

Metallic coatings - Electroplated coatings of nickel for engineering purposes

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EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

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| <p>Käesolev Eesti standard EVS-EN ISO 4526:2004 sisaldab Euroopa standardi EN ISO 4526:2004 ingliskeelset teksti.</p> <p>Käesolev dokument on jõustatud 23.09.2004 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 4526:2004 consists of the English text of the European standard EN ISO 4526:2004.</p> <p>This document is endorsed on 23.09.2004 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 requirements for electroplated nickel and nickel alloy coatings applied to ferrous and non-ferrous basis metals for engineering purposes. Binary nickel alloys in which nickel is a minor constituent are outside the scope of this International Standard. The designation provides a means of specifying the type and thickness of nickel and nickel alloy coatings appropriate for engineering applications.</p> | <p>Scope:</p> <p>This International Standard specifies requirements for electroplated nickel and nickel alloy coatings applied to ferrous and non-ferrous basis metals for engineering purposes. Binary nickel alloys in which nickel is a minor constituent are outside the scope of this International Standard. The designation provides a means of specifying the type and thickness of nickel and nickel alloy coatings appropriate for engineering applications.</p> |
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Võtmesõnad: determination, electrodeposited coatings, metal coatings, nickel coatings, porosity, specifications, tests, thickness

English version

Metallic coatings

**Electroplated coatings of nickel for engineering
purposes**

(ISO 4526 : 2004)

Revêtements métalliques – Dépôts
électrolytiques de nickel pour usages
industriels (ISO 4526 : 2004)

Metallische Überzüge – Galvanische
Nickelüberzüge für technische
Zwecke (ISO 4526 : 2004)

This European Standard was approved by CEN on 2004-05-13.

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, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, 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 4526 : 2004 Metallic coatings – Electroplated coatings of nickel for engineering purposes, 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 December 2004 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, Cyprus, the Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, the Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 4526 : 2004 was approved by CEN as a European Standard without any modification.

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Introduction

Engineering nickel coatings are specified for various applications such as improved hardness, wear and corrosion resistance, load-bearing characteristics, heat-scaling resistance, corrosion fatigue resistance and other improvements in surface properties. Electrodeposited nickel is also, used in engineering applications to salvage worn or incorrectly machined manufactured articles, and function as diffusion barriers in combination with other metallic coatings. Engineering nickel coatings usually contain greater than 99 % nickel and are most frequently electrodeposited from additive-free Watts or nickel sulfamate solutions. Typical solution compositions, operating conditions and mechanical properties of electrodeposits from these solutions are given in Annex A.

When increased hardness, greater wear resistance, modified deposit internal stress values and enhanced levelling characteristics are required, particles of organic additives such as silicon carbide, tungsten carbide, aluminium oxide, chromium carbide and other substances may be introduced into these solutions. The use of sulfur-containing organic additives to increase hardness and to lower residual internal stress is feasible only when the end-use involves exposure to low or moderate temperatures. High temperature exposure of nickel coatings that contain sulfur may result in embrittlement and cracking of the coating. The effect is time-dependent and may become evident at 150 °C if the time of heating is sufficiently long.

A notable trend is the growing utilisation of nickel alloy electroplating processes for engineering applications. These include binary alloys of nickel with cobalt, iron, manganese, molybdenum, phosphorus and tungsten.

1 Scope

This International Standard specifies requirements for electroplated nickel and nickel alloy coatings applied to ferrous and non-ferrous basis metals for engineering purposes.

Binary nickel alloys in which nickel is a minor constituent are outside the scope of this International Standard.

The designation provides a means of specifying the type and thickness of nickel and nickel alloy coatings appropriate for engineering applications.

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, *Metallic 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 2080, *Electroplating and related processes — Vocabulary*

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

ISO 2361, *Electrodeposited nickel coatings on magnetic and non-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 3497, *Metallic coatings — Measurement of coating thickness — X-ray spectrometric methods*

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

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

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 8401, *Metallic coatings — Review of methods of measurement of ductility*

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

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 metallic 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*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2064, ISO 2079, ISO 2080 and EN 12508 apply.

4 Information to be supplied to the electroplater

4.1 Essential information

When ordering articles to be electroplated, in accordance with this International Standard, the purchaser shall provide the following information in writing, e.g. in the contract or purchase order, or on engineering drawings.

- a) The designation (see Clause 5).
- b) The requirements for special test specimens (see 6.1).
- c) The significant surface, indicated by drawings of the articles or by suitably marked samples (see 6.2).
- d) The final surface finish, e.g. as-plated, ground, machined or polished. Alternatively, samples showing the required finish shall be supplied or approved by the purchaser, and used for comparison purposes (see 6.2 and 6.3).
- e) The type and size of defects with the number of defects that can be tolerated per item, for the surface or per square decimetre of surface (see 6.2).
- f) Additional portions of the surface where minimum thickness requirements apply (see 6.4).
- g) The test methods to be used to measure thickness, adhesion and porosity and, if required, those for internal stress and ductility (see 6.4, 6.6, 6.7, 6.11 and 6.12, respectively).
- h) The tensile strength of parts and the requirement for stress relief heat treatment before electroplating (see 6.8).
- i) The requirement for hydrogen embrittlement relief after electroplating, and the hydrogen embrittlement test methods (see 6.9).
- j) The sampling plan and acceptance levels (see Clause 7).