1 SCOPE

The test method describes a way of determining the ability of cementitious and organically-modified cementitious adhesives to absorb movements in the underlying concrete when applying tiles using the thin-layer method. The result can be used in assessing the ability of adhesives to absorb movements due to shrinkage and creep.

2 REFERENCES

Methods
EN 196-7 Methods of testing cement: Methods of taking and preparing samples of cement.
SS-EN 1348 Adhesives for tiles – Determination of tensile adhesion strength for cementitious adhesives.
SS 13 72 10 Concrete testing – Hardened concrete – Cube strength.
SS 22 72 08 Ground covering products – Concrete slabs etc.
SS-EN 159 Ceramic tiles – Dry-pressed ceramic tiles with water absorption E >10% – Group BIII.

Other literature


3 DEFINITIONS

Adhesive. Cementitious, organically-bound or reaction-bound compound for applying or laying ceramic tiles using the thin-layer method.

Tile. Thin, glazed ceramic plate of earthenware with a water absorption of 10–20 per cent by weight.

Shrinkage. Deformation caused by the drying out of the concrete.

Creep. Deformation over time under continuous load.

Thin-layer method. A method of fitting ceramic tiles to walls and floors in a 2–3 mm layer of adhesive.

4 SAMPLING

Unless otherwise stated, sampling shall be carried out in accordance with EN 196-7.

5 EXECUTION

5.1 Principle

The method is used for determining the ability of adhesives to absorb shrinkage and creep movement in concrete, simulating this through vertical loading of a minimum of 3 concrete slabs with tiles attached as shown in Figure 1 below. The ability is determined through measuring the deformation required for the tiles to be completely or partly detached from the substrate (Loss of adhesion).

5.2 Apparatus

- Press and loadcell with maximum inaccuracy ±1%.
- Mechanical mixer.
- Extensometers or other displacement transducers with maximum inaccuracy ±0.01 mm.
- Collection system for data.
- Scales with maximum inaccuracy ±0.5 g.
- Straight edge trowel and Notched trowel in accordance with the specification in SS-EN 1348.
- Climate chamber (23°C, 50% RH).
- Metal bar for tapping to locate loss of adhesion.
- Concrete paving blocks 250x170x70 mm in accordance with the requirements of SS 22 72 08, strength class 14.
- Tiles approx. 150x150x5 mm in accordance with EN 159.
- Weights for loading tiles during tile attachment.

5.3 Preparation of test specimen

The short sides of the concrete blocks are sawn and ground to meet the requirements for a level surface in accordance with SS 13 72 10. After the blocks have been conditioned for a minimum of 48 hours in the climate chamber (23°C, 50% RH), the adhesive is mixed in accordance with the manufacturer’s instructions, and is applied on one side of the concrete blocks with the help of a straight edge trowel and then spread out using the notched trowel. The tiles are

![Figure 1. Left: Perspective drawing of the test rig. Right: Outline sketch of the cross section of the arrangement. In both figures the extensometers are included.](image-url)
then applied, and loaded with 100 ± 5 N for 30 seconds. After 24 hours, tiles are applied to the opposite side of the concrete blocks as above (see Figure 1).

The finished test pieces are then placed in the climate chamber (23°C, 50% RH) for 28 days. After 27 days, measurement bosses are attached for deformation measurement.

5.4 Procedure

Before the test, the surface of the test pieces must be tapped with a metal bar (tapping to ascertain loss of adhesion) and any areas of failed adhesion marked. At least 3 test pieces as described in 5.3 are loaded gradually to a minimum of 0.15% deformation or 75% of the breaking load of the concrete block. The loading takes place in stages of approx. 30 kN, with one rocker type loading plate, and a loading rate of approx. 2.5 MPa/min. Tap-testing for loss of adhesion shall be carried out at every loading step. For every loading step, the load, deformation and any loss of adhesion must be registered. If the tiles become completely detached during the loading phase, the deformation when this occurred is noted.

After the load is removed, both sides shall be tap-tested, and any areas of failed adhesion marked with a felt pen. The areas of failed adhesion will be estimated visually into 4 classes, 0–25, 25–50, 50–75, 75–100%. The tiles are then broken loose, the thickness of the adhesive is measured, and the degree of coverage checked.

6 EXPRESSION OF RESULTS

Under the results heading, the following data is given.

- The type of product which was tested.
- Deformation at first sign of loss of adhesion.
- Deformation when the tiles became fully detached.
- Approximate area of failed adhesion after removal of load.
- Degree of coverage and thickness of the layer of adhesives.

The deformation at the first sign of loss of adhesion is given as the median for the sub-tests.

A load-deformation diagram is drawn up for each test piece.

6.1 Uncertainty of measurement

The total measurement uncertainty is based on the pooled standard deviation being ±0.01%.

7 TEST REPORT

The test report shall at least include the following information, where relevant:

a) Name and address of the testing laboratory
b) Identification number of the test report
c) Name and address of the organisation or the person who ordered the test
d) Purpose of the test
e) Method of sampling and other circumstances (date and person responsible for sampling)
f) Name and address of manufacturer or supplier of the tested object
g) Name or other identification mark of the tested object
h) Description of the tested object
i) Date of supply of the tested object
j) Date of the test
k) Reference to this test method
l) Conditioning of the test specimens, environmental data during the test (temperature and RH)
m) Identification of the test equipment and instruments used
n) Any deviation from the test method
o) Test results (SI units)
p) Uncertainty of the test result
q) Date and signature.