BRITISH STANDARD

BS EN 13888:2009

Grout for tiles — Requirements, evaluation of conformity, classification and designation

ICS 01.040.91; 91.100.10

BSI British Standards

National foreword

This British Standard is the UK implementation of EN 13888:2009. It supersedes BS EN 13888:2002 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/539, Ceramic tiles and other rigid tiling.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Grout for tiles - Requirements, evaluation of conformity, classification and designation

Mortiers de jointoiement pour carreaux et dalles céramiques - Exigences, évaluation de conformité, classification et désignation

Fugenmörtel für Fliesen und Platten - Anforderungen, Konformitätsbewertung, Klassifikation und Bezeichnung

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Foreword

This document (EN 13888:2009) has been prepared by Technical Committee CEN/TC 67 “Ceramic tiles”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2009, and conflicting national standards shall be withdrawn at the latest by November 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13888:2002

The main changes from the 2002 version are:

— the change in the requirements for flexural strength for cementitious grouts;

— the modification of Table 4 “Production Control Frequency”;

— the modification of Table 5 “Classification and designation”.

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

Introduction

The characteristics of the construction products defined in this European Standard have to consider that the normal stresses due to the works for which they are intended, assembled or installed, can be properly accommodated. Some special characteristics will take into account the type of substrate and that the grouts should resist the degrading actions of climate, environment, etc.

Many properties of grouts for tiles are mainly determined by the type of binders used.

Tile grouts are defined in different types depending on the chemical nature of their binders.

The different types have specific characteristics in terms of application properties and final performance.

The relationship between characteristics and the working conditions (dry or humid conditions, hot climate, fast setting, etc.) is not given in this standard.

The manufacturer gives information about the use of the product and the correct conditions of use.

The specifier evaluates the state of the job site (mechanical, thermal and chemical influences) and chooses the appropriate product considering all the possible risks.

1 Scope

This European Standard is applicable to ceramic tile grouts for internal and external tile installations on walls and floors.

This standard gives the terminology concerning the products, working methods, application properties, etc., for ceramic tile grouts.

This European Standard specifies the performance requirements for cementitious and reaction resin grouts for ceramic tiles.

This European Standard does not contain criteria or recommendations for the design and installation of ceramic tiles.

NOTE Ceramic tile grouts can also be used for other types of tiles (natural and agglomerated stones, etc.), where these do not adversely affect these materials.

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.

EN 12808 (all parts), *Grouts for tiles*

3 Terms and definitions

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

3.1 General

3.1.1
wall and floor tiles
tiles made out of ceramic or natural and agglomerated stones

3.1.2
grouting a tile surface
process of filling the joints between all types of tiles, with the exception of movement joints

3.2 Products

3.2.1
ceramic tile grout
any suitable product to be used to fill the joints between all types of ceramic tiles

3.2.2
cementitious grout
(CG)
mixture of hydraulic binding agents, aggregates, inorganic and organic additives

NOTE The grout has only to be mixed with water or liquid admix just before use.

3.2.3
reaction resin grout
(RG)
mixture of synthetic resin, aggregates, inorganic and organic additives in which hardening occurs by chemical reaction

NOTE They are available in one or more component forms.

3.2.4
liquid admix or latex additive
special aqueous polymer dispersion to be mixed with a cementitious grout on site

3.3 Tools and working methods

There are three possible working methods for filling the joints between tiles:

a) manually with a rubber float or suitable tool;

b) with an air pressurized- or handgun from a cartridge or an appropriate container (often done with reaction resin grouts);

c) mechanically with a suitable machinery.

The cleaning of tiles after the application of the grout can be performed manually or mechanically with appropriate tools.

