



SLOVENSKI STANDARD

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Nadomešča:

SIST EN 12878:2005

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Pigmenti za obarvanje gradbenih materialov na osnovi cementa in/ali apna - Specifikacije in metode preskušanja

Pigments for the colouring of building materials based on cement and/or lime -
Specifications and methods of test

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Pigmente zum Einfärben von zement- und/oder kalkgebundenen Baustoffen -
Anforderungen und Prüfverfahren

SIST EN 12878:2014

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Pigments de coloration des matériaux de construction à base de ciment et/ou de chaux -
Spécifications et méthodes d'essai

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Pigments for the colouring of building materials based on cement and/or lime - Specifications and methods of test

Pigments de coloration des matériaux de construction à
base de ciment et/ou de chaux - Spécifications et méthodes
d'essai

Pigmente zum Einfärben von zement- und/oder
kalkgebundenen Baustoffen - Anforderungen und
Prüfverfahren

This European Standard was approved by CEN on 4 January 2014.

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 CEN-CENELEC Management Centre or to any CEN member.

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COMITÉ EUROPÉEN DE NORMALISATION
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EN 12878:2014 (E)**Foreword**

This document (EN 12878:2014) has been prepared by Technical Committee CEN/TC 298 "Pigments and extenders", 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of an identical text or by endorsement, at the latest by October 2014 and conflicting national standards shall be withdrawn at the latest by January 2016.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12878:2005.

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 the Construction Production Regulation (CPR).

For relationship with the Construction Production Regulation, see informative Annex ZA, which is an integral part of this document.

EN 12878:2005 has been technically revised as follows:

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- a) requirements for Category B regarding water soluble substances in 4.2.3 modified to accommodate non powder preparations;
 - b) test method for total chlorine content (5.2.5) changed;
 - c) permission to use alternative test methods with proven correlation to standard methods added;
 - d) light source amended;
 - e) Annex ZA has been changed to consider the new Construction Production Regulation (CPR).

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, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This European Standard specifies the requirements and the methods of test for pigments for use in the colouring of building materials based on cement and cement/lime combinations.

Pigments covered by this European Standard may also be used in pure lime mortar. For this application, see EN 459-1 and EN 459-2.

Pigments for this purpose may be single pigments, blends of pigments, or blends of pigments and extenders, in powder or granular form, or aqueous preparations.

Pigments typically belong to one of the following classes of compounds:

- synthetic or natural oxides and hydroxides of iron;
- oxides of chromium, titanium and manganese;
- complex inorganic pigments, for example combinations of the above mentioned metal oxides and hydroxides with cobalt, aluminium, nickel and antimony oxides and hydroxides;
- ultramarine pigments;
- phthalocyanine blue and green;
- elemental carbon (shall be regarded as an inorganic pigment);
- blends of the above materials (which may also include extenders).

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2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 196-1:2005, *Methods of testing cement - Part 1: Determination of strength*

EN 196-3, *Methods of testing cement - Part 3: Determination of setting times and soundness*

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

EN 934-1:2008, *Admixtures for concrete, mortar and grout - Part 1: Common requirements*

EN ISO 787-3, *General methods of test for pigments and extenders - Part 3: Determination of matter soluble in water - Hot extraction method (ISO 787-3)*

EN ISO 787-7, *General methods of test for pigments and extenders - Part 7: Determination of residue on sieve - Water method - Manual procedure (ISO 787-7)*

EN ISO 787-9, *General methods of test for pigments and extenders - Part 9: Determination of pH value of aqueous suspension (ISO 787-9)*

EN ISO 787-13, *General methods of test for pigments and extenders - Part 13: Determination of water-soluble sulfates, chlorides and nitrates (ISO 787-13)*

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EN ISO 15528, *Paints, varnishes and raw materials for paints and varnishes - Sampling (ISO 15528)*

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

3 Terms and definitions

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

3.1 pigment
substance, generally in the form of fine particles, which is practically insoluble in the application medium and whose sole purpose is to colour cement- and/or lime-based building materials

3.2 single pigment
pigment that is of singular (chemical) composition

Note 1 to entry: Single pigments contain no substances other than those originating from the pigment manufacturing process.

