BRITISH STANDARD

BS EN
451-2 : 1995

Method of testing fly ash

Part 2. Determination of fineness by wet sieving

The European Standard EN 451-2 : 1994 has the status of a British Standard

UDC 666.952.2.620.168.32:539.215.4

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by Technical Committee B/516, Cement and lime, to Subcommittee B/516/101, Pozzolanas, upon which the following bodies were represented:

British Aggregate Construction Materials Industries
British Cement Association
British Precast Concrete Federation
British Ready Mixed Concrete Association
Cementitious Slag Makers' Association
Department of the Environment (Building Research Establishment)
Department of Transport
Electricitiy Association
Federation of Civil Engineering Contractors
Quality Ash Association

This British Standard, having been prepared under the direction of the Sector Board for Building and Civil Engineering, was published under the authority of the Standards Board and comes into effect on 15 September 1995

The following BSI references relate to the work on this standard:
Committee reference B/516/101
Draft for comment 91/11364 DC

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Amendments issued since publication

Amd. No.	Date	Text affected

Contents

National foreword

This Part of BS EN 451 has been prepared by Subcommittee B/516/101 and is the English language version of EN 451-2 : 1994 *Method of testing fly ash – Part 2: Determination of fineness by wet sieving* published by the European Committee for Standardization (CEN). This standard has been prepared as part of a package of standards harmonized within the member countries of CEN to support the essential requirements of the Construction Products Directive.

BS EN 451-2 describes a method for the determination of fineness of fly ash by wet sieving on a calibrated 0.045 mm (45 μm) sieve as a reference procedure.

The method described in BS EN 451-2 is based on other internationally recognized standard methods for the determination of fly ash fineness, as is the method described in annex D of BS 3892 : Part 1 : 1993.

The importance of checking (calibrating) each test sieve is essential to obtaining the correct results from this test method. While BS 3892 : Part 1 specifies that calibration be performed with standard reference powders, appropriate to the grade of ash to be tested, BS EN 451-2 has not made such a stipulation, except that the reference sample is to consist of rounded sand particles[1)].

While calibration or recalibration of each test sieve in both standards is made after 100 tests, BS 3892 requires also that test sieves are re-calibrated every 3 months, if this is sooner than the maximum of 100 tests permitted. There are also some minor differences between the two methods, e.g.

a) the pressure of the water supply is specified as (80 ± 5) kPa in BS EN 451-2, while it is 70 kPa to 80 kPa in annex D of BS 3892 : Part 1 : 1993;

b) the mass of the sample to be tested is to be approximately 1.0 g in BS EN 451-2, while it is 1.0 g to 1.1 g in annex D of BS 3892 : Part 1 : 1993;

c) the determination of the sieve correction factor in BS EN 451-2 is not required to be repeated if the two determinations differ by more than 0.3 %, as is required by annex D of BS 3892 : Part 1 : 1993.

With the exception of the constraint on the maximum of 3 months in use and the omission of specifying the origin of the calibration powder, any other minor differences are not considered sufficient to cause significant differences in the test results obtained by the two methods.

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

1) The source of supply of the reference material will be announced by the Secretariat of CEN/TC 104, DIN Deutsches Institut für Normung, Burggrafenstrasse 6, D-1000 Berlin 30, Germany.

EUROPEAN STANDARD
NORME EUROPÉENNEE
EUROPÄISCHE NORM

EN 451-2

September 1994

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Descriptors: Fly ash, determination, fineness, sieving, wet processes

English version

Method of testing fly ash - Part 2: Determination of fineness by wet sieving

Méthode d'essai des cendres volantes - Partie 2: Détermination de la finesse par tamisage humide

Prüfverfahren für Flugasche - Teil 2: Bestimmung der Feinheit durch Naßsiebung

This European Standard was approved by CEN on 1994-09-09. 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 Central Secretariat or to any CEN member.

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CEN
European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Ref. No. EN 451-2 : 1994 E

Foreword

This European Standard was drawn up by the Technical Committee CEN/TC 104, Concrete, the Secretariat of which is held by DIN.

The preparatory work was carried out by WG 4 of CEN/TC 104 since June 1988 in which the following countries participated: Austria, Belgium, Denmark, France, Germany, Ireland, Italy, Netherlands, Norway, Portugal, Sweden and United Kingdom.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EC Directive(s).

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 1995, and conflicting national standards shall be withdrawn at the latest by March 1995.

No existing European Standard is superseded.

According to the CEN/CENELEC Internal Regulations, the following countries are bound to implement this European Standard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom.

Contents

1 Scope

This test method describes the determination of fly ash fineness by wet sieving on a 0,045 mm sieve (ISO 565).

The standard describes the reference procedure. If other methods are used it shall be shown that they give results equivalent to those obtained by the reference method. In case of a dispute, only the reference method shall be used.

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.

