BRITISH STANDARD

BS EN
450-2:2005

Fly ash for concrete —

Part 2: Conformity evaluation

The European Standard EN 450-2:2005 has the status of a British Standard

ICS 91.100.30

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 450-2:2005. Together with BS EN 450-1:2004, this document supersedes BS EN 450:1995.

The UK participation in its preparation was entrusted by Technical Committee B/516, Cement and lime, to Subcommittee B/516/101, Additions for concrete, 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.

Additional information

The term "fly ash" used in this standard covers pulverized-fuel ash (PFA) which is the more precise term for fly ashes produced from electricity generating power stations burning pulverized hard coals and which has been in common use in the UK for many years.

This British Standard specifies the scheme for the evaluation of conformity of fly ash as an addition in concrete, including certification of conformity. In doing so it complements BS EN 450-1:2005, which, when implemented in the UK, will make appropriate reference to this British Standard.

Cross-references

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

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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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Foreword

This document (EN 450-2:2005) 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 August 2005, and conflicting national standards shall be withdrawn at the latest by August 2006.

This document supersedes EN 450:1994.

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This document specifies the scheme for the evaluation of conformity of fly ash according to EN 450-1.

The document provides technical rules for the production control by the producer, including autocontrol testing of samples. It also provides rules for actions to be followed in the event of non-conformity, the procedure for the certification of conformity and requirements for dispatching centres.

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

EN 196-7, *Methods of testing cement — Methods of taking and preparing samples of cement*.

EN 450-1:2005, *Fly ash for concrete — Part 1: Definition, specifications and conformity criteria.*

EN 451-2, *Method of testing fly ash — Part 2: Determination of fineness by wet sieving.*

3 Terms and definitions

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

3.1 Specific definitions

3.1.1
certificate of conformity to EN 450-1
document issued under the rules of a certain scheme for the evaluation of conformity indicating that adequate confidence is provided that fly ash is in conformity with EN 450-1

3.1.2
conformity mark
protected mark applied on the basis of the certificate of conformity (see 3.1.1)

3.1.3
certified fly ash
fly ash for which a certificate of conformity has been issued

3.1.4
initial period
immediate period after the first issuing of the certificate of conformity for a fly ash

3.1.5
certification body
impartial body, governmental or non-governmental, possessing the necessary competence and responsibility to carry out conformity certification according to given rules of procedure and management

3.1.6
production control
permanent internal control of fly ash production exercised by the producer consisting of internal quality control and autocontrol testing

3.1.7
production plant
facility used by a producer for the production of fly ash:

a) power plant with one(several) boiler(s),

b) processing plant, for example for the classification, selection, sieving, drying, blending, grinding and/or carbon reduction of fly ash(es).

In the production plant equipment has to be used which is suitable for production of fly ash including the necessary silo capacity for the storage and dispatch of the fly ash produced, and equipment to test, evaluate and control the fly ash production. This equipment and the production control applied allow the control of production with sufficient accuracy to ensure that the requirements of EN 450-1 are met

3.1.8
new production plant
production plant which is not already producing fly ash certified under this scheme

3.1.9
existing production plant
production plant which is already producing fly ash certified under this scheme

3.1.10
depot
bulk fly ash handling facility (not located at the production plant) used for the dispatch of fly ash (whether in bulk or bagged) after transfer or storage where the producer has full responsibility for all aspects of the quality of the fly ash

3.1.11
dispatching centre
bulk fly ash handling facility (not located at the production plant) used for the dispatch of fly ash after transfer or storage where an intermediary has full responsibility for all aspects of the quality of the fly ash

3.1.12
intermediary
natural or legal person who takes from the producer fly ash certified according to EN 450-2 and bearing the conformity mark, who undertakes full responsibility for maintaining in a dispatching centre all aspects of the quality of the fly ash and who supplies the fly ash onwards to a further natural or legal person

3.1.13
confirmation autocontrol testing
continual testing carried out by an intermediary which consists of testing of samples taken by the intermediary at the point(s) of release from the dispatching centre

3.1.14
works' quality manual
document that provides information on the production control which is applied by a producer at a particular production plant to ensure conformity of the fly ash with the requirements of the relevant product specification standard

3.1.15
producer
producer is the operator of the production plant or a person (natural or legal) authorised by the production plant. The producer is named in the certificate of conformity

3.2 General definitions

See Annex B (informative).

4 Tasks for the producer

4.1 Factory production control

4.1.1 Concept

Production control means the permanent internal control of fly ash production exercised by the producer and consists of internal quality control (see 4.2) and autocontrol testing[1)] of samples of fly ash taken at the point of release (see 4.3).

