

Cement — Composition, specifications and conformity criteria for very low heat special cements

The European Standard EN 14216:2004 has the status of a
British Standard

ICS 91.100.10

National foreword

This British Standard is the official English language version of EN 14216:2004.

EN 14216 is a candidate “harmonized” European standard and fully takes into account the requirements of the European Commission mandate M/114, Cement, building limes and other hydraulic binders, given under the EU Construction Products Directive (89/106/EEC), and intended to lead to CE marking. The date of applicability of EN 14216 as a “harmonized” European standard, i.e. the date after which this standard may be used for CE marking purposes, is subject to an announcement in the *Official Journal of the European Communities*.

The Commission in consultation with Member States has agreed a transition period for the co-existence of “harmonized” European Standards and their corresponding national standard(s). It is intended that this period will comprise a period, usually nine months, after the date of availability of the European Standard, during which any required changes to national regulations are to be made, followed by a further period, usually of 12 months, for the implementation of CE marking. At the end of this co-existence period, the national standard(s) will be withdrawn.

EN 14216 is the subject of transitional arrangements agreed under the Commission mandate. In the UK, there is no corresponding national standard.

The UK participation in its preparation was entrusted by Technical Committee B/516, Cement and lime, to Subcommittee B/516/6, Cement specifications, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

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

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 23 and a back cover.

The BSI copyright notice displayed in this document indicates when the document was last issued.

Amendments issued since publication

Amd. No.	Date	Comments

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 10 June 2004

© BSI 10 June 2004

ISBN 0 580 43897 X

English version

Cement - Composition, specifications and conformity criteria for very low heat special cements

Ciments - Composition, spécifications et critères de
conformité de ciments spéciaux à très faible chaleur
d'hydratation

Zement - Zusammensetzung, Anforderungen und
Konformitätskriterien von Zement mit sehr niedriger
Hydratationswärme

This European Standard was approved by CEN on 1 September 2003.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of 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.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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

Contents

	Page
Foreword	3
1 Scope	5
2 Normative references	5
3 Terms and definitions.....	5
4 Very low heat special cement	6
5 Constituents	6
6 Composition and notation	6
7 Mechanical, physical, heat of hydration, chemical and durability requirements.....	8
8 Standard designation	9
9 Conformity criteria	10
Annex A (informative) Water-soluble hexavalent chromium	15
Annex ZA (informative) Clauses of this European Standard addressing the provisions of EU Construction Products Directive.....	16

Foreword

This document (EN 14216:2004) 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 special properties or those having hardening processes not mainly dependent on the hydration of calcium silicates.

The low heat property for common cements is covered by EN 197-1:2000/A1:2004.

A need for control of heat development during hydration of concrete is referred to in EN 206-1. Classification of cements with respect to heat of hydration is one method whereby heat development of concrete can be controlled. Thus the purpose of this EN 14216 is to specify the heat of hydration for very low heat special cements. Composition and other requirements are those specified in EN 197-1 for common cements. Conformity criteria are additionally specified.

The requirements in this EN 14216 are based on the results of tests on cement in accordance with EN 196, parts - 1, -2, -3, -5, -7, -21, EN 196-8 and EN 196-9. The scheme for the evaluation of conformity in EN 197-2 is applicable to very low heat special cements.

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 recognized 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 14216. 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 14216 defines and gives the specifications of 6 distinct very low heat special 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 single strength class having a limited heat of hydration value. The definition also includes requirements the constituents have to meet and the mechanical, physical, chemical and heat of hydration requirements for these products. This EN 14216 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 14216 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 14216 is used to refer to very low heat special cement unless otherwise indicated.

NOTE 3 The risk of early-age thermal cracking in concrete depends upon the properties and execution and is, therefore, also dependent on factors other than the heat of hydration of the cement.

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

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

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 197-12000 apply.

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

4 Very low heat special cement

Very low heat special 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 hydration process is slower.

Very low heat special cement is particularly suitable for dams and other similar massive construction, where the dimensions of the structure have a low surface/volume ratio. In this case the dispersion of heat, developed during the hydration of the cement, is very slow and therefore it is possible to have large increases in temperature. Thermal gradients then develop between internal and external zones of the concrete setting up internal stress which can be greater than the tensile strength of the concrete and lead to cracking and breakdown. These same properties make very low heat special cement unsuitable for use in reinforced, elevated, concrete structures, e.g. bridges or buildings.

