

KENYA STANDARD

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**Tile adhesive for marble,
granite, ceramic and porcelain
- Part 1: Requirements,
assessment and verification of
constancy of performance,
classification and marking**



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Tile adhesive for ceramic, marble, granite, and porcelain - Part 1: Requirements, assessment and verification of constancy of performance, classification and marking

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Public Review draft

Foreword

This Kenya Standard was prepared by the Cement Technical Committee under the guidance of the Standards Projects Committee, and it is in accordance with the procedures of the Kenya Bureau of Standards.

During the preparation of this standard, reference was made to EN 12004:2007 Adhesives for tiles — Requirements, evaluation of conformity, classification and designation.

Public Review draft

Tile adhesive for ceramic, marble, granite, and porcelain - Part 1: Requirements, assessment and verification of constancy of performance, classification and marking

1 Scope

This Kenya Standard is applicable to the following three types of adhesives for ceramic, marble, granite, and porcelain tiles, i.e. cementitious ones for internal and external tile installations, dispersion and reaction resin ones for internal tile installations, on walls and floors.

This Kenya Standard gives the terminology concerning the products, working methods, application properties, etc, for tile adhesives.

This Kenya Standard specifies the performance requirements for the adhesives for ceramic, marble, granite, and porcelain tiles.

It also specifies the appurtenant test methods, assessment and verification of constancy of performance (AVCP), as well as classification, designation and marking of adhesives for tiles.

This Kenya Standard does not provide criteria or recommendations for the design and installation of tiles.

Tile adhesives may also be used for other types of tiles (natural and agglomerated stones, etc.), if they do not adversely affect these materials.

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.

KS 2129-2:2017, adhesives for tiles — Part 2: Test methods

EN 12808-1, Grouts for tiles — Part 1: Determination of chemical resistance of reaction resin mortars

EN 13238, Reaction to fire tests for building products — Conditioning procedures and general rules for selection of substrates

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

EN 14411, tiles — Definition, classification, characteristics, assessment and verification of constancy of performance and marking

3 Terms and definitions

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

3.1 General

3.1.1

thin bed method

method used for installing tiles onto a plane surface with an adhesive

Note 1 to entry: The adhesive is usually applied with a trowel to obtain a layer and then combed with a notched trowel to achieve the right thickness and planarity.

3.1.2

fixing surface

plane rigid surface upon which the tile is fixed

3.1.3

wall and floor tiles

tiles made out of or natural and agglomerated stones

3.2

Tiles

3.2.1

vitified tiles

non water absorbent tiles

3.2.2

marble

a natural stone product quarried from the earth. It gets a distinctive shine from the polishing process it goes through. Available in multiple finishes and a wide variety of colours

3.2.3

granite

a natural stone denser than marble. Granite is molten lava that never rose above the surface of the earth. It is extremely durable and holds a polish. Available in polished, honed or flamed (rough) surfaces

3.2.4

porcelain

a hard, white, translucent ceramic made by firing a pure clay and then glazing it with variously colored fusible materials

3.2.5

ceramic

refers to the range of materials created by firing clay at a high temperature. In the context of mosaics, this would include traditional ceramic tiles, pottery, and terracotta. Unglazed ceramic tends to be porous and brittle, but cinca (a high-fired unglazed porcelain) is very hardwearing and water resistant. Technically, brick is also a ceramic material.

3.3 Products

3.3.1

cementitious adhesive

mixture of hydraulic binding agents, aggregates, and organic additives, mixed with water or liquid admix just before use

3.3.2

dispersion adhesive

ready to use mixture of organic binding agent(s) in the form of an aqueous polymer dispersion, organic additives and mineral fillers

3.3.3

reaction resin adhesive

one or more component mixture of synthetic resin, mineral fillers and organic additives in which hardening occurs by chemical reaction

3.4 Tools and working methods

3.4.1

notched trowel

toothed tool, which makes it possible to apply the adhesive as a series of ribs of a uniform thickness onto the fixing surface and/or the reverse face of the tile



