.1 — Requirements for dry-pressed ceramic tiles with low water absorption, Group BI_b (0,5 % < E_b ≤ 3 %)

Characteristics	Requirements for nominal size *N*				Test method
	N **< 7cm**	**7 cm ≤** ***N*** **< 15 cm**	***N*** **≥ 15 cm**		
	(mm)	(mm)	(%)	(mm)	
A) DIMENSIONS AND SURFACE QUALITY					
A.1 Length and width					
The work size shall be chosen as follows for:					
a) modular tiles:	Not applicable	in order to allow a nominal joint width of between 2 and 5 mm [a]			–
b) non-modular tiles:	Not applicable	so that the difference between the work size and the nominal size is not more than 2 % (maximum ±5 mm)			–
The permissible deviation of the average size for each tile (2 or 4 sides) from the work size (*W*)	±0,5 mm	±0,9 mm	±0,6 %	±2,0 mm	EN ISO 10545-2
A.2 Thickness					
c) The thickness shall be specified	Declared thickness				
d) The permissible deviation, of the average thickness of each tile from the work size thickness	±0,5 mm	±0,5 mm	±5 %	±0,5 mm	EN ISO 10545-2
A.3 Straightness of sides [b] (facial sides)					
The maximum permissible deviation from straightness, related to the corresponding work sizes	Without testing	±0,75 mm	±0,5 %	±1,5 mm	EN ISO 10545-2
A.4 Rectangularity [b]					

Characteristics	Requirements for nominal size *N*				Test method
	***N* < 7cm**	**7 cm ≤ *N* < 15 cm**	***N* ≥ 15 cm**		
	(mm)	(mm)	(%)	(mm)	
The maximum permissible deviation from rectangularity related to the corresponding work sizes.	Without testing	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
A.5 Surface flatness					
The maximum permissible deviation from flatness:					
a) centre curvature, related to diagonal calculated from the work sizes;	Without testing	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
b) edge curvature, related to the corresponding work sizes;	Without testing	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
c) warpage, related to diagonal calculated from the work sizes.	Without testing	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
A.6 Surface quality [c]	A minimum of 95 % of the tiles shall be free from visible defects that would impair the appearance of a major area of tiles				EN ISO 10545-2
B) PHYSICAL PROPERTIES					
B.1 Water absorption (in % by mass)	$0,5\ \% < E_b \leq 3\ \%$ Individual maximum 3,3 %				EN ISO 10545-3
B.2 Breaking strength, for:					
a) Thickness ≥ 7,5 mm	Not less than 1 100 N				EN ISO 10545-4
b) Thickness < 7,5 mm	Not less than 700 N				EN ISO 10545-4
B.3 Flexural tensile strength or modulus of rupture [d]	Average minimum 30 N/mm^2 Individual minimum 27 N/mm^2				EN ISO 10545-4
B.4 Abrasion resistance					
c) Resistance to deep abrasion of unglazed tiles: removed volume	Maximum 175 mm^3				EN ISO 10545-6
d) Resistance to surface abrasion of glazed tiles intended for use on floors [e]	Abrasion class and cycles passed				EN ISO 10545-7
B.5 Coefficient of linear thermal expansion:					
– from ambient temperature to 100 °C	Without testing	Declared value [f]			EN ISO 10545-8
B.6 Thermal shock resistance	Pass according to EN ISO 10545-1 [g]				EN ISO 10545-9

Characteristics	Requirements for nominal size *N*				Test method
	N **< 7cm**	**7 cm ≤ *N* < 15 cm**	***N*** **≥ 15 cm**		
	(mm)	(mm)	(%)	(mm)	
B.7 Crazing resistance: glazed tiles [h]	Pass according to EN ISO 10545-1 [g]				EN ISO 10545-11 [h]
B.8 Frost resistance	Pass according to EN ISO 10545-1 [g]				EN ISO 10545-12
B.9 Slipperiness	Declared value(s) [g]				CEN/TS 16165 [i]
B.10 Bond strength/adhesion [j], for:					
a) cementitious adhesives [k]	Declared value(s)				EN 12004:2007+A1:2012, 4.1 [l]
b) dispersion adhesives [k]	Declared value(s)				EN 12004:2007+A1:2012, 4.2 [l]
c) reaction resin adhesives [k]	Declared value(s)				EN 12004:2007+A1:2012, 4.3 [l]
B.11 Moisture expansion (in mm/m)	Without testing	Declared value [f]			EN ISO 10545-10
B.12 Small colour differences [f] for:					
c) Glazed tiles	$\Delta E_{cmc} < 0{,}75$				EN ISO 10545-16
a) Unglazed tiles	$\Delta E_{cmc} < 1{,}0$				EN ISO 10545-16
B.13 Impact resistance, as:					
– Coefficient of restitution (COR)	Declared value [f]				EN ISO 10545-5
B.14 Reaction to fire	(Class A1 or $A1_{FL}$) [m]				–
B.15 Tactility [n]	Declare surface description [g]				CEN/TS 15209 [i]
C) CHEMICAL PROPERTIES					
C.1 Resistance to staining, for:					
a) Glazed tiles	Minimum Class 3				EN ISO 10545-14
d) Unglazed tiles	Declared value [f]				EN ISO 10545-14
C.2 Resistance to chemicals					
a) Resistance to low concentrations of acids and alkalis	Declared value [f]				EN ISO 10545-13
e) Resistance to high concentrations of acids and alkalis	Declared value [f]				EN ISO 10545-13
f) Resistance to household chemicals and swimming pool salts	Minimum class B				EN ISO 10545-13

Characteristics	Requirements for nominal size *N*				Test method
	***N* < 7cm**	**7 cm ≤ *N* < 15 cm**	***N* ≥ 15 cm**		
	(mm)	(mm)	(%)	(mm)	
C.3 Release of dangerous substances					
a) Cadmium (in mg/dm²)	Declared value [g]				EN ISO 10545-15
b) Lead (in mg/dm²)	Declared value [g]				EN ISO 10545-15
c) other dangerous substances [o]	Declared value				As relevant

[a] Similar joint widths may be used to apply to traditional systems based on non-metric sizes.

[b] Not applicable for tiles having curved shapes.

[c] Because of firing, slight variations from the standard colour are unavoidable. This does not apply to intentional irregularities of colour variation of the face of tiles (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area which is characteristic of the given tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect.

[d] Not applicable to ceramic tiles with breaking strength > 3 000 N.

[e] Where required, the abrasion class resistance according to Annex N may be declared.

[f] See Annex O Additional information on applicability.

[g] See Table 2 for uses where it is applicable.

[h] Certain decorative effects may have a tendency to craze. They are to be identified by the manufacturer, in which case the crazing test given in EN ISO 10545-11 is not applicable.

[i] 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 (as long as a consolidated European test method is not available).

[j] For intended uses subject to requirements against accidental fall of objects on to transit areas only. Tests are to be performed using the actual tiles and suitable adhesive and/or mortar.

[k] For the types of adhesives, defined in EN 12004:2007+A1:2012 only.

[l] The proposed test methods are intended to determine the adhesion strength of adhesive and have not been developed to determine ceramic tile characteristics. Thus, there might be no correlation between the declared bond strength and the performance of the tile in use (other factors like proper installation techniques and type of background support will influence the final performance).

[m] Ceramic, as a homogeneously distributed material used for ceramic tiles, is considered as material of known and stable performance with respect to the reaction to fire performance as it does not consist of any organic material. As such it does not contribute to the fire and it may be considered without the need for testing (CWT) as the Class A1 material [8]. The reaction to fire performance of ceramic tiles may also be classified also as Class A1 according to EN 13501–1.

