

# Methods of test for screed materials —

## Part 7: Determination of wear resistance to rolling wheel of screed material with floor coverings

The European Standard EN 13892-7:2003 has the status of a  
British Standard

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## National foreword

This British Standard is the official English language version of EN 13892-7:2003.

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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### Summary of pages

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English version

## Methods of test for screed materials - Part 7: Determination of wear resistance to rolling wheel of screed material with floor coverings

Méthodes d'essai des matériaux de chape - Partie 7:  
Détermination de la résistance à l'usure par roulette  
pivotante des matériaux de chape avec revêtements de sol

Prüfverfahren für Estrichmörtel und Estrichmassen - Teil 7:  
Bestimmung des Widerstandes gegen Rollbeanspruchung  
von Estrichen mit Bodenbelägen

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

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## Contents

page

Foreword.....	3
1 Scope .....	3
2 Normative references .....	3
3 Symbols and abbreviations .....	3
4 Principle.....	4
5 Apparatus – Test rig .....	4
5.1 General.....	4
5.2 Supporting table.....	4
5.3 Swivel castor.....	4
6 Preparation of test specimens.....	4
7 Procedure .....	5
8 Expression of results .....	5
9 Test report .....	6
Bibliography .....	10



## Foreword

This document (EN 13892-7:2003) 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of an identical text or by endorsement, at the latest by December 2003, and conflicting national standards shall be withdrawn at the latest by December 2003.

It 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No existing European Standard is superseded.

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.

## 1 Scope

This European Standard specifies a method for determining the resistance to a loaded rolling wheel on moulded mortar specimens made from cementitious screed- calcium sulfate screed-, asphalt screed-, magnesite screed-, and synthetic resin screed material with a floor covering.

## 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 649, Resilient floor coverings - Homogeneous and heterogeneous polyvinyl chloride floor coverings - Specification.

EN 660-1, Resilient floor coverings - Determination of wear resistance - Part 1: Stuttgart test.

EN 660-2, Resilient floor coverings - Determination of wear resistance - Part 2: Frick-Taber test.

EN 13813, Screed material 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.

prEN 14259, Adhesives for floor coverings – Requirements.

## 3 Symbols and abbreviations

RWFC      Rolling Wheel, Floor Covering resistance in Newton.

## 4 Principle

Concrete slabs surfaced with screed material and with a defined polyvinyl chloride floor covering are subjected to the repeated passages of a loaded rolling wheel. The specimen fixed to a support moves under a 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. During the test, the screed material is influenced by the fatiguing effect of repeated passages of the loaded wheel.

The test is repeated with increasing load. The resistance to the rolling wheel is taken as the maximum load at which the test can be passed without delamination between the floor covering and the screed material.

## 5 Apparatus – Test rig

### 5.1 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, the load and the length of the movement.

### 5.2 Supporting table

The supporting table should be level and at least 400 mm x 400 mm. It supports the test specimen while it is moved under the loaded castor, described in 5.3. The supporting table and specimen move under the castor wheel in two directions at right angle, with a longitudinal movement of  $(210 \pm 2)$  mm with a frequency of  $(23,6 \pm 0,7)$  cycles/minute, and transverse movement of  $(150 \pm 2)$  mm and a frequency of  $(5,8 \pm 0,2)$  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  $4,07 \pm 0,03$  to ensure that the wheel does not follow the same path all the time.

### 5.3 Swivel castor

The swivel castor is shown in Figure 2. The wheel is made from a steel roller bearing. The diameter shall be  $(47 \pm 1)$  mm, the width shall be  $(20,6 \pm 0,5)$  mm. The travelling surface shall be cylindrical with chamfered edge with radius 1 mm. The castor can 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 either  $(150 \pm 5)$  N,  $(250 \pm 5)$  N,  $(350 \pm 5)$  N,  $(450 \pm 5)$  N or  $(550 \pm 5)$  N. The overhang shall be  $(19 \pm 1)$  mm, see Figure 2.

## 6 Preparation of test specimens

The resistance to rolling wheel is measured on at least 3 specimen made in accordance with EN 13892-1.

