



# SLOVENSKI STANDARD

## SIST EN 12206-1:2005

01-april-2005

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### Barve in laki - Premazi za aluminij in aluminijeve zlitine v gradbeništvu - 1. del: Praškasti premazi

Paints and varnishes - Coating of aluminium and aluminium alloys for architectural purposes - Part 1: Coatings prepared from coating powder

Beschichtungsstoffe - Beschichtungen auf Aluminium und Aluminiumlegierungen für Bauzwecke - Teil 1: Beschichtungen aus Beschichtungspulvern

Peintures et vernis - Revêtements de l'aluminium et des alliages d'aluminium pour applications architecturales - Partie 1: Revêtements à partir de peintures en poudre

**Ta slovenski standard je istoveten z: EN 12206-1:2004**

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87.040

Barve in laki

Paints and varnishes

**SIST EN 12206-1:2005**

**en**

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English version

Paints and varnishes - Coating of aluminium and aluminium alloys for architectural purposes - Part 1: Coatings prepared from coating powder

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This European Standard was approved by CEN on 27 December 2001.

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.

CEN members are the national standards bodies of 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.

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## Foreword

This document (EN 12206-1:2004) has been prepared by Technical Committee CEN/TC 139 "Paints and varnishes", 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 December 2004, and conflicting national standards shall be withdrawn at the latest by December 2004.

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.

Annexes A, B, C, D and F are normative, annex E is for information only.

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## Introduction

This is the first Part of EN 12206. The present intention is to develop another Part dealing with the organic coating of aluminium and aluminium alloy extrusions, sheet and preformed sections for architectural purposes, prepared from liquid coating materials.

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## 1 Scope

This Part of EN 12206 specifies requirements and the corresponding methods of test relating to the organic coating of aluminium and aluminium alloy extrusions, sheet and preformed sections for architectural purposes, using coating powders. It also describes:

- a) the pretreatment of the substrate prior to the coating process;
- b) the coating powder;
- c) the coating process;
- d) the final product.

Each item is dealt with separately in this Part of EN 12206 so that any interested party can ensure compliance appropriate to its area of responsibility.

**CAUTION — The procedures described in this standard are intended to be carried out by suitably trained and/or supervised personnel. The substances and procedures used in this method may be injurious to health if adequate precautions are not taken. Attention is drawn in the text to specific hazards. This standard refers only to technical suitability and does not absolve the user from statutory obligations relating to health and safety.**

## 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 573-3, *Aluminium and aluminium alloys – Chemical composition and form of wrought products – Part 3: Chemical composition*.

EN ISO 1519, *Paints and varnishes – Bend test (cylindrical mandrel) (ISO 1519:2002)*.

EN ISO 1520, *Paints and varnishes – Cupping test (ISO 1520:1999)*.

EN ISO 2409, *Paints and varnishes – Cross-cut test (ISO 2409:1992)*.

EN ISO 2813, *Paints and varnishes – Determination of specular gloss of non-metallic paint films at 20°, 60° and 85° (ISO 2813:1994, including Technical Corrigendum 1:1997)*.

EN ISO 3231, *Paints and varnishes – Determination of resistance to humid atmospheres containing sulfur dioxide (ISO 3231:1993)*.

EN ISO 3668, *Paints and varnishes – Visual comparison of the colour of paints (ISO 3668:1998)*.

EN ISO 3696, *Water for analytical laboratory use – Specification and test methods (ISO 3696:1987)*.

EN ISO 6270-1, *Paints and varnishes – Determination of resistance to humidity – Part 1: Continuous condensation (ISO 6270-1:1998)*.

EN ISO 8130-9, *Coating powders – Part 9: Sampling (ISO 8130-9:1992)*.

EN ISO 8565, *Metals and alloys – Atmospheric corrosion testing – General requirements for field tests (ISO 8565:1992)*.

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EN ISO 11341:1997, *Paints and varnishes – Artificial weathering and exposure to artificial radiation – Exposure to filtered xenon-arc radiation (ISO 11341:1994)*.

ISO 2810, *Paints and varnishes – Notes for guidance on the conduct of natural weathering tests*.