Note 2 to entry: Surface treatment of the primary pigment particles is considered as a part of the pigment manufacturing process.

3.3 pigment blend
blend of at least two single pigments, or at least one single pigment and an extender

3.4 aqueous pigment preparation
preparation in which a pigment (single pigment or pigment blend) is dispersed in water, with or without a dispersion or other agent

EXAMPLES of agents are:

- dispersants;
- binding agents (resins);
- solvents;
- wetting agents;
- or combinations thereof.

3.5 pigment in granular form
preparation in which a pigment (single pigment or pigment blend) is converted into granules, by the use of the binding agent which retains the integrity of the granule

3.6 reference sample; standard pigment
sample of a single pigment or a blend (powder, or preparation) retained by the interested parties for comparison for the evaluation of the product properties (e.g. colour)

3.7

extender

inorganic substance, generally in the form of fine particles, which is practically insoluble in the application medium and has no inherent colour properties

4 Requirements

4.1 Effects on concrete properties

4.1.1 General

Pigments for steel reinforced concrete shall additionally meet all Category B requirements given in 4.1.3, 4.2.3 to 4.2.5.

The inorganic pigment dosage shall be 5,0 % solids, carbon black and organic pigment dosage of 2,0 % solids, by mass, based on the cement amount for testing according 5.1.

If a higher dosage of pigment is recommended the tests shall be carried out with that dosage.

The dosage in percent by mass shall be specified by the manufacturer.

4.1.2 Setting time

4.1.2.1 Initial setting time

The initial setting time of cement with the single pigment or a blend (both as powder, granulate or preparation), determined in accordance with 5.1.1, shall be not less than 60 min.

The maximum difference between the initial setting time of mixes with and without the single pigment or a blend (both as powder, granulate or preparation) shall be not greater than 60 min.

4.1.2.2 Final setting time

The final setting time of cement with the single pigment or a blend (both as powder, granulate or preparation), determined in accordance with 5.1.1, shall not be longer than 720 min. The maximum difference between the final setting time of mixes with and without the single pigment or a blend (both as powder, granulate or preparation) shall be not greater than 120 min.

4.1.3 Compressive strength

The 28 day compressive strength of mixes with the single pigment or a blend (both as powder, granulate or preparation), determined in accordance with 5.1.2, shall not be reduced in comparison with the mix without pigment more than

- Category A: the manufacturer's declared value;
- Category B: 8 %.

4.2 Composition

4.2.1 General

The stability of a pigment with respect to colour shall be linked to the intended end use conditions.

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The solids content, as a percentage (%) of aqueous preparations, shall be declared by the manufacturer.

4.2.2 Constitution of pigments

The main constituents of the pigments are determined in accordance with 5.2.1 and 5.2.2.

4.2.3 Water soluble substances

The content of water soluble substances, determined in accordance with 5.2.3, shall not be greater than

- Category A: the manufacturer's declared value
- Category B: 0,5 % by mass for single pigments and pigment blends. Where additives such as dispersion agents, binding agents and/or grinding aids are used for powder and non-powder preparations, their total water soluble content shall be equal to or less than 5,0 % (8 % for carbon black) by mass, based on solids. The used additives shall conform to EN 934-1:2008, Annex A.1.

For pigment blends in powder form, evidence of compliance may be calculated from data recorded for constituent single pigments.

4.2.4 Soluble chloride

The soluble chloride content of a single pigment or a blend (powder, granulate or preparation), determined in accordance with 5.2.4, shall not be greater than

- Category A: the manufacturer's declared value;
- Category B: 0,10 % by mass.

For pigment blends in powder form, evidence of compliance may be calculated from data recorded for constituent single pigments.

Where pigment blends, pigment/extender mixtures, or granulates or aqueous preparations thereof, are used in excess of 5 % based on cement, the total content of halides which are admitted into the concrete should not exceed 0,005 % based on the cement.

4.2.5 Total chlorine

The total chlorine content of a single pigment or a blend (powder, granulate or preparation), determined in accordance with 5.2.5, shall not be greater than

- Category A: the manufacturer's declared value;
- Category B: 0,10 % by mass.

