BRITISH STANDARD

BS EN 12273:2008
Incorporating Corrigenda January 2009 and June 2009

Slurry surfacing — Requirements

ICS 93.080.20

BSI British Standards

National foreword

This British Standard is the UK implementation of EN 12273:2008.

The UK participation in its preparation was entrusted to Technical Committee, B/510/2, Surface dressings, sprays and slurry surfacing.

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

EN 12273:2008 is a candidate “harmonized” European Standard and fully takes into account the requirements of the European Commission mandate M/124, *Road Construction Products*, given under the EU Construction Products Directive (89/106/EEC), and is intended to lead to CE marking. The date of applicability of EN 12273:2008 as a “harmonized” European Standard, i.e. the date after which this standard may be used for CE marking purposes, is subject to an announcement in the *Official Journal of the European Communities*.

EN 12273:2008 is the subject of transitional arrangements agreed under the European Commission mandate. The Member States have agreed a nominal transition period for the co-existence of EN 12273:2008 and their corresponding national standard(s). It is intended that this period will comprise a nominal nine month period during which any required changes to national regulations are to be made, followed by a further nominal twelve month period for the implementation of CE marking. At the end of this co-existence period, the national standard(s) will be withdrawn. In the UK, there is no corresponding national standard.

It is important to distinguish between unmodified slurry surfacing based on unmodified bitumen emulsion and slurry surfacing that contains additives such as polymers or fibres. This National Foreword clarifies Note 1 under the terms and definitions described in Sub-clause 3.1. In the UK the term "slurry surfacing" is used for unmodified conventional slurry surfacings and "microsurfacing" is used for slurry surfacings that are based on polymer modified bituminous emulsions or latex modified bituminous emulsions and may have additives such as fibres. The UK industry does not differentiate between different aggregate sizes to define microsurfacing, as indicated in Note 1 under Sub-clause 3.1, although generally a coarser system is used. In the UK "microsurfacing" is sometimes referred to as "microasphalt". The term "slurry seal" for a fine graded, unmodified slurry surfacing, often specified as a recipe, is no longer used.

This standard should be read in conjunction with PD 6689:2009, *Surface Treatments — Guidance on the use of BS EN 12271 and BS EN 12273.*

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This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

Compliance with a British Standard cannot confer immunity from legal obligations.

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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April 2008

ICS 93.080.20

English Version

Slurry surfacing - Requirements

Matériaux Bitumineux coulés à froid - Spécifications

Dünne Asphaltdeckschichten in Kaltbauweise - Anforderungen

This European Standard was approved by CEN on 23 February 2008.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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Contents

Page

Foreword 3

1 Scope 4

2 Normative references 4

3 Terms and definitions 5

4 Symbols 6

5 Requirements 6
5.1 Constituent materials 6
5.1.1 General 6
5.1.2 Binders 7
5.1.3 Aggregates 7
5.1.4 Grading curves 7
5.2 Slurry surfacing 7
5.2.1 Defects as determined by visual assessment 7
5.2.2 Skid resistance 7
5.2.3 Characterising noise generation (other characteristics) 10
5.3 Durability 10
5.3.1 General 10
5.3.2 Skid resistance 10
5.3.3 Bond 10

6 Evaluation of conformity 10

Annex A (normative) **Factory Production Control (FPC)** 11
A.1 General 11
A.2 General requirements 11
A.3 Product specific requirements 12

Annex B (normative) **Minimum test frequencies for Factory Production Control (FPC)** 16

Annex C (normative) **Type Approval Installation Trial (TAIT)** 20
C.1 General 20
C.2 Requirements 20
C.3 Records 20
C.4 Information availability 21

Annex ZA (informative) **Clauses of this European Standard addressing the provisions of the EU Construction Product Directive** 22
ZA.1 Scope and relevant characteristics 22
ZA.2 Procedure for attestation of conformity of slurry surfacing 24
ZA.3 CE marking and labelling 25

Bibliography 29

Foreword

This document (EN 12273:2008) has been prepared by Technical Committee CEN/TC 227 "Road materials", the Secretariat of which is held by DIN.

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 October 2008, and conflicting national standards shall be withdrawn at the latest by January 2010.

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 has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

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.

1 Scope

This European Standard specifies the performance requirements and control procedures for the installation of slurry surfacing as a product for the surface treatment of roads and other trafficked areas (e.g. footways, cycleways).

This European Standard is not designed for small areas of slurry surfacing on roads that are less than 500 m^2 which are not contiguous (for example minor repairs).

This European Standard does not apply to slurry surfacing designed by the purchaser.

This European Standard is not applicable to slurry surfacing carried out in tunnels in terms of reaction to fire. No such regulations have yet been identified, nor is there any method of classification of reaction to fire.

NOTE Member States can call up the technical requirements of this European Standard for use in tunnels.

This European Standard is not designed for pavements that are covered by international regulations, for example, International Civil Aviation Organisation (ICAO) regulations (airfields).

