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**Metallic and other inorganic coatings —  
Electrodeposited coatings of tin-cobalt  
alloy**

*Revêtements métalliques et autres revêtements inorganiques — Dépôts  
électrolytiques d'alliage étain-cobalt*

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## Contents

Page

Foreword.....	iv
Introduction .....	v
1 Scope .....	1
2 Normative references .....	1
3 Terms and definitions .....	2
4 Information to be supplied by the purchaser to the processor .....	2
4.1 Required information .....	2
5 Designation .....	3
5.1 General.....	3
5.2 Designation specification .....	3
5.3 Basis metal .....	3
5.4 Designation of heat treatment requirements .....	3
5.5 Examples .....	4
6 Requirements .....	4
6.1 Basis material.....	4
6.2 Appearance .....	5
6.3 Undercoats .....	5
6.4 Thickness .....	5
6.5 Adhesion.....	6
6.6 Accelerated corrosion testing .....	6
6.7 Stress relief heat treatment prior to electroplating.....	7
6.8 Hydrogen-embrittlement-relief heat treatment after electroplating.....	7
7 Sampling.....	7
Annex A (normative) Methods of measuring the thickness of tin-cobalt alloy coatings .....	8
Bibliography .....	10

## 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

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

ISO 26945 was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*.

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## Introduction

Electrodeposited coating of tin-cobalt alloy is characterized by its bright surface which is similar to decorative chromium coating. Hardness and wear-resistance properties of tin-cobalt alloy coatings are not equivalent to those of chromium coatings, but are similar to those of tin-nickel alloy coatings (see ISO 2179). Thus tin-cobalt coatings may be regarded, as far as surface lustre is concerned, as one of the possible alternatives to chromium coating. Due to its higher current efficiency (more than 70 %), tin-cobalt alloy coatings can be applied by rack and barrel plating processes to a wide range of complicated shapes and sizes, e.g. nuts, bolts, rivets, etc.

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# Metallic and other inorganic coatings — Electrodeposited coatings of tin-cobalt alloy

**WARNING** — This International Standard may not be compliant with some countries' health and safety legislation, 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 legislation 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 of itself confer immunity from legal obligations.

## 1 Scope

This International Standard specifies electrodeposited coatings of tin-cobalt alloy of approximate composition 75 % (mass fraction) to 80 % (mass fraction) tin, remainder cobalt, as a substitute for decorative chromium coatings of 0,1  $\mu\text{m}$  to 0,3  $\mu\text{m}$  thickness. Hardness and wear resistance properties of the coatings obtained are not equivalent to those of chromium coatings, but similar to those of tin-nickel alloy coatings.

Tin-cobalt alloy coatings can be applied by rack or barrel plating processes.

This International Standard does not specify requirements for the surface condition of the basis metal prior to electroplating.

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

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

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

ISO 4541, *Metallic and other non-organic coatings — Corrodokote corrosion test (CORR test)*

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

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

ASTM B117, *Standard Practice for Operating Salt Spray (Fog) Apparatus*

ASTM B368, *Standard Method for Copper-Accelerated Acetic Acid-Salt Spray (Fog) Testing (CASS Test)*

### **3 Terms and definitions**

For the purposes of this document, the terms and definitions given in ISO 2064, ISO 2080, ISO 9587 and ISO 9588 apply.

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

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### **4.1 Required information**

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

- a) the number of this International Standard, ISO 26945, and article designation;
- b) the nature, condition and finish of the basis metal if they are likely to affect the serviceability and/or appearance of the coating (see 6.1);
- c) the significant surface of the article to be electroplated, as indicated, for example, by drawings or by the provision of suitably marked samples;
- d) additional parts of surfaces where minimum thickness requirements apply;
- e) positions where unavoidable contact marks and other defects are acceptable (see 6.2);
- f) any requirements for special pretreatment (see 6.1);
- g) tensile strength of parts and requirements for heat treatment before and/or after electrodeposition (see 6.7 and 6.8);
- h) requirements, nature and thickness of undercoats (see 6.3);
- i) requirements for thickness, accelerated corrosion and adhesion testing (see 6.4, 6.5 and 6.6);
- j) finish required, e.g. bright, dull or other type, accompanied by approved samples of the finish (see 6.2);
- k) the sampling plan to be adopted, and the acceptance levels (see Clause 7);
- l) any additional essential information.



## 5 Designation

### 5.1 General

The article designation shall appear on engineering drawings, in the purchase order, in the contract or in the detailed product specification.

The designation specifies, in the following order, the basis metal, the specific alloy (optional), stress relief requirements, the type and thickness of undercoats (when present), the thickness and composition of alloy coating or coatings (in the order of application when double or multilayer coatings are specified), and supplementary treatments, such as heat treatment to reduce susceptibility to hydrogen embrittlement.

### 5.2 Designation specification

The designation shall comprise:

- a) the term, Electrodeposited coating;
- b) the number of this International Standard, ISO 26945;
- c) a hyphen;
- d) the chemical symbol of the basis metal (see 5.3), e.g. Fe (iron or steel), followed by a solidus (/);
- e) the chemical symbol of the undercoat, e.g. Cu (copper) or Ni (nickel);
- f) stress relief (SR) designation, (see 5.4);
- g) a solidus (/);
- h) the chemical symbol(s) for the metal or alloy or coating(s);
- i) a number indicating the minimum local thickness, in micrometres, of the coating(s) followed by a solidus;
- j) hydrogen-embrittlement-relief (ER) designation (see 5.4);
- k) if appropriate, codes indicating the type of any supplementary coating, followed by a solidus;
- l) if appropriate, codes designating any supplementary treatments.

See 5.5 for examples of designations.

### 5.3 Basis metal

The basis metal shall be designated by its chemical symbol, or its principal constituent if an alloy. For example, Fe for iron and steel; Zn for zinc alloys; Cu for copper and copper alloys, Al for aluminium and aluminium alloys, Sn for tin and tin alloys, and Co for cobalt. In the case of non-metallic materials, the letters, NM, shall be used.

It is recommended that the specific alloy be identified by its standard designation; for example, its UNS number or the local, national equivalent placed between the symbols, <>. For example, Fe<G43400> is the UNS designation for one high-strength steel (see Reference [1]).

### 5.4 Designation of heat treatment requirements

The heat treatment requirements shall be in brackets and designated as follows: