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GB/T 4100-2015

Replacing GB/T 4100-2006

Ceramic tiles

(ISO 13006:2012, Ceramic tiles - Definitions, classification, characteristics and marking, MOD)

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Foreword

This Standard is drafted in accordance with the rules given in GB/T 1.1-2009.

This Standard replaces GB/T 4100-2006 “Ceramic tiles”. Compared with GB/T 4100-2006, the main technical changes are as follows:

- ADD the specifications for the thickness of ceramic tiles (see 7.3);
- DELETE extruded ceramic tiles 3 % < E ≤ 6 %, Group AIIa - Part 2 (see Annex C of 2006 edition);
- DELETE extruded ceramic tiles 6 % < E ≤ 10 %, Group AIIb - Part 2 (see Annex E of 2006 edition);
- MODIFY the requirements for the coefficient of friction of ceramic tiles (See Annex A, Annex B, Annex C, Annex D, Annex E, Annex G, Annex H, Annex J, Annex K, Annex L of this Standard, Annex A, Annex B, Annex C, Annex D, Annex E, Annex G, Annex H, Annex J, Annex K, Annex L of 2006 edition);
- MODIFY the requirements for the small colour difference of ceramic tiles (See Annex A, Annex B, Annex C, Annex D, Annex E, Annex G, Annex H, Annex J, Annex K, Annex L of this Standard, Annex A, Annex B, Annex C, Annex D, Annex E, Annex G, Annex H, Annex J, Annex K, Annex L of 2006 edition);
- MODIFY the classification method for the technical requirements of dry-pressed ceramic tiles, from the classification according to product surface areas to the classification according to nominal sizes (see Annex G, Annex H, Annex J, Annex K of this Standard, Annex G, Annex H, Annex J, Annex K of 2006 edition);
- MODIFY the classification method for the technical requirements of ceramic tiles, from the classification according to whether there are spacer lugs to the classification according to nominal sizes (see Annex L of this Standard, Annex L of 2006 edition).

This Standard uses the re-drafting method to modify and adopt ISO 13006:2012 “Ceramic tiles - Definitions, classification, characteristics and marking”.

Compared with ISO 13006:2012, this Standard has added 3 clauses (7.1, 7.2, 7.3) in the structure, and added the thickness of ceramic tiles (see 7.3), to meet the needs of the thinness tendency of China’s ceramic tiles. ADD an annex (Annex M) to unify the determination method for coefficient of friction. DELETE two annexes of ISO 13006:2012 (Annex C and Annex E of ISO 13006:2012), that is, cancel part 2 in Group AIIa extruded ceramic tiles (3 % < E ≤ 6 %) of medium water absorption and part 2 in Group AIIb extruded ceramic tiles (6 % < E ≤ 10 %) of medium water absorption, which

Ceramic tiles

1 Scope

This Standard specifies terms and definitions, classifications, characteristics, sampling and basis for acceptance, requirements and test methods, marking and specifications for ceramic tiles.

This Standard is applicable to ceramic tiles made by extrusion or dry pressing.

This Standard is not applicable to ceramic accessory tiles.

2 Normative references

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

GB/T 3810.1 Test methods of ceramic tiles - Part 1: Sampling and basis for acceptance (GB/T 3810.1-2006, ISO 10545-1:1995, MOD)

GB/T 3810.2 Test methods of ceramic tiles - Part 2: Determination of dimensions and surface quality (GB/T 3810.2-2006, ISO 10545-2:1995, MOD)

GB/T 3810.3 Test method of ceramic tiles - Part 3: Determination of water absorption, apparent porosity, apparent relative density and bulk density (GB/T 3810.3-2006, ISO 10545-3:1995, IDT)

GB/T 3810.4 Test methods of ceramic tiles - Part 4: Determination of modulus of rupture and breaking strength (GB/T 3810.-2006, ISO 10545-4:2004, IDT)

GB/T 3810.5 Test methods of ceramic tiles - Part 5: Determination of impact resistance by measurement of coefficient of restitution (GB/T 3810.5-2006, ISO 10545-5:1996, IDT)

GB/T 3810.6 Test methods of ceramic tiles - Part 6: Determination of resistance to deep abrasion for unglazed tiles (GB/T 3810.6-2006, ISO 10545-6:1995, IDT)

GB/T 3810.7 Test methods of ceramic tiles - Part 7: Determination of resistance to surface abrasion for glazed tiles (GB/T 3810.7-2006, ISO 10545-7:1996, IDT)

