SLOVENSKI STANDARD
SIST EN ISO 10308:1999

01-oktober-1999

Kovinske prevleke - Pregled preskusov za ugotavljanje poroznosti (ISO 10308:1995)

Metallic coatings - Review of porosity tests (ISO 10308:1995)

Metallische Überzüge - Übersicht der Porenprüfverfahren (ISO 10308:1995)

Revetements métalliques - Passage en revue des essais de porosité (ISO 10308:1995)

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Metallic coatings - Review of porosity tests (ISO 10308:1995)

Revêtements métalliques - Passage en revue des essais de porosité (ISO 10308:1995)

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This European Standard was approved by CEN on 1997-06-22. 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.

The European Standards exist 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.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart,36 B-1050 Brussels

Foreword

The text of the International Standard from Technical Committee ISO/TC 107 "Metallic and other inorganic coatings" of the International Organization for Standardization (ISO) has been taken over as an European Standard by Technical Committee CEN/TC 262 "Protection of metallic materials against corrosion", the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by January 1998, and conflicting national standards shall be withdrawn at the latest by Januar 1998.

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 10308:1995 has been approved by CEN as a European Standard without any modification.

NOTE: Normative references to International Standards are listed in annex ZA (normative).

Annex ZA (normative)
Normative references to international publications with their relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

Publication	Year	Title	EN	Year
ISO 4524-3	1985	Metallic coatings - Test mehods for electro-deposited gold and gold alloy coatings - Part 3: Electrographic tests for porosity	EN ISO 4524-3	1995
ISO 4538	1978	Metallic coatings - Thioacetamide corrosion test - Hydrostatic testing (TAA test)	EN ISO 4538	1995
ISO 4540	1980	Metallic coatings - Coatings cathodic to the substrate - Rating of electroplated test specimens subjected to corrosion	EN ISO 4540	1995
ISO 4541	1978	Metallic and other non-organic coatings - Corrodkote corrosion test (CORR test)	EN ISO 4541	1994
ISO 6988	1985	Metallic and other non-organic coatings - Sulfur dioxide test with general condensation of moisture	EN ISO 6988	1994

INTERNATIONAL STANDARD

ISO 10308

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Metallic coatings — Review of porosity tests

Revêtements métalliques — Passage en revue des essais de porosité

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Contents

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Annexes

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 10308 was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, Subcommittee SC 7, *Corrosion tests*.

Annex A forms an integral part of this International Standard. Annexes B to G are for information only.

Metallic coatings — Review of porosity tests

1 Scope

This International Standard reviews published methods for revealing pores (see ISO 2080) and discontinuities in coatings of aluminium, anodized aluminium, brass, cadmium, chromium, cobalt, copper, gold, indium, lead, nickel, nickel-boron, nickel-cobalt, nickel-iron, nickel-phosphorus, palladium, platinum, vitreous or porcelain enamel, rhodium, silver, tin, tin-lead, tin-nickel, tin-zinc, zinc and chromate or phosphate conversion coatings (including associated organic films) on aluminium, beryllium-copper, brass, copper, iron, kovar (NiFeCo) alloys, magnesium, nickel, nickel-boron, nickel-phosphorus, phosphor-bronze, silver, steel, tin-nickel and zinc alloy base metal.

The tests summarized in this International Standard are designed to react with the substrate when exposed, by a discontinuity, in such a way as to form an observable reaction product.

NOTES

1 Pores are usually perpendicular to the coating surface but may be inclined to the coating surface. They are frequently cylindrical in shape but may also assume a twisted shape (see annex C).

2 Porosity may vary in size from the submicroscopic, invisible under a light microscope, to the microscopic, visible from × 10 to × 1 000, to the macroscopic, visible to the naked eye.

3 Porosity may be visibly indicated by discoloration of the coated surface.

4 Porosity in a coating is not always detrimental. In microdiscontinuous chromium, for example, porosity or microcracking is required and tests are conducted to indicate the pores.

5 Results obtained from porosity tests expressed in terms such as pores per square centimetre are relative values related to the specific test method used and the magnification used during examination. Annex B gives typical report criteria.