NOTE The requirements of EN 450-2 as regards the production control take account of those clauses of EN ISO 9001 which are relevant to the production, process control and testing of fly ash.

4.1.2 Works' quality manual

The producer's documentation and procedures for the production control shall be described in a Works' quality manual, which shall adequately describe, among other things:

a) the quality aims and the organisational structure, responsibilities and powers of the responsible staff with regard to product quality and the means to monitor the achievement of the required product quality and the effective operation of the internal quality control (see 4.1.3);

b) the production and quality control techniques, processes and systematic actions that will be used (see 4.2.1, 4.2.3 and 4.3.2);

c) the inspections and tests that will be carried out before, during and after production, and the frequency with which they will be carried out (see 4.2.2, 4.3.1 and 4.3.3).

The Works' quality manual prepared by the producer for each production plant shall include an adequate system of documentation (see 4.1.4 and 4.3.4). In case of suitability testing of fly ash from co-combustion of pulverised coal with certain co-combustion materials according to EN 450-1, the procedure of sampling shall be documented in agreement with the certification body.

The Works' quality manual shall address and document the procedures operated to ensure that the fly ash conforms to the technical specifications. The manual may reference associated documents which provide further details of the autocontrol testing of samples and the internal quality control. For the purpose of this scheme, the term Works' quality manual shall be considered to include these associated documents.

NOTE In the case of an existing quality management system according to EN ISO 9001, the certification body may examine if the corresponding quality manual meets all the requirements of EN 450-1 which are relevant to the production control of fly ash. Provided all the requirements are included, this quality manual may also be applied for product certification.

4.1.3 Management systems

4.1.3.1 Quality policy statement

The Works' quality manual shall include a statement by the management of the producer defining its quality policy, objectives and commitments to the attainment of product quality.

4.1.3.2 Management representative

If the producer is a person authorized by the production plant (see 3.1.15), suitable relations between the producer and the production plant shall be established and documented in order to ensure that the requirements of this document are met.

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1) This testing corresponds also to the "further testing of samples" mentioned in Annex III Section 2 point (i) of the Construction Products Directive 89/106/EEC.

4.1.3.3 Internal audits and management review

In order to ensure the continuing suitability and effectiveness of the Work's quality manual to meet the requirements of EN 450-1, the producer shall perform at least once per year:

a) internal audits covering the scope of this Clause 4 and 6.1;

b) producer's management review of the production control, taking into account records of the internal audits.

4.1.3.4 Training

The Works' quality manual shall describe the measures taken to ensure that all the personnel involved in operations that can affect internal quality control and product quality have appropriate experience or training. Appropriate records shall be retained.

4.1.4 System of documentation

4.1.4.1 Document control

The management representative of the producer shall be responsible for the control of all documents and data related to the production control and to this scheme for the evaluation of conformity.

This control shall ensure that the appropriate issues of all documents are available at essential locations, that obsolete documents are withdrawn and that changes or modifications to any document are effectively introduced.

A master list shall be established to identify the current version of documents in order to prevent the use of non-applicable documents.

4.1.4.2 Quality records

The producer shall retain records of production control for at least the period required to comply with relevant legislation.

4.2 Internal quality control

4.2.1 Process control

4.2.1.1 General

The Works' quality manual shall describe the parameters for process planning, process control and testing, inspection, corrective action, verification, dispatch and the associated records.

Depending on the installation, the following measures shall be provided:

a) in all types of production plants

   1) in-process testing of fly ash properties;

   2) silos of adequate capacity for storage of the fly ash produced allowing a proper identification of the product and giving possibilities of taking spot samples at any time without prior notice;

b) additionally, in production plants using processing facilities:

   1) separate and adequate storing facilities for the fly ashes to be processed;

   2) controlled proportioning of the fly ashes to be processed in order to achieve the target properties of the produced fly ash;

   3) facilities for adequate homogenisation of fly ash;

4) in-process testing of fly ash properties.