GB/T 3810.8 Test methods of ceramic tiles - Part 8: Determination of linear thermal

expansion (GB/T 3810.8-2006, ISO 10545-8:1994, IDT)

GB/T 3810.9 Test methods of ceramic tiles - Part 9: Determination of resistance to thermal shock (GB/T 3810.9-2006, ISO10545-9:1994, IDT)

GB/T 3810.10 Test methods of ceramic tiles - Part 10: Determination of moisture expansion (GB/T 3810.10-2006, ISO 10545-10:1995, IDT)

GB/T 3810.11 The methods of ceramic tiles - Part 11: Determination of crazing resistance for glazed tiles (GB/T 3810.11-2006, ISO 10545-11:1994, IDT)

GB/T 3810.12 Test methods of ceramic tiles - Part 12: Determination of frost resistance (GB/T 3810.12-2006, ISO 10545-12:1995, IDT)

GB/T 3810.13 Test methods of ceramic tiles - Part 13: Determination of chemical resistance (GB/T 3810.13-2006, ISO 10545-13:1995, IDT)

GB/T 3810.14 Test methods of ceramic tiles - Part 14: Determination of resistance to stains (GB/T 3810.14-2006, ISO 10545-14:1995, IDT)

GB/T 3810.15 Test methods of ceramic tiles - Part 15: Determination of lead and cadmium given off by glazed tiles (GB/T 3810.15-2006, ISO 10545-15:1995, IDT)

GB/T 3810.16 Test methods of ceramic tiles - Part 16: Determination of small colour differences (GB/T 3810.16-2006, ISO 10545-16:1999, IDT)

GB/T 9195-2011 Classification and terms of building and sanitary ceramics

GB/T 13891 Test methods of specular gloss for decorative building materials

3 Terms and definitions

For the purposes of this document, the terms and definitions given in GB/T 9195-2011 and the following apply. For ease of use, some of the terms and definitions in GB/T 9195-2011 are repeated below.

3.1

ceramic tile

Plate or block building ceramic products made from clays, feldspars and quartz, generally used as covering for floors and walls.

[GB/T 9195-2011, definition 3.1.1]

3.2

3.8

porcelain tile

Ceramic tiles with a water absorption (*E*) of not more than 0.5 %.

3.9

stoneware porcelain tile

Ceramic tiles with a water absorption (*E*) of more than 0.5 % and not more than 3 %.

3.10

fine stoneware tile

Ceramic tiles with a water absorption (*E*) of more than 3 % and not more than 6 %.

3.11

stoneware tile

Ceramic tiles with a water absorption (*E*) of more than 6 % and not more than 10 %.

3.12

earthenware tile

Ceramic tiles with a water absorption (*E*) of more than 10 %.

3.13

water absorption

E

Mass of the water absorbed when dried unit mass of products is saturated, expressed as a percentage by mass.

[GB/T 9195-2011, definition 7.10]

3.14

description of sizes

NOTE: The sizes here 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. See Figures 1 and 2.

Size used to describe the product specification.

3.14.2

work size

W

Size specified for manufacturing to which the actual size shall conform within specified permissible deviations.

NOTE: Work size includes length, width and thickness.

3.14.3

actual size

Size measured in accordance with the method in GB/T 3810.2.

3.14.4

coordinating size

C

Work size plus the joint width.

3.14.5

modular size

Tile and size based on module M, 2 M, 3 M and 5 M and also their multiples or subdivisions, except for tiles with a surface area of less than 9 000 mm^2.

NOTE: In ISO 1006, 1 M = 100 mm.

3.14.6

non-modular size

Size not based on module M

3.14.7

tolerance

Difference between the permissible limits of size.