3.4 Application properties

3.4.1
shelf life
time of storage under stated conditions during which a grout may be expected to maintain its working properties

3.4.2
maturing time
interval between the time when the cementitious grout is mixed and the time when it is ready for use

3.4.3
pot-life
maximum time interval during which the grout can be used after mixing

3.4.4
grouting time
minimum time interval after installation of tiles, after which the grout can be applied into the joints

3.4.5
cleaning time
time interval between filling the joints and starting to clean the tiles

3.4.6
service time
minimum time interval after which the tile installation can be put into service

3.5 Final properties

3.5.1
flexural strength
maximum value of a grout prism failure determined by exerting a force in flexure at three points

NOTE Fleural strength is measured according to EN 12808-3.

3.5.2
compressive strength
maximum value of a grout prism failure determined by exerting a force in compression on two opposite points

NOTE Compressive strength is measured according to EN 12808-3.

3.5.3
water absorption
amount of water absorbed by capillary action when the surface of the grout prism is in contact with water without any additional pressure

NOTE Water absorption is measured according to EN 12808-5.

3.5.4
abrasion resistance
capability of the grout surface to resist wear

NOTE Abrasion resistance is measured according to EN 12808-2.

3.5.5
shrinkage
reduction in length of a grout prism during hardening

NOTE Shrinkage is measured according to EN 12808-4.

3.5.6
chemical resistance
capability of a grout to resist chemical agents

NOTE Chemical resistance is measured according to EN 12808-1.

3.6 Characteristics

3.6.1
fundamental characteristics
characteristics that a grout shall have

3.6.2
additional characteristics
characteristics for specific service conditions where enhanced levels of performance are required

4 Specifications

4.1 Cementitious grouts (CG)

The cementitious grouts shall comply with the characteristics reported in Table 1.

Table 2 reports the additional characteristics that might be required for special service conditions.

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

Table 1 — Specification for Cementitious grouts

FUNDAMENTAL CHARACTERISTICS		
Characteristic	**Requirement**	**Test Method**
Abrasion resistance	≤ 2 000 mm^3	EN 12808-2
Flexural strength after dry storage	≥ 2,5 N/mm^2	EN 12808-3
Flexural strength after freeze-thaw cycles	≥ 2,5 N/mm^2	EN 12808-3
Compressive strength after dry storage	≥ 15 N/mm^2	EN 12808-3
Compressive strength after freeze-thaw cycles	≥ 15 N/mm^2	EN 12808-3
Shrinkage	≤ 3 mm/m	EN 12808-4
Water absorption after 30 min	≤ 5 g	EN 12808-5
Water absorption after 240 min	≤ 10 g	EN 12808-5

Table 2 — Additional characteristics for Cementitious grouts

ADDITIONAL CHARACTERISTICS		
Characteristic	**Requirement**	**Test Method**
High abrasion resistance	≤ 1 000 mm^3	EN 12808-2
Reduced water absorption after 30 min	≤ 2 g	EN 12808-5
Reduced water absorption after 240 min	≤ 5 g	EN 12808-5

4.2 Reaction resin grouts (RG)

The reaction resin grouts shall comply with the characteristics reported in Table 3.

Regarding the characteristic of chemical resistance there is no indication of limit value or chemical agent. 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, etc.) shall simulate the anticipated service and exposure conditions as closely as possible.

Table 3 — Specification for reaction resin grouts

FUNDAMENTAL CHARACTERISTICS		
Characteristic	**Requirement**	**Test Method**
Abrasion resistance	≤ 250 mm^3	EN 12808-2
Flexural strength after dry storage	≥ 30 N/mm^2	EN 12808-3
Compressive strength after dry storage	≥ 45 N/mm^2	EN 12808-3
Shrinkage	≤ 1,5 mm/m	EN 12808-4
Water absorption after 240 min	≤ 0,1 g	EN 12808-5

5 Evaluation of conformity

5.1 Principle

The scheme for the evaluation of conformity includes the following tasks:

a) Initial tests

b) Factory Production Control (FPC)

c) Registration and traceability.

NOTE Manufacturers having a Quality System complying with EN ISO 9001 meet the requirements related to Factory Production Control systems by including this standard in the Quality System.

