BRITISH STANDARD

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Methods of test for screed materials —

Part 5: Determination of wear resistance to rolling wheel of screed material for wearing layer

The European Standard EN 13892-5:2003 has the status of a British Standard

ICS 91.100.10

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 13892-5:2003.

The UK participation in its preparation was entrusted by Technical Committee B/544, Plastering, rendering, dry lining, to Subcommittee B/507/6 (formerly designated B/544/6), Screeds and in situ floorings, which has the responsibility to:

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Methods of test for screed materials - Part 5: Determination of wear resistance to rolling wheel of screed material for wearing layer

Méthodes d'essais des matériaux de chape - Partie 5: Détermination de la résistance à l'usure par roulette pivotante - Méthodes pour matériaux de chape avec couche d'usure

Prüfverfahren für Estrichmörtel und Estrichmassen - Teil 5: Bestimmung des Widerstandes gegen Rollbeanspruchung von Estrichen für Nutzschichten

This European Standard was approved by CEN on 3 April 2003.

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Foreword

This document (EN 13892-5:2003) has been prepared by Technical Committee CEN /TC 303 "Floor screeds and in-situ floorings in buildings" 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of an identical text or by endorsement, at the latest by December 2003, and conflicting national standards shall be withdrawn at the latest by December 2003.

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 was prepared by Working Group 2 „Screed material and floor screeds-Test-methods“ taking into account the proposals submitted by Working Group 1 „Screed material and floor screeds-Definitions, properties and requirements“.

No existing European Standard is superseded.

1 Scope

This European Standard specifies a method for determining the wear resistance to a heavily loaded rolling wheel on moulded mortar specimens made from cementitious screed material or synthetic resin screed material or optionally for other screed materials intended for wearing surface.

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).

EN 10084*, Case hardening steels - Technical delivery conditions.*

EN 13813, Screed materials and floor screeds – Screed material – Properties and requirements.

EN 13892-1, *Methods of test for screed materials - Part 1: Sampling, making and curing specimens for test.*

ISO 606, *Short-pitch transmission precision roller chains and chain wheels.*

3 Symbols and abbreviations

RWA wear resistance to Rolling Wheel, expressed in cm^3

d depth of wear in μm

4 Principle

Concrete slabs surfaced with screed material are subjected to the repeated passages of a heavily loaded rolling wheel. The specimen fixed to a support moves under a heavily loaded castor wheel in two perpendicular directions at different frequencies. The movement creates normal and shear stress onto the screed material. At the points where the castor turns, shear stress caused by a torsion action is superimposed.

The abrasion resistance is determined by the change in surface profile.

5 Apparatus

5.1 Test rig

5.1.1 General

The principle of the test rig is shown in Figure 1.

NOTE The test rig is the same as in EN 1818, except for the swivel castor and the load.

5.1.2 Supporting table

The supporting table should be level and at least 700 mm x 800 mm. It supports the test specimen while it is moved under the loaded castor, described in 5.1.3. The supporting table and specimen move under the castor wheel in two directions at right angle, with a longitudinal movement of (390 ± 2) mm with a frequency of (7,0 ± 0,4) cycles/minute, and transverse moment of (260 ± 2) mm and a frequency of (1,72 ± 0,1) cycles/minute. For the wear on the test area to be uniform, the two movements shall not be co-ordinated, but may be driven for example by a common motor with a roller chain transmission as described in ISO 606, with chain wheels with fifty-seven and fourteen teeth respectively.

The ratio of the frequencies shall be 4,07 ± 0,03 to ensure that the wheel does not follow the same path all the time.

5.1.3 Swivel castor

The swivel castor is shown in Figure 2. The wheel shall be made of case hardened solid steel with Vickers hardness ≥ 735 HV (throughout at least the outer 1,5 mm of the radius). A suitable steel quality is 16NiCrS4 according to EN 10084. The diameter shall be (125 ± 2) mm, the width shall be (40 ± 1) mm. The travelling surface shall be cylindrical with chamfered edge with radius 1 mm. The castor shall be able to move freely about the swivel axis.