3.15

	Surface quality	√	√	√	√	GB/T 3810.2
	Back feet[a]				√	Figure 3
Physical property	Water absorption	√	√	√	√	GB/T 3810.3
	Breaking strength	√	√	√	√	GB/T 3810.4
	Modulus of rupture	√	√	√	√	GB/T 3810.4
	Resistance to deep abrasion of unglazed tiles	√	√			GB/T 3810.6
	Resistance to surface abrasion of glazed tiles	√	√			GB/T 3810.7
	Linear thermal expansion[b]	√	√	√	√	GB/T 3810.8
	Resistance to thermal shock[b]	√	√	√	√	GB/T 3810.9
	Resistance to crazing of glazed tiles	√	√	√	√	GB/T 3810.11
	Frost resistance[c]		√		√	GB/T 3810.12
	Moisture expansion[b]	√	√	√	√	GB/T 3810.10
	Small colour differences[b]	√	√	√	√	GB/T 3810.16
	Impact resistance[b]	√	√			GB/T 3810.5
Chemical property	Resistance to staining of glazed tiles	√	√	√	√	GB/T 3810.14
	Resistance to staining of unglazed tiles[b]	√	√	√	√	GB/T 3810.14
	Resistance to low concentrations of acids and alkalis	√	√	√	√	GB/T 3810.13
	Resistance to high concentrations of acids and alkalis[b]	√	√	√	√	GB/T 3810.13
	Resistance to household cleaners and swimming pool salts	√	√	√	√	GB/T 3810.13
	Lead and cadmium release of glazed tiles[b]	√	√	√	√	GB/T 3810.15
	Lead and cadmium release of glazed tiles[b]	√	√	√	√	GB/T 3810.15

[a] For application to exterior tiles installed by cement mortar, including tiles installed in tunnels.
[b] See Annex Q.
[c] For tiles intended to be used in situations where frost conditions apply.

6 Sampling and basis for acceptance

The sampling and basis for acceptance shall be in accordance with GB/T 3810.1.

g) total weight of the tiles and their packaging.

8.2 Product literature

Product literature for tiles intended for use on floors shall state the abrasion class or the place of use of glazed tiles.

NOTE: See Annex N.

8.3 Product specifications

Product specifications shall include the following:

a) the method of shaping;

b) type of ceramic tile and reference to the appropriate annex of this Standard;

c) nominal and work sizes, modular (M) and non-modular;

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

e) back feet (if required).

EXAMPLE 1: Precision extruded tile, GB/T 4100-2015, Annex A, AIa M 25 cm × 12.5 cm (*W* 240 mm × 115 mm × 10 mm) GL.

EXAMPLE 2: Natural extruded tile, GB/T 4100-2015, Annex B, AIb 15 cm × 15 cm (*W* 150 mm × 15 mm × 12.5 mm) UGL.

EXAMPLE 3: Dry-pressed tile, GB/T 4100-2015, Annex G, BIa M 25 cm × 12.5 cm (*W* 240 mm × 115 mm × 10 mm) GL.

EXAMPLE 4: Dry-pressed tile, GB/T 4100-2015, Annex L, BIII 15 cm × 15 cm (*W* 150 mm × 150 mm × 12.5 mm) UGL.

Back feet (if required)	Height (h)/mm		$h \geq 0.7$	Figure 3
	Shape		Back feet as specified by the manufacturer and as shown in one of the examples in Figure 3. Example 1: $L_0 - L_1 > 0$ Example 2: $L_0 - L_2 > 0$ Example 3: $L_0 - L_3 > 0$	Figure 3
Surface quality[d]			A minimum of 95 % of the tiles are to be free from visible defects which can impair the appearance of a major area of tiles	GB/T 3810.2
Water absorption[e] (Per cent mass fraction)			Average value ≤ 0.5 %, individual value ≤ 0.6 %	GB/T 3810.3
Breaking strength/N	Thickness (work size) ≥ 7.5 mm		≥ 1 300	GB/T 3810.4
	Thickness (work size) < 7.5 mm		≥ 600	GB/T 3810.4
Modulus of rupture/[N/mm^2 (MPa)] Not applicable to tiles with breaking strength ≥ 3 000 N			Average value ≥ 28, individual value ≥ 21	GB/T 3810.4
Abrasion resistance	Resistance to deep abrasion of unglazed tiles: removed volume/mm^2		≤ 275	GB/T 3810.6
	Resistance to surface abrasion of glazed tiles intended for use on floors[f]		Report abrasion class and cycles passed	GB/T 3810.7
Coefficient of linear thermal expansion[g]	From ambient temperature to 100 °C		See Annex Q	GB/T 3810.8
Thermal shock resistance[g]			See Annex Q	GB/T 3810.9
Crazing resistance of glazed tiles[h]			No crazing after test	GB/T 3810.11
Frost resistance			See Annex Q	GB/T 3810.12
Coefficient of friction of tiles			Individual value ≥ 0.50	Annex M
Moisture expansion[g]/(mm/m)			See Annex Q	GB/T 3810.10
Small colour differences[g]			Plain coloured tiles GL: $\Delta E < 0.75$ UGL: $\Delta E < 1.0$	GB/T 3810.16
Impact resistance[g]			See Annex Q	GB/T 3810.5
Resistance to staining	Glazed tiles		Minimum class 3	GB/T 3810.14
	Unglazed tiles e		See Annex Q	GB/T 3810.14
Resistance to chemicals	Resistance to low concentrations of	glazed tiles	Manufacturer is to state classification	GB/T 3810.13

