SLOVENSKI STANDARD
SIST EN 176:1998

01-november-1998

Suho stiskane keramiļ ne ploģļ ice z nizko vodovpojnostjo (E<=3 %) - skupina BI

Dust-pressed ceramic tiles with a low water absorption (E<=3%) - Group BI

Trockengepreßte keramische Fliesen und Platten mit niedriger Wasseraufnahme (E<=3%) - Gruppe BI

Carreaux et dalles céramiques pressés à sec, à faible absorption d'eau (E<=3%) - Groupe BI

Ta slovenski standard je istoveten z: **EN 176:1991**

ICS:

91.100.23 Keramiļ ne ploģļ ice Ceramic tiles

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EUROPEAN STANDARD

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EN 176:1991

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Descriptors: Tiles, coating slabs, equipment specifications, dimensions, dimensional tolerances, mechanical properties, physical properties, chemical properties, appearence, marking

English version

Dust-pressed ceramic tiles with a low water absorption (E<=3%) -- Group BI.

Carreaux et dalles céramiques pressés à sec, à faible absorption d'eau (E<=3%) -- Groupe BI.

Trockengepreßte keramische Fliesen und Platten mit niedriger Wasseraufnahme (E<=3%) -- Gruppe BI.

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat or to any CEN member.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

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FOREWORD

This European Standard was drawn up by the Technical Committee CEN/TC 67 'Ceramic tiles', the Secretariat of which is held by UNI.

This European Standard was adopted by CEN on the strength of its acceptance by the following Member countries:

Austria
Belgium
Denmark
Finland
France
Germany
Greece
Iceland
Ireland
Italy
Luxemburg
Netherlands
Norway
Portugal
Spain
Sweden
United Kingdom

1. Object and field of application

This European Standard specifies the sizes, dimensional tolerances, mechanical, physical and chemical requirements, surface quality requirements and marking of ceramic tiles.

It is applicable only to dust-pressed ceramic tiles, including tiles premounted on sheets of first quality, with a low water absorption ($E \leq 3$ %) according to Group BI of EN 87, for interior and exterior use on both floors and walls.

2. References

EN 87 'Ceramic floor and wall tiles — Definitions, classification, characteristics and marking'

EN 98 'Ceramic tiles — Determination of dimensions and surface quality'

EN 99 'Ceramic tiles — Determination of water absorption'

EN 100 'Ceramic tiles — Determination of modulus of rupture'

EN 101 'Ceramic tiles — Determination of scratch hardness of surface according to Mohs'

EN 102 'Ceramic tiles — Determination of resistance to deep abrasion — Unglazed tiles'

EN 103 'Ceramic tiles — Determination of linear thermal expansion'

EN 104 'Ceramic tiles — Determination of resistance to thermal shock'

EN 105 'Ceramic tiles — Determination of crazing resistance — Glazed tiles'

EN 106 'Ceramic tiles — Determination of chemical resistance — Unglazed tiles'

EN 122 'Ceramic tiles — Determination of chemical resistance — Glazed tiles'

EN 154 'Ceramic tiles — Determination of resistance to surface abrasion — Glazed tiles'

EN 163 'Ceramic tiles — Sampling and basis for acceptance'

EN 202 'Ceramic tiles — Determination of frost resistance'

3. Definitions

The definition of dust-pressed ceramic tiles is given in EN 87. Mosaic is a tile of any geometrical shape whose surface area is equal to or less than 90 cm^2. A fully vitrified tile is one with a water absorption of a maximum individual value of 0,5 %.

The water absorption of unglazed light coloured tiles, which are usually white bodied, is normally less than 1,5 %. If the average of 1,5 % is exceeded, the water absorption shall be indicated by the manufacturer.

The surface of tiles and components belonging to this group can be smooth, profiled, wavy, decorated or finished in some other way. It can be unglazed (UGL), glossy, matt or semi-matt (GL).

The tiles have a visible surface and usually a surface which is intended to be adhered and bears a back panel. They may, however, have identical surfaces without a panel or marking.

Tiles may have spacer-lugs.

4. Shapes and sizes

For shapes and sizes, see figures 1 and 2 and tables 1 and 2.