4.2.1.2 Provisions for processing plants

In production plants for the controlled processing of fly ash, for example by classification, selection, sieving, drying, blending, grinding, and carbon reduction, the relevant information on each consignment of incoming fly ash and all operating steps in the process shall be documented in the Work´s quality manual by the producer in agreement with the certification body. The following data shall be at least part of this documentation:

a) the producer and the production location from which the fly ash originates;

b) an acknowledgement that the fly ash is according to 3.2 in EN 450-1:2005;

c) the documented suitability and environmental compatibility as required in EN 450-1, where co-combustion materials have been used;

d) in case of blending only, the properties of each incoming fly ash shall be controlled on a regular basis in order to be able to achieve the target properties of the fly ash blend. On each incoming fly ash the relevant properties listed in Table 2 of EN 450-1:2005, except particle density, activity index, initial setting time, and water requirement should be tested by the supplier of the incoming fly ash. The minimum testing frequency should be chosen as indicated in Table 2 of EN 450-1:2005, “Routine situation”, and should be documented in the work’s quality manual. Each incoming fly ash should conform to the requirements in Clauses 4 and 5 of EN 450-1:2005 with the exception of loss on ignition, fineness, and variation of fineness;

e) if one of the incoming fly ashes is obtained from co-combustion, then the environmental compatibility of the blended fly ash shall be proven, as required by 4.3 of EN 450-1:2005.

4.2.1.3 Provisions for co-combustion materials

In power plants where co-combustion of materials, or mixtures of materials, according to Clause 4 of EN 450-1:2005 and mixtures thereof is conducted, the following measures shall be ensured:

a) different co-combustion materials shall be stored separately;

b) the proportion of co-combustion material(s) related to pulverised coal used in the boiler shall be controlled at regular intervals.

4.2.1.4 Control of off-specification production

The Works' quality manual shall contain procedures to ensure that off-specification production is adequately managed.

4.2.2 Measuring and testing

4.2.2.1 Inspection, measuring and test equipment

The equipment for in-process inspection and testing shall be regularly checked and calibrated in accordance with the procedures and frequencies laid down in the Works' quality manual.

4.2.2.2 Inspection and test status

Procedures for the inspection and test status through the stages of production shall be detailed in the Works' quality manual. These shall include procedures for the control of off-specification intermediate materials.

To ensure that only fly ash conforming to EN 450-1 is conveyed to the silo, samples shall be taken from appropriate places prior to the silo for certified fly ash in agreement with the certification body. The sampling places shall be laid down in the Works´ quality manual. Spot samples shall be taken for the determination of fineness and loss on ignition in agreement with the certification body.

4.2.3 Handling, storage, packaging and delivery

The Works' quality manual shall describe the precautions taken for the protection of the quality of the fly ash while under the responsibility of the producer. It shall include a description of the procedures used at depots. Delivery documentation shall allow traceability to the production plants, depots or dispatching centres.

4.3 Autocontrol testing of samples

4.3.1 Sampling and testing

The producer shall operate a system of autocontrol testing for each certified fly ash. This system shall be used to demonstrate conformity to the requirements in Clause 8 of EN 450-1:2005. The properties to be tested, the testing methods, the minimum frequency of autocontrol testing during routine testing and initial period of testing and the conformity criteria shall be in accordance with the requirements given in Clause 8 of EN 450-1:2005. For fly ashes not being dispatched continuously, the frequency of testing and the point of sampling shall be as specified in the Works' quality manual.

All test data shall be documented.

4.3.2 Corrective action

The Works' quality manual shall document procedures for the review and adjustment of the production control in case of non-conformity (see 6.1).

The actions taken in the event of non-conformity shall be recorded in a report subject to inspection during the management review.

In the event of fly ash yielding a test result not conforming to the single result limit value conformity criteria specified in EN 450-1, the producer shall immediately determine the affected quantity, take appropriate action to prevent the dispatch of this quantity and inform the affected customer if such fly ash has been released. In addition, the producer shall immediately determine the causes of such non-conformity, take corrective actions and undertake a review of all relevant production control procedures. All such actions and findings shall be appropriately recorded in a report subject to inspection during the management review.

NOTE The certification body may require to be kept informed of these actions and findings.

4.3.3 Measuring and test equipment for autocontrol testing

The equipment used for autocontrol testing shall be regularly checked and calibrated in accordance with procedures and frequencies laid down in the Works' quality manual. These procedures may include comparison of activity index test results by proficiency testing with another laboratory designated in the Works' quality manual.

The Works' quality manual shall document procedures to ensure that all personnel involved in autocontrol testing have appropriate experience and training. Appropriate records shall be retained.

4.3.4 Quality records

The producer shall retain records of the autocontrol test results and appropriate records on test equipment for at least the period required to comply with relevant legislation.

5 Tasks for the certification body

5.1 General

The certification body (see 3.1.5) has responsibility for three separate functions - certification, inspection and testing. These three functions may be carried out by one body or by more than one body. The inspection

function may be carried out by an inspection body (see B.1.1) and the testing function by a testing laboratory (see B.1.2). Reference to the certification body includes reference to any sub-bodies it has.

