BRITISH STANDARD

BS EN
933-10:2009

Tests for geometrical properties of aggregates

Part 10: Assessment of fines — Grading of filler aggregates (air jet sieving)

ICS 91.100.15

BSI
British Standards

National foreword

This British Standard is the UK implementation of EN 933-10:2009. It supersedes BS EN 933-10:2001 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/502/6, Test methods.

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

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This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 August 2009

ISBN 978 0 580 63831 2

Amendments/corrigenda issued since publication

Date	Comments

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 933-10

July 2009

ICS 91.100.15

Supersedes EN 933-10:2001

English Version

Tests for geometrical properties of aggregates - Part 10: Assessment of fines - Grading of filler aggregates (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)

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COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 933-10:2009) has been prepared by Technical Committee CEN/TC 154 “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of an identical text or by endorsement, at the latest by January 2010, and conflicting national standards shall be withdrawn at the latest by January 2010.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 933-10:2001.

This standard forms part of a series of tests for geometrical properties of aggregates. Test methods for other properties of aggregates are 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

— Part 11: Classification test for the constituents of coarse recycled aggregate

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1 Scope

This European Standard describes the reference method used for type testing and in cases of dispute for determining the particle size distribution up to 2 mm size of natural or manufactured origin filler aggregate using air jet sieving. For other purposes, in particular factory production control, other methods may be used provided that an appropriate working relationship with the reference method has been established.

NOTE A wet sieving procedure conforming to EN 933-1 can be used as an alternative method. However, this procedure is not applicable for mixed filler.

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 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 document, the following terms and definitions apply.

3.1
filler aggregate
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 ± 5) °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 aggregate 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 ± 0,5) kPa across the sieve, during the test procedure.

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

5.5 Balance, accurate to ± 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 ± 1,0) g.

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

7 Procedure

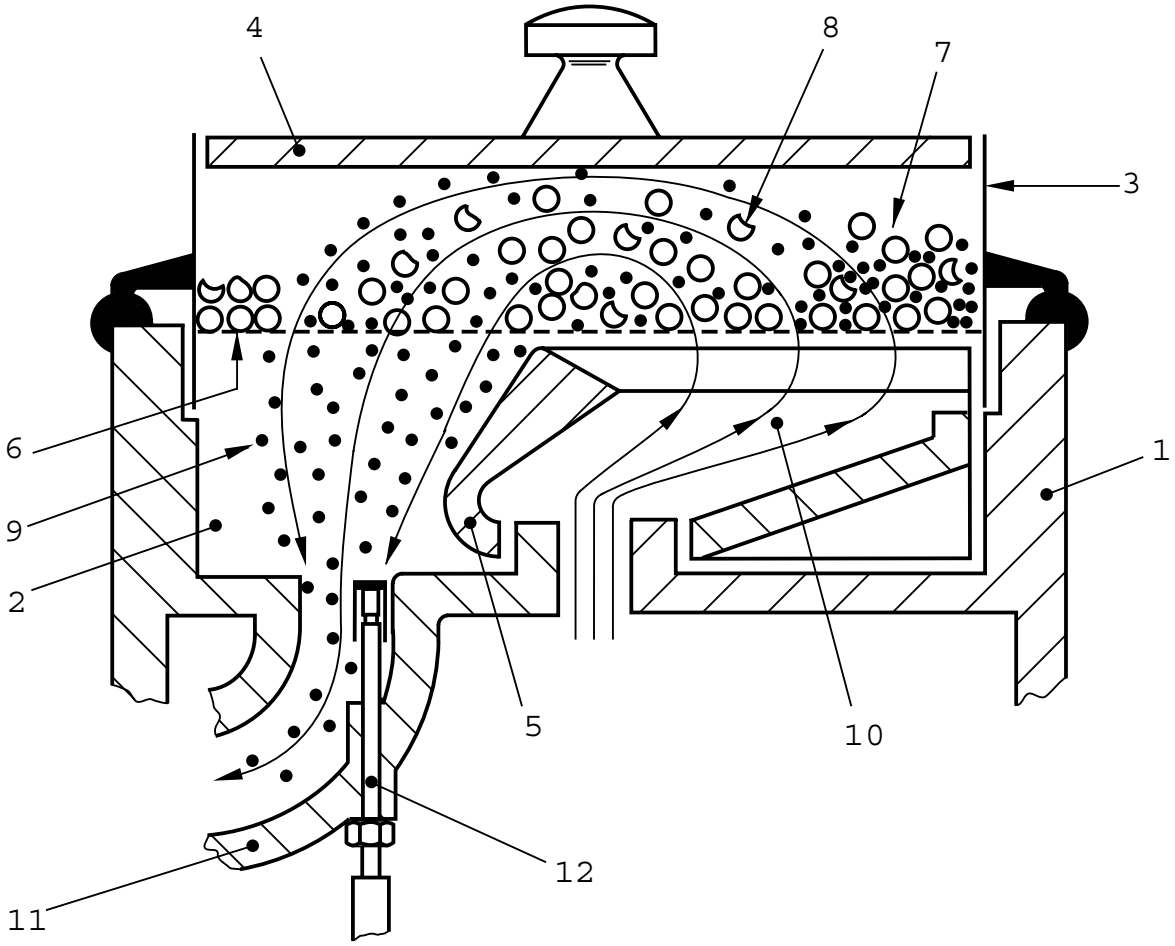
Fit the 0,063 mm test sieve onto the apparatus and transfer all of the test portion onto the sieve.

