SLOVENSKI STANDARD
SIST EN 13748-2:2004

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Teraco ploģļ e - 2. del: Teraco ploģļ e za zunanjo rabo

Terrazzo tiles - Part 2: Terrazzo tiles for external use

Terrazzoplatten - Terrazzoplatten für die Anßenverwendung

Carreaux de mosaique - Partie 2: Carreaux de mosaique de marbre a usage extérieur

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Terrazzo tiles - Part 2: Terrazzo tiles for external use

Carreaux de mosaïque - Partie 2: Carreaux de mosaïque de marbre à usage extérieur

Terrazzoplatten – Teil 2: Terrazzoplatten für die Verwendung im Außenbereich

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

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Foreword

This document (EN 13748-2:2004) has been prepared by Technical Committee CEN/TC 229 “Precast concrete products”, the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by December 2004, and conflicting national standards shall be withdrawn at the latest by March 2006.

This document has been prepared under Mandates M119 and M122 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.

EN 13748 consists of the following parts, under the general title *"Terrazzo tiles"* :

— *Part 1: Terrazzo tiles for internal use*

— *Part 2: Terrazzo tiles for exterior use*

Terrazzo tiles for exterior use are different from concrete paving flags covered by EN 1339, *Concrete paving flags*. Main differences are that the priority is given in EN 13748-2 to decorative aspects and mechanical requirements are different. For information, decorative products, similar to flags, with limited mechanical properties intended to be used in exterior for exclusive pedestrian circulation are covered by EN 13198.

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

1 Scope

This European Standard specifies materials, properties and methods of testing for unreinforced cement-bound terrazzo tiles which are factory made and sold ready to be placed.

The tiles are intended for external use (including roofing applications) in pedestrian areas, e.g. walkways, terraces, commercial centres and swimming-pools, etc, where the decorative aspect of the covering is predominant.

NOTE This standard applies to ex-factory products and does not take into account the laying of the product.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 197-1, *Cement – Part 1: Composition, specifications and conformity criteria for common cements.*

EN 450, *Fly ash for concrete – Definitions, requirements and quality control.*

EN 934-2, *Admixtures for concrete, mortar and grout – Part 2: Concrete admixtures – Definitions, requirements, conformity, marking and labelling.*

prEN 10083-2, *Quenched and tempered steels – Part 2: Technical delivery conditions for unalloyed quality steels.*

EN 12620, *Aggregates for concrete.*

EN 13369, *Common rules for precast concrete products.*

EN ISO 6506-1, *Metallic materials – Brinell hardness test – Part 1: Test method (ISO 6501-1:1999).*

ISO 48, *Rubber, vulcanised or thermoplastics – Determination of hardness (hardness between 10 IRHD and 100 IRHD).*

ISO 4662, *Rubber – Determination of rebound resilience of vulcanizates.*

ISO 7619, *Rubber – Determination of indentation hardness by means of pocket hardness meters.*

ISO 8486-1, *Bounded abrasives – Determination and designation of grain size distribution – Part 1: Macrogrits F4 to F220.*

3 Terms and definitions

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

3.1
terrazzo tiles
suitably compacted elements of uniform shape and thickness, which conform with this standard. The tiles may be single – or dual – layered.

They are either individually produced by compression and/or vibration, or cast as large cement-bound mineral aggregate sheets or blocks by means of vibration and/or compression and/or vacuum, before being cut to size

3.2
single-layered terrazzo tiles
terrazzo tiles made in a single homogeneous layer of granules or chippings of a suitable aggregate embedded in a paste of grey or white cement and water. Admixtures and additions may be used

3.3
dual-layered terrazzo tiles
terrazzo tiles made up of a facing or wear layer whose composition is similar to single-layered terrazzo tiles and a second layer known as the backing or base concrete layer whose surface is not exposed during normal use and which in the case of a calibrated tile will be partially removed by specialised processing

3.4
work dimension
any dimension of a terrazzo tile specified for its manufacture to which the actual dimension should conform within specified permissible deviations

3.5
actual dimension
dimension of a terrazzo tile as measured

3.6
format
dimensions of a terrazzo tile as specified in commercial terms, mostly in rounded figures

3.7
thickness
distance between the upper face and the bed face of the terrazzo tile

3.8
upper face
surface intended to be seen when in use

3.9
bed face
surface generally parallel to the upper face and in contact with the bedding after laying

3.10
facing layer
layer of concrete on the face of a tile of materials and/or properties different to the main body or backing layer of a terrazzo tile

3.11
slip resistance
property of the surface to maintain the adherence of a pedestrian foot

3.12
declared value
value for a requirement as declared by the manufacturer, taking into account the accuracy of the test and the variability of the manufacturing process

3.13
textured upper face
not flat upper face, with a regular texture pattern

4 Requirements

4.1 Materials

4.1.1 General

Only materials with established suitability shall be used.