NOTE Low heat common cements according to EN 197-1:2000/A1:2004, or low early strength blastfurnace cements conforming to EN 197-4 are suitable for dams and other similar massive construction, depending on the design of the concrete and method of construction.

5 Constituents

The requirements for the constituents of very low heat special cements shall conform to the requirements in EN 197-1.

6 Composition and notation

The 6 products in the family of very low heat special cements, covered by this European Standard, and their notation are given in Table 1. They are grouped into three main cement types as follows:

$\frac{3}{4}$ VLH III Blastfurnace cement

$\frac{3}{4}$ VLH IV Pozzolanic cement

$\frac{3}{4}$ VLH V Composite cement

The composition of each of the 6 products in the family of very low heat special 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 and any additives.

Table 1 — The 6 products in the family of very low heat special cements

Main type	Notation of the 6 products (types of very low heat special cement)		Composition (proportion by mass in % ^a)							
			Main constituents							Minor additional constituents
			Clinker	Blast-furnace slag	Silica fume	Pozzolana		Fly ash		
						natural	natural calcined	Siliceous	calcareous	
						K	S	D ^b	P	
VLH III	Blastfurnace Cement	VLH III/B	20–34	66–80	–	–	–	–	–	0–5
		VLH III/C	5–19	81–95	–	–	–	–	–	0–5
VLH IV	Pozzolanic Cement ^c	VLH IV/A	65–89	–	<----- 11–35 ----->					0–5
		VLH IV/B	45–64	–	<----- 36–55 ----->					0–5
VLH V	Composite Cement ^c	VLH V/A	40–64	18–30	–	<----- 18–30 ----->			–	0–5
		VLH V/B	20–38	31–50	–	<----- 31–50 ----->			–	0–5

^a The values of the table refer to the sum of the main and minor additional constituents.

^b The proportion of silica fume is limited to 10 %.

^c In Pozzolanic cements VLH IV/A and VLH IV/B and in Composite cements VLH V/A and VLH V/B the main constituents besides clinker shall be declared by designation of the cement (for example see clause 8).

7 Mechanical, physical, heat of hydration, chemical and durability requirements

7.1 Mechanical requirements

7.1.1 Standard strength

The standard strength of a very low heat special cement is the compressive strength determined in accordance with EN 196-1 at 28 days and shall conform to the requirements in Table 2.

One class of standard strength is included; class 22,5, (see Table 2).

Table 2 — Mechanical and physical requirements given as characteristic values

Strength class	Compressive strength MPa		Initial setting time	Soundness (Expansion)
	Standard strength			
	28 days			
22,5	22,5	42,5	75	10

7.2 Physical requirements

7.2.1 Initial setting time

The initial setting time, determined in accordance with EN 196-3, shall conform to the requirement in Table 2.

7.2.2 Soundness

The expansion, determined in accordance with EN 196-3, shall conform to the requirement in Table 2.

7.2.3 Heat of hydration

The heat of hydration of very low heat special cements shall not exceed the characteristic value of 220 J/g, determined in accordance with either EN 196-8 at 7 days or in accordance with EN 196-9 at 41 h.

NOTE A pre-normative research project has demonstrated the equivalence of test results for EN 196-8 at 7 days and EN 196-9 at 41 h. Nevertheless, in case of dispute between laboratories, the method to be applied should be agreed.

7.3 Chemical requirements

The properties of the cements of the cement type shown in column 3 of Table 3 shall conform to the requirements listed in column 4 of this table when tested in accordance with the standard referred to in column 2.

NOTE Some European countries have regulations for the content of water-soluble hexavalent chromium (see informative annex A).

Table 3 — Chemical requirements given as characteristic values

1	2	3	4
Property	Test reference	Cement type	Requirements ^a
Loss on ignition	EN 196-2	VLH III	5,0 %
Insoluble residue	EN 196-2 ^b	VLH III	5,0 %
Sulfate content (as SO ₃)	EN 196-2	VLH IV VLH V	3,5 %
		VLH III/B	4,0 %
		VLH III/C	4,5 %
Chloride content	EN 196-21	All ^c	0,10 %
Pozzolanicity	EN 196-5	VLH IV	Satisfy the test
^a Requirements are given as percentage by mass of the final cement. ^b Determination of residue insoluble in hydrochloric acid and sodium carbonate. ^c Cement type VLH III may contain more than 0,1 % chloride but in that case the maximum chloride content shall be stated on the packaging and/or the delivery note.			

