BRITISH STANDARD

BS EN 15167-1:2006
Incorporating Corrigendum No. 1

Ground granulated blast furnace slag for use in concrete, mortar and grout —

Part 1: Definitions, specifications and conformity criteria

The European Standard EN 15167-1:2006 has the status of a British Standard

ICS 91.100.15; 01.040.91

BSI British Standards

National foreword

This British Standard was published by BSI. It is the UK implementation of EN 15167-1:2006. Together with BS EN 15167-2 it supersedes BS 6699:1992 which will be withdrawn on 1 May 2008.

EN 15167-1 is a candidate "harmonized" European standard and fully takes into account the requirements of the European Commission Mandate M/128, *Products related to concrete, mortar and grout*, given under the EU Construction Products Directive (89/106/EEC), and is intended to lead to CE marking. The date of applicability of EN 15167-1 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 coexistence 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 At the end of this coexistence period, the national standard will be withdrawn.

In the UK, the corresponding national standard is:

— BS 6699: 1992, *Specification for ground granulated blastfurnace slag for use with Portland cement*, and based on this transition period of 21 months, BS 6699:1992 will be withdrawn on 1 May 2008

NOTE This date is approximate. Users of this standard should contact BSI Customer Services for confirmation of withdrawal.

The UK participation in its preparation was entrusted by Technical Committee B/517, Cement and lime, to Subcommittee B/517/4, Additions for concrete. A list of organizations represented on B/517/4 can be obtained on request to its secretary.

Additional information

In most cases, ground granulated blastfurnace slag that conforms to BS 6699 will also conform to BS EN 1567-1, and vice-versa. The requirements for: fineness, glass content, sulfide, sulfate, loss-on-ignition, chloride and moisture content are essentially identical. The limit in BS EN 15167-1 for magnesia is higher than in BS 6699. Unlike BS 6699, BS EN 15167-1 contains no limits for manganese, insoluble residue or soundness. The 7- and 28-day strength requirements in BS EN 15167-1 are expressed as "activity indices" (% of strength of test cement) and are based on tests with 50% ground granulated blastfurnace slag (compared to 70% ground granulated blastfurnace slag in BS 6699), and the strength requirements cannot be directly compared. Comparative testing suggests that the strength requirements in BS EN 15167-1 are slightly less onerous than those in BS 6699. BS EN 15167-1 contains a requirement for the initial setting time to be not more than twice as long as the test cement on its own, whereas the requirement in BS 6699 is for the setting time to be not less than that of the test cement.

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 cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 October 2006

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EUROPEAN STANDARD

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EUROPÄISCHE NORM

EN 15167-1

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ICS 91.100.15; 01.040.91

English Version

Ground granulated blast furnace slag for use in concrete, mortar and grout - Part 1: Definitions, specifications and conformity criteria

Laitier granulé de haut-fourneau moulu pour utilisation dans le béton, mortier et coulis - Partie 1: Définitions, exigences et critères de conformité

Hüttensandmehl zur Verwendung in Beton, Mörtel und Einpressmörtel - Teil 1: Definitionen, Anforderungen und Konformitätskriterien

This European Standard was approved by CEN on 26 June 2006.

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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (EN 15167-1:2006) has been prepared by Technical Committee CEN/TC 104 “Concrete and related products”, the secretariat of which is held by DIN.

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 February 2007, and conflicting national standards shall be withdrawn at the latest by May 2008.

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 Construction Products Directive (89/106/EEC).

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

The standard EN 15167 is composed of two parts:

— Part 1: Definitions, specifications and conformity criteria

— Part 2: Conformity evaluation

The preparatory work was carried out by WG15 of CEN/TC 104 since November 2003 in which the following countries participated: Austria, Belgium, Czech Republic, Finland, France, Germany, Ireland, Italy, Netherlands, Norway, Poland, Spain, Sweden, Switzerland and the United Kingdom.

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

1 Scope

This European Standard specifies requirements for the chemical and physical properties as well as quality control procedures for ground granulated blastfurnace slag for use as a type II addition in the production of concrete, including in particular cast-in-situ or prefabricated structural concrete conforming to EN 206-1. Ground granulated blastfurnace slag conforming to this European Standard may also be used in mortars and grouts.