5.2 Surveillance, assessment and acceptance of the production control

5.2.1 Inspection tasks

The inspection tasks include surveillance, assessment and acceptance of the production control operated by the producer. Inspection shall include checking that any major change in the Works' quality manual which is relevant to the production control of fly ash has been reported to the certification body by the producer within one month of its implementation.

Inspection shall verify that the production control complies with the requirements as described in 4 and has been carried out according to the Works' quality manual.

5.2.2 Frequency of inspections

The inspections shall be carried out at least once per year and the certification body shall inform the producer in advance when an inspection is to be made.

5.2.3 Reports

Following each inspection, a confidential report shall be prepared and sent to the producer.

The producer shall, if appropriate, advise the certification body of any corrective actions taken or planned to be taken following receipt of the report.

The certification body shall then make a decision on its final assessment.

5.3 Evaluation of the results of autocontrol testing of samples

5.3.1 Evaluation tasks

Surveillance, assessment and acceptance of the production control includes evaluation of the test results of the producer's autocontrol testing to check conformity to the statistical conformity criteria and single result limit values in EN 450-1.

5.3.2 Number and timing of evaluations

The number of evaluations of the results of autocontrol testing of samples shall be at least two per year. The timing of the evaluations should be decided in advance.

5.3.3 Control period

The length of the control period for evaluation of the autocontrol test results shall be as specified in Clause 8 of EN 450-1:2005, or equal to the initial period (see 5.6.1) in the case of a newly certified fly ash.

5.3.4 Evaluation of test results

Each evaluation shall be made on the test results obtained on all autocontrol samples of a given certified fly ash, without selection, taken during the control period preceding the date of the evaluation or during the initial period as the case may be.

NOTE The evaluation of the test results should exclude any test result accepted as an outlier by the certification body.

In the case of managed step changes in product properties or in the case of limited production or dispatching runs during the control period the corresponding data sets may be evaluated separately.

The evaluations may normally be carried out by correspondence and each evaluation shall lead, for the property examined, to a single conclusion in respect of the set of test results as a whole.

5.3.5 Reports

Following each evaluation a confidential report shall be prepared and a copy sent to the producer.

5.4 Audit testing of samples taken at the production plant/depot and initial type testing

5.4.1 Sampling

Spot samples shall be taken in the autocontrol scheme under the responsibility of the certification body at the point(s) of release of fly ash from the production plant and/or depots supplied with fly ash by the production plant. These are taken principally in order to provide a check on the accuracy of the producer's test results. Representatives of the certification body shall be granted access to the production plant/depots at any time without giving prior notice in order to allow the samples to be taken.

5.4.2 Number of samples

The number of samples taken shall be at least six per year for each certified fly ash sent out continuously from the production plant. When certified fly ash is not dispatched continuously, this frequency and the point of sampling may be altered by mutual agreement between the certification body and the producer.

The first sample of a fly ash to be certified is used for initial type testing.

The number of samples to be taken during the initial period (see 5.6.1) shall be at least one per month.

5.4.3 Properties and test methods

The physical and chemical properties specified for testing in Clause 8 of EN 450-1:2005 shall be determined according to the indicated test methods.

The source of the EN 196-1 CEN standard sand to be used for autocontrol and audit activity index testing shall be as agreed between the producer and the certification body.

5.4.4 Testing

Unless otherwise specified, each sample taken shall be homogenized and divided into three sub-samples. The methods used to take and prepare samples shall be in accordance with EN 196-7.One sub-sample shall be retained by the producer for testing under the autocontrol scheme and one shall be packed, sealed, clearly labelled and forwarded to the testing laboratory for audit testing. The third sub-sample shall be sealed and retained by the producer for a minimum period of six months. It is intended for use if:

a) one of the first two sub-samples is lost, deteriorates or becomes contaminated;

b) further testing is needed in the event of a dispute.

The first of the two sub-samples shall be tested, when relevant, by the producer and the other one by the testing laboratory, for the required properties as listed in EN 450-1, using the test methods indicated in that standard. The samples taken for audit testing may be part of the autocontrol testing of samples according to 4.3.

5.4.5 Evaluation of test results

The results obtained shall be evaluated by the certification body. The procedures described in Annex A shall be used for the evaluation of the representativeness and accuracy of the fineness test results.

5.4.6 Reports

Following each evaluation of audit test results a confidential report shall be prepared without delay and a copy sent to the producer.

5.4.7 Proficiency testing

The testing laboratory shall carry out regular proficiency testing involving comparison of at least the activity index test results with other approved testing laboratories in order to maintain the accuracy required.