The swivel axis shall be free to move vertically (which may be achieved with roller bearings at both ends of the axis, at least 300 mm apart) and shall be loaded so that the total load applied by the castor is (2000 ± 10) N. The overhang shall be (45 ± 1) mm, see Figure 2.

5.2 Suction device for removing abraded material

The test rig shall be equipped with suction nozzles on both sides of the wheel in its travelling direction. The nozzles shall be connected to vacuum devices, for example vacuum cleaners. The suction arrangement shall have such a capacity that the abraded material is continuously removed from the specimen surface during the test.

5.3 Measuring bridge

A rigid steel bridge shall be used as shown in Figure 3. This shall have 5 locating positions in each of which the depth gauge (5.4) shall seat firmly and reproducibly.

5.4 Depth gauge

The gauge used to measure the depth of the profile shall be capable of being read to the nearest 10 µm. The end of the slider contacting the surface shall be rounded.

6 Preparation of test specimens

The wear resistance to rolling wheel shall be measured on 3 specimen made in accordance with EN 13892-1.

Square slabs with minimum edge length of 500 mm and with a thickness of ≥ 50 mm shall be used as specimens

Where the screed material is not designed to be applied at this thickness it should be applied onto a concrete substrate according to EN 13892-1.

The contact surface and the opposite face of the specimen shall be parallel and flat.

It shall be ensured that the test specimen is surface dry and free of contaminants. Any dust, dirt or debris shall be removed with a brush or by vacuuming.

7 Procedure

7.1 Profile measurement

The measuring bridge shall be placed on the test specimen in the positions as shown in Figure 4. The position of the feet of the measuring bridge shall be marked on the surface of the test specimen. The depth of the surface below the bridge at each of the measuring points shall be determined with a depth gauge and recorded. Alternatively, the profile measuring device of EN 1818:1998 clause 4.2, may be used.

7.2 Test operation

The test specimen shall be fixed on the supporting table in such a way that the abraded area will be centralised. The apparatus and the suction device shall be started and the loaded wheel shall be lowered gently into contact with the test specimen. The duration of the test shall be 10000 cycles in direction of the long movement (approximately 24 h). If necessary, this can be run intermittently.

If severe damage occurs, or the wear reaches the concrete substrate, the test shall be stopped immediately. and the number of cycles recorded. In this case the screed material failed the test.

7.3 Determination of wear profile

The profile measurement as given in 7.1 shall be repeated. For each measuring point, the depth of wear is calculated from the difference in the before and after readings. The mean depth of wear in microns shall be calculated. The abrasion quantity shall be calculated to the following equation:

$$RWA = 0{,}11 \times d \qquad (1)$$

where d is the mean depth in µm

NOTE This equation assumes that the abraded area is 1100 cm²

The result for each specimen shall be expressed in cm³, the mean value shall be calculated and expressed to the nearest cm³.

A photograph of the wear pattern vertically from above may be taken to provide information on the abraded surface. A remark can be made if the test has caused excessive indentation without wear.

8 Test report

The report shall include the following information:

a) the number, title and date of issue of this European Standard;

b) name and address of the laboratory carrying out the tests and name and address of the laboratory preparing the samples (if different);

c) identification number of the test report;

d) name and address of the manufacturer or supplier of the product;

e) name and identification marks or batch number of the product;

f) date of supply of the product;

g) the method of sampling (by reference to EN 13892-1) and by which organisation;

h) the place, date and time of sampling;

i) identification of the screed samples, including type, origin and designation of the screed material by reference to the relevant product standard EN 13813;

j) preparation (mixing, casting, preparation of the substrate, use of the bonding agent, if appropriate) and storage (curing) conditions by reference to EN 13892-1;

k) the date and time of preparing specimens for test (i. e. date and time of any mixing, casting, moulding or demoulding procedure, if appropriate);

l) age of screed material when tested;

