BRITISH STANDARD

BS EN
13036-3:2002

Road and airfield surface characteristics — Test methods —

Part 3: Measurement of pavement surface horizontal drainability

The European Standard EN 13036-3:2002 has the status of a British Standard

ICS 93.080.20

National foreword

This British Standard is the official English language version of EN 13036-3:2002.

The UK participation in its preparation was entrusted by Technical Committee B/510, Road materials, to Subcommittee B/510/5, Surface characteristics, which has the responsibility to:

— aid enquirers to understand the text;

— present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;

— monitor related international and European developments and promulgate them in the UK.

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

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This British Standard, having been prepared under the direction of the Building and Civil Engineering Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 7 January 2003

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 14, an inside back cover and a back cover.

The BSI copyright date displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments

ISBN 0 580 41071 4

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13036-3

December 2002

ICS 93.080.20

English version

Road and airfield surface characteristics - Test methods - Part 3: Measurement of pavement surface horizontal drainability

Caractéristique de surface de routes et aérodromes - Méthodes d'essai - Partie 3: Méthodes d'essai pour mesurer la drainabilité superficielle d'un revêtement de chaussée

Oberflächeneigenschaften von Straßen und Flugplätzen - Prüfverfahren - Teil 3: Messung der horizontalen Entwässerung von Deckschichten

This European Standard was approved by CEN on 23 October 2002.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 13036-3:2002 E

Contents

Foreword

This document (EN 13036-3:2002) 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 June 2003, and conflicting national standards shall be withdrawn at the latest by June 2003.

This European Standard is one of a series of standards as listed below.

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

prEN 13036-2, *Road and airfield surface characteristics — Test methods — Part 2: Procedure for determination of skid resistance of a pavement surface.*

EN 13036-3, *Road and airfield surface characteristics — Test methods — Part 3: Measurement of pavement surface horizontal drainability.*

prEN 13036-4, *Road and airfield surface characteristics — Test methods — Part 4: Method for measurement of slip/skid resistance of a surface — The pendulum test.*

prEN (00227131)-5, *Road and airfield surface characteristics — Test methods — Part 5: Definition and calculation of the longitudinal evenness indices.*

prEN (00227132)-6, *Road and airfield surface characteristics — Test methods — Part 6: Longitudinal evenness — Profilametrie test methods.*

prEN 13036-7, *Road and airfield surface characteristics — Test methods — Part 7: Irregularity measurement of pavement courses — The straightedge test.*

Annex A is normative. Annex B is informative.

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

Introduction

Three test methods are described in the EN 13036 series of standards for assessing macrotexture which can be used in different applications, depending on availability of equipment, measuring speed requirement and surface texture range (see Table 1). The selection of the method is determined by the purchaser of the product. These test methods can be used as part of the evaluation of surface skid resistance in accordance with prEN 13036-2.

Table 1 — Test methods for assessing macrotexture

Test methods		**Validity range** (expressed in Mean Profile Depth, MPD)
EN 13036-1	Measurement of pavement surface macro-texture depth using a volumetric technique	0,25 mm to 5 mm
ISO 13473-1	Determination of Mean Profile Depth (MPD)	0 mm to 5 mm
EN 13036-3	Measurement of pavement surface horizontal drainability	0 mm to 0,4 mm

1 Scope

This European Standard describes a method for determining the horizontal drainability of a road surface as an indicator of relatively low surface texture using the outflow meter as a stationary device.

The method provides a measure of the drainability in the road/tyre contact area for use on all smooth non porous road surfaces (less than 0,4 mm mean profile depth) either in the field or in the laboratory.

As the method measures the horizontal drainability of a small area of the surface only the selection of the test area should be assessed carefully so that it is representative of the general area on which the measurements are to be made.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

ISO 868, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness).*

3 Terms and definitions

For the purposes of this European Standard, the following term and definition apply.

3.1
horizontal drainability
capacity of the road surface texture to provide interconnecting voids through which water can be squeezed out by a moving tyre

4 Safety

When carrying out the test on a jobsite, adequate safety measures shall be in place to maintain a safe working area as the equipment and operator form a stationary obstructive.

