SLOVENSKI STANDARD
SIST EN 13892-9:2018

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Metode preskušanja mešanice za estrih - 9. del: Dimenzijska stabilnost

Methods of test for screed materials - Part 9: Dimensional stability

Prüfverfahren für Estrichmörtel und Estrichmassen - Teil 9: Dimensionsstabilität

Méthodes d'essai des matériaux pour chapes - Partie 9 : Stabilité dimensionnelle

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Methods of test for screed materials - Part 9: Dimensional stability

Méthodes d'essai des matériaux pour chapes - Partie 9 : Stabilité dimensionnelle

Prüfverfahren für Estrichmörtel und Estrichmassen - Teil 9: Dimensionsstabilität

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (EN 13892-9:2018) has been prepared by Technical Committee CEN/TC 303 “Floor screeds and screed materials”, the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by April 2019, and conflicting national standards shall be withdrawn at the latest by April 2019.

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1 Scope

This document specifies a method for determining the dimensional stability (i.e. the shrinkage and swelling) of cementitious screed, calcium sulfate screed, magnesite screed and synthetic resin screed materials made in accordance with EN 13892-1.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13454-2, *Binders, composite binders and factory made mixtures for floor screeds based on calcium sulfate — Part 2: Test methods*

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*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

4 Principle

This test method measures the unrestrained linear movement, called dimensional stability (i.e. shrinkage and swelling), of screed materials in a 1 000 mm curling profile apparatus. A special feature of this test method is the earliest possible commencement of measurements.

Dimensional stability is measured on screed materials made in accordance with EN 13892-1.

Irrespective of the consistency of the screed material, monitoring of horizontal length change commences directly after the mould is filled. When measurements of length reach a steady-state, the monitoring process ends.

The apparatus monitors the change in length of the specimen over time.

In general, the shrinkage predominates the dimensional stability. In this case, the dimensional stability is calculated by comparing the difference between the measured local maximum length and the measured length at steady-state (end of length change):

$$\mathrm{DL} = \frac{\Delta L}{1\ \mathrm{m}} = \frac{L_{\mathrm{max}} - L_{\mathrm{end}}}{1\ \mathrm{m}}$$

If the swelling predominates the dimensional stability is calculated by comparing the difference between the measured length at start (L_{start}) and the measured length at steady-state (end of length change):

$$\mathrm{DL} = \frac{\Delta S}{1\ \mathrm{m}} = \frac{L_{\mathrm{start}} - L_{\mathrm{end}}}{1\ \mathrm{m}}$$

5 Symbols and abbreviations

DL	dimensional stability (µm/m)
L	horizontal length change (µm)
L_{start}	start of length change (µm)
L_{min}	local minimum in length change curve (µm)
L_{max}	local maximum in length change curve (µm)
L_{end}	end of length change (µm)
$\Delta L = L_{max} - L_{end}$	shrinkage (µm)
$\Delta S = L_{start} - L_{end} > 0$	swelling (µm)
M	moisture content in percentage
m_b	weight at beginning (g)
m_d	weight after drying (g)

6 Curling profile apparatus

The curling profile apparatus, shown in Figure 1, features a stainless steel, distortion-resistant mould 50 mm in depth and 100 mm in width with an effective specimen length of 1 000 mm.

At one end of the mould, the specimen is restrained horizontally and vertically by two stainless steel dowels cast within the specimen whilst the opposite end is unrestrained and the specimen connected to a length variation sensor. The two horizontal dowels, comprising 10 mm thick stainless steel bar, are located within the mould, perpendicularly to its length and vertically central within the depth of the mould:

— the first dowel is fixed at a horizontal distance of 17 mm from the restrained end of the mould, this support is attached to the mould;

— the second dowel is located at a horizontal distance of 260 mm from the restrained end of the mould and extends through holes in the mould on each side, where it rests and can slide freely upon flat stainless steel anvils. Horizontal freedom of movement ≥ ± 4 mm exists in the axis of length measurement.

At the unrestrained end of the mould, a stainless steel striker plate is attached to the specimen by means of a stainless steel tang which protrudes into the specimen. The striker plate is unrestrained and transmits horizontal movement directly to the length variation sensor.

NOTE 1 A vertical deflection sensor can be installed to monitor vertical movement at the unrestrained end of the specimen, which represents curling of this specimen.

NOTE 2 Spacers are initially placed between the striker plate and the end of the mould; these are removed after the mould has been filled and directly before the start of measurement.

The length variation sensor shall measure change in length over a distance of not less than 5 mm with an accuracy of < 0,001 mm.

The mould is lined with a 2 mm thick polychloroprene sheet to separate the specimen from the mould and in order to prevent obstruction to free movement even if the specimen should swell.

To prevent contamination, the mould is additionally lined with thin (<0,2 mm) polyethylene film.

Before testing, all materials, the curling profile apparatus and all equipment shall be conditioned in the standard laboratory climate (23 ± 2)°C for not less than 24 h.

