

# Tests for geometrical properties of aggregates —

## Part 10: Assessment of fines — Grading of fillers (air-jet sieving)

The European Standard EN 933-10:2001 has the status of a  
British Standard

ICS 91.100.15

**NO COPYING WITHOUT BSI PERMISSION EXCEPT AS PERMITTED BY COPYRIGHT LAW**

---



## National foreword

This British Standard is the official English language version of EN 933-10:2001, which is included in a package of new European Standards being prepared by CEN/TC 154 relating to aggregates. Although the English text versions of these European Standards will be adopted as British Standards as they become available, the existing British Standards for aggregates will be retained, but only until such time that the completed package of European Standards becomes available. The original group of British Standards will then be withdrawn and this will be noted in *Update Standards*.

The UK participation in its preparation was entrusted by Technical Committee B/502, Aggregates, to Subcommittee B/502/6, Test methods, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible 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.

### Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the BSI Standards Catalogue under the section entitled "International Standards Correspondence Index", or by using the "Find" facility of the BSI Standards Electronic Catalogue.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

**Compliance with a British Standard does not of itself confer immunity from legal obligations.**

This British Standard, having been prepared under the direction of the Sector Committee for Building and Civil Engineering, was published under the authority of the Standards Committee and comes into effect on 15 May 2001

### Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 10, an inside back cover and a back cover.

The BSI copyright date displayed in this document indicates when the document was last issued.

### Amendments issued since publication

Amd. No.	Date	Comments

© BSI 05-2001

ISBN 0 580 36857 2

EUROPEAN STANDARD

EN 933-10

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2001

ICS 91.100.15

English version

## Tests for geometrical properties of aggregates — Part 10: Assessment of fines — Grading of fillers (air jet sieving)

Essais pour déterminer les caractéristiques géométriques  
des granulats — Partie 10: Détermination des fines —  
Granularité des fillers (tamisage dans un jet d'air)

Prüfverfahren für geometrische Eigenschaften von  
Gesteinskörnungen — Teil 10: Beurteilung von  
Feinanteilen — Kornverteilung von Füller  
(Luftstrahlsiebung)

This European Standard was approved by CEN on 18 January 2001.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

Management Centre: rue de Stassart, 36 B-1050 Brussels

© 2001 CEN All rights of exploitation in any form and by any means reserved  
worldwide for CEN national Members.

Ref. No. EN 933-10:2001 E

**Contents**

	Page
<b>Foreword</b> .....	3
<b>1 Scope</b> .....	4
<b>2 Normative references</b> .....	4
<b>3 Terms and definitions</b> .....	4
<b>4 Principle</b> .....	4
<b>5 Apparatus</b> .....	5
<b>6 Preparation of test portions</b> .....	5
<b>7 Procedure</b> .....	5
<b>8 Calculation and expression of results</b> .....	7
<b>9 Test report</b> .....	7
<b>Annex A (informative) Example of a test data sheet</b> .....	8
<b>Annex B (informative) Precision</b> .....	9
<b>Annex C (informative) Graphical presentation of results</b> .....	10

## Foreword

This European Standard has been prepared by Technical Committee CEN/TC154, Aggregates, the Secretariat of which is held by BSI.

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 September 2001, and conflicting national standards shall be withdrawn at the latest by December 2003.

This standard forms part of a series of tests for geometrical properties of aggregates. Test methods for other properties of aggregates will be covered by Parts of the following European Standards:

EN 932, *Tests for general properties of aggregates*

EN 1097, *Tests for mechanical and physical properties of aggregates*

EN 1367, *Tests for thermal and weathering properties of aggregates*

EN 1744, *Tests for chemical properties of aggregates*

EN 13179, *Tests for filler aggregate used in bituminous mixtures*

The other parts of EN 933 will be:

*Part 1: Determination of particle size distribution — Sieving method*

*Part 2: Determination of particle size distribution — Test sieves, nominal size of apertures*

*Part 3: Determination of particle shape — Flakiness index*

*Part 4: Determination of particle shape — Shape index*

*Part 5: Determination of percentage of crushed and broken surfaces in coarse aggregate particles*

*Part 6: Assessment of surface characteristics — Flow coefficient for aggregates*

*Part 7: Determination of shell content — Percentage of shells in coarse aggregates*

*Part 8: Assessment of fines — Sand equivalent test*

*Part 9: Assessment of fines — Methylene blue test*

Annexes A, B and C are informative.

