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Interested committees:

Title: Draft BS EN ISO 1456 Metallic and other inorganic coatings — Electrodeposited coatings of nickel, nickel plus chromium, copper plus nickel and of copper plus nickel plus chromium.

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Introduction

This draft standard is based on national and international discussions. Your comments on this draft are invited and will assist in the preparation of the consequent standard.

For international standards, comments will be reviewed by the relevant UK national committee before sending the consensus UK vote and comments to the international committee, which will then decide appropriate action. If the international standard is approved, it is usual for the text to be published as a British Standard.

For national standards, comments will be reviewed by the relevant UK national committee and the resulting standards published as a British Standard.

UK Vote

Please indicate whether you consider the UK should submit a negative (with supporting technical reasons) or positive vote on this draft. Please indicate if you are aware of any reason why this draft standard should not be published as a British Standard.

Submission of Comments

- **Annotated drafts are not acceptable and will be rejected.**
- All comments should be submitted online at <https://standardsdevelopment.bsigroup.com/>. You will need to register in order to comment.

Template for comments and secretariat observations

Date: xx/xx/20xx	Document: ISO/DIS xxxx
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1	2	(3)	4	5	(6)	7
MB	Clause No./ Subclause No./Annex (e.g. 3.1)	Paragraph/ Figure/Table/Note	Type of comment	Comment (justification for change) by the MB	Proposed change by the MB	Secretariat observations on each comment submitted
	3.1	Definition 1	ed	Definition is ambiguous and needs clarifying.	Amend to read '...so that the mains connector to which no connection...'	
	6.4	Paragraph 2	te	The use of the UV photometer as an alternative cannot be supported as serious problems have been encountered in its use in the UK.	Delete reference to UV photometer.	



DRAFT International Standard

ISO/DIS 1456

Metallic and other inorganic coatings — Electrodeposited coatings of nickel, nickel plus chromium, copper plus nickel and of copper plus nickel plus chromium

Revêtements métalliques et autres revêtements inorganiques — Dépôts électrolytiques de nickel, de nickel plus chrome, de cuivre plus nickel et de cuivre plus nickel plus chrome

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents. ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, Subcommittee SC 3, *Electrodeposited coatings and related finishes*.

This fifth edition cancels and replaces the fourth edition (ISO 1456:2009), which has been technically revised.

The main changes are as follows:

- new [section 5.4](#) to introduce and explain [tables 1](#) through [4](#) better including a technical correction to [tables 1](#) and [2](#) (remove the possibility to plate Cu10a from a cyanide electrolyte);
- make [Table 5](#) and [Annex E](#) consistent;
- updating the requirements for Crmp (minimum and maximum local thickness), introducing requirements on the number of microdiscontinuities in Crmp, and updating [Annex A](#) with an actual overview of methods to determine microdiscontinuities in Crmp in accordance with DIN 53100 and DIN 53099;
- refer to ISO 16866 for the STEP test and shorten [Annex E](#) accordingly;
- make ISO 9227 a normative reference;
- add further explanations to the x-ray spectrometry method in [B.3.3](#) for coating thickness measurement.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Decorative, electrodeposited nickel coatings, with and without copper undercoats and without chromium as further coating on top of the nickel, are suitable for applications in which tarnishing could be prevented by avoiding rubbing or handling in service or by the use of further coatings other than chromium. They are also suitable for those applications where tarnishing is of no importance. Corrosion resistance depends on the type and thickness of the coatings.

Decorative, electrodeposited nickel plus chromium and copper plus nickel plus chromium coatings are applied to manufactured articles to enhance their appearance and corrosion resistance. Corrosion resistance depends on the type and thickness of the coatings. In general, multilayer nickel coatings provide better corrosion resistance than single-layer nickel coatings of equal thickness, and micro-discontinuous chromium coatings provide better protection than conventional chromium.

Metallic and other inorganic coatings — Electrodeposited coatings of nickel, nickel plus chromium, copper plus nickel and of copper plus nickel plus chromium

WARNING — The use of this document can involve hazardous materials, operations and equipment. It does not purport to address all of the safety or environmental problems associated with its use.

