SLOVENSKI STANDARD
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Metallic coatings -- Electrodeposited coatings of nickel plus chromium and of copper plus nickel plus chromium

Revêtements métalliques -- Dépôts électrolytiques de nickel plus chrome et de cuivre plus nickel plus chrome

Ta slovenski standard je istoveten z: ISO 1456:2003

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INTERNATIONAL STANDARD

ISO 1456

Third edition
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Metallic coatings — Electrodeposited coatings of nickel plus chromium and of copper plus nickel plus chromium

Revêtements métalliques — Dépôts électrolytiques de nickel plus chrome 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

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 International Standard may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 1456 was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, Subcommittee SC 3, *Electrodeposited coatings and related finishes*.

This third edition cancels and replaces the second edition (ISO 1456:1988), which has been editorially and technically revised.

Annexes B to E form a normative part of this International Standard. Annex A is for information only.

Introduction

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 microdiscontinuous chromium coatings provide better protection than conventional chromium.

Metallic coatings — Electrodeposited coatings of nickel plus chromium and of copper plus nickel plus chromium

1 Scope

This International Standard specifies the requirements for decorative, electroplated nickel plus chromium, and copper plus nickel plus chromium coatings on iron, steel, zinc alloys, copper and copper alloys, and 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 in selecting the coating designation appropriate to the service conditions to which the coated product will be exposed.

This International Standard does not specify the surface condition required by the base metal prior to the coating process, 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. Similar coatings, except for the absence of a top-coat of chromium, are specified in ISO 1458.

ISO 4526 and ISO 6158 specify requirements for coatings of nickel and chromium, respectively, for engineering purposes.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

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, *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 — Corrodkote corrosion test (CORR test)*

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

ISO 9227:1990, *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 10289:1999, *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 16348, *Metallic and other inorganic coatings — Definitions and conventions concerning appearance*

ASTM B764-94, *Standard Test Method for Simultaneous Thickness and Electrochemical Potential Determination of Individual Layers in Multilayer Nickel Deposit (STEP Test)*

3 Terms and definitions

For the purposes of this International Standard, the terms and definitions given in ISO 2064, ISO 2079, ISO 2080 and ISO 16348 apply.

4 Information to be supplied by the purchaser 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, in e.g., the contract or purchase order, or on engineering drawings:

a) the designation (see clause 6);

b) the appearance required, e.g., bright, dull or satin (see 6.3 and 7.1). Alternatively, samples showing the required finish or range of finishes shall be supplied or approved by the purchaser, and used for comparison purposes (see 7.1);

c) the significant surfaces, to be indicated on drawings of the parts or by providing suitably marked specimens;

d) the type of corrosion test to be used (see 7.5 and Table 8);

e) the type of adhesion test to be used (see 7.4);

f) the extent to which defects shall be tolerated on non-significant surfaces (see 7.1);

g) positions on the significant surface for rack or contact marks, where such marks are unavoidable (see 7.1);

h) sampling methods and acceptance levels (see clause 8);

i) the tensile strength of the steel and any requirement for prior or post treatments of iron or steel to reduce the risk of hydrogen embrittlement, as well as hydrogen embrittlement test methods (see 7.8 and 7.9).

4.2 Additional information

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

a) any requirements for STEP testing (see 7.6);

b) thickness requirements on those areas that cannot be touched by a ball 20 mm in diameter (see 7.2);

c) whether or not a copper undercoat is required (see 6.1 and 6.2).

5 Service condition number

The service condition number is used by the purchaser to specify the degree of protection required, as related to the severity of the conditions to which a product is to be subjected, in accordance with the following scale:

5 Exceptionally severe

4 Very severe

3 Severe

2 Moderate

1 Mild

Typical service conditions for which the various service condition numbers are appropriate are listed in annex A.

6 Designation

6.1 General

The coating designation specifies the type and thickness of coatings appropriate for each service condition number (see Tables 1 to 6 for various substrates) and comprises the following:

a) the term, “Electroplated coating”, the number of this International Standard, ISO 1456, followed by a hyphen;

b) the chemical symbol for the base metal (or for the principal metal if an alloy) followed by a solidus (/) as follows:

- Fe/for iron or steel;
- Zn/for zinc alloys;
- Cu/for copper and copper alloys;
- Al/for aluminium or aluminium alloys;

c) the chemical symbol for copper (Cu), if copper, or brass containing greater than 50 % copper, is used as an undercoat;

d) a number indicating the minimum local thickness, in micrometres, of the copper coating where applicable;

e) a letter indicating the type of copper, where applicable;

f) the chemical symbol for nickel (Ni);

g) a number indicating the minimum local thickness, in micrometres, of the nickel coating;

h) a letter designating the type of nickel coating (see 6.3);

i) the chemical symbol for chromium (Cr);

j) a letter or letters designating the type of chromium and its minimum local thickness (see 6.4).