4.1 Modular preferred sizes (See table 1)

4.2 Non-modular sizes. The most common sizes are those given in table 2.

4.3 Other sizes. For tiles with dimensions other than those given in **4.1** and **4.2**, the work size shall be stated by the manufacturer. The relevant requirements for work size and thickness given in the respective tables above are applicable.

4.4 Spacer lug tiles. Spacer lugs are projections, which are 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 joint. Lugs are positioned so that the joint between the tiles may be filled with grout without the lugs remaining exposed.

Dust-pressed tiles may be made with other spacer lug systems and in such cases, the manufacturer's work size shall apply.

For an example of spacer lug tiles, see figure 2.

NOTE. Some tiles have one or more manufacturing projections part way along certain edges and smaller than 0,3 mm. These are not intended as spacer lugs and shall not be used to space joints.

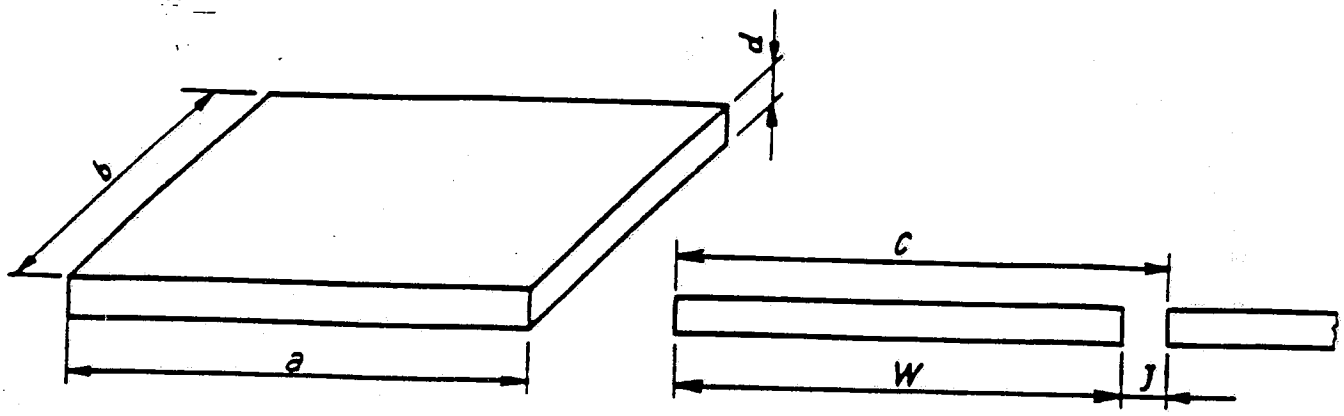
4.5 Accessories. Dimensions of accessories and their tolerances are not standardized and these shall be stated by the manufacturer where appropriate.

5. Requirements

Given the wide diversity of tile/component sizes as found in practice, shape and dimensional requirements shall be based upon the surface area determined by nominal dimensions of the tiles and components in question.

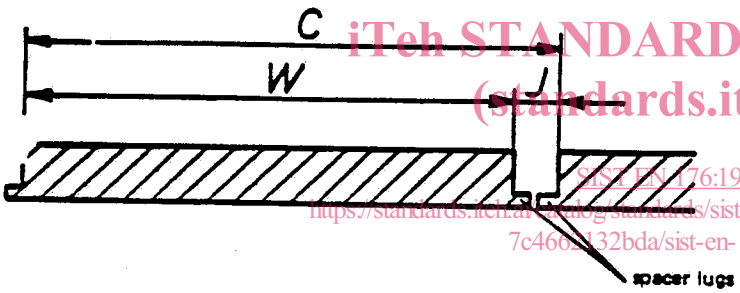
Dimensional and surface quality requirements and physical and chemical properties are given in table 3.

Sampling and basis for acceptance shall be in accordance with EN 163.