7.4 Durability requirements

In many applications, particularly in severe environmental conditions, the choice of cement has an influence on the durability of concrete, mortar and grouts, e. g. frost resistance, chemical resistance and protection of reinforcement.

The choice of cement, from this European Standard, particularly as regards type and heat of hydration for different applications and exposure classes shall follow the appropriate standards and/or regulations for concrete or mortar valid in the place of use.

The mortar or concrete made from very low heat special cements requires additional protection from drying out and from carbonation during curing. Frost resistance of very low heat special cement concrete should be suitable for the exposure conditions in the place of use.

8 Standard designation

Very low heat special cements shall be identified by the notation of the cement type as specified in Table 1 and the figure 22,5 indicating the standard strength class (see 7.1).

EXAMPLE 1 Very low heat special cement with a granulated blastfurnace slag (S) content between 81 % and 95 % of strength class 22,5, with a very low heat of hydration is identified by:

Very low heat special blastfurnace cement EN 14216 – VLH III/C 22,5.

EXAMPLE 2 Very low heat special cement with a natural pozzolana (P) content between 36 % and 55 % of strength class 22,5 with a very low heat of hydration is identified by:

Very low heat special pozzolanic cement EN 14216 – VLH IV/B (P) 22,5.

EXAMPLE 3 Very low heat special composite cement containing between 18 % and 30 % by mass of granulated blastfurnace slag (S) and between 18 % and 30 % by mass of siliceous fly ash (V) of strength class 22,5 with a very low heat of hydration is identified by:

Very low heat special composite cement EN 14216 – VLH V/A (S-V) 22,5.

9 Conformity criteria

9.1 General requirements

Conformity of the 6 products to this European Standard shall be continually evaluated on the basis of testing of spot samples. The properties, test methods and the minimum testing frequencies for the autocontrol testing by the manufacturer are specified in Table 4. For cement not being dispatched continuously testing frequencies and other provisions are dealt with in EN 197-2.

For certification of conformity by an approved certification body, conformity of cement with this European Standard shall be evaluated in accordance with EN 197-2.

NOTE This European Standard does not deal with acceptance inspection at delivery.

Table 4 — Properties and test methods and minimum testing frequencies for the autocontrol testing by the manufacturer and the statistical assessment procedure

Property	Cements to be tested	Test method ^{a,b}	Autocontrol testing			
			Minimum testing frequency		Statistical assessment procedure	
			Routine situation	Initial period for a new type of cement	Inspection by	
					Variables ^e	Attributes
1	2	3	4	5	6	7
Standard strength	All	EN 196-1	2/week	4/week	X	
Initial setting time	All	EN 196-3	2/week	4/week		x ^f
Soundness (expansion)	All	EN 196-3	1/week	4/week		x
Loss on ignition	VLH III	EN 196-2	2/month ^c	1/week		x ^f
Insoluble residue	VLH III	EN 196-2	2/month ^c	1/week		x ^f
Sulfate content	All	EN 196-2	2/week	4/week		x ^f
Chloride content	All	EN 196-21	2/month ^c	1/week		x ^f
Pozzolanicity	VLH IV	EN 196-5	2/month	1/week		x
Heat of hydration	All	EN 196-8 or EN 196-9	1/month	1/week		x ^f
Composition	All	— ^d	1/month	1/week		

^a Where allowed in the relevant part of EN 196, other methods than those indicated may be used providing they give results equivalent to those obtained with the reference method.

^b The methods used to take and prepare samples shall be in accordance with EN 196-7.

^c When none of the test results within a period of 12 months exceeds 50 % of the characteristic value the frequency may be reduced to one per month.

^d Appropriate test method chosen by the manufacturer.

^e If the data are not normally distributed then the method of assessment may be decided on a case by case basis.

^f If the number of samples is at least one per week during the control period, the assessment may be made by variables.