5.5 Initial inspection of the production plant and the production control

5.5.1 Inspection of a new production plant

In the case of a new production plant, an initial inspection of the plant and the production control shall be made, based on information on the production control and the equipment to be used to produce the fly ash. The inspection shall, among other things:

a) verify that the Works' quality manual complies with the requirements of 4.1.2;

b) verify that the equipment used to produce and test the fly ash meets the criteria in 5.5.3 and 5.5.4.

5.5.2 Inspection of an existing production plant

In case of any significant changes concerning the production control and the equipment, it has to be decided, based on the importance of the changes to the Works' quality manual, whether a particular inspection is necessary. In this case any new equipment which has caused a major change in the Works' quality manual shall be inspected to verify that it meets the relevant criteria in 5.5.3 and 5.5.4.

5.5.3 Criteria for the assessment of the production equipment

The inspection shall assess the suitability of the production equipment in relation to the Works' quality manual and in relation to providing the ability to meet the requirements of EN 450-1. The following criteria shall be considered:

a) Equipment shall be provided which is suitable for the production of fly ash, in particular for adequate homogenisation, allowing control of production with sufficient accuracy to ensure that the requirements of EN 450-1 are met.

b) Each fly ash shall be stored in one or more separate silos, protected to prevent contamination and deterioration. The silos may include or take the form of fully enclosed separated air-tight subdivisions. Silos and/or discharge points shall be clearly marked (indication of the fly ash, reference to EN 450-1). For products going under CE-marking, see EN 450-1:2005, Annex ZA.3.

c) Points where fly ash is released from the production plant and/or depot shall allow samples to be taken in accordance with the methods in EN 196-7.

5.5.4 Criteria for the assessment of laboratories

The laboratory responsible for carrying out the tests required for internal quality control shall have at least the equipment needed to carry out the relevant tests indicated or referred to in the Works' quality manual (see also 4.2.2).

The laboratory responsible for carrying out autocontrol testing shall have at least the equipment needed to carry out tests for the properties listed in the relevant product specification standard using the test methods indicated (see 4.3.3).

The laboratories shall demonstrate the ability to provide results within a time and in a manner suitable for the producer’s production control.

5.5.5 Reports

Following any initial inspection, a confidential report shall be prepared and a copy sent to the producer.

5.6 Evaluation of test results during the initial period

5.6.1 Initial period

The duration of the initial period (see 3.1.4 and 7) shall be, as a rule, three months.

5.6.2 Evaluation of test results

The evaluation of test results on the fly ash shall be based on the autocontrol test results (see 4.3.1) and the audit test results (see 5.4.2) obtained during the initial period.

5.6.3 Reports

Following the evaluation a confidential report shall be prepared, considered by the certification body and a copy sent to the producer.

6 Actions in the event of non-conformity

6.1 Actions to be taken by the producer

The control of non-conforming fly ash and the corrective actions to be taken are dealt with in 4.3.2. These are the full responsibility of the producer, who shall document the detailed procedures in the Works' quality manual.

In the event of a complaint plus warning the minimum frequency of autocontrol testing of non-conforming properties shall be doubled for a period of two months following the warning, unless it can be demonstrated to the satisfaction of the certification body that adequate measures were taken from the time of the initial occurrence of the non-conformity until its resolution, including doubling the minimum frequency of autocontrol testing for a minimum period of two months.

6.2 Actions to be taken by the certification body

6.2.1 Following surveillance, assessment and acceptance of the production control (see 5.2) and evaluation of the results of autocontrol testing (see 5.3)

The reports made following the assessment of the production control (see 5.2.3) and the evaluation of the results of the autocontrol testing (see 5.3.5) shall form the basis for any decisions/actions taken by the certification body and shall be considered on a case by case basis.

In the event that the results of the producer's autocontrol testing indicate that the requirements given in Clause 8 of EN 450-1:2005 are not met, the actions taken by the certification body shall be as shown in Table 1. The certification body shall check that in the event of a complaint plus warning the minimum frequency of autocontrol testing of non-conforming properties has been doubled for a period of two months following the warning (see 6.1).

6.2.2 Following evaluation of the results of the audit testing of samples taken at the production plant/depot (see 5.4 and Annex A)

If comparisons for physical and chemical properties show deviations indicating sampling or testing errors, the reasons shall be identified. The certification body shall establish whether appropriate actions have been taken to correct for these deviations and shall specify any further actions required including, if necessary, correction of all relevant results.

If the results of the audit testing include a test result below or above the specified characteristic value, the inspection body shall evaluate the results of the producer's autocontrol testing over an appropriate period and

make a report to the certification body. If the autocontrol testing is found to be satisfactory no further action is necessary. If the autocontrol testing confirms the findings of the audit testing the actions taken by the certification body shall be as shown in Table 1.