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 58, *Bitumen and bituminous binders — Sampling bitumen binders*

EN 933-1, *Tests for geometrical properties of aggregates — Part 1: Determination of particle size distribution — Sieving method*

EN 933-8, *Tests for geometrical properties of aggregates — Part 8: Assessment of fines — Sand equivalent test*

EN 933-9, *Tests for geometrical properties of aggregates — Part 9: Assessment of fines — Methylene blue test*

EN 1097-5, *Tests for mechanical and physical properties of aggregates — Part 5: Determination of the water content by drying in a ventilated oven*

EN 12274-2, *Slurry surfacing — Test methods — Determination of residual binder content*

EN 12274-6, *Slurry surfacing — Test methods — Rate of application*

EN 12274-8, *Slurry surfacing — Test methods — Visual assessment of defects*

EN 13036-1:2001, *Road and airfield surface characteristics — Test methods — Part 1: Measurement of pavement surface macrotexture depth using a volumetric patch technique*

EN 13043, *Aggregates for bituminous mixtures and surface treatments for roads, airfields and other trafficked areas*

EN 13808, *Bitumen and bituminous binders — Framework for specifying cationic bituminous emulsions*

EN ISO 9001:2000, *Quality management systems — Requirements (ISO 9001:2000)*

EN ISO 13473-1, *Characterization of pavement texture by use of surface profiles — Part 1: Determination of mean profile depth (ISO 13473-1:1997)*

3 Terms and definitions

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

3.1
slurry surfacing
surface treatment consisting of a mixture of aggregates, bituminous emulsion water and additives, which is mixed and laid in-place. Slurry surfacing product may consist of one or more layers

NOTE 1 Slurry surfacing made with larger size aggregates is often known as micro-surfacing and when made with smaller aggregates, for example less than 4 mm maximum size, is sometimes called slurry seal. Both are included in this European Standard.

NOTE 2 Layers that are not intended to be trafficked do not have to meet all performance requirements (for example macro-texture).

3.2
binder
component of slurry surfacing is a bituminous emulsion which may be modified with polymer or other additives

3.3
Factory Production Control (FPC)
permanent internal control of production exercised by the producer when all the elements, requirements and provisions adopted by the producer are documented in a systematic manner in the form of written policies and procedures

3.4
design
recipe and method statement to achieve the performance requirements specified

3.5
perceptible properties check
evaluation made with the senses: sight, touch, smell, hearing etc. It is a broader concept than the more commonly used term ‘visual inspection’

NOTE 1 For example, a check of an emulsion delivery can involve visual (colour, consistency and homogeneity), smell (odour) and touch (estimate of viscosity by stirring and tackiness after curing). This would determine whether the binder conformed to the expectations of the tester and would be the quickest way to detect a defective load. Similar principles apply to aggregates, particularly with stockpile inspection where handling soon reveals cleanliness, grading or flakiness problems. (See also EN 1425.)

NOTE 2 In all cases perceptible property checks should extend only as far as good practice and health and safety regulations permit.

3.6
Type Approval Installation Trial (TAIT)
synonymous with Initial Type Test (ITT) which demonstrates that the characteristics of the slurry surfaces complies with the declared characteristics according to this European Standard. The TAIT consists of a defined section where surface dressing has been installed using Factory Production Control (FPC) and which has been submitted to performance tests after a period of one year. Detailed information is recorded to clearly identify the product, its performance and the intended uses (see Annex C)

NOTE A TAIT is used by the producer to provide confidence in his product and his capability to design and install it.

3.7
durability
ability of a product to maintain its required performance, under the influence of foreseeable actions, for a reasonable economic working life

3.8
producer
legally responsible for placing the product on the market

3.9
product family
declared group of intended uses where the declared performance characteristics of the slurry surfacing is representative

EXAMPLES Motorways, lightly trafficked roads, footways or declared by stress level.

4 Symbols and abbreviations

For the purposes of this document, the following symbols apply.

S is the area of 100 m long slurry surfacing section, in square metres (m^2);

P_1 the proportion of area of bleeding, fatting up and tracking in the 100 m section being considered expressed as a percentage of the area of the section;

P_2 the proportion of area of delamination, loss of aggregate, wearing, lane joint gaps, rutting and slippage in the 100 m section being considered expressed as a percentage of the area of the section;

P_3 the proportion of area of corrugation and bumps in the 100 m section being considered expressed as a percentage of the area of the section;

$P_{4\,(n)}$ the proportion of area of the rectangle or rectangles containing small repetitive defects in the 100 m section being considered expressed as a percentage of the area of the section;

L the total length of longitudinal grooves in the 100 m section, in metres (m);

NOTE The above are determined by test procedures in EN 12274-8.

FPC Factory Production Control;

TAIT Type Approval Installation Trial;

PSV Polished Stone Value;

NPD No Performance Determined

5 Requirements

5.1 Constituent materials

5.1.1 General

Only constituent materials with established suitability may be used.

The establishment of suitability shall result from one or more of the following:

a) European Standard;

b) European Technical Approval;

c) specifications for materials based on a demonstrable history of satisfactory use in slurry surfacing. Evidence shall be provided for their suitability. This evidence may be based on research combined with evidence from practice.

5.1.2 Binders

The binder shall be a bituminous emulsion, which may be modified with polymer, in accordance with EN 13808 (see Table 1).

The cohesion of the bituminous binder shall comply with the classes specified in EN 13808.

For defined purposes other binders may be used, for example binders resistant to fuel spillage or pigmentable binders, which are specific to the intended use and they shall have performance characteristics complying with EN 13808.

5.1.3 Aggregates

The levels and classes for aggregate properties shall be chosen from the appropriate properties and categories in EN 13043 (see Table 1).

5.1.4 Grading curves

The maximum nominal size of aggregate (in mm) is declared according to

— Basic set + set 1 of sieves: 2; 4; 5,6 (5); 8; 11,2 (11) or

— Basic set + set 2 of sieves: 2 (or 2,8); 4; 6,3 (6); 8; 10; 12,5 (12).

The design grading curve and tolerance shall be declared by the producer as part of C.3 h).

5.2 Slurry surfacing

5.2.1 Defects as determined by visual assessment

The visual assessment of defects according to EN 12274-8 shall be used for the essential characteristics of adhesion of binder to aggregate, resistance to flow/deformation, hardening or setting ability, resistance to abrasion and bond to substrate and their durability (see Table ZA.1) and shall include the measurement of pavement surface macro-texture.