9.2 Conformity criteria for mechanical, physical and chemical properties and evaluation procedure

9.2.1 General

Conformity of cement with the requirements for mechanical, physical and chemical properties in this European Standard is assumed if the conformity criteria specified in 9.2.2 and 9.2.3 are met. Conformity shall be evaluated on the basis of continual sampling using spot samples taken at the point of release and on the basis of the test results obtained on all autocontrol samples taken during the control period.

9.2.2 Statistical conformity criteria

9.2.2.1 General

Conformity shall be formulated in terms of a statistical criterion based on:

- $\frac{3}{4}$ the specified characteristic values for mechanical, physical and chemical properties as given in 7.1, 7.2, and 7.3 of this European Standard;
- $\frac{3}{4}$ the percentile P_k on which the specified characteristic value is based, as given in Table 5;
- $\frac{3}{4}$ the allowable probability of acceptance CR , as given in Table 5.

Table 5 — Required values P_k and CR

	Mechanical requirements		Physical and chemical requirements
	Standard strength (Lower limit)	Standard strength (Upper limit)	
The percentile P_k on which the characteristic value is based	5 %	10 %	
Allowable probability of acceptance CR	5 %		

NOTE Conformity evaluation by a procedure based on a finite number of test results can only produce an approximate value for the proportion of results outside the specified characteristic value in a population. The larger the sample size (number of test results), the better the approximation. The selected probability of acceptance CR controls the degree of approximation by the sampling plan.

Conformity with the requirements of this European Standard shall be verified either by variables or by attributes, as described in 9.2.2.2 and 9.2.2.3 as specified in Table 4.

The control period shall be 12 months.

9.2.2.2 Inspection by variables

For this inspection the test results are assumed to be normally distributed.

Conformity is verified when equation(s) (1) and (2), as relevant, are satisfied:

$$\bar{x} - k_A \times s \geq L \quad (1)$$

and

$$\bar{x} + k_A \times s \leq U \quad (2)$$

where

$\bar{x}$ is the arithmetic mean of the totality of the autocontrol test results in the control period;

s is the standard deviation of the totality of the autocontrol test results in the control period;

k_A is the acceptability constant;

L is the specified lower limit given in Table 2 referred to in 7.1;

U is the specified upper limit given in Tables 2 and 3 referred to in clause 7.

The acceptability constant k_A depends on the percentile P_k on which the characteristic value is based, on the allowable probability of acceptance CR and on the number n of the test results. Values of k_A are listed in Table 6.

Table 6 — Acceptability constant k_A

Number of test results n	k_A^a	
	for $P_k = 5 \%$	for $P_k = 10 \%$
	Standard strength, lower limit)	(other properties)
20 to 21	2,40	1,93
22 to 23	2,35	1,89
24 to 25	2,31	1,85
26 to 27	2,27	1,82
28 to 29	2,24	1,80
30 to 34	2,22	1,78
35 to 39	2,17	1,73
40 to 44	2,13	1,70
45 to 49	2,09	1,67
50 to 59	2,07	1,65
60 to 69	2,02	1,61
70 to 79	1,99	1,58
80 to 89	1,97	1,56
90 to 99	1,94	1,54
100 to 149	1,93	1,53
150 to 199	1,87	1,48
200 to 299	1,84	1,45
300 to 399	1,80	1,42
> 400	1,78	1,40
NOTE Values given in this table are valid for $CR = 5 \%$.		
^a Values of k_A valid for intermediate values of n may also be used.		

9.2.2.3 Inspection by attributes

The number c_D of test results outside the characteristic value shall be counted and compared with an acceptable number c_A , calculated from the number n of autocontrol test results and the percentile P_k as specified in Table 7.

Conformity is verified when equation (3) is satisfied:

$$c_D \leq c_A \quad (3)$$

The value of c_A depends on the percentile P_k on which the characteristic value is based, on the allowable probability of acceptance CR and on a number n of the test results. Values of c_A are listed in Table 7.

Table 7 — Values of c_A

Number of test results n^a	c_A for $P_K = 10 \%$
20 to 39	0
40 to 54	1
55 to 69	2
70 to 84	3
85 to 99	4
100 to 109	5
110 to 123	6
124 to 136	7
NOTE Values given in this table are valid for $CR = 5 \%$.	
^a If the number of test results is $n < 20$ (for $P_K = 10 \%$) a statistically based conformity criterion is not possible. Despite this, a criterion of $c_A = 0$ shall be used in cases where $n < 20$.	

