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Paints and varnishes — Electrochemical impedance spectroscopy (EIS) on high-impedance coated specimens —

Part 2: Collection of data

Peintures et vernis — Spectroscopie d'impédance électrochimique (SIE) sur des éprouvettes revêtues de haute impédance —

Partie 2: Recueil des données

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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 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 16773-2 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

ISO 16773 consists of the following parts, under the general title *Paints and varnishes — Electrochemical impedance spectroscopy (EIS) on high-impedance coated specimens*:

— *Part 1: Terms and definitions*

— *Part 2: Collection of data*

— *Part 3: Processing and analysis of data from dummy cells* [1)]

— *Part 4: Examples of spectra of polymer-coated specimens* [1)]

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1) In preparation.

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Paints and varnishes — Electrochemical impedance spectroscopy (EIS) on high-impedance coated specimens —

Part 2: Collection of data

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1 Scope

This part of ISO 16773 provides guidance on optimizing the collection of EIS data from high-impedance systems. High impedance in the context of intact coatings refers to systems with an impedance greater than $10^9\ \Omega{\cdot}cm^2$. This does not preclude measurements on systems with lower impedance.

This part of ISO 16773 deals with:

— instrumental set-up: requirements and pit-falls;

— data validation: checking the measurement range and the accuracy of the data;

— performing an EIS measurement: specimen considerations and instrumental parameters;

— the experimental results: different methods of presenting EIS data.

Following the recommendations should ensure the acquisition of EIS data that can be used to study the performance of the specimen. It does not give guidelines for the interpretation of the data.

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 16773-1, *Paints and varnishes — Electrochemical impedance spectroscopy (EIS) on high-impedance coated specimens — Part 1: Terms and definitions*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 16773-1 apply.

4 Principle

A so-called “confidence” test is described in order to check the suitability of the entire set-up and recommendations are given as to how to perform EIS experiments. For convenience, only potentiostatically controlled EIS measurements are described, although it is also possible to make EIS measurements under galvanostatic control.

A potentiostat is connected either to a dummy cell or to an electrochemical cell (with working, counter- and reference electrodes). A single-sinusoidal- or multi-sinusoidal-waveform potential, either in conjunction with a d.c. offset or not, is applied by the potentiostat to the dummy cell or to the electrochemical cell, and the resulting a.c. current is measured. Both potential and a.c. current data are collected and analysed for amplitude and phase shift. This can be done in a variety of ways, depending on the type of equipment used.

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