Visual assessment of defects shall be carried out between 11 months and 13 months (see Table 1) after the installation.

NOTE 1 In general most defects occur during the first twelve months after the installation of a slurry surfacing.

NOTE 2 The measurement of visual assessment after twelve months gives an appreciation of the durability of the slurry surfacing and is used in the TAIT.

For FPC other surrogate methods may be used if a correlation can be identified with the test used for ITT.

5.2.2 Skid resistance

Skid resistance shall be assessed by macro-texture in accordance with EN 13036-1 and shall be declared from the categories in Table 1.

The test in EN 13036-1:2001 shall be the reference test.

Other test methods may be used (for example laser texture meters – see EN ISO 13473-1) provided that they are correlated with the patch test as the reference test.

NOTE Dynamic skid resistance test methods are being developed.

Table 1 — Performance categories

Characteristics of slurry surfacing required by mandate			**Category**					
Technical requirement	**Reference**	**Unit**	**0**	**1**	**2**	**3**	**4**	**5**
Visual assessment of defects								
P1 – Bleeding, fatting up and tracking	EN 12274-8	%	NPD	≤ 8	≤ 2	≤ 0,5	≤ 0,2	
P2 – Delamination, loss of aggregate, wearing, lane joint gaps, rutting or slippage	EN 12274-8	%	NPD	≤ 8	≤ 2	≤ 0,5	≤ 0,2	
P3 – Corrugation, bumps and ridges	EN 12274-8	%	NPD	≤ 8	≤ 2	≤ 0,5	≤ 0,2	
$P4_{(n)}$ – groups of small and repetitive defects in not more than rectangles (n)	EN 12274-8	%	NPD	≤ 20 (20)	≤ 5 (6)	≤ 1 (2)	≤ 0,2 (1)	
L – longitudinal grooves-(scoremarks)	EN 12274-8	m	NPD	< 20	< 10	< 5	< 1	
Surface characteristics								
Macrotexture	EN 13036-1	mm	NPD	≥ 0,2	≥ 0,4	≥ 0,6	≥ 0,8	≥ 1,0
Noise generation Macrotexture	EN 13036-1	mm	Declared maximum value					
Constituent materials								
Binder cohesion – bituminous emulsion	EN 13808		Declare from classes in EN 13808					
Aggregate – polished stone value	EN 13043		Declare from the categories given in EN 13043					
Aggregate – resistance to wear by micro-Deval	EN 13043		Declare from the categories given in EN 13043					
Aggregate – resistance to wear by abrasion by studded tyres	EN 13043		Declare from the categories given in EN 13043					
Type of slurry surfacing			Declared type which should include maximum aggregate size (D as defined in EN 13043) and binder type (for each layer)					
Other characteristics of constituents								
Binders – other characteristics of binders may be chosen from those given in EN 13808								
Aggregates – other characteristics of aggregates may be chosen from those given in EN 13043								

NOTE A category is declared for each specific technical requirement.

The selection of categories for all technical requirements shall be made to avoid technically incompatible combinations e.g. high macro texture category 4 and high fatting defect category 1.

5.2.3 Characterising noise generation (other characteristics)

If noise generation is to be characterised by macro-texture it shall be measured in accordance with EN 13036-1 (see Table 1).

If the site configuration permits then EN ISO 11819-1 may be used.

5.3 Durability

5.3.1 General

Slurry surfacing prepared in accordance with this European Standard is deemed to be durable for a reasonable economic working life.

Durability of slurry surfacing is demonstrated by the Type Approval Installation Trial (TAIT).

NOTE The effect of changes in traffic levels, climate, substrate etc., prevents exact prediction of lifetime.

5.3.2 Skid resistance

5.3.2.1 General

Durability of skid resistance shall be demonstrated by means of measurement of polished stone value (PSV) in accordance with EN 13043 together with a measurement of macro-texture in accordance with EN 13036-1.

5.3.2.2 Polished stone value (PSV)

Polished stone value shall be declared in accordance with EN 13043.

NOTE Different categories can be used for different intended uses.

5.3.2.3 Macro-texture

Macro-texture shall be declared in accordance with 5.2.2.

5.3.3 Bond

Bond shall be evaluated in accordance with 5.2.1.

NOTE Test methods for bond are being developed.

6 Evaluation of conformity

Evaluation of conformity shall be demonstrated by:

— **Type Approval Installation Trial (TAIT)** in accordance with Annex C.

— **Factory Production Control (FPC)** in accordance with Annex A.

Annex A
(normative)

Factory Production Control (FPC)

A.1 General

The producer shall establish, document and maintain a Factory Production Control (FPC) system to ensure that the slurry surfacing placed on the market conforms to the stated performance characteristics. The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control incoming materials, equipment, the production process and the product. Alternative tests to those referred to in this document may be used for Factory Production Control if a correlation can be identified with the test used for ITT.

Where the producer purchases constituent materials or has the slurry surfacing designed, or parts of the production or testing carried out by sub-contracting, the FPC of the supplier or sub-contractor may be taken into account. However, where this occurs, the producer shall retain the overall control of the slurry surfacing and ensure that he receives all the information that is necessary to fulfil the requirements according to this European Standard. The producer who sub-contracts all of his activities may in no circumstances discharge himself of his responsibilities to a sub-contractor.

All the elements, requirements and provisions adopted by the producer shall be documented in a systematic manner in the form of written policies and procedures. This production control system documentation shall ensure a common understanding of conformity evaluation and enable the achievement of the required component characteristics 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 conformity of the slurry surfacing with its technical requirements. Its implementation may be achieved by controls and tests on measuring equipment, constituents, processes, machines and manufacturing equipment and finished components, including material properties of components, and by making use of the results thus obtained.