Square slabs with minimum edge length of 350 mm and with a thickness of  $\geq 30$  mm shall be used as specimens

Where the product is intended to be applied at a thickness less than 10 mm 3 test areas shall be made with the minimum thickness, but not less than 0,5 mm, and three test areas shall be made with the maximum thickness of the screed material as indicated by the manufacturer. When the thickness is less than 30 mm, the screed material should be applied onto a concrete substrate according to EN 13892-1.

A 1,5 mm homogeneous polyvinyl chloride floor covering according to EN 660-1 or EN 660-2 with 20 – 40 % filler classified in wear class P and Level of use class 32 according to EN 649. The flooring, which should not be older than 1 year, is adhered to the surface of the screed material with a dispersion adhesive suitable for polyvinyl chloride floor coverings which meets the requirements of prEN 14259. The floor covering should be applied at the



time that is indicated by the screed material manufacturer as the earliest possible for floor coverings. This time can be expressed explicitly as a drying time in hours or days, or related to the thickness of the product, for example 7days/centimeter.

**NOTE** To determine the maximum resistance to rolling wheel for an unknown material, a minimum of five specimens per thickness is necessary. In that case the first specimen should be tested at 350 N.

## 7 Procedure

The testing is performed 28 days after casting the specimen, or later if required because of the minimum drying time indicated by the screed material manufacturer. In no case should the testing be done earlier than 7 days after adhering the floor covering.

The test specimen shall be installed. The appropriate vertical load for the screed material under test shall be chosen from the five values given in clause 5.3. The apparatus shall be started and the loaded wheel be lowered gently so that the wheel comes into contact with the test specimen. The duration of the test shall be 10000 cycles (~ 8h) in the direction of the long movement. If severe damage occurs the test shall be stopped immediately and the number of cycles recorded.

The floor shall be inspected to ascertain if delamination has taken place. If no obvious delamination is observed, drilling shall be performed in six positions according to Figure 3. A diamond core drill with inner and outer diameter of  $(36 \pm 1)$  mm and  $(42 \pm 1)$  mm, respectively is used. The drilling machine should be attached to a fixture which allows a truly vertical movement. The drill shall run at  $(3000 \pm 100)$  rev/minute and the drilling shall continue until dust from the screed material is visible (2-3 seconds per hole). If any of the circular floor covering-discs is removed completely by the drilling, the specimen has failed the test, and the mode of failure is noted. A disc which is stuck in the drill shall be removed before drilling the next position.

If the test has failed the whole test procedure may be repeated at a lower load level.

## 8 Expression of results

For each specimen, the number of discs removed by the drilling shall be noted together with the mode of failure. If no disc has been removed of any of the three or six specimens, the screed material has passed the test and the resistance to rolling wheel is expressed as the load used.