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

## 1 Scope

This European Standard specifies a method using air jet sieving for the determination of the particle size distribution of fillers by mass. It applies to fillers of natural or artificial origin up to 2 mm nominal size.

## 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 932-2, *Tests for general properties of aggregates — Part 2: Methods for reducing laboratory samples*

EN 932-5, *Tests for general properties of aggregates — Part 5: Common equipment and calibration*

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

## 3 Terms and definitions

For the purposes of this standard, the following terms and definitions apply.

### 3.1

#### **filler**

aggregate, most of which passes a 0,063 mm sieve

### 3.2

#### **laboratory sample**

sample intended for laboratory testing

### 3.3

#### **test portion**

sample used as a whole in a single test

### 3.4

#### **constant mass**

successive weighings after drying at least 1 h apart not differing by more than 0,1 %

NOTE In many cases constant mass can be achieved after a test portion has been dried for a pre-determined period in a specified oven at  $(110 \pm 5) ^\circ\text{C}$ . Test laboratories can determine the time required to achieve constant mass for specific types and sizes of sample dependent upon the drying capacity of the oven used.

## 4 Principle

The test consists of dividing up and separating, by means of a series of sieves, a filler into several granular classifications of decreasing sizes. The aperture sizes and the number of sieves are specified in 5.2. The test is in particular well suited for materials which when dry neither tend to agglomeration nor to electrostatic charge.

The method adopted is dry air jet sieving.

The mass of the particles passing each sieve is related to the initial mass of the material. The percentages obtained are used either in their numerical form or in a graphical form.

## 5 Apparatus

**5.1 All apparatus**, unless otherwise stated, shall conform to the general requirements of EN 932-5.

**5.2 Test sieves**, with round frame of 200 mm nominal diameter and square aperture sizes of 0,063 mm, 0,125 mm and 2 mm in accordance with EN 933-2.

**5.3 Air jet sieving apparatus**, (general form shown in Figure 1) with a pressure difference of  $(3,0 \pm 0,5)$  kPa across the sieve, during the test procedure.

**5.4 Ventilated oven**, thermostatically controlled to maintain a temperature of  $(110 \pm 5)$  °C or other suitable equipment for drying the filler, if it does not cause any particle breakdown.

**5.5 Balance**, accurate to  $\pm 0,1$  % of the test portion mass.

**5.6 Soft brush**.

**5.7 Plastic hammer** (optional).

## 6 Preparation of test portions

Laboratory samples shall be reduced in accordance with EN 932-2 to produce test portions.

The test portion shall have a mass of  $(50,0 \pm 1,0)$  g.

Dry the test portion at  $(110 \pm 5)$  °C to constant mass. Allow to cool, weigh and record as  $M_1$ .

## 7 Procedure

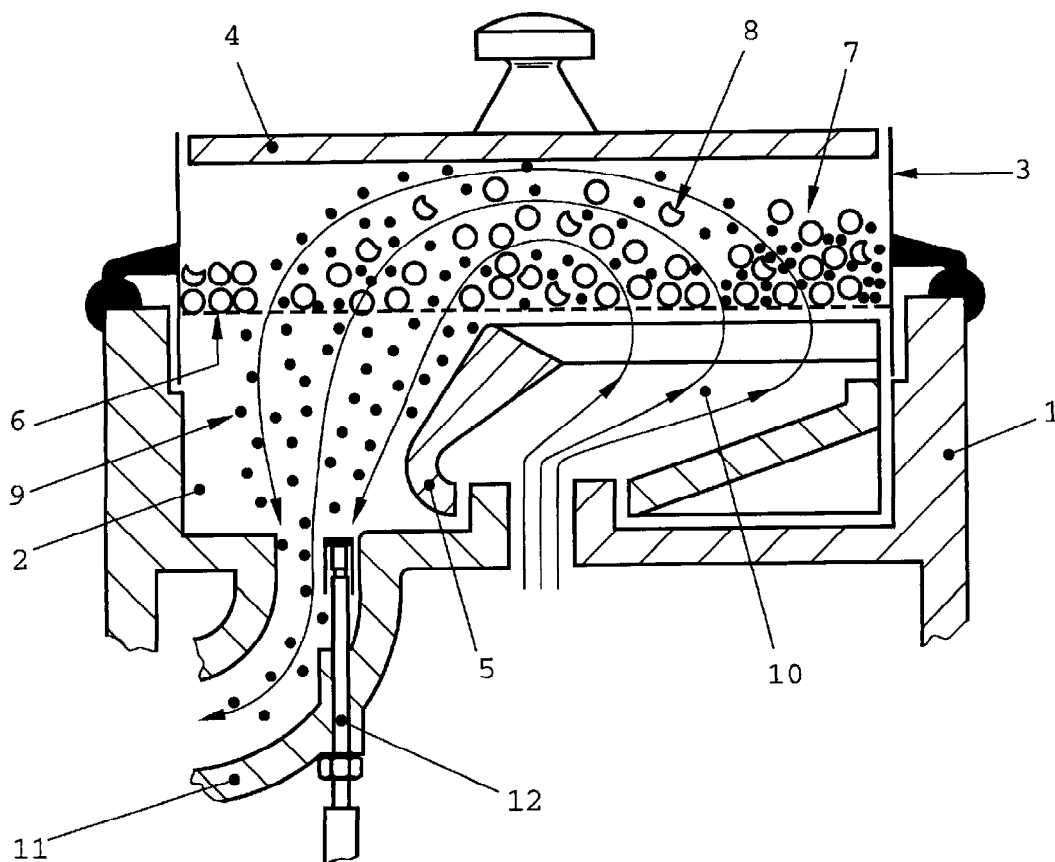
Fit the 0,063 mm test sieve onto the apparatus and transfer all of the test portion onto the sieve.

