

Cement — Composition, specifications and conformity criteria —

Part 1: Common cements

Cooperating organizations

The European Committee for Standardization (CEN), under whose supervision this European Prestandard was prepared, comprises the national standards organizations of the following countries:

Austria	Oesterreichisches Normungsinstitut
Belgium	Institut belge de normalisation
Denmark	Dansk Standard
Finland	Suomen Standardisoimisliitto, r.y.
France	Association française de normalisation
Germany	Deutsches Institut für Normung e.V.
Greece	Hellenic Organization for Standardization
Iceland	Technological Institute of Iceland
Ireland	National Standards Authority of Ireland
Italy	Ente Nazionale Italiano di Unificazione
Luxembourg	Inspection du Travail et des Mines
Netherlands	Nederlands Normalisatie-instituut
Norway	Norges Standardiseringsforbund
Portugal	Instituto Português da Qualidade
Spain	Asociación Española de Normalización y Certificación
Sweden	Standardiseringskommissionen i Sverige
Switzerland	Association suisse de normalisation
United Kingdom	British Standards Institution

This Draft for Development having been prepared under the direction of the Building and Civil Engineering Sector Board (B/-), was published under the authority of the Standards Board and comes into effect on 15 January 1995

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The following BSI reference relates to the work on this Draft for Development:
Committee reference B/516

ISBN 0 580 23295 6

Amendments issued since publication

Amd. No.	Date	Comments
9138	October 1996	Indicated by a sideline in the margin

Contents

	Page
Cooperating organizations	Inside front cover
National foreword	ii
Foreword	2
Text of ENV 197-1	4
National annex NA (informative) Comparison between cements specified in this Draft for Development and in British Standards	16
National annex NB (informative) Information to be provided	19
National annex NC (informative) Sampling and testing for acceptance inspection at delivery	20
National annex ND (informative) Special Portland cements	21
National annex NE (informative) Product guidance	21
National annex NF (informative) Conformity criteria	22
National annex NG (informative) Publications referred to in the national foreword and annexes	26
National annex NH (informative) Committees responsible	28
Table NA.1 — British Standards corresponding to the designations in Table 1 of DD ENV 197-1	18
Table NA.2 — Maximum values of sulfate (as SO ₃) in Table 3 of DD ENV 197-1 and in British Standards	19
Table NC.1 — Acceptance inspection limits	22
Table NE.1 — British Standards with guidance on the use of cement	24

National foreword

This Draft for Development has been prepared under the direction of the Technical Committee B/516, Cement and lime.

It is the English language version of ENV 197-1:1992 *Cement — Composition, specifications and conformity criteria — Part 1: Common cements*, published by the European Committee for Standardization (CEN). It includes national annexes that give provisions from British Standards to complement ENV 197-1. ENV 197-1 has been prepared by Technical Committee CEN/TC 51, Cement and building limes, as part of a package of standards, harmonized within the member countries of CEN, that deals with design and construction in concrete. The package also includes Part 1 of Eurocode 2 (DD ENV 1992-1-1) for the design of concrete structures, DD ENV 206 for the properties of concrete, and specifications for the constituents of concrete. The intention is that the complete European package will ultimately replace national packages of standards so that products can be traded freely.

ENV 197-1 has the status of a prestandard because some of its technical requirements are only agreed provisionally. Further consideration will be given by CEN/TC 51 during its three year period of validity in order to refine these requirements so that it can be transformed into a European Standard. In particular, a revised version of the clause on conformity criteria will be published at the same time as ENV 197-2 *Cement – Conformity evaluation* that describes the autocontrol scheme.

