

ZANZIBAR NATIONAL STANDARD

Specification for marble tiles and slabs

DRAFT STANDARD FOR PUBLIC COMMENTS

ZANZIBAR BUREAU OF STANDARDS

National foreword

ZBS is in the process of adopting Aggregate - Part 2: Natural Aggregate for concrete – Specification, under the Building and Construction Technical Committee. In accordance with ZBS general procedures, this draft standard is presented to the public in order to receive any technical comment concerns.

In the preparation of this Standard, the reference was derived from the following source:

KS 1433: 2001 Aggregate - Part 2: Natural Aggregate for concrete – Specification

Technical Committee Representatives

This Draft Zanzibar National Standard was prepared by Building and Construction Standard Technical committee which consists of representatives from the following organizations:

Karume Institute of Science and Technology (KIST)
Architects, Engineers and Quantity Surveyors Registration Board (AEQSRB)
Stone Town Conservation and Development Authority (STCDA)
Zanzibar Road Agency (ZANROAD)
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SPECIFICATION FOR MARBLE TILES AND SLABS

1 Scope

This Draft of Zanzibar National Standard specifies the materials characteristics, physical requirement, sizes and finish of marble tiles and slabs

2 Normative references

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

KS 1433: 2001: Specification for marble tiles and slabs

ASTM C 97 Test method for absorption and bulk specific gravity of dimension stone.

ASTM C 99 Test method for modulus of rupture of dimension stone.

ASTM C 170 Test method for compression strength of dimension stone.

ASTM C 241 Test method for compression strength of dimension stone.

ASTM C 880 Test method for flexural strength of dimensional stone.

3 Terms and definitions

For the purposes of this document, the (terms and) definitions given in D1356 and D5681 and the following apply.

3.1

marble

A carbonate rock that has acquired a distinctive crystalline texture by re-crystallization, most commonly by heat and pressure during metamorphism, and is composed principally of the carbonate minerals calcite and dolomite and serpentine, singly or in combination and capable of taking a polish.

3.2

limestone marble

Compact, dense limestone that will take a polish and is classified as marble in trade practice and can be sold as limestone or as marble.

3.3

dolomite

A sedimentary carbonate rock (a variety of limestone) that consists largely or entirely of the mineral dolomite.

NOTE 1: The rock term 'dolomite', as applied to building stone, is synonymous with the term dolostone as used in sedimentary petrology.

3.4

onyx marble

A translucent, generally layered, crystalline calcite with colours in pastel shades, particularly yellow, brown, and green.

NOTE 2: The term "Onyx" to designate onyx marble is a misnomer. True onyx is nearly pure crystalline silica closely related to agate, a semi-precious stone.

3.5**travertine marble**

A porous or cellularly layered, partly crystalline calcite of chemical origin.

NOTE 4: Travertine is formed by precipitation from generally hot solutions of carbonated spring water, usually at the bottom of shallow pools.

3.6**serpentine marble**

A rock consisting mostly or entirely of serpentine (hydrated magnesium silicate, green to greenish black in colour, commonly veined with calcite, and dolomite or magnesite, or both (magnesium carbonate).

NOTE 5: The term “*verd (or verde) antique*” is popularly used for serpentine marble, but it can also refer to green marble or limestone marble devoid of serpentine. Due to its composition, “Serpentine marble” is not a true marble in the geological sense.

3.7**abrasive finish**

A flat non-reflective surface finish.

3.8**honed finish**

Honed finish is a super fine smooth finish, though not as fine as a polished finish.

3.9

plucked finish — Obtained by rough-planing the surface of stone, breaking or plucking out small particles to give rough texture.

3.10**polished finish**

The finest and smoothest finish available in stone characterized by a high luster (gloss) and strong reflection of incident light, generally only possible on hard, dense materials.

3.11**sand-blasted finish**

A matte-texture surface finish with no gloss, accomplished by exposing the surface to a steady flow of sand under pressure.

3.12**tooled or bush-hammered finish**

Customarily has four, six or eight parallel, concave grooves to the inch.

3.13**flamed finish**

A rough surface obtained by applying a naked controlled flame to the stones surface.

4 CLASSIFICATION

4.1 Geological classification — Marble is classified as follows:

- (i) Calcite
- (ii) Dolomite
- (iii) Serpentine
- (iv) Travertine

4.2 Colour classification — Marble occurs in various colours and shades depending upon the source, for example, in Kenya, see the Appendix A

5 SIZES

5.1 Slabs — The marble shall be supplied in sizes given below:

- (i) The length shall be 600 mm to 2,500 mm (in stages of 100 mm);
- (ii) The width shall be 300 mm to 1 000 mm (in stages of 100 mm);
- (iii) The thickness shall be 20 mm to 100 mm (in stages of 10 mm).

5.2 Tiles — The marble shall be supplied in sizes given below:

- (a) The length and width of tiles shall be:
600 mm x 300 mm, 500 mm x 250 mm, 400 mm x 400 mm, 300 mm x 300 mm, 200 mm x 200 mm and 100 mm x 100 mm.
- (b) The thickness of tiles shall be 10 mm to 20 mm in the same piece.