2 Normative references

The following standards contain provisions which, through references in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 1456:1988, *Metallic coatings — Electrodeposited coatings of nickel plus chromium and of copper plus nickel plus chromium.*

ISO 2080:1981, *Electroplating and related processes — Vocabulary.*

ISO 2085:1976, *Anodizing of aluminium and its alloys — Check of continuity of thin anodic oxide coatings — Copper sulphate test.*

ISO 3160-2:1992, *Watch cases and accessories — Gold alloy coverings — Part 2: Determination of fineness, thickness, corrosion resistance and adhesion.*

ISO 4524-2:1985, *Metallic coatings — Test methods for electrodeposited gold and gold alloy coatings — Part 2: Environmental tests.*

ISO 4524-3:1985, *Metallic coatings — Test methods for electrodeposited gold and gold alloy coatings — Part 3: Electrographic tests for porosity.*

ISO 4525:1985, *Metallic coatings — Electroplated coatings of nickel plus chromium on plastics materials.*

ISO 4526:1984, *Metallic coatings — Electroplated coatings of nickel for engineering purposes.*

ISO 4527:1987, *Autocatalytic nickel-phosphorus coatings — Specification and test methods.*

ISO 4538:1978, *Metallic coatings — Thioacetamide corrosion test (TAA test).*

ISO 4540:1980, *Metallic coatings — Coatings cathodic to the substrate — Ratings of electroplated test specimens subjected to corrosion tests.*

ISO 4541:1978, *Metallic and other non-organic coatings — Corrodkote corrosion test (CORR test).*

ISO 6158:1984, *Metallic coatings — Electroplated coatings of chromium for engineering purposes.*

ISO 6988:1985, *Metallic and other non-organic coatings — Sulfur dioxide test with general condensation of moisture.*

ISO 9227:1990, *Corrosion tests in artificial atmospheres — Salt spray tests.*

ISO 10309:1994, *Metallic coatings — Porosity tests — Ferroxyl test.*

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 2080 as well as the following apply.

3.1 discontinuities: Cracks, micro-holes, pits, scratches or any other opening in the coating surface that exposes a different underlying metal.

For further information on discontinuities see annex D and reference [1] in annex G.

4 Principle

Porosity test results occur as chemical reaction end-products. Some occur *in situ*, others on paper or in a gel coating. Observations are made that are consistent with the test method and the items being tested as specified by the buyer. These may be visual inspections (naked eye) or at × 10 magnification (microscope). Other methods may involve enlarged photographs or photo-micrographs. See references [1, 2, 3, 5 and 6] in annex G (see also annex A for a tabular summary of the porosity tests and annex D for a classification of discontinuities).

5 Common features of porosity tests

Porosity tests differ from corrosion and ageing tests particularly concerning testing time. Porosity tests are primarily short-time tests. A good porosity test process must clean, depolarize and activate the substrate metal exposed by the pore and attack it to such a degree as to cause the reaction product to fill the pore to the surface of the coating. Ideally, the corrosive provided for this should not react with the coating surface. It is essential that the time of reaction be limited, particularly with thin coatings, since the corrosive will attack the substrate in all directions and in so doing, will undermine the coatings such that false observations will be made. When the corrosion product is soluble in the reagent, the precipitating indicator is used to form the reaction product. (See annex E for classification of methods of porosity testing.)

6 Test specimens

Porosity tests are generally destructive in nature and are designed to assess the quality of the coating process of the substrate. Therefore, separate test specimens are not ordinarily allowed.

7 Specific porosity tests

7.1 Alizarin test

7.1.1 Scope

For coatings of chromium (including Cr/Ni/Cu and Cr/Ni/Ni), cobalt, copper, nickel, nickel-boron, nickel-cobalt, nickel-iron and nickel-phosphorus on aluminium substrate.

7.1.2 Summary of method

The test specimens are treated with sodium hydroxide, sodium alizarin sulfonate and glacial acetic acid under defined conditions. Formation of red markings or spots indicates porosity. Details of the test procedure can be found in ISO 4527. See also references [9, 31 and 37] in annex G.

7.2 Anthraquinone test

7.2.1 Scope

For coatings of chromium (including Cr/Ni/Ni), cobalt, nickel, nickel-boron, nickel-cobalt, nickel-iron and nickel-phosphorus on aluminium, magnesium or zinc alloy substrates.

7.2.2 Summary of method

The test specimens are treated with sodium hydroxide and potassium 1-aminoanthraquinone-2-carboxylic acid under defined conditions. Formation of red markings or spots indicates porosity. Details of the test procedure can be found in reference [13] in annex G.