



SLOVENSKI STANDARD

SIST EN 13143:2003

01-december-2003

Kovinske in druge anorganske prevleke - Definicije in dogovori v zvezi s poroznostjo

Metallic and other inorganic coatings - Definitions and conventions concerning porosity

Metallische und andere anorganische Überzüge - Definitionen und Festlegungen, die die Porigkeit betreffen

Revetements métalliques et autres revêtements non organiques - Définitions et principes concernant la porosité

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ICS:

| | | |
|-----------|------------------------------|--|
| 01.040.25 | Izdelavna tehnika (Slovarji) | Manufacturing engineering (Vocabularies) |
| 25.220.40 | Kovinske prevleke | Metallic coatings |

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EUROPEAN STANDARD

EN 13143

NORME EUROPÉENNE

EUROPÄISCHE NORM

March 2003

ICS 01.040.25; 25.220.40; 25.220.99

English version

Metallic and other inorganic coatings - Definitions and conventions concerning porosity

Revêtements métalliques et autres revêtements non organiques - Définitions et principes concernant la porosité

Metallische und andere anorganische Überzüge - Definitionen und Festlegungen, die die Porigkeit betreffen

This European Standard was approved by CEN on 27 December 2002.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.

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Foreword

This document (EN 13143:2003) 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 September 2003, and conflicting national standards shall be withdrawn at the latest by September 2003.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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EN 13143:2003 (E)

1 Scope

This European Standard defines porosity and its associated terms and outlines the principles involved in porosity testing of metallic and related inorganic coatings. It also considers the purpose of porosity testing, thereby assisting the user to select the most suitable test for the product and its service application.

The porosity test cannot be used to establish corrosion performance standards.

2 Terms and definitions

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

2.1

porosity

holes, pores, cracks or other **discontinuities** (2.3) in the coating that expose the substrate or basis metal to the environment

2.2

pore (of a coating)

essentially circular **discontinuity** (2.3)

2.3

discontinuity

opening in an otherwise continuous coating extending through the underlying coating to the basis metal

NOTE Typically, the openings are pores, cracks or pits in the coating. They can also be voids or breaks in the coating caused by mechanical damage such as scratches or non-conductive inclusions in the basis metal (see ISO 10308).

2.4

tarnish

a) dulling, staining or discoloration of metals due to superficial corrosion

b) film so formed

[ISO 2080:1981, definition 652]

2.5

corrosion product

substance formed as a result of corrosion

2.6

open porosity in coating

discontinuities (2.3) in the coating surface

NOTE Such discontinuities include cracks, micro-holes, pits, scratches or any opening in the coating surface that exposes either the undercoat or the basis metal.

3 Purpose of porosity testing

The main purpose of porosity testing is to determine the quality of the coating and its freedom from porosity, particularly on those areas of the significant surface that demand a functional requirement, for example, as electrical contacts.

For the purpose of porosity testing of metallic and related inorganic coatings, there are two modes of corrosion that need to be considered, i.e. electrochemical and chemical. Either type of test can be used to identify the presence,

location and extent of porosity. The test method selected will depend on the nature of the coating, the basis material and any undercoat.

In general, electrochemical tests are of an "accelerated nature", with relatively short exposure times carried out under controlled chemical, electrical and physical conditions; these are ideal for process control purposes. Exposure tests are usually of long duration and can be either static or cyclic, depending on product requirements, and are particularly suitable for qualification purposes.

4 Principles

4.1 Electrochemical testing

In electrochemical testing, the basis metal/coating combination is generally made the anode of an electrochemical cell; a stainless steel platen or any inert but conductive material can be used as the cathode. When testing flat surfaces a suitable pressure is applied to the cathode to ensure intimate contact of the paper over the area under test. An appropriate indicator responsive to the presence of basis metal ions is incorporated in the electrolyte or conducting medium contained in a filter paper or gel.

The object of the test is to create dissolution of the basis metal by the direct application of a positive polarizing voltage. The resulting basis metal ions will then migrate under the applied electrical field towards the cathode through the conductive paper or gel. The indicator response and the resultant photographic image produced depends on the extent of the porosity in the coating.

NOTE 1 In general, both constant applied voltage and current can be used for electrochemical and gel techniques. Anodic dissolution of the coating, which will result in spurious results, is avoided by ensuring certain maximum values are not exceeded.

NOTE 2 Gel testing is normally applied to irregular geometric shapes other than continuously flat surfaces where no physical pressure on the cathode is necessary.

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4.2 Exposure test

When coated articles are exposed to corrosive liquids or moist vapours, the basis metal will degrade where open porosity occurs. Such corrosion environments involve similar pore corrosion mechanisms as those occurring in many contaminated or polluted service environments.

A porosity test involving exposure to a corrosive environment shall not, however, be used as a measure of product performance.

5 Rating of test specimens

On completion of the exposure time, examination/inspection shall be carried out under the viewing conditions specified in the product standard. The specimens shall be assessed and rated for the number of pores and/or discontinuities per unit area of the significant surface.

The product standard or engineering drawing shall specify the rating required.

6 Test report

The test report shall contain at least the following information:

- a) type of test and/or specification number;
- b) test conditions;
- c) details of articles tested;
- d) examination/inspection conditions;
- e) rating;
- f) any deviation from the product standard.

Bibliography

EN ISO 10289:2001, *Methods for corrosion testing of metallic and other inorganic coatings on metallic substrates — Rating of test specimens and manufactured articles subjected to corrosion tests* (ISO 10289:1999)

EN ISO 10308:1997, *Metallic coatings — Review of porosity tests* (ISO 10308:1995)

EN 12508:2000, *Corrosion protection of metals and alloys — Surface treatment, metallic and other inorganic coatings — Vocabulary*.

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