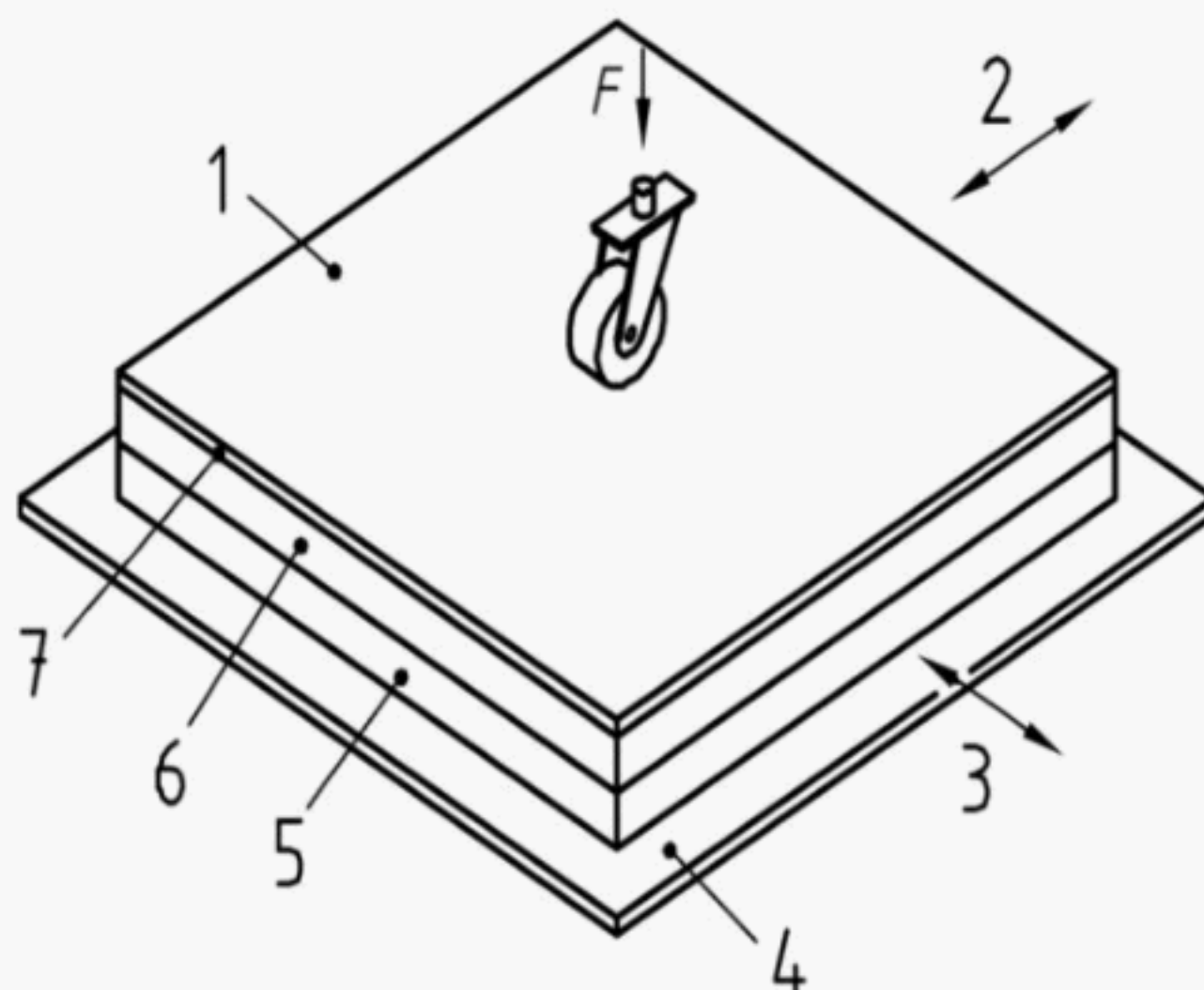
The result of the test is the highest load the screed material can withstand without any delamination, termed RWFC, using the following system:

- RWFC - 150
- RWFC - 250
- RWFC - 350
- RWFC - 450
- RWFC - 550

## 9 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 adhering of floor coverings);
- l) age of screed material when polyvinyl chloride floor covering was adhered and the age of the screed material when tested;
- m) test method used (reference manual or alternative method, if appropriate), details of test specimens including number, dimensions, mass, etc. if appropriate and details of floor covering, batch number and date of manufacture;
- 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) test results stated as number of discs failed (with description of failure) on each specimen and the RWFC value in N (one of 150, 250, 350, 450, 550);
- p) remarks;
- q) date of test report and signature.