5 Principle

The horizontal drainability of relatively smooth surfaces simulates the drainage of water from the contact area beneath a moving vehicle tyre. The outflow meter is placed on the test surface and filled with water. The time required for the water level to fall from an upper to a lower mark is recorded.

6 Apparatus

6.1 Outflow meter

6.1.1 Description of the outflow meter

The outflow meter consists of a cylinder of a solid transparent plastic height (400 ± 1) mm, internal diameter (50 ± 0,5) mm, which is glued to a brass weighting ring (see Figure 1). A brass carrier ring with a precision rubber ring bonded to it (see Figure 2) shall be screwed to the underside of the weighting ring. The total mass of the outflow-meter shall be (3 500 ± 10) g. The mass of the carrier ring shall be (138 ± 3) g. The rubber ring is vulcanised onto the carrier ring. The property of the vulcanised rubber ring shall be as follows:

¾ hardness 48 ± 1, Shore A, in accordance with ISO 868.

The carrier ring shall carry the mark of the manufacturer together with a serial number and the expiry date (month, year) (see Figure 2).

A carrying box with holding devices shall be used for the transport and storage of the apparatus without damage.

The holding devices shall secure that:

¾ the cylinder of the apparatus is not in contact with the inner surface of the top of the carrying box;

¾ the brass weighting ring is laid on a holding device, so that the cylinder is without loading;

¾ the adhesive joint between cylinder and brass weighting ring does not touch any holding device;

¾ the rubber ring does not touch any holding device;

¾ the outflow meter is stored in a vertical position.

6.1.2 Maintenance and storage of the outflow meter

The carrier ring with the rubber ring of the outflow meter shall be replaced when the expiry date is past. During the service life, the carrier ring shall be carefully protected from dirt, oil and grease. During longer intervals between test programmes, the outflow meter shall be protected against light and air by storing it in its carrying box at a temperature of (20 ± 5) °C.

6.1.3 Preparing the outflow meter for testing

Before each test the rubber ring on the carrier ring shall be checked for any incisions, cracks, surface damage or warpage and that it is clean. If damaged, the carrier ring shall be replaced before testing.

The water tightness of the outflow meter under test conditions shall be checked on a level glass plate before starting and after completing a series of tests. No fall in water level shall be exhibited during a period of 5 min.

6.2 Soft hand brush

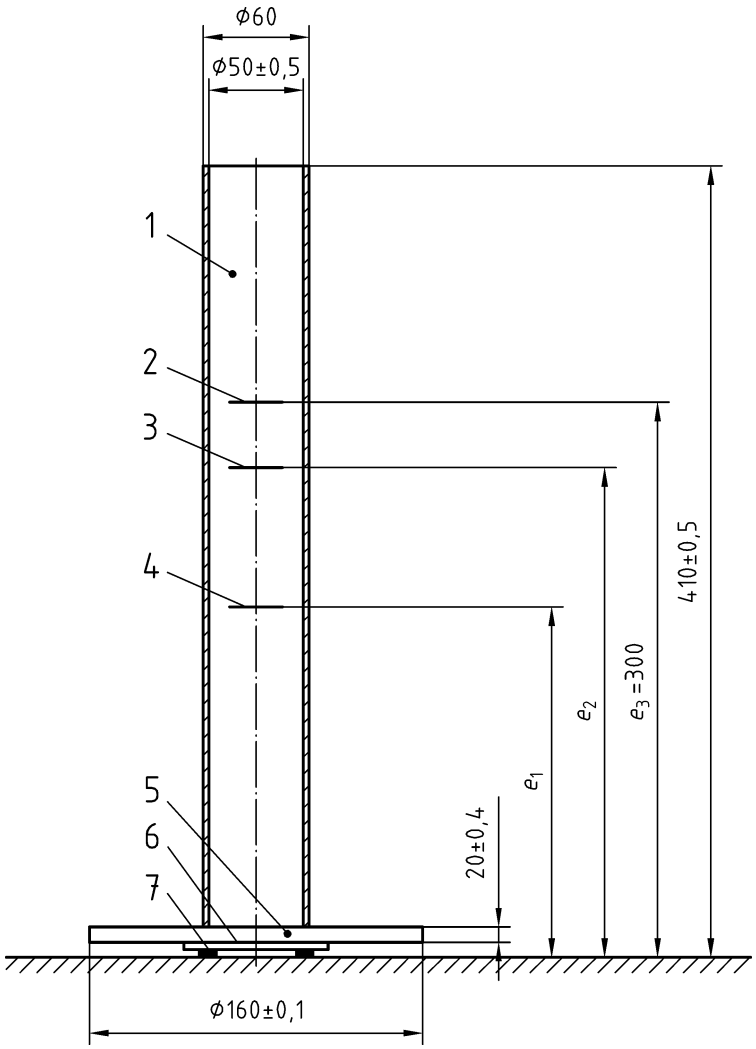
6.3 **Vessel for water storage**, containing potable water