An earlier draft of the prestandard (June 1988) is referred to in 4.1 of DD ENV 206:1992 (see also annexes A and B in PD 6534:1993, the guide to the use of ENV 206 in the UK). A subsequent draft (June 1989) has served as the basis of the 1991 revisions of BS 12, BS 146 and BS 6588, and of the new standard BS 7583, first issued in 1992. These revisions were prepared to align the standards more closely with developments in the work of the Technical Committee CEN/TC 51 and to specify requirements in terms of the test procedures described in EN 196. During the lifetime of ENV 197-1:1992 these existing national standards will remain in force. Conversely, BS 4246 and BS 6610, also revised in 1991, specify cements with compositions which were considered to be outside the scope of the 1989 draft of ENV 197 but are now covered by the 1992 version of the prestandard. However, the strength classes in these latter two standards are not included in this Draft for Development.

This Draft for Development covers a much wider range of types, compositions, and constituents than the existing British Standards (see Table NA.1). It also includes, for all types of cement, three classes of standard strength (32.5, 42.5 and 52.5) each with two subclasses of early strength (high early strength is indicated by the letter R). In consequence, the provisions of the existing British Standards differ from those of this Draft for Development as detailed in national annex NA.

DD ENV 197-1 does not cover the additional special properties of low heat Portland cement conforming to BS 1370 or of sulfate-resisting Portland cement conforming to BS 4027, or other types of cement whose hardening is not primarily due to the hydration of calcium silicates, i.e. high alumina cement, conforming to BS 915-2, and supersulfated cement, conforming to BS 4248. It is intended that these cements will be specified in further parts of ENV 197.

National annex NB details the exchange of additional information between the cement producer and user and national annex NC gives recommendations for sampling and testing for acceptance inspection at delivery.

Reference should be made to BS 5328-2 for recommendation on the cement content when cements of the 32.5 standard strength class are used in concrete to ensure that the required compressive strength and durability are obtained.

The list of other main constituents in DD ENV 197-1 (see 4.2 to 4.7) contains many materials of which there is at present no experience in use in the UK. Accordingly, specifiers should give consideration to the long-term safety and durability aspects, such as possible harmful leaching from, for example, some industrial pozzolanas, e.g. air cooled slags from lead, copper, zinc and other products from the ferroalloys industry.

NOTE Attention is drawn to the general safety precautions recommended in national annex NE when working with cement.

Clause 9 on conformity criteria contains details which are not appropriate for the manufacture of cement in the UK, as indicated by footnotes to appendix A in BS 12:1991, BS 146:1991, BS 6588:1991 and BS 7583:1992.

A revised clause 9 has been published by CEN in C.2 of ENV 197-2:1994 *Cement — Part 2: Conformity evaluation*, adopted as DD ENV 197-2:1996. The revised clause is reproduced in annex NF and should be used instead of the existing clause 9 so that ENV 197-2 can be used with ENV 197-1. BSI has requested CEN to issue a formal amendment to ENV 197-1 to substitute the revised clause 9.

This Draft for Development does not give fineness limits. National annex ND describes how specialist users in the UK can order a controlled fineness Portland cement having a small agreed range of fineness. It also covers pigmented Portland cement.

UK purchasers are recommended to specify cement manufactured and supplied to a nationally recognized third party product certification scheme.

This publication is not to be regarded as a British Standard

It is being issued in the Draft for Development series of publications and is of a provisional nature because some of its requirements are not fully agreed. It should be applied on this provisional basis so that information and experience of its practical application may be obtained.

Comments arising from the use of this Draft for Development are requested so that UK experience can be reported to the European organization responsible for its conversion to a European Standard. A review of this publication will be initiated two years after its publication by the European organization so that a decision can be taken on its status at the end of its three-year life. The commencement of the review period will be notified by an announcement in BSI News.

According to the replies received by the end of the review period, the responsible BSI Committee will decide whether to support the conversion into a European Standard, to extend the life of the prestandard or to withdraw. Comments should be sent in writing to the Secretary of BSI Technical Committee B/516 at 389 Chiswick High Road, London W4 4AL giving the document reference and clause number and proposing, where possible, an appropriate revision of the text.