A producer who has a Factory Production Control which complies with EN ISO 9001 and made specific to this European Standard shall be deemed to satisfy the requirements of this annex.

A.2 General requirements

The FPC system shall at least fulfil the requirements as described in EN ISO 9001 specified in Table A.1, where applicable:

Table A.1 — Clauses of EN ISO 9001:2000 to be addressed in the FPC

EN ISO 9001 clause	Subject	Clause number in this document for additional requirements or information
4.2 (except 4.2.1 a)	Documentation required and control of documents	A.3.1
5.1 e)	Management to ensure availability of resources	A.3.2
5.5.1	Responsibility and authority	A.3.3
5.5.2	Management representative to ensure quality system is maintained	
6	Resource management for FPC system including provision, human resources, infrastructure and work environment	
7.1 except 7.1 a)	Planning of product realization	
7.2.3 c)	Customer feedback	
7.3	Design and development	A.3.4
7.4	Purchasing (process, information and verification)	
7.5	Production and service provision	A.3.5
7.6	Control of monitoring and measuring devices	A.3.6
8.2.4	Monitoring of processes and product	A.3.7
8.3	Control of non-conforming product	A.3.8
8.5.2	Corrective action	A.3.9

The FPC system may be part of a Quality Management system, e.g. in accordance with EN ISO 9001.

A.3 Product specific requirements

The requirements set out in this clause provide product specific details.

A.3.1 Records

Records shall be stored and maintained in such a way they are retrievable and maintained for a minimum period of 5 years from the date of production.

A.3.2 FPC system

The FPC system shall:

— ensure consistency with the requirements of this document;

— ensure that the slurry surfacing placed on the market conforms with the stated performance characteristics;

— comply with the clauses of EN ISO 9001 listed in Table A.1.

A.3.3 Responsibility and authority

The responsibility and authority of personnel shall be defined for personnel who have authority to

— modify the design locally to adjust for to road and environmental conditions;

— determine that the slurry surfacing complies with the requirements of this document.

NOTE An individual may exercise such supervision over a number of sites.

A.3.4 Design process

The design procedure used shall be documented.

Reference to a standard procedure, if used, shall be sufficient.

Tests from EN 12274-4, EN 12274-5 and EN 12274-7 may be used in the design process.

A.3.5 Process control

The producer shall produce a method statement for each site or group of sites for the installation of the slurry surfacing. The appropriate management shall have a working knowledge of and access to all relevant documentation including the contract and relevant European Standards.

Before site work commences the producer shall ensure that the following are documented and issued to the appropriate production personnel:

— the design of slurry surfacing for the site;

— any special instructions to the site staff relating to the programme of work;

— the equipment required for the work and the method of working to meet the design proposal and the requirements of the contract;

— any additional instructions including application requirements.

The performance of slurry surfacing greatly depends upon the application.

NOTE 1 The following actions can be necessary to achieve the performance requirements of this document and should be recorded:

— cleanliness of substrate;

— preparatory work based on weather conditions;

— materials purchased conformity to the specification requirements;

— materials identification;

— operation of application equipment;

— the use of competent personnel for the production of the slurry surfacing;

— a system for handling and taking account of any changes ordered by an authorized body;

— record of the road surface condition prior to production of the slurry surfacing and any local variations to the design proposal;

— procedure and time scale for notifying the purchaser of any problems which may affect the work (issues which may require deviation from the original specification);

— activities to maintain the product until the work is handed to the purchaser.

Records shall be kept of the operation on site that could affect the performance of the slurry surfacing covering the period shortly before operations commence until the opening of the site to unrestricted normal traffic.

NOTE 2 These records can contain the following:

— variations from the original design proposal including those necessitated by site conditions;

— unforeseen problems (weather conditions, emergency vehicle damage etc.);

— weather information;

— any other information considered relevant to the performance of the product;

— traffic control measures;

— notes on perceptible properties checks;

— complaints from the public.

A.3.6 Control of equipment and monitoring and measuring devices

Procedures shall be documented for ensuring that test, monitoring and measuring equipment continues to function within the tolerances stated in the producer's documented procedures.

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure consistency in the manufacturing process according to the requirements of this European Standard.

NOTE 1 Rapid checks on the functionality of test equipment can be used, e.g. checking a balance with a standard mass.

NOTE 2 Useful information on calibration and accuracy of test equipment can be found in EN 12697-38.

A.3.7 Monitoring and measurement of product

The producer shall establish procedures to ensure that the product performances are in accordance with this European Standard.

The characteristics and the means of inspection are given in Table A.2.

Table A.2 — Assessment of performance characteristics

Characteristics	Inspection procedure and frequency
Adhesion of binder to aggregate	Tables B.2 and B.3
Resistance to flow/deformation (including temperature dependence)	Tables B.2 and B.3
Hardening or setting ability	Table B.3 and weather
Cohesion of binder	Table B.3
Skid resistance	Table B.2
Resistance to abrasion	Table B.2
Bond to substrate	Table B.6
Reaction to fire	(see Clause 1 [a])
Noise characterisation	(see 5.2.3 [a])
Durability of adhesion of binder to aggregates	Tables B.2 and B.3
Durability of resistance to flow/deformation	(see Table ZA.1 [a])
Durability of cohesion	Table B.2 and B.3
Durability of skid resistance	Table B.2
Durability of resistance to abrasion of aggregate	Table B.2
Durability of bond to substrate	Table B.6
Dangerous substances	Incoming materials (see NOTE)
[a] interconnected to TAIT, not to FPC.	

NOTE See ZA.1, NOTE 2.

