



BSI Standards Publication

**Method for the determination of C₃A in
the clinker from cement analysis**

National foreword

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English Version

Method for the determination of C3A in the clinker from cement analysis

Verfahren für die Bestimmung des C3A-

Gehalts im Klinker aus der Zementanalyse

This Technical Report was approved by CEN on 12 May 2019. It has been drawn up by the Technical Committee CEN/TC 51.

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European foreword

This document (CEN/TR 17365:2019) has been prepared by Technical Committee CEN/TC 51 “Cement and building limes”, the secretariat of which is held by NBN.

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1 Scope

This document describes the analytical procedures used to determine the content of C_3A in the clinker starting from a chemical analysis on cement. The method can be applied to CEM type I and IV for the determination of the requirement of C_3A , as defined on EN 197-1.

This document describes two methods, traditional wet and XRF analysis (EN 196-2), which can be considered to be equivalent, in the scope of this CEN/TR 17365, for the determination of Al_2O_3 , Fe_2O_3 and SO_3 .

The same methods are described in EN 196-2, but for the scope of this document, the X-ray fluorescence (XRF) is the preferred method to be used for the determination of Al_2O_3 , Fe_2O_3 and SO_3 .

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 196-2, *Method of testing cement — Part 2: Chemical analysis of cement*

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

ISO 385, *Laboratory glassware — Burettes*

ISO 835, *Laboratory glassware — Graduated pipettes*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

4 Principle of the method

The principle of the method is based on the calculation of the amounts of Al_2O_3 and Fe_2O_3 that may be occurring in the clinker by the chemical analysis of cement corrected for the oxide fraction resulting from materials other than clinker.

Once Al_2O_3 and Fe_2O_3 values are obtained, the amount of C_3A in the clinker is calculated according to Bouge.

The following assumptions should be made to determine the Al_2O_3 and Fe_2O_3 amounts in the clinker:

- a) Any sulfate occurring in the cement is ascribable to $CaSO_4 \cdot 2H_2O$; all determined CO_2 is $CaCO_3$. Moreover, the Al_2O_3 and Fe_2O_3 input from minor additional constituents and calcium sulfate is assumed to be zero.
- b) The residue from the base-complexing agent treatment (BCR) is constituted by pozzolanic materials only (natural pozzolana, siliceous fly ash and microsilica) and the dissolution is selective and complete.

Based on the above assumptions and on the calculated quantities of $CaSO_4 \cdot 2H_2O$ and $CaCO_3$, Al_2O_3 and Fe_2O_3 percentages in the clinker can be calculated by subtracting the oxide fraction in the cement and the BCR, corrected for the amount of gypsum and pozzolanic materials (see [Figure 1](#)).