Annex B

(normative)

Extruded ceramic tiles (0.5 < *E* ≤ 3 %, Group AIb)

Technical requirements for extruded ceramic tiles (0.5 < *E* ≤ 3 %, Group AIb) shall be in accordance with Table B.1.

Table B.1 -- Technical requirements for extruded ceramic tiles (0.5 < *E* ≤ 3 %, Group AIb)

Technical requirements				Test method
Item		Precision	Natural	
Length and width	The deviation, in %, 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	GB/T 3810.2
	The deviation, in %, of the average size for each tile (2 or 4 sides) from the average size of 10 tiles (20 or 40 sides)	± 1.0	± 1.5	GB/T 3810.2
	The manufacturer shall choose the work size as follows: for modular tiles in order to allow a nominal joint width of between 3 mm and 11 mm[a]; for non-modular tiles so that the difference between the work size and the nominal size is not more than ± 3 mm.			GB/T 3810.2
Thickness[b] The thickness shall be specified by the manufacturer; The deviation, in %, of the average thickness of each tile from the work size thickness		± 10	± 10	GB/T 3810.2
Straightness of sides[c] (facial sides) The maximum deviation from straightness, in %, related to the corresponding work sizes		± 0.5	± 0.6	GB/T 3810.2
Rectangularity[c] The maximum deviation from rectangularity, in %, related to the corresponding work sizes		± 1.0	± 1.0	GB/T 3810.2
Surface flatness The maximum deviation from flatness/%	Centre curvature, related to diagonal calculated from the work sizes	± 0.5	± 1.5	GB/T 3810.2
	Edge curvature, related to the corresponding work sizes	± 0.5	± 1.5	GB/T 3810.2
	Warpage, related to diagonal calculated from the work sizes	± 0.8	± 1.5	GB/T 3810.2
Back feet	Height (*h*)/mm	*h* ≥ 0.7		Figure 3

Annex C

(normative)

Extruded ceramic tiles (3 % < *E* ≤ 6 %, Group AIIa)

Technical requirements for extruded ceramic tiles (3 % < *E* ≤ 6 %, Group AIIa) shall be in accordance with Table C.1.

Table C.1 -- Technical requirements for extruded ceramic tiles (3 % < *E* ≤ 6 %, Group AIIa)

Technical requirements				Test method
Item		Precision	Natural	
Length and width	The deviation, in %, 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	GB/T 3810.2
	The deviation, in %, of the average size for each tile (2 or 4 sides) from the average size of 10 tiles (20 or 40 sides)	± 1.0	± 1.5	GB/T 3810.2
	The manufacturer shall choose the work size as follows: for modular tiles in order to allow a nominal joint width of between 3 mm and 11 mm[a]; for non-modular tiles so that the difference between the work size and the nominal size is not more than ± 3 mm.			GB/T 3810.2
Thickness[b] The thickness shall be specified by the manufacturer; The deviation, in %, of the average thickness of each tile from the work size thickness		± 10	± 10	GB/T 3810.2
Straightness of sides[c] (facial sides) The maximum deviation from straightness, in %, related to the corresponding work sizes		± 0.5	± 0.6	GB/T 3810.2
Rectangularity[c] The maximum deviation from rectangularity, in %, related to the corresponding work sizes		± 1.0	± 1.0	GB/T 3810.2
Surface flatness The maximum deviation from flatness/%	Centre curvature, related to diagonal calculated from the work sizes	± 0.5	± 1.5	GB/T 3810.2
	Edge curvature, related to the corresponding work sizes	± 0.5	± 1.5	GB/T 3810.2
	Warpage, related to diagonal calculated from the work sizes	± 0.8	± 1.5	GB/T 3810.2
Back feet	Height (*h*)/mm	*h* ≥ 0.7		Figure 3

Annex D

(normative)

Extruded ceramic tiles (6 % < *E* ≤ 10 %, Group AIIb)

Technical requirements for extruded ceramic tiles (6 % < *E* ≤ 10 %, Group AIIb) shall be in accordance with Table D.1.