6.4 **Water bucket**, for interim storage

6.5 Refill bottle

6.6 **Stop watch**, **accurate to 0,1 s**

Dimensions in millimetres



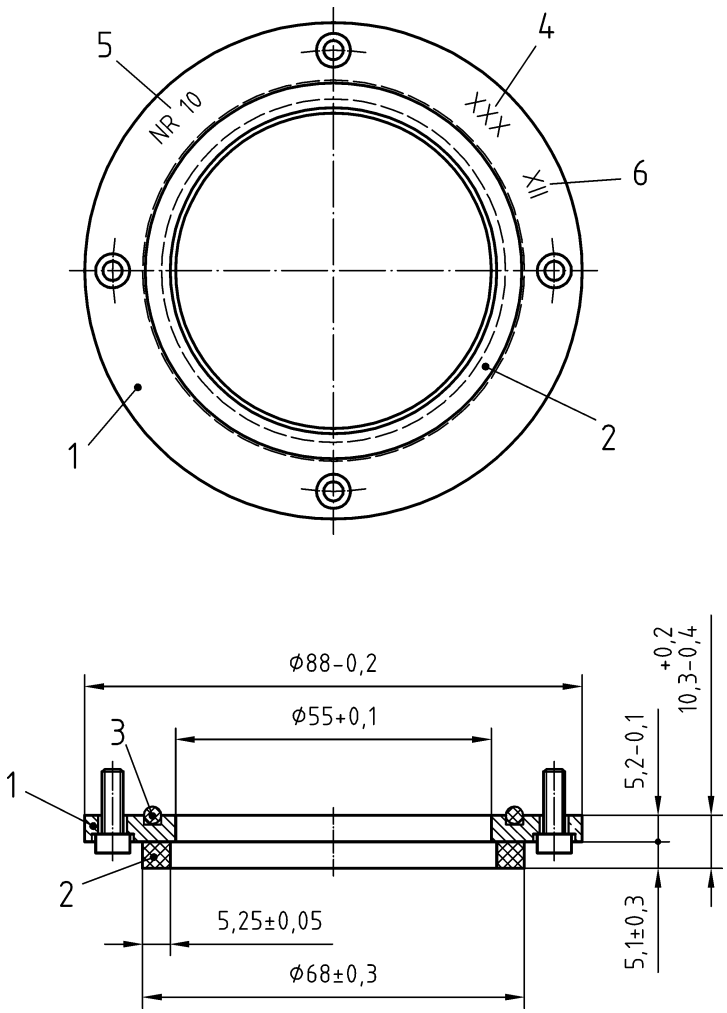
Key

1 Solid transparent plastic
2 Top mark
3 Intermediate mark
4 Lower mark
5 Brass weighting ring (material MS 58)
6 Brass carrier ring as shown in Figure 2
7 Rubber ring

NOTE The three marks (top, intermediate and lower mark) are placed by the authorized calibration organization.

Figure 1 — Outflow meter

Dimensions in millimetres



Key

1 Carrier ring
2 Precision rubber ring
3 Seal
4 Mark of the certified calibration centre (example)
5 Serial number (example)
6 Expiring date

Figure 2 — Carrier ring of the outflow meter, manufactured as a rubber-metal bond

7 Calibration

The outflow meter shall be checked for correct functioning and calibrated at least once a year. This has to be done by an authorized calibration organization and confirmed by attaching a seal to the carrier ring of the outflow meter. The calibration of the outflow meter is described in annex A.

