

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

## Part 3: Test for flow of repair concrete

The European Standard EN 13395-3:2002 has the status of a  
British Standard

ICS 91.080.40; 91.100.30

## National foreword

This British Standard is the official English language version of EN 13395-3:2002.

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, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this subcommittee can be obtained on request to its secretary.

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This British Standard, having been prepared under the direction of the Building and Civil Engineering Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 31 July 2002

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English version

**Products and systems for the protection and repair of concrete structures - Test methods - Determination of workability - Part 3:  
Test for flow of repair concrete**

Produits et systèmes de protection et de réparation des structures en béton - Méthodes d'essai - Détermination de l'ouvrabilité - Partie 3: Essai d'écoulement du béton

Produkte und Systeme für den Schutz und die Instandsetzung von Betontragwerken - Prüfverfahren - Bestimmung der Verarbeitbarkeit - Teil 3: Prüfung des Fließverhaltens von Instandsetzungsбетон

This European Standard was approved by CEN on 4 January 2002.

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## Foreword

This document EN 13395-3:2002 has been prepared by Technical Committee CEN/TC 104 "Concrete and related products", the secretariat of which is held by DIN.

This document has been prepared by CEN/TC 104/SC8, "Product and systems for the protection and repair of concrete structures", the secretariat of which is held by 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 November 2002, and conflicting national standards shall be withdrawn at the latest by December 2002.

This European Standard is one of a series dealing with products and systems for the protection and repair of concrete structures. It describes a method for determining the workability of free-flowing repair concrete mixes.

It is one of a series of inter-related parts dealing with the workability of repair grouts, mortars and concretes. The other parts are:

- EN 13395-1, *Products and systems for the protection and repair of concrete structures – Test methods – Determination of workability – Part 1: Test for flow of thixotropic mortars* ;
- EN 13395-2, *Products and systems for the protection and repair of concrete structures – Test methods – Determination of workability – Part 2: Test for flow of grout or mortar* ;
- EN 13395-4, *Products and systems for the protection and repair of concrete structures – Test methods – Determination of workability – Part 4: Application of repair mortar overhead*.

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 workability of high flow hydraulic cement, PCC and PC based concrete products for the protection and repair of concrete, as defined in EN 1504-3, whose workability is outside the normal range for concrete as defined in ENV 206.

Tests for the workability of repair products and systems based on thixotropic mortar and high flow grout or mortar are contained in [prEN 13395-1 and prEN 13395-2] respectively.

Normal workability concrete mixes, which can include proprietary formulations, are applied and compacted in accordance with conventional practice. The workability of these products should be assessed using the slump, VeBe or other appropriate method given in EN 206-1. The workability of conventional high flow concrete mixes should be assessed by the method of EN 12350-5.

## 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 196-1, *Methods of testing cement — Part 1: Determination of strength*.

EN 206-1, *Concrete — Part 1: Specification, performance, production and conformity*.

EN 1504-1, *Products and systems for the protection and repair of concrete structures – Definitions, requirements, quality control and evaluation of conformity — Part 1: Definitions*.

EN 12350-5, *Testing fresh concrete — Part 5: Flow test table*.

prEN 1504-3<sup>1</sup>, *Products and systems for the protection and repair of concrete structures – Definitions, requirements, quality control and evaluation of conformity – Part 3: Structural and non-structural repair*.

## 3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 1504-1 and the following apply.

### 3.1

#### flow time

the time taken for a fixed volume of concrete to flow 750 mm along a trough

## 4 Principle

The principle of this test is to provide a relevant method to evaluate the workability of high flow repair concrete in the laboratory, which reflects the actual workability requirements for site concrete repair works. The test measures the time taken for a fixed volume of the concrete to flow 750 mm along a defined horizontal trough.

NOTE 1 High flow repair concretes are specially formulated mixes with a maximum aggregate size of 10 mm that are unsuitable for testing by normal workability tests (i.e. EN 206-1 or EN 12358).

NOTE 2 The method of test is sufficiently robust as to be suitable for use as a quality control technique in site laboratories.

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<sup>1</sup> Under preparation.

## 5 Equipment

- 5.1 **Concrete mixer** as specified in EN 206-1.
- 5.2 **Flow trough and funnel** fabricated in accordance with Figure 1.
- 5.3 **Six Litre Measuring jug** capable of taking the required volume of concrete.
- 5.4 **Standard laboratory climate** of  $(21 \pm 2)$  °C and  $(60 \pm 10)$  % RH.
- 5.5 **Climatic chamber** for mixing and testing of the concrete at  $(5 \pm 2)$  °C.

## 6 Test procedure

All the concreting materials, including the mix water and the test equipment (5.2 and 5.3) shall be conditioned in either the standard laboratory climate (5.4) or the climatic chamber (5.5) for a period of not less than 24 h prior to mixing.