ISO 2859-1, *Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*.

ISO 2859-2, *Sampling procedure for inspection by attributes – Part 2: Sampling plans indexed by limiting quality (LQ) for isolated lot inspection*.

ISO 7724-3, *Paints and varnishes – Colorimetry – Part 3: Calculation of colour differences*.

ISO 9227, *Corrosion tests in artificial atmospheres – Salt spray tests*.

### 3 Terms and definitions

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

#### 3.1

##### **powder coating**

a continuous layer of a coating powder which has been applied to the aluminium or aluminium alloy substrate and which is protective or decorative, or both

#### 3.2

##### **conversion layer**

a layer produced on an aluminium surface by chemical pretreatment with or without the use of an applied electric current

#### 3.3

##### **finish**

the surface of the coated article which determines its appearance

#### 3.4

##### **coating powder**

a solvent-free coating material in powder form which, after fusing and possible curing, gives a continuous film

[EN 971-1:1996]

#### 3.5

##### **significant surface**

that area of the article on which the coating is essential for serviceability and/or appearance

#### 3.6

##### **specifier**

the person specifying the performance requirements for the coating and significant surfaces of the article

#### 3.7

##### **test specimen**

a single sample of the final product to be used for testing

### 4 Requirements

#### 4.1 Material (substrate)

Aluminium and aluminium alloys are classified in accordance with EN 573-3. Suitable materials are those listed as series 1000, 3000, 5000 and 6000.



## 4.2 Pretreatment of the substrate

### 4.2.1 General

Before application of the coating powder, a pretreatment layer shall be applied. This pretreatment may be either

- a) chemical treatment with aqueous solutions containing either chromate ions or chromate and phosphate ions, without applying an electric current, or
- b) an alternative pretreatment (for instance chromium-free systems, "no-rinse-dry-in-place pretreatment" or electrolytic conversion, or other processes).

After the conversion process, the substrate is normally rinsed with deionized water, and dried.

### 4.2.2 Conventional pretreatment

#### 4.2.2.1 General

The aluminium or aluminium alloy shall be free from corrosion prior to pretreatment.

Any item previously coated or anodized shall be stripped down to the aluminium substrate prior to the pretreatment.

The sequence of the pretreatment stages is shown in annex E.

The pretreatment stages shall take place one after the other with the minimum delay in between to ensure that the surface to be pretreated does not become dry between successive stages.

The pretreatment solutions shall be applied either:

- a) **by dipping** in baths of sufficient size to allow efficient operation of the chemical process on all significant surfaces ; or
- b) **by spraying**, in tanks or cabinets made so that all significant surfaces are in contact with the spraying solution for the specified period of time.

The solution used for the conversion process is normally used for aluminium and aluminium alloys only. Pretreatment of other metals is not authorized unless removal of metallic-ion contamination is ensured.

#### 4.2.2.2 Cleaning, pickling and rinsing

All surface contaminants such as oils, greases, lubricants and other residues shall be removed using alkaline or acidic solutions and/or organic solvents in appropriate combinations. Before the conversion stage, the substrate shall be thoroughly cleaned and/or pickled.

After cleaning and/or pickling, the substrate may be rinsed (see annex E).

NOTE It is advisable that the rinse water prior to the conversion stage should comply to the following requirements :

- electrical conductivity : max. 1 000  $\mu\text{S}/\text{cm}$  ;
- chloride content : less than 100 mg/l ;
- sulfate content : less than 50 mg/l ;
- phosphate content : less than 5 mg/l (for chromate conversion only).

#### 4.2.2.3 Conversion and drying of chromate and phosphochromate layers

A conversion layer is produced by application of the appropriate solution.

Chromate conversion layers vary in colour from an iridescent yellow to a golden tan. The layers are characterized by the presence of chromium and the absence of phosphate (see annex A).

The mass per unit surface area of the conversion layer, often referred to as "conversion coating weight", as measured in accordance with the method described in annex A, shall be between 0,4 g/m<sup>2</sup> and 1 g/m<sup>2</sup>.