The performance of the outflow meter shall be verified before each use on a surface of known characteristics. This surface is described in Figure A.1. If the results are not valid replace the carrier ring.

8 Sampling

As the horizontal drainability of a road surface varies considerably across the width of the road, tests shall be taken on the most trafficked area (wheel track) and elsewhere if required.

The location of the sample shall be selected so that it is a homogeneous area that contains no unique localized features such as cracks and joints and representative on the site. The number of samples necessary to obtain the horizontal drainability of an area shall be dependant upon variability of the surface. A sample plan shall be prepared to detail where tests should be carried out and locations where tests have been carried out shall be recorded.

At least 10 values shall be obtained approximately 2,5 m apart to obtain the outflow meter value for a length of 25 m.

For the sampling and documentation the following definitions and procedure can be used:

The test section is the homogeneous area to be tested. The test point is the tested surface of an area, measured at one time.

The test panel is a sub-area of a test section, which is selected for measurements. The length of a test panel is usually 25 m. The width of a test panel depends on the test object.

On roads test panels shall be located every 300 m to 500 m. Additional test panels may be necessary:

¾ in case of doubts;

¾ on areas (roads) with a inhomogeneous structure of the surface;

¾ on roads with pronounced rutting.

9 Test procedure

Before testing begins, immerse the lower part of the outflow meter completely in water to wet the rubber ring. Immediately after, place the outflow meter vertically on the test surface, taking particular care that the rubber ring does not come into contact with an isolated protruding mineral particle or with an isolated depression in the road surface.

Fill the outflow meter with potable water. Measure the time ± 0,5 s for the water level to fall from the upper mark to the lower mark on the cylinder wall. The reading is made when the water level is coincident with the marks on the front and on the rear side of the cylinder. Read the time, rounded to the nearest full second, and record.

NOTE The reading is both the test value and the result for the test point.

If it takes longer than 3 min for the water level to reach the intermediate mark, located at the one third point between the two marks, stop the stop watch when the water level reaches the intermediate mark. Read and record the time rounded to the nearest second as the test value. The result for the test point is obtained by multiplying the test value by six.

Raise the outflow meter from the surface immediately after the test and place it so that the rubber ring is not compressed and can regain its initial form.

NOTE In the meantime, a test can be carried out with a second outflow meter at the next test point. The test thereafter can be made with the first apparatus and so on until the required surface is tested.

On completion of the testing the outflow meters shall be dried. Cylinders and rubber rings shall be cleaned of deposits. If applicable the outflow meter shall be stored as described in 6.2.

10 Test results

The results for the ten test points OT_i shall be averaged to obtain the value OT_P for the length of surface.

A correction for temperature shall not be made.

$$OT_P = \frac{OT_1 + OT_2 + \ldots + OT_{10}}{10} \quad (1)$$

where

OT_P is the outflow time for a 25 m length of surface;

$OT_1 ... OT_{10}$ are the outflow time on test point 1 ... to test point 10.

11 Test report

The test report shall include the following information:

a) location of the site(s);

b) location of each test (distance from road edge and chainage);

c) any pertinent remarks about the surface type;

d) name of the organisation carrying out the test;

e) name of the person carrying out the test;

f) date of the test;

g) mean results from the test points;

h) mean results for the panel or line;

i) reference of this European Standard.

NOTE For combined measurements using outflow meter and pendulum test according prEN 13036-4 the test report in annex B can be used.

12 Precision

Repeated tests show standard deviation of 4,0 s on a fine textured, plane surface (outflow time approximately in the range of 30 s to 250 s).

NOTE 1 Coarse textured or exceptionally smooth surfaces will reduce the precision of the test.

NOTE 2 The determination of the precision has not been carried out.

Annex A
(normative)

Calibration and validation of the performance

A.1 Calibration of the outflow meter

Each new outflow meter shall be calibrated using the method described below.

A.1.1 Checking of dimensions

¾ total height (410 ± 0,5) mm;

¾ total weight (3 500 ± 10) g;

¾ diameter of weighting ring (160 ± 0,1) mm;

¾ check watertightness on glass plate (1 h without water loss is required).