3.4.2

floating method

adhesive applied only to the fixing surface, usually with a trowel to obtain a uniform layer and then combed with a notched trowel

3.4.3

floating and buttering method

adhesive applied to the fixing surface and to the reverse of the tiles

3.5 Application properties

3.5.1

shelf life

time of storage under stated conditions during which an adhesive is expected to maintain its working properties

3.5.2

maturing time

interval between the time when the cementitious adhesive is mixed and the time when it is ready for use

3.5.3

pot-life

maximum time interval during which the adhesive can be used after mixing with appropriate liquid component

3.5.4

open time

maximum interval after application at which tiles can be embedded in the applied adhesive and meet the specified tensile adhesion strength requirement

3.5.5

wetting capability

ability of a combed adhesive layer to wet the tile

3.5.6

slip

downward movement of a tile applied to a combed adhesive layer on a vertical or inclined surface

3.5.7

adjustability

maximum time interval after which the tile's position in the adhesive layer can be adjusted without significant loss of adhesion strength

3.6 Final properties

3.6.1

adhesion strength

maximum strength per unit surface area which can be measured by shear and tensile testing

3.6.2

deformability

capacity of a hardened adhesive to be deformed by stresses between the tile and the fixing surface without damage to the installed surface

3.6.3

transverse deformation

deflection recorded at the centre when a beam of hardened adhesive is subjected to three point loading

3.7 Characteristics

3.7.1

basic characteristics

characteristics that an adhesive absolutely has to have

3.7.2 Optional characteristics

3.7.2.1 additional characteristic

characteristic for specific service conditions where enhanced levels of performance are required

3.7.2.2

special characteristic

characteristic of the adhesive which provide further information about its general performance

4 Product characteristic

4.1 Cementitious adhesives (C)

Characteristics of the normal setting cementitious adhesive for tiles shall comply with the requirements specified in Table 1 a, and characteristics of the fast-setting cementitious adhesive for tiles with those in Table 1 b.

When needed for special service condition(s) of cementitious adhesive for tiles, its optional characteristics shall comply with the requirements specified in Tables 1 c, 1 d and/or 1 e.

The amount of water and/or liquid admixes required for preparing the cementitious adhesive shall be the same for all tests.

Table 1 — Requirements for cementitious adhesives (C)

Basic characteristics		
Basic adhesive		
Characteristic	Requirement	Test Method
Initial tensile adhesion strength	$\geq 0.5 \text{ N/mm}^2$	KS 2129–2:2017, 8.3
Slip (T)- to be mandatory for all tiles	$\leq 0.5 \text{ mm}$	KS 2129–2:2017, 8.2
1 a Normal setting adhesives (c1)		
Characteristic	Requirement	Test Method
Slip (T)- to be mandatory for all tiles	$\leq 0.5 \text{ mm}$	KS 2129–2:2017, 8.2
Initial tensile adhesion strength	$\geq 0.5 \text{ N/mm}^2$	KS 2129–2:2017, 8.3
Tensile adhesion strength after immersion water	$\geq 0.5 \text{ N/mm}^2$	
Tensile adhesion strength after heat ageing	$\geq 0.5 \text{ N/mm}^2$	
Tensile adhesion strength after freeze–thaw cycles	$\geq 0.5 \text{ N/mm}^2$	
Open time: tensile adhesion strength	$\geq 0.5 \text{ N/mm}^2$ after not less than 20min	KS 2129–2:2017, 8.1
1 b Fast setting adhesives (C1F)		
Characteristic	Requirement	Test Method
Slip (T)- to be mandatory for all tiles	$\leq 0.5 \text{ mm}$	KS 2129–2:2017, 8.2
Early tensile adhesion strength	$\geq 0.5 \text{ N/mm}^2$ after not more than 6 h	KS 2129–2:2017, 8.3
Open time: tensile adhesion strength	$\geq 0.5 \text{ N/mm}^2$ after not less than 10min	KS 2129–2:2016, 8.1
All other requirements as in Table 1 a		KS 2129–2:2017, 8.3
Optional characteristics		
1 c Special characteristics		
Characteristic	Requirement	Test Method
Slip (T)- to be mandatory for all tiles	$\leq 0.5 \text{ mm}$	KS 2129–2:2017, 8.2
Extended open time (E): tensile adhesion strength	$\geq 0.5 \text{ N/mm}^2$ after not less than 30min	KS 2129–2:2017, 8.1

