

Road and airfield surface characteristics — Test methods —

Part 7: Irregularity measurement of pavement courses — The straightedge test

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National foreword

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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:

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

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English version

Road and airfield surface characteristics - Test methods - Part 7: Irregularity measurement of pavement courses : the straightedge test

Caractéristiques de surface des routes et aérodromes -
Méthodes d'essai - Partie 7: Mesurage des déformations
localisées des couches de roulement des chaussées: essai
à la règle

Oberflächeneigenschaften - Prüfverfahren - Teil 7:
Messung von Einzelunebenheiten von Deckschichten für
Straßen, Flugplätze und andere Verkehrsflächen -
Messung mit der Richtlatte

This European Standard was approved by CEN on 28 November 2002.

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Foreword

This document EN 13036-7:2003 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of an identical text or by endorsement, at the latest by February 2004, and conflicting national standards shall be withdrawn at the latest by February 2004.

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 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.*

EN 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 (WI 00227131)-5, *Road longitudinal evenness Definition (and calculation methods) of the longitudinal evenness indices.*

prEN (WI 00227132)-6, *Road longitudinal evenness Longitudinal evenness — Profilametric test methods.*

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

Annex A is normative and 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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

Introduction

This European Standard describes a simple apparatus and a test method for the measurement of irregularities in surfaces. Compliance within specified limits of irregularities is a prime determinant of quality in new construction. Irregularities in the surface course of roads can cause high dynamic wheel load variations and impede surface water drainage to the detriment of durability and adversely affect vehicle handling, safety, running costs and comfort.

NOTE This apparatus can also be used transversely to measure rut depth of in-service roads. This application is the subject of a separate standard prEN (WI 00227133).

1 Scope

This European Standard describes a standard apparatus and a test method (see NOTE of A.1) for measuring single irregularities attributable to quality defects in new surface course(s) of roads, airfields and other trafficked surfaces as well as in-service surfaces.

This test method is not applicable to providing information on profile or general unevenness. Single irregularities are by nature random, and consequently no routine sampling rates or precision data are specified.

2 Terms and definitions

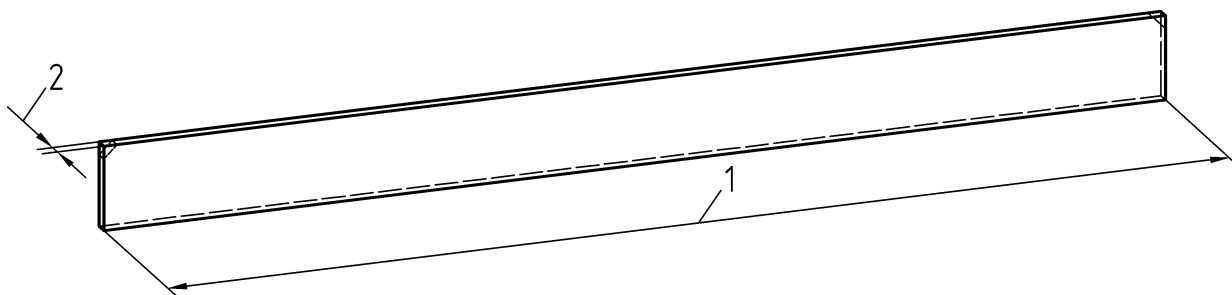
For the purposes of this European Standard, the following terms and definitions apply.

- 2.1 irregularity**
maximum variance of a surface from the measurement edge of the straightedge between two contact points of the straightedge when placed perpendicular to the surface
- 2.2 pavement**
structure composed of one or more courses, to assist the passage of wheeled traffic over terrain
- 2.3 layer**
structural element of a pavement laid in a single operation
- 2.4 surface**
surface of an individual layer
- 2.5 surface course**
upper layer of the pavement which is in contact with the traffic
- 2.6 detritus**
loose surface matter

3 Apparatus

3.1 Straightedge, to measure the distance of a surface from the plane of its measurement edge. The measurement edge of the straightedge shall be identifiable.