Ground granulated blastfurnace slag containing any added materials other than grinding aids, is not within the scope of this European Standard. It is also not within the scope of this European Standard to specify provisions governing the practical application of ground granulated blastfurnace slag in the production of concrete, mortar or grout, i.e. requirements concerning composition, mixing, placing, curing etc. As regards such provisions, reference should be made to other European or national standards, such as EN 206-1.

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 196-6, *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 197-1, *Cement — Part 1: Composition, specifications and conformity criteria for common cements*

EN 15167-2:2006, *Ground granulated blast furnace slag for use in concrete, mortar and grout — Part 2: Conformity evaluation*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
activity index
ratio (in percent) of the compressive strength of mortar prisms made from 50 % by mass test cement and 50 % by mass ground granulated blastfurnace slag, relative to the compressive strength of equivalent mortar prisms made from 100 % test cement, tested at the same age

3.2
allowable probability of acceptance CR
for a given sampling plan, the allowed probability of acceptance of ground granulated blastfurnace slag with a characteristic value outside the specified characteristic value

3.3
autocontrol
continual statistical quality control of the ground granulated blastfurnace slag based on the testing of samples taken by the manufacturer or their agent at point(s) of release from the ground granulated blastfurnace slag factory

3.4
characteristic value
value of the required property outside of which lies a specified percentage, the percentile P_k, of all the values of the population

3.5
control period
period of manufacture and/or dispatch identified for the evaluation of the autocontrol test results

3.6
granulated blastfurnace slag
vitrified material made by rapid cooling of a slag melt of suitable composition, obtained by smelting iron ore in a blastfurnace, consisting of at least two thirds by mass of glassy slag and possessing hydraulic properties when suitably activated

NOTE Rapid cooling includes quenching in water (granulation) and projecting through water and air (pelletisation).

3.7
ground granulated blastfurnace slag
fine powder made by grinding granulated blastfurnace slag

3.8
sampling plan
specific plan which states the (statistical) sample size(s) to be used, the percentile P_k (on which the characteristic value is based) and the allowable probability of acceptance CR

3.9
single result limit value
value of a mechanical, physical or chemical property which – for any single test result – in the case of an upper limit is not to be exceeded or in the case of a lower limit is, as a minimum, to be reached

3.10
specified characteristic value
characteristic value of a chemical or physical property which in the case of an upper limit is not to be exceeded or in the case of a lower limit is, as a minimum, to be reached

3.11
spot sample
sample taken at the same time and from one and the same place, relating to the intended tests. It can be obtained by combining one or more immediately consecutive increments (see EN 196-7)

3.12
test cement
selected batch of Portland cement, to be used for carrying out the tests needed to evaluate conformity to the requirements of 5.3.2.2 and 5.3.2.3

3.13
type II addition
finely divided inorganic, pozzolanic or latent hydraulic material that may be added to concrete in order to improve certain properties or to achieve special properties (see EN 206-1)

4 Constituents

The main constituent shall be granulated blastfurnace slag, as defined in 3.6. Its chemical composition shall consist of at least two-thirds by mass of the sum of calcium oxide (CaO), magnesium oxide (MgO) and silicon dioxide (SiO_2). The remainder shall be aluminium oxide (Al_2O_3) together with small amounts of other compounds. The ratio by mass (CaO + MgO)/(SiO_2) shall exceed 1,0.

Ground granulated blastfurnace slag conforming to this European Standard shall contain no added materials except grinding aids to assist in the manufacture. The total quantity of grinding aid shall not exceed 1,0 % and the organic content of any grinding aid(s) shall not exceed 0,2% (both by mass of the ground granulated blastfurnace slag). Grinding aids shall not promote corrosion of the reinforcement or impair the properties of the ground granulated blastfurnace slag or the concrete, mortar or grout, made from it.