5.2 Conditioning of the test specimen

When the test specimens have to be conditioned according to the test method, the tolerances in the time of conditioning for all test specimens shall be as specified in Table 4:

Table 4 – Conditioning and tolerance of test specimens

Conditioning	Tolerance
24 h	± 0,5 h
7 days	± 3 h
14 days	± 6 h
21 days	± 9 h
28 days	± 12 h

5.3 Initial type testing

On first evaluation of a product to the requirements of this standard, or before the beginning of sale of a new product, appropriate initial type testing shall be carried out to confirm that the characteristics of the product meet the requirements of this standard. Tests which have previously been performed in accordance with the provisions of this standard (same product, same characteristic, test method, sampling procedure, etc.) may be taken into account for the purpose of demonstrating satisfactory initial type testing.

Initial tests shall also be carried out on existing products after any change in raw materials or manufacturing procedures that can modify the declared values of the characteristics or application properties.

In these cases the appropriate initial type testing to be carried out shall be those for characteristics and properties that can be affected and need confirmation; any new property or properties arising from a change of formulation or manufacturing procedure shall be tested and the results reported.

The initial type testing shall be performed in accordance with the methods listed in Table 5.

The results of initial type tests shall be recorded and be available for inspection.

Table 5 — Initial tests

Characteristic	Test method	Type of grout	
		Cementitious	Reaction Resin
Abrasion resistance	EN 12808-2	y	y
Flexural strength after dry storage	EN 12808-3	y	y
Flexural strength after freeze-thaw cycles	EN 12808-3	y	-
Compressive strength after dry storage	EN 12808-3	y	y
Compressive strength after freeze-thaw cycles	EN 12808-3	y	-
Shrinkage	EN 12808-4	y	y
Water absorption after 30 min	EN 12808-5	y	-
Water absorption after 240 min	EN 12808-5	y	y
Chemical resistance	EN 12808-1	-	(y)
NOTE y means "yes "; (y) means "yes, if relevant for the product "			

5.4 Factory Production Control

5.4.1 General

A Factory Production Control (FPC) plan shall be established and documented in a manual.

Any change in raw materials, manufacturing procedures or control plan that can affect the properties of the product shall be recorded.

The manual shall include the FPC procedures relevant to the declared properties, as confirmed by the initial tests.

The FPC procedures shall consist of a system for the production quality control to ensure that the product conforms with this standard.

The production control shall consist of the following main phases:

a) Inspection and testing of raw materials;

b) Inspection and testing of production equipment and process;

c) Inspection and testing on finished products.

5.4.2 Production

5.4.2.1 Raw materials

The acceptance criteria and control procedures for incoming materials shall be defined to ensure that these are not used until it has been verified that they conform to the required specifications.

5.4.2.2 Production process

The manufacturer shall identify the plant and production processes and ensure that the processes are carried out under controlled conditions clearly described in documented operating procedures. The processes shall be verified by means of inspections and testing documented in a plan, as frequency and values or criteria required, both on equipment and on operations in the process.

The action to be taken when control values or criteria are not obtained shall be given.

5.4.3 Finished products

As appropriate, the factory production control system shall incorporate a sampling plan and the frequency of testing for the finished product. The number and size of the samples, the frequency of sampling, the tests performed and the results obtained, shall be recorded.

The frequency of sampling and testing can be determined from statistical principles, ensuring that the corresponding production conforms to the compliance criteria in this standard and achieves the required values for grouts. The tests can also be performed with the frequency described in Table 6.

These records shall be available for inspection by relevant parties.