For pigment blends in powder form, evidence of compliance may be calculated from data recorded for constituent single pigments.

4.3 Loss on ignition

The loss on ignition of a single pigment or a blend (powder, granulate or preparation), determined in accordance with 5.3, shall be declared by the manufacturer.

4.4 Emission of radioactivity

Where subject to regulatory requirements, the emission of radioactivity by a single pigment or a blend (powder, granulate or preparation) shall be declared.

4.5 Release of dangerous substances

Where subject to regulatory requirements, the release of dangerous substances by a single pigment or a blend (powder, granulate or preparation) shall be declared.

National regulations on dangerous substances may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets.

In the absence of European harmonized test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

NOTE An informative database covering European and national provisions on dangerous substances is available at the Construction website on EUROPA accessed through: <http://ec.europa.eu/enterprise/construction/cpd-ds/>

4.6 Relative colour strength

The relative colour strength in comparison with the standard pigment, determined in accordance with 5.6, shall be 100 % \pm 5 %.

4.7 Residue on sieve

The residue on the sieve of pigment in powder form, determined in accordance with 5.7, shall be declared by the manufacturer.

4.8 pH value

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The pH value, determined in accordance with 5.8, shall conform with the manufacturer's specified value \pm 2.

4.9 Alkali stability

The manufacturer shall declare that the pigment, tested in accordance with 5.9, is alkali stable.

4.10 Resistance to weathering

The manufacturer shall declare that the pigment, tested in accordance with 5.10, is resistant to weathering.

4.11 Thermal stability

The manufacturer shall declare that the pigment, tested in accordance with 5.11, is thermally stable.

4.12 Colour comparison against standard pigment

The manufacturer shall declare the ΔE value, compared against the standard pigment, tested in accordance with 5.12.

NOTE Research into the repeatability and reproducibility of this test method has shown that samples prepared using the same pigments at five separate laboratories produced results within a ΔE range of 0,5.

EN 12878:2014 (E)**5 Test methods****5.1 Effect on concrete properties****5.1.1 Setting time**

The influence on the setting time of cement shall be tested using the test method described in EN 196-3, using a paste made with Portland cement CEM I 42,5 R conforming to EN 197-1, with and without the addition of pigment.

5.1.2 Compressive strength

The influence of a pigment on the 28 day compressive strength of the mortar shall be tested in accordance with EN 196-1. The mortar shall be made with Portland cement CEM I 42,5 R conforming to EN 197-1 (same cement as in 5.1.1) with and without the addition of pigment.

The water content of aqueous pigment preparations shall be taken into account.

5.2 Composition**5.2.1 General**

Any physical effects are determined by way of comparative tests on pigmented and unpigmented cement paste, mortar or concrete mixes, as appropriate. When using pigment preparations (3.4 and 3.5), the pigment solids content shall be taken into consideration in the mix composition.

Generally, an amount of not more than 10,0 % pigment should be added to cement or lime.

Sampling shall be in accordance with 6.2.

5.2.2 Composition of the pigments

Determine the chemical composition of the pigments (4.2.2) in accordance with the relevant standard (see Bibliography). Where no standard exists, appropriate up-to-date analytical procedures shall be used.

5.2.3 Water soluble substances

The determination of the water soluble content shall be performed in accordance with EN ISO 787-3. In pigment preparations (3.4 and 3.5) the quantity to be used is chosen so that it contains the amount of solids indicated in EN ISO 787-3.

5.2.4 Soluble chloride

Conduct the test for water soluble chloride in accordance with EN ISO 787-13. For pigment preparations (3.4 and 3.5), the quantity to be used is chosen so that it contains the amount of solids indicated in EN ISO 787-3.

5.2.5 Total chlorine**5.2.5.1 Reagents**

5.2.5.1.1 Sodium carbonate, anhydrous

5.2.5.1.2 Nitric acid 1:1 (1 volume 65 % nitric acid (density 1,4 g/cm³) and 1 volume water)

5.2.5.1.3 0,1 N silver nitrate solution