

# Products and systems for the protection and repair of concrete structures — Test methods — Determination of the filtration stability

The European Standard EN 14497:2004 has the status of a British Standard

ICS 91.080.40

## National foreword

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The UK participation in its preparation was entrusted by Technical Committee B/517, Concrete, to Subcommittee B/517/8, Protection and repair of concrete structures.

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2006

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ISBN 0 580 44543 7

### Amendments issued since publication

Amd. No.	Date	Comments

EUROPEAN STANDARD

EN 14497

NORME EUROPÉENNE

EUROPÄISCHE NORM

September 2004

ICS 91.080.40

English version

## Products and systems for the protection and repair of concrete structures - Test methods - Determination of the filtration stability

Produits et systèmes pour la protection et la réparation des structures en béton - Méthodes d'essai - Détermination de la stabilité de filtration

Produkte und Systeme für den Schutz und die Instandsetzung von Betontragwerken - Prüfverfahren - Bestimmung der Eindringstabilität

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## Foreword

This document (EN 14497:2004) has been prepared by Technical Committee CEN/TC 104 "Concrete and related products", the secretariat of which is held by DIN.

It has been drafted by Sub-Committee 8 "Products and systems for the protection and repair of concrete structures" (Secretariat AFNOR).

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of an identical text or by endorsement, at the latest by March 2005, and conflicting national standards shall be withdrawn at the latest by March 2005.

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## 1 Scope

This document describes a test method to determine the filtration stability of cementitious injection products. This test can also be used:

- to check the filtration stability and workable time in situ with the used mixing equipment, mixing time and temperature.
- for assessment of mixing stability and required mixing time, with the mixing equipment used.

## 2 Normative references

The following referenced documents are indispensable for the application 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 1504-1:1998, *Products and systems for the protection and repair of concrete structures — Definitions, requirements, quality control and evaluation of conformity — Part 1: Definitions.*

prEN 1504-5:2001, *Products and systems for the protection and repair of concrete structures — Definitions, requirements, quality control and evaluation of conformity — Part 5: Concrete injection.*

ISO 565, *Test sieves - Metal wire cloth, perforated metal plate and electroformed sheet — Nominal sizes of openings.*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 1504-1:1998 and prEN 1504-5:2001 and the following apply.

### 3.1

#### **filtration stability**

ability of a cementitious injection product to pass constrictions in the flow path and to enter cracks without agglomeration

Test principle

The cementitious injection product is drawn into a filtration device by suction and then pressed out into a measuring vessel.

The amount that has passed the filter is measured and registered as a measure of filtration stability.

The filter consists of a woven metal wire cloth. The cloth shall have a mesh width of 32 µm, 45 µm, 75 µm, 100 µm or 125 µm, depending on the expected performance of the product to be tested.

## 4 Significance and use

The most significant limitation to the penetrability of a cementitious injection product in a fine crack is the tendency of cement grains to agglomerate into an impermeable filter cake.

Clogging of the crack can occur by a combination of several factors including:

- large cement grains too large for the crack;
- poor initial dispersion of the cement grains;

- agglomeration when the grout is exposed to filtration situations such as entrances to fine cracks or porous material.

This test can also be used:

- for assessment of mixing ability and required mixing time, with the mixing equipment used;
- for determination of pot life;
- to check the filtration stability and workable time in situ with the used mixing equipment, mixing time and temperature.

## 5 Apparatus

**5.1 Suction filtration device**, according to Figure 1. The body shall be made of non-corroding metal.

**5.2 Woven metal wire cloths** with mesh apertures of 125  $\mu\text{m}$ , 100  $\mu\text{m}$ , 75  $\mu\text{m}$ , 45  $\mu\text{m}$  and 32  $\mu\text{m}$  according to ISO 565.

