BRITISH STANDARD

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14864:2005

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

The European Standard EN 14864:2005 has the status of a British Standard

ICS 25.220.50

BSI
British Standards

National foreword

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The UK participation in its preparation was entrusted to Technical Committee STI/36, Vitreous enamel coatings, which has the responsibility to:

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

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

Emails und Emaillierungen - Email-Schichten auf Stahl für Schreibtafeln - Anforderungen

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Foreword

This European Standard (EN 14864:2005) 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of an identical text or by endorsement, at the latest by February 2006, and conflicting national standards shall be withdrawn at the latest by February 2006.

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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, *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 x 10^{-7} K in the temperature range 20 ºC to 100 ºC, 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.

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 refire 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.

6.7 Acid and chemical resistance

When tested in accordance with EN 14483-1, the acid resistance shall be a minimum of class A for whiteboards.

When tested in accordance with EN 14483-1, the chemical resistance shall be a minimum of class A for whiteboards and chalkboards for each of the following: deionized water, ethanol, methylethylketone, xylene and toluene.

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.

7.2 Gloss

The gloss of the enamelled coating shall be the subject of an agreement between the contracting parties.

Compliance can be tested visually, according to predefined methods or measured with a gloss meter using an appropriate method such as EN ISO 2813.

In all cases, the gloss shall be in the range 2 to 20 units (at an angle of incidence of 60° in accordance with EN ISO 2813) for chalkboards and at least 35 units (at an angle of incidence of 60° in accordance with EN ISO 2813) for whiteboards.

7.3 Surface appearance

Every other particular aspect of the surface (minimal orange peel, silk-screened patterns, etc.) shall form the subject of an agreement between the contracting parties.

8 Writeability and eraseability

8.1 Chalkboards

The surface of chalkboards shall be suitable and easy to write on. Removal of writing shall be achieved smoothly with a dry felt eraser or latex sponge.

8.2 Whiteboards

The surface shall be easy to write on with dry-erasable, water-soluble or permanent felt markers.

Writing with dry erasable felt markers shall be easy to wipe off dry with a felt eraser or a cotton cloth.

Water-erasable writings shall be easy to wipe off with water. Permanent felt-marker writing shall be easy to remove with alcohol or any other solvent, without visual colour or gloss change on the surface.

After a thorough cleaning, the surface contamination or colour fading under influence of the marker pigment shall not exceed $\Delta E^* = 0{,}5$ (see ISO 7724-1, ISO 7724-2, ISO 7724-3 and CIELAB).

NOTE CIELAB is an abbreviation for the colour difference formula CIE 1976 ($L^*a^*b^*$) recommended by the Commission Internationale de L'Eclairage (CIE) and is normatively referred to in ISO 7724: (all parts).

9 Resistance to graffiti

After eight days of ageing at room temperature, inks, varnishes, lacquers or paints shall be easily removable with solvents, without any visible gloss or colour change.

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