Table D.1 -- Technical requirements for extruded ceramic tiles (6 % < *E* ≤ 10 %, Group AIIb)

Technical requirements				Test method
Item		Precision	Natural	
Length and width	The deviation, in %, 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	GB/T 3810.2
	The deviation, in %, of the average size for each tile (2 or 4 sides) from the average size of 10 tiles (20 or 40 sides)	± 1.5	± 1.5	GB/T 3810.2
	The manufacturer shall choose the work size as follows: for modular tiles in order to allow a nominal joint width of between 3 mm and 11 mm[a]; for non-modular tiles so that the difference between the work size and the nominal size is not more than ± 3 mm.			GB/T 3810.2
Thickness[b] The thickness shall be specified by the manufacturer; The deviation, in %, of the average thickness of each tile from the work size thickness		± 10	± 10	GB/T 3810.2
Straightness of sides[c] (facial sides) The maximum deviation from straightness, in %, related to the corresponding work sizes		± 1.0	± 1.0	GB/T 3810.2
Rectangularity[c] The maximum deviation from rectangularity, in %, related to the corresponding work sizes		± 1.0	± 1.0	GB/T 3810.2
Surface flatness The maximum deviation from flatness/%	Centre curvature, related to diagonal calculated from the work sizes	± 1.0	± 1.5	GB/T 3810.2
	Edge curvature, related to the corresponding work sizes	± 1.0	± 1.5	GB/T 3810.2
	Warpage, related to diagonal calculated from the work sizes	± 1.5	± 1.5	GB/T 3810.2
Back feet	Height (*h*)/mm	*h* ≥ 0.7		Figure 3

Annex E

(normative)

Extruded ceramic tiles (*E* > 10 %, Group AIII)

Technical requirements for extruded ceramic tiles (*E* > 10 %, Group AIII) shall be in accordance with Table E.1.

Table E.1 -- Technical requirements for extruded ceramic tiles (*E* > 10 %, Group AIII)

Technical requirements				Test method
Item		Precision	Natural	
Length and width	The deviation, in %, 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	GB/T 3810.2
	The deviation, in %, of the average size for each tile (2 or 4 sides) from the average size of 10 tiles (20 or 40 sides)	± 1.5	± 1.5	GB/T 3810.2
	The manufacturer shall choose the work size as follows: for modular tiles in order to allow a nominal joint width of between 3 mm and 11 mm[a]; for non-modular tiles so that the difference between the work size and the nominal size is not more than ± 3 mm.			GB/T 3810.2
Thickness[b] The thickness shall be specified by the manufacturer; The deviation, in %, of the average thickness of each tile from the work size thickness		± 10	± 10	GB/T 3810.2
Straightness of sides[c] (facial sides) The maximum deviation from straightness, in %, related to the corresponding work sizes		± 1.0	± 1.0	GB/T 3810.2
Rectangularity[c] The maximum deviation from rectangularity, in %, related to the corresponding work sizes		± 1.0	± 1.0	GB/T 3810.2
Surface flatness The maximum deviation from flatness/%	Centre curvature, related to diagonal calculated from the work sizes	± 1.0	± 1.5	GB/T 3810.2
	Edge curvature, related to the corresponding work sizes	± 1.0	± 1.5	GB/T 3810.2
	Warpage, related to diagonal calculated from the work sizes	± 1.5	± 1.5	GB/T 3810.2
Back feet	Height (*h*)/mm	*h* ≥ 0.7		Figure 3

Annex G

(normative)

Dry-pressed ceramic tiles ($E \leq 0.5$ %, Group BIa)

Technical requirements for dry-pressed ceramic tiles ($E \leq 0.5$ %, Group BIa) shall be in accordance with Table G.1.