Assemble the funnel support and funnel and locate onto the trough, ensuring that the edge of the funnel support is aligned with the edge of the trough. Ensure that the test equipment is rigidly supported such that the trough is horizontal and free from vibration.

Unless otherwise instructed by the manufacturer, mix the concrete in accordance with EN 206-1 at the required temperature.

Carry out the testing of the concrete immediately after completion of mixing and then again  $(30 \pm 1)$  min after mixing. Gently re-agitate the concrete every five minutes between the two tests.

Immediately before carrying out the test, flood the surfaces of the funnel and trough with water and drain-off excess water by inverting the test equipment for one minute. Fit the bung and charge the funnel with six litres of concrete. Pull the bung upwards to release the concrete and record the time taken for the concrete to flow a distance of 750 mm along the trough (the "flow time") and the maximum distance flowed.

Record any evidence of bleeding or segregation that occurs in the concrete.

Carry out three repeat tests at both temperatures (5.4 and 5.5) and at both times after mixing, resulting in a total of twelve tests.

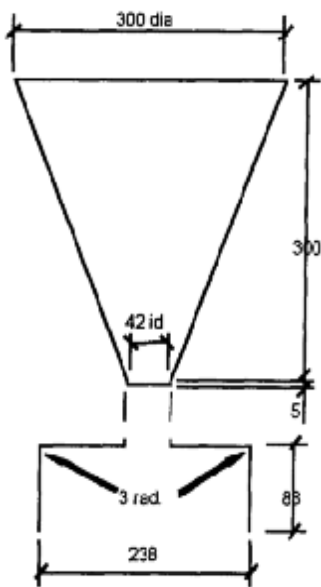
## 7 Test report

- a) a reference to the test method standard;
- b) name and address of the test laboratory;
- c) identification number and date of the test;
- d) name and address of the manufacturer or supplier of the product;
- e) name and identification marks or batch number of the product, and the maximum aggregate size;
- f) date of supply of the product;
- g) date of preparation of the test specimens and any deviation from the prescribed method of preparation;
- h) conditions of storage of prepared specimens prior to test;

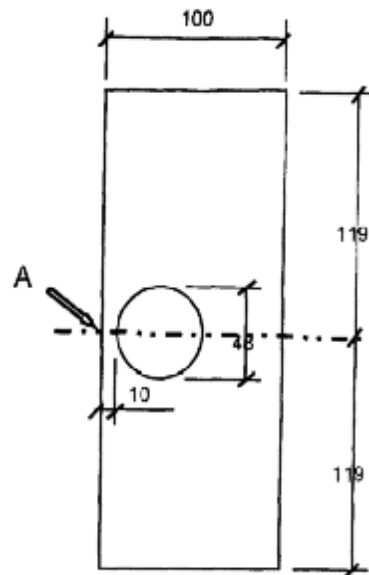
**EN 13395-3:2002 (E)**

- i) date of test and details of the test equipment used, including the make, type and capacity and the calibration details or the identification number of the apparatus;
- j) the test results, including the period of delay between completion of mixing and testing, any evidence of segregation and bleeding and the time taken for the concrete to flow 750 mm along the trough (the "flow time") and the maximum distance travelled for each mix and each temperature;
- k) precision data;
- l) date of test report and signature.

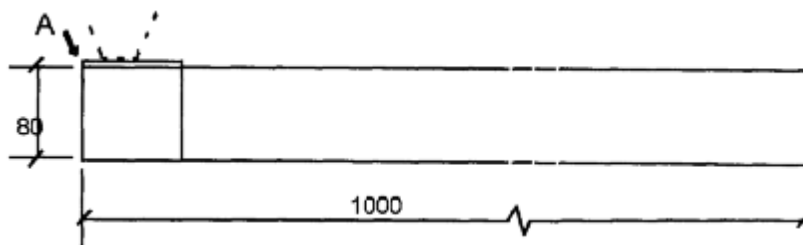
Dimensions in millimetres



a) Funnel and support

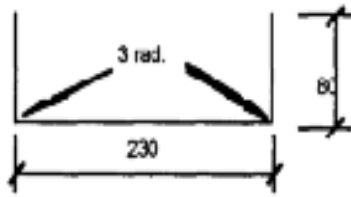


b) Enlarged view of funnel support, showing dimensions



c) Side elevation of flow trough





d) Section through trough

- NOTE 1 Through and funnel made of 2 mm galvanised steel.  
NOTE 2 Funnel support fits flush with end of the trough (align A-A).  
NOTE 3 Ends of trough welded/riveted to make a grout-tight seal.  
NOTE 4 Funnel to be provided with a suitable non-absorbent bung.  
NOTE 5 Funnel and support to be demountable for ease of cleaning.  
NOTE 6 Tolerance to  $\pm 0,5$  mm.

Figure 1 – Concrete flow trough apparatus

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