5 Specifications

5.1 General

The chemical and physical requirements in 5.2 and 5.3 are specified as characteristic values. Conformity to a characteristic value is assessed by means of a statistical quality control procedure as described in Clause 8. The test methods prescribed in this European Standard are reference methods. In factory production control (see EN 15167-2), other methods may be used provided they give results equivalent to those obtained with the reference method. In case of a dispute, only the reference method shall be used.

5.2 Chemical requirements

The chemical properties of the ground granulated blastfurnace slag shall conform to the requirements in Table 1.

Table 1 — Chemical requirements given as characteristic values

Property	Test reference	Requirements [a]
magnesium oxide	EN 196-2	≤ 18 %
sulfide	EN 196-2	≤ 2,0 %
sulfate	EN 196-2	≤ 2,5 %
loss on ignition, corrected for oxidation of sulfide	EN 196-2	≤ 3,0 %
chloride [b]	EN 196-2	≤ 0,10 %
moisture content	Annex A	≤ 1,0 %

[a] Requirements are given by mass of the ground granulated blastfurnace slag.

[b] Ground granulated blastfurnace slag may contain more than 0,10 % chloride but in that case the maximum chloride content, as a value not to be exceeded, shall be stated on the packages or the documents (see Clause 6).

5.3 Physical requirements

5.3.1 Fineness

The specific surface determined in accordance with the air permeability method specified in EN 196-6, shall be not less than 275 m^2/kg.

5.3.2 Requirements when combined with the test cement

5.3.2.1 Test cement

The test cement shall conform to EN 197-1 and shall be selected by the ground granulated blastfurnace slag manufacturer, subject to the following restrictions:

— it shall be a type CEM I, of strength class 42,5 or higher;

— the Blaine fineness shall be at least 300 m^2/kg;

— the tricalcium aluminate shall be between 6 % and 12 %;

— the alkali (Na_2O equivalent) content shall be between 0,5 % and 1,2 %.

5.3.2.2 Initial setting time

When determined in accordance with EN 196-3, the initial setting time of a combination (by mass) of 50 % of ground granulated blastfurnace slag with 50 % of test cement, shall not be more than twice as long as that of the test cement on its own.

5.3.2.3 Activity index

The activity index shall be expressed as the ratio (in percent) of the compressive strength of the combination (by mass) of 50 % of ground granulated blastfurnace slag with 50 % of test cement, to the compressive strength of the test cement on its own. The compressive strengths shall be determined in accordance with EN 196-1 and the water:combination ratio and the water:cement ratio shall both be 0,50.

The activity index at 7 days and at 28 days shall be not less than 45 % and 70 % respectively.

NOTE The activity index gives no direct information on the strength contribution of ground granulated blastfurnace slag in concrete, nor is the use of the ground granulated blastfurnace slag limited to the mixing ratio used in the activity index test.

5.4 Other requirements

5.4.1 Durability requirements

The composition and the performance of the ground granulated blastfurnace slag shall be such that durable concrete may be produced when using it. GGBS conforming to this European Standard is deemed to satisfy the durability requirements, provided that other requirements for durability of concrete in relevant standards and/or regulations valid in the place of use are fulfilled.

5.4.2 Release of dangerous substances and emission of radioactivity

NOTE In the absence of specific requirement with respect to substances, dangerous to health, hygiene and environment in this European Standard, Annex ZA.1, Note 1 applies.

5.5 Information to be supplied upon request

Information on the properties listed below shall be declared to the user upon request:

a) 7- and 28-day activity index of a 50 % combination of the ground granulated blastfurnace slag with 50 % of test cement, determined in accordance with 5.3.2.3;

b) initial setting time of a 50 % combination of the ground granulated blastfurnace slag with 50 % of test cement;

c) initial setting time and 7- and 28-day strength of the test cement;

d) chemical oxide composition of the ground granulated blastfurnace slag, comprising the contents of calcium oxide (CaO), silicon dioxide (SiO_2), aluminium oxide (Al_2O_3), magnesium oxide (MgO), titanium dioxide (TiO_2) and manganese (Mn_2O_3);

e) total content of alkalis determined in accordance with EN 196-2, or other method agreed between manufacturer and user, and expressed as equivalent sodium oxide;

f) fineness value determined in accordance with the air permeability method in EN 196-6;

g) relative density determined in accordance with EN 196-6;

h) glass content and the method used for its determination;

i) the method(s) of rapid cooling used to produce the granulated blastfurnace slag(s) used in the manufacture of the ground granulated blastfurnace slag (see note to 3.6).

