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Zidarski cement - 1. del: Sestava, zahteve in merila skladnosti

Masonry cement - Part 1: Composition, specifications and conformity criteria

Putz- und Mauerbinder - Teil 1: Zusammensetzung, Anforderungen und Konformitätskriterien

Ciment de maçonner - Partie 1: Composition, spécifications et criteres de conformité

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Masonry cement - Part 1: Composition, specifications and conformity criteria

Ciment de maçonnerie - Composition, spécifications et critères de conformité

Putz- und Mauerbinder - Teil 1: Zusammensetzung, Anforderungen und Konformitätskriterien

This European Standard was approved by CEN on 10 December 2003.

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Foreword

This document (EN 413-1:2004) 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of an identical text or by endorsement, at the latest by August 2004, and conflicting national standards shall be withdrawn at the latest by November 2005.

This document supersedes ENV 413-1:1994.

The European Standard, EN 413, “Masonry cement”, consists of the following Parts:

Part 1: Composition, specifications and conformity criteria;

Part 2: Test methods.

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.

EN 413-1 has been prepared to provide a range of materials from which users of EN 998-1, EN 998-2 and ENV 1996-1-1 (Eurocode 6) can select with confidence to achieve the level of strength and durability required of masonry and rendering.

The main changes from ENV 413-1:1994 are as follows:

- organic additives that may be included shall not be more than 0,5 % (see Table 1);

- the final setting time is an optional requirement if the initial setting time is less than 6 h (see 5.3.3);

- the upper limit for water retention is removed (see Table 2);

The requirements of this European Standard are, where appropriate, based on the results from tests on masonry cement in accordance with EN 196 'Methods of testing cement'. Strength is measured on a standard mortar prepared in accordance with EN 196-1 with a fixed water/cement ratio and compacted using the equipment described in EN 196-1 or EN 459-2. However, some additional tests have been found necessary and these tests are described in EN 413-2.

CEN/TC 51 recognises the importance of workability (cohesivity at standard consistence) of mortars prepared from masonry cements. A test method is available in CR 13933, and in which results of a test programme are also given. This test method was not found valid for standard requirement purposes due to its lack of reproducibility, however it provides valuable information for the manufacturers and users on the property in use of masonry cements.

The properties of bond and durability (resistance to frost and/or chemical attack) of mortars are very important and appropriate mortar tests are being developed by CEN/TC 125, Masonry. In many applications, particularly in severe environmental conditions, the choice of the type/class of masonry cement from EN 413-1 can influence the durability of mortar, e.g. in respect of frost and chemical resistance.

Annex A is informative.

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

The basis for this European Standard has been the national standards already existing in Europe. These national standards differ from each other; some of the differences relate to important principles of definition and specification of properties and composition.

CEN/TC 51 has not found it appropriate to prepare a European masonry cement standard which is a common denominator of all existing national standards. Masonry cement should be defined and specified precisely with sufficiently stringent requirements to satisfy those who are responsible for the design and construction of buildings and other structures for maximum safety and durability.

CEN/TC 51 has, on the other hand, been aware that a precise and detailed formulation of a European Standard may render it more difficult to adopt the standard in the countries where the national standards differ from it.

CEN/TC 51 has made every effort to obtain a balance between an adequate and clear wording of this standard and the anticipated national difficulties of adoption.

EN 413-1 is a carefully balanced compromise which has been thoroughly discussed, taking into account the need to arrive at a usable standard.

1 Scope

This European Standard specifies the definition and composition of masonry cements as commonly used in Europe for the production of mortar for bricklaying and blocklaying and for rendering and plastering. It includes physical, mechanical and chemical requirements and defines strength classes. EN 413-1 also states the conformity criteria and the related rules. Necessary durability requirements are also given.

NOTE For normal applications the information given in EN 413-1, in EN 998-1 and in EN 998-2 is generally sufficient. However, in special cases, an exchange of additional information between the masonry cement producer and user can be helpful. The details of such an exchange are not within the scope of EN 413-1 but should be dealt with in accordance with national standards or other regulations or can be agreed between the parties concerned.

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

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

EN 196-21[1)], *Methods of testing cement — Part 21: Determination of the chloride, carbon dioxide and alkali content of cement.*

EN 197-1, *Cement — Part 1: Composition, specification and conformity criteria for common cements.*

EN 197-2:2000, *Cement — Part 2: Conformity evaluation.*

EN 413-2, *Masonry cement — Part 2: Test methods.*

EN 459-1, *Building lime - Part 1: Definitions, specifications and conformity criteria.*

EN 459-2: 2001, *Building lime — Part 2: Test methods.*

EN 12878, *Pigments for the colouring of building materials based on cement and/or lime - Specifications and methods of test.*