If the results of the audit testing do not meet the single result limit value conformity criteria specified in Clause 8 of EN 450-1:2005, the actions taken by the certification body shall be as shown in Table 1.

7 Procedure for third party certification of conformity

When a producer applies for certification of a fly ash, the certification body shall arrange for an initial inspection of the production plant and the production control (if required) (see 5.5) and for the testing of a first audit sample of the fly ash by the testing laboratory according to 5.4.1 to 5.4.4.

Given that the inspection (if any) indicates that the requirements of 5.5 are met, the results from the first sample conform to the requirements of EN 450-1 and that in case of the production of fly ash from co-combustion of pulverised coal with certain co-combustion material the suitability according to EN 450-1 is proven, then the certification body shall issue a certificate of conformity.

During the initial period, the results of the audit testing obtained by the testing laboratory and the results of the autocontrol testing obtained by the producer shall be evaluated by the certification body (see 5.6).

If this evaluation is satisfactory, the certificate of conformity remains valid unless cancelled (or withdrawn as a result of actions taken in the event of non-conformity, see 6).

In the event that a producer permanently ceases production of a certified fly ash, he shall advise the certification body accordingly and the relevant certificate of conformity shall be cancelled. A producer shall be deemed to have permanently ceased production of a fly ash when a period of twelve months has elapsed since the date of the last autocontrol sample.

8 Certificate of conformity and conformity mark

8.1 Indication of conformity

Conformity of a fly ash to EN 450-1 shall be indicated by a certificate of conformity issued by the certification body and the related use of a conformity mark by the producer.

8.2 Certificate of conformity

The certificate of conformity shall include, in particular:

a) the name and address of the certification body;

b) the name and address of the producer and of the production plant;

c) the designation of the fly ash according to EN 450-1 and any additional identification required;

d) statement that the fly ash conforms to the requirements of EN 450-1 and that the conformity is established according to EN 450-2;

e) the certificate's number.

The certificate of conformity shall entitle the producer to use the conformity mark on packaging and documentation used for the certified fly ash.

NOTE For EC Certificate of conformity, see Annex ZA of EN 450-1:2005.

8.3 Conformity mark

The conformity marking shall consist of the conformity symbol and shall be followed by:

a) the identification number of the certification body responsible for certification of conformity;

b) the name or identifying mark of the producer and of the production plant;

c) the last two digits of the year in which the conformity mark was affixed;

d) the number of the certificate of conformity;

e) the standard designation of the fly ash according to EN 450-1 and any additional identification required.

NOTE For CE conformity marking, see Annex ZA of EN 450-1:2005.

9 Requirements for dispatching centres

9.1 General requirements

Intermediaries operating dispatching centres have a responsibility to maintain the quality, the identity and the conformity of the certified fly ash (certified under a certificate of conformity issued according to EN 450-2 to the producer and bearing conformity mark). The intermediary shall demonstrate that the conformity of the certified fly ash received is maintained during transport, reception, storage, packaging and dispatch and that the quality and the identity of the fly ash is assured from the producer to the user after dispatch. This should be shown by meeting the specifications given in 9.2 and 9.3.

9.2 Tasks for the intermediary

9.2.1 Measures to maintain the fly ash quality

The intermediary shall demonstrate that he operates measures to maintain the quality of the certified fly ash and shall have a quality manual which describes the quality aims and the organisational structure and which adequately covers purchasing, transport, reception, handling, storage, testing and dispatch of the fly ash, taking into account the principles given for the producer in 4.

In particular these measures shall include appropriate acceptance and identification testing in order to demonstrate that the bulk certified fly ash delivered to the dispatching centre has not suffered from contamination and corresponds to the fly ash specified in the purchasing or delivery contracts. In addition appropriate measures shall be taken to ensure that different fly ashes are kept separate and are stored in separate silos and that contamination of fly ash is avoided.

The minimum frequency of the reception identification testing is one test per delivery, but at least one test per *1 000* tonnes. The properties to be determined for rapid identification (e.g. fineness, loss on ignition or colour) may be chosen by the intermediary, subject to approval by the inspection body.

9.2.2 Confirmation autocontrol testing of samples taken at the dispatching centre

For certified fly ash, the intermediary shall carry out confirmation autocontrol testing of samples to verify that the fly ash maintains its properties. The frequency of sampling and testing, the properties to be tested and the test methods shall be at least as specified in Table 2. The results of the autocontrol testing carried out at the dispatching centre and at the production plant supplying the certified fly ash shall be compared.

