



SLOVENSKI STANDARD

SIST EN 13263-1:2005+A1:2009

01-julij-2009

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SIST EN 13263-1:2005

Mikro silika za beton - 1. del: Definicije, zahteve in merila skladnosti

Silica fume for concrete - Part 1: Definitions, requirements and conformity criteria

Silikastaub für Beton - Teil 1: Definitionen, Anforderungen und Konformitätskriterien

Fumée de silice pour béton - Partie 1: Définitions, exigences et critères de conformité
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Ta slovenski standard je istoveten z: EN 13263-1:2005+A1:2009

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ICS:

91.100.30 Beton in betonski izdelki Concrete and concrete products

SIST EN 13263-1:2005+A1:2009 en,fr,de

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EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13263-1:2005+A1

March 2009

ICS 91.100.30

Supersedes EN 13263-1:2005

English Version

Silica fume for concrete - Part 1: Definitions, requirements and conformity criteria

Fumée de silice pour béton - Partie 1: Définitions, exigences et critères de conformité

Silikastaub für Beton - Teil 1: Definitionen, Anforderungen und Konformitätskriterien

This European Standard was approved by CEN on 19 May 2005 and includes Amendment 1 approved by CEN on 8 February 2009.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (EN 13263-1:2005+A1:2009) 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of an identical text or by endorsement, at the latest by September 2009, and conflicting national standards shall be withdrawn at the latest by September 2009.

This document includes Amendment 1, approved by CEN on 2009-02-08.

This document supersedes EN 13263-1:2005.

The start and finish of text introduced or altered by amendment is indicated in the text by tags \square_{A1} \square_{A1} .

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.

\square_{A1} EN 13263-1:2005+A1:2009 contains a modified requirement for the content of silicon dioxide in a new class 2. \square_{A1}

EN 13263 consists of the following parts, under the general title *Silica fume for concrete*:

- Part 1: Definitions, requirements and conformity criteria,
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- Part 2: Conformity evaluation.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, 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.

Introduction

Silica fume consists of mainly spherical particles of amorphous silicon dioxide smaller than 10^{-6} m and is highly pozzolanic. It is collected by filters as a by-product of the smelting process to produce silicon metal and ferro-silicon alloys. It can be supplied as collected from the filters (undensified), after treatment to increase its bulk density (densified), or as a slurry. Silica fume from more than one furnace, filter or intermediate storage silo will normally be blended in the production plant.

Many years of research and practical experience have demonstrated that silica fume which satisfies the requirements in this Part of this European Standard has highly pozzolanic properties, and may be used to produce concrete with improved properties in both the fresh and hardened states.

Silica fume is normally used in combination with a plasticizer and/or superplasticizer.

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1 Scope

This European Standard applies to the silica fume which is a by-product of the smelting process used to produce silicon metal and ferro-silicon alloys.

This part of EN 13263 gives requirements for chemical and physical properties for silica fume to be used as a type II addition in concrete conforming to EN 206-1, or in mortars, grouts and other mixes. This part of EN 13263 also states conformity criteria and related rules.

EN 13263 does not give rules for the use of silica fume in concrete. Some rules are given in EN 206-1.

NOTE 1 Supplementary rules related to the use of silica fume in concrete may be given in non conflicting national standards for concrete.

NOTE 2 EN 206-1 (5.2.5.1 in the 2000 edition) provides conditions for national acceptance of silica fumes coming from calcium silicon alloys production or other silica fumes, not conforming completely to EN 13263, as type II additions for use in concrete.

2 Normative references

The following referenced documents are indispensable for the application of this European Standard. 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 196-6, *Methods of testing cement — Part 6: Determination of fineness*

EN 196-7:2007 ^[A1], *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 206-1 *Concrete — Part 1: Specification, performance, production and conformity*

EN 413-2:2005 ^[A1], *Masonry cement — Part 2: Test methods*

EN 451-1, *Method of testing fly ash — Part 1: Determination of free calcium oxide content*

EN 934-2, *Admixtures for concrete, mortar and grout — Part 2: Concrete admixtures — Definitions, requirements, conformity, marking and labelling*

EN 13263-2:2005, *Silica fume for concrete — Part 2: Conformity evaluation*

ISO 9277, *Determination of the specific surface area of solids by gas adsorption using the BET method*

ISO 9286, *Abrasive grains and crude — Chemical analysis of silicon carbide*

3 Terms and definitions

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

EN 13263-1:2005+A1:2009 (E)**3.1
activity index**

measurement of the effect of silica fume on the compressive strength of mortar

**3.2
allowable probability of acceptance
CR**

for a given sampling plan, the allowed probability of acceptance of silica fume with a characteristic value outside the specified characteristic value

**3.3
autocontrol**

continuous statistical quality control of the silica fume based on the testing of samples taken by the manufacturer at point(s) of release from the silica fume production plant

**3.4
autocontrol testing**

continual testing by the manufacturer of silica fume spot samples taken at the point(s) of release from the production plant

**3.5
certificate of conformity to EN 13263-1**

document issued under the rules of a certain scheme for the evaluation of conformity indicating that adequate confidence is provided that a silica fume is in conformity with this part of EN 13263

**3.6
certification**

procedure by which a third party gives written assurance that a product, process or service conforms to specified requirements

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[EN 45020:1998]

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**3.7
certification body**

impartial body, governmental or non-governmental, possessing the necessary competence and responsibility to carry out conformity certification according to given rules of procedure and management

**3.8
certified silica fume**

silica fume for which a certificate of conformity (see 3.5) has been issued

**3.9
characteristic value**

value having a prescribed probability of not being attained in a hypothetical unlimited test series

[ISO 8930:1987]

NOTE Equivalent to "fractile" which is defined in ISO 3534-1:1993.

