



**SLOVENSKI STANDARD**  
**oSIST prEN 16333:2011**  
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**Tankoplastne prevleke po hladnem postopku - Specifikacije za letališča**

Slurry surfacing - Specification for airfields

Dünne Asphaltsschichten in Kaltbauweise - Anforderungen an Flugplätze

Matériaux bitumineux coulés à froid - Spécifications relatives aux aérodromes

**Ta slovenski standard je istoveten z: prEN 16333**

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**ICS:**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**DRAFT**  
**prEN 16333**

October 2011

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ICS 93.080.20; 93.120

English Version

## Slurry surfacing - Specification for airfields

Matériaux bitumineux coulés à froid - Spécifications  
relatives aux aérodromes

Dünne Asphaltsschichten in Kaltbauweise - Anforderungen  
an Flugplätze

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 227.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (prEN 16333:2011) has been prepared by Technical Committee CEN/TC 227 “Road materials”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

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.

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## 1 Scope

This document describes the performance requirements and control procedures for the installation of slurry surfacing on airfields as a product for the surface treatment of areas trafficked by Aircraft (e.g. runways on „low” trafficked airfields, aprons and taxiways).

**NOTE** The installation of slurry surfacing on airfields requires experience and skills from both the Client and the Contractor. The suitability of the product for a particular airfield application and the capability of the contractor have to be considered carefully in every case.

This document does not apply to small areas of slurry surfacing that are less than 500 m<sup>2</sup> which are not contiguous (for example minor repairs).

This document contains

- Annex A (normative) Factory Production Control,
- Annex B (informative) Minimum Test Frequencies for FPC,
- Annex C (normative) Type Approval Installation Trial (TAIT),
- Annex D (normative) Mix Design,
- Annex E (normative) Shear Bond Strength Test Method.

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## 2 Normative references (standards.iteh.ai)

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 932-1, *Tests for general properties of aggregates — Part 1: Methods for sampling*

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

EN 933-3, *Tests for geometrical properties of aggregates — Part 3: Determination of particle shape — Flakiness index*

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

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

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

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

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

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

EN 1367-1:1999, *Tests for thermal and weathering properties of aggregates — Part 1: Determination of resistance to freezing and thawing*

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

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

EN 12273:2008, *Slurry Surfacing — Requirements*

EN 12274-1, *Slurry Surfacing Test Methods — Part 1: Sampling for binder extraction*

EN 12274-2, *Slurry Surfacing Test Methods — Part 2: Determination of residual binder content*

EN 12274-3, *Slurry Surfacing Test Methods — Part 3: Consistency*

EN 12274-4, *Slurry Surfacing Test Methods — Part 4: Determination of the cohesion of the mix*

EN 12274-5, *Slurry Surfacing Test Methods — Part 5: Determination of wearing*

EN 12274-6, *Slurry Surfacing Test Methods — Part 6: Rate of application*

EN 12274-7, *Slurry Surfacing Test Methods — Part 7: Shaking abrasion test*

EN 12274-8, *Slurry Surfacing Test Methods — Part 8: Visual Assessment of Defects*

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

EN 12697-19, *Bituminous mixtures — Test methods for hot mix asphalt — Part 19: Permeability of specimen*

EN 12697-41, *Bituminous mixtures — Test methods for hot mix asphalt — Part 41: Resistance to de-icing fluids*

EN 12697-43, *Bituminous mixtures — Test methods for hot mix asphalt — Part 43: Resistance to fuel*

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

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

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

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

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

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



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

EN 13588, *Bitumen and bituminous binders — Determination of cohesion of bituminous binders*

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

EN 14769, *Bitumen and bituminous binders — Accelerated long-term ageing — Pressure Ageing Vessel (PAV)*

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

EN ISO 9001, *Quality management systems — Requirements*

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

### 3 Terms and definitions

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

#### 3.1

##### **slurry surfacing (slurry seal) on airfields**

surface treatment consisting of a mixture of aggregates, water, bituminous emulsion and additives which is mixed by machine and laid in-place. Slurry surfacing on airfields consists of one or more layers and a tack coat or bond coat