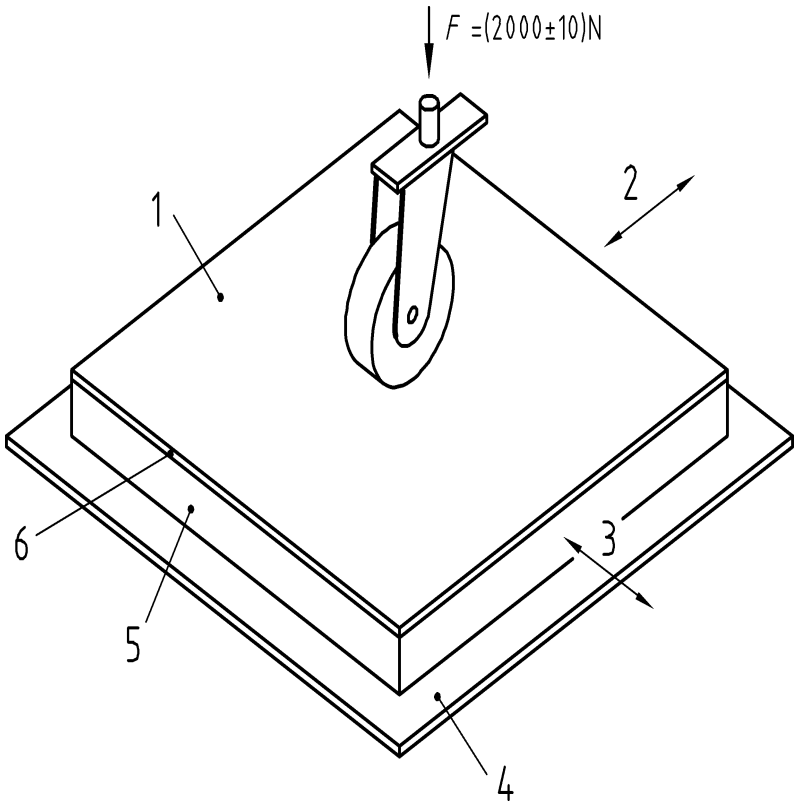
m) test method used (reference manual or alternative method, if appropriate), and details of test specimens including number, dimensions, mass, etc. if appropriate;

n) date of test and the identification number of the apparatus or details of the test equipment used, including the make, type and capacity and the calibrations details;

o) individual values and corresponding mean value of each test specimen. The differences of the abrasion quantities stated to the nearest 10 µm;

p) remarks;

q) date of test report and signature.