The format and the basis on which the information on the properties is declared, shall be as agreed between the manufacturer and user.

6 Packaging and labelling

Ground granulated blastfurnace slag may be delivered in suitable packages or by means of suitable bulk-delivery transportation systems. The following information shall be marked on the packages or in the case of bulk delivery, on the documents:

— the number of this European Standard, i.e. EN 15167-1;

— description of the product, e.g. “ground granulated blastfurnace slag”;

— the name or identification mark of the factory where the ground granulated blastfurnace slag was manufactured;

— where appropriate, additional identification to distinguish between different certified ground granulated blastfurnace slag, produced in the same factory;

— where the chloride content is in excess of 0,10 %, the maximum chloride content (as a value that will not be exceeded).

NOTE For CE marking and labelling, ZA.3 ZA applies.

7 Sampling

Spot samples, equally distributed over the manufacturing period, shall be taken at the point of release into packages or a system for bulk-delivery transportation or, alternatively, directly from bulk-delivery transportation systems or packages, using the equipment and principles described in EN 196-7.

For the purpose of carrying out all the analyses and tests needed to show conformity or non-conformity to the requirements set out in 5, a representative laboratory sample of ground granulated blastfurnace slag of at least 1 kg is required. This sample shall be obtained by subdividing, such as quartering, a spot sample of at least 5 kg.

8 Evaluation of conformity

8.1 General requirements

The conformity of ground granulated blastfurnace slag to the requirements of this European Standard and to the stated values shall be demonstrated by:

— initial type testing;

— factory production control by the manufacturer, including product assessment.

Conformity of ground granulated blastfurnace slag 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 2.

In addition to the provisions of this clause, the initial type testing and the factory production control shall be carried out according to the relevant clauses in EN 15167-2.

NOTE 1 For attestation of conformity for CE marking, reference is made to Annex ZA.

NOTE 2 EN 15167-2 does not deal with acceptance inspection at delivery.

Table 2 — Properties, test methods and minimum testing frequencies for the autocontrol testing by the manufacturer or his agent and the statistical assessment procedure

Property	Test method [a] [b]	Autocontrol testing [c]			
		Minimum testing frequency		Statistical assessment procedure	
		Routine situation	Initial period for a new ggbs	Inspection by	
				Variables [d]	Attributes
magnesium oxide	EN 196-2	1/month	1/week		X
sulfide	EN 196-2	1/month	1/week		X
sulfate	EN 196-2	1/month	1/week		X
loss on ignition	EN 196-2	2/month [e]	1/week		X
chloride	EN 196-2	2/month [e]	1/week		X
moisture	Annex A	1/month	1/week		X
fineness	EN 196-6	2/week	4/week		X
initial setting time	EN 196-3	1/week [e]	1/week		X
activity index	EN 196-1	2/week [f]	4/week [f]	X	

[a] Where allowed in the relevant parts of EN 196, other methods than those indicated may be used in factory production control provided they give results equivalent to those obtained with the reference method. A cement that otherwise conforms to 5.3.2.1 but has an alkali content in excess of 1,2 % may be used in factory production control, provided that the activity index and setting time results obtained using it, are adjusted in accordance with a documented calibration against results using a test cement that fully conforms to 5.3.2.1.

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

[c] A minimum of 10 samples shall be used for assessing the conformity and shall represent a period of not more than 12 months and not less than 1 month.

[d] If the data are not normally distributed then the method of assessment may be decided on a case-by-case basis.

[e] When none of the test results within a period of 12 months exceeds 50 % of the characteristic value (or in the case of initial setting time, none exceeds 1,5 times that of the test cement), the frequency may be reduced to one per month.

