

**Tsement. Osa 4: Väikese eeltugevusega
räbutsementide koostis, spetsifikatsioon ja
vastavuskriteeriumid**

Cement - Part 4: Composition, specifications and
conformity criteria for low early strength blastfurnace
cements

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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English version

Cement - Part 4: Composition, specifications and conformity criteria for low early strength blastfurnace cements

Ciment - Partie 4 : Composition, spécification et critères de conformité des ciments de haut fourneau et à faible résistance à court terme

Zement - Teil 4: Zusammensetzung, Anforderungen und Konformitätskriterien von Hochofenzement mit niedriger Anfangsfestigkeit

This European Standard was approved by CEN on 19 September 2003.

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Foreword

This document (EN 197-4:2004) has been prepared by Technical Committee CEN/TC 51 "Cement and building limes", the secretariat of which is held by IBN.

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of an identical text or by endorsement, at the latest by October 2004, and conflicting national standards shall be withdrawn at the latest by October 2004.

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

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

Annex A is informative.

This document includes a Bibliography.

The various stages in the development of a European Standard for common cement, in response to the preliminary Mandate given to CEN by the EC and the EFTA, are described in EN 197-1. It is indicated that, in view of the large numbers of different cements involved, it was considered necessary to separate the "common cements", which are now covered by EN 197-1, from special cements i.e. those with additional or special properties or those having hardening processes not mainly dependent on the hydration of calcium silicates.

The strength attained at 28 days is the important criterion in classifying cement for most uses. In order to achieve a specific strength class at 28 days the early strength, at 2 days or at 7 days, can vary and some types of cement may not attain the minimum early strengths specified in EN 197-1 for common cements. The heat of hydration is linked to the early reactivity and lower early strengths indicate lower heat evolution and lower temperatures in concrete. For these cements additional precautions in use can be necessary to ensure adequate curing and safety in construction. The purpose of this EN 197-4 is to specify the composition requirements and conformity requirements for low early strength blastfurnace cements and low early strength blastfurnace cements with low heat of hydration.

The requirements in EN 197-4 are based on the results of tests on cement in accordance with EN 196 Parts 1, 2, 3, 7, 8, 9 and 21. The scheme for the evaluation of conformity of low early strength blastfurnace cements to EN 197-4 is included in EN 197-2.

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.

Introduction

It is recognised that different cements have different properties and performance. Those performance tests now available (i.e. setting time, strength, soundness and heat of hydration), have been included in this EN 197-4. In addition, work is being carried out by CEN/TC 51 to identify any additional tests which are needed to specify further performance characteristics of cement. Until further performance tests are available it is highly recommended that the choice of cement, especially the type and/or strength class in relation to the requirements for durability depending on exposure class and type of construction in which it is incorporated, follows the appropriate standards and/or regulations for concrete valid in the place of use.

1 Scope

This EN 197-4 defines and gives the specifications of 3 distinct low early strength blastfurnace cement products and their constituents. The definition of each cement includes the proportions in which the constituents are to be combined to produce these distinct products in a range of three strength classes. The definition also includes requirements the constituents have to meet and the mechanical, physical, chemical, including where appropriate, heat of hydration, requirements and strength classes. This EN 197-4 also states the conformity criteria and the related rules. Necessary durability requirements are also given.

NOTE 1 In addition to the specified requirements, an exchange of additional information between the cement producer and user can be helpful. The procedures for such an exchange are not within the scope of EN 197-4 but should be dealt with in accordance with national standards or regulations or can be agreed between the parties concerned.

NOTE 2 The word "cement" in this EN 197-4 is used to refer only to low early strength blastfurnace cements unless otherwise indicated.

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 (including amendments).

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 time and soundness.*

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 : Determination of heat of hydration — Solution method.*

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

EN 196-21¹⁾, *Methods of testing cement — Part 21 : Determination of the chloride, carbon dioxide and alkali content of cement.*

1) EN 196-21 is currently being incorporated into EN 196-2.

EN 197-1:2000, *Cement — Part 1 : Composition, specifications and conformity criteria for common cements*.

EN 197-1:2000/A1:2004, *Cement — Part 1 : Composition, specifications and conformity criteria for common cements*.

EN 197-2:2000, *Cement — Part 2 : Conformity evaluation*.

3 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in EN 197-1:2000 and the following apply.

3.1

type of low early strength blastfurnace cement

one of the 3 products (see Table 1) in the family of low early strength cements

3.2

heat of hydration

quantity of heat developed by the hydration of a cement within a given period of time

3.3

low heat low early strength blastfurnace cement

low early strength blastfurnace cement with a limited heat of hydration

4 Low early strength blastfurnace cement

Low early strength blastfurnace cement is a hydraulic binder, i.e. a finely ground inorganic material which, when mixed with water, forms a paste which sets and hardens by means of hydration reactions and processes and which, after hardening, retains its strength and stability even under water. It has hydration reactions and processes identical to those of common cements (see EN 197-1) but through composition, fineness or reactivity of constituents the early hydration process is slower.

5 Constituents

For the purpose of this European Standard the requirements for constituents specified in clause 5 of EN 197-1:2000 apply.

6 Composition and notation

The 3 products in the family of low early strength blastfurnace cements, covered by this European Standard, and their notation are given in Table 1. They are grouped into one main cement type:

— CEM III Blastfurnace cement

The composition of the different low early strength blastfurnace cements shall be in accordance with Table 1.

NOTE For clarity in definition, the requirements for the composition refer to the sum of all main and minor additional constituents. The final cement should be understood as the main and minor additional constituents plus the necessary calcium sulfate (see 5.4 of EN 197-1:2000) and any additives (see 5.5 of EN 197-1:2000).