



**NSAI**  
Standards

Irish Standard  
I.S. EN 451-1:2017

# Method of testing fly ash - Part 1: Determination of free calcium oxide content

**I.S. EN 451-1:2017**

*Incorporating amendments/corrigenda/National Annexes issued since publication:*

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I.S. xxx: Irish Standard — national specification based on the consensus of an expert panel and subject to public consultation.

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## National Foreword

I.S. EN 451-1:2017 is the adopted Irish version of the European Document EN 451-1:2017, Method of testing fly ash - Part 1: Determination of free calcium oxide content

This document does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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EUROPEAN STANDARD

**EN 451-1**

NORME EUROPÉENNE

EUROPÄISCHE NORM

May 2017

ICS 91.100.30

Supersedes EN 451-1:2003

English Version

## Method of testing fly ash - Part 1: Determination of free calcium oxide content

Méthode d'essai des cendres volantes - Partie 1:  
Détermination de la teneur en oxyde de calcium libre

Prüfverfahren für Flugasche - Teil 1: Bestimmung des  
freien Calciumoxidgehalts

This European Standard was approved by CEN on 27 February 2017.

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 CEN-CENELEC 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 CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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## European foreword

This document (EN 451-1:2017) 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 2017, and conflicting national standards shall be withdrawn at the latest by November 2017.

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 451-1:2003.

EN 451, *Method of testing fly ash*, is currently composed with the following parts:

- *Part 1: Determination of free calcium oxide content* [the present document];
- *Part 2: Determination of fineness by wet sieving.*

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

## EN 451-1:2017 (E)

### 1 Scope

This European Standard specifies the procedure for the determination of free calcium oxide content in fly ash.

The European Standard specifies the reference procedure. If other methods are used it needs to be shown that they give results equivalent to those obtained by the reference method.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 450-1:2012, *Fly ash for concrete — Part 1: Definition, specifications and conformity criteria*

ISO 565, *Test sieves — Metal wire cloth, perforated metal plate and electroformed sheet — Nominal sizes of openings*

ISO 3534-1, *Statistics — Vocabulary and symbols — Part 1: General statistical terms and terms used in probability*

### 3 General

#### 3.1 Number of determinations

Carry out twice the procedure for determining the free calcium oxide content of the sample.

If the difference between two determinations is more than twice the repeatability standard deviation, repeat the test and take the mean of the closest values

#### 3.2 Repeatability and reproducibility

The standard deviations of repeatability and reproducibility, as defined in ISO 3534-1, are expressed in absolute percentages by mass.

#### 3.3 Expression of masses and volumes

Express masses in grams to the nearest 0,000 1 g, measure volumes using a burette and express them in millilitres to the nearest 0,05 ml.

### 4 Reagents

Use only reagents of analytical grade and distilled water, or water of equal purity.

**4.1 Butanoic acid**, 3-oxo-ethyl ester (= ethyl acetoacetate).

**4.2 Butan-2-ol**.

**4.3 Propan-2-ol**.

**4.4 Indicator** (0,1 g of bromophenol blue in 100 ml of ethanol).

**4.5 Hydrochloric acid** (0,100 M).



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