3.2 The straightedge shall be $(3\,000 \pm 3)$ mm and of rigid construction such that when suspended at the end points its measurement edge shall not deviate from a true plane by more than $\pm 0,5$ mm at any point. The straightedge shall also be straight along its length and shall not deviate from straight by more than 1,5 mm. The horizontal width of the measurement edge shall be (25 ± 1) mm (see Figure 1).

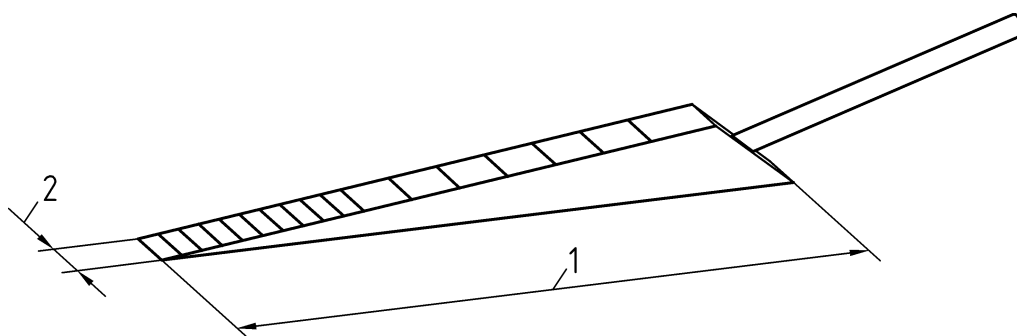


Key

- 1 length, $l = (3\,000 \pm 3)$ mm
- 2 width, $w = (25 \pm 1)$ mm

Figure 1 — Sketch of a straightedge type (not to scale)

3.3 The distance between the measurement edge and the surface shall be measured with a calibrated wedge (300 ± 1) mm in length and (25 ± 1) mm in width. It shall be permanently marked on the slope plane in increments of 1mm for the first 10mm and 2,5 mm increments thereafter and the true height at each marked increment shall be accurate to $\pm 0,1$ mm (see Figure 2).



Key

- 1 length, $l = (300 \pm 1)$ mm
- 2 width, $w = (25 \pm 1)$ mm

Figure 2 — Sketch of a wedge type (not to scale)

3.4 The straightedge and its associated measurement wedge(s) shall be permanently marked with the same unique reference.

NOTE Other methods of measuring the distance between the measurement edge of the straightedge and the surface may be used, providing that the measuring device(s) can bridge minor discontinuities of the surface and can be demonstrated to achieve an equivalent standard of accuracy as required in 3.3.

4 Test methods

4.1 General

Ensure that the surface is free from detritus. Place the straightedge on the surface perpendicular to it, at any place and in any direction.

4.2 Longitudinal

Ensure that the surface is free from detritus. Place the straightedge on the surface perpendicular to it, and parallel to the centre line of the road.

4.3 Transverse

Ensure that the surface is free from detritus. Place the straightedge on the surface perpendicular to it, and perpendicular to the centreline of the road. The straightedge may be moved across the lane width and construction joints to determine the greatest irregularity.

NOTE This apparatus can also be used transversely to measure rut depth of in-service roads. This application is the subject of a separate standard prEN (WI 00227133).

4.4 Procedure

4.4.1 Place the wedge on the surface so that firm contact with the surface is obtained. The wedge shall be perpendicular to the measurement edge of the straightedge. Measurements may be taken from both sides of the straightedge, between two contact points of the straightedge and the surface.

4.4.2 Measure the distance between the measurement edge of the straightedge and the surface by inserting the wedge in the gap to refusal and by reading off the marked increments on the slope of the wedge. Measurements shall be made to ascertain the greatest distance between the straightedge and the surface to be measured.

4.4.3 Measurements shall be recorded to the nearest 1 mm

4.5 Test report

The test report shall contain the following information:

- a) reference to this European standard;
- b) test date;
- c) reference number of the straight edge and wedge;
- d) test location e.g. road number, lane, chainage reference;
- e) type of measurement e.g. longitudinal, diagonal, transverse;
- f) whether the surface has been trafficked;
- g) signature of the person accepting the technical responsibility for the report.