Summary of pages

This document comprises a front cover, an inside front cover, pages i to iv, the ENV title page, pages 2 to 28 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

UDC 666.94:691.54:001.4

Descriptors: Cements, composition, definitions, property, portland cements, slag cements, blastfurnace cements, cement clinker, pozzolans.

English version

Cement — Composition, specifications and conformity criteria — Part 1: Common cements

Ciment — Composition, spécifications et critères de conformité — Partie 1: Ciments courants

Zement — Zusammensetzung, Anforderungen und Konformitätskriterien — Teil 1: Allgemein gebräuchlicher Zement

This European Standard (ENV) was approved by CEN on 1992-04-29; as a prospective standard for provisional application. The period of validity of this ENV is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the ENV can be converted into an European Standard (EN)

CEN members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

CEN members are the national standards bodies of Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

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Foreword

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 TC 51 was entrusted with the task of preparing a cement standard for the countries of Western Europe, comprising the EEC and EFTA members.

The inquiry initiated by CEN/TC 51 in the mid-seventies identified at that time nearly 20 different kinds of cement, and a second inquiry in 1990 resulted in some further 50 different kinds of cement, which had all been standardized on a national basis and which had proved satisfactory in common or special fields of application under local conditions. The evaluation of the inquiries showed that different sources of raw materials, different climatic conditions and different social/cultural attitudes have established a typical architecture with different building techniques in the different regions of Western Europe which led to the great variety of kinds of cement. The same or similar cement may be used in very different structures with different types of application and with substantially different requirements regarding its performance under the respective climatic conditions.

When CEN/TC 51 became aware of this situation, it decided in the early eighties to include in ENV 197 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 earlier view of CEN/TC 51 was that the more regional cements should continue to be standardized at the national level. The 1989 draft of ENV 197 followed this approach, but did not achieve the majority necessary for acceptance because a few countries wanted to incorporate all their nationally standardized cements and because the EEC Directive Relating to Construction Products requires the incorporation of all traditional and well tried cements in order to remove technical barriers to trade in the construction field.

In view of the large number of different kinds of cement involved, CEN/TC 51 has now decided to divide ENV 197 into several parts. In this first part, ENV 197-1, only those cements have been taken into consideration of which the hardening mainly depends on the hydration of calcium silicates and which are provided for common uses. Cements with different mechanisms of hardening or additional special properties will be dealt with in later parts of the prestandard, i.e. in ENV 197-2, ENV 197-3 etc. The requirements in this European Prestandard are based on the results of tests on cement in accordance with EN 196 "Methods of testing cement" that consists of the following parts:

- *Part 1: Determination of strength;*
- *Part 2: Chemical analysis of cement;*
- *Part 3: Determination of setting time and soundness;*
- *Part 4: Quantitative determination of constituents¹⁾;*
- *Part 5: Pozzolanicity test for pozzolanic cements;*
- *Part 6: Determination of fineness;*
- *Part 7: Methods of taking and preparing samples of cement;*
- *Part 21: Determination of the chloride, carbon dioxide and alkali content of cement.*

¹⁾ This Part has the status of ENV. An EN is in preparation.