NOTE 1 Slurry surfacing formerly included and was known as „slurry seal” and incorporates microsurfacing, a polymer modified slurry surfacing

NOTE 2 For small areas the material may be pre-mixed and transported to site, for example for repairs

#### 3.2

##### **binder**

as a component of slurry surfacing is a bitumen emulsion which may be modified with polymers 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. This production control system documentation shall ensure a common understanding of quality assurance and enable the achievement of the required product characteristics and the effective operation of the production control system to be checked

#### 3.4

##### **mix design**

recipe and method statement to achieve the performance requirements specified

#### 3.5

##### **perceptible properties check**

an 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 on an emulsion delivery might 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

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principles apply to aggregates, particularly with stockpile inspection where handling soon reveals cleanliness, grading or flakiness problems.

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

**3.6**  
**Type Approval Installation Trial (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, unless otherwise specified by the client. 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 or microsurfacing comply with the requirements of the technical specification

**3.7**  
**Construction Trial**  
safety critical nature of airfield pavement engineering will normally necessitate a construction trial of slurry surfacing being laid on a suitable non-aircraft trafficked pavement (ie a pavement with a surface in similar condition to the aircraft pavement which is to receive slurry surfacing) immediately prior to commencement of slurry surfacing works on an airfield. The purpose of this is to demonstrate the suitability of the proposed slurry surfacing mix and laying method in order to manage the FOD risk

**3.8**  
**durability**  
ability of a product to maintain its required performance, under the influence of foreseeable actions, for a reasonable economic working life

**3.9**  
**Shear Bond Strength (SBS)**  
measure of the bond at the interface with the substrate and the shear strength within the slurry surfacing material in accordance with the test method in Annex E

**3.10**  
**tack coat**  
bitumen emulsion used to prime the substrate prior to application of slurry surfacing

**3.11**  
**bond coat**  
polymer modified bituminous emulsion, having a cohesive quality, used to promote adhesion between the slurry surfacing and substrate

**4 Symbols**

- $S$  is the area of 100 m long slurry surfacing and microsurfacing section, in square metres ( $m^2$ );
- $P_1$  the proportion of area of bleeding, fattening 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;
- $P_4$  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);

## 5 Requirements

### 5.1 Constituent materials

Only constituent materials with established suitability shall be used.

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

- European Standard;
- European Technical Approval;
- Specifications for materials based on a demonstrable history of satisfactory use in slurry surfacing or microsurfacing. Evidence shall be provided on their suitability. This evidence may be based on research combined with evidence from practice.

#### 5.1.1 Binders

The binder for slurry surfacing shall be a bituminous emulsion, which may be modified with polymer in accordance with EN 13808.

When additives are used, these must be declared by the producer.

The cohesion of the bituminous binder, when tested in accordance with EN 13588, shall comply with the classes specified in EN 13808.

For special purposes other binders may be used, for example, binders resistant to fuel spillage or de-icing chemicals.

#### 5.1.2 Aggregates and filler

Aggregates and filler in accordance with EN 13043.

The levels and classes for aggregate properties shall be chosen from the appropriate properties and categories in EN 13043.

##### 5.1.2.1 Grading

The grading of the aggregate size shall be determined in accordance with EN 933-1.

100 % of the aggregate shall pass a 4 mm sieve.

The grading curve (aggregate, filler and cement) may be specified in accordance with sieve sizes 4 mm, 2 mm, 1 mm, 0,125 mm and 0,063 mm.

##### 5.1.2.2 Percentage of crushed and broken surfaces

The percentage of crushed and broken surfaces shall be 100 %, indicated in EN 13043 as  $C_{100/0}$ .

##### 5.1.2.3 Resistance to fragmentation

The category of resistance to impact shall be  $LA_{20}$  or  $LA_{15}$ .

**prEN 16333:2011 (E)****5.1.2.4 Resistance to polishing of aggregate**

A  $PSV_{50}$  is required.

NOTE In some countries a higher value may be required.

**5.1.2.5 Resistance to wear**

The Micro-Deval shall be determined in accordance with EN 1097-1.