5.3 Skirtings

5.3.1 The width of the skirtings per linear metre shall be 100 mm, 125 mm and 150 mm.

5.3.2 The thickness of the skirtings shall be 10 mm, and 20 mm. 4

- 5.4** Custom sizes — Sizes and shapes other than those specified shall be supplied as agreed between the supplier and the purchaser depending on the design requirements. However, thickness shall not be below 10 mm for tiles and 20 mm for slabs.

6 TOLERANCE

The following tolerance shall be allowed on tiles, slabs and skirtings whether they are standard or custom sizes:

6.1 Slabs Tolerance

(a)	Length	± 2 mm
(b)	Width	± 2 mm
(c)	Thickness	± 1 mm

6.2 Tiles Tolerance

(a)	Linear dimension	± 1 mm
(b)	Thickness	± 1 mm

6.3 Skirtings Tolerance

(a)	Width	± 1 mm
(b)	Thickness	± 1 mm

7 PHYSICAL PROPERTIES

The physical properties of marble stone used for manufacturing tiles and slabs shall conform to the requirements given in Table 1.

TABLE 1. PHYSICAL REQUIREMENTS

PHYSICAL PROPERTY	TEST REQUIREMENTS	TEST METHOD
Water absorption by mass, max. %	0.45	ASTM C 97
Density, min. Kg/m ³	2 600	ASTM C 97
Compressive strength, min. N/mm ²	52	ASTM C 170
Modulus of rupture, min. N/mm ²	7	ASTM C 99
Abrasion resistance, min. N/mm ²	10	ASTM C 241
Flexural strength, Min. N/mm ²	7	ASTM C 880

8 FINISH

- 8.1 The marble shall be sound, free of spalls, cracks, open seams, pits or other defects that would impair its strength, durability, or appearance.
- 8.2 The faces of marble slabs and tiles shall be supplied with one of the following finishes:
- (i) Sand and/or abrasive finish;
 - (ii) Honed finish;
 - (iii) Polished finish.
- 8.3 The edges of the slabs and tiles shall be true and straight but shall be profiled, bull nosed or chamfered.
- 8.4 Machine cut tiles and slabs with square edges shall be supplied if so specified by the customer/purchaser.

9 SAMPLING

- 9.1 In any consignment, all the slabs or tiles of the same group, size and finish shall be grouped together to constitute a lot.
- 9.2 The number of slabs or tiles to be selected for the sample shall depend upon the size of the lot and shall be in accordance with Table 2.

TABLE 2. SAMPLE SIZE AND CRITERIA FOR CONFORMITY

NUMBER OF SLABS/TILES (1)	NUMBER OF SLABS/TILES TO BE SELECTED ON SAMPLE (2)	PERMISSIBLE NUMBER OF DEFECTIVES (3)
Up to 25	3	0
26 to 100	5	0
101 to 200	8	0
201 to 500	13	0
501 to 1 000	20	1

- 9.2.1 The slabs or tiles in the sample shall be selected at random and in order to ensure the randomness of selection, random number tables shall be used.

- 9.3** All the slabs or tiles selected in the sample shall be examined for dimensions, finish and general requirements. Any slab or tile falling in any one or more of the above requirements shall be considered as defective. A lot shall be considered, as conforming to these requirements for the number of defectives obtained is not more than the permissible number of defectives given in Column 3 of Table 2.

10 INSPECTION

- 10.1** The purchaser/ customer or his authorized representative shall if he so desires be granted facilities for inspection of finished slabs or tiles prior to dispatch from the supplier's works.
- 10.2** The supplier shall supply a certificate stating that the marble stone used for manufacturing tiles and slabs supplied comply with this standard.

11 TESTING

The manufacturer shall prepare and supply specimens for testing from each source.

12 MARKING

- 12.1** Each type of marble slabs and tiles shall be marked in a suitable manner with the manufacturer's name or trade mark.
- 12.2** The packaging for the tiles shall be labeled clearly and indelibly with the following:
- (i) Name of manufacturer or trade mark;
 - (ii) The number and size of the tiles.

APPENDIX A

COLOURS OF LOCAL MARBLE

Marbles occur in various colours and shades, for example, in Kenya currently; the following are the colours of marble:

- (1) *White Kajiado* — White marble with large crystals, slight grey and brown veining.
- (2) *Kaloleni Grey* — Grey/brown limestone with dark and light pattern.
- (3) *Machakos White* — Grey/white marble with dark grey veining.
- (4) *Machakos Black* — Black/grey marble with dark veining.
- (5) *Kima Grey* — Grey marble with light veining.
- (6) *Ganze Brown* — Brown/gold limestone with dark and light pattern.
- (7) *Ganze Black* — Black/white limestone with dark and light pattern.
- (8) *Pink Kerio Valley* — Pink/white marble with dark veining.

Further additions shall be made when new quarries are developed.