[f] Either the compressive strength of the test cement shall be re-determined for each calculation of the activity index, or alternatively a mean strength for the test cement may be used in calculating the activity index. When the option of using a mean strength is employed, the compressive strength of the test cement shall be measured at least twice a month and the mean value used in calculating the activity index shall be the average of the last four measurements on that batch of test cement.

8.2 Statistical conformity criteria

8.2.1 General

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

a) the required characteristic values for chemical and physical properties as specified in 5.2 and 5.3;

b) a percentile P_k of 10 % on which the required characteristic value is based;

c) an allowable probability of acceptance CR (consumer's risk) of 5 %.

Conformity to the requirements of this European Standard shall be verified either by variables or by attributes, as described in 8.2.2 and 8.2.3 and as specified in Table 2. The control period shall be 12 months for the routine situation.

8.2.2 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:

$$x - k_A \cdot s \geq L \quad (1)$$

and

$$x + k_A \cdot s \leq U \quad (2)$$

where

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 referred to in Clause 5;

U is the specified upper limit referred to in Clause 5.

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 3.

Table 3 — Acceptability constant k_A (P_k = 10 %) at CR = 5 %

Number of test results n	k_A
20 to 21	1,91
22 to 23	1,89
24 to 25	1,85
26 to 27	1,82
28 to 29	1,80
30 to 34	1,78
35 to 39	1,73
40 to 44	1,70
45 to 49	1,67
50 to 59	1,65
60 to 69	1,61
70 to 79	1,58
80 to 89	1,56
90 to 99	1,54
100 to 149	1,53
150 to 199	1,48
200 to 299	1,45
300 to 399	1,42
≥ 400	1,40

8.2.3 Inspection by attributes

The number C_D of test results below (if the characteristic value is an upper limit) or above (if the characteristic value is a lower limit) 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 4.

Conformity is verified when Equation (3) is satisfied:

$$C_D \leq C_A \tag{3}$$

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 the number n of the test results. Values of C_A are listed in Table 4.

Table 4 — Values of C_A (P_k = 10 %) at CR = 5 %

Number of test results n [a]	C_A
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	0,075 (n - 30)
[a] If the number of test results is less than 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.	

8.3 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 5.

Table 5 — Limit values for single results

Property	Single result limit values
magnesium oxide	19 %
sulfide	2,5 %
sulfate	3,0 %
loss on ignition	3,5 %
chloride [a]	0,10 %
moisture	1,5 %
fineness	250
initial setting time	2,25 times that of test cement
activity index at 7 days	40 %
activity index at 28 days	65 %
[a] Ground granulated blastfurnace slag may contain more than 0,10 % chloride but in that case the maximum chloride content shall be declared.	

Annex A
(normative)

Method of determining the moisture content of ground granulated blastfurnace slag

A.1 Principle

The moisture content is determined by drying a sample in an oven until constant mass is achieved.

A.2 Apparatus

A.2.1 Balance, capable of weighing to an accuracy of 0,001 g

A.2.2 Shallow container of about 20 g capacity

A.2.3 Electric oven with natural ventilation controlled at (110 ± 5) °C

A.2.4 Desiccator containing dried magnesium perchlorate

A.3 Procedure

Weigh (to the nearest 0,001 g), 10 ± 1 g of ground granulated blastfurnace slag into the shallow container that has been previously dried and weighed. Place the container in the electric oven for 1 h. Remove the container and contents and allow to cool in the desiccator to room temperature and then weigh it. Repeat the heating and cooling cycle until constant mass is achieved, i.e. when the difference between two successive weighings is less than 0,005 g.

A.4 Calculation

Calculate the moisture content C of the sample as a percentage, from the following equation:

$$C = 100 \times (M_1 - M_2) / M_2 \qquad \text{(A.1)}$$

where M_1 is the mass of the initial sample and M_2 is the mass of the dried sample (in g).

A.5 Report

Report the moisture content as a percentage, to the nearest 0,1 %.