**5.3 Graduated beaker** with an internal diameter of  $(105 \pm 5)$  mm and a height of at least 140 mm.

**5.4 Measuring cylinder**, with a capacity of 500 ml.

**5.5 Stop-watch** with an accuracy of  $\pm 1$  s.

**5.6 Cementitious** injection product mixer.

**5.7 Thermometer** with an accuracy of  $\pm 0,5$  °C.

## 6 Sampling and preparation

- The temperature of the dry materials and mixing water shall be  $(21 \pm 2)$  °C;
- the mixing procedure shall be in accordance with the manufacturer's instructions;
- if it is required to test the mixture after a longer holding period, continue mixing of the remaining portion at slow speed for the specified time, if necessary (given by the manufacturer's instruction).

## 7 Procedure

- The standard conditions of test shall be  $(21 \pm 2)$  °C and  $(60 \pm 10)$  % ;
- The woven metal wire cloth in question (125  $\mu\text{m}$ , 100  $\mu\text{m}$ , 75  $\mu\text{m}$ , 45  $\mu\text{m}$  or 32  $\mu\text{m}$ ) is fixed to the filtration suction device;
- The determination shall be made in duplicate.

- the product is poured into a graduated beaker to the 1,0 l graduation mark within  $(5 \pm 1)$  min of the completion of mixing, unless otherwise stated. The suction filtration device is immersed in the grout in such a way that the bottom of the suction device is situated at half the height of the injection product filling level (see Figure 2). The handle of the suction device is immediately drawn up. This shall be done with a constant speed and the whole procedure shall take  $(5 \pm 2)$  s. The suction device is kept immersed in the same position for  $(20 \pm 5)$  s further. Then the suction device is taken up from the graduated beaker and the content of the suction device pumped into the measuring vessel. The suction filtration device is cleaned by suction and pumping water through the device several times directly after the test. The remaining part in the vessel, which has earlier been tested, is not allowed to be tested again; the volumes passing through the mesh into the device are measured in ml with an accuracy of  $\pm 5$  ml.
- the procedure starts with the 125  $\mu$ m metal wire cloth and if the suction device is completely filled (300 ml) the procedure is repeated for the following wire cloth and so forth, until the volume passing through the sieve is less than 20 ml;
- the repetition shall be made within 3 min. If one particular mesh size is expected to be suitable, the remaining wire cloths may be omitted. If the test is carried out with different mesh sizes it is advisable to have one device for each size of mesh.

## 8 Expression of results

The volumes passing through the mesh into the device are measured in ml with an accuracy of  $\pm 5$  ml.

The determination shall be made in duplicate, for each selected mesh/size.

