



SLOVENSKI STANDARD
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Vitreous and porcelain enamels - Enamel coatings applied to steel for writing surfaces -
Specification

Emails und Emailierungen - Email-Schichten auf Stahl für Schreibtäfel - Anforderungen

Emaux vitrifiés - Revêtements émaillés appliqués sur l'acier de surfaces d'écriture -
Spécification

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English Version

Vitreous and porcelain enamels - Enamel coatings applied to steel for writing surfaces - Specification

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This European Standard was approved by CEN on 8 July 2005 and includes Amendment 1 approved by CEN on 13 August 2007.

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 Management Centre 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 CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 14864:2005+A1:2007) has been prepared by Technical Committee CEN/TC 262 “Metallic and other inorganic coatings”, the secretariat of which is held by BSI.

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of an identical text or by endorsement, at the latest by March 2008, and conflicting national standards shall be withdrawn at the latest by March 2008.

This document supersedes EN 14864:2005.

This document includes Amendment 1, approved by CEN on 2007-08-13.

The start and finish of text introduced or altered by amendment is indicated in the text by tags **A1** and **A1**.

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 the United Kingdom.

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1 Scope

This European Standard specifies the requirements for the functional and aesthetic characteristics of vitreous or porcelain enamel coatings applied to plain steel for use as writing surfaces (whiteboards and chalkboards).

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 101, *Ceramic tiles - Determination of scratch hardness of surface according to Mohs*

EN 10209: 1996, *Cold rolled low carbon steel flat products for vitreous enamelling — Technical delivery conditions*

EN 14483-1:2004, *Vitreous and porcelain enamels - Determination of resistance to chemical corrosion - Part 1: Determination of resistance to chemical corrosion by acids at room temperature*

EN ISO 2178, *Non-magnetic coatings on magnetic substrates - Measurement of coating thickness - Magnetic method (ISO 2178:1982)*

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 15695, *Vitreous and porcelain enamels - Determination of scratch resistance of enamel finishes (ISO 15695:2000, including Technical Corrigendum 1:2000)*

ISO 4532, *Vitreous and porcelain enamels - Determination of the resistance of enamelled articles to impact - Pistol test*

ISO 7724-1, *Paints and varnishes — Colorimetry — Part 1: Principles*

ISO 7724-2, *Paints and varnishes — Colorimetry — Part 2: Colour measurement*

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

ASTM C501, *Standard test method for relative resistance to wear of unglazed ceramic tiles by the Taber Abrader*

3 Terms and definitions

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

3.1

vitreous or porcelain enamel

substantially vitreous, or glassy, inorganic coating bonded to metal by fusion at a temperature above 500 °C

NOTE Vitreous or porcelain enamel is a glazed surface finish designed for application to metallic surfaces for protective, functional and or decorative purposes. It is produced by the application of powdered inorganic glass, dry or suspended in water on to the metal surface, and its subsequent fusion bonding. The fused coating exhibits cubic thermal expansion of between 150K and 450×10^{-7} K in the temperature range 20 °C to 100 °C, the actual value varying specifically with the type of substrate and field of application.

3.2

vitreous or porcelain enamel writing surface

facing material or component of a chalkboard or whiteboard

NOTE Writing boards can have vitreous or porcelain enamelled sheets laminated to any of a variety of substrates, and perhaps framed, or be made from fabricated vitreous or porcelain enamelled panels.

4 Steel substrate requirements

The steel for enamelling shall conform to the requirements of EN 10209.

The interested parties shall determine by mutual agreement the required thickness of the steel.

The steel shall be free from all defects that may affect the appearance of the surface finish.

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5 Final thickness of fired enamel

When tested in accordance with EN ISO 2178, the thickness of the enamel on the outer side of the product shall be 250 µm maximum for whiteboards and 200 µm maximum for chalkboards.

6 Functional characteristics of coating

6.1 Adherence test

The adherence of the enamelled coating shall be tested in accordance with EN 10209: 1996, Annex D. For steel thickness less than 0,6 mm a fall height of 300 mm shall be used.

The adherence of the enamel shall be at least level 3 of EN 10209: 1996, Annex D.

NOTE The test can be performed on pieces fired in parallel to the production panels.

Because re-fire bond is important, the test shall be performed on the final cover coat.

6.2 Wear resistance

The resistance to abrasion of enamelled surfaces shall be tested using the TABER apparatus in accordance with ASTM C501, using emery paper S 33, and a weight of 1 kg.

The loss in mass after 1000 revolutions shall be a maximum of 0,10 g.

This test shall not serve as guidance for assessing loss in gloss.

6.3 Impact resistance

When the resistance to impact is tested in accordance with ISO 4532, and the pistol activated with a load of 20 N, there shall be no damage over 2 mm in diameter after 24 h.

6.4 Surface hardness (Mohs)

When tested in accordance with EN 101, the Mohs surface hardness shall be a minimum 5 for whiteboard, and a minimum 3 for chalkboard.

6.5 Scratch resistance

When determined in accordance with EN ISO 15695, the scratch resistance of whiteboard shall be a minimum of 7 N.

The scratch resistance of silk-screened whiteboard shall be a minimum of 4 N.

6.6 Flatness

Flatness deviations shall not be disturbing when the finished writing surface is observed from normal distances.

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6.7 Acid and chemical resistance

^{A1} When tested in accordance with Clause 9 of EN 14483-1:2004, the citric acid resistance shall be a minimum of class A for whiteboards.

When tested in accordance with Clause 11 of EN 14483-1:2004, the chemical resistance for a test time of 15 min ± 30 s shall be a minimum of class A for whiteboards and chalkboards for each of the following liquids: deionised water, ethanol, methylethylketone, xylene and toluene.

NOTE Although these reagents are not acids, the method in Clause 11 of EN 14483-1:2004 is the most appropriate. ^{A1}

7 Aesthetic characteristics of coating

7.1 Colour

Colour shall form the subject of an agreement between the contracting parties.

Conformity can be determined visually, according to predefined methods, or using suitable equipment such as a colorimeter or a spectrometer.

NOTE The colour of the enamelled surface is characterised by constancy over time.