The suitability requirements of the materials used shall be given in the manufacturer's production control documentation.

The suitability of materials shall be established in terms of their properties and performance.

Where, by conformity with relevant specifications, the properties and performance of materials have been demonstrated, further testing need not be performed.

4.1.2 Cement

EN 197-1 shall be applied. The suitability of cement shall be established in accordance with 4.1.1.

4.1.3 Aggregates

EN 12620 shall be applied. Natural stone or other aggregates may be used provided that their suitability has been assessed according to 4.1.1.

4.1.4 Mixing water

The suitability of mixing water shall be established in accordance with 4.1.1.

In general in Europe, water from the public supply is suitable.

4.1.5 Admixtures

EN 934-2 shall be applied. The suitability of admixtures shall be established in accordance with 4.1.1.

4.1.6 Additions (including mineral fillers, pigments and polymers)

Where applicable, fly ash shall conform to EN 450. The suitability of the other additions shall be established in accordance with 4.1.1.

4.2 Finished product requirements

4.2.1 General

When tested in accordance with the methods described in clause 5, the tiles shall comply with the following requirements at the minimum age of 28 days or at the age declared suitable for use by the manufacturer if earlier.

4.2.2 Geometrical requirements

4.2.2.1 General

The work dimensions of the tiles shall be specified by the manufacturer.

4.2.2.2 Thickness

Thickness class I (Th I) : The thickness of the facing layer of the manufactured tile shall be at least 4 mm for a product that will not be ground after laying.

Thickness class II (Th II) : The thickness of the facing layer of the manufactured tile shall be at least 8 mm for a product that will be ground after laying.

Isolated particles of aggregates protruding into the facing material shall be ignored. No thickness requirements are applicable to single layered tiles.

NOTE If the surface of the terrazzo tiles contains ridges, grooves or other surface features as shown in Figure 1, the minimum thickness of the upper face from the bottom of the grooves to the bottom of the facing layer should be 2 mm.

4.2.2.3 Dimensional deviations

Individual units when tested in accordance with 5.2 shall conform to the manufacturer's declared work dimensions within the permissible deviations. These deviations of the actual dimensions from the declared work dimensions shall be in accordance with Table 1.

Table 1 – Deviation of actual dimensions

Dimension	Tolerance
Edge length	± 0,3 %
Thickness of the unit	± 2 mm (for a thickness ≤ 40 mm) ± 3 mm (for a thickness ≥ 40 mm)

The difference between any two measurements of the thickness of a single tile shall be ≤ 3 mm.

Tiles specified as calibrated shall have a tolerance on thickness of ± 1 mm.

4.2.2.4 Shape tolerances

4.2.2.4.1 General

The format of the terrazzo tiles shall be specified by the manufacturer, including at least the length, the width and the thickness. For non-square or non-rectangular tiles, the manufacturer shall also specify all the work dimensions that are required to define the tile.

4.2.2.4.2 Straightness of edges of the upper face

When measured in accordance with 5.3, the maximum discrepancy between the edge and the ruler shall not exceed ± 0,3 % of the length of the considered edge.

4.2.2.4.3 Flatness of the upper face

When measured in accordance with 5.4, no point shall deviate from the surface by more than 0,3 % of the length of the considered diagonal. This does not apply to textured upper faces.

4.2.3 Surface characteristics and appearance

In natural daylight and dry condition, no projections, depressions, flakes or crazes shall be visible from a distance of 2 m.

Permanent filling of minor voids is allowed.

Colourings, where applied, shall be provided in a facing layer or throughout the tile. Slight variations in the colour consistency between batches of tiles can be caused by unavoidable variations in the shade and properties of cement and aggregates, by the manufacturing process or by time. The manufacturer shall define what he considers as a batch.

NOTE Special attention should be given to correct storage of the tiles before placing them into the works.

4.2.4 Mechanical strength

4.2.4.1 Breaking strength

The breaking strength shall be tested in accordance with 5.5.

4.2.4.2 Breaking strength requirements

The breaking strength is deemed sufficient when the tiles comply with the following requirements when tested in accordance with 5.5:

— the mean breaking strength for four specimens shall be more than or equal to the values in Table 2 for the appropriate strength class ;

— no individual result shall be lower than the values in Table 2 for the appropriate strength class.