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

[o] When relevant, see Notes 1 and 2 in ZA.1 for the performance of the product concerning this characteristic, if any to be declared.

8) Commission Decision 96/603/EC, as amended (see Bibliography, [1]).

Annex J
(normative)

Requirements for dry-pressed ceramic tiles of Group BII_a ($3\ \% < E_b \leq 6\ \%$)

Requirements for dimensions and surface quality and for physical and chemical properties of this group of ceramic tiles shall be in accordance with Table J.1.

Table J.1 — Requirements for dry-pressed ceramic tiles, Group BII_a ($3\ \% < E_b \leq 6\ \%$)

Characteristics	Requirements for nominal size *N*			Test method
	7 cm ≤ *N* < 15 cm	***N* ≥ 15 cm**		
	(mm)	(%)	(mm)	
A) DIMENSIONS AND SURFACE QUALITY				
A.1 Length and width				
The work size shall be chosen as follows for:				
a) modular tiles:	in order to allow a nominal joint width of between 2 and 5 mm [a]			–
b) non-modular tiles:	so that the difference between the work size and the nominal size is not more than 2 % (maximum ±5 mm)			–
The permissible deviation of the average size for each tile (2 or 4 sides) from the work size (*W*)	±0,9 mm	±0,6 %	±2,0 mm	EN ISO 10545-2
A.2 Thickness				
a) The thickness shall be specified	Declared thickness			
b) The permissible deviation, of the average thickness of each tile from the work size thickness	±0,5 mm	±5 %	±0,5 mm	EN ISO 10545-2
A.3 Straightness of sides [b] (facial sides)				
The maximum permissible deviation from straightness, related to the corresponding work sizes	±0,75 mm	±0,5 %	±1,5 mm	EN ISO 10545-2
A.4 Rectangularity [b]				
The maximum permissible deviation from rectangularity related to the corresponding work sizes	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2

Characteristics	Requirements for nominal size *N*			Test method
	7 cm ≤ *N* < 15 cm	***N* ≥ 15 cm**		
	(mm)	(%)	(mm)	
A.5 Surface flatness				
The maximum permissible deviation from flatness:				
a) centre curvature, related to diagonal calculated from the work sizes;	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
b) edge curvature, related to the corresponding work sizes;	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
c) warpage, related to diagonal calculated from the work sizes.	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
A.6 Surface quality [c]	A minimum of 95 % of the tiles shall be free from visible defects that would impair the appearance of a major area of tiles			EN ISO 10545-2
B) PHYSICAL PROPERTIES				
B.1 Water absorption (in % by mass)	3 % < E_b ≤ 6 % Individual maximum 6,5 %			EN ISO 10545-3
B.2 Breaking strength, for:				
a) Thickness ≥ 7,5 mm	Not less than 1 000 N			EN ISO 10545-4
b) Thickness < 7,5 mm	Not less than 600 N			EN ISO 10545-4
B.3 Flexural tensile strength or modulus of rupture [d]	Average minimum 22 N/mm^2 Individual minimum 20 N/mm^2			EN ISO 10545-4
B.4 Abrasion resistance				
a) Resistance to deep abrasion of unglazed tiles: removed volume	Maximum 345 mm^3			EN ISO 10545-6
b) Resistance to surface abrasion of glazed tiles intended for use on floors [e]	Abrasion class and cycles passed			EN ISO 10545-7
B.5 Coefficient of linear thermal expansion:				
– from ambient temperature to 100 °C	Declared value [f]			EN ISO 10545-8
B.6 Thermal shock resistance	Pass according to EN ISO 10545-1 [g]			EN ISO 10545-9
B.7 Crazing resistance: glazed tiles [h]	Pass according to EN ISO 10545-1 [g]			EN ISO 10545-11 [h]
B.8 Frost resistance	Declared value [g]			EN ISO 10545-12
B.9 Slipperiness	Declared value(s) [g]			CEN/TS 16165 [i]

Characteristics	Requirements for nominal size *N*			Test method
	7 cm ≤ *N* < 15 cm	***N* ≥ 15 cm**		
	(mm)	(%)	(mm)	
B.10 Bond strength/adhesion [j], for:				
a) cementitious adhesives [k]	Declared value(s)			EN 12004:2007+A 1:2012, 4.1 [l]
b) dispersion adhesives [k]	Declared value(s)			EN 12004:2007+A 1:2012, 4.2 [l]
c) reaction resin adhesives [k]	Declared value(s)			EN 12004:2007+A 1:2012, 4.3 [l]
B.11 Moisture expansion (in mm/m)	Declared value [f]			EN ISO 10545-10
B.12 Small colour differences [f] for:				
a) Glazed tiles	$\Delta E_{cmc} < 0,75$			EN ISO 10545-16
b) Unglazed tiles	$\Delta E_{cmc} < 1,0$			EN ISO 10545-16
B.13 Impact resistance, as:				
– Coefficient of restitution (COR)	Declared value [f]			EN ISO 10545-5
B.14 Reaction to fire	(Class A1 or $A1_{FL}$) [m]			–
B.15 Tactility [n]	Declare surface description [g]			CEN/TS 15209 [i]
C) CHEMICAL PROPERTIES				
C.1 Resistance to staining, for:				
a) Glazed tiles	Minimum Class 3			EN ISO 10545-14
b) Unglazed tiles	Declared value [f]			EN ISO 10545-14
C.2 Resistance to chemicals				
a) Resistance to low concentrations of acids and alkalis	Declared value [f]			EN ISO 10545-13
b) Resistance to high concentrations of acids and alkalis	Declared value [f]			EN ISO 10545-13
c) Resistance to household chemicals and swimming pool salts	Minimum class B			EN ISO 10545-13
C.3 Release of dangerous substances				
a) Cadmium (in mg/dm²)	Declared value [g]			EN ISO 10545-15
b) Lead (in mg/dm²)	Declared value [g]			EN ISO 10545-15
c) other dangerous substances [o]	Declared value			As relevant

Characteristics	Requirements for nominal size *N*			Test method
	7 cm ≤ *N* < 15 cm	***N* ≥ 15 cm**		
	(mm)	(%)	(mm)	

[a] Similar joint widths may be used to apply to traditional systems based on non-metric sizes.

[b] Not applicable for tiles having curved shapes.

[c] Because of firing, slight variations from the standard colour are unavoidable. This does not apply to intentional irregularities of colour variation of the face of tiles (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area which is characteristic of the given tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect.

[d] Not applicable to ceramic tiles with breaking strength > 3 000 N.

[e] Where required, the abrasion class resistance according to Annex N may be declared.

[f] See Annex O Additional information on applicability.

[g] See Table 2 for uses where it is applicable.

[h] Certain decorative effects may have a tendency to craze. They are to be identified by the manufacturer, in which case the crazing test given in EN ISO 10545-11 is not applicable.

[i] 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 (as long as a consolidated European test method is not available).

[j] For intended uses subject to requirements against accidental fall of objects on to transit areas only. Tests are to be performed using the actual tiles and suitable adhesive.

[k] For the types of adhesives, defined in EN 12004:2007+A1:2012 only.

[l] The proposed test methods are intended to determine the adhesion strength of adhesive and have not been developed to determine ceramic tile characteristics. Thus, there might be no correlation between the declared bond strength and the performance of the tile in use (other factors like proper installation techniques and type of background support will influence the final performance).

[m] Ceramic, as a homogeneously distributed material used for ceramic tiles, is considered as material of known and stable performance with respect to the reaction to fire performance as it does not consist of any organic material. As such it does not contribute to the fire and it may be considered without the need for testing (CWT) as the Class A1 material [9)]. The reaction to fire performance of ceramic tiles may also be classified also as Class A1 according to EN 13501–1.