Phosphochromate conversion layers vary in colour from iridescent to various shades of green. The layers are characterized by the presence of both chromate and phosphate (see annex A).

The mass per unit surface area of the conversion layer, as measured in accordance with the method described in annex A, shall be between 0,4 g/m<sup>2</sup> and 1,2 g/m<sup>2</sup>.

NOTE The colours given above are only indicative. They depend on alloys used and pretreatment and do not characterize the quality of the conversion layer.

The conversion layer can be rinsed with water and shall finally be rinsed with deionized water. The electrical conductivity of the water draining off from significant surfaces at the final rinse shall be below 30 µS/cm at 20 °C.

If the final rinse is carried out with hot water, the temperature shall not exceed 60 °C and the rinsing time shall be as short as possible in order to avoid dissolving of hexavalent chromium from the conversion layer.

The layer shall be as uniform as possible, adhering to the substrate and free from any powdering.

The drying temperature after pretreatment, as measured on the metal surface, shall not exceed 100 °C if the coating powder is applied without delay or interruption after pretreatment. If it is applied with delay or interruption after pretreatment (less than 16 h but not more), the maximum temperature on the metal surface shall be as follows:

— 65 °C for chromate layers;

— 85 °C for phosphochromate layers.

The coating powder shall not be applied more than 16 h after pretreatment.

#### 4.2.3 Alternative pretreatments

Alternative pretreatments, e.g. chromium-free systems, "no-rinse-dry-in-place pretreatment" or electrolytic conversion or other processes may be specified but shall comply with the requirements of annex B.

### 4.3 Coating powder

#### 4.3.1 General

The tests shall be carried out in accordance with clause 5. The panels shall be prepared in accordance with 5.1.

NOTE A coating powder that has been found to be of suitable quality to pass the requirements of this Part of EN 12206 may then be used to confirm the suitability of other pretreatment processes.

##### 4.3.1.1 Coating powders based on conventional technology

Coating powders based on conventional technology shall meet all the criteria in 4.3. Products based on future technology may exhibit different characteristics.

##### 4.3.1.2 Enhanced durability coating powders

Enhanced durability coating powders can be specified. See annex G.

#### 4.3.2 Colour

When tested in accordance with 5.3, the colour of the coating shall match the colour previously specified with agreed limits.

#### 4.3.3 Gloss

When tested in accordance with 5.4, the gloss level of the coating shall be in the range of  $\pm 10$  units of the specified value for coatings of gloss greater than 50 units, and in the range of  $\pm 7$  units for coatings of gloss equal to or less than 50 units.

#### 4.3.4 Adhesion

When tested in accordance with 5.5, the result of the test shall be classification 0.

#### 4.3.5 Cupping test

When tested in accordance with 5.6, there shall be neither cracking in the coating nor any detachment of the coating.

#### 4.3.6 Falling weight test

When tested in accordance with 5.7, there shall be neither cracking in the coating nor any detachment of the coating.

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#### 4.3.7 Bend test

When tested in accordance with 5.8, there shall be neither cracking in the coating nor any detachment of the coating.

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#### 4.3.8 Resistance to mortar

When tested in accordance with 5.9, the mortar shall be easily removed and there shall be no detachment of the coating nor any staining.

#### 4.3.9 Pressure cooker test

When tested in accordance with 5.10, there shall be neither blistering nor detachment of the coating.

#### 4.3.10 Resistance to humidity

When tested in accordance with 5.11, there shall be no blistering, softening or detachment of the coating. Loss of adhesion of the coating from the scratches shall be no more than 1 mm.

#### 4.3.11 Resistance to acetic acid salt spray

When tested in accordance with 5.12, the coating shall show neither blistering nor more than 3 mm of corrosion from the scratches.

#### 4.3.12 Resistance to sulfur dioxide

When tested in accordance with 5.13, the coating shall show no more than 1 mm of corrosion from the scratches, and no visual colour change.

#### 4.3.13 Resistance to filiform corrosion

No requirements for resistance to filiform corrosion are laid down in this Part of EN 12206 as yet.

A test method is described in 5.14.