Table 6 — Production control frequency

Characteristic	Test method	Frequency of test	
		At six month interval	
		CG	RG
Abrasion resistance	EN 12808-2	y	y
Flexural strength after dry storage	EN 12808-3	y	y
Flexural strength after freeze-thaw cycles	EN 12808-3	y	-
Compressive strength after dry storage	EN 12808-3	y	y
Compressive strength after freeze-thaw cycles	EN 12808-3	y	-
Shrinkage	EN 12808-4	y	y
Water absorption after 30 min	EN 12808-5	y	-
Water absorption after 240 min	EN 12808-5	y	y
Chemical resistance	EN 12808-1	-	(y)
NOTE y means "yes "; (y) means "yes, if relevant for the product "			

When alternative tests to reference tests are used, the test methods with the demonstration of correlation of the results obtained with both tests, shall be recorded, maintained and be made available on request from a relevant party.

5.4.4 Equipment

All the measuring instruments used for production or testing shall be identified, calibrated and kept in good order, in accordance with documented procedures and instructions.

The manufacturer shall establish an appropriate plan detailing the procedures and frequency of these checks and shall maintain the registrations. Test equipment shall be calibrated to traceable standards.

5.4.5 Statistical techniques

Where and when possible and applicable, the results of inspections and testing shall be interpreted by means of statistical techniques, to verify the product characteristics and to determine if the production conforms with the compliance criteria and the product conforms with the declared values.

5.5 Registration, traceability and non-conforming materials

5.5.1 Registration

The records of inspections and testing shall be collected, stored and retained in a way to prevent damage, deterioration or loss.

These records shall be maintained for 5 years and shall be made available on request from a relevant party.

5.5.2 Identification and traceability

Where appropriate, the manufacturer shall establish and maintain in the FPC manual suitable procedures for the identification and traceability of materials from receipt of raw materials and during all stages of production and delivery.

5.5.3 Non-conforming materials and corrective actions

The manufacturer shall ensure by means of procedures, documented in the FPC manual, that the materials (raw materials, packaging, finished products) that do not conform to the specified requirements are clearly identified and/or segregated to prevent their use or dispatch.

The non-conforming material may be reworked to meet the specifications, reclassified (see Clause 6: applies to cementitious grouts only) or rejected and discarded, with a corrective action described and recorded in a non-conformity report.

5.5.4 Management and personnel

The management activities to ensure that all of the above requirements operate shall be described in the manual.

The manufacturer shall ensure that all personnel involved in the process receive the appropriate training to perform their duties.

Where appropriate, all educational and training activities shall be recorded to prove the personnel qualification.

The job description and the responsibilities of the operatives shall be given in the FPC manual.

6 Classification and designation

Ceramic tile grouts are defined in two types, according to the definitions reported in 3.2:

CG Cementitious grout

RG Reaction resin grout

For cementitious grouts it is possible to have different classes, related to the different additional characteristics, in accordance with Tables 1 and 2. These classes are designated with the following references:

1 normal grout

2 improved grout (meets the requirements for additional characteristics, indicated as:

W reduced water absorption or **A** high abrasion resistance)

Table 7 — Classification and designation

SYMBOL		DESCRIPTION
TYPE	CLASS	
CG	1	Normal cementitious grout
CG	2 W	Improved cementitious grout with additional characteristic of reduced water absorption
CG	2 A	Improved cementitious grout with additional characteristic of high abrasion resistance
CG	2 W A	Improved cementitious grout with additional characteristics of reduced water absorption and high abrasion resistance
RG		Reaction resin grout

7 Marking and labelling

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

a) name of the product,

b) manufacturer's mark and place of origin,

c) date or code of production, shelf life and conditions of storage,

d) number of this EN Standard and date of issue,

e) type of grout according to Clause 6 (using symbols reported in Table 7),

f) instructions for use:

1) mix proportions (where applicable);

2) maturing time (where applicable);

3) pot life;

4) mode of application;

5) delay for cleaning and service time (where applicable);

6) field of application.

NOTE In the designation of a grout, information about special properties can be included when the product is intended for use in specific applications.

This information shall be marked on the packaging and/or on the product's technical data sheet.

This does not remove the requirement that all manufacturers claiming compliance with this standard shall state declared values for the properties of their products, when required.

Bibliography

[1] EN ISO 9001, *Quality management systems - Requirements (ISO 9001:2008)*

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