

SLOVENSKI STANDARD

SIST EN ISO 16773-3:2016

01-julij-2016

Nadomešča:

SIST EN ISO 16773-3:2009

Barve in laki - Elektrokemijska impedančna spektroskopija (EIS) premazanih in nepremazanih kovinskih vzorcev - 3. del: Obdelava in analiza podatkov iz preskusnih celic (ISO 16773-3:2016)

Paints and varnishes - Electrochemical impedance spectroscopy (EIS) on coated and uncoated metallic specimens - Part 3: Processing and analysis of data from dummy cells (ISO 16773-3:2016)

iTeh STANDARD PREVIEW

(standards.iteh.ai)

Elektrochemische Impedanzspektroskopie (EIS) an beschichteten und unbeschichteten metallischen Proben - Teil 3: Verarbeitung und Analyse von Daten von Testschaltkreisen (ISO 16773-3:2016)

[SIST EN ISO 16773-3:2016](https://standards.iteh.ai/catalog/standards/sist/ea80017c-0643-4f3d-9ce7-f50f2ee8510d/sist-en-iso-16773-3-2016)

<https://standards.iteh.ai/catalog/standards/sist/ea80017c-0643-4f3d-9ce7-f50f2ee8510d/sist-en-iso-16773-3-2016>

Spectroscopie d'impédance électrochimique (SIE) sur des éprouvettes métalliques revêtues et non revêtues - Partie 3: Traitement et analyse des données obtenues à partir de cellules test (ISO 16773-3:2016)

Ta slovenski standard je istoveten z: EN ISO 16773-3:2016

ICS:

87.040

Barve in laki

Paints and varnishes

SIST EN ISO 16773-3:2016

en,fr,de

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 16773-3:2016](https://standards.iteh.ai/catalog/standards/sist/ea80017c-0643-4f3d-9ce7-f50f2ee8510d/sist-en-iso-16773-3-2016)

<https://standards.iteh.ai/catalog/standards/sist/ea80017c-0643-4f3d-9ce7-f50f2ee8510d/sist-en-iso-16773-3-2016>

EUROPEAN STANDARD

EN ISO 16773-3

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2016

ICS 87.040

Supersedes EN ISO 16773-3:2009

English Version

Electrochemical impedance spectroscopy (EIS) on coated and uncoated metallic specimens - Part 3: Processing and analysis of data from dummy cells (ISO 16773-3:2016)

Spectroscopie d'impédance électrochimique (SIE) sur des éprouvettes métalliques revêtues et non revêtues - Partie 3: Traitement et analyse des données obtenues à partir de cellules test (ISO 16773-3:2016)

Elektrochemische Impedanzspektroskopie (EIS) an beschichteten und unbeschichteten metallischen Proben - Teil 3: Verarbeitung und Analyse von Daten von Testschaltkreisen (ISO 16773-3:2016)

This European Standard was approved by CEN on 11 March 2016.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

| Contents | Page |
|-------------------------------|-------------|
| European foreword..... | 3 |

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 16773-3:2016](https://standards.iteh.ai/catalog/standards/sist/ea80017c-0643-4f3d-9ce7-f50f2ee8510d/sist-en-iso-16773-3-2016)
<https://standards.iteh.ai/catalog/standards/sist/ea80017c-0643-4f3d-9ce7-f50f2ee8510d/sist-en-iso-16773-3-2016>

European foreword

This document (EN ISO 16773-3:2016) has been prepared by Technical Committee ISO/TC 35 “Paints and varnishes” in collaboration with Technical Committee CEN/TC 139 “Paints and varnishes” the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2016, and conflicting national standards shall be withdrawn at the latest by October 2016.

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

This document supersedes EN ISO 16773-3:2009.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

PREVIEW

(standards.iteh.ai)

Endorsement notice

The text of ISO 16773-3:2016 has been approved by CEN as EN ISO 16773-3:2016 without any modification.