Deformable adhesive (S1): transverse deformation	≥ 2.5 mm and < 5 mm	KS 2129– 2:2017, 8.6
Highly deformable adhesive (S2): transverse deformation:	≥ 5 mm	
1 d Additional characteristics (C2)		
Characteristic	Requirement	Test Method
Slip (T)- to be mandatory for all tiles	≤ 0.5 mm	KS 2129– 2:2017, 8.2
High initial tensile adhesion strength	≥ 1 N/mm ²	KS 2129– 2:2017, 8.3
High tensile adhesion strength after water immersion	≥ 1 N/mm ²	
High tensile adhesion strength after heat ageing	≥ 1 N/mm ²	
High tensile adhesion strength after freeze–thaw cycles	≥ 1 N/mm ²	
1 e FAST SETTING ADHESIVES (C2F)		
Characteristic	Requirement	Test Method
Slip (T)- to be mandatory for all tiles	≤ 0.5 mm	KS 2129– 2:2017, 8.2
Early tensile adhesion strength	≥ 0.5 N/mm ² after not more than 6 h	KS 2129– 2:2017, 8.3
Open time: tensile adhesion strength	≥ 0.5 N/mm ² after not less than 10min	KS 2129– 2:2017, 8.1
All other requirements as in Table 1 d		KS 2129– 2:2017, 8.3

4.2 Dispersion adhesives (D)

Characteristics of the dispersion adhesive for tiles shall comply with the requirements specified in Table 2 a. When needed for special service condition(s) of dispersion adhesive for tiles, its optional characteristics shall comply with the requirements specified in Tables 2 b and/or 2 c.

Table 2 — Requirements for Dispersion Adhesives (D)

2 a Basic characteristics (D1)		
Characteristic	Requirement	Test Method
Initial shear adhesion strength	≥ 1 N/mm ²	KS 2129– 2:2017, 8.4
Shear adhesion strength after heat ageing	≥ 1 N/mm ²	
Open time: tensile adhesion strength	≥ 0.5 N/mm ² after not less than 20 min	KS 2129– 2:2017, 8.1
Optional characteristics		
2 b Special characteristics		
Characteristic	Requirement	Test Method
Slip (T)	≤ 0.5 mm	KS 2129– 2:2017

		8.2
Extended open time (E): tensile adhesion strength	$\geq 0.5 \text{ N/mm}^2$ after not less than 30 min	KS 2129- 2:2017, 8.1
2 c Additional characteristics (D2)		
Characteristic	Requirement	Test Method
Shear adhesion strength after water immersion	$\geq 0.5 \text{ N/mm}^2$	KS 2129- 2:2017, 8.4
Shear adhesion strength at elevated temperature	$\geq 1 \text{ N/mm}^2$	

4.3 Reaction resin adhesives (R)

Characteristics of the reaction resin adhesive for tiles shall comply with the requirements specified in Table 3 a. When needed for special service condition(s) of reaction resin adhesive for tiles, its optional characteristics shall comply with the requirements specified in Tables 3 b and/or 3 c.