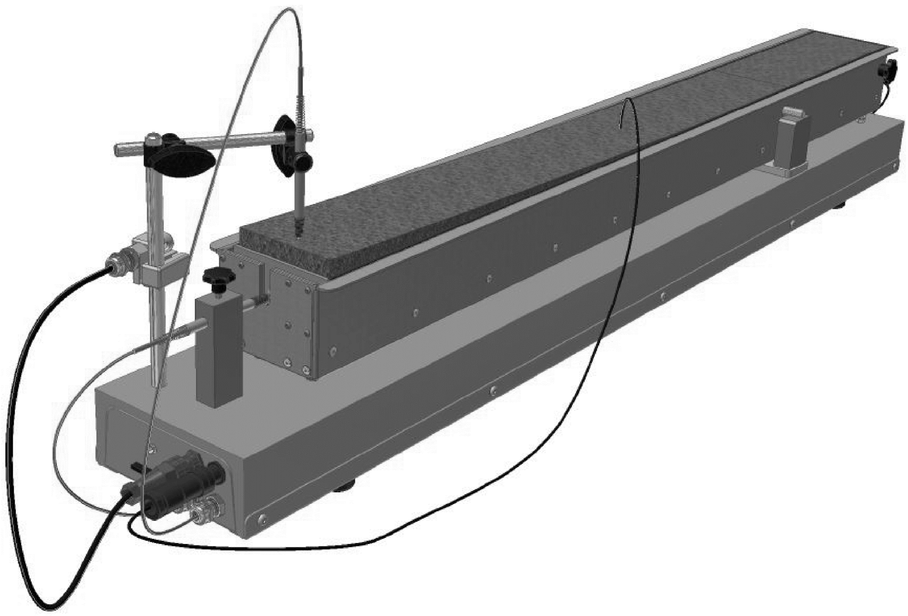

Figure 1 — Principle illustration of the curling profile apparatus

7 Procedure

7.1 General

The dimensional stability (i.e. shrinkage and swelling) of screed materials depends on climatic conditions. Therefore, the entire test procedure shall be carried out in the standard laboratory climate, temperature (23 ± 2)°C, relative humidity (50 ± 5)%.

7.2 Preparation of specimen

The screed material shall be prepared in accordance with EN 13892-1.

Within 5 minutes of the mixing process being completed, the consistency of the screed material shall be determined according to EN 13454-2.

The filling of the mould shall be done without delay.

The fresh screed material shall be carefully compacted into the curling profile apparatus mould, which has first been lined with a thin (<0,2 mm) polyethylene film.

The mould shall be filled to a depth of 50 mm unless it is determined that a lesser depth is necessary.

If the intended application for the screed material (according to manufacturer's information) does not permit a specimen depth of 50 mm, the test may be carried out using the greatest possible depth. Use smaller dowels if the depth of the screed material is smaller than 20 mm. When specimens less than 50 mm in depth are tested, it shall be ensured that the two stainless steel support bars are located centrally in relation to the specimen's depth.

In order that a single material characteristic is tested, no change of curing or other treatment (e.g. covering the surface) is permitted.

7.3 Length change

The measurement of change in length shall commence directly after the mould is filled and at the moment the horizontal length sensor is positioned and spacers removed from the striker plate. The change in length is thereafter continuously monitored and recorded at predetermined time intervals.

The predetermined time intervals between length measurements may be decided within permitted limits, providing that the relationship between length change measurements and time may be recorded with sufficient accuracy and comparable during evaluation. Initially and until the local maximum length has been reached, the time interval should be 10 min, following which the time interval may be increased to a period of not more than 6 h.

The length variation curve shall record local extremes (local minimum L_{min} and local maximum L_{max}).

Length variation shall be recorded until the end of length change L_{end}. This is the condition of equilibrium moisture content having been reached. The end of length change L_{end} is determined as being when change of length, monitored over a period of 5 days, differs by less than 3 % from the obtained shrinkage value.

NOTE The test to determine shrinkage and swelling can last for a long period of time. For cementitious and magnesite screed materials, the test will typically last 8 weeks. For calcium sulfate screed materials, the test will typically last 11 weeks.

Immediately after the end of length change measurement the moisture content of the screed material test specimen shall be determined by drying a sample (>300 g total cross section) until the weight remains constant. Constant weight is defined as when the loss of weight is less than 0,1 % between 2 measurements over a 24 h period. The drying temperature of cementitious screed material and magnesite screed material is (105 ± 2)°C and for calcium sulfate screed material (40 ± 2)°C. Different temperatures may be given by the manufacturer. The weight shall be measured with an accuracy of ≤ 0,05 g.

$$M = \frac{(m_B - m_d)}{m_d} \qquad (1)$$

7.4 Evaluation of length change

Measurement data are presented in a length change/time curve.

When the monitoring of length change commences, it is possible that the screed material has not gained initial strength, in which situation length change data reflects a deformation of the specimen and not shrinkage or swelling. When strength gain commences, the shrinkage/swelling of the screed material starts and the deformation speed changes. The start of length change L_{start} may be interpolated from the constant deformation speed in the curve; this point shall be defined as start of length change L_{start}, see Figure 2.