A.3.8 Non-conforming products

The producer shall have written procedures which specify how to deal with non-conforming products. Any such events shall be recorded as they occur and these records shall be kept for the period defined in the producer's written procedures (at least 5 years).

A.3.9 Corrective and remedial action

The producer shall have documented procedures that instigate action to eliminate the cause of non-conformities in order to prevent recurrence. Non-conformity of the slurry surfacing shall involve one or more of the following:

— repair and/or remedial action to bring the product up to the required standard;

— written acceptance of the product following agreement by the purchaser to accept the non-conforming product;

— rejection and removal of the product.

Annex B
(normative)

Minimum test frequencies for Factory Production Control (FPC)

Table B.1 — Equipment calibration requirements

Machine components	Inspection/test	Purpose	Minimum frequency
Metering equipment	Visual control.	Check the proper operation of the machine.	Once on each production day.
Flow meters for liquids	Comparison of the quantity delivered by the pump with the quantity consumed by time unit. Control done on different flows relevant to the range of uses. Tests are done for extreme contents and tests for the middle one. Graph can be enclosed.	Check the accuracy of the contents in accordance to the quality plan.	On installation. [a] Annually. When apparatus does not appear to be functioning correctly.
Solids measured by volume	Determination of the flow of the machine as a function of the speed of the conveyor or the screw. Control done at different speeds of the range of use. Tests are carried out at the highest and lowest flow and one flow rate approximately mid way between. Graph can be produced.	Check the accuracy of the contents in accordance to the quality plan.	On installation. [a] Annually. When apparatus does not appear to be functioning correctly.
Solids measured by mass	Comparison of the mass delivered by the control instrument with the mass measured by the checking device. Control based on contents linked to the range of use. Tests are carried out at the highest and lowest flow and one flow rate approximately mid way between. Graph can be produced.	Check the accuracy of the contents in accordance to the quality plan.	On installation. [a] Annually. When apparatus does not appear to be functioning correctly.
Levels in the tanks and storage hoppers	Visual control.	Check the proper operation.	Continual.

[a] Or following a complete repair; the term installation including changing the type of the components.

Table B.2 — Inspection and test frequencies for aggregates

Inspection/test	Purpose	Normative references	Minimum frequency
Test for intrinsic and geometric properties of aggregates (strength, PSV etc.)	To check properties against the design proposal. Tests are carried out only where required by the slurry surfacing producer.	EN 13043	Source approval before initial use [a] Once per year and per quarry. In case of doubt following a perceptible properties check.
Inspection of delivery ticket	To check the conformity of the aggregates received with the order and comes from the correct plant.	As described in the quality plan.	Each delivery.
Visual check perceptible properties	To realise a comparison with the normal aspect in matter of source, gradation. Flakiness and impurities.	As described in the quality plan.	Each delivery.
Control on stock	To check that the material has not changed since delivery into stock.	As described in the quality plan.	On each production day.
Sieve analysis	Tests are carried out only where required by the slurry surfacing producer.	EN 933-1	Every 1 000 t per type [a]. In case of doubt following a perceptible properties check.
Moisture of the aggregates	To ensure consistency of slurry surfacing moisture content and achieve the target binder content	EN 1097-5	In case of doubt following a perceptible properties check.
Sand equivalent or Methylene Blue test	To check conformity of the aggregates	EN 933-8 or EN 933-9	In case of doubt following a perceptible properties check.

[a] Results of tests and inspections by the aggregate supplier, as part of his Factory Production Control (when included in the producer's FPC) may be used to satisfy the requirements of this table.

Table B.3 — Inspection and test frequencies for bituminous emulsions

Inspection/test	Purpose	Normative reference	Minimum frequency
Test for intrinsic properties of the bituminous emulsion	To confirm the characteristics of the product and the conformity to the appropriate specification. Tests are carried out only where required by the slurry surfacing producer.	EN 13808	Source approval before initial use.[a] Once per year and per source. In case of doubt following a perceptible properties check.
Inspection delivery ticket	To check the conformity of the binder received with the order and comes from the correct supplier or plant.	As described in the quality plan.	At every delivery.
Perceptible properties check (control of the sample from the tank) of consignment	To make a comparison with the normal characteristics.	As described in the quality plan.	At every delivery or each production day.
Take a reference sample	To be able to test later in case of problems	EN 58.	In case of doubt following a perceptible properties check

[a] Results of tests and inspections by the binder supplier, as part of his Factory Production Control (when included in the producer's FPC) may be used to satisfy the requirements of this table

All samples shall be stored in such a manner that deterioration is kept to a minimum.

Table B.4 — Control on the water

Control/test	Purpose	Normative reference	Minimum frequency
Intrinsic properties	Confirm the water is suitable for use (not needed for potable water from public supply).	As described in the quality plan.	Source approval before initial use.
Perceptible properties	Do a comparison with the normal characteristics.	As described in the quality plan.	On each production day.

Table B.5 — Control of the additives (including cement, lime, fibres and chemicals)

Control/test	Purpose	Normative reference	Minimum frequency
Intrinsic properties	To check the conformity of the additives.	As described in the quality plan.	Source approval before initial use.[a] In case of doubt following a perceptible properties check
Control of the delivery ticket	Check that the delivery is in conformity with the order.	As described in the quality plan.	At each delivery.
Perceptible properties check of the delivery	Compare with the normal aspect.	As described in the quality plan.	At each delivery.

[a] Results of tests and inspections by the additive supplier, as part of his Factory Production Control (when included in the producer's FPC) may be used to satisfy the requirements of this table.