Table G.1 -- Technical requirements for dry-pressed ceramic tiles ($E \leq 0.5$ %, Group BIa)

Technical requirements				Test method
Item		Nominal size		
		70 mm ≤ N < 150 mm	$N \geq 150$ mm	
Length and width	The deviation, in %, of the average size for each tile (2 or 4 sides) from the work size (W)	± 0.9 mm	± 0.6 to a maximum of ± 2.0 mm	GB/T 3810.2
		Polished tiles: a maximum of ± 1.0 mm		GB/T 3810.2
	The manufacturer shall choose the work size as follows: for modular tiles in order to allow a nominal joint width of between 2 mm and 5 mm[a]; for non-modular tiles so that the difference between the work size and the nominal size is not more than ± 2 % to a maximum of 5 mm.			GB/T 3810.2
Thickness[b] The thickness shall be specified by the manufacturer; The deviation, in %, of the average thickness of each tile from the work size thickness		± 0.5 mm	± 5 to a maximum of ± 0.5 mm	GB/T 3810.2
Straightness of sides[c] (facial sides) The maximum deviation from straightness, in %, related to the corresponding work sizes		± 0.75 mm	± 0.5 to a maximum of ± 1.5 mm	GB/T 3810.2
		Polished tiles: ± 0.2 to a maximum ≤ 1.5 mm		
Rectangularity[c] The maximum deviation from rectangularity, in %, related to the corresponding work sizes		± 0.75 mm	± 0.5 to a maximum of ± 2.0 mm	GB/T 3810.2
		Polished tiles: ± 0.2 to a maximum ≤ 1.5 mm		
Surface flatness The maximum	Centre curvature, related to diagonal calculated from the	± 0.75 mm	± 0.5 to a maximum of	GB/T 3810.2

Annex H

(normative)

Dry-pressed ceramic tiles (0.5 % < *E* ≤ 3 %, Group BIb)

Technical requirements for dry-pressed ceramic tiles (0.5 % < *E* ≤ 3 %, Group BIb) shall be in accordance with Table H.1.

Table H.1 -- Technical requirements for dry-pressed ceramic tiles (0.5 % < *E* ≤ 3 %, Group BIb)

Technical requirements				Test method
Item		Nominal size		
		70 mm ≤ *N* < 150 mm	*N* ≥ 150 mm	
Length and width	The deviation, in %, of the average size for each tile (2 or 4 sides) from the work size (*W*)	± 0.9 mm	± 0.6 to a maximum of ± 2.0 mm	GB/T 3810.2
	The manufacturer shall choose the work size as follows: for modular tiles in order to allow a nominal joint width of between 2 mm and 5 mm[a]; for non-modular tiles so that the difference between the work size and the nominal size is not more than ± 2 % to a maximum of 5 mm.			GB/T 3810.2
Thickness[b] The thickness shall be specified by the manufacturer; The deviation, in %, of the average thickness of each tile from the work size thickness		± 0.5 mm	± 5 to a maximum of ± 0.5 mm	GB/T 3810.2
Straightness of sides[c] (facial sides) The maximum deviation from straightness, in %, related to the corresponding work sizes		± 0.75 mm	± 0.5 to a maximum of ± 1.5 mm	GB/T 3810.2
Rectangularity[c] The maximum deviation from rectangularity, in %, related to the corresponding work sizes		± 0.75 mm	± 0.5 to a maximum of ± 2.0 mm	GB/T 3810.2
Surface flatness The maximum deviation from flatness/%	Centre curvature, related to diagonal calculated from the work sizes	± 0.75 mm	± 0.5 to a maximum of ± 2.0 mm	GB/T 3810.2
	Edge curvature, related to the corresponding work sizes	± 0.75 mm	± 0.5 to a maximum of ± 2.0 mm	GB/T 3810.2
	Warpage, related to diagonal calculated from the work sizes	± 0.75 mm	± 0.5 to a maximum of	GB/T 3810.2

Annex J

(normative)

Dry-pressed ceramic tiles (3 % < *E* ≤ 6 %, Group BIIa)

Technical requirements for dry-pressed ceramic tiles (3 % < *E* ≤ 6 %, Group BIIa) shall be in accordance with Table J.1.

Table J.1 -- Technical requirements for dry-pressed ceramic tiles (3 % < *E* ≤ 6 %, Group BIIa)

