



SLOVENSKI STANDARD
oSIST prEN 12878:2018
01-junij-2018

**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

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

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 draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 298.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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prEN 12878:2018 (E)**European foreword**

This document (prEN 12878:2018) has been prepared by Technical Committee CEN/TC 298 “Pigments and extenders”, the secretariat of which is held by DIN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 12878:2014.

This document has been prepared under a standardization request given to CEN by the European Commission and the European Free Trade Association.

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

The main changes with respect to the previous edition are listed below:

- a) revision according to TFN548rev1, TFN 577 and TFN687rev1;
- b) correction of the “chlorine” to “chloride”;
- c) general editorial revision.

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1 Scope

This document specifies the characteristics 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 document 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).

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 196-1:2016, *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 591-1, *Titanium dioxide pigments for paints — Part 1: Specifications and methods of test (ISO 591-1)*

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 1248, *Iron oxide pigments — Specifications and methods of test (ISO 1248:2006 including Technical Corrigendum 1:2007)*

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

EN ISO 18451-1, *Pigments, dyestuffs and extenders — Terminology — Part 1: General terms (ISO 18451-1)*

EN ISO 18451-2, *Pigments, dyestuffs and extenders — Terminology — Part 2: Classification of colouring materials according to colouristic and chemical aspects (ISO 18451-2)*

ISO 788, *Ultramarine pigments for paints*

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

ISO 4621, *Chrome oxide green pigments — Specifications and methods of test*

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 terms and definitions given in EN ISO 18451-1, EN ISO 18451-2 and the following apply.

3.1 pigment

colourant consisting of particles, insoluble in the application medium (e.g. coating material or plastic)

Note 1 to entry: Pigments can be further described on the basis of their chemical composition, their optical or technical properties, e.g. inorganic pigment, organic pigment, coloured pigment, white pigment, effect pigment, corrosion-inhibiting pigment, magnetic pigment.

Note 2 to entry: Pigments for ceramics, glass and vitreous enamels are called stains.

Note 3 to entry: Whether a given substance is to be considered as pigment or extender depends on its application.

[SOURCE: EN ISO 18451-1:2017, definition 2.95]

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**

substance in granular or powder form, insoluble in the medium (e.g. coating material) and used to modify or influence certain physical properties

Note 1 to entry: The German terms “Extender”, “Extenderpigment”, “Pigmentextender” or “Verschnittmittel” should be avoided.

Note 2 to entry: Whether a given substance is to be considered as pigment or extender depends on its application.

[SOURCE: EN ISO 18451-1:2017, definition 2.34]

4 Characteristics**4.1 Effects on concrete properties****4.1.1 General**

Pigments for steel reinforced concrete shall additionally meet all Category B characteristics 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.

prEN 12878:2018 (E)**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 %.

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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.

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 % (8,0 % 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 chloride

The total chloride 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) shall be determined in accordance with 5.3.

4.4 Emission of radioactivity

When declared, the emission of radioactivity by a single pigment or a blend (powder, granulate or preparation) shall be assessed.

4.5 Release of dangerous substances

The release of dangerous substances by a single pigment or a blend (powder, granulate or preparation) shall be declared.

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

NOTE An informative database covering European and national provisions on dangerous substances is available at the Construction website on EUROPA accessed through:

https://ec.europa.eu/growth/tools-databases/cp-ds_en

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 shall be determined in accordance with 5.7.

4.8 pH value

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

prEN 12878:2018 (E)**4.9 Alkali stability**

For alkali stability the pigment shall be tested in accordance with 5.9.

4.10 Resistance to weathering

The resistance of weathering of the pigment shall be assessed in accordance with 5.10.

4.11 Thermal stability

The thermal stability of the pigment shall be tested in accordance with 5.11.

4.12 Colour comparison against standard pigment

The ΔE_{ab}^* value, compared against the standard pigment, shall be 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_{ab}^* range of 0,5.

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 in Table 1. If no standard exists, appropriate up-to-date analytical procedures shall be used.