The confirmation autocontrol testing may be carried out in the laboratory of the intermediary or in an external laboratory. Representatives of the inspection body shall be granted access to the laboratory in order to verify that the equipment used to test the fly ash meets the criteria of 5.5.4 and 4.3.3.

The individual results of confirmation autocontrol testing carried out by an intermediary in respect of each certified fly ash shall remain within the range of the maximum and minimum values of the relevant producer's autocontrol results in any given control period.

9.3 Tasks for the third party

9.3.1 Surveillance, assessment and acceptance of the measures to maintain the fly ash quality and of the confirmation autocontrol

The third party shall carry out an initial inspection and, thereafter, once per year, a surveillance, assessment and acceptance of the measures to maintain the quality of the certified fly ash by the intermediary. Among other things, the inspection shall assess whether the equipment is suitable, taking account of 5.5.3 and 5.5.4 where relevant, and shall examine the unloading system, the storage facilities, the reclaiming and loading system and the laboratory. In particular the procedures adopted to avoid wrong routing of fly ashes or mixing of different fly ashes shall be considered with special care.

The third party shall check by inspection at least once a year that the results of the intermediary's confirmation autocontrol testing conform to 9.2.2. If the results of the autocontrol testing are outside the range of the maximum and minimum values of the autocontrol testing at the production plant for a relevant control period the right to continue to use the conformity mark shall be based on a case by case assessment. Following the inspection, the third party shall prepare a confidential report on its assessment and send this to the intermediary.

9.3.2 Audit testing of samples taken at the dispatching centre

Sampling and testing shall be carried out under the responsibility of the third party as in 5.4.1, 5.4.3. and 5.4.4. Each sample shall be packed, clearly labelled and forwarded to the testing laboratory.

The frequency of audit testing, the properties to be tested and the test methods shall be at least as specified in Table 2.

9.3.3 Decisions to be taken

The third party shall decide on the basis of all its findings whether to grant the intermediary the right to continue the use of the conformity mark.

Table 1 — Actions to be taken by the Certification Body in the event of non-conformity of the results of autocontrol and/or audit testing

Criterion	Item		Non-conformity of test result(s) [a]	Action to be taken by Certification Body		
				Issue of a complaint	Issue of a complaint plus warning [b]	Withdrawal of Certificate of Conformity [c]
Specified characteristic value	Auto-control testing	All-results in control period	Non-conformity of the test results with the requirements of the statistical conformity criteria specified in the relevant product specification standard	First non-conformity of the test results	Non-conformity of the test results for the same property in 2 consecutive statistical assessments	Non-conformity of the test results for the same property in 3 consecutive statistical assessments
Single result limit value	Auto-control testing and Audit testing	Individual results	Non-conformity of any result with the requirements of the single result limit value conformity criteria specified in the relevant product specification standard	First non-conformity of a test result	Second non-conformity of a test result for the same property within 12 months [d]	Third non-conformity of a test result for the same property within 12 months [d]

[a] Non-conformities for different properties are treated separately.

[b] The minimum frequency of autocontrol testing shall be doubled for a period of 2 months following receipt of a complaint plus warning, unless it can be demonstrated to the satisfaction of the certification body that adequate measures were taken from the time of the initial occurrence of the non-conformity until its resolution, including doubling the minimum frequency of autocontrol testing for a minimum period of two months.

[c] Withdrawal is always based on a case by case assessment of the history.

[d] Only if information on the preceding non-conforming test result has been available at the time of sampling.

Table 2 — Confirmation and audit testing of samples of certified fly ash taken at dispatching centres: properties and minimum testing frequencies[a]

Properties to be tested [b]	**Minimum testing frequencies**		
	Confirmation autocontrol by the intermediary		Audit testing by the third party
	Fly ash unloaded and stored at the dispatching centre	Fly ash transhipped at the dispatching centre	
Loss on ignition	*1/week*	*1 per delivered lot but at least 1 per 1 000 tonnes*	*3/year*
Fineness	*1/week*		
Activity index at 28 days	*1/month*		

[a] The methods used to take and prepare samples shall be in accordance with the requirements of EN 196-7.

[b] Using the test methods referred to in EN 450-1.

Annex A
(normative)

Evaluation of the representativeness and the accuracy of the fineness test results

A.1 General

This annex describes the procedures to be used to evaluate the representativeness and the accuracy of the fineness test results. The evaluation shall preferably be made in connection with the routine yearly inspection by the inspection body.