A.1.2 Placing of the marks

The outflow meter is produced without marks.

A.1.2.1 Upper mark (red)

The distance from the base contact area of the rubber ring to the upper mark is e_3 = 300 mm.

A.1.2.2 Intermediate mark (yellow)

The intermediate mark is placed at the level of 65,45 g (1/3 of 196,35 g) water below the top mark.

A.1.2.3 Lower mark (red)

The lower mark is placed at the level of 196,35 g water below the top mark.

A.1.2.4 The marks are 20 mm long and 0,7 mm thick. Two marks are placed on the front and on the rear side of the cylinder.

A.1.3 The authorized calibration organization places the test seal on the weighting ring showing the name of the calibration organization and the date of the next calibration.

A.2 Validation of the performance of the outflow meter

At least once a year, the outflow meter shall be validated using the method described below.

A.2.1 Check all data as described in A.1.

A.2.2 Check the outflow time by placing the outflow meter in the centre of the calibration surface shown on Figure A.1.

The outflow time from the upper mark to intermediate mark shall be (75 ± 5) s.

The outflow time from the upper mark to lower mark shall be (260 ± 30) s.

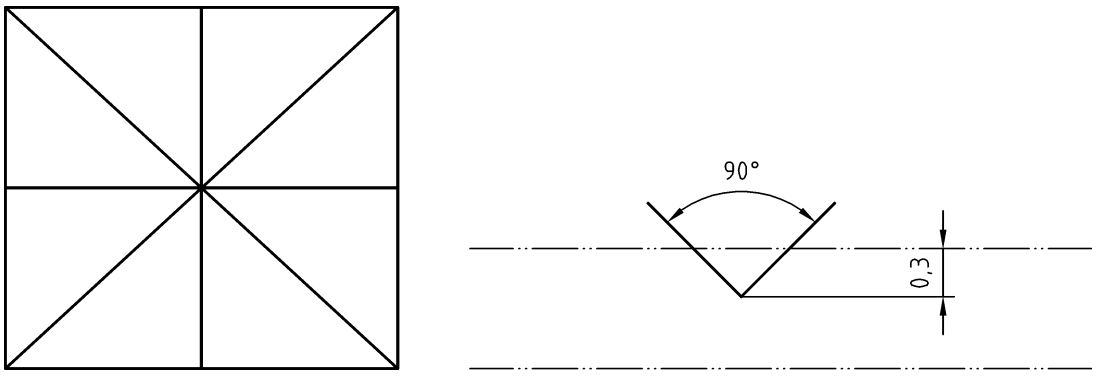


Figure A.1 — Calibration surface

Square plate (160 mm 160 mm) made from stainless steel and at least 10 mm thick. The surface of the plate is polished and grooved as shown in this Figure. The four grooves are 0,3 mm deep with an opening angle of 90°.

Annex B
(informative)

Example for test report for combined measurements using outflow meter and pendulum

Test Institut												
Combined skid resistance and texture measurements										Orderer:		
										Order No.:		
Pendulum tester	No. Last calibration:									Test section (Name, No. location)		
Outflow meter	No. Last calibration: No. Last calibration:											
Date, Time										Test panel/Test line		
Weather conditions										Downgrade, slope	Longit. %	Cross %
Air temperature	°C									Type of wearing courses		
Temperature of the wetted surface	Begin of test: °C		End of test: °C		Average: °C					Surface structure		
										Time of Laydown/ reconstruction		
Remarks												
Testpoint No.		1	2	3	4	5	6	7	8	9	10	Remarks
Pendulum tester	1. reading											
	2. reading											
	3. reading											
	4. reading											
	5. reading											
	necessary further readings											
	Average 1. to 5. reading[a]											
	Average over all Testpoints						y_0 =		Units			
	Temperature compensation						k =		Units			
	Result of test panel						$y = y_0 + k$ =				Units	
Outflow meter	Readings											
	Average over all Testpoints							z =			sec	
Operator:		Secretary:			Leader of Test group:							

[a] In case of differences greater than 3 units in the 1st to 5th reading, the pendulum tests and readings have to be continued until three consecutive readings correspond and this result replaces the average over all testpoints.

Bibliography

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

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

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