Table 3 — Requirements for reaction resin adhesives (R)

3 a Basic characteristics (R1)		
Characteristic	Requirement	Test Method
Initial shear adhesion strength	$\geq 2 \text{ N/mm}^2$	KS 2129–2:2017, 8.5
Shear adhesion strength after water immersion	$\geq 2 \text{ N/mm}^2$	
Open time: tensile adhesion strength	$\geq 0.5 \text{ N/mm}^2$ after not less than 20 min	KS 2129–2:2017, 8.1
Optional characteristics		
3 b Special characteristics		
Characteristic	Requirement	Test Method
Slip (T)	$\leq 0.5 \text{ mm}$	KS 2129–2:2017, 8.2
3 c Additional characteristics (R2)		
Characteristic	Requirement	Test Method
Shear adhesion strength after thermal shock	$\geq 2 \text{ N/mm}^2$	KS 2129–2:2017, 8.5

4.4 Reaction to fire

4.4.1 General

The reaction to fire performance of adhesive for tiles shall be declared as the class in accordance with EN 13501-1, based on one of the following options:

- a) either without the need for testing (CWT), according to 4.4.2, or without the need for further testing (CWFT), according to 4.4.3, when meeting the requirements, specified therein, or otherwise
- b) based on results of the test method(s), relevant to specific reaction to fire class, and carried out in accordance with the standard(s), referred to in EN 13501-1, as specified in 4.4.4.

4.4.2 Adhesives classified as Class A1 without the need for testing (CWT)

The reaction to fire performance of a given type of adhesive for tiles may be declared as Class A1 without the need for testing, provided that it contains not more than 1 % of homogeneously distributed organic material, by mass or volume (whichever is the most onerous).

4.4.3 Adhesives classified as class E without the need for further testing (CWFT)

The reaction to fire performance of a given type of adhesive for tiles may be declared as class given in Table 4 when meeting the requirements for specific type of adhesive, specified therein.

Table 4 — Classes of reaction-to-fire performance for adhesives for tiles

Product^a	Organic content (% in weight)	Maximum layer thickness (mm)
Cementitious adhesives in accordance with KS 2129-1	< 20	20
Dispersion adhesives in accordance with KS 2129-1	< 40	5
Reaction resin adhesives in accordance with KS 2129-1	< 50	5

4.4.4 Adhesives classified according to the test results

The reaction to fire performance of a given type of adhesive for tiles shall be declared as class (including the additional classification for smoke production and flaming droplets/particles, if any), determined on a base of results of the tests carried out on the specimens prepared according to 4.4.4.2 and 4.4.4.3, in accordance with the relevant methods, which are specified for considered class in the standards referred in EN 13501-1.

The specimens of the adhesive, which are to be tested, shall be sampled, prepared and conditioned according to EN 13238 under the following test conditions:

- substrate: paper-faced gypsum plaster board;
- conditioning: 28 days, (23 ± 2) °C and (50 ± 5) % relative humidity;
- number of specimen: 6.

In addition, the test specimen shall be prepared as follows for the following reaction to fire classes:

- a) for class E or E_{FL} and class F or F_{FL}:
 - apply the adhesive with a notched trowel 10 mm × 10 mm, notches at 20 mm centres;
- b) for class (A2, B, C or D) or (A2_{FL}, B_{FL}, C_{FL} or D_{FL}):
 - apply the adhesive with a notched trowel 10 mm × 10 mm, notches at 20 mm centres;
 - position and align tiles, classified as group B_{1A} according to EN 14411, with facial dimensions (50 ± 1) mm × (50 ± 1) mm into the adhesive;
 - place the tiles 5 mm apart.

4.5 Resistance to chemical attack

The resistance to chemical attack of the reaction resin adhesive for tiles shall be determined in accordance with EN 12808-1.

NOTE 1 The resistance to chemical attack is relevant for the reaction resin adhesives for tiles only.

NOTE 2 For the resistance to chemical attack of these products there is neither indication of applicable chemical agent(s) nor of threshold level.

The test media shall consist of the media to which the chemical resistant materials are to be exposed in service and the test conditions (temperature, concentration, etc.) shall simulate the anticipated service and exposure conditions as closely as possible.

4.6 Release of dangerous substances

Materials used in products shall not release any dangerous substances in excess of the maximum permitted levels specified in relevant NEMA regulations.