Table 2 — Breaking strength classes for external use

Class	Marking	Average bending strength MPa	Minimum bending strength MPa
1	ST	3,5	2,8
2	TT	4,0	3,2
3	UT	5,0	4,0

NOTE Guidance on application may be provided on a national basis.

4.2.4.3 Breaking load requirements

When tested in accordance with the test method described in 5.5, the tiles shall comply with the following requirements:

— the average breaking load for four specimens shall be more than or equal to the values in Table 3 for the appropriate breaking class;

— no individual result shall be lower than the values in Table 3 for the appropriate breaking class.

Table 3 — Breaking load classes

Class	Marking	Average breaking load kN	Minimum breaking load kN
30	3T	3,0	2,4
45	4T	4,5	3,6
70	7T	7,0	5,6
110	11T	11,0	8,8
140	14T	14,0	11,2
250	25T	25,0	20,0
300	30T	30,0	24,0
NOTE For design considerations special attention should be paid to the possible loading conditions on flags larger than 600 mm and if class 30 is required, it is only recommended for use with a continuous rigid foundation.			

4.2.4.4 Abrasion

Abrasion shall be verified in accordance with the wide wheel test method described in 5.6.1 (modified Capon test) which is the reference test; alternatively, the Böhme test method described in 5.6.2 may be used. The abrasion requirement is assumed satisfied:

— if no individual test result exceeds the values in Table 4 for the appropriate abrasion class, when tested in accordance with the wide wheel test (5.6.1 modified Capon test);

— if no individual test result exceeds the values in Table 4 for the appropriate abrasion class, when tested in accordance with the Böhme test (5.6.2).

Table 4 — Abrasion resistance classes

Class	Marking	Individual abrasion
1	F	no performance measured
2	G	≤ 26 mm measured in accordance with the test method described in 5.6.1 **or alternatively** ≤ 26 $cm^3/50\ cm^2$ measured in accordance with test method described in 5.6.2.
3	H	≤ 23 mm measured in accordance with the test method described in 5.6.1 **or alternatively** ≤ 20 $cm^3/50\ cm^2$ measured in accordance with test method described in 5.6.2.
4	I	≤ 20 mm measured in accordance with the test method described in 5.6.1 **or alternatively** ≤ 18 $cm^3/50\ cm^2$ measured in accordance with test method described in 5.6.2.

4.2.5 Slip/Skid resistance

4.2.5.1 General

Terrazzo tiles for external use have satisfactory slip/skid resistance, provided their whole upper surface has not been ground and/or polished to produce a very smooth surface.

If in an exceptional case the unpolished slip/skid resistance value (USRV) is required, the product shall be tested according to 5.7 and the result declared.

If the surface of the terrazzo tile contains ridges, grooves or other surface features which prevent testing by pendulum friction equipment, the product is deemed to satisfy the requirements without testing.

NOTE The slip/skid resistance value relates to the tiles as manufactured.

4.2.5.2 Durability of slip/skid resistance

Under normal conditions of use, terrazzo tiles provide satisfactory slip/skid resistance during the working life of the product, provided they are subjected to normal maintenance that does not modify their initial slipperiness.

4.2.6 Weathering resistance

The weathering resistance is determined by test in accordance with 5.8 for water absorption or in accordance with 5.9 for freeze-thaw resistance.

The terrazzo tile shall comply with the requirements in Table 5.

Table 5 — Weathering resistance classes

Class	Marking	Water absorption % by mass	Mass loss after freeze/thaw test kg/m^2
1	A	No performance measured	No performance measured
2	B	≤ 6 as a mean	No performance measured
3	D	No performance measured	≤ 1,0 as a mean with no individual value > 1,5

NOTE The National Annex of a country may state the class(es) of weathering resistance required to ensure durability for that country.

4.2.7 Fire performance

4.2.7.1 Reaction to fire

Terrazzo tiles for external use are considered to be reaction to fire class A1fl without the need for testing according to EC Decision 96/603/EEC, as amended.

4.2.7.2 External fire performance

Terrazzo tiles for external use used as roof covering are deemed to satisfy the requirements for external fire performance without the need for testing according to EC Decision 2000/553/EC.

4.2.8 Thermal conductivity

If terrazzo tiles for external use are intended to contribute to the thermal performance of an element, the manufacturer shall declare the thermal conductivity using data given in Table L2 of EN 13369.

5 Physical test methods

5.1 Sampling plan and compliance criteria

Table 6 details the sampling and compliance criteria for the testing of each requirement.