After covering the sieve with the plexiglass lid, operate the air jet sieving apparatus until complete sieving is achieved. A minimum of 3 min is required. During sieving the pressure difference to normal air pressure in the air jet sieving apparatus shall be  $(3,0 \pm 0,5)$  kPa.

**NOTE 1** Any agglomeration of particles during sieving can be alleviated by tapping the plastic hammer at the centre of the plexiglass lid.

**NOTE 2** The sieving process is complete when the mass of retained material does not change more than 0,1 % of the mass of the test portion during one minute of this sieving operation.

**NOTE 3** In many cases sieving can be completed after sieving for a pre-determined time. Test laboratories can determine the time required to fulfil the requirements of clause 7 for completion of sieving for specific types and sizes of test portions in the air jet sieving apparatus used.



**Key**

- |                        |  |
|------------------------|--|
| 1 Housing              | 7 Test portion                           |
| 2 Dish                 | 8 Oversize material                      |
| 3 Sieve frame          | 9 Undersize material                     |
| 4 Plexiglass lid       | 10 Air jet                               |
| 5 Rotating slit-nozzle | 11 Air discharge                         |
| 6 Test sieve           | 12 Pressure gauge socket, with dust hood |

**Figure 1 — Example of air jet sieving apparatus**

Determine the mass of material retained on the sieve including the filler brushed from the sieve mesh and record the mass as  $R_1$  to 0,1 g.

Repeat the above procedure with the 0,125 mm sieve and then with the 2 mm sieve, using in each case the retained material from the previous sieve and record the masses retained as  $R_2$  and  $R_3$  respectively to 0,1 g.



## 8 Calculation and expression of results

Record the various masses on a test data sheet, an example of which is given in annex A.

Calculate the mass retained on each sieve as a percentage of the original dry mass  $M_1$  to the nearest whole number.

Calculate the cumulative percentage of the original dry mass passing each sieve down to the 0,063 mm test sieve.

NOTE A statement on the precision of this test is given in annex B.

## 9 Test report

### 9.1 Required data

The test report shall include the following information:

- a) reference to this European Standard;
- b) identification of the sample;
- c) identification of the laboratory;
- d) cumulative percentage of the mass of the test portion passing each of the sieves to the nearest whole number;
- e) date of reception of sample;
- f) sampling certificate, if available.

### 9.2 Optional data

The test report can include the following information:

- a) name and location of the sample source;
- b) description of the material and of the sample reduction procedure;
- c) mass of test portion;
- d) graphical presentation of results (see annex C);
- e) date of test.

