



**SLOVENSKI STANDARD**  
**SIST EN 15206:2007**

01-april-2007

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Glavni namen tega standarda je opredeliti metode za izdelavo vzorcev za preizkušanje emaila na listu jekla, listu aluminija in litini.

Vitreous and porcelain enamels - Production of specimens for testing enamel on sheet steel, sheet aluminium and cast iron

Emails und Emailierungen - Herstellung von Proben zur Prüfung von Stahlblech-Emails, Aluminium-Emails und Gusseisen-Emails

Emaux vitrifiés - Production d'échantillons afin de soumettre à l'essai l'email sur la tôle d'acier, la tôle d'aluminium et la fonte

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Ta slovenski standard je istoveten z: **EN 15206:2007**

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**ICS:**

25.220.50      Emajlne prevleke      Enamels

**SIST EN 15206:2007**      en

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English Version

## Vitreous and porcelain enamels - Production of specimens for testing enamel on sheet steel, sheet aluminium and cast iron

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This European Standard was approved by CEN on 8 December 2006.

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.

CEN members are the national standards bodies of 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 United Kingdom.

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## Foreword

This document (EN 15206:2007) 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 July 2007, and conflicting national standards shall be withdrawn at the latest by July 2007.

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 United Kingdom.

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## 1 Scope

This European Standard specifies a method for the production of specimens suitable for testing vitreous and porcelain enamel coatings.

The standard specifies 2 different specimens:

- specimens taken from production article, and
- specially produced specimens.

NOTE Only the specially produced specimens can be used when the loss in mass per unit area of the enamel coating is to be determined quantitatively as specimens cut from enamelled articles can reduce the accuracy of the test method.

## 2 Normative references

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

EN 14430, *Vitreous and porcelain enamels — High voltage test*

## 3 Designation

Specimens prepared in accordance with this European Standard shall have the following designation:

Specimen EN 15206-(substrate)

where a steel substrate shall be designated by A, a cast iron substrate by B and an aluminium substrate by C.

**EXAMPLE** The designation of a specimen prepared in accordance with EN 15206 by using a steel substrate is:

Specimen EN 15206-A

## 4 Specimens from production articles

### 4.1 Requirements for the used articles

The specimens shall be taken from a production article that was produced with the normal production parameters. Reworked articles shall not be used as specimens.

### 4.2 Shape and dimension requirements

The specimens shall be circular or square with a diameter or side length of 105 mm  $\pm$  5 mm.

The specimens shall be taken only from the flat areas of enamelled articles.

NOTE For enamelled aluminium specimens on which only the adherence is to be determined using the procedure given in ISO 13805 [1], other shapes may be used.

### 4.3 Preparation

Before cutting the specimens off the production article, the enamel shall be removed by grinding along the cutting line on both surfaces (i.e. front and back) of the production article down to the base metal. The width of the zone from which the enamel shall be removed shall be the width of the cutting tool plus 2 mm on each side.

NOTE Grinding machines operating with corundum or diamond stones are suitable for removing the enamel.

## 5 Specially produced specimens

### 5.1 Shape, dimension and substrate requirements

#### 5.1.1 General

The specimens shall be made from a substrate that can be enamelled, and shall be flat, circular or square plates, with a diameter or side length of 105 mm  $\pm$  5 mm.

If a specimen is intended to hang during weighing and/or enamelling, the specimen shall be provided with a hole to enable the specimen to be hung. The hole shall be approximately 2,5 mm in diameter with its centre either 3 mm from the edge of a circular test plate or 3 mm from the corner of a square test plate.

#### 5.1.2 Steel substrate

The sheet steel upon which the enamel is applied shall be of an appropriate enamelling quality for the enamelling process used, and the thickness shall be between 0,3 mm and 3,0 mm.

NOTE 1 Other thicknesses may be used if agreed between the interested parties; if other thicknesses are used (i.e. not within the range 0,3 mm to 3 mm) the thickness should be clearly reported on every test result obtained.

Condition the metal for enamelling using any recognized method, but use the same method, substrate quality and substrate thickness if the specimens are provided for comparison.

In case of fishscale testing, steel samples of a minimum 100 mm wide strip shall be taken from across the whole width of the steel coil.

NOTE 2 EN 10209 [2] describes the qualities required for enamelling cold rolled steel according to different processes.

NOTE 3 Clause B.2 of EN 10209 [2] describes the fish scaling test.

#### 5.1.3 Cast iron substrate

The cast iron upon which the enamel is applied shall be of enamelling quality.

The specimens may be specially cast plates or plates cut from a cast iron bar with a minimum thickness of 2,5 mm. If the mass of cut specimens is to be determined, in order to determine the loss in mass of the enamel coating, and the mass exceeds the carrying capacity of the analytical balance, the thickness may be reduced by machining.

