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English version

Methods of test for screed materials - Part 8: Determination of bond strength

Méthodes d'essais des matériaux pour chapes - Partie 8:
Détermination de la force d'adhérence

Prüfverfahren für Estrichmörtel und Estrichmassen - Teil 8:
Bestimmung der Haftzugfestigkeit

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Foreword

This document (EN 13892-8:2002) 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.

It was prepared by Working Group 2 "Screed materials and floor screeds – Test methods" taking into account the proposals submitted by Working Group 1 "Screed materials and floor screeds – Definitions, properties and requirements".

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of an identical text or by endorsement, at the latest by May 2003, and conflicting national standards shall be withdrawn at the latest by May 2003.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, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies a method for determining the bond strength between a screed and a standard substrate for specimens made from cementitious screed-, calcium sulphate screed-, magnesite screed- and synthetic resin screed material.

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 1766:2000, *Products and systems for the protection and repair of concrete structures - Test methods - Reference concretes for testing*.

EN 13813, *Screed material and floor screeds - Screed material - Properties and requirements*.

EN 13892-1, *Test methods for screed materials – Part 1: Sampling, making and curing specimens for test*.

EN 24624:1992, *Paints and varnishes — Pull-off test (ISO 4624:1978)*.

3 Principle

The bond strength is determined as the failure tensile stress applied by a direct load perpendicular to the bond area. The bond strength is calculated as the quotient between the failure load and the test area. The test area is defined by coring or cutting through the screed into the substrate.

4 Symbols and abbreviations

F is the failure load in N;

A is the test area in mm²;

B is the bond strength in N/mm².

5 Apparatus and material

Test specimen, of minimum dimensions 300 mm x 300 mm x 50 mm, with a reproducible surface texture, made of concrete according to EN 1766 of type MC (040) with maximum aggregate size 10 mm, water/cement ratio 0,40 and cement content 455 kg/m³;

Steel Pull-head plates, of circular cross section with a diameter of (50 ± 0,5) mm or of a square cross section with a side of (50 ± 0,5) mm. And a thickness of at least 20 mm. On the side on which the adhesive is to be applied, the pull head plate shall be clean and flat with a tolerance of 0,1 mm per 50 mm length. It shall be provided with a

means for attaching the pull-off test equipment ensuring normal application of the load on the surface under test, without the occurrence of bending or shear forces on the test area.

Resin based adhesive, e.g. epoxy resin or methylmethacrylate resin.

Core drilling device and barrel that enable the drilling of a $(50 \pm 1,0)$ mm cylinder through the screed. The core barrel should have a cutting edge that stands proud of the cylinder by $(1,5 \pm 0,5)$ mm (to reduce lateral forces being applied on the test area).

Diamond sawing machine that enables a cross cut through the screed.

Pull off test equipment complying with EN 24624 with a pulling capacity sufficient to cause tensile bond failure of the specimen. The accuracy shall be within $\pm 2 \%$ (a capacity of 10 kN is sufficient for most applications). The pull off equipment shall be capable of applying the load according to 3.1 of EN 24624:1992 and shall be provided with a measurement device that displays the exerted force by an analogue or digital system. The measurement device shall retain the reading of maximum force exerted.

6 Procedure

Sampling of screed material and preparation and curing of test specimens shall follow the method in EN 13892-1. If a bonding agent is prescribed by the manufacturer, it shall be applied to the surface of the concrete test specimens. The thickness of the screed shall be within the range declared by the manufacturer.

Either the square or the circular pull-head plates shall be used. The square pull-head plates are preferred where the screed is greater than 20mm in thickness.

A minimum of 5 test areas of approximately 50 mm cross section shall be cored or cut through the screed material or the floor screed. The test areas shall be at least 50 mm apart from each other and at least 50 mm away from the edge of the test specimens. The dimensions of each test area shall be measured to the nearest 0,5 mm. The test area shall be calculated and the result recorded.

After storage, test specimens shall be cut or cored using a core drilling machine or a saw, as appropriate. The cutting shall extend through the screed to a depth of more than 5 mm into the substrate. Water cooling should be avoided, especially for calcium sulphate and magnesite screeds. If water cooling is unavoidable, the cutting or coring should be done at least one day before the tensile testing. Damaged specimens shall be rejected.

The pull-head-plates shall be bonded centrally on the test areas with the adhesive, preventing any excess adhesive from bridging the cut around the test areas.

The tensile load shall be applied perpendicular to the test area through the pull-head plates. The load shall be applied without shock and at a uniform rate of $0,05 \pm 0,01 \text{ N}/(\text{mm}^2 \text{ s})$. The failure load shall be recorded. Any test shall be rejected where the mode of failure is fracture at the adhesive layer between the pull-head plate and the screed and the achieved value is lower than the designated value.

7 Expression of results

The individual bond (B) strength shall be calculated from the following formula:

$$B = \frac{F}{A}$$

The bond strength shall be calculated as the mean value from the 5 individual values to the nearest 0,1 N/mm².

From a visual assessment, the type of failure of the specimen shall be determined. Types of failure are as follows:

- X = Cohesive failure in the concrete substrate
- X/Y = Failure between the substrate and the screed
- Y = Cohesive failure in the screed
- Z = Failure between the adhesive layer and the pull-head plate

If there is a combination of these types of failure, a visual inspection shall be made of the failure face to estimate the percentage of each type of failure, based on the surface area, for example:

X : X/Y : Y = 40 % : 10 % : 50 %.

Where the screed system comprises more than 1 layer of material the location of failure, if occurring between the layers, shall be recorded.

8 Test Report

The test report shall include the following information:

- a) 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) method of sampling (by reference to EN 13892-1) and by which organisation;
- h) 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) and storage (curing) conditions by reference to EN 13892-1;
- k) date and time of preparing samples for test (i. e. date and time of any mixing, casting, moulding or demoulding procedure, preparation of the substrate, use of the bonding agent, if appropriate);
- l) age of screed material when tested;

- m) density of each individual test sample;
- n) test method used (reference manual or alternative method, if appropriate), and details of test specimens including number, dimensions, mass, etc. if appropriate;
- o) 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;
- p) test results (individual values to the nearest $0,1 \text{ N/mm}^2$, and corresponding mean value stated to the nearest $0,1 \text{ N/mm}^2$);
- q) remarks;
- r) date of test report and signature.