**3.10
conformity mark**

protected mark applied on the basis of the certificate of conformity (see 3.5)

**3.11
control period**

period of production and dispatch identified for the evaluation of the autocontrol test results

3.12**densified silica fume**

silica fume that has been treated to increase the bulk density by particle agglomeration, the bulk density typically being above 500 kg/m³

3.13**depot**

bulk silica fume handling facility – not located at the production plant – used for the dispatch of silica fume – whether in bulk or bagged – after transfer or storage where the manufacturer has full responsibility for all aspects of the quality of the silica fume

3.14**existing production plant**

production plant which is already producing silica fume under the certification scheme

3.15**factory production control**

permanent internal control of silica fume production exercised by the manufacturer including internal quality control and autocontrol testing

NOTE The required activities are stated in 4.1 to 4.3 in EN 13263-2:2005.

3.16**further testing of samples**

testing according to 4.4 in EN 13263-2:2005

3.17**initial period**

immediate period after the first issuing of the certificate of conformity for a silica fume (see 5.6.1 in EN 13263-2:2005 for duration)

3.18**initial type testing**

testing of the first audit sample according to 5.4 in EN 13263-2:2005

3.19**inspection body**

impartial body having the organization, staffing, competence and integrity to perform according to specified criteria functions such as assessing, recommending for acceptance and subsequent audit of manufacturers' quality control operations, and selection and evaluation of products on site or in factories or elsewhere, according to specific criteria

3.20**new production plant**

production plant which is not already producing silica fume under the certification scheme

3.21**production plant**

facility used by a manufacturer for the production of silica fume:

- a) silicon metal or silicon alloy production plant;
- b) processing plant, for example for the selection, slurrifying, blending or densifying of silica fume.

3.22**quality control**

part of quality management focused on fulfilling quality requirements

[EN ISO 9000:2000]

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EN 13263-1:2005+A1:2009 (E)**3.23****sampling plan**

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

3.24**silica fume**

very fine particles of amorphous silicon dioxide collected as a by-product of the smelting process used to produce silicon metal and ferro-silicon alloys

NOTE 1 Silica fume may be processed, for example by classification, selection, blending, densifying, or slurrifying, or by a combination of these processes, in adequate production plants. Such processed silica fume may consist of silica fumes from different sources, each conforming to the definition given in this subclause.

NOTE 2 Other names used for silica fume are condensed silica fume and microsilica.

3.25**silica fume slurry**

homogeneous, pH regulated liquid suspension of silica fume in water, typically with a dry content of 50 % by mass, corresponding to about 700 kg of silica fume per m³ of slurry

3.26**single result limit value**

value of a chemical or physical 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

3.27**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

NOTE Conformity with the specified characteristic values in this part of EN 13263 is verified by the methods in 7.2.

3.28**spot sample**

[A₁] sample taken within a short period of time and at a fixed point from within a larger quantity, relating to the intended tests. It can be obtained by combining one or more immediately consecutive increments

[EN 196-7:2007] **[A₁]**

3.29**test**

technical operation that consists of the determination of a characteristic of a product according to a specified procedure

[Adapted from EN 45020:1998]

3.30**test cement**

selected brand of Portland cement of type CEM I, strength class 42,5 N or higher, conforming to EN 197-1 to be used for carrying out the tests needed to evaluate conformity to the requirement of 5.3.3 in this part of EN 13263

Test cement is selected by the silica fume manufacturer and is further characterized by its fineness and contents of tricalcium aluminate and alkalis as follows:

- Fineness: 300 m²/kg to 400 m²/kg when determined in accordance with EN 196-6;
- Tricalcium aluminate: 8 % to 12 % when determined in accordance with EN 196-2;

— Alkalis (Na_2O eqv): 0,6 % to 1,2 % when determined in accordance with EN 196-2.

3.31

testing laboratory

laboratory which measures, examines, tests, calibrates or otherwise determines the characteristics or performance of materials or products

3.32

test method

specified technical procedure for performing a test

[EN 45020:1998]

3.33

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

3.34

undensified silica fume

silica fume taken directly from the collection filter, the bulk density typically being in the range 150 kg/m^3 to 350 kg/m^3

3.35

works' quality manual

document that provides information on the production control which is applied by a manufacturer at a particular production plant to ensure conformity of the silica fume with the requirements of this part of EN 13263

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4 Health, hygiene and environment

SIST EN 13263-1:2005+A1:2009

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Concerning release of dangerous substances and emission of radioactivity, see Annex A (normative).

Materials used in products shall not release any dangerous substances in excess of the maximum permitted levels specified in a relevant European Standard for the material or permitted in the national regulation of the Member State of destination.

5 Specifications

5.1 General

The chemical and physical requirements in 5.2 and 5.3 are specified as characteristic values. Conformity to a specified characteristic value is assessed by means of a statistical control procedure as described in clause 7.

The test methods prescribed in this part of EN 13263 are reference methods. In factory production control, see EN 13263-2, other methods may be used provided they give results equivalent to those obtained with the reference method. In case of dispute, only the reference method shall be used.

The properties in 5.2.1 to 5.3.1 are specified as proportions by mass of dry silica fume. The laboratory samples shall be dried in a ventilated oven at $(105 \pm 5)^\circ\text{C}$ to constant mass and then cooled in a dry atmosphere.