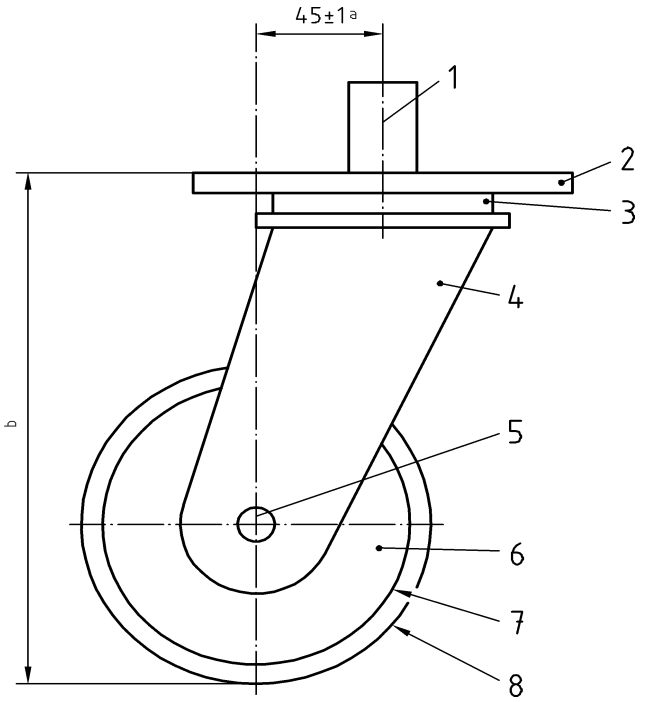


Key

1 Test piece
2 Travel (260 ± 2) mm / Frequency (1,71 ± 0,1) cycles per minute
3 Travel (390 ± 2) mm / Frequency (7 ± 0,4) cycles per minute
4 Supporting table
5 Concrete slab
6 Screed

Figure 1 — Principle sketch of test rig

Dimensions in millimetres

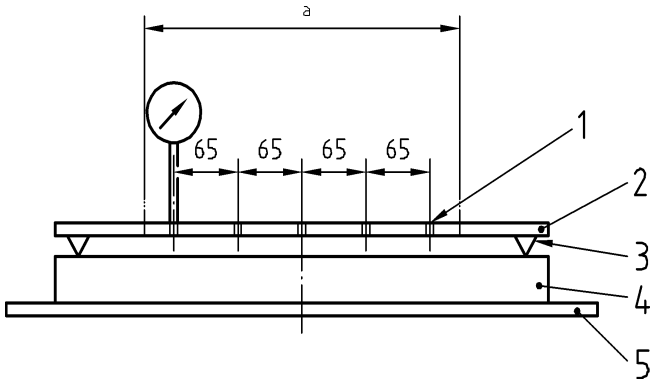


Key

a Overhang
b Wheel height
1 Swivelling axis
2 Mounting plate
3 Bearing
4 Fork
5 Wheel axle
6 Wheel body
7 Wheel ring
8 Travelling surface

Figure 2 — Heavily loaded rolling wheel

Dimensions in millimetres

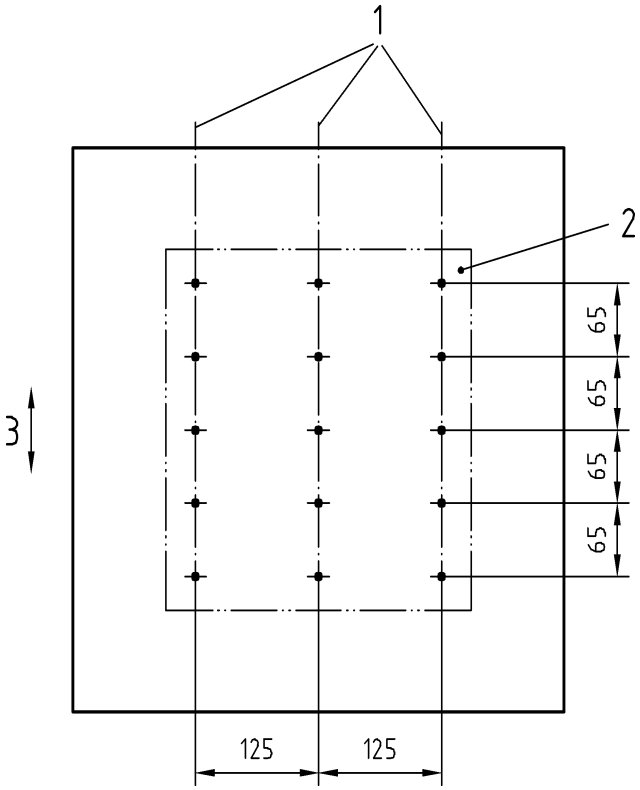


Key

a Abraded area
1 Measuring points
2 Rigid steel bar
3 Locating feet
4 Test specimen
5 Supporting table

Figure 3 — Measuring bridge

Dimensions in millimetres



Key

1 Positions for Measuring bridge
2 Abraded area
3 Direction of long movement

Figure 4 — Profile measurements positions

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