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 ± 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 1 min 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 aggregate 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 = ……..... 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 0,125 0,063	R_3 R_2 R_1		 (to nearest whole number)

Annex B
(informative)

Precision

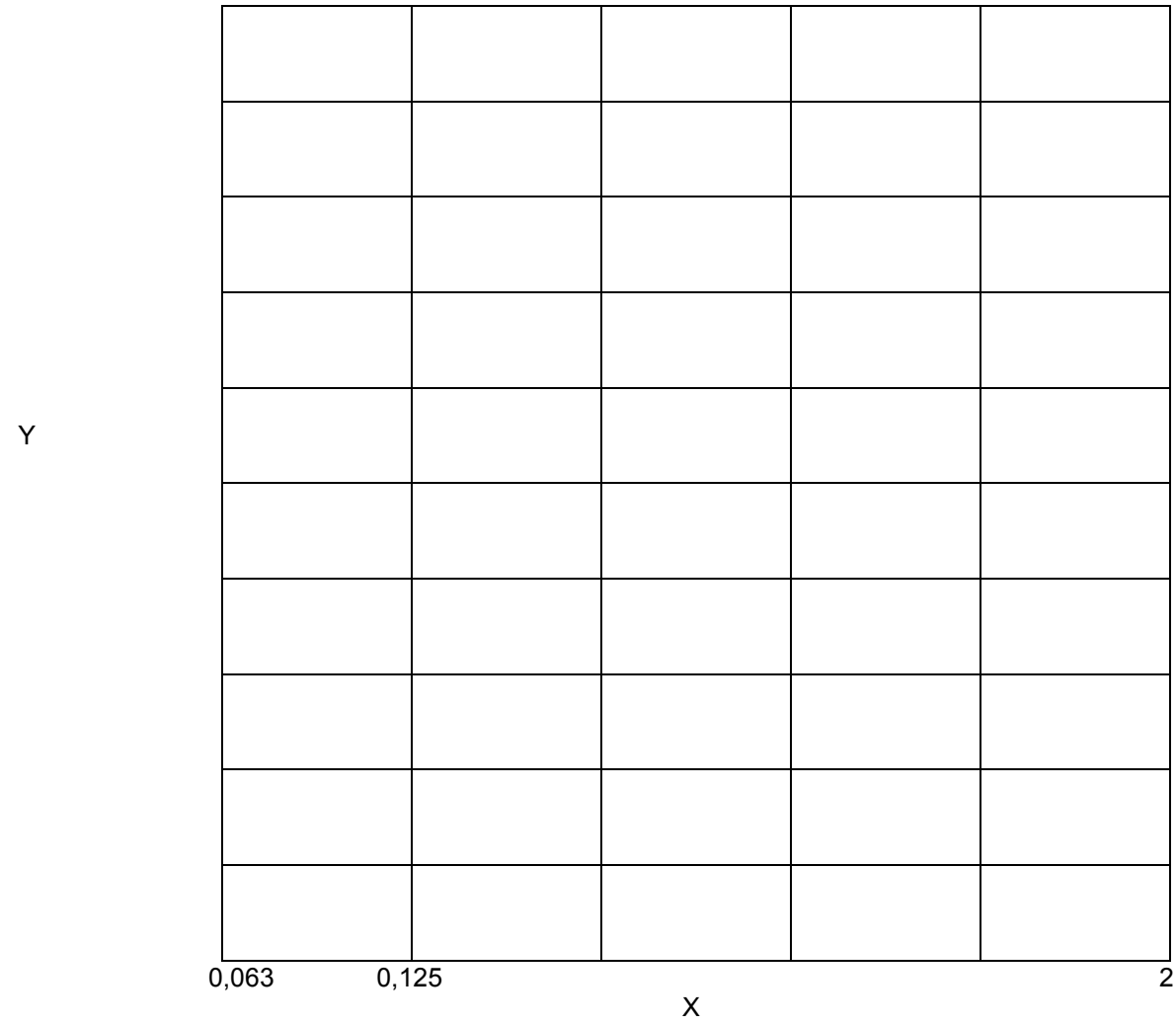
The following values have been obtained by a Dutch proficiency scheme using (10,00 ± 0,01) g test portions and (3,0 ± 0,5) kPa pressure difference.

Repeatability r = 3 %

Reproducibility R = 3,5 %

Annex C
(informative)

Graphical presentation of results



Key

1 cumulative percentage passing (%)

2 sieves of square aperture (mm)

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