NOTE For repeatability and reproducibility the location of each measurement position should be recorded as accurately as possible.

4.6 Reporting of results

4.6.1 If specified contractually the number and amplitude of single irregularities per specified unit length longitudinally and/or transversely and/or in any direction shall be recorded, e.g. where two default values are specified

$\frac{3}{4}$ exceeding a mm, n per x linear metres,

$\frac{3}{4}$ exceeding b mm, n per x linear metres,

where

a is a specified default value;

b is a larger specified default value;

n is number of measurements of a and b ;

x is specified unit length, e.g. 100 linear metres.

Annex A (normative)

Application and calibration

A.1 Field of application

Irregularities measured by this European Standard defines solely the variance of level from the measurement edge of the apparatus between two contact points to the surface and is limited, therefore, to the length, 3 m, of the apparatus and may not correspond to values obtained by other methods.

NOTE This test method is slow and labour intensive and visual, static level. Mechanised response apparatuses (e.g. rolling straightedge) and profilometric methods can be used to identify the irregularities to be measured by this European Standard.

A.2 Apparatus calibration

The straightedge, and measurement wedge(s) shall be calibrated annually and shall have a dated accompanying certificate.

NOTE Straightedges are accurate measuring devices and although of robust construction require care in transportation and use to retain factory calibration.

The straightedge shall be checked on a calibrated plane, accurate to $\pm 0,1$ mm over the length of the straightedge and the distance between the measurement edge and the plane when checked by callipers, shall be equal to or less than the distance detailed in 3.2.

Annex B (informative)

A–deviations

A-deviation: National deviation due to regulations, the alteration of which is for the time being outside the competence of the CEN/ CENELEC member.

This European Standard does not fall under any Directive of the EU. In the relevant CEN/ CENELEC countries these A-deviations are valid instead of the provisions of the European Standard until they have been removed.

In the relevant CEN/CENELEC country this A-deviation is valid instead of the provisions of the European Standard until it has been removed.

GERMANY

National regulation: Decree of the German Ministry of Transport from 4 March 1977,
RSch StB 9/38.56.60 –01/9020 Vms 77

Clause 2.1.1 – Straightedge

Clause 2.2.2.2.1 – Measuring with the Straightedge

Deviation	
Country	National Regulation
Germany	Decree of the German Ministry of Transport from 4 March 1977, RSch StB 9/38.56.60 – 01/9020 Vms 77 concerning evenness measurements of pavement courses with a straightedge according "Merkblatt für Ebenheitsprüfungen" (1976).
<u>Clause</u> Merkblatt für Ebenheitsprüfungen Clause 2.1.1 – Straightedge For measuring evenness in general a straightedge with a length of $L = 4 \text{ m}$ (4 mm) is to use. The straightedge introduced on the basis of the "Merkblatt für Ebenheitsprüfungen" has generally a width of $W = (18 \pm 1) \text{ mm}$. To reduce the effect of texture the width of the wedge W shall be 25 –35 mm. The wedge introduced on the basis of the "Merkblatt für Ebenheitsprüfungen" has generally a length of $L = 300 \text{ mm}$. It is permanently marked on the slope plane in increments of 1 mm starting at the height of 2 mm (Figure 1). Clause 2.2.2.2.1 – Measuring with the Straightedge The results of the measurements shall be rounded down between 0,1 – 0,5 mm and rounded up between 0,6 – 0,9 mm.	<u>Deviation</u> Pursuant to the decree of the German Ministry of Transport from 4 March 1977 (RSch StB 9/38.56.60 – 01/9020 Vms 77) evenness measurements of pavement courses with a straightedge shall be in accordance with "Merkblatt für Ebenheitsprüfungen" (1976).

Bibliography

ASTM E1703/E 1703M-95, *Standard test method for measuring rut depth of pavement surfaces using a straightedge*.

Swedish National Road Administration, VV Method 107–1993.

Volume 1 – Specification for Highway Works, DD 227:1996 (GB).

NF P 98-218-1, *Test relating to pavements — Evenness test — Part 1: Measurement using a 3 m straight edge (May 1992).*

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