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

3 Terms and definitions

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

3.1
masonry cement
factory made finely powdered hydraulic binder which relies essentially upon the presence of Portland cement clinker to develop strength. When mixed with sand and water only and without the addition of further materials it produces a workable mortar suitable for use in rendering, plastering and masonry work

3.2
additives
constituents which are added to improve the manufacture or the properties of the masonry cement, e.g. grinding aids, air-entraining agents

3.3
autocontrol testing
continual testing by the manufacturer, of masonry cement spot samples taken at the point(s) of release from the factory/depot

3.4
control period
period of production and despatch identified for the evaluation of the autocontrol test results

3.5
characteristic value

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

3.6

specified characteristic value
characteristic value of a mechanical, physical or chemical 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

3.7
single result limit value
value of a mechanical, physical or chemical property which, for any single test result as 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

3.8
allowable probability of acceptance CR
for a given sampling plan, the allowed probability of acceptance of masonry cement with a characteristic value outside the specified characteristic value

3.9
sampling plan
specific plan which states the (statistical) sample size(s) to be used, the percentile P_k and the allowable probability of acceptance CR

3.10
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)

4 Notation

Masonry cement is designated by the term 'MC'.

There are three strength classes of masonry cement, 5, 12,5 and 22,5.

The term 'X' designates masonry cements in which an air entraining agent is not incorporated.

5 Requirements

5.1 General

The physical, mechanical and chemical properties of masonry cements shall be measured by the test methods described in EN 413-2 and in the relevant parts of EN 196. These European Standards give alternative test methods for some properties but in the event of a dispute only the reference methods shall be used. Where allowed in the relevant part of EN 196, different methods may be used provided they give correlated and equivalent values to those obtained using the reference method.

The CEN Standard sand (see EN 196-1) used to make the mortars for the tests required by 5.3.5 and 5.3.6 shall have a silica content (as quartz) of not less than 93 %.

NOTE EN 196-1 permits the use of CEN Standard sands that have been assessed against the CEN Reference sand in respect of their strength characteristics. According to this standard the CEN Standard sand is used in mortar for tests other than that for strength. These tests have only been evaluated using CEN Standard sand based essentially on silica.

All requirements are specified as characteristic values. They serve to define the performance level and classification of the masonry cements.

5.2 Constituents and composition

Masonry cement shall comprise Portland cement clinker, inorganic constituents and where appropriate additive(s) as given in Table 1. Calcium sulfate is added in small quantities to the other constituents of masonry cement during its manufacture to control setting.

The inorganic constituents of masonry cements conforming to EN 413-1 shall be materials selected from:

— natural mineral materials;

— mineral materials used for or derived from the clinker production process;

— hydrated and/or hydraulic building limes conforming to EN 459-1;

— constituents specified in EN 197-1;

— inorganic pigments (except those containing carbon black) conforming to EN 12878.

NOTE Carbon black has a detrimental effect upon the air entrainment.

Additives shall not promote corrosion of embedded metal such as reinforcement and wall ties or impair the properties, including behaviour in fire, of the mortar made from the masonry cement. Organic pigments are not permitted.

Table 1 — Composition of masonry cements

Type	Content % by mass	
	Portland cement clinker	Additives
MC 5	≥ 25	≤ 1 [a]
MC 12,5 MC 12,5 X MC 22,5 X	≥ 40	
[a] The quantity of organic additives on a dry basis shall not exceed 0,5 % by mass of the masonry cement.		

The manufacturing process and its control shall ensure that the composition of masonry cement is kept within the limits fixed in EN 413-1. Masonry cements consist ultimately of individual small grains of different materials and are statistically homogeneous in composition resulting from quality assured production and material handling processes.

A high degree of uniformity in all masonry cement properties shall be obtained through mass production processes, in particular, adequate grinding and homogenization. Qualified and skilled personnel and the facilities to test, evaluate and adjust product quality are indispensable for producing masonry cement in accordance with this European Standard.

5.3 Physical and mechanical requirements

5.3.1 Fineness (sieve residue)

The residue on a 90 µm sieve shall be not more than 15 % by mass when determined in accordance with EN 196-6.

5.3.2 Initial setting time

The initial setting time shall be not less than 60 min when determined in accordance with EN 413-2.

5.3.3 Final setting time

Where the initial setting time is less than 6 h, there is no requirement for final setting time. Where the initial setting time is 6 h or more, the final setting time shall be not more than 15 h when determined in accordance with EN 413-2.

5.3.4 Soundness

The expansion shall be not more than 10 mm when determined in accordance with EN 196-3.

5.3.5 Fresh mortar requirements

The properties of air content and water retention of fresh mortar shall be measured in accordance with EN 413-2, on a mortar of standard consistence which shall have a value of penetration of (35 ± 3) mm using the plunger apparatus as the reference method. The flow table test is the alternative method. The test results shall meet the requirements given in Table 2.