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

[o] When relevant, see Tables ZA.1.1 and ZA.1.2, note b, for the performance of the product concerning this characteristic, if any to be declared.

9) Commission Decision 96/603/EC, as amended (see Bibliography, [1]).

Annex K
(normative)

Requirements for dry-pressed ceramic tiles of Group BII_b (6 % < E_b ≤ 10 %)

Requirements for dimensions and surface quality and for physical and chemical properties of this group of ceramic tiles shall be in accordance with Table K.1.

Table K.1 — Requirements for dry-pressed ceramic tiles, Group BII_b (6 % < E_b ≤ 10 %)

Characteristics	Requirements for nominal size *N*			Test method
	7 cm ≤ *N* < 15 cm	*N* ≥ 15 cm		
	(mm)	(%)	(mm)	
A) DIMENSIONS AND SURFACE QUALITY				
A.1 Length and width				
The work size shall be chosen as follows for:				
a) modular tiles:	in order to allow a nominal joint width of between 2 and 5 mm [a]			–
b) non-modular tiles:	so that the difference between the work size and the nominal size is not more than 2 % (maximum ±5 mm)			–
The permissible deviation of the average size for each tile (2 or 4 sides) from the work size (*W*)	±0,9 mm	±0,6 %	±2,0 mm	EN ISO 10545-2
A.2 Thickness				
a) The thickness shall be specified	Declared thickness			
b) The permissible deviation, of the average thickness of each tile from the work size thickness	±0,5 mm	±5 %	±0,5 mm	EN ISO 10545-2
A.3 Straightness of sides [b] (facial sides)				
The maximum permissible deviation from straightness, related to the corresponding work sizes	±0,75 mm	±0,5 %	±1,5 mm	EN ISO 10545-2
A.4 Rectangularity [b]				
The maximum permissible deviation from rectangularity related to the corresponding work sizes	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2

Characteristics	Requirements for nominal size *N*			Test method
	7 cm ≤ *N* < 15 cm	***N* ≥ 15 cm**		
	(mm)	(%)	(mm)	
A.5 Surface flatness				
The maximum permissible deviation from flatness:				
a) centre curvature, related to diagonal calculated from the work sizes;	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
b) edge curvature, related to the corresponding work sizes;	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
c) warpage, related to diagonal calculated from the work sizes.	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
A.6 Surface quality [c]	A minimum of 95 % of the tiles shall be free from visible defects that would impair the appearance of a major area of tiles			EN ISO 10545-2
B) PHYSICAL PROPERTIES				
B.1 Water absorption (in % by mass)	6 % < E_b ≤ 10 % Individual maximum 11 %			EN ISO 10545-3
B.2 Breaking strength, for:				
a) Thickness ≥ 7,5 mm	Not less than 800 N			EN ISO 10545-4
b) Thickness < 7,5 mm	Not less than 500 N			EN ISO 10545-4
B.3 Flexural tensile strength or modulus of rupture [d]	Average minimum 18 N/mm^2 Individual minimum 16 N/mm^2			EN ISO 10545-4
B.4 Abrasion resistance				
a) Resistance to deep abrasion of unglazed tiles: removed volume	Maximum 540 mm^3			EN ISO 10545-6
b) Resistance to surface abrasion of glazed tiles intended for use on floors [e]	Abrasion class and cycles passed			EN ISO 10545-7
B.5 Coefficient of linear thermal expansion:				
– from ambient temperature to 100 °C	Declared value [f]			EN ISO 10545-8
B.6 Thermal shock resistance	Pass according to EN ISO 10545-1 [g]			EN ISO 10545-9
B.7 Crazing resistance: glazed tiles [h]	Pass according to EN ISO 10545-1 [g]			EN ISO 10545-11 [h]
B.8 Frost resistance	Declared value [g]			EN ISO 10545-12
B) PHYSICAL PROPERTIES				

Characteristics	Requirements for nominal size *N*			Test method
	7 cm ≤ *N* < 15 cm	***N* ≥ 15 cm**		
	(mm)	(%)	(mm)	
B.9 Slipperiness	Declared value(s) [g]			CEN/TS 16165 [i]
B.10 Bond strength/adhesion [j], for:				
a) cementitious adhesives [k]	Declared value(s)			EN 12004:2007+A1 :2012, 4.1 [l]
b) dispersion adhesives [k]	Declared value(s)			EN 12004:2007+A1 :2012, 4.2 [l]
c) reaction resin adhesives [k]	Declared value(s)			EN 12004:2007+A1 :2012, 4.3 [l]
B.11 Moisture expansion (in mm/m)	Declared value [f]			EN ISO 10545-10
B.12 Small colour differences [f] for:				
a) Glazed tiles	$\Delta E_{cmc} < 0{,}75$			EN ISO 10545-16
b) Unglazed tiles	$\Delta E_{cmc} < 1{,}0$			EN ISO 10545-16
B.13 Impact resistance, as:				
– Coefficient of restitution (COR)	Declared value [f]			EN ISO 10545-5
B.14 Reaction to fire	(Class A1 or $A1_{FL}$) [m]			–
B.15 Tactilitly [n]	Declare surface description [g]			CEN/TS 15209 [i]
C) CHEMICAL PROPERTIES				
C.1 Resistance to staining, for:				
a) Glazed tiles	Minimum Class 3			EN ISO 10545-14
b) Unglazed tiles	Declared value [f]			EN ISO 10545-14
C.2 Resistance to chemicals				
a) Resistance to low concentrations of acids and alkalis	Declared value [f]			EN ISO 10545-13
b) Resistance to high concentrations of acids and alkalis	Declared value [f]			EN ISO 10545-13
c) Resistance to household chemicals and swimming pool salts	Minimum class B			EN ISO 10545-13
C.3 Release of dangerous substances				
a) Cadmium (in mg/dm²)	Declared value [g]			EN ISO 10545-15
b) Lead (in mg/dm²)	Declared value [g]			EN ISO 10545-15
c) other dangerous substances [o]	Declared value			As relevant

[a] Similar joint widths may be used to apply to traditional systems based on non-metric sizes.

[b] Not applicable for tiles having curved shapes.

[c] Because of firing, slight variations from the standard colour are unavoidable. This does not apply to intentional

Characteristics	Requirements for nominal size *N*			Test method
	7 cm ≤ *N* < 15 cm	***N* ≥ 15 cm**		
	(mm)	(%)	(mm)	

irregularities of colour variation of the face of tiles (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area which is characteristic of the given tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect.

[d] Not applicable to ceramic tiles with breaking strength > 3 000 N.

[e] Where required, the abrasion class resistance according to Annex N may be declared.

[f] See Annex O Additional information on applicability.

[g] See Table 2 for uses where it is applicable.

[h] Certain decorative effects may have a tendency to craze. They are to be identified by the manufacturer, in which case the crazing test given in EN ISO 10545-11 is not applicable.

[i] 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 (as long as a consolidated European test method is not available).

[j] For intended uses subject to requirements against accidental fall of objects on to transit areas only. Tests are to be performed using the actual tiles and suitable adhesive.

[k] For the types of adhesives, defined in EN 12004:2007+A1:2012 only.

[l] The proposed test methods are intended to determine the adhesion strength of adhesive and have not been developed to determine ceramic tile characteristics. Thus, there might be no correlation between the declared bond strength and the performance of the tile in use (other factors like proper installation techniques and type of background support will influence the final performance).