Co-ordinating size (*C*) = Work size (*W*) + Joint (*J*)
Work size (*W*) = Dimension of the visible face (*a*) and (*b*)

Figure 1. Tile



Co-ordinating size (*C*) = Work size (*W*) + Joint (*J*)
Work size (*W*) = Dimension of the visible face (*a*) and (*b*)

Figure 2. Tile with spacer lug

Table 1. Modular preferred sizes

Co-ordinating size (*C*) cm	Work size (*W*) mm		Thickness (*d*) mm
	Length (*a*)	Width (*b*)	
M 10 x 10 M 15 x 15 M 20 x 10 M 20 x 15 M 20 x 20 M 30 x 30	The manufacturer shall choose the work size in order to allow a nominal joint width of between 2 mm to 5 mm		The thickness shall be specified by the manufacturer. It includes the profile on the visual face and on the rear side

Table 2. Non-modular sizes

The most common sizes are:

Nominal size (*N*) cm	Work size (*W*) mm		Thickness (*d*) mm
	Length (*a*)	Width (*b*)	
10 x 10 15 x 7,5 15 x 10 15 x 15 15,2 x 7,6 15,2 x 15,2 20 x 10 20 x 20 25 x 25 30 x 15 30 x 20 30 x 30 40 x 30	The manufacturer shall choose the work size in such a way that the difference between the work size and the nominal size is not more than ± 2 % and 5 mm		The thickness shall be specified by the manufacturer. It includes the profile on the visual face and on the rear side

Table 3.

	Surface S of the product (cm²)				Test according to
	$S \leq 90$	$90 < S \leq 190$	$190 < S \leq 410$	$S > 410$	
Dimensions and surface quality					
Length and width					
e The deviation in % of the average size for each tile (2 or 4 sides) from the work size (*W*)	± 1,2	± 1,0	± 0,75	± 0,6	EN 98
f The deviation in % of the average size for each tile (2 or 4 sides) from the average size of the 10 test specimens (20 or 40 sides)	± 0,75	± 0,5	± 0,5	± 0,5	EN 98
Thickness					
The deviation, in %, of the average thickness of each tile from the work size thickness	± 10	± 10	± 5	± 5	EN 98
Straightness of sides[1] *(facial sides)*					
The maximum deviation from straightness, in %, related to the corresponding work size	± 0,75	± 0,5	± 0,5	± 0,5	EN 98
Rectangularity[1]					
The maximum deviation from rectangularity, in %, related to the corresponding work sizes	± 1,0	± 0,6	± 0,6	± 0,6	EN 98
Surface flatness					
The maximum deviation from flatness, in %					
(a) centre curvature, related to diagonal calculated from the work size	± 1,0	± 0,5	± 0,5	± 0,5	EN 98
(b) edge curvature, related to the corresponding work size	± 1,0	± 0,5	± 0,5	± 0,5	EN 98
(c) warpage, related to diagonal calculated from the work size	± 1,0	± 0,5	± 0,5	± 0,5	EN 98
Surface quality[2]	Min. 95 % of tiles shall be free from visible defects that would impair the appearance of a major area of tiles.				EN 98
Physical properties					
Water absorption % by weight	Average ≤ 3 Individual max. 3,3				EN 99
Modulus of rupture in N/mm²	min. 27				EN 100
Scratch hardness of surface (Mohs scale)					
(a) glazed tiles	min. 5				EN 101
(b) unglazed tiles	min. 6				EN 101
Abrasion resistance					
(a) Resistance to deep abrasion of unglazed tiles: removed volume in mm³	max. 205				EN 102
(b) Resistance to abrasion of glazed tiles Class I - IV	According to the abrasion class indicated by the manufacturer				EN 154
Coefficient of linear thermal expansion from ambient temperature to 100 °C (K^{-1})	max. 9×10^{-6}				EN 103
Thermal shock resistance	required				EN 104
Crazing resistance[3] *glazed tiles*	required				EN 105
Frost resistance	required				EN 202

1) Not applicable for tiles having curved shapes.

2) 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 dust-pressed tiles of low water absorption (which can be unglazed, glazed or partly glazed) or to the colour variation over a tile area which is characteristic for this type of tile and desirable. Spots or coloured dots which are introduced for decorative purposes are not considered a defect.

3) Certain decorative effects may have a tendency to craze. These must be identified by the manufacturer, in which case the crazing test given in EN 105 is not applicable.