Annex ZA
(informative)

Clauses of this European Standard addressing essential requirements or other provisions of EU Directives

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M/128 (“Products related to concrete, mortar and grout”) 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 the mandate given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the ground granulated blastfurnace slag covered by this annex for the intended uses 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 uses, can be applicable to ground granulated blastfurnace slag falling within the scope of this European Standard.

NOTE 1 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 2 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 has the same scope as Clause 1 of this standard with regard to the product covered. It establishes the conditions for the CE marking of ground granulated blastfurnace slag intended for use in the production of concrete, mortar and grout and shows the relevant clauses applicable (see Table ZA.1).

The requirement on a certain characteristic is not applicable in those Member States where there are no regulatory requirements on that characteristic for the intended end use of the product. In this case, manufacturers placing their products on the market of these Member States 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 ZA.3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level.

Table ZA.1 — Relevant clauses for ground granulated blastfurnace slag and intended use

Product: Ground granulated blastfurnace slag (Type II addition) as covered by the scope of this standard **Intended use:** Preparation of concrete, mortar and grout			
Essential Characteristics	**Requirement clauses in this European Standard**	**Levels and/or classes**	**Notes**
Compressive strength (Activity index)	5.3.2.3	None	Requirement expressed in terms of lower limits at 7- and 28 -days, (as percentage) of test cement. Pass/fail
Initial setting time	5.3.2.2	None	Requirement expressed in terms of upper limit (as a ratio) for difference from the setting time of cement paste without ground granulated blastfurnace slag Pass/fail
Fineness	5.3.1	None	Requirement expressed in terms of lower limit (in m^2/kg) Pass/fail
Composition -Magnesium oxide	5.2	None	Requirement expressed in terms of upper limit (in % by mass) oxide Pass/fail
Composition -Sulfide	5.2	None	Requirement expressed in terms of upper limit (in % by mass) element Pass/fail
Composition -Sulfate	5.2	None	Requirement expressed in terms of upper limit (in % by mass) oxide Pass/fail
Composition -Loss on ignition	5.2	None	Requirement expressed in terms of upper limit (in % by mass) Pass/fail
Composition -Chloride	5.2	None	Requirement expressed in terms of upper limit (in % by mass) element Pass/fail
Composition -Moisture	5.2	None	Requirement expressed in terms of upper limit (in % by mass) Pass/fail
Durability	5.4.1	None	Ground granulated blastfurnace slag conforming to EN 15167-1 is deemed to provide a durable concrete when other requirements for durability of concrete in relevant standards and/or regulations valid in the place of use are fulfilled.
Release of dangerous substances and emission of radioactivity	5.4.2	None	No requirements are included in EN 15167-1, but see Note 1 to ZA.1.

ZA.2 Procedure for attestation of conformity of ground granulated blastfurnace slag

ZA.2.1 System of attestation of conformity

The system(s) of attestation of conformity of the ground granulated blastfurnace slag indicated in Table ZA.1, in accordance with the Decision of the Commission 99/469/EC of 1999-07-17 amended by 01/596/EC of 2-08-01 as given in Annex III of the mandate for "Concrete, mortar, grout and related products", is shown in Table ZA.2 for the indicated intended use(s) and relevant level(s) or class(es).

Table ZA.2 — System of attestation of conformity

Product	Intended use	Level(s) or class(es)	Attestation of conformity system
Additions (type II)	For concrete, mortar and grout	-	1+
System 1+: See Directive 89/106/EEC (CPD) Annex III.2.(i) with audit testing of samples.			

The attestation of conformity of the ground granulated blastfurnace slag in Table ZA.1 shall be based on the evaluation of conformity procedure indicated in Table ZA.3 resulting from application of the clauses of this or other European Standards indicated therein.