Contents

	Page		Page
Foreword	2	9.6 Conformity criteria and procedures for physical and chemical properties	14
0 Introduction	5	9.7 Limits for major defects	15
1 Scope	5	Annex A (Informative) Sampling plans	16
2 Normative references	5	Table 1 — Cement types and composition: proportion by mass	10
3 Cement	6	Table 2 — Mechanical and physical requirements	11
4 Constituents	6	Table 3 — Chemical requirements	12
4.1 Portland cement clinker (K)	6	Table 4 — Minimum testing frequencies	14
4.2 Granulated blastfurnace slag (S)	6	Table 5 — Parameters determining the conformity procedure	14
4.3 Pozzolan material (P, Q)	7	Table 6 — Major defects	15
4.3.1 General	7	Table A.1 — Acceptability constant k_A	16
4.3.2 Natural pozzolana (P)	7	Table A.2 — Acceptable number of defects at 5 % consumer's risk	16
4.3.3 Industrial pozzolana (Q)	7		
4.4 Fly ash (V, W)	7		
4.4.1 General	7		
4.4.2 Siliceous fly ash (V)	7		
4.4.3 Calcareous fly ash (W)	7		
4.5 Burnt shale (T)	8		
4.6 Limestone (L)	8		
4.7 Silica fume (D)	8		
4.8 Filler (F)	8		
4.9 Calcium sulfate	9		
4.10 Additives	9		
5 Cement types, composition and standard designation	9		
5.1 Cement types	9		
5.2 Composition	9		
5.3 Standard designation	9		
6 Mechanical requirements	11		
6.1 Standard strength	11		
6.2 Early strength	11		
6.3 Requirements	11		
7 Physical requirements	11		
7.1 Initial setting time	11		
7.2 Soundness	11		
8 Chemical requirements	11		
9 Conformity criteria	12		
9.1 Definitions	12		
9.2 Introduction	13		
9.3 Application of conformity procedures	13		
9.4 General procedure for assessing conformity with the characteristic values	14		
9.5 Conformity criteria and procedures for strength	14		

0 Introduction

Different climatic conditions, different sources of raw materials and different social/cultural attitudes have led to different developments in architecture, structures, building materials and their application and usage in different regions of Western Europe. This applies especially to cement which is used as a universal binding agent in almost all fields of construction.

The provisional mandates to CEN from the European Commission and the EFTA Authorities for the "Realization of a standardization programme in the field of construction products: Cement and building limes" require that "all traditional and well tried cements" used in Europe should be included in the standards which are developed. There are as yet no criteria for the descriptions "traditional" and "well tried". From a study of an inquiry, set up by CEN/TC 51 in 1990, it became obvious that some of the cements described as traditional by the respective national standardization bodies have been produced and used for decades so that their durability performance has been proved in practice. In contrast, there are some cements, also regarded as traditional and well tried by the respective national standardization bodies, which have been produced only for a few years and have been standardized nationally for only one or two years.

In view of the large number of different cements involved, it was considered necessary to separate the "common cements" from special cements i.e. those with additional or special properties.

The purpose of this Prestandard is to specify the composition, requirements and conformity criteria for the common cements. This includes all common cements which are described by the respective national standardization bodies within CEN as traditional and well tried. Types based on composition and a classification based on strength have been introduced in order to take into account the different cements included.

1 Scope

This European Prestandard specifies properties of the constituents of common cements and the proportions in which they are to be combined to produce a range of types and classes of cement. It then specifies the mechanical, physical and chemical requirements for these types and classes as characteristic values and states the rules for assessing their conformity to these requirements.

It is recognized that different cements have different properties and performance. Where performance tests are available (i.e. setting time, strength and soundness), they have already been taken into account in this European Prestandard. In addition, work is being carried out by CEN/TC 51 to identify any additional tests which are needed to specify further performance of cement. In the meantime, and during the life of this prestandard, it is necessary that the choice of cement, especially the type and/or strength class in relation to the exposure class and type of construction in which it is incorporated, should follow the national standards and other regulations valid in the place where the cement is used.

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

2 Normative references

This European Prestandard 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 Prestandard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

EN 196-1, *Methods of testing cement — Determination of strength.*

EN 196-2, *Methods of testing cement — Chemical analysis of cement.*

EN 196-3, *Methods of testing cement — Determination of setting time and soundness.*

ENV 196-4, *Methods of testing cement — Quantitative determination of constituents*²⁾.

EN 196-5, *Methods of testing cement — Pozzolanicity test for pozzolanic cements.*

EN 196-6, *Methods of testing cement — Determination of fineness.*

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

²⁾ This Part has the status of ENV. An EN is in preparation.