[m] Ceramic, as a homogeneously distributed material used for ceramic tiles, is considered as material of known and stable performance with respect to the reaction to fire performance as it does not consist of any organic material. As such it does not contribute to the fire and it may be considered without the need for testing (CWT) as the Class A1 material [10)]. The reaction to fire performance of ceramic tiles may also be classified also as Class A1 according to EN 13501–1.

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

[o] When relevant, see Tables ZA.1.1 and ZA.1.2, note b, for the performance of the product concerning this characteristic, if any to be declared.

10) Commission Decision 96/603/EC, as amended (see Bibliography, [1]).

Annex L
(normative)

Requirements for dry-pressed ceramic tiles of Group BIII (E_b > 10 %)

Requirements for dimensions and surface quality and for physical and chemical properties of this group of ceramic tiles shall be in accordance with Table L.1.

Table L.1 — Requirements for dry-pressed ceramic tiles, Group BIII (E_b > 10 %)

Characteristics	Requirements for nominal size *N*			Test method
	7 cm ≤ *N* < 15 cm	*N* ≥ 15 cm		
	(mm)	(%)	(mm)	
A) DIMENSIONS AND SURFACE QUALITY				
A.1 Length and width				
The work size shall be chosen as follows for:				
a) modular tiles:	in order to allow a nominal joint width of between 2 and 5 mm [a]			–
b) non-modular tiles:	so that the difference between the work size and the nominal size is not more than 2 % (maximum ±5 mm)			–
The permissible deviation of the average size for each tile (2 or 4 sides) from the work size (*W*)	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
A.2 Thickness				
c) The thickness shall be specified	Declared thickness			
d) The permissible deviation, of the average thickness of each tile from the work size thickness	±0,5 mm	±10 %	±0,5 mm	EN ISO 10545-2
A.3 Straightness of sides [b] (facial sides)				
The maximum permissible deviation from straightness, related to the corresponding work sizes	±0,5 mm	±0,3 %	±1,5 mm	EN ISO 10545-2
A.4 Rectangularity [b]				
The maximum permissible deviation from rectangularity related to the corresponding work sizes	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2

Characteristics	Requirements for nominal size *N*			Test method
	7 cm ≤ *N* < 15 cm	***N* ≥ 15 cm**		
	(mm)	(%)	(mm)	
A.5 Surface flatness				
The maximum permissible deviation from flatness:				
a) centre curvature, related to diagonal calculated from the work sizes;	+ 0,75 mm - 0,50 mm	+ 0,5 % - 0,3 %	+ 2,0 mm - 1,5 mm	EN ISO 10545-2
b) edge curvature, related to the corresponding work sizes;	+ 0,75 mm - 0,50 mm	+ 0,5 % - 0,3 %	+ 2,0 mm - 1,5 mm	EN ISO 10545-2
c) warpage, related to diagonal calculated from the work sizes.	±0,75 mm	±0,5 %	±2,0 mm	EN ISO 10545-2
A.6 Surface quality [c]	A minimum of 95 % of the tiles shall be free from visible defects that would impair the appearance of a major area of tiles			EN ISO 10545-2
B) PHYSICAL PROPERTIES				
B.1 Water absorption (in % by mass)	Average > 10 %. When the average exceeds 20 %, this shall be indicated. Individual minimum value 9 %			EN ISO 10545-3
B.2 Breaking strength, for:				
a) Thickness ≥ 7,5 mm	Not less than 600 N			EN ISO 10545-4
b) Thickness < 7,5 mm	Not less than 200 N			EN ISO 10545-4
B.3 Flexural tensile strength or modulus of rupture [d]				
a) Thickness ≥ 7,5 mm	Average minimum 12 N/mm²			EN ISO 10545-4
b) Thickness < 7,5 mm	Individual minimum 15 N/mm²			EN ISO 10545-4
B.4 Abrasion resistance				
a) Resistance to surface abrasion of glazed tiles intended for use on floors [f]	Abrasion class and cycles passed			EN ISO 10545-7
B.5 Coefficient of linear thermal expansion:				
– from ambient temperature to 100 °C	Declared value [e]			EN ISO 10545-8
B.6 Thermal shock resistance	Pass according to EN ISO 10545-1 [f]			EN ISO 10545-9
B.7 Crazing resistance: glazed tiles [g]	Pass according to EN ISO 10545-1 [f]			EN ISO 10545-11 [g]
B.8 Frost resistance	Declared value [f]			EN ISO 10545-12

Characteristics	Requirements for nominal size *N*			Test method
	7 cm ≤ *N* < 15 cm	***N* ≥ 15 cm**		
	(mm)	(%)	(mm)	
B) PHYSICAL PROPERTIES				
B.9 Slipperiness	Declared value(s) [f]			CEN/TS 16165 [h]
B.10 Bond strength/adhesion [i], for:				
a) cementitious adhesives [j]	Declared value(s)			EN 12004:2007+A1 :2012, 4.1 [k]
b) dispersion adhesives [j]	Declared value(s)			EN 12004:2007+A1 :2012, 4.2 [k]
c) reaction resin adhesives [j]	Declared value(s)			EN 12004:2007+A1 :2012, 4.3 [k]
B.11 Moisture expansion (in mm/m)	Declared value [e]			EN ISO 10545-10
B.12 Small colour differences [e] for:				
a) Glazed tiles	$\Delta E_{cmc} < 0,75$			EN ISO 10545-16
B.13 Impact resistance, as:				
– Coefficient of restitution (COR)	Declared value [e]			EN ISO 10545-5
B.14 Reaction to fire	(Class A1 or $A1_{FL}$) [l]			–
B. 15 Tactility [m]	Declare surface description [f]			CEN/TS 15209 [h]
C) CHEMICAL PROPERTIES				
C.1 Resistance to staining, for:				
a) Glazed tiles	Minimum Class 3			EN ISO 10545-14
b) Unglazed tiles	Declared value [e]			EN ISO 10545-14
C.2 Resistance to chemicals				
a) Resistance to low concentrations of acids and alkalis	Declared value [e]			EN ISO 10545-13
b) Resistance to high concentrations of acids and alkalis	Declared value [e]			EN ISO 10545-13
c) Resistance to household chemicals and swimming pool salts	Minimum class B			EN ISO 10545-13
C.3 Release of dangerous substances				
a) Cadmium (in mg/dm²)	Declared value [f]			EN ISO 10545-15
b) Lead (in mg/dm²)	Declared value [f]			EN ISO 10545-15
c) other dangerous substances [n]	Declared value			As relevant

[a] Similar joint widths may be used to apply to traditional systems based on non-metric sizes.

[b] Not applicable for tiles having curved shapes.

[c] Because of firing, slight variations from the standard colour are unavoidable. This does not apply to intentional

Characteristics	Requirements for nominal size *N*			Test method
	7 cm ≤ *N* < 15 cm	*N* ≥ 15 cm		
	(mm)	(%)	(mm)	
irregularities of colour variation of the face of tiles (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area which is characteristic of the given tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect. [d] Not applicable to ceramic tiles with breaking strength > 3 000 N. [e] See Annex O Additional information on applicability. [f] See Table 2 for uses where it is applicable. [g] Certain decorative effects may have a tendency to craze. They are to be identified by the manufacturer, in which case the crazing test given in EN ISO 10545-11 is not applicable. [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 (as long as a consolidated European test method is not available). [i] For intended uses subject to requirements against accidental fall of objects on to transit areas only. Tests are to be performed using the actual tiles and suitable adhesive. [j] For the types of adhesives, defined in EN 12004:2007+A1:2012 only. [k] The proposed test methods are intended to determine the adhesion strength of adhesive and have not been developed to determine ceramic tile characteristics. Thus, there might be no correlation between the declared bond strength and the performance of the tile in use (other factors like proper installation techniques and type of background support will influence the final performance). [l] Ceramic, as a homogeneously distributed material used for ceramic tiles, is considered as material of known and stable performance with respect to the reaction to fire performance as it does not consist of any organic material. As such it does not contribute to the fire and it may be considered without the need for testing (CWT) as the Class A1 material [11]. The reaction to fire performance of ceramic tiles may also be classified also as Class A1 according to EN 13501–1. [m] For tactile paving surfaces only i.e. when required for blind or vision impaired persons. [n] When relevant, see Tables ZA.1.1 and ZA.1.2, note b, for the performance of the product concerning this characteristic, if any to be declared.				