Table ZA.3 — Assignment of evaluation of conformity tasks for ground granulated blastfurnace slag under system 1+

Tasks		Content of the task	Evaluation of conformity clauses to apply
Tasks under the responsibility of the manufacturer	Factory production control (F.P.C)	Parameters related to all characteristics of Table ZA.1 relevant for the intended use	Clause 8 of this European Standard, EN 15167-2:2006, 4.1
	Further testing of samples taken at factory	All characteristics of Table ZA.1 relevant for the intended use	Clause 8 of this European Standard, EN 15167-2:2006, 4.3
Tasks under the responsibility of the product certification body	Initial type testing	All relevant characteristics of Table ZA.1, except *- release of dangerous substances and emission of radioactivity*	Clause 8 of this European Standard, EN 15167-2:2006, 5.4
	Initial inspection of factory and of F.P.C	Parameters related to all relevant characteristics of Table ZA.1	Clause 8 of this European Standard, EN 15167-2:2006, 5.5
	Continuous surveillance, assessment and approval of F.P.C.	Parameters related to all relevant characteristics of Table ZA.1	Clause 8 of this European Standard, EN 15167-2:2006, 5.2, 5.3 and 5.6

Table ZA.3 (*concluded*)

Tasks	Content of the task	Evaluation of conformity clauses to apply	
	Audit testing of samples taken at factory	All relevant characteristics of Table ZA.1, except - *release of dangerous substances and emission of radioactivity*	Clause 8 of this European Standard, EN 15167-2:2006, 5.4

ZA.2.2 EC Certificate and 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:

— name, address and identification number of the certification body;

— name and address of the manufacturer, or his authorised representative established in the EEA, and place of production;

NOTE 1 The manufacturer may also be the person responsible for placing the product onto the EEA market, if he takes responsibility for CE marking;

— description of the product (ground granulated blastfurnace slag for use in concrete mortar and grout conforming to this European Standard);

— provisions to which the product conforms (i.e. Annex ZA of this EN);

— particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);

— the number of the certificate;

— conditions of validity of the certificate, where applicable;

— name of, and position held by, the person empowered to sign the certificate.

In addition, the manufacturer shall draw up and retain 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;

— name and address of the certification body;

— description of the product (i.e. ground granulated blastfurnace slag for use in concrete mortar and grout), and a copy of the information accompanying the CE marking;

NOTE 2 Where some of the information required for the Declaration is already given in the CE marking information, it does not need to be repeated.

— provisions to which the product conforms (i.e. Annex ZA of this European Standard);

— particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions);

— number of the accompanying EC Certificate of conformity;

— 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 accompanying commercial documents e.g. a delivery note (bulk ground granulated blastfurnace slag) or on the packaging (packed ground granulated blastfurnace slag). The following information shall accompany the CE marking symbol:

— identification number of the certification body;

— name or identifying mark and registered address of the manufacturer;

— the last two digits of the year in which the marking is affixed;

— number of the EC Certificate of conformity;

— reference to this European Standard;

— description of the product, i.e. ground granulated blastfurnace slag for use in concrete mortar and grout;

— information on those relevant requirements listed in Table ZA.1 which are to be declared presented as:

  — declared values and, where relevant, level or class (including “pass” for pass/fail requirements, where necessary) to declare for each requirement as indicated in Table ZA.1;

  — “No performance determined” for characteristics where this is relevant;

  — as an alternative, a standard designation which shows some or all of the relevant characteristics (where the designation covers only some characteristics, it will need to be supplemented with declared values for other characteristics as above.

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.

CE	*CE conformity marking, consisting of the "CE"-symbol given in Directive 93/68/EEC*
01234	*Identification number of the certification body*
AnyCo Ltd, PO Box 21, B-1050	*Name or identifying mark and registered address of the producer*
Any Factory	*Name or identifying mark of the factory where the ground granulated blastfurnace slag was produced*
06	*Last two digits of the year in which the marking was affixed*
01234 – CPD - 00234	*Certificate number*
EN 15167-1	*No. of European Standard*
ground granulated blastfurnace slag for use in concrete, mortar and grout	*Description of product*

Figure ZA.1 — Example CE marking information

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

NOTE 1 European legislation without national derogations need not be mentioned.

NOTE 2 Affixing the CE marking symbol means, if a product is subject to more than one directive, that it complies with all applicable directives.

Bibliography

[1] EN 206-1, *Concrete — Part 1: Specification, performance, production and conformity*

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