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National Standards
Authority of Ireland
Glasnevin, Dublin 9
Ireland
Tel: +353 1 807 3800
Fax: +353 1 807 3838
http://www.nsai.ie

Sales
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METHODS OF TESTING CEMENT - PART 4: QUANTITATIVE DETERMINATION OF CONSTITUENTS

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Methods of testing cement - Part 4: Quantitative determination of constituents

Méthodes d'essais des ciments - Partie 4 : Détermination quantitative des constituants

Prüfverfahren für Zement - Teil 4: Quantitative Bestimmung der Bestandteile

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

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Foreword

This document (CEN/TR 196-4:2007) has been prepared by Technical Committee CEN/TC 51 “Cement and building limes”, the secretariat of which is held by NBN.

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 ENV 196-4:1993.

This European Technical Report was drawn up by Technical Committee CEN/TC 51 "*Cement and building limes*" the Secretariat of which is held by NBN. It is based on a revision of the European Pre-standard ENV 196-4 of July 1993.

The main aim of this document is to quantitatively verify the compositions (analysis of the constituents) of all the cements included in EN 197-1:2000 (Cements – Part1: composition, specifications and conformity criteria for common cements) as set out in Table 1 “The 27 products in the family of common cements”.

Further to this objective, original methods of analysis were devised, firstly, for cements with 3 constituents and then a reference method for cements with more constituents. Following the progress of work on EN 197-1, cements with blastfurnace slag, siliceous fly ash and natural pozzolans have been successively studied. As a result the first draft of ENV 196-4 was published in December 1989, followed by the ENV 196-4 in July 1993.

The main aim of the revision of the Pre-standard was to adapt the reference method in such a way that it would be qualitative and quantitative whatever the constituent materials, including blastfurnace slag (which had not been included in the 1989 draft ENV 196-4). This entailed revising the analytical procedure and the calculation of the constituents.

The opportunity was taken at the same time to unify the presentation of the different methods, reference and alternative, endeavoring to standardize the notational symbols to eliminate all ambiguities in the interpretation of the formulae for calculations.

Table 1 of ENV 197-1:1992 introduced further new constituent materials. One of them, silica fume, could be routinely determined by the reference method, while calcareous fly ash and burnt shale, being composites of several minerals, react partially like other constituents capable of being determined by the reference method. Where these materials are constituents it has proved not to be possible to determine the mass composition of the cement but only to obtain an overall bulk analysis.

Almost all of the cements manufactured in Europe can be correctly characterized and quantified by the reference method. However, for cements containing burnt shale (CEM II/A-T and B-T) or calcareous fly ash (CEM II/A-W and B-W) it would be necessary to undertake further research in order to obtain an acceptable reference method.

For cements having constituents that can be analyzed by the current reference method as defined in section 1 “Scope” the method will be adequate. Where other constituents are known, or suspected, to be included it will be necessary to develop additional methods for the quantitative determination of those particular constituents.

The European Standard on the methods of testing cement comprises the following Parts:

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

EN 196-2 *Methods of testing cement — Part 2: Chemical analysis of cement*

EN 196-3 *Methods of testing cement — Part 3: Determination of setting times and soundness*

EN 196-5 *Methods of testing cement — Part 5: Pozzolanicity test for pozzolanic cement*

EN 196-6 *Methods of testing cement — Part 6: Determination of fineness*

EN 196-7 *Methods of testing cement — Part 7: Methods of taking and preparing samples of cement*

EN 196-8 *Methods of testing cement — Part 8: Heat of hydration — Solution method*

EN 196-9 *Methods of testing cement — Part 9: Heat of hydration — Semi-adiabatic method.*

NOTE A previous Part, EN 196- 21: Methods of testing cement — Part 21: Determination of the chloride, carbon dioxide and alkali content of cement, has been revised and incorporated into EN 196-2