11) Commission Decision 96/603/EC, as amended (see Bibliography, [1]).

Annex M
(normative)

Requirements of extruded ceramic tiles with low water absorption of Group AI_a ($E_b \leq 0,5$ %)

Requirements for dimensions and surface quality and for physical and chemical properties of this group of ceramic tiles shall be in accordance with Table M.1.

Table M.1 — Requirements for extruded ceramic tiles, Group AI_a ($E_b \leq 0,5$ %)

Characteristics	Requirements for		Test method
	Precision	Natural	
A) DIMENSIONS AND SURFACE QUALITY			
A.1 Length and width			
The work size shall be chosen as follows for:			
a) modular tiles:	in order to allow a nominal joint width of between 3 and 11 mm [a]		–
b) non-modular tiles:	so that the difference between the work size and the nominal size is not more than ±3 mm		–
The permissible deviation, of the average size for each tile (2 or 4 sides) from the work size (*W*)	±1,0 % to a maximum of ± 2 mm	±2,0 % to a maximum of ± 4 mm	EN ISO 10545-2
The permissible deviation of the average size for each tile (2 or 4 sides) from the average size of 10 test specimens (20 or 40 sides)	±1,0 %	±1,5 %	EN ISO 10545-2
A.2 Thickness			
a) The thickness shall be specified	Declared thickness		–
b) The permissible deviation, of the average thickness of each tile from the work size thickness	±10 %	±10 %	EN ISO 10545-2
A.3 Straightness of sides [b] (facial sides)			
The maximum permissible deviation from straightness, related to the corresponding work sizes	±0,5 %	±0,6 %	EN ISO 10545-2
A.4 Rectangularity [b]			
The maximum permissible	±1,0 %	±1,0 %	EN ISO 10545-2

Characteristics	Requirements for		Test method
	Precision	Natural	
deviation from rectangularity, related to the corresponding work sizes			
A.5 Surface flatness			
The maximum permissible deviation from flatness:			
a) centre curvature, related to diagonal calculated from the work sizes	±0,5 %	±1,5 %	EN ISO 10545-2
b) edge curvature, related to the corresponding work sizes	±0,5 %	±1,5 %	EN ISO 10545-2
c) warpage related to diagonal calculated from the work sizes	±0,8 %	±1,5 %	EN ISO 10545-2
A.6 Surface quality [c]	A minimum of 95 % of the tiles shall be free from visible defects that would impair the appearance of a major area of tiles		EN ISO 10545-2
B) PHYSICAL PROPERTIES			
B.1 Water absorption (% by mass)	E_b **≤ 0,5 %** Individual maximum 0,6 %	E_b **≤ 0,5 %** Individual maximum 0,6 %	EN ISO 10545-3
B.2 Breaking strength, for:			
a) Thickness ≥ 7,5 mm	Not less than 1 300 N	Not less than 1 300 N	EN ISO 10545-4
b) Thickness < 7,5 mm	Not less than 600 N	Not less than 600 N	EN ISO 10545-4
B.3 Flexural tensile strength or modulus of rupture [d]	Average minimum 28 N/mm^2 Individual minimum 21 N/mm^2	Average minimum 28 N/mm^2 Individual minimum 21 N/mm^2	EN ISO 10545-4
B.4 Abrasion resistance, as:			
a) Resistance to deep abrasion of unglazed tiles: removed volume	Maximum 275 mm^3	Maximum 275 mm^3	EN ISO 10545-6
b) Resistance to surface abrasion of glazed tiles intended for use on floors [e]	Abrasion class and cycles passed	Abrasion class and cycles passed	EN ISO 10545-7
B.5 Coefficient of linear thermal expansion:			
– from ambient temperature to 100 °C	Declared value [f]	Declared value [f]	EN ISO 10545-8
B.6 Thermal shock resistance	Pass according to EN ISO 10545-1 [g]		EN ISO 10545-9
B.7 Crazing resistance: glazed tiles [h]	Pass according to EN ISO 10545-1 [g]		EN ISO 10545-11 [h]

Characteristics	Requirements for		Test method
	Precision	Natural	
B.8 Frost resistance	Pass according to EN ISO 10545-1 [g]		EN ISO 10545-12
B.9 Slipperiness	Declared value(s) [g]		CEN/TS 16165 [i]
B.10 Bond strength/adhesion [j], for:			
a) cementitious adhesives [k]	Declared value(s)		EN 12004:[l]
b) dispersion adhesives [k]	Declared value(s)		EN 12004:2007+ A1:2012, 4.2 [l]
c) reaction resin adhesives [k]	Declared value(s)		EN 12004:2007+ A1:2012, 4.3 [l]
B.11 Moisture expansion (in mm/m)	Declared value [f]		EN ISO 10545-10
B.12 Small colour differences [f] for:			
a) Glazed tiles	$\Delta E_{cmc} < 0{,}75$		EN ISO 10545-16
b) Unglazed tiles	$\Delta E_{cmc} < 1{,}0$		EN ISO 10545-16
B.13 Impact resistance, as:			
– Coefficient of restitution (COR)	Declared value [f]		EN ISO 10545-5
B.14 Reaction to fire	(Class A1 or $A1_{FL}$) [m]		–
B.15 Tactility [n]	Declare surface description [g]		CEN/TS 15209 [i]
C) CHEMICAL PROPERTIES			
C.1 Resistance to staining, for:			
a) Glazed tiles	Minimum Class 3	Minimum Class 3	EN ISO 10545-14
b) Unglazed tiles	Declared value [f]		EN ISO 10545-14
C.2 Resistance to chemicals:			
a) Resistance to low concentrations of acids and alkalis	Declared value [f]		EN ISO 10545-13
b) Resistance to high concentrations of acids and alkalis	Declared value [f]		EN ISO 10545-13
c) Resistance to household chemicals and swimming pool salts	Minimum class B	Minimum class B	EN ISO 10545-13
C.3 Release of dangerous substances			
a) Cadmium (in mg/dm^2)	Declared value [g]		EN ISO 10545-15
b) Lead (in mg/dm^2)	Declared value [g]		EN ISO 10545-15
c) other dangerous substances [o]	Declared value		As relevant

[a] Similar joint widths may be used to apply to traditional systems based on non-metric sizes.

Characteristics	Requirements for		Test method
	Precision	Natural	

[b] Not applicable for tiles having curved shapes.

[c] Because of firing, slight variations from the standard colour are unavoidable. This does not apply to intentional irregularities of colour variation of the face of tiles (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area which is characteristic of the given tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect.

[d] Not applicable to ceramic tiles with breaking strength > 3 000 N.

[e] Where required, the abrasion class resistance according to Annex N may be declared.

[f] See Annex O Additional information on applicability.

[g] See Table 2 for uses where it is applicable.

[h] Certain decorative effects may have a tendency to craze. They are to be identified by the manufacturer, in which case the crazing test given in EN ISO 10545-11 is not applicable.

[i] 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 (as long as a consolidated European test method is not available).