9.2.3 Single result conformity criteria

In addition to the statistical conformity criteria, conformity of test results to the requirements of this European Standard requires that it shall be verified that each test result remains within the single result limit values specified in Table 8.

Table 8 — Limit values for single results

Property		Single result limit values
Standard strength (MPa) Lower limit value 28 days		20,0
Initial setting time (min) lower limit value		60
Soundness (expansion mm) upper limit value		10
Sulfate content (as % SO_3) upper limit value	VLH IV, VLH V	4,0
	VLH III/B	4,5
	VLH III/C	5,0
Chloride content (%) ^a upper limit value		0,10
Heat of hydration (J/g) upper limit value		250
Pozzolanicity		positive at 15 days
^a Cement type VLH III may contain more than 0,10 % chloride but in that case the maximum chloride content shall be declared.		

9.3 Conformity criteria for cement composition

At least once per month the composition of the cement shall be checked by the manufacturer, using as a rule a spot sample taken at the point of release of the cement. The cement composition shall meet the requirements specified in Table 1. The limiting quantities of the main constituents specified in Table 1 are reference values to be met by the average composition calculated from the spot samples taken in the control period. For single results, maximum deviations of -2 at the lower and $+2$ at the higher reference value are allowed. Suitable procedures during production and appropriate verification methods to ensure conformity to this requirement shall be applied and documented.

9.4 Conformity criteria for properties of the cement constituents

The cement constituents shall meet the requirements specified in clause 5. Suitable procedures during production to ensure conformity with this requirement shall be applied and documented.

Annex A (informative)

Water-soluble hexavalent chromium

Some CEN member countries have regulations for the content of water-soluble hexavalent chromium.

Alteration of these national regulations is, for the time being, outside the competence of CEN/CENELEC members. In these countries these regulations are valid in addition to the relevant requirements of this European Standard until they have been removed.

For this European Standard the following national regulations have been applied according to EC-Directive 90/531 by Denmark, Finland, Germany, Iceland, Norway and Sweden:

- | | |
|----------|---|
| Denmark: | Arbejdstilsynets bekendtgørelse nr 661 af 28. November 1983 om vandopløseligt chromat i cement. |
| Finland: | Decision of the Council of State concerning the content of chromate in cement for concrete and masonry cement, No. 593, July 24, 1986. |
| Germany: | Gefahrstoffverordnung (GefStoffV) together with TRGS 613 "Ersatzstoffe, Ersatzverfahren und Verwendungsbeschränkungen für chromathaltige Zemente und chromathaltige zementhaltige Zubereitungen, April 1993 (BArbBI Nr. 4.1993)". |
| Iceland: | Reglur nr. 330/1989 um króm i sementi, Order No. 330 of 19 June 1989. |
| Norway: | Directorate of Labour Inspection: Regulations relating to the Working Environment, laid down on 23 October 1987. |
| Sweden: | Kemikalieinspektionens föreskrifter om kemiska produkter och biotekniska organismer, KIFS 1998:8, 9 kapitlet §§ 10-13, Kemikalieinspektionens allmänna råd till föreskrifterna om krom i cement, 1989:1. |

Annex ZA (informative)

Clauses of this European Standard addressing the provisions of EU Construction Products Directive

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under a Mandate M114 "Cement, building limes and other hydraulic binders" given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European Standard shown in this annex, meet the requirements of this mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the very low heat special cements covered by this annex for the intended use indicated herein; reference shall be made to the information accompanying the CE marking.

WARNING — Other requirements and other EU Directives, not affecting the fitness for intended use(s), can be applicable to a construction product falling within the scope of this European Standard.

In addition to any specific clauses relating to dangerous substances contained in this Standard, there may be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply.

NOTE An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA, accessed through <http://europa.eu.int/comm/enterprise/construction/internal/dangsub/dangmain.htm>.

This annex establishes the conditions for the CE marking of the very low heat special cement intended for the uses indicated in table ZA.1 and shows the relevant clauses applicable:

The scope of this annex is defined by table ZA.1.