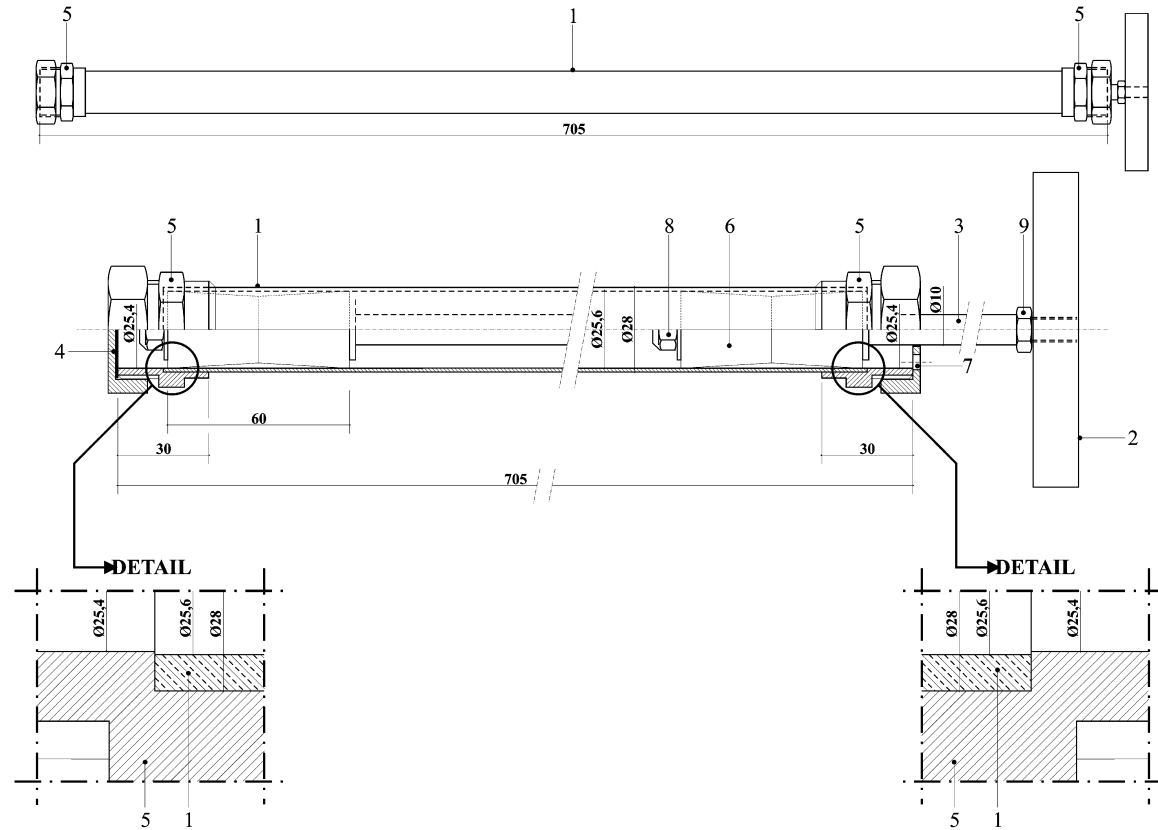
## 9 Report

The test report shall contain the following informations:

- a) reference to the test method standard;
- b) name and address of the test laboratory;
- c) identification number and date 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) procedure of mixing the product (water content, description of mixing equipment, duration of mixing);
- h) time from the completion of the mixing until the test was made;
- i) date of test and details of the test equipment used, including the make, type and capacity and the calibrations details or the identification number of the apparatus;
- j) test results: individual and average values measured for each selected metal wire cloth;
- k) accuracy data;
- l) date of test report and signature.



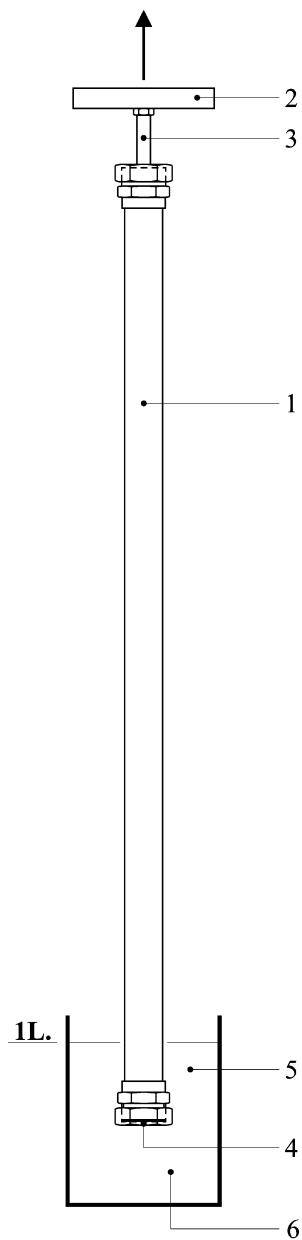
Dimensions in millimetres



**Key**

- |   |  |   |  |
|---|--|---|--|
| 1 | Metal tube                                       | 6 | Piston rubber                                |
| 2 | Handle   | 7 | Outlet port                                  |
| 3 | Piston rod                                       | 8 | Nut with security collar in polyamide. (M.8) |
| 4 | Woven metal wire cloth                           | 9 | Stop nut. (M.8)                              |
| 5 | Sleeve 1 "Gaz 11f.p.p./Inside diameter:25,4 (1") |   |  |

**Figure 1 — Suction filtration device**



**Key**

- 1 Metal tube
- 2 Handle
- 3 Piston rod
- 4 Woven metal wire cloth
- 5 Beaker
- 6 injection product

**Figure 2 — Suction filtration device handled in injection product**



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