[j] For intended uses subject to requirements against accidental fall of objects on to transit areas only. Tests are to be performed using the actual tiles and suitable adhesive.

[k] For the types of adhesives, defined in EN 12004:2007+A1:2012 only.

[l] The proposed test methods are intended to determine the adhesion strength of adhesive and have not been developed to determine ceramic tile characteristics. Thus, there might be no correlation between the declared bond strength and the performance of the tile in use (other factors like proper installation techniques and type of background support will influence the final performance).

[m] Ceramic, as a homogeneously distributed material used for ceramic tiles, is considered as material of known and stable performance with respect to the reaction to fire performance as it does not consist of any organic material. As such, it does not contribute to the fire and it may be considered without the need for testing (CWT) as the Class A1 material [12)]. The reaction to fire performance of ceramic tiles may also be classified also as Class A1 according to EN 13501–1.

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

[o] When relevant, see Tables ZA.1.1 and ZA.1.2, note b, for the performance of the product concerning this characteristic, if any to be declared.

12) Commission Decision 96/603/EC, as amended (see Bibliography, [1]).

Annex N
(informative)

Classification of glazed ceramic tiles for floorings according to their resistance to surface abrasion

Where required, the following approximate classification may be used for glazed ceramic tiles intended for floorings with regard to their resistance to surface abrasion.

This classification should not be taken as providing accurate product specifications for specific requirements but rather used as guidance only (see EN ISO 10545-7).

Class 0 Glazed tiles in this class are not recommended for use on floors.

Class 1 Floor coverings in areas that are walked on essentially with soft soled footwear or bare feet without scratching dirt (e.g. residential bathrooms and bedrooms without direct access from the outside).

Class 2 Floor coverings in areas that are walked on by soft soled or normal footwear with, at the most, occasional small amounts of scratching dirt (e.g. rooms in the living areas of homes but with the exception of kitchens, entrances, and other rooms which may have a lot of traffic). This does not apply to abnormal footwear (i.e. hobnailed boots).

Class 3 Floor coverings in areas that, with normal footwear, are walked on more often with small amounts of scratching dirt (e.g. residential kitchens, halls, corridors, balconies, loggias and terraces). This does not apply to abnormal footwear (i.e. hobnailed boots).

Class 4 Floor coverings that are walked on by regular traffic with some scratching dirt so that the conditions are more severe than Class 3 (e.g. entrances, commercial kitchens, hotel, exhibition and sale rooms).

Class 5 Floor coverings that are subject to severe pedestrian traffic over sustained periods with some scratching dirt, so that the conditions are the most severe for which glazed floor tiles may be suitable (e.g. public areas such as shopping centres, airport concourses, hotel foyers, public walkways and industrial applications).

This classification is valid for the given applications under normal conditions. Consideration should be given to the footwear, type of traffic and cleaning methods expected, and the floors should be adequately protected against scratching dirt at the entrances to buildings by interposing footwear cleaning devices. In extreme cases of very heavy pedestrian traffic and quantities of scratching dirt, unglazed floor tiles from Group I can be considered.

Annex O
(informative)

Additional information on applicability of certain characteristics

O.1 General

The purpose of this annex is to provide additional explanatory comments and pertinent information with regard to the application of the characteristics listed in O.2, for the intended uses as specified in Table 2.

O.2 Characteristics

O.2.1 Impact resistance

Determination of impact resistance by measurement of the coefficient of restitution is intended only for testing ceramic tiles according to EN ISO 10545-5 that are used in areas where impact resistance is considered to be of particular importance. The normal requirement for light duty installations is a coefficient of restitution (COR) of 0,55. For heavier duty applications, a higher figure would be required.

O.2.2 Linear thermal expansion

Most ceramic tiles have low levels of linear thermal expansion. Testing, according to EN ISO 10545-8 is intended for ceramic tiles that are installed in conditions of high thermal variation.

O.2.3 Moisture expansion

The majority of glazed and unglazed ceramic tiles have negligible moisture expansion as tested according to EN ISO 10545-10, which does not contribute to tiling problems when tiles are correctly fixed (installed). However, with unsatisfactory fixing practices or in certain climatic conditions, moisture expansion in excess of 0,06 % (0,6 mm/m) may contribute to problems.

O.2.4 Chemical resistance

Ceramic tiles are normally resistant to common chemicals. The test performed according to EN ISO 10545-13 for high concentrations of acids and alkalis, listed in C.2 of Tables A.1 to M.1, is intended for ceramic tiles which are to be used in potentially corrosive conditions.

O.2.5 Resistance to staining

The test performed according to EN ISO 10545-14 is compulsory for glazed ceramic tiles. For unglazed ceramic tiles, where staining may be a problem, it is recommended that the manufacturer be consulted. This method does not address the temporary colour changes that may occur in certain types of glazed tile due to the absorption of water in the body under the glaze.

O.2.6 Small colour differences

The test performed according to EN ISO 10545-16 is applicable only to plain coloured ceramic tiles and is considered to be of importance in certain specialized circumstances. It is to be used only where small colour differences between plain coloured glazed tiles are important in a specification.

Annex P
(informative)

Symbols for indication of intended use and of performances of some characteristics of ceramic tiles

Where required, the symbols, listed below and shown in Figure P.1, may be used on packaging and/or in accompanying documents for indication of:

a) the intended use of ceramic tiles:

   1) suitable for use on floors (see Figure P.1, a);

   2) suitable for use on walls (see Figure P.1, b).

b) the expressions of the name and performances of the following characteristics of ceramic tiles:

   1) frost resistance (see Figure P.1, d);

   2) thermal shock resistance (see Figure P.1, h);

   3) abrasion resistance, as numeral, indicating the class of a glazed tile intended for use on floors according to Annex N (see Figure P.1, c).

c) the expressions of the name of the following characteristics of ceramic tiles:

   1) breaking strength/modulus of rupture (see Figure P.1, f);

   2) slip resistance (see Figure P.1, g);

   3) bond strength/adhesion (see Figure P.1, i);

   4) reaction to fire (see Figure P.1, e);

   5) emission of dangerous substances (see Figure P.1, j).

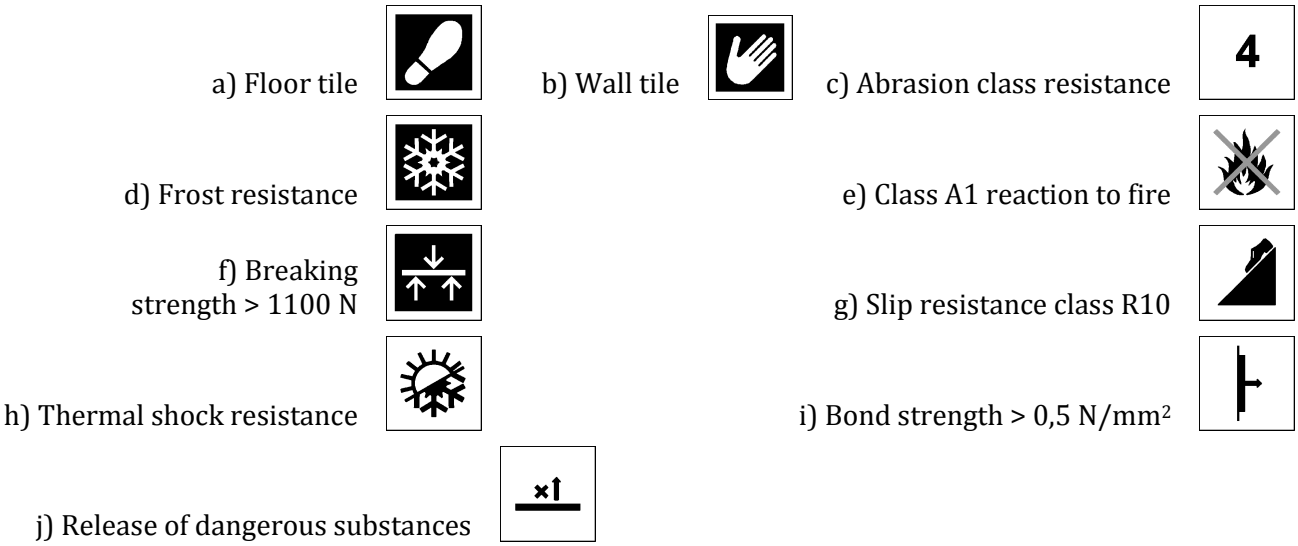


Figure P.1 — Examples of symbols of indication of the intended uses and of the names and performances of some characteristics of ceramic tiles

Annex ZA
(informative)

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

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/119 on "Floorings", as amended, and M/121 on "Internal and external wall and ceiling finishes" given to CEN by the European Commission and the European Free Trade Association.