Table ZA.1 — Harmonized clauses

Construction Products: Intended use(s):		6 different very low heat special cement products (see Table 1) Preparation of concrete, mortar, grout and other mixes for construction and for the manufacture of construction products (see notes in this table)		
Requirements/performance characteristics	Harmonised clauses ^a in this European Standard		CPD Article 3.2 Level(s) and/or class(es)	Notes
Very low heat special cements (Subfamilies) constituents and composition	3 4 5 6 8	Constitutions of the 6 different products (Table 1) in the Product family “Very low heat special cements”, defined on the basis of constituent materials and composition.	None	Selection of very low heat special cements by the Member States in technical regulations for particular intended uses shall be possible, based on the different cement products, strength classes and heat of hydration.
Compressive strength	7.1 8	Compressive strength requirements expressed in terms of strength classes and limits. ^b	None	
Setting time	7.2	Requirements expressed in terms of lower limits. ^b	None	
Insoluble residue	7.3	Requirements expressed in terms of upper limits. ^b	None	Only for VLH III.
Loss on ignition	7.3	Requirements expressed in terms of upper limits. ^b	None	Only for VLH III.
Soundness – Expansion – SO ₃ content	7.2 7.3	Requirements expressed in terms of upper limits. ^b	None	
Chloride content	7.3	Requirements expressed in terms of upper limits. ^b	None	
Pozzolanicity (for pozzolanic cement only)	7.3	Requirements expressed in terms of limits. ^b	None	Only for VLH IV.
Heat of hydration	7.2.3	Requirements expressed in terms of upper limits. ^b	None	
Durability	4 5 7.4			Durability relates to the concrete, mortar, grout and other mixes made from very low heat special cement according to the application rules valid in the place of use.
^a The requirements in these clauses, including the entire contents and tables of the clauses listed, are fully integrated parts of this harmonised European Standard for very low heat special cement.				
^b These limits are part of the definition of the products covered by this harmonized European Standard for very low heat special cement.				

The requirement on a certain characteristic is not applicable in those Member States (MSs) where there are no regulatory requirements on that characteristic for the intended use of the product. In this case, manufacturers placing their products on the market of these MSs are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option "No performance determined" (NPD) in the information accompanying the CE marking (see Clause ZA.3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level.

ZA.2 Procedure for the attestation of conformity of products

ZA.2.1 System of attestation of conformity

The system of attestation of conformity for the 6 very low heat special cement products indicated in table ZA.1 in accordance with the Commission decision of 14 July 1997 (97/555/EC) published in the Official Journal of the European Communities and given in Annex III of the Mandate for the product family "Cements", is shown in table ZA.2 for the indicated intended uses.

Table ZA.2 — System of attestation of conformity

Product(s)	Intended use(s)	Level(s) or class(es)	Attestation of conformity system(s)
Very low heat special cements, including: ¾ Blastfurnace cements ¾ Pozzolanic cements ¾ Composite cements	Preparation of concrete, mortar, grout and other mixes for construction and for the manufacture of construction products		1+
System 1+: See annex III Section 2 point (i) of Directive 89/106/EEC, with audit-testing of samples taken at the factory			

The attestation of conformity of the very low heat special cements in table ZA.1 shall be based on the evaluation of conformity procedures indicated in table ZA.3 resulting from application of the clauses of this European Standard indicated therein. Clause 6 of EN 197-2:2000, gives rules relating to actions in the event of non-conformity.

Clause 9 of EN 197-2:2000, giving rules relating to Dispatching Centres, is not part of the procedure of attestation of conformity for the affixing of the CE marking under the CPD. However, Member States, within their market surveillance obligations, must ensure that CE marking is correctly used (Article 15.1 of the CPD). Clause 9 of EN 197-2:2000 should be used for the corresponding national provisions concerning Dispatching Centres.

Table ZA.3 — Assignment of evaluation of conformity tasks

Tasks		Scope of the tasks	Clauses to apply
Tasks for the manufacturer	Factory production control	Parameters related to all relevant characteristics in Table ZA.1 ^a	clause 9 and EN 197-2:2000, clause 4
	Further testing of samples taken at the factory/depot	All relevant characteristics in Table ZA.1 ^a	
Tasks for the notified body	Initial type testing	All relevant characteristics in Table ZA.1 ^a	clauses 9 and EN 197-2:2000, clauses 5 and 7
	Certification of the factory production control on the basis of:	Parameters related to all relevant characteristics in Table ZA.1 ^a	
	$\frac{3}{4}$ initial inspection of factory and factory production control		
	$\frac{3}{4}$ continuous surveillance, assessment and approval of factory production control		
	Audit-Testing of samples taken at the factory/depot	All relevant characteristics in Table ZA 1 ^a	
^a except durability			