Table B.6 — Controls during the process and installation of the slurry surfacing

Control/test	Purpose	Normative reference	Minimum frequency
Control of the storage areas	Check that the storage areas correspond to the criteria described in the quality plan.	As described in the quality plan.	For every site.
Check the cleanness of the tanks	Avoid contamination.	As described in the quality plan.	Every production day prior to production. If constituents are changed.
Control the quantities of the components (bituminous emulsion, aggregates etc.)	Check that sufficient amounts of the correct materials are available to carry out production.	As described in the quality plan.	For every site.
Weather conditions	Check that the weather conditions are suitable.	As described in the quality plan.	For every application.
Preparation (Bond to substrate) Durability of bond to substrate	Check that the substrate conforms to the criteria described in the quality plan.	As described in the quality plan.	For every application.
Application of the slurry surfacing	Check that all the settings described in the quality plan are achieved.	As described in the quality plan.	For every application.
Determination of residual binder content	To ensure slurry surfacing conforms to requirements	EN 12274-2	1 per 1 000 t.
Determination of rate of application	To ensure slurry surfacing conforms to requirements	EN 12274-6	Each work site.
Perceptible properties	Check that material conforms to normal appearance etc.	As described in the quality plan.	Continuously during application.

Table B.7 — Inspection and test frequencies measured after installation

Inspection/test	Purpose	Normative reference	Recommended frequency
Visual assessment as 5.2.1	To ensure slurry surfacing conforms to specification.	EN 12274-8	As described in the Quality Plan.
Macro-texture as 5.2.2	To ensure slurry surfacing conforms to specification.	EN 13036-1	As described in the Quality Plan.

Annex C
(normative)

Type Approval Installation Trial (TAIT)

C.1 General

A TAIT consists of a defined section where slurry surfacing has been installed using Factory Production Control (FPC) and which has been submitted to performance tests after a period of one year. Detailed information is recorded to clearly identify the product, its performance and the intended uses. The producer carries out one Type Approval Installation Trial (TAIT) to cover each product family he wishes to place on the market. The TAIT is synonymous with Initial Type Test (ITT) which demonstrates that the characteristics of the slurry surfacing comply with the requirements of the technical specification.

A TAIT of micro-surfacing for a motorway may cover the use on lightly trafficked road but not vice versa as it demonstrates the ability of the producer. A product family is performance based and therefore permits a variation of components in accordance with the producer's FPC.

NOTE A TAIT is used by the producer to demonstrate that his product complies with the requirements of this European Standard.

C.2 Requirements

A TAIT shall comprise a full set of test results as Table 1 of this document demonstrating the performance characteristics of a defined section or sections of slurry surfacing constructed in accordance with the requirements of this European Standard.

The minimum length of a section shall be 200 m and the width shall be the full width of road on single carriageway roads or one lane width on dual carriageways or motorways.

A TAIT shall be carried out on one section of work that shall be representative of a slurry surfacing type.

The TAIT is completed by carrying out performance tests on the slurry surfacing, on site, after one year of completion of the installation.

The producer shall design and install the slurry surfacing, of which the TAIT is a representative section, in accordance with his documented Factory Production Control system (Annex A). He shall record all the data required by the FPC and any additional data required by C.3.

C.3 Records

The data recorded for a TAIT shall include the following information:

a) producer (name, address, phone number etc.);

b) date of TAIT;

c) location of TAIT (road number, start and end points);

d) intended use;

e) description of type of slurry surfacing (see Table 1);

f) design procedure or method;

g) design office (name, address, phone number etc. (where different from 'producer'));

h) relevant test results of materials used;

NOTE The TAIT can include further information, for example: Rate of Application EN 12274-6, Residual Binder Content EN 12274-2, Shaking Abrasion Test EN 12274-7, bond test results, target grading and tolerances.

i) One year after the installation visual assessment to EN 12274-8 and macro texture to EN 13036-1 or to EN ISO 13473-1 shall be recorded;

j) bond;

k) name of producer's representative responsible for TAIT.

C.4 Information availability

The information from a TAIT shall be kept and stored securely. If the data is lost the TAIT shall no longer be valid.

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Product Directive

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under mandate M/124 – Road Construction Products – given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard shown in this Annex meet the requirements of the mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the slurry surfacing covered by this Annex for the intended uses indicated herein; reference shall be made to the information accompanying the CE marking.

WARNING — Other requirements and other EU Directives, not affecting the fitness for intended uses, may be applicable to the Slurry Surfacing falling within the scope of this European Standard.

NOTE 1 In addition to any specific clauses relating to dangerous substances contained in this standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

NOTE 2 An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (accessed through http://europa.eu.int/comm/enterprise/construction/internal/dangsub/dangmain.htm).

This annex establishes the conditions for the CE marking of the slurry surfacing intended for the uses indicated in Table ZA.1 and shows the relevant clauses applicable.

This annex has the same scope as Clause 1 of this document and is defined by Table ZA.1.