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets. In the absence of Kenya harmonized test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

5 Testing, assessment and sampling methods

Testing and assessment methods and requirements for sampling shall be as set out in Clause 4 of this document.

6 Assessment and verification of constancy of performance (AVCP)

6.1 General

The compliance of the adhesives for tiles with the requirements of this standard and with the performances declared by the manufacturer in the DoP shall be demonstrated by: determination of the product-type on the base of 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 performances.

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, adhesives for tiles may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for that same characteristics for all products within that same family.

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, the determination of the product type shall be performed for all characteristics included in the standard for which the manufacturer declares the performance:

- at the beginning of the production of a new or modified adhesive for tiles (unless a member of the same product range); or
- at the beginning of a new or modified method of production (where this may affect the stated properties); or
- they shall be repeated for the appropriate characteristic(s), whenever a change occurs in the adhesive for tiles design, in the raw material 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 (e.g. cement) are used whose characteristics have already been determined by the component supplier on the basis of conformity with other product standards, these characteristics need not be re-assessed to demonstrate compliance with the Kenya Standard. The specifications of these components shall be documented.

Products bearing regulatory marking in accordance with appropriate harmonized Kenya specifications may be presumed to have the performances declared in the DoP, although this does not replace the responsibility on the tile adhesives manufacturer to ensure that the tile adhesives as a whole is correctly manufactured and its component products have the declared performance values.

6.2.2 Test samples, testing and compliance criteria

The number of samples of tile adhesives and the testing method to be tested/assessed shall be in accordance with Table 5.

Table 5 — Number of samples to be tested and compliance criteria

Characteristic	Requirement	Assessment method	No. of samples	Compliance criteria
Open time: tensile adhesion strength	Clause 4	KS 2129–2:2017, 8.1,	1	Table 1a of Clause 4
Slip	Clause 4	KS 2129–2:2017, 8.2	1	Table 1c of Clause 4
Initial tensile adhesion	Clause 4	KS 2129–2:2017, 8.3	1	Table 1a of Clause 4
Early tensile adhesion strength (fast setting cementitious adhesives)	Clause 4	KS 2129–2:2017, 8.3	1	Table 1b of Clause 4
Tensile adhesion strength after water immersion (cementitious adhesives)	Clause 4	KS 2129–2:2017, 8.3	1	Table 1a of Clause 4
Tensile adhesion strength after heat ageing (cementitious adhesives)	Clause 4	KS 2129–2:2017, 8.3	1	Table 1a of Clause 4
Tensile adhesion strength after freeze–thaw cycles (cementitious adhesives)	Clause 4	KS 2129–2:2017, 8.3	1	Table 1a of Clause 4
Transverse deformation (cementitious adhesives)	Clause 4	KS 2129–2:2017, 8.6	1	Table 1c of Clause 4
Open time (dispersion adhesives)	Clause 4	KS 2129–2:2017, 8.1	1	Table 2a of Clause 4
Slip (dispersion adhesives)	Clause 4	KS 2129–2:2017, 8.2	1	Table 2b of Clause 4
Initial shear adhesion	Clause 4	KS 2129–2:2017, 8.4	1	Table 2a of Clause 4
Shear adhesion strength after heat ageing (dispersion adhesives)	Clause 4	KS 2129–2:2017, 8.4	1	Table 2a of Clause 4
Shear adhesion strength after water immersion (dispersion adhesives)	Clause 4	KS 2129–2:2017, 8.4	1	Table 2c of Clause 4
Shear adhesion strength at elevated temperature (dispersion adhesives)	Clause 4	KS 2129–2:2017, 8.4	1	Table 2c of Clause 4
Open time (reaction resin adhesives)	Clause 4	KS 2129–2:2017, 8.1	1	Table 3a of Clause 4
Slip (reaction resin adhesives)	Clause 4	KS 2129–2:2017, 8.2	1	Table 3b of Clause 4
Initial shear adhesion strength (reaction resin adhesives)	Clause 4	KS 2129–2:2017, 8.5	1	Table 3a of Clause 4
Shear adhesion strength after water immersion	Clause 4	KS 2129–2:2017, 8.5	1	Table 3a of Clause 4