ZA.2.2 EC certificate of conformity and EC declaration of conformity

When compliance with the conditions of this Annex is achieved, the certification body shall draw up a certificate of conformity (EC Certificate of conformity), which entitles the manufacturer to affix the CE marking. The certificate shall include:

- ¾ Name, address and identification number of the certification body,
- ¾ Name and address of the manufacturer, or his authorised representative established in the EEA, and place of production,
- ¾ Description of the product (type, identification, use, ...)
- ¾ Provisions to which the product conforms (e. g. Annex ZA of this EN)
- ¾ Particular conditions applicable to the use of the product (e. g. provisions for use under certain conditions, etc.)
- ¾ The number of the certificate,
- ¾ Conditions and period of validity of the certificate, where applicable,
- ¾ Name of, and position held by, the person empowered to sign the certificate.

In addition, the manufacturer shall draw up a declaration of conformity (EC Declaration of conformity) including the following:

Name and address of the manufacturer, or his authorised representative established in the EEA,,

- ¾ Name and address of the certification body,

- ¾ Description of the product (type, identification, use, ...), and a copy of the information accompanying the CE marking,
- ¾ Provisions to which the product conforms (e. g. Annex ZA of this EN),
- ¾ Particular conditions applicable to the use of the product (e. g. provisions for use under certain conditions, etc.),
- ¾ Number of the accompanying EC Certificate of conformity,
- ¾ Name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or of his authorised representative.

The above mentioned declaration and certificate shall be presented in the official language or languages of the Member State in which the product is to be used.

ZA.3 CE marking and labelling

The manufacturer or his authorised representative established within the EEA is responsible for the affixing of the CE marking. The CE marking symbol to affix shall be in accordance with Directive 93/68/EC and shall be shown on the bag of the very low heat special cement (or when not possible it may be on the accompanying label, the packaging or on the accompanying commercial documents e.g. a delivery note). The following information shall accompany the CE marking symbol:

- ¾ Identification number of the certification body ;
- ¾ Name or identifying mark and registered address of the producer;
- ¾ The last two digits of the year in which the marking is affixed;
- ¾ Number of the EC Certificate of conformity or factory production control certificate ;
- ¾ Reference to this European Standard;
- ¾ Description of the product: generic name, ... and intended use;
- ¾ Information on those relevant essential characteristics listed in table ZA.1 which are to be declared presented as:
 - ¾ declared values and, where relevant, level or class (including “pass” for pass/fail requirements, where necessary) to declare for each essential characteristic as indicated in "Notes" in table ZA.1;
 - ¾ as an alternative, standard designation(s) alone or in combination with declared values as above, and;
 - ¾ “No performance determined” for characteristics where this is relevant.

The “No performance determined” (NPD) option may not be used where the characteristic is subject to a threshold level. Otherwise, the NPD option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements in the Member State of destination.

Figure ZA.1 gives an example of the information to be given on the product, label, packaging and/or commercial documents.

In addition to any specific information relating to dangerous substances shown above, the product should be accompanied, when and where required and in the appropriate form, by documentation listing any legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE European legislation without national derogations need not be mentioned.

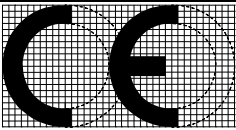
 0123	CE conformity marking, consisting of the "CE"-symbol given in Directive 93/68/EEC
Any Company	Identification number of the certification body
The registered address	Name or identifying mark of the producer
Any Factory ²⁾	Registered address of the producer
Year 03 (or position of date stamping)	Name or identifying mark of the factory where the cement was produced ²⁾
0123-CPD-0456	The last two digits of the year in which the marking was affixed ³⁾
EN 14216	Number of the EC certificate of conformity
VLH III/C 22,5	Number of European standard
Additional information	Example of standard designation, indicating the cement product, the strength class and the heat of hydration, as specified in clause 8 of this European Standard
	Limit for chloride, in % ⁴⁾
	Limit for loss on ignition of fly ash, in % ⁵⁾
	Standard notation of admixture ⁶⁾