A.2 Sets of results considered

The evaluation procedure considers the following three sets of test results:

a) all test results from the autocontrol testing during the period under consideration (set A);

b) the results of tests carried out by the manufacturer on samples taken for audit testing, if any, when relevant (set B);

c) the results of tests carried out by the testing laboratory on samples taken for audit testing (set C).

The number of results in each of the sets B, when relevant, and C is at least six. They should be equally distributed throughout the period under consideration.

A.3 Evaluation procedure

A.3.1 Introduction

The evaluation procedure includes two parts, as described in A.3.3 and A.3.4. The symbols used are listed in A.3.2.

A.3.2 Symbols

The symbols used in A.3.3 and A.3.4 are given in Table A.1.

Table A.1 — Symbols

Symbol	Meaning
M_A	is the average of all results of the autocontrol testing during the period under consideration
M_B	is the average of the results of the tests carried out by the producer on the samples taken for audit testing
M_C	is the average of the results of the tests carried out by the testing laboratory on samples taken for audit testing
N_B	is the number of the samples taken for audit testing
S_A	is the standard deviation of all results of the autocontrol testing during the period under consideration
S_D	is the standard deviation of the differences between the corresponding results of the samples taken for audit testing as defined by $d_i = B_i - C_i$ where B_i is the individual test result by the manufacturer C_i is the corresponding individual test result by the testing laboratory. $S_D = [(\Sigma d_i^2 - (\Sigma d_i)^2 / N_B) / (N_B - 1)]^{1/2}$

A.3.3 Evaluation of whether set A and set B belong to the same population (sampling error check)

If $|M_A - M_B| \leq 2{,}58 \times S_A / (N_B)^{1/2}$

the two sets of results are considered to belong to the same population,

if $|M_A - M_B| > 2{,}58 \times S_A / (N_B)^{1/2}$

the reason shall be identified by the producer. (In this case the two sets of test results can be considered to belong to different populations with a confidence level of 99 % as described in ISO 2854).

A.3.4 Comparison between set B and set C in order to check the accuracy of the autocontrol testing (testing error check)

Set B and set C shall be compared on the basis of the requirements on the reproducibility specified in EN 451-2.

Annex B
(informative)

General definitions

B.1 Definitions based on the Construction Products Directive[2)]

B.1.1
inspection body
impartial body having the organisation, staffing, competence and integrity to perform according to specified criteria functions such as assessing, recommending for acceptance and subsequent audit of producers' quality control operations, and selection and evaluation of products on site or in factories or elsewhere, according to specific criteria

B.1.2
testing laboratory
laboratory which measures, examines, tests, calibrates or otherwise determines the characteristics or performance of materials or products

B.2 Definitions from or based on EN 45020

B.2.1
Certification
procedure by which a third party gives written assurance that a product, process or service conforms to specified requirements

B.2.2
Test
technical operation that consists of the determination of a characteristic of a product according to a specified procedure

B.2.3
test method
specified technical procedure for performing a test

B.3 Definition from EN ISO 9000

Quality control
operational techniques and activities that are used to fulfil requirements for quality

2) 89/106/EEC

B.4 Definitions from EN 197-1 and EN 196-7

B.4.1
autocontrol testing[3)]

continual testing by the producer of fly ash spot samples taken at the point(s) of release from the production plant or depot

B.4.2
control period
period of production and dispatch identified for the evaluation of the autocontrol test results

B.4.3
spot sample
sample taken at the same time and from one and the same place, relating to the intended tests. It can be obtained by combining one or more immediately consecutive increments

B.4.4
specified characteristic value
characteristic value of a mechanical, physical or chemical property which in the case of an upper limit is not to be exceeded or in the case of a lower limit is, as a minimum, to be reached

B.4.5
single result limit value
value of a mechanical, physical or chemical property which – for any single test result – in the case of an upper limit is not to be exceeded or in the case of a lower limit is, as a minimum, to be reached

3) This testing corresponds also to the “further testing of samples” mentioned in Annex III Section 2 point (i) of the Construction Products Directive 89/106/EEC.

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[2] EN 45004, *General criteria for the operation of various types of bodies performing inspection*.

[3] EN 45011, *General requirements for bodies operating product certification systems (ISO/IEC Guide 65:1996).*

[4] EN 45020, *Standardization and related activities - General vocabulary (ISO/IEC Guide 2:1996); Trilingual version EN 45020:1998*

[5] EN ISO 9000, *Quality management systems - Fundamentals and vocabulary (ISO 9000:2000).*

[6] EN ISO 9001: 2000, *Quality management systems — Requirements (ISO 9001:2000)*.

[7] ISO 2854, *Statistical interpretation of data — Techniques of estimation and tests relating to means and variances.*

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