				4
Shear adhesion strength after thermalshock	Clause 4	KS 2129-2:2017, 8.5	1	Table 3c of Clause 4
Reaction to fire	Clause 4	EN 13501-1	1	

6.2.3 Test reports

The results of the determination of the product type 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 adhesives for tiles 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 manufacturer, as a common service to manufacturers, or by a product developer), to justify his own declaration of performance regarding a product 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 products 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 licence, 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:
 - a) 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
 - b) 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 products placed on the market comply with the declared performance of the essential 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 product.

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 product 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 product 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 product 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)
- e) 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 Kenya Standard.

If the manufacturer has part of the product 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.

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 Traceability and marking

Individual product batches shall be identifiable and traceable with regard to their production origin. The manufacturer shall have written procedures ensuring that processes related to affixing traceability codes and/or markings are inspected regularly.

6.3.2.5 Controls during manufacturing process

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

6.3.2.6 Product testing and evaluation

The manufacturer shall establish procedures to ensure that the stated values of the characteristics he declares are maintained. The characteristics, the test methods and the minimum frequencies shall be as specified in Table 6.

Table 6 — Production control - Test methods and minimum FPC frequency

Characteristic		Test method	Minimum FPC frequency ^d
Open time: tensile adhesion strength		KS 2129–2:2017, 8.1	A
Slip		KS 2129–2:2017, 8.2	A
Normal Setting Adhesives - Initial tensile adhesion strength(cementitious adhesives)		KS 2129–2:2017, 8.3	A
Fast Setting Adhesives - Early tensile adhesion strength(fast setting cementitious adhesives)		KS 2129–2:2017, 8.3	A
Initial shear adhesion strength (dispersion adhesives)		KS 2129–2:2017, 8.4	A
Initial shear adhesion strength (reaction resin adhesives)		KS 2129–2:2017, 8.5	A
Tensile adhesion strength after conditioning (cementitiousadhesives)		KS 2129–2:2017, 8.3	B
Shear adhesion strength after conditioning (dispersionadhesives)		KS 2129–2:2017, 8.4	B
Shear adhesion strength after conditioning (reaction resinadhesives)		KS 2129–2:2017, 8.5	B
Transverse deformation		KS 2129–2:2017, 8.6	B
Reaction to fire ^a	- (CWT or CWFT)	Test method(s) ^b	C
	- tested	EN 13501–1 ^c	
<p>^a For uses subject to the reaction to fire regulations only.</p> <p>^b Appropriate test/assessment method(s) to check compliance with the requirements relevant for application of CWT or CWFT cases (see 4.4.2 and 4.4.3, respectively).</p> <p>^c Test method(s), which are specified for considered class in the standards referred in EN 13501–1. ^d Minimum FPC frequency:</p> <p>A means at least one test for every 1000 tonnes, with a minimum of one time per year and a maximum of one time per month,</p> <p>B means at least one test per year for production below 2500 tonnes/y and two tests per year for production over 2500 tonnes/y.</p> <p>C means no direct testing. However, the composition shall be checked at regular intervals.</p>			

6.3.2.7 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 product 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 products 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 Kenya Standard, the corrective measures taken to rectify the situation (e.g. a further test carried out, modification of manufacturing process, throwing away or putting right of product) shall be indicated in the records.

6.3.2.8 Corrective action

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

6.3.2.9 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 Kenya 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 ten years.

6.3.4 Initial inspection of factory and of FPC

Initial inspection of factory and of FPC shall be carried out when the production process has been finalized and in operation. The factory and FPC documentation shall be assessed to verify that the requirements of 6.3.2 and 6.3.3 are fulfilled.