Figure ZA.1 — Example of CE marking information

-
- 2) Considered necessary for the requirements of EN 197-2 but not compulsory.
- 3) The year of marking should relate to either the time of packing into bags or the time of dispatch from the factory or depot.
- 4) Only where the very low heat special cement is produced to meet a different chloride content limit to the value specified in Table 3 of this European Standard.
- 5) Only where, in accordance with 5.2.4.1 of EN 197-1:2000, a fly ash loss on ignition limit of 5,0 % to 7,0 % is used.
- 6) Only where, in accordance with 5.5 of EN 197-1:2000, an admixture conforming to the EN 934 series is used.

For reasons of practicality, selections from the following alternative arrangements for bagged cement concerning the presentation of the accompanying information may be used:

- a) When the CE marking is given on the bag (this is the normal situation and is preferred) the elements shown on the Figure ZA.1 shall be given.
- b) Where the last two digits of the year in which the CE marking is affixed is pre-printed on the bag, the year so printed should relate to the date of affixing with an accuracy of within plus or minus three months.
- c) Where the last two digits of the year in which the marking is affixed is to be presented but not pre-printed on the bag it may be applied by means of date-stamping of the bag in any easily visible position. This position should be indicated in the information accompanying the CE marking.

In the case of bulk cement, the CE conformity marking, the identification number of the certification body and the accompanying information as listed before for bagged cement should be affixed in some suitable practical form on the accompanying commercial documents.

Bibliography

EN 197-4, *Cement – Part 4: Composition, specifications and conformity criteria for low early strength blastfurnace cements.*

EN 934 (all parts), *Admixtures for concrete, mortar and grout.*

BSI — British Standards Institution

BSI is the independent national body responsible for preparing British Standards. It presents the UK view on standards in Europe and at the international level. It is incorporated by Royal Charter.

Revisions

British Standards are updated by amendment or revision. Users of British Standards should make sure that they possess the latest amendments or editions.

It is the constant aim of BSI to improve the quality of our products and services. We would be grateful if anyone finding an inaccuracy or ambiguity while using this British Standard would inform the Secretary of the technical committee responsible, the identity of which can be found on the inside front cover.
Tel: +44 (0)20 8996 9000. Fax: +44 (0)20 8996 7400.

BSI offers members an individual updating service called PLUS which ensures that subscribers automatically receive the latest editions of standards.

Buying standards

Orders for all BSI, international and foreign standards publications should be addressed to Customer Services. Tel: +44 (0)20 8996 9001.
Fax: +44 (0)20 8996 7001. Email: orders@bsi-global.com. Standards are also available from the BSI website at <http://www.bsi-global.com>.

In response to orders for international standards, it is BSI policy to supply the BSI implementation of those that have been published as British Standards, unless otherwise requested.

Information on standards

BSI provides a wide range of information on national, European and international standards through its Library and its Technical Help to Exporters Service. Various BSI electronic information services are also available which give details on all its products and services. Contact the Information Centre.
Tel: +44 (0)20 8996 7111. Fax: +44 (0)20 8996 7048. Email: info@bsi-global.com.

Subscribing members of BSI are kept up to date with standards developments and receive substantial discounts on the purchase price of standards. For details of these and other benefits contact Membership Administration.
Tel: +44 (0)20 8996 7002. Fax: +44 (0)20 8996 7001.
Email: membership@bsi-global.com.

Information regarding online access to British Standards via British Standards Online can be found at <http://www.bsi-global.com/bsonline>.

Further information about BSI is available on the BSI website at <http://www.bsi-global.com>.

Copyright

Copyright subsists in all BSI publications. BSI also holds the copyright, in the UK, of the publications of the international standardization bodies. Except as permitted under the Copyright, Designs and Patents Act 1988 no extract may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, photocopying, recording or otherwise – without prior written permission from BSI.

This does not preclude the free use, in the course of implementing the standard, of necessary details such as symbols, and size, type or grade designations. If these details are to be used for any other purpose than implementation then the prior written permission of BSI must be obtained.

Details and advice can be obtained from the Copyright & Licensing Manager.
Tel: +44 (0)20 8996 7070. Fax: +44 (0)20 8996 7553.
Email: copyright@bsi-global.com.