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

This annex deals with the CE marking of the ceramic tiles intended for the uses indicated in Table(s) ZA.1.1 to ZA.1.2 and shows the relevant clauses applicable.

This annex has the same scope as in Clause 1 of this standard related to the aspects covered by the mandate and is defined by Table(s) ZA.1.1 to ZA.1.2.

Table ZA.1.1 — Relevant clauses for ceramic tiles used for floorings

Product: ceramic tiles **Intended use:** for internal and/or external floorings			
Essential Characteristics	**Clauses [a] in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Reaction to fire	B.14	$A1_{FL}$	Classified without testing (CWT)
Release of dangerous substances [b]: - Cadmium - Lead - Other	C.3 a) C.3 b) C.3 c)	- - -	Declared in mg/dm^2 Declared in mg/dm^2 Declared in mg/dm^2
Breaking strength	B.2	-	Declared in N
Slipperiness	B.9	-	Declared as given in CEN/TS 16165 [c]
Durability for: - Internal uses [d] - External uses: freeze–thaw resistance	- B.8	- -	Declared as "Pass" Declared as "Pass"
Tactility	B.15	-	Declared as given in CEN/TS 15209 [e]

[a] As given in Tables A.1 to M.1, for the concerned product group of ceramic tiles.

[b] Only if 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.

[c] 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 (as long as a consolidated European test method is not available).

[d] With regard to the internal uses, the durability aspect of ceramic tiles is considered as deem to be satisfied, if all other essential characteristics of ceramic tiles, listed above, comply with this European Standard. This statement is based on practical experience of at least 50 years in this field showing that durability of ceramic tiles can be the same as the life time of the building.

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

Table ZA.1.2 — Relevant clauses for ceramic tiles used for walls

Product: ceramic tiles **Intended use:** for internal and/or external walls			
Essential Characteristics	**Clauses [a] in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Reaction to fire	B.14	A1	Classified without testing (CWT)
Release of dangerous substances [b]: - Cadmium - Lead - Other	C.3 a) C.3 b) C.3 c)	- - -	Declared in mg/dm^2 Declared in mg/dm^2 Declared in mg/dm^2
Bond strength/adhesion - cementitious adhesives - dispersion adhesives - reaction resin adhesives	B.10 a) B.10 b) B.10 c)	- - -	Declared in N/mm^2 Declared in N/mm^2 Declared in N/mm^2
Thermal shock resistance	B.6	-	Declared as “Pass”
Durability for: - Internal uses [c] - External uses: freeze–thaw resistance	- B.8	- -	Declared as “Pass” Declared as “Pass”

[a] As given in Tables A.1 to M.1, for the concerned product group of ceramic tiles.

[b] Only if 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.

[c] With regard to the internal uses, the durability aspect of ceramic tiles is considered as deem to be satisfied, if all other essential characteristics of ceramic tiles, listed above, comply with this European Standard. This statement is based on practical experience of at least 50 years in this field showing that durability of ceramic tiles can be the same as the life time of the building.

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

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

ZA.2 Procedure for Assessment and Verification of Constancy of Performance of ceramic tiles

ZA.2.1 System(s) of AVCP

The AVCP system(s) of ceramic tiles indicated in Table(s) ZA.1.1 to ZA.1.2, established by the following EC Decisions, is shown in Table ZA.2.1 for the indicated intended use(s) and relevant level(s) or class(es) of performance:

— Decision of the Commission 97/808/EC of 1997-11-20 (see OJEU L331 of 1997-12-03), as amended firstly by 1999/453/EC of 1999-06-18 (see OJEU L178 of 1999-07-14), secondly by 2001/596/EC of 2001-01-08 (see OJEU L209 of 2001-08-02) and thirdly by 2006/190/EC of 2006-03-01 (see OJEU L66 of 2006-03-08), as given in Annex III of the mandate for “Floorings”, and

— Decision of the Commission 98/437/EC of 1998-06-30 (see OJEU L194 of 1998-07-10), as corrected (see OJEU L278 of 1998-10-15) and amended by 2001/596/EC of 2001-01-08 (see OJEU L209 of 2001-08-02) as given in Annex III of the mandate for “Internal and external wall and ceiling finishes”.

Table ZA.2.1 — System(s) of AVCP

Products	Intended use(s)	Level(s) or class(es) of performance	AVCP system(s)
Rigid flooring products: Rigid floor tiles	For external uses, to cover external pedestrian and vehicular circulation areas		4
	For internal uses including enclosed public transport premises	$A1_{FL}$*, $A2_{FL}$*, B_{FL}* and C_{FL}* $A1_{FL}$**, $A2_{FL}$**, B_{FL}**, C_{FL}**, D_{FL} and E_{FL} ($A1_{FL}$ to E_{FL})***, F_{FL}	1 3 4
Wall tiles	As internal or external finishes in walls subject to reaction to fire regulations	A1*, A2*, B* and C* A1**, A2**, B**, C**, D and E (A1 to E)***, F	1 3 4
	As internal or external finishes in walls, as relevant, subject to regulations on dangerous substances [1]	–	3
	As internal or external finishes in walls for all other uses mentioned in the mandate [2]	–	4

* Products/materials for which a clearly identifiable stage in the production process results in an improvement of the reaction to fire classification (e.g. an addition of fire retardants or a limiting of organic material).

** Products/materials not covered by footnote (*).

*** Products/materials that do not require to be tested for reaction to fire (e.g. products/materials of Class A1 according to Commission Decision 96/603/EC).

System 1: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.2

System 3: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.4

System 4: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.5

1 In particular, those dangerous substances defined in Council Directive 76/769/EEC, as amended.

2 Other intended uses covered by the mandate are for vapour control, water penetration control, acoustic control and thermal control.

The AVCP of the ceramic tile in Table(s) ZA.1.1 to ZA.1.2 shall be according to the AVCP procedures indicated in Table ZA.2.2 resulting from application of the clauses of this or other European Standard indicated therein. The content of tasks of the notified body shall be limited to those essential characteristics as provided for, if any, in Annex III of the relevant mandate and to those that the manufacturer intends to declare.

Table ZA.2.2 — Assignment of AVCP tasks for ceramic tiles under system 3 and 4

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1.1 and/or ZA.1.2, relevant for the intended use which are declared	6.1 and 6.3
	Determination of the performance of the construction product on the basis of testing, calculation, tabulated values or descriptive documentation of that product.	Essential characteristics of Table ZA.1.1 and/or ZA.1.2, relevant for the intended use, except dangerous substances	6.1 and 6.2
Tasks for a notified testing laboratory	Determination of the performance on the basis of testing (based on sampling carried out by the manufacturer), calculation, tabulated values or descriptive documentation of the construction product.	- Release of dangerous substances [a]	6.1 and 6.2
a) See Tables ZA.1.1 and/or ZA.1.2, where relevant, for the intended use, as given therein.			