**Annex A**  
(informative)

**Example of a test data sheet**

EN 933-10 Identification of the sample	Laboratory: Date: Operator:
---	-----------------------------------

Dry mass of test portion:  $M_1 = \dots\dots\dots$  g

Sieve aperture size mm	Mass of material retained ( $R_i$ ) g	Percentage of material retained ( $R_i/M_1$ )100 (%)	Cumulative percentages passing $100 - (100 R_i/M_1)$ (%)
2	$R_3$		(to nearest whole number)
0,125	$R_2$		
0,063	$R_1$		

## Annex B (informative)

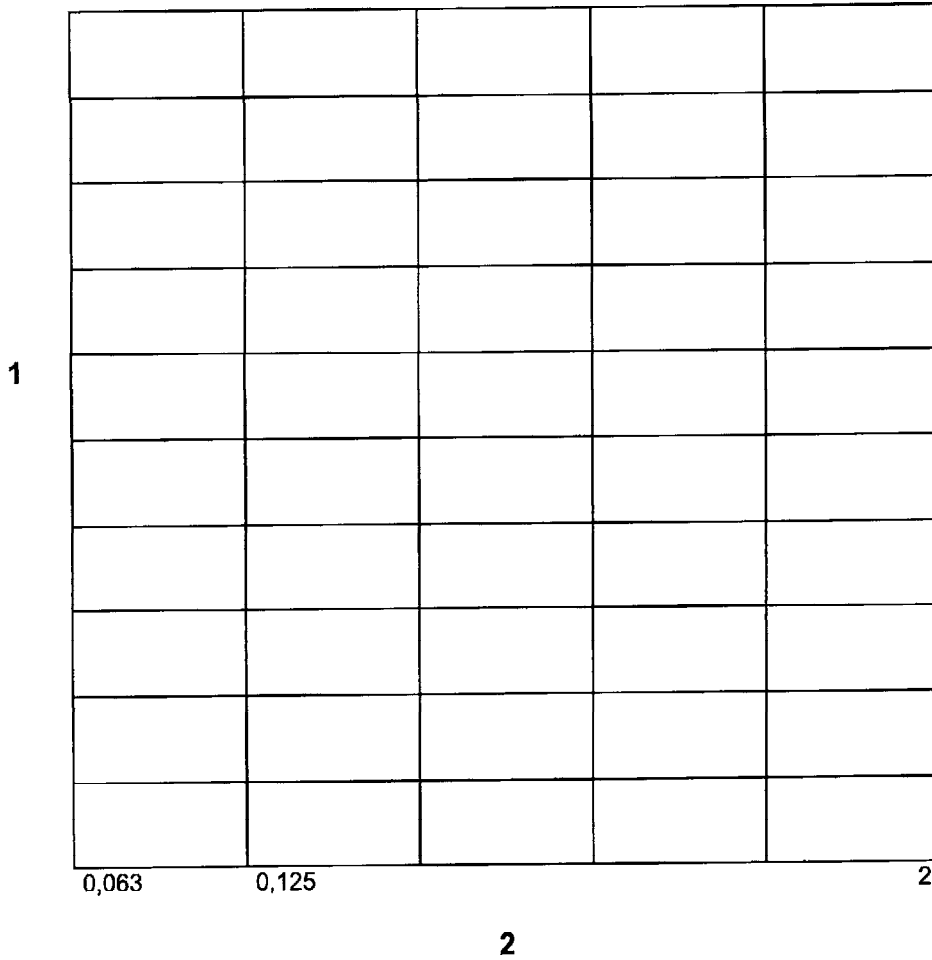
### Precision

The following values have been obtained by a Dutch proficiency scheme using  $(10,00 \pm 0,01)$  g test portions and  $(3,0 \pm 0,5)$  kPa pressure difference.

Repeatability	<i>r</i>	=	3 %
Reproducibility	<i>R</i>	=	3,5 %

**Annex C**  
(informative)

**Graphical presentation of results**



**Key**

- 1 cumulative percentage passing
- 2 sieves of square aperture (mm)

---

## BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

### Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover. Tel: 020 8996 9000. Fax: 020 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

### Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: 020 8996 9001. Fax: 020 8996 7001. Standards are also available from the BSI website at <http://www.bsi-global.com>.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

### Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre. Tel: 020 8996 7111. Fax: 020 8996 7048.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration. Tel: 020 8996 7002. Fax: 020 8996 7001. Further information about BSI is available on the BSI website at <http://www.bsi-global.com>.

### Copyright

Copyright subsists in all BSI publications. BSI also holds the copyright, in the UK, of the publications of the international standardization bodies. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI.

This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols, and size, type or grade designations. If these details are to be used for any other purpose than implementation then the prior written permission of BSI must be obtained.

If permission is granted, the terms may include royalty payments or a licensing agreement. Details and advice can be obtained from the Copyright Manager. Tel: 020 8996 7070.

BSI  
389 Chiswick High Road  
London  
W4 4AL