ISO 565 : 1990	*Test sieves – Woven metal wire cloth, perforated plate and electroformed sheet – Nominal sizes of openings*
ISO 3310-1 : 1990	*Test sieves – Technical requirements and testing – Part 1: Test sieves of metal wire cloth*

3 Apparatus

The complete apparatus is shown in figure 1 and consists of:

3.1 *Sieve*

The sieve frame shall be constructed of durable material not susceptible to corrosion or distortion by oven heat. The frame is essentially a tube of 50 mm nominal diameter and measuring 75 mm from the top of the frame to the sieve cloth, with facilities for removing and replacing the cloth. The stainless steel sieve cloth of a mesh size of 0,045 mm shall conform to ISO 565 and ISO 3310-1 and be free of visible irregularities such as creases, poor cloth tension, scratches or irregular markings when inspected visually as described in ISO 3310-1. The sieve cloth shall be suitably sealed in the case and uniformly tensioned in the frame to prevent loss of material.

3.2 *Spray nozzle*

The spray nozzle (figure 2) shall be constructed of metal not susceptible to corrosion by water, with an inside diameter of 17,5 mm. The spray nozzle shall have a central hole drilled parallel to the longitudinal axis, an intermediate row of eight holes drilled 6 mm centre-to-centre at an angle of 5° to the longitudinal axis and an outer row of eight holes drilled 11 mm centre-to-centre at an angle of 10° to the longitudinal axis. All holes shall be 0,5 mm in diameter and be fully functional.

3.3 *Pressure gauge*

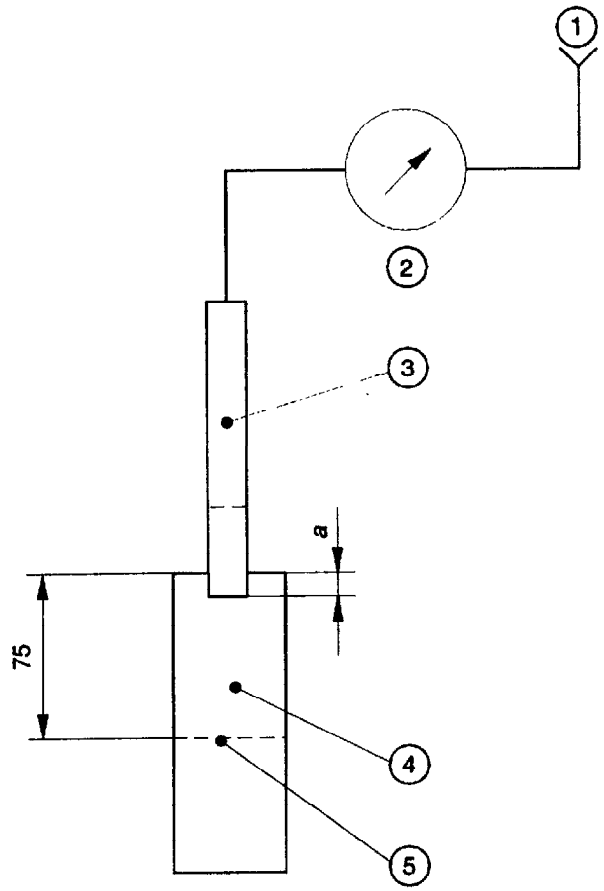
The pressure gauge shall have a minimum diameter of 80 mm and a maximum scale capacity of 160 kPa, graduated at maximum intervals of 5 kPa. The accuracy of the gauge shall be ±5 kPa.

3.4 *Oven*

A well ventilated drying oven regulated at (105 ± 5) °C.

3.5 *Balance*

A balance capable of weighing to the nearest 0,001 g.