During the inspection it shall be verified:

- a) that all resources necessary for the achievement of the product characteristics included in this Kenya Standard are in place and correctly implemented;
and
- b) that the FPC-procedures in accordance with the FPC documentation are followed in practice; and
- c) that the product complies with the product type samples, for which compliance of the product performance to the DoP has been verified.

All locations where final assembly or at least final testing of the relevant product is performed, shall be assessed to verify that the above conditions a) to c) are in place and implemented. If the FPC system covers more than one product, production line or production process, and it is verified that the general requirements are fulfilled when assessing one product, production line or production process, then the assessment of the general requirements does not need to be repeated when assessing the FPC for another product, production line or production process.

All assessments and their results shall be documented in the initial inspection report.

6.3.5 Continuous surveillance of FPC

Surveillance of the FPC shall be undertaken once per year. The surveillance of the FPC shall include a review of the FPC test plan(s) and production processes(s) for each product to determine if any changes have been made since the last assessment or surveillance. The significance of any changes shall be assessed.

Checks shall be made to ensure that the test plans are still correctly implemented and that the production equipment is still correctly maintained and calibrated at appropriate time intervals.

The records of tests and measurement made during the production process and to finished products shall be reviewed to ensure that the values obtained still correspond with those values for the samples submitted to the determination of the product type and that the correct actions have been taken for non-compliant products.

6.3.6 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product 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 6.2.1.

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.

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

The tiles adhesives 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.

In the initial assessment of the factory and FPC it shall be verified:

- a) that all resources necessary for the achievement of the product characteristics included in this Kenya Standard will be available, and
- b) that the FPC-procedures in accordance with the FPC-documentation will be implemented and followed in practice, and
- c) that procedures are in place to demonstrate that the factory production processes can produce a product complying with the requirements of this Kenya standard and that the product will be the same as the samples used for the determination of the product type, for which compliance with this Kenya Standard has been verified.

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

7 Classification and designation

Adhesives for tiles are classified into one of three types, according to the definitions given in 3.2:

- C** Cementitious adhesive
- D** Dispersion adhesive
- R** Reaction resin adhesive

For each type it is possible to have different classes, related to the different characteristics, according to Tables 1, 2 and 3. These classes are designated with the following abbreviations:

- 1** normal adhesive
- 2** improved adhesive (meets the requirements for all the additional characteristics)
- F** fast setting adhesive
- T** adhesive with reduced slip
- E** adhesive with extended open time
- S1** deformable adhesive
- S2** highly deformable adhesive

The designation of the adhesive comprises the symbol of the type (C, D or R), followed by the abbreviation of the class or classes it belongs to.

Table 7 describes the designation of tile adhesives which shall be used.

Table 7 — Classification, designation and description of adhesives for tiles

DESIGNATION		DESCRIPTION
TYPE	CLASS	
C	1	Normal setting cementitious adhesive
C	1F	Fast setting cementitious adhesive
C	1T	Normal setting cementitious adhesive with reduced slip
C	1E	Normal setting cementitious adhesive with extended open time
C	1S1	Normal setting, deformable cementitious adhesive
C	1S2	Normal setting, highly deformable cementitious adhesive
C	1TS1	Normal setting, deformable cementitious adhesive with reduced slip
C	1TS2	Normal setting, highly deformable cementitious adhesive with reduced slip
C	1ES1	Normal setting, deformable cementitious adhesive with extended open time
C	1ES2	Normal setting, highly deformable cementitious adhesive with extended open time
C	1TE	Normal setting cementitious adhesive with reduced slip and extended open time
C	1TES1	Normal setting deformable cementitious adhesive with reduced slip and extended open time
C	1TES2	Normal setting highly deformable cementitious adhesive with reduced slip and extended open time
C	1FT	Fast setting cementitious adhesive with reduced slip
C	1FE	Fast setting cementitious adhesive with extended open time
C	1FS1	Fast setting deformable cementitious adhesive
C	1FS2	Fast setting highly deformable cementitious adhesive
C	1FTE	Fast setting cementitious adhesive with reduced slip and extended open time
C	1FTS1	Fast setting deformable cementitious adhesive with reduced slip
C	1FTS2	Fast setting highly deformable cementitious adhesive with reduced slip
C	1FES1	Fast setting deformable cementitious adhesive with extended open time
C	1FES2	Fast setting highly deformable cementitious adhesive with extended open time
C	1FTES1	Fast setting deformable cementitious adhesive with reduced slip and extended open time
C	1FTES2	Fast setting highly deformable cementitious adhesive with reduced slip and extended open time
C	2	Improved cementitious adhesive
C	2F	Improved fast setting cementitious adhesive
C	2T	Improved adhesive with reduced slip
C	2E	Improved cementitious adhesive with extended open time