1 Scope

This document specifies requirements for decorative nickel, nickel plus chromium, copper plus nickel and copper plus nickel plus chromium coatings that are applied to iron, steel, zinc alloys, copper and copper alloys, and to aluminium and aluminium alloys, to provide an attractive appearance and enhanced corrosion resistance. Coating designations are specified that differ in thickness and type, and guidance is given on selecting the coating designation appropriate for the service conditions to which the coated product will be exposed.

This document does not specify the surface condition required by the basis metal prior to the coating process (see hints under 5.4), and is not applicable to coatings on sheet, strip or wire in the non-fabricated form nor to threaded fasteners or coil springs.

Requirements for decorative, electroplated copper plus nickel plus chromium coatings on plastic materials are specified in ISO 4525. ISO 4526 and ISO 6158 specify requirements for coatings of nickel and chromium, respectively, for engineering purposes.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 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 4519, *Electrodeposited metallic coatings and related finishes — Sampling procedures for inspection by attributes*

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

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 — 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*

ISO 16348, *Metallic and other inorganic coatings — Definitions and conventions concerning appearance*

ISO 16866, *Metallic and other inorganic coatings — Simultaneous thickness and electrode potential determination of individual layers in multilayer nickel deposits (STEP test)*

ISO 27831-2, *Metallic and other inorganic coatings — Cleaning and preparation of metal surfaces — Part 2: Non-ferrous metals and alloys*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 2064, ISO 2080, ISO 9587, ISO 9588 and ISO 16348 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Information to be supplied by the purchaser to the processor

4.1 Essential information

When ordering articles to be electroplated in accordance with this document, the purchaser shall provide the following information in writing, in, for example, the contract or purchase order, or on engineering drawings:

- a) a reference to this document, ISO 1456, and the designation (see [Clause 5](#));
- b) the significant surfaces, to be indicated on drawings of the parts or by providing suitably marked specimens;
- c) the service-condition (see [5.3](#)) and/or the required corrosion resistance (see [6.5](#)), the latter especially when a different duration than specified in [Table 6](#) is agreed upon;
- d) the appearance required, e.g. bright, dull or satin, (see [5.6](#) and [6.1](#)); alternatively, samples showing the required finish or range of finishes may also be supplied and approved by the purchaser, and used for comparison purposes (see [6.1](#));

- e) the type of nickel coating, e.g. decorative, sulfur-containing bright, semi-bright, or satin containing a lamellar structure; or high-sulfur-containing bright, semi-bright or dull containing a lamellar structure without mechanical polishing; or dull or semi-bright with mechanical polishing; or sulfur-free dull or semi-bright with a columnar structure without mechanical polishing; or double- or triple-layer coating (see [5.6](#) and [6.3](#));
- f) the type of chromium coating, e.g. regular, black, micro-cracked or micro-porous (see [5.7](#));
- g) the type of corrosion test to be used (see [6.5](#) and [Table 6](#));
- h) the type of adhesion test and minimum local thicknesses to be used (see [6.4](#) and [6.2](#));
- i) the extent to which defects shall be tolerated on non-significant surfaces (see [6.1](#));
- j) positions on the significant surface for rack or contact marks, where such marks are unavoidable (see [6.1](#));
- k) the tensile strength of the steel and any requirement for stress relief for pre- or post-coating embrittlement-relief treatments of iron or steel to reduce the risk of hydrogen embrittlement, as well as hydrogen-embrittlement test methods (see [6.8](#) and [6.9](#));
- l) sampling methods and acceptance levels (see [6.10](#)).

4.2 Additional information

The following additional information shall also be provided by the purchaser, when appropriate:

- a) any requirements for STEP testing (see [5.6](#) and [6.6](#)) and for the number of microdiscontinuities in the chromium coating (see [5.7](#) and [6.11](#));
- b) thickness requirements on those areas that cannot be touched by a ball 20 mm in diameter (see [6.2](#));
- c) whether or not a copper undercoat is required (see [5.2](#) and [5.5](#)).

5 Designation

5.1 General

The 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 the nickel or nickel-alloy coating or coatings (when double or multilayer coatings are specified);
- the thickness and type of a chromium coating on top of the nickel (when present);
- and supplementary treatments, such as heat treatment to reduce susceptibility to hydrogen embrittlement (for designation, see [5.2](#), [6.8](#) and [6.9](#)).