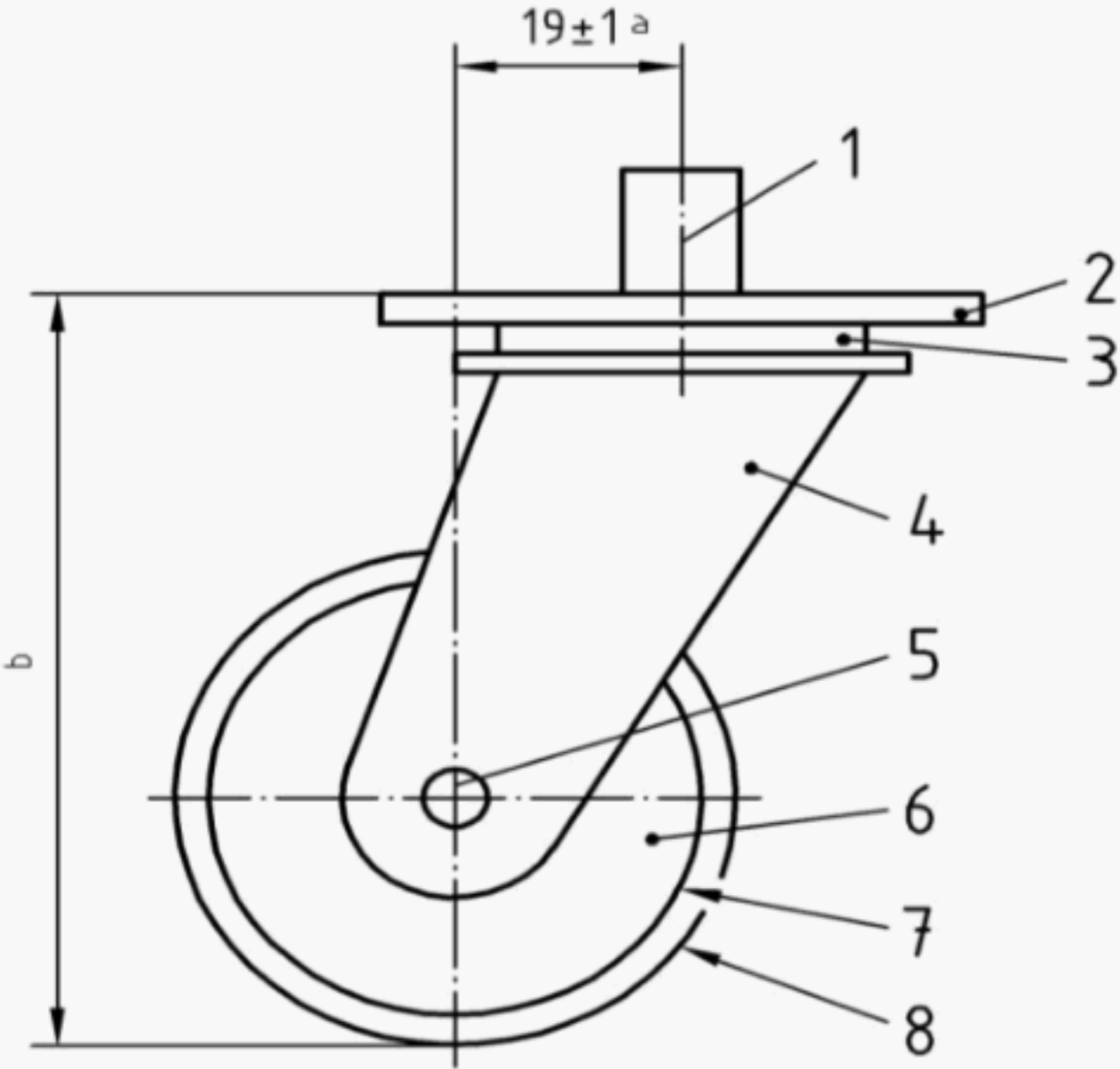


### Key

- 1 Test piece
- 2 Length of stroke ( $150 \pm 2$ ) mm / Frequency ( $5,8 \pm 0,2$ ) cycles per minute
- 3 Length of stroke ( $210 \pm 2$ ) mm / Frequency ( $23,6 \pm 0,7$ ) cycles per minute
- 4 Supporting table
- 5 Concrete slab
- 6 Screed
- 7 Glued PVC

Figure 1 — Principle sketch of test rig

Dimensions in millimetres



Key

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

Figure 2 — Loaded rolling wheel



Technical drawing showing the layout of six circular holes (numbered 1 through 6) arranged in two rows of three. The drawing includes dimensions for hole positions and overall plate size.

- Hole Positions:**
  - Horizontal distance between hole centers:  $\approx 60$
  - Vertical distance between hole centers:  $\approx 60$
  - Distance from top edge to center of top row:  $\approx 175$
  - Distance from bottom edge to center of bottom row:  $\approx 175$
  - Total vertical distance between hole centers:  $\approx 350$
  - Distance from left edge to center of first column:  $\approx 170$
  - Distance from right edge to center of last column:  $\approx 180$
  - Total horizontal distance between hole centers:  $\approx 350$
- Overall Dimensions:**
  - Plate width:  $\approx 350$
  - Plate height:  $\approx 350$

- a Direction of the shorter movement
- 1 Concrete slab
- 2 Screed glued with PVC flooring
- 3 Boundary for wheel loaded surface

**Figure 3 — Location of the drilling points**

## Bibliography

EN 1818, Resilient floor coverings - Determination of the effect of loaded heavy duty castors.

ISO 606: 1994, Short-pitch transmission precision roller chains and chain wheels.



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