Technical requirements				Test method
Item		Nominal size		
		70 mm ≤ *N* < 150 mm	*N* ≥ 150 mm	
Length and width	The deviation, in %, of the average size for each tile (2 or 4 sides) from the work size (*W*)	± 0.9 mm	± 0.6 to a maximum of ± 2.0 mm	GB/T 3810.2
	The manufacturer shall choose the work size as follows: for modular tiles in order to allow a nominal joint width of between 2 mm and 5 mm[a]; for non-modular tiles so that the difference between the work size and the nominal size is not more than ± 2 % to a maximum of 5 mm.			GB/T 3810.2
Thickness[b] The thickness shall be specified by the manufacturer; The deviation, in %, of the average thickness of each tile from the work size thickness		± 0.5 mm	± 5 to a maximum of ± 0.5 mm	GB/T 3810.2
Straightness of sides[c] (facial sides) The maximum deviation from straightness, in %, related to the corresponding work sizes		± 0.75 mm	± 0.5 to a maximum of ± 1.5 mm	GB/T 3810.2
Rectangularity[c] The maximum deviation from rectangularity, in %, related to the corresponding work sizes		± 0.75 mm	± 0.5 to a maximum of ± 2.0 mm	GB/T 3810.2
Surface flatness The maximum deviation from flatness/%	Centre curvature, related to diagonal calculated from the work sizes	± 0.75 mm	± 0.5 to a maximum of ± 2.0 mm	GB/T 3810.2
	Edge curvature, related to the corresponding work sizes	± 0.75 mm	± 0.5 to a maximum of ± 2.0 mm	GB/T 3810.2
	Warpage, related to diagonal calculated from the work sizes	± 0.75 mm	± 0.5 to a maximum of	GB/T 3810.2

Annex K

(normative)

Dry-pressed ceramic tiles (6 % < *E* ≤ 10 %, Group BIIb)

Technical requirements for dry-pressed ceramic tiles (6 % < *E* ≤ 10 %, Group BIIb) shall be in accordance with Table K.1.

Table K.1 -- Technical requirements for dry-pressed ceramic tiles (6 % < *E* ≤ 10 %, Group BIIb)

Technical requirements				Test method
Item		Nominal size		
		70 mm ≤ *N* < 150 mm	*N* ≥ 150 mm	
Length and width	The deviation, in %, of the average size for each tile (2 or 4 sides) from the work size (*W*)	± 0.9 mm	± 0.6 to a maximum of ± 2.0 mm	GB/T 3810.2
	The manufacturer shall choose the work size as follows: for modular tiles in order to allow a nominal joint width of between 2 mm and 5 mm[a]; for non-modular tiles so that the difference between the work size and the nominal size is not more than ± 2 % to a maximum of 5 mm.			GB/T 3810.2
Thickness[b] The thickness shall be specified by the manufacturer; The deviation, in %, of the average thickness of each tile from the work size thickness		± 0.5 mm	± 5 to a maximum of ± 0.5 mm	GB/T 3810.2
Straightness of sides[c] (facial sides) The maximum deviation from straightness, in %, related to the corresponding work sizes		± 0.75 mm	± 0.5 to a maximum of ± 1.5 mm	GB/T 3810.2
Rectangularity[c] The maximum deviation from rectangularity, in %, related to the corresponding work sizes		± 0.75 mm	± 0.5 to a maximum of ± 2.0 mm	GB/T 3810.2
Surface flatness The maximum deviation from flatness/%	Centre curvature, related to diagonal calculated from the work sizes	± 0.75 mm	± 0.5 to a maximum of ± 2.0 mm	GB/T 3810.2
	Edge curvature, related to the corresponding work sizes	± 0.75 mm	± 0.5 to a maximum of ± 2.0 mm	GB/T 3810.2
	Warpage, related to diagonal calculated from the work sizes	± 0.75 mm	± 0.5 to a maximum of	GB/T 3810.2

Annex L

(normative)

Dry-pressed ceramic tiles (*E* > 10 %, Group BIII)

Technical requirements for dry-pressed ceramic tiles (*E* > 10 %, Group BIII) shall be in accordance with Table L.1.

Table L.1 -- Technical requirements for dry-pressed ceramic tiles (*E* > 10 %, Group BIII)

