



# SLOVENSKI STANDARD

SIST EN 15159-2:2006

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GHY`Ughj]b`\_YfUa ] b]Ya U^]E`9a U^]fUbY`bUdfUj YnUdfcWgbc`cdfYa c`E`&`rXY.  
CnbU Yj Ub^]b`gdYWZ`\_UM^UcXdcfbcgh]dfc]`\_Ya ] b]U[ fYg]j]b`hcd`cbYa i`i`XUfi

Vitreous and porcelain enamels - Glass-lined apparatus for process plants - Part 2:  
Designation and specification of resistance to chemical attack and thermal shock

Emails und Emailierungen - Emailierte Apparate für verfahrenstechnische Anlagen - Teil  
2: Bezeichnung und Festlegung der chemischen und Temperaturschockbeständigkeit

**iTeh STANDARD PREVIEW**

Emaux vitrifiés - Appareils émaillés pour les installations industrielles - Partie 2:  
Désignation et spécifications de la résistance a l'attaque chimique et au choc thermique

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**ICS:**

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ICS 71.120.10; 25.220.50

English Version

Vitreous and porcelain enamels - Glass-lined apparatus for  
process plants - Part 2: Designation and specification of  
resistance to chemical attack and thermal shock

Emaux vitrifiés - Appareils émaillés pour les installations  
industrielles - Partie 2: Exigences de qualité

Emails und Emailierungen - Emailierte Apparate für  
verfahrenstechnische Anlagen - Teil 2: Bezeichnung und  
Festlegung der chemischen und  
Temperaturschockbeständigkeit

This European Standard was approved by CEN on 12 June 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 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.



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## Foreword

This document (EN 15159-2:2006) 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 January 2007, and conflicting national standards shall be withdrawn at the latest by January 2007.

EN 15159 is comprised of the following parts under the general heading *Vitreous and porcelain enamels — Glass-lined apparatus for process plants*

Part 1: *Quality requirements for apparatus, components, appliances and accessories*

Part 2: *Designation and specification of resistance to chemical attack and thermal shock*

Part 3: *Thermal shock resistance*

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom. (standards.iteh.ai)

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## Introduction

For many materials, the chemical composition can serve as a basis for a specification. This is not possible for chemical enamels because the composition is tied very closely to the specific enamelling technique and is therefore not disclosed by the manufacturer for competitive reasons. In order to ascribe measurable attributes to an enamel besides its general designation, the manufacturer conducts standardized tests and specifies its enamel in terms of the resulting resistance to corrosion and thermal shock, together with a declaration of the structure of the cover coat enamel and the colour of the enamel.

The quality requirements stated in this European Standard represent the minimum requirements a chemical enamel is expected to meet based on the current state of the art.

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## 1 Scope

This European Standard specifies requirements for the resistance to chemical attack and thermal shock of chemical enamels and their designation for ordering purposes.

It is applicable to enamelled apparatus, components and piping components primarily used for process equipment in chemical plants.

This European Standard only applies to unalloyed and low-alloy carbon steels suitable for enamelling.

NOTE The main criteria for assessing enamel quality are the resistance to chemical attack and thermal shock and the structure of the cover coat enamel.

## 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 14483-2, *Vitreous and porcelain enamels — Determination of resistance to chemical corrosion — Part 2: Determination of resistance to chemical corrosion by boiling acids, neutral liquids and/or their vapours*

EN 14483-4, *Vitreous and porcelain enamels — Determination of resistance to chemical corrosion — Part 4: Determination of resistance to chemical corrosion by alkaline liquids using a cylindrical vessel*

ISO 13807, *Vitreous and porcelain enamels — Determination of crack formation temperature in the thermal shock testing of enamels for the chemical industry*

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## 3 Designation

The enamel quality shall be designated by stating the following information:

- corrosion rate in hydrochloric acid determined in accordance with EN 14483-2;
- corrosion rate in sodium hydroxide solution determined in accordance with EN 14483-4;
- crack formation temperature determined in accordance with ISO 13807;
- structure of the cover coat enamel, e.g. all vitreous, all semi-crystalline, vitreous on a semi-crystalline intermediate layer and semi-crystalline on a vitreous intermediate layer;
- colour of the enamel.

The designation of data on quality requirements according to this European Standard shall be as follows:

Enamel quality requirements in accordance with EN 15159-2.

## 4 Quality requirements

### 4.1 Corrosion rate in hydrochloric acid

When tested in accordance with EN 14483-2 the resistance to condensing hydrochloric acid vapour shall be less than or equal to 0,08 mm/a.

#### **4.2 Corrosion rate in sodium hydroxide solution**

When tested in accordance with EN 14483-4 the corrosion rate in a sodium hydroxide solution shall be less than or equal to 0,40 mm/a.

The ratio of the volume of an attacking sodium hydroxide solution in cubic centimetres to the exposed enamel surface in square centimetre shall be 3,5:1.

#### **4.3 Crack formation temperature**

When tested in accordance with ISO 13807 the crack formation temperature shall be greater than or equal to 190 °C.

For enamels used on accessories such as agitators, baffles, thermometer wells, immersion tubes, intermediate rings, sensors and perforated plates, and also for piping accessories and pumps, a crack formation temperature of at least 170 °C may be permissible.

The crack formation temperature determined in accordance with ISO 13807 represents a character of the specimens. This test result shall not be applied directly to an apparatus or accessories.

Temperature limits for thermal shock and for heating and cooling of an apparatus are given in the thermal shock diagram and the diagram for heating and cooling given in EN 15159-3.

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