Cement
Part 1: Composition, specifications and conformity criteria for common cements
National foreword

This British Standard is the UK implementation of EN 197-1:2011. It supersedes BS EN 197-1:2000 and BS EN 197-4:2004 which are withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/516/6, Cement specifications.

A list of organizations represented on this committee can be obtained on request to its secretary.

When reference to this Standard has been published in the Official Journal of the European Union (OJEU), compliance with it will confer a presumption of conformity with the Construction Products Directive.

The detailed requirements for evaluating the conformity of common cements with this standard are given in BS EN 197-2 Cement — Part 2: Conformity evaluation. In addition, these same provisions describe all the tasks that are required for demonstrating legal attestation of conformity to a system 1+ for CE marking purposes.

This British Standard does not include in its scope the additional special properties of pozzolanic pulverized-fuel ash cement, conforming to BS 6610, or other types of cement where hardening is not primarily due to the hydration of calcium silicates.

National annex NA (informative) details the exchange of additional information between the cement manufacturer and user, including the provision of information for alkali contents.

National annex NB (informative) gives recommendations for sampling and testing for acceptance inspection at delivery.

National annex NC (informative) gives a national recommendation for the loss on ignition property of a siliceous fly ash constituent.

National annex ND (informative) provides guidance on the general use of common cements, including health and safety aspects.

National annex NE (informative) lists publications referred to in national annexes NA – ND.

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

© BSI 2011

ISBN 978 0 580 76786 9

ICS 91.100.10

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 30 September 2011.

Amendments/ corrigenda issued since publication

<table>
<thead>
<tr>
<th>Date</th>
<th>Text affected</th>
</tr>
</thead>
<tbody>
<tr>
<td>30 November 2011</td>
<td>National foreword revised and addition of National Annexes NA, NB, NC, ND, and NE</td>
</tr>
</tbody>
</table>
Cement - Part 1: Composition, specifications and conformity criteria for common cements

This European Standard was approved by CEN on 6 August 2011.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.
Annex A (informative) List of common cements considered as sulfate resisting by National Standards in different CEN member countries but not included in Table 2 or not fulfilling the requirements given in Table 5 ................................................................. 30

Annex ZA (informative) Clauses of this European standard addressing the provisions of the EU Construction Products Directive ....................................................................................................... 31
ZA.1 Scope and relevant characteristics ........................................................................................................ 31
ZA.2 Procedure for the attestation of conformity of products ........................................................................ 33
ZA.2.1 System of attestation of conformity .................................................................................................. 33
ZA.2.2 EC certificate of conformity ............................................................................................................... 34
ZA.3 CE marking and labelling ................................................................................................................... 35

Bibliography ...................................................................................................................................................... 38
Foreword

This document (EN 197-1:2011) has been prepared by Technical Committee CEN/TC 51 “Cement and building limes”, the secretariat of which is held by NBN.

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 March 2012, and conflicting national standards shall be withdrawn at the latest by June 2013.

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 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 EN 197-1.

Annexes A and ZA are informative.


The preparation of a standard for cement was initiated by the European Economic Community (EEC) in 1969 and, at the request of a member state later in 1973, the work was given to the European Committee for Standardization (CEN). The Technical Committee CEN/TC 51 was entrusted with the task of preparing a cement standard for the countries of Western Europe, comprising the EEC and EFTA members.

In the early eighties, CEN/TC 51 decided to include in the standard for cement only those cements which are intended for use in any plain and reinforced concrete and which are familiar in most countries in Western Europe because they have been produced and used in these countries for many years. The EU Construction Products Directive (89/106/EEC) requires the incorporation of all traditional and well-tried cements in order to remove technical barriers to trade in the construction field. There are currently no criteria for the descriptions "traditional" and "well tried" and it was considered necessary to separate the “common cements” from special cements, i.e. those with additional or special properties.

The requirements in this standard are based on the results of tests on cement in accordance with EN 196-1, EN 196-2, EN 196-3, EN 196-5, EN 196-6, EN 196-7, EN 196-8, and EN 196-9. The scheme for the evaluation of conformity of common cements including common cements with low heat of hydration and common cements generally accepted as being sulfate resisting are specified in EN 197-2.

In order to find out which common cements are generally accepted as being sulfate resisting and should be included in EN 197-1, there was an investigation within CEN/TC 51 comprising all national specifications and recommendations in the European Union. The review of these investigations led to the following results:

- a wide variety of cements has been classified in the EU Member States as sulfate resisting. This is due to the different geographical and climatic conditions under which sulfate attacks on mortar and concrete occur at the place of use and the traditionally different rules governing the production and use of sulfate resistant mortars and concretes;
- sulfate resistance is an additional property and therefore sulfate resisting cements have first to conform to the requirements of the standards which define the product, e.g. EN 197-1 for common cements;
the additional requirements to be met by the nationally specified sulfate resisting cements refer to selected characteristics for which the required limit values are more stringent than those for common cements;

having satisfied the local requirements for various cement types many countries apply further restrictions to the production of concrete to be used in a sulfate environment, such as minimum cement contents and/or maximum water/cement ratio that vary depending on the cement type and the type and intensity of the sulfate conditions.

Based on the above results common cement types to be harmonized at the European level have been chosen. The predominant part of the common cements considered to be sulfate resisting in the market is covered by this selection. It was not possible to take into account national particularities the use of which is laid down within national standards, national application rules and regulations/provisions.

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 standard is to specify the composition requirements and conformity requirements for common cements, including common cements with low heat of hydration and common cements with adequate sulfate resistance as well as low early strength blast furnace cements and low early strength blast furnace cements with low heat of hydration.

Cement types and strength classes defined in this European Standard allow the specifier and/or the user to fulfil objectives of sustainability for cement based constructions. Cement types produced by using constituents listed and defined in Clause 5 allow the manufacturer to minimize the use of natural resources in accordance with local conditions of production.

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, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the 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 standard. 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 necessary 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 or mortar valid in the place of use.
1 Scope

This European Standard defines and gives the specifications of 27 distinct common cements, 7 sulfate resisting common cements as well as 3 distinct low early strength blast furnace cements and 2 sulfate resisting low early strength blast furnace cements 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 nine strength classes. The definition also includes requirements which the constituents have to meet. It also includes mechanical, physical, and chemical requirements. Furthermore, this standard states the conformity criteria and the related rules. Necessary durability requirements are also given.

In addition to those sulfate resisting cements defined in the present document, other cements conforming either to this standard or to other standards, European or national, have been nationally demonstrated to have sulfate resisting properties. These cements which are listed in Annex A, are considered by different CEN Member countries as sulfate resisting within the limits of their territory.

NOTE 1 In addition to the specified requirements, an exchange of additional information between the cement manufacturer and user can be helpful. The procedures for such an exchange are not within the scope of this standard 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 EN 197-1 is used to refer only to common cements unless otherwise specified.

This European Standard does not cover:

— very low heat special cement covered by EN 14216;
— supersulfated cement covered by EN 15743;
— calcium aluminate cement covered by EN 14647;
— masonry cement covered by EN 413-1.

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 196-2, 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
EN 197-2:2000, Cement — Part 2: Conformity evaluation
EN 451-1, Method of testing fly ash — Part 1: Determination of free calcium oxide content