a = 5 mm to 10 mm

1 Water tap

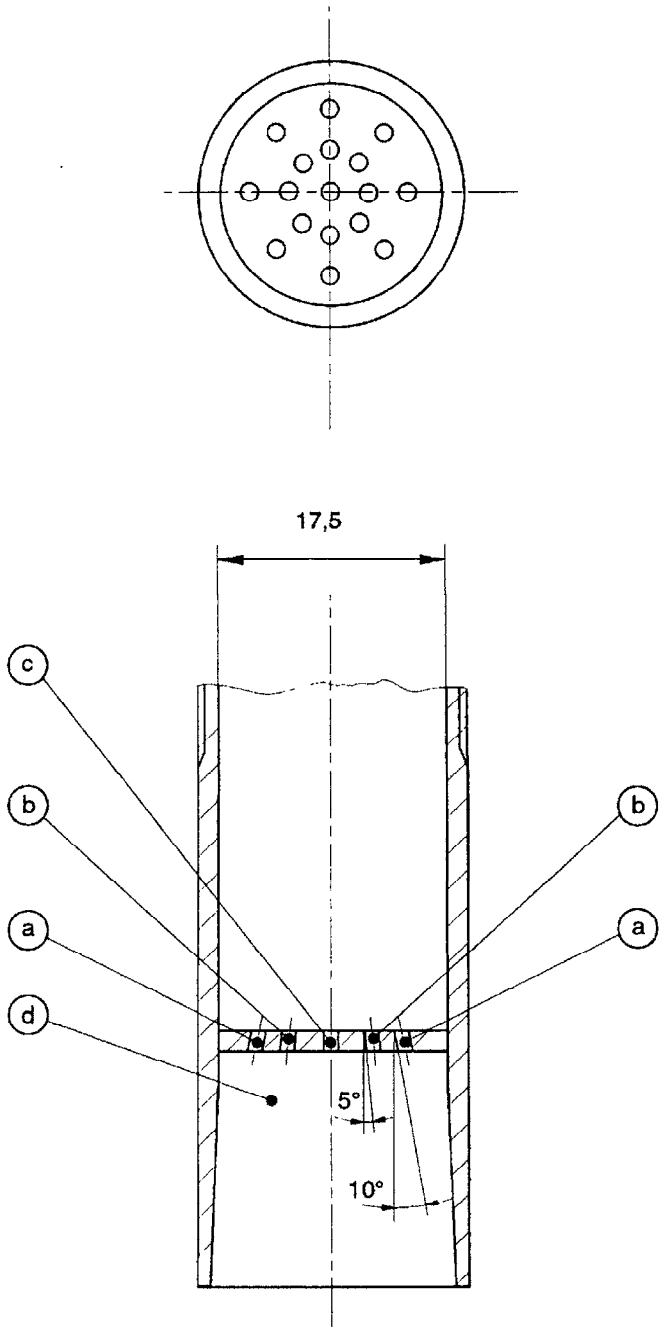
2 Pressure gauge

3 Spray nozzle

4 Sieve frame

5 Sieve cloth

Figure 1. Device



a Outer row

b Intermediate row

c Central hole

d Spray nozzle with 17 holes of 0,5 mm diameter

Figure 2. Spray nozzle

4 Checking the test sieve

A reference material, consisting of rounded sand particles[1)] with a known proportion of material coarser than the specified mesh size shall be used for checking the sieve (**3.1**). The material shall be stored in sealed, airtight containers, to preclude changes in its properties due to deposition or absorption from the atmosphere. Containers with the 0,045 mm sieve residue of the reference material shall be marked.

Test sieves shall be checked when new and at intervals not exceeding 100 tests. The sieve cloth shall first be inspected visually as described in ISO 3310-1. Any sieve with an imperfect or damaged sieve cloth shall be rejected. The sieve shall be cleaned after every five tests, for example by back-flushing with water.

Determine the fineness of the reference material as described in clause **5**. Calculate the correction factor f for the test sieve from the equation:

$$f = r_t / r_r$$

where

f	is the correction factor;
r_r	is the percentage by mass of the reference material retained by the test sieve;
r_t	is the known 0,045 mm sieve residue in percentage by mass of the reference material.

The test shall be performed twice and the mean value of f taken as the correction factor. It shall be within the limits 0,8 and 1,2 otherwise the sieve cloth shall be replaced and the test repeated.

5 Procedure

Dry a sample of at least 1 g in the oven (**3.4**) at (105 ± 5) °C to constant mass.

For the test sample, transfer approximately 1,0 g, weighed to the nearest 0,001 g, of the oven-dry sample to a clean, dry sieve (**3.1**).

Wet the sample thoroughly with a gentle flow of water, for example, by using a hand-held wash bottle.

Set the water pressure to (80 ± 5) kPa and place the sieve in position under the spray nozzle (**3.2**) and wash for (60 ± 10) s, keeping the lower end of the nozzle between 10 mm and 15 mm below the top of the sieve frame, and swirling the sieve horizontally at about 1 r/s.

Remove the sieve from under the nozzle, rinse with approximately 50 ml alcohol or distilled water and blot up residual moisture from the underside of the sieve cloth. Dry the sieve and residue to a constant mass in the oven at (105 ± 5) °C. Cool the sieve and the residue in a desiccator and weigh the residue to the nearest 0,001 g.

6 Calculation

Calculate the fineness as a percentage by mass to the nearest 0,10 % from the following equation:

$$r = \frac{f \times m_s}{m_o} \times 100$$

where

r	is the fineness expressed as the 0,045 mm sieve residue fraction (in % m/m);
f	is the sieve correction factor (see **4**);
m_s	is the mass of the residue (in g);
m_o	is the mass of test sample (in g).

7 Results

Report the mean value of r from the two tests, expressed to one decimal place, as the fineness of the fly ash. If the two values differ by more than 0,3 %, repeat the test on further samples until two values are obtained that differ by not more than 0,3 %.

[1)] Reference samples may be obtained from (addresses to be inserted later).

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