Table ZA.1 — Relevant clauses

Product: Description of slurry surfacing **Intended use:** For surface treatment of roads and other trafficked areas.			
Essential Characteristics	**Requirement clauses in this and other European Standard(s)**	**Levels and/or classes**	**Notes**
Adhesion of binder to aggregate (visual assessment of defects from TAIT)	5.2.1 – Table 1 (P_2, P_4)		NOTE 3 Category
Resistance to flow/deformation (including temperature dependence) (visual assessment of defects from TAIT)	5.2.1 – Table 1 (P_1, P_4)		NOTE 3 Category
Hardening or setting ability (visual assessment of defects from TAIT)	5.2.1 – Table 1 (P_2, P_3, P_4, L)		NOTE 3 Category
Cohesion of binder	5.2.1 – Table 1 (P_2, P_4)		Category
Skid resistance (macro texture)	5.2.2 – Table 1		NOTE 3 Category
Resistance to abrasion (Resistance to aggregate abrasion) (Resistance to abrasion from studded tyres)	5.2.1 – Table 1 5.2.1 – Table 1		Category Category
Bond to substrate (visual assessment of defects from TAIT)	5.2.1 – Table 1 (P_2, P_4)		NOTE 3 Category
Reaction to fire	Not applicable		(see Clause 1)
Noise characterisation (macro texture)	5.2.3 – Table 1		Category
Durability of adhesion of binder to aggregates (visual assessment of defects from TAIT)	5.2.1 – Table 1 (P_2, P_4)		NOTE 1, 3 Category
Durability of resistance to flow/deformation (visual assessment of defects from TAIT)	5.2.1 – Table 1 (P_1, P_3, P_4)		NOTE 1, 3 Category
Durability of cohesion (durability of binder)	5.2.1 – Table 1		NOTE 1 Category
Durability of skid resistance (polished stone value, PSV) (macro-texture)	5.3.2.2 – Table 1 5.3.2.3 – Table 1		NOTE 1 Category Category
Durability of resistance to abrasion (durability of aggregates) (visual assessment of defects from TAIT)	5.2.1 – Table 1 5.2.1 – table 1 (P_2, P_4)		NOTE 1, 3 Category
Durability of bond to substrate (visual assessment of defects from TAIT)	5.3.3 – table 1 (P_2, P_4)		NOTE 1, 3 Category
Dangerous substances	see ZA 1 NOTE 2		

NOTE 1 The standard for durability is after one year but a producer may wish to demonstrate enhanced durability by monitoring the TAIT over a longer period.

NOTE 2 Categories in Table ZA.1 represent technical classes of convenience.

NOTE 3 All measurements are carried out on the TAIT.

The requirement on a certain characteristic is not applicable in those Member States (MSs) where there are no regulatory requirements on that characteristic for the intended use of the product. In this case, manufacturers placing their products on the market of these MSs are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option "No performance determined" (NPD) in the information accompanying the CE marking (see ZA.3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level.

ZA.2 Procedure for attestation of conformity of slurry surfacing

ZA.2.1 System of attestation of conformity

The system of attestation of conformity of slurry surfacing indicated in Table ZA.1, in accordance with the Decision of the Commission [98/601/EC] of [1998-10-24] as given in Annex III of the mandate for "Road Construction Products", is shown in Table ZA.2 for the indicated intended use(s) and relevant level(s) or class(es):

Table ZA.2 — System of attestation of conformity

Product	Intended use	Levels or classes	Attestation of conformity system
Slurry surfacing	Surface treatment of Roads	None	2+

The attestation of conformity of the slurry surfacing in Table ZA.1 shall be based on the evaluation of conformity procedures indicated in Table ZA.3 resulting from application of the clauses of this or other European Standard indicated therein.

Table ZA.3 — Assignment of evaluation of conformity tasks for slurry surfacing under system 2+

Tasks			Content of task	Evaluation of conformity clauses to apply
Tasks for the producer	Factory Production Control (FPC)		Parameters related to all declared characteristics of Table ZA.1	Annex A
	Initial Type Trial (type approval installation trial (TAIT))		All declared characteristics of Table ZA.1	Annex C
	Testing of samples taken at the factory		All declared characteristics of Table ZA.1	EN 12273
	Certification of FPC by a notified body on the basis of	Initial inspection of factory by a notified body and of FPC	Parameters related to all declared characteristics of Table ZA.1	Annex A
		Continuous surveillance, assessment and approval of FPC	Parameters related to all declared characteristics of Table ZA.1	Annex A

ZA.2.2 EC Certificate and Declaration of conformity

When compliance with the conditions of this annex is achieved, and once the notified body has drawn up the certificate mentioned below, the manufacturer or his agent established in the EEA shall prepare and retain a declaration of conformity, which entitles the manufacturer to affix the CE marking. This declaration shall include:

— name and address of the manufacturer;

— description of the product (type, identification, use,...), and a copy of the information accompanying the CE marking;

— provisions to which the product conforms (i.e. Annex ZA of this EN);

— particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);

— the number of the accompanying Factory Production Control certificate;

— name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

The declaration shall be accompanied by a Factory Production Control certificate, which shall contain, in addition to the information above, the following information:

— name and address of the notified body;

— the number of the Factory Production Control certificate;

— conditions and period of validity of the certificate, where applicable;

— name of, and position held by, the person empowered to sign the certificate.

The above mentioned declaration and certificate shall be presented in the official language acceptable to the Member State in which the product is to be used.

ZA.3 CE marking and labelling

The manufacturer is responsible for the affixing of the CE marking. The CE marking symbol shall be in accordance with Directive 93/68/EC and shall be shown on the accompanying commercial documents.

The following information shall accompany the CE marking symbol:

— identification number of the certification body;

— name or identifying mark and registered address of the producer;

— the last two digits of the year in which the marking is affixed;

— number of the Factory Production Control certificate;

— reference to this European Standard;

— description of the product;

— information on those relevant characteristics listed in Table ZA.1.1 which are to be declared presented as:

— category for each essential characteristic in Table ZA.1;

— “No performance determined” for characteristics where this is relevant.

Figure ZA.1 gives an example of the information to be given on the product, label, packaging and/or commercial documents.