ZA.2.2 Declaration of performance (DoP)

ZA.2.2.1 General

The manufacturer draws up the DoP according to model provided in Delegated Regulation EU No 574/2014 and affixes the CE marking on the basis of the different AVCP systems set out in Annex V of the Regulation (EU) No 305/2011 (amended by Delegated Regulation EU No 568/2014).

NOTE Ceramic tiles do not require to be tested for reaction to fire (system 1) and are classified without testing (according to Commission Decision 96/603/EC).

In case of ceramic tiles under system 3:

— the manufacturer shall carry out factory production control; and

— the notified laboratory shall assess the performance on the basis of testing (based on sampling carried out by the manufacturer), calculation, tabulated values or descriptive documentation of the construction product.

In case of ceramic tiles under system 4:

— The manufacturer shall carry out:

i) an assessment of the performance of the construction product on the basis of testing, calculation, tabulated values or descriptive documentation of that product; and

ii) factory production control.

— No tasks require the intervention of notified bodies.

ZA.2.2.2 Content

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

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

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

— the AVCP system or systems of the construction product, as set out in Annex V of the CPR;

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

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

The DoP shall in addition contain:

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

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

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

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

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

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

When drawing up a declaration of performance, the manufacturer shall reproduce the texts of the model. Furthermore, the regulation referenced above permits manufacturers to:

— use a different layout as in the model;

— combine the points of the model by presenting some of them together;

— present the points of the model in a different order or using one or more tables;

— omit some points of the model which are not relevant for the product for which a declaration of performance is drawn up. For example, this is the case since the declaration of performance may be based either on a harmonized standard or on a European Technical Assessment issued for the

product, rendering the other alternative not applicable. These omissions could also concern the points on the authorized representative or on the use of Appropriate Technical Documentation and the Specific Technical Documentation;

— present the points without numbering them.

Regarding the supply of the DoP, article 7 of the Regulation (EU) No 305/2011 and Commission Delegated Regulation (EU) No 157/2014 (conditions for making the DoP available on websites) applies. Manufacturers may include in the declaration of performance the reference to the website where the copy of the declaration of performance is made available.

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

ZA.2.2.3 Example of DoP

The following gives an example of a filled-in DoP for ceramic tiles used for internal and external floorings.

DECLARATION OF PERFORMANCE No. 002CPR2013-07-20

1. Unique identification code of the product-type: **Dry pressed ceramic floor tiles**, **water absorption E_b ≤ 0,5 %**

2. Intended use/es: **Internal and external floorings**

3. Manufacturer: **AnyCo SA, PO Box 21, B-1050 Brussels, Belgium, www.anyco.be**

4. System/s of AVCP: **System 4**

5. Harmonized standard: EN 14411:2016

6. Declared performance/s

Essential characteristics	Performance
Reaction to fire	**$A1_{FL}$**
Breaking strength	**> 2000 N**
Release of dangerous substances, for: - cadmium - lead	**NPD** **NPD**
Slipperiness, as: PTV slider 57, CEN/TS 16165:2011 Annex C	**> 0.35**
Durability, for: - internal use - external use: freeze–thaw resistance	**Pass** **Pass**
Tactility	**NPD**

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

Signed for and on behalf of the manufacturer by:

[name]
……

At [place]…….. on [date of issue]……..

[signature]
……..

ZA.3 CE marking and labelling

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

— to the ceramic tile; or

— to a label attached to it.

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

— to the packaging; or

— to the accompanying documents.

Due the nature of ceramic tiles, the CE marking can only be placed on the last two given locations, that is, on the packaging or with the accompanying documents. Furthermore, when it is not possible to affix the complete CE marking on the packaging (i.e. due to lack of space on the box) minimum information may be placed on the packaging while the complete CE marking is included in the accompanying documents.

NOTE For ceramic tiles intended to be used for both flooring and walls, the characteristics shown with the CE marking relevant to both uses may be combined.

The CE marking shall be followed by:

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

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

— the unique identification code of the product-type

— the reference number of the declaration of performance

— the level or class of the performance declared

— the reference to the harmonized technical specification applied

— the identification number of the notified body, where relevant

— the intended use as laid down in the harmonized standard applied.

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

Figures ZA.1 and ZA.2 give examples of the information related to ceramic tiles subject to AVCP system 3 and 4 to be given on the packaging and accompanying commercial documents.

CE	*CE-marking symbol* *Identification number of notified body/laboratory, where applicable* [13].
AnyCo Ltd, PO Box 21, B-1050 15 002CPR2013–07–20	*Name or identifying mark, and registered address of the manufacturer.* *Last two digits of the year in which the marking was first affixed.* *Reference number of the declaration of performance.*
EN 14411 Dry-pressed ceramic tiles, with water absorption $E_b \leq 0{,}5$ %, for internal and external floorings	*Reference of the harmonized standard applied.* *Name and unique identification code of the product and intended use.*
Reaction to fire — $A1_{FL}$	*List of essential characteristics and the level or class of the performance declared.* *Those characteristics for which the NPD option is used are not included in the CE marking, such as in this case the 'release of dangerous substances' and 'tactility'.*
Breaking strength — > 2 000 N	
Slipperiness	
PTV slider 57, CEN/TS 16165:2012, Annex C — > 0.35	
Durability	
- internal use: — Pass	
- external use: freeze–thaw resistance — Pass	

Figure ZA.1 — Example of CE marking of ceramic tiles used as internal and external floorings under AVCP system 4 [13]

[13] No tasks require the intervention of notified bodies (AVCP system 4). Therefore, identification number of notified laboratory is not applicable.

CE 0321	*CE-marking symbol given in Directive 93/68/EEC* *Identification number of notified body/laboratory, where applicable* [14]
AnyCo Ltd, PO Box 21, B-1050 15 001CPR2013–07–14	*Name or identifying mark, and registered address of the manufacturer.* *Last two digits of the year in which the marking was first affixed.* *Reference number of the declaration of performance.*
EN 14411 Ceramic tiles, dry-pressed, with water absorption E_b > 10 %, for internal walls	*Dated reference of the harmonized standard applied.* *Name and unique identification code of the product and intended use.*
Reaction to fire | A1	*List of essential characteristics and the level or class of the performance declared.* *Those characteristics for which the NPD option is used are not included in the CE marking.*
Release of dangerous substances	
- Cadmium | < 0,1 mg/dm²	
- Lead | < 0,1 mg/dm²	
Bond strength/adhesion	
- cementitious adhesive, Type C1: | > 0,5 N/mm²	
Durability	
- internal use: | Pass	

Figure ZA.2 — Example of CE marking of ceramic tiles used as internal walls under AVCP systems 3 and 4

[14] When declaring the characteristic of release of dangerous substances (the only characteristic subject to AVCP system 3), the notified laboratory shall determine its performance. In this case, the manufacturer shall indicate the identification number of the corresponding notified laboratory.

Bibliography

[1] Commission Decision 96/603/EC of 1996-10-04 *(see OJEU L267 of 1996-10-19)*, as amended twice by 2000/605/EC of 2000-09-26 *(see OJEU L258 of 2000-10-12)* and by 2003/424/EC of 2003-06-06 *(see OJEU L144 of 2003-06-12)*

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

[3] EN ISO 9001, *Quality management systems - Requirements (ISO 9001)*

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