**5.1.2.6 Resistance to freezing and thawing**

When required, the resistance to freezing and thawing shall be determined in accordance with EN 1367-1:1999, Annex B (using salt saturation). The tests shall be done also with a 10 % solution of the chemicals used for de-icing airfield pavement and for de-icing of aircraft.

The Magnesium Sulphate Soundness value may be specified.

**5.1.3 Methylene blue**

The methylene blue shall be determined in accordance with EN 933-9. The category shall be chosen from levels in EN 13043.

**5.2 Product performance****5.2.1 Defects as determined by visual assessment**

The visual assessment of defects according to EN 12274-8 is 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. Airfield requirements are listed in Table 1. The TAIT at 12 months shall in accordance with Category 1 and the Construction Trial with Category 2.

NOTE Figures in EN 12274-8 may be used as a guidance to illustrate different defects.

**5.2.2 Skid resistance**

When required, the test equipment and minimum values shall be specified according to ICAO (International Civil Aviation Organisation) Annex 14 or national regulations.

**5.2.3 Macrotexture**

When required, the texture depth of the macrotexture shall be assessed in accordance with EN 13036-1. 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.

**5.2.4 Resistance to wearing**

When required, the resistance to wearing shall be determined in accordance with EN 12274-5. The mass loss of slurry surfacing allowed is  $\leq 500 \text{ g/m}^2$ .

**5.2.5 Consistency**

When required, the consistency of slurry surfacing shall be determined in accordance with EN 12274-3. The requirement is 20 mm to 30 mm.

### 5.2.6 Cohesion of the mix

When required, the cohesion of the slurry surfacing or microsurfacing mix shall be determined in accordance with EN 12274-4. Quick-set quick-traffic systems require 12 kg/cm after 30 min and 20 kg/cm after 60 min.

### 5.2.7 Shear bond strength

This test method shall be carried out in accordance with Annex E. The minimum value shall be selected from the categories in Table 1. This includes a minimum in situ value which may be specified to permit early trafficking.

### 5.2.8 Over-specification

To prevent the over-specification of slurry surfacing and microsurfacing the following combinations of requirements are not permissible.

Requirements for consistency and cohesion of the mix shall not be combined with requirements for minimum shear bond strength.

## 5.3 Construction requirements

### 5.3.1 Existing surface integrity

The suitability of slurry surfacing as a maintenance treatment for an asphalt surface will normally be dependent on the existing pavement having good structural integrity and the surface not exhibiting extensive distresses other than low to medium weathering. The suitability of slurry surfacing shall be judged on a case by case basis with guidance of pavement inspections by suitably experienced engineers and maintenance staff, preferably within the framework of a pavement management system, which considers the use and condition of the surface.

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### 5.3.2 Weather

Slurry surfacing shall not be applied if either the pavement or air temperature is below 10 °C and falling, but may be applied when both pavement and air temperatures are above 7 °C and rising.

Placing of the slurry surfacing shall not take place during rainfall or when rain is imminent.

### 5.3.3 Preparation of existing surface

Markings and rubber deposits shall be removed.

In order to obtain sufficient adhesion between the existing surface and the slurry surfacing, the existing surface shall be swept and if so required also high pressure water flushed. No loose contamination is allowed.

Manhole covers, airfield lights, joints and other objects in the area to be treated with slurry surfacing or microsurfacing shall be properly covered.

### 5.3.4 Construction Trial

For safety reasons as described in 3.7 a Construction Trial will normally be required immediately prior to commencement of slurry surfacing work on an airfield. The construction trial shall demonstrate that the slurry surfacing fulfils the requirements before work can commence on an airfield pavement. The construction trial should be made at the airfield at which the slurry surfacing is to be carried out, it should be based on an approved mix design and should be laid on an asphalt surface on a non-aircraft trafficked pavement in similar condition to the aircraft pavement which is to receive slurry surfacing. The construction trial shall consist of two adjacent lanes minimum 100 m long unless otherwise specified. The construction trial shall be visibly inspected after the curing of the slurry surfacing has occurred. If the slurry surfacing is to be placed on