

**Metallic coatings - Autocatalytic
(electroless) nickel-phosphorus alloy
coatings - Specification and test methods**

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EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 4527:2004 sisaldab Euroopa standardi EN ISO 4527:2003 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 23.11.2004 ja selle kohta on avaldatud teade Eesti standardiorganisatsiooni ametlikus väljaandes.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 4527:2004 consists of the English text of the European standard EN ISO 4527:2003.</p> <p>This document is endorsed on 23.11.2004 with the notification being published in the official publication of the Estonian national standardisation organisation.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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<p>Käsitlusala:</p> <p>This International Standard specifies the requirements and test methods for autocatalytic nickel-phosphorus alloy coatings applied from aqueous solutions on to metallic substrates. This International Standard does not apply to autocatalytic nickel-boron alloy coatings, nickel-phosphorus composites and ternary alloys.</p>	<p>Scope:</p> <p>This International Standard specifies the requirements and test methods for autocatalytic nickel-phosphorus alloy coatings applied from aqueous solutions on to metallic substrates. This International Standard does not apply to autocatalytic nickel-boron alloy coatings, nickel-phosphorus composites and ternary alloys.</p>
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ICS 25.220.40

Võtmesõnad:

English version

Metallic coatings

**Autocatalytic (electroless) nickel-phosphorus
alloy coatings**

Specification and test methods
(ISO 4527 : 2003)

Revêtements métalliques – Dépôts
autocatalytiques (sans courant)
d'alliages de nickel-phosphore –
Spécifications et méthodes d'essai
(ISO 4527 : 2003)

Metallische Überzüge – Auto-
katalytisch (außenstromlos) abge-
schiedene Nickel-Phosphor-
Legierungs-Überzüge – Spezifikatio-
nen und Prüfverfahren
(ISO 4527 : 2003)

This European Standard was approved by CEN on 2003-04-25.

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.

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 Management Centre has the same status as the official versions.

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

CEN

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

Management Centre: rue de Stassart 36, B-1050 Brussels

Foreword

International Standard

ISO 4527 : 2003 Metallic coatings – Autocatalytic (electroless) nickel-phosphorus alloy coatings – Specification and test methods,

which was prepared by ISO/TC 107 'Metallic and other inorganic coatings' of the International Organization for Standardization, has been adopted by Technical Committee CEN/TC 262 'Metallic and other inorganic coatings', the Secretariat of which is held by BSI, as a European Standard.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, and conflicting national standards withdrawn, by November 2003 at the latest.

In accordance with the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard:

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

Endorsement notice

The text of the International Standard ISO 4527 : 2003 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to international publications are listed in Annex ZA (normative).

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Introduction

Autocatalytic nickel-phosphorus alloy coatings are produced by the catalytic reduction of nickel ions in hot, usually mildly acidic solutions at atmospheric pressure using hypophosphite ion as the reducing agent. Because the deposited nickel alloy is a catalyst for the reaction, the process is self-sustaining. The coatings produced are uniform in thickness on irregularly shaped parts if the processing solution circulates freely over their surfaces.

The as-deposited coating is a thermodynamically metastable, supersaturated solid solution of phosphorus in nickel containing up to 14 % mass fraction phosphorus. The physical and chemical properties and the structure of autocatalytic nickel-phosphorus coatings are dependent on the composition of the coating, the chemical make-up of the plating solution, the pre-treatment and quality of the substrate, and heat treatment after deposition.

Autocatalytic nickel-phosphorus coatings are applied in order to improve corrosion protection and to provide wear resistance. In general, corrosion performance is significantly improved as the phosphorus content of the deposit is increased to 8 % mass fraction or higher, whereas wear resistance is improved as the phosphorus content of the coating is decreased below that level. With suitable heat treatment however, coatings with high phosphorus contents display greatly improved microhardness and hence, wear resistance.

1 Scope

This International Standard specifies the requirements and test methods for autocatalytic nickel-phosphorus alloy coatings applied from aqueous solutions on to metallic substrates.

This International Standard does not apply to autocatalytic nickel-boron alloy coatings, nickel-phosphorus composites and ternary alloys.

WARNING — The use of this International Standard may involve hazardous materials, operation and equipment. This International Standard does not purport to address all the safety problems associated with its use. It is the responsibility of the user of this International Standard to establish appropriate safety and health practices, and determine the applicability of regulatory limitations prior to use.

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.

ISO 1463, *Metal and oxide coatings — Measurement of coating thickness — Microscopical method*

ISO 2064, *Metallic and other inorganic coatings — Definitions and conventions concerning the measurement of thickness*

ISO 2079, *Surface treatment and metallic coatings — General classification of terms*

ISO 2080¹⁾, *Surface treatment, metallic and other inorganic coatings — Vocabulary*

ISO 2177, *Metallic coatings — Measurement of coating thickness — Coulometric measurement by anodic dissolution*

ISO 2178, *Non-magnetic coatings on magnetic substrates — Measurement of coating thickness — Magnetic method*

ISO 2819, *Metallic coatings on metallic substrates — Electrodeposited and chemically deposited coatings — Review of methods available for testing adhesion*

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptance quality limit (AQL) for lot-by-lot inspection*

ISO 2859-2, *Sampling procedures for inspection by attributes — Part 2: Sampling plans indexed by limiting quality (LQ) for isolated lot inspection*

ISO 2859-3, *Sampling procedures for inspection by attributes — Part 3: Skip-lot sampling procedures*

1) To be published. (Revision of ISO 2080:1981)

ISO 2859-4, *Sampling procedures for inspection by attributes — Part 4: Procedures for assessment of declared quality levels*

ISO 3497, *Metallic coatings — Measurement of coating thickness — X-ray spectrometric methods*

ISO 3543, *Metallic and non-metallic coatings — Measurement of coating thickness — Beta-backscatter method*

ISO 3882, *Metallic and other inorganic coatings — Review of methods of measurement of thickness*

ISO 4288, *Geometrical Product Specifications (GPS) — Surface texture: Profile method — Rules and procedures for the assessment of surface texture*

ISO 4516, *Metallic and other inorganic coatings — Vickers and Knoop microhardness tests*

ISO 4519, *Electrodeposited metallic coatings and related finishes — Sampling procedures for inspection by attributes*

ISO 4526²⁾, *Metallic coatings — Electroplated coatings of nickel and nickel alloys for engineering purposes*

ISO 6158, *Metallic coatings — Electrodeposited coatings of chromium for engineering purposes*

ISO 9220, *Metallic Coatings — Measurement of coating thickness — Scanning electron microscope method*

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

ISO 9587, *Metallic and other inorganic coatings — Pretreatments of iron or steel to reduce the risk of hydrogen embrittlement*

ISO 9588, *Metallic and other inorganic coatings — Post-coating treatments of iron or steel to reduce the risk of hydrogen embrittlement*

ISO 10289, *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 10587, *Metallic and other inorganic coatings — Test for residual embrittlement in both metallic-coated and uncoated externally-threaded articles and rods — Inclined wedge method*

ISO 12686, *Metallic and other inorganic coatings — Automated controlled shot-peening of articles prior to nickel, autocatalytic nickel or chromium plating, or as a final finish*

ISO 15724, *Metallic and other inorganic coatings — Electrochemical measurement of diffusible hydrogen in steels — Barnacle electrode method*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2064, ISO 2079, ISO 2080, ISO 9587 and ISO 9588 apply. See [1] for European terminology.

2) To be published. (Revision of ISO 4526:1984)