Condition the metal for enamelling using any recognized method using the same method, substrate quality and substrate thickness if the specimens are provided for comparison.

NOTE Completely ferritised grey cast iron is suitable. A pre-annealing between 700 °C to 850 °C for 10 min to 15 min may be used in order to achieve the ferritisation.

#### 5.1.4 Aluminium substrate

The aluminium upon which the enamel is applied shall be of enamelling quality. Specimens of aluminium sheets shall have a thickness between 2 mm and 3 mm.

Condition the metal for enamelling using any recognized method, but use the same method, substrate quality and substrate thickness if the specimens are provided for comparison.

NOTE The following aluminium alloys are suitable if their Mg content is below a mass fraction of 0,01 %:

— For sheet substrates: alloy EN AW-1050A, EN AW-3003 and EN AW-4006 as described in EN 573-3 [3];

#### 5.1.5 Other substrates

For vitreous and porcelain enamels used on other substrates, the substrate used and conditioning parameters shall be agreed between the interested parties.

### 5.2 Enamelling of specimens

#### 5.2.1 General

The normal processing steps of the enamelling process, i.e. those used in that particular process, shall be followed and no extra steps (such as reparation enamelling, extra firing, etc...) shall be used for the production of the specimen.

Care shall be taken to ensure that there is a minimum of build-up of enamel around the edge of the specimen. The applied enamel may, therefore, be suitably wiped from the edges to a width of 2 mm or 3 mm after drying and before fusing the specimen.

Comparative specimens shall be of the same nominal thickness. The maximum difference in thickness between all comparative specimens shall be less than 15 %.

In all cases the enamel coating thicknesses applied to the test specimen shall be normally used in the enamelling of the production article.

#### 5.2.2 Steel enamelling

##### 5.2.2.1 Application

The enamel shall be applied to one or both sides of the specimen. When the loss in mass per unit area of the enamel coating is to be determined quantitatively, the specimen shall be enamelled on both sides.

##### 5.2.2.2 Direct-on enamels

When in practice the usual application consists of one coat only, one coat shall be applied. In cases where additional coatings are a necessary part of the finish, these coatings shall be applied.

##### 5.2.2.3 Cover coat enamels

If a ground coat is applied prior to application of the cover coat, this may be dipped or sprayed on to both sides of the specimen, so that an agreed coating thickness is applied.

After drying, fusing and cooling of the ground coated specimen, the cover coat shall be applied to one of the ground coated sides of the specimen.

The same number of cover coats that are considered to be usual practice in the enamelling of the production article shall be applied to the test specimen.



NOTE 1 For most purposes one cover coat is standard procedure, but in some cases two or three coats are considered to be usual practice.

NOTE 2 When enamelling containers and apparatus that are to be used in the chemical industry, even more layers of cover coat may be applied.

### 5.2.3 Cast iron enamelling

#### 5.2.3.1 Direct-on enamels

The enamel shall be applied to one side of the specimen in accordance with usual practice in the enamelling of the production article.

The same number of cover coats that are considered to be usual practice in the enamelling of the production article shall be applied to the test specimen.

#### 5.2.3.2 Cover coat enamels

A ground coat may be dusted, sprayed or electrophoretically applied onto one side of the specimen.

After drying and fusing of the specimen, the cover coat shall be applied to the ground coated side only.

NOTE For most purposes two cover coats are standard procedure for dry processing (dusting) and one cover coat is standard procedure for wet processing, but in cases where more cover coats are considered to be usual practice, the additional coats should be applied.

### 5.2.4 Aluminium enamelling (standards.iteh.ai)

If one coat of the enamel slip is required, it shall be applied to one surface of the specimen by spraying. After firing at a temperature of  $560\text{ °C} \pm 20\text{ °C}$ , the thickness of the coating shall be  $60\text{ }\mu\text{m} \pm 10\text{ }\mu\text{m}$ .

For most purposes one coat is standard procedure. If a second coat is required, for example, for inspecting appearance, the total thickness of the coating shall not exceed  $80\text{ }\mu\text{m}$ .

### 5.2.5 Enamelling of other substrates

The enamelling parameters shall be agreed between the interested parties.

## 5.3 Surface of enamelled specimens

When visually inspected, the surface of the enamelled specimens shall be flat and free from defects such as blisters, burn-off, chipping, copper heads, cracking, crazing, fire-tool marks, fishscales, spalling and tearing (see Clause 3).

The specimens shall be checked by visual inspection for freedom from defects.

For vitreous and porcelain enamels used for containers and apparatuses to be used in the chemical industry, an extra surface inspection for freedom from weak places and pinholes shall be carried out using the high voltage method given in EN 14430. The voltage to be used for the test shall be agreed between the interested parties.