

# Products and systems for the protection and repair of concrete structures — Granulometry analysis —

Part 1: Test method for dry components  
of premixed mortar

The European Standard EN 12192-1:2002 has the status of a  
British Standard

ICS 91.080.40; 91.100.10

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## 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, 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;
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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 12 July 2002

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Produkte und Systeme für den Schutz und die Instandsetzung von Betontragwerken - Prüfverfahren - Korngrößenverteilung - Teil 1: Verfahren für Trockenkomponenten von Fertigmörtel

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

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## Foreword

This document EN 12192-1:2002 has been prepared by Technical Committee CEN/TC 104 "Concrete and related products", the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by November 2002, and conflicting national standards shall be withdrawn at the latest by December 2002.

It has been prepared by sub-committee 8 "Products and systems for the protection and repair of concrete structures", the secretariat of which is held by AFNOR.

This European Standard describes a method for determining the particle size distribution of repair mortars, containing various water-dispersible components. It has been adapted from EN 1015-1 "Method of Test for mortar for masonry - Part 1: Determination of particle size distribution" which is unsuitable for measurement of particle size for proprietary repair products and systems because they contain a variety of special additives, fibres and fillers.

It is one of a series of inter-related parts dealing with granulometry size grading of products and systems for the protection and repair of concrete structures.

The other part of this standard is:

EN 12192-2, *Products and systems of the protection and repair of concrete structures – Granulometry analysis– Part 2: Test method for fillers for polymer bonding agents.*

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 measuring the particle size distribution of the dry components of repair mortar mixes, being part of a repair product or system, as defined in prEN 1504-3, with a maximum particle size of 8 mm or 10 mm.

Part 1 does not cover particle size distribution of separate aggregates, which should be determined in accordance with the test method described in EN 933 series.

NOTE This standard gives a method for granulometric analysis of fillers for polymer bonding agents.

## 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 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 933-1, *Tests for geometrical properties of aggregates - Part 1: Determination of particle size distribution - Sieving method.*

EN 933-2, *Tests for geometrical properties of aggregates - Part 2: Determination of particle size distribution - Test sieves, nominal size of apertures.*

EN 1015-2, *Method of test for mortar for masonry - Part 2: Bulk sampling of mortars and preparation of test mortars.*

prEN 1504-3<sup>1</sup>, *Products and systems for the protection and repair of concrete structures - Part 3: Structural and non-structural repair.*

ISO 3310-1, *Test sieves - Technical requirements and testing - Part 1: Test sieves of metal wire cloth.*

## 3 Terms and definitions

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

## 4 Principle

Test sieves with increasing aperture size are nested on each other on top of a collection pan. The sample is placed on the top sieve and the stack of sieves agitated until the mass retained on each sieve remains constant. The retained mass is then measured.

NOTE For samples with particles of different densities the sieve analysis will only give particle size distribution as a percent of total mass.

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<sup>1</sup> Under preparation.

## 5 Apparatus

Table 1 — Aperture sizes of the test sieves (in mm)

Series A <sup>1 2</sup>
8,00
4,00
2,00
1,00
0,500
0,250
0,125
0,063
<p><sup>1</sup> Additional sieve aperture sizes (e.g. 5,6 mm, 0,09 mm) may be added when needed.</p> <p><sup>2</sup> Series R20 from ISO 565 may be used as an alternative.</p>

- 5.1 Balance with a capacity of 1 kg and an accuracy of 0,1 g.
- 5.2 Test sieves, with square apertures as specified in EN 933-2, are given in Table 1. The maximum aperture shall not exceed 10 mm. The test sieves shall conform to the requirements of ISO 3310-1.
- 5.3 Tightly fitting fines collection pan and lid, for the sieves.
- 5.4 Shallow trays, made of corrosion resistant metal, approximately 200 mm in diameter and 50 mm in height.
- 5.5 Soft brush.
- 5.6 Ventilated oven, thermostatically controlled to maintain temperatures of  $(105 \pm 5)$  °C and  $(60 \pm 5)$  °C.
- 5.7 Sieving machine (optional).

## 6 Sampling and preparation

The sample shall be taken in accordance with EN 1015-2. Reduction shall be carried out by use of a sample divider or by quartering, yielding a test sample of mass larger than minimum value below, but not of an exact predetermined value. The minimum dry mass of the test sample shall be as follows:

0,3 kg for  $D_{\max} \leq 4$  mm;

0,6 kg for  $D_{\max} > 4$  mm.

where

$D_{\max}$  = the maximum aggregate size of the sample in millimetres.

Spread the sample in a thin layer in shallow trays and dry in the oven at a temperature of  $(105 \pm 5)$  °C. With respect to the special constituents of repair mortars, a drying temperature of  $(60 \pm 5)$  °C may be used if recommended by the manufacturer.

Continue the drying process until two successive weighings of the sample at one day intervals do not differ by more than 1 g.

## 7 Procedure

### 7.1 General

If mortars with lightweight or organic aggregates are tested, the material to be sieved may be statically charged by the motion of the material on the sieve, resulting in agglomeration, or sticking to the sieve base. Should such a phenomenon occur, suitable measures should be taken to reduce this effect.

### 7.2 Sieving

The dried sample shall be weighed immediately before sieving. The sample shall be placed on the top sieve of the nested sieves and the sieve-shaking procedure begun.

NOTE Mechanical sieving is preferred, but manual sieving can be used if it produces the same results as mechanical sieving.

Continue sieving until less than 1 % of the retained material (according to EN 933-1) will pass through any individual sieve during continuous hand sieving for one minute. Do not force any material through the sieve by hand pressure. The use of a soft brush may be helpful if the mortar agglomerates.

### 7.3 Weighing

Determine the mass of each fraction retained on the individual sieves and the fines collected in the pan. By addition, calculate the residual mass of the sample. Any difference between the original weight and the residual weight shall be added to the pan fines.

NOTE 1 Some losses of very fine material into the air are likely to occur.

On the sieves with apertures smaller than 4,00 mm, the fraction retained at the end of the sieving operation shall not exceed the following:

$$m_r = \frac{A \sqrt{d}}{200}$$

where

$m_r$  is the mass, in grams of the fraction retained on the sieve;

$A$  is the area, in square millimetres, of the sieve;

$d$  is the nominal aperture size, in millimetres, of the sieve.

If any of the fractions retained exceeds this amount, one of the two following procedures shall be used:

- a) divide the fraction into proportions smaller than the specified maximum and sieve these one after the other;
- b) divide the portion of the sample passing through the 4,00 mm sieve with the aid of a sample divider or by quartering, and continue the sieve analysis on the reduced sample.

NOTE 2 To meet these requirements, completing the mechanical sieving by hand may be necessary.

If the material to be sieved contains fibres, their proportion and type shall be recorded and described.



## 8 Expression of results

Calculate each individual retained fraction as percentage of the total mass of the sample, and express this as the percentage passing each sieve.

If a dividing operation as described in 7.3 was carried out, this shall be taken into account in the calculation.

NOTE A graphical presentation of the results can assist in making comparisons with manufacturers' production limits.

## 9 Test Report

The test report shall include the following information:

- 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;
- 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;
- 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, the total mass of each individual test sample, the method of sieving (by hand or mechanical means, etc.);
- j) the test results, including the percentage passing each sieve, and/or the cumulative percentage of the mass of the total sample passing each sieve, to the nearest 1 %;
- k) if fibres are present, description of procedures used to identify nature and measure fibre content;
- l) precision data;
- m) date of test report and signature.

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