C	2S1	Improved deformable cementitious adhesive
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DESIGNATION		DESCRIPTION
TYPE	CLASS	
C	2S2	Improved highly deformable cementitious adhesive
C	2TS1	Improved deformable cementitious adhesive with reduced slip
C	2TS2	Improved highly deformable cementitious adhesive with reduced slip
C	2ES1	Improved deformable cementitious adhesive with extended open time
C	2ES2	Improved highly deformable cementitious adhesive with extended open time
C	2TE	Improved cementitious adhesive with reduced slip and extended open time
C	2TES1	Improved deformable cementitious adhesive with reduced slip and extended open time
C	2TES2	Improved highly deformable cementitious adhesive with reduced slip and extended open time
C	2FT	Improved fast setting cementitious adhesive with reduced slip
C	2FE	Improved fast setting cementitious adhesive with extended open time
C	2FS1	Improved fast setting deformable cementitious adhesive
C	2FS2	Improved fast setting highly deformable cementitious adhesive
C	2FTE	Improved fast setting cementitious adhesive with reduced slip and extended open time
C	2FTS1	Improved fast setting deformable cementitious adhesive with reduced slip
C	2FTS2	Improved fast setting highly deformable cementitious adhesive with reduced slip
C	2FES1	Improved fast setting deformable cementitious adhesive with extended open time
C	2FES2	Improved fast setting highly deformable cementitious adhesive with extended open time
C	2FTES1	Improved fast setting deformable cementitious adhesive with reduced slip and extended open time
C	2FTES2	Improved fast setting highly deformable cementitious adhesive with reduced slip and extended open time
D	1	Normal dispersion adhesive
D	1E	Normal dispersion adhesive with extended open time
D	1T	Normal dispersion adhesive with reduced slip
D	1TE	Normal dispersion adhesive with reduced slip and extended open time
D	2	Improved dispersion adhesive
D	2E	Improved dispersion adhesive with extended open time
D	2T	Improved dispersion adhesive with reduced slip
D	2TE	Improved dispersion adhesive with reduced slip and extended open time
R	1	Normal reaction resin adhesive
R	1T	Normal reaction resin adhesive with reduced slip
R	2	Improved reaction resin adhesive

R	2T	Improved reaction resin adhesive with reduced slip
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8 Marking and labelling

Products complying with the requirements of this Kenya Standard shall be clearly marked with the following information:

- a) name of the product;
- b) field of application (internal or external tile installation, on wall or floor, etc. as per table 7).
- c) Comment at the front of bag “ for proper use follow instructions at the back”
- d) manufacturer’s mark and place of origin;
- e) batch number, shelf life and conditions of storage;
- f) number of this KS and date year of issue;
- g) type of adhesive according to Clause 7 (using symbols given in Table 7);
- h) instructions for use:
 - mix proportions (where applicable);
 - maturing time (where applicable);
 - pot life;
 - mode of application;
 - open time;
 - delay for grouting and for opening to traffic (where applicable);

This information shall be marked on the packaging and/or on the product’s technical data sheet. In the designation of an adhesive, information about special properties may be included when the product is intended for use in specific applications.

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.

Public Review draft