Technical requirements				Test method
Item		Nominal size		
		70 mm ≤ *N* < 150 mm	*N* ≥ 150 mm	
Length and width	The deviation, in %, of the average size for each tile (2 or 4 sides) from the work size (*W*)	± 0.75 mm	± 0.5 to a maximum of ± 2.0 mm	GB/T 3810.2
	The manufacturer shall choose the work size as follows: for modular tiles in order to allow a nominal joint width of between 1.5 mm and 5 mm[a]; for non-modular tiles so that the difference between the work size and the nominal size is not more than ± 2 % to a maximum of 5 mm.			GB/T 3810.2
Thickness[b] The thickness shall be specified by the manufacturer; The deviation, in %, of the average thickness of each tile from the work size thickness		± 0.5 mm	± 10 to a maximum of ± 0.5 mm	GB/T 3810.2
Straightness of sides[c] (facial sides) The maximum deviation from straightness, in %, related to the corresponding work sizes		± 0.5 mm	± 0.3 to a maximum of ± 1.5 mm	GB/T 3810.2
Rectangularity[c] The maximum deviation from rectangularity, in %, related to the corresponding work sizes		± 0.75 mm - 0.5 mm	± 0.5, - 0.3 to a maximum of ± 2.0 mm, - 1.5 mm	GB/T 3810.2
Surface flatness The maximum deviation from flatness/%	Centre curvature, related to diagonal calculated from the work sizes	± 0.75 mm - 0.5 mm	± 0.5, - 0.3 to a maximum of ± 2.0 mm, - 1.5 mm	GB/T 3810.2
	Edge curvature, related to the corresponding work sizes	± 0.75 mm	± 0.5 to a maximum of ± 2.0 mm	GB/T 3810.2

Annex M

(normative)
Determination of coefficient of friction

M.1 Scope of application

This annex specifies the determination method for static coefficient of friction of ceramic tiles.

M.2 Instruments and materials

M.2.1 Instruments

A force measuring system, used to test the force required to pull a slider on a tile surface, see figure M.1. Include:

- a horizontal tension meter with a division not less than 0.25 kgf;
- a weight of 4.5 kg;
- 4S rubber, with a IRD hardness of 90 ± 2;
- a slider assembly consisting of a 4S rubber block of 75 mm × 75 mm × 3 mm attaching to a plywood of 200 mm × 200 mm × 20 mm. One side of the plywood is fixed with a ring screw for connection to the tension meter;
- a fixed frame below the tile's working surface to prevent the tile from sliding.

M.2.2 Materials for test

Materials for test include:

- two float glass plates of 6 mm thick: one with size not less than 150 mm × 150 mm and the other with size of 100 mm × 100 mm;
- No. 220 silicon carbide powder;
- No. 400 silicon carbide sandpaper;
- distilled water or deionized water;
- neutral cleaning agent.

M.3 Test procedure

COF - the calibration value of coefficient of friction.

If the 4S rubber surface is polished evenly, the 4 tension readings shall be substantially the same and the calibration value shall be in the range of 0.75 ± 0.05. The calibration process shall be repeated and recorded before and after testing the 3 samples. If the difference between the calibration values before and after is more than ± 0.05, the entire test process shall be redone. The operator shall calibrate the test equipment and check the operation before and after testing each of the three samples to ensure a higher test consistency.

M.3.4 Measurement procedure (dry method)

M.3.4.1 Wash and dry the test surface of each tile, place the tile to be measured on the work surface and close to the fixed frame restricting its movement, and brush all the debris.

M.3.4.2 Place the slider assembly on the test surface of the test brick and place the 4.5 kg weight on the center of the upper part of the slider assembly. The tensile force required to produce a sliding tendency of the assembly in the horizontal direction is measured by a tension meter, and the tension reading is recorded.

M.3.4.3 After testing three test surfaces or samples, pull the assembly 4 times on each test surface, each pulling direction is 90 ° differ from that of last time. Obtain a total of 12 readings required to calculate the static coefficient of friction. Record all readings.

M.3.4.4 After testing a test surface or sample, check the 4S rubber surface and, if its surface shows gloss or scratches, repeat the grinding process according to M.4.2.

M.3.5 Measurement procedure (wet method)

The surface of the sample is wetted with distilled water and the procedure of M.4.4.2 to M.4.4.4 is repeated. Each test shall ensure that the tile surface is always moist.

M.3.6 Calculation

Use equations (M.2) and (M.3) to calculate the static coefficient of friction of the test surface:

Dry method:

$$F_d = R_d/nm \quad \text{..... (M.2)}$$

Wet method:

$$F_w = R_w/nm \quad \text{..... (M.3)}$$

where:

Annex P

(informative)

Classification of glazed tiles for floors according to their abrasion resistance

This approximate classification is given for guidance only (see GB/T 3810.7). It is not to be taken to provide accurate product specifications for specific requirements.

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

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

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

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

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

Class 5 Floor coverings which are subjected to severe pedestrian traffic over sustained periods with some scratching dirt, so that the conditions are the most severe for which glazed floor tiles are to be suitable (for example 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 traffic and quantities of scratching dirt, unglazed floor tiles and quarries from Group I may be considered.

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------ The End ------