CE 01234	*CE conformity marking, consisting of the "CE"-symbol given in directive 93/68/EEC.* *Identification number of the certification body (where relevant)*
Slurry surfacing example Ltd., Europe **05** 01234-CPD-00234	*Name or identifying mark and registered address of the producer* *Last two digits of the year in which the marking was affixed* *Certificate number (where relevant)*
EN 12273	*No. of European Standard*
Slurry surfacing intended use: Road maintenance	*Class(es) of use for which slurry surfacing is intended e.g. road maintenance. A particular intended use may be detailed, e.g. lightly trafficked roads, footways.* *For a double layer, the first layer, when it is not intended to be trafficked, is not required to achieve surface characteristics as it will be overlaid. The TAIT is used to assess the durability of the layers of the double-layered product.* *For footways the requirements would be much less onerous than the example shown and several performance characteristics would have NPD.*
Description of slurry surfacing 0/6 microsurfacing with polymer modified binder	
Adhesion of binder to aggregate:	
Visual assessment P2 — Category 2	
Visual Assessment P4 — Category 1	
Resistance to flow/deformation:	
Visual assessment P1 — Category 3	
Visual assessment P4 — Category 1	
Hardening or settingability:	
Visual assessment P2 — Category 2	
Visual assessment P3 — Category 3	
Visual assessment P4 — Category 1	
Visual assessment L — Category 2	
Cohesion of binder:	
EN 13808 — Class 4	
Skid resistance:	
Macro-texture — Category 3	
Resistance to abrasion:	*Resistance to abrasion is by one of the two tests depending on the intended use (e.g. those countries using studded tyres)*
Aggregate Abrasion Value — Declared	
Abrasion from studded tyres — NPD	

Bond to substrate:	
Visual Assessment P2	Category 2
Visual Assessment P4	Category 1
Noise characterisation:	NPD
Durability of adhesion of binder to aggregate:	
Visual Assessment P2	Category 2
Visual assessment P4	Category 1
Durability of resistance to flow/deformation:	
Visual Assessment P1	Category 3
Visual assessment P3	Category 3
Visual assessment P4	Category 1
Durability of cohesion of binder EN 13808: Declared Class	
Durability of skid resistance:	
Macro-texture	Category 3
PSV EN 13043	PSV55
Durability of resistance to abrasion:	
Visual assessment P2	Category 2
Visual assessment P4	Category 1
Durability of Bond to Substrate:	
Visual assessment P2	Category 2
Visual assessment P4	Category 1

If a producer wishes to declare a performance within a category but better than the minimum he is permitted to do so.

Figure ZA.1 — Example CE marking information

In addition to any specific information relating to dangerous substances shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE European legislation without national derogations need not be mentioned.

Bibliography

[1] EN 933-5, *Tests for geometrical properties of aggregates — Part 5: Determination of percentage of crushed and broken surfaces in coarse aggregate particles*

[2] EN 933-6, *Tests for geometrical properties of aggregates — Part 6: Assessment of surface characteristics — Flow coefficient of aggregates*

[3] EN 1097-1, *Tests for mechanical and physical properties of aggregates — Part 1: Determination of the resistance to wear (micro-Deval)*

[4] EN 1097-2, *Tests for mechanical and physical properties of aggregates — Part 2: Methods for the determination of resistance to fragmentation*

[5] EN 1097-8, *Tests for mechanical and physical properties of aggregates — Part 8: Determination of the polished stone value*

[6] EN 1097-9, *Tests for mechanical and physical properties of aggregates — Part 9: Determination of the resistance to wear by abrasion from studded tyres — Nordic test*

[7] EN 1425, *Bitumen and bituminous binders — Characterization of perceptible properties*

[8] EN 1428, *Bitumen and bituminous binders — Determination of water content in bitumen emulsions — Azeotropic distillation method*

[9] EN 1429, *Bitumen and bituminous binders — Determination of residue on sieving of bitumen emulsions, and determination of storage stability by sieving*

[10] EN 12274-1, *Slurry surfacing — Test methods — Part 1: Sampling for binder extraction*

[11] EN 12274-3, *Slurry surfacing — Test methods — Part 3: Consistency*

[12] EN 12274-4, *Slurry surfacing — Test methods — Determination of cohesion of the mix*

[13] EN 12274-5, *Slurry surfacing — Test methods — Determination of wearing*

[14] EN 12274-7, *Slurry Surfacing — Test methods — Shaking abrasion test*

[15] EN 12697-38, *Bituminous mixtures — Test methods for hot mix asphalt — Part 38: Common equipment and calibration*

[16] EN 12846, *Bitumen and bituminous binders — Determination of efflux time of bitumen emulsions by the efflux viscometer*

[17] EN 12847, *Bitumen and bituminous binders — Determination of settling tendency of bitumen emulsions*

[18] EN 13074, *Bitumen and bituminous binders — Recovery of binder from bitumen emulsions by evaporation*

[19] EN 13075-1, *Bitumen and bituminous binders — Determination of breaking behaviour — Part 1: Determination of breaking value of cationic bitumen emulsions, mineral filler method*

[20] EN 13075-2, *Bitumen and bituminous binders — Determination of breaking behaviour — Part 2: Determination of fines mixing time of cationic bitumen emulsions*

[21] EN 13588, *Bitumen and bituminous binders — Determination of cohesion of bituminous binders with pendulum test*

[22] EN 13589, *Bitumen and bituminous binders — Determination of the tensile properties of modified bitumen by the force ductility method*

[23] EN 14769, *Bitumen and bituminous binders — Accelerated long-term ageing conditioning by a Pressure Ageing Vessel (PAV)*

[24] EN 14895, *Bitumen and bituminous binders — Stabilisation of binder from bituminous emulsions or from cut-back and fluxed bituminous binders*

[25] EN ISO 11819-1, *Acoustics — Measurement of the influence of road surfaces on traffic noise — Part 1: Statistical Pass-By method (ISO 11819-1:1997)*

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