

**Metallic and other inorganic coatings -  
Electrodeposited silver and silver alloy coatings for  
engineering purposes - Specification and test  
methods**

## EESTI STANDARDI EESSÕNA

## NATIONAL FOREWORD

<p>Käesolev Eesti standard EVS-EN ISO 4521:2008 sisaldab Euroopa standardi EN ISO 4521:2008 ingliskeelset teksti.</p> <p>Standard on kinnitatud Eesti Standardikeskuse 27.10.2008 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.</p> <p>Euroopa standardimisorganisatsioonide poolt rahvuslikele liikmetele Euroopa standardi teksti kättesaadavaks tegemise kuupäev on 01.09.2008.</p> <p>Standard on kättesaadav Eesti standardiorganisatsioonist.</p>	<p>This Estonian standard EVS-EN ISO 4521:2008 consists of the English text of the European standard EN ISO 4521:2008.</p> <p>This standard is ratified with the order of Estonian Centre for Standardisation dated 27.10.2008 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.</p> <p>Date of Availability of the European standard text 01.09.2008.</p> <p>The standard is available from Estonian standardisation organisation.</p>
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Võtmesõnad:

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Andmete paljundamine, taastekitamine, kopeerimine, salvestamine elektroonilisse süsteemi või edastamine ükskõik millises vormis või millisel teel on keelatud ilma Eesti Standardikeskuse poolt antud kirjaliku loata.

Kui Teil on küsimusi standardite autorikaitse kohta, palun võtke ühendust Eesti Standardikeskusega:  
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English Version

**Metallic and other inorganic coatings - Electrodeposited silver  
and silver alloy coatings for engineering purposes - Specification  
and test methods (ISO 4521:2008)**

Revêtements métalliques et autres revêtements  
inorganiques - Dépôts électrolytiques d'argent et d'alliages  
d'argent pour applications industrielles - Spécifications et  
méthodes d'essai (ISO 4521:2008)

Metallische Überzüge - Galvanische Silber- und  
Silberlegierungs-Überzüge für technische Zwecke -  
Anforderungen und Prüfverfahren (ISO 4521:2008)

This European Standard was approved by CEN on 24 August 2008.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Foreword

This document (EN ISO 4521:2008) has been prepared by Technical Committee ISO/TC 107 "Metallic and other inorganic coatings" in collaboration with 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 March 2009, and conflicting national standards shall be withdrawn at the latest by March 2009.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, 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 the United Kingdom.

### Endorsement notice

The text of ISO 4521:2008 has been approved by CEN as a EN ISO 4521:2008 without any modification.

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## Introduction

Electrodeposited silver and silver alloy coatings are often specified for their extremely good electrical conductivity, but corrosion protection is often an additional requirement for electrical, electronic and other applications. In many conditions of service, sulfide films may form on the coatings, increasing the contact resistance at the silver electroplated mating surface and making them unsuitable for use in low-voltage electronic circuits. Sulfide films are not especially detrimental to other electronic applications where higher voltage and higher contact pressures are used, because the films are not completely insulating.

Because the appearance and serviceability of electroplated silver coatings depend on the condition of the basis material, agreement should be reached between interested parties that the surface finish and roughness of the basis material are satisfactory for electroplating.

Electroplated silver coatings have been used as bearing surfaces for many decades and are particularly useful where the load-bearing surfaces are not well lubricated.

Electroplated silver coatings have largely replaced electroplated gold coatings on metallic lead frames, the devices that support the majority of silicon chips.

# Metallic and other inorganic coatings — Electrodeposited silver and silver alloy coatings for engineering purposes — Specification and test methods

**WARNING** — This International Standard may not be compliant with some countries' health and safety legislations and calls for the use of substances and/or procedures that may be injurious to health if adequate safety measures are not taken. This International Standard does not address any health hazards, safety or environmental matters and legislations associated with its use. It is the responsibility of the user of this International Standard to establish appropriate health, safety and environmentally acceptable practices, and take suitable actions to comply with any national and international regulations. Compliance with this International Standard does not, in itself, confer immunity from legal obligations.

## 1 Scope

This International Standard specifies requirements for electroplated silver and silver alloy coatings for electrical, electronic and other engineering applications, including test methods. Engineering applications are defined as those in which the coating essentially serves a non-decorative purpose.

Although this International Standard does not specify the condition, finish or surface roughness of the basis material prior to electroplating, the appearance and serviceability of electroplated silver and silver alloy coatings depend on the condition of the basis material. It is essential that the purchaser specifies the surface finish and roughness of the basis material in order to conform to the product requirements.

This International Standard does not apply to coatings on screw threads or to coatings on sheet, strip or wire in the non-fabricated form.

## 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 2080, *Metallic and other inorganic coatings — Surface treatment, metallic and other inorganic coatings — Vocabulary*

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

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

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 3868, *Metallic and other non-organic coatings — Measurement of coating thicknesses — Fizeau multiple-beam interferometry method*

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

ISO 4518, *Metallic coatings — Measurement of coating thickness — Profilometric method*

ISO 4519:1980, *Electrodeposited metallic coatings and related finishes — Sampling procedures for inspection by attributes*

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

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

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

ISO 10111, *Metallic and other inorganic coatings — Measurement of mass per unit area — Review of gravimetric and chemical analysis methods*

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 10308, *Metallic coatings — Review of porosity 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 12687, *Metallic coatings — Porosity tests — Humid sulfur (flowers of sulfur) test*

ISO 14647, *Metallic coatings — Determination of porosity in gold coatings on metal substrates — Nitric acid vapour test*

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

IEC 60068-2-20, *Basic environmental testing procedures — Part 2: Tests. Test T: Soldering*

### **3 Terms and definitions**

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

## **4 Information to be supplied by the purchaser to the electroplater**

### **4.1 Essential information**

The following information shall be supplied by the purchaser to the electroplater in writing, for example, in the purchase order or contract, or on engineering drawings:

- a) the number of this International Standard (ISO 4521) and the designation (see Clause 5);
- b) the significant surface indicated, for example, on drawings or by the provision of suitably marked samples;