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International Standard 2361

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Electrodeposited nickel coatings on magnetic and non-magnetic substrates — Measurement of coating thickness — Magnetic method

Revêtements électrolytiques de nickel sur métal de base magnétique et non magnétique — Mesurage de l'épaisseur — Méthode magnétique

Second edition — 1982-08-15

UDC 669.248.7 : 621.317.49 : 531.717

Ref. No. ISO 2361-1982 (E)

Descriptors : nickel coatings, dimensional measurement, thickness.

Price based on 4 pages

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been set up 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2361 was developed by Technical Committee ISO/TC 107, *Metallic and other non-organic coatings*, and was circulated to the member bodies in November 1980.

It has been approved by the member bodies of the following countries :

Australia	Italy	Spain
Bulgaria	Japan	Sweden
Czechoslovakia	Netherlands	Switzerland
Egypt, Arab Rep. of	Poland	United Kingdom
France	Portugal	USA
Hungary	Romania	USSR
India	South Africa, Rep. of	

No member body expressed disapproval of the document.

This second edition cancels and replaces the first edition (i.e. ISO 2361-1972).

Electrodeposited nickel coatings on magnetic and non-magnetic substrates — Measurement of coating thickness — Magnetic method

1 Scope and field of application

This International Standard specifies the method of using coating thickness instruments of the magnetic type for non-destructive measurements of the thickness of electrodeposited nickel coatings on magnetic or non-magnetic substrates.

The method may not be applicable to autocatalytic (electroless) nickel coatings depending on their chemical composition.

For the purposes of this International Standard, two types of nickel coating are distinguished :

- a) nickel coatings on magnetic substrates (type A coatings);
- b) nickel coatings on non-magnetic substrates (type B coatings).

It should not be assumed that all instruments are applicable to both types of coating.

The effective measuring ranges of instruments using the principle of magnetic attraction are up to 50 μm for type A coatings, and up to 25 μm for type B coatings.

For instruments using the principle of reluctance, the effective ranges are much greater and measurements up to 1 mm, or more, can be made on both types of coating.

2 References

ISO 1463, *Metallic and oxide coatings — Measurement of coating thickness — Microscopical method.*

ISO 2064, *Metallic and other non-organic coatings — Definitions and conventions concerning the measurement of thickness.*

ISO 2177, *Metallic coatings — Measurement of coating thickness — Coulometric method by anodic dissolution.*¹⁾

1) At present at the stage of draft. (Revision of ISO 2177-1972.)

2) For the purpose of this International Standard, the measuring uncertainty is defined as that obtained with an instrument correctly calibrated and used.

3 Principle

Coating thickness instruments of the magnetic type measure either the magnetic attraction between a permanent magnet and the coating/substrate combination, or the reluctance of a magnetic flux path passing through the coating and the substrate.

4 Factors affecting the measuring accuracy²⁾

The following factors may affect the accuracy of measurements of coating thickness.

4.1 Coating thickness

The precision of a measurement changes with coating thickness depending on the instrument design. For thin coatings, the precision is constant, independent of the thickness. For thick coatings, the precision is an approximately constant fraction of the thickness.

4.2 Magnetic properties of the basis metal

(type A coatings only)

Thickness measurements by the magnetic method are affected by variations in the magnetic properties of the basis metal. For practical purposes, magnetic variations in low carbon steels can be considered to be insignificant.

4.3 Basis metal thickness (type A coatings only)

For each instrument, there is a critical thickness of basis metal above which measurements will not be affected by an increase in thickness. Since it depends on the instrument probe and the nature of the basis metal, its value should be determined experimentally, unless it is specified by the manufacturer.