SIST EN ISO 16773-3:2016
<https://standards.iteh.ai/catalog/standards/sist/ca80017c-0643-4f3d-9ce7-f50f2ee8510d/sist-en-iso-16773-3-2016>

iTeh STANDARD PREVIEW
(standards.iteh.ai)

[SIST EN ISO 16773-3:2016](#)

<https://standards.iteh.ai/catalog/standards/sist/ea80017c-0643-4f3d-9ce7-f50f2ee8510d/sist-en-iso-16773-3-2016>

INTERNATIONAL
STANDARD

ISO
16773-3

Second edition
2016-04-01

**Electrochemical impedance
spectroscopy (EIS) on coated and
uncoated metallic specimens —**

**Part 3:
Processing and analysis of data from
dummy cells**

iTeh STANDARD PREVIEW

*Spectroscopie d'impédance électrochimique (SIE) sur des éprouvettes
métalliques revêtues et non revêtues —*

*Partie 3: Traitement et analyse des données obtenues à partir de
cellules test*

<https://standards.iteh.ai/catalog/standards/sist/ea80017c-0643-4f3d-9ce7-f50f2ee8510d/sist-en-iso-16773-3-2016>



Reference number
ISO 16773-3:2016(E)

© ISO 2016

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 16773-3:2016](https://standards.iteh.ai/catalog/standards/sist/ea80017c-0643-4f3d-9ce7-f50f2ee8510d/sist-en-iso-16773-3-2016)

<https://standards.iteh.ai/catalog/standards/sist/ea80017c-0643-4f3d-9ce7-f50f2ee8510d/sist-en-iso-16773-3-2016>



COPYRIGHT PROTECTED DOCUMENT

© ISO 2016, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

| | |
|---|-----------|
| Foreword | iv |
| 1 Scope | 1 |
| 2 Description of the dummy cells | 1 |
| 2.1 General..... | 1 |
| 2.2 Components of the dummy cells..... | 1 |
| 2.3 Accuracy requirements for the components..... | 2 |
| 2.4 Circuit description..... | 2 |
| 3 Procedure | 3 |
| 4 Data analysis | 3 |
| 5 Presentation of the results | 3 |
| 6 Acceptance criteria for the measurement system | 5 |
| 7 Test report | 5 |
| 8 Repeatability and reproducibility | 6 |
| Bibliography | 11 |

iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN ISO 16773-3:2016](https://standards.iteh.ai/catalog/standards/sist/ea80017c-0643-4f3d-9ce7-f50f2ee8510d/sist-en-iso-16773-3-2016)

<https://standards.iteh.ai/catalog/standards/sist/ea80017c-0643-4f3d-9ce7-f50f2ee8510d/sist-en-iso-16773-3-2016>

ISO 16773-3:2016(E)

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information \(standards.iteh.ai\)](http://Foreword - Supplementary information (standards.iteh.ai))

The committee responsible for this document is ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

This second edition cancels and replaces the first edition (ISO 16773-3:2009), which has been technically revised. The main changes are the following:

- a) the introductory element of the title, *Paints and varnishes*, has been omitted, because the scope is broadened to include metals and alloys and the main element of the title has been changed to: *Electrochemical impedance spectroscopy (EIS) on coated and uncoated metallic specimens*;
- b) a reference to ISO/TR 16208 for dummy cells with low impedance values (10 Ω to 1 000 Ω) has been added;
- c) a reference to ASTM G106 for the precision data of low impedance measurements has been added;
- d) a test report has been added.

ISO 16773 consists of the following parts, under the general title *Electrochemical impedance spectroscopy (EIS) on coated and uncoated metallic specimens*:

- *Part 1: Terms and definitions*
- *Part 2: Collection of data*
- *Part 3: Processing and analysis of data from dummy cells*
- *Part 4: Examples of spectra of polymer-coated and uncoated specimens*

Electrochemical impedance spectroscopy (EIS) on coated and uncoated metallic specimens —

Part 3: Processing and analysis of data from dummy cells

1 Scope

This part of ISO 16773 specifies a procedure for the evaluation of the experimental set-up used for carrying out EIS on high-impedance coated samples. For this purpose, dummy cells are used to simulate high-impedance coated samples. On the basis of the equivalent circuits described, this part of ISO 16773 gives guidelines for the use of dummy cells to increase confidence in the test protocol, including making measurements, curve fitting and data presentation.

NOTE Due to the nature of the measurements, investigations of high-impedance coated samples are more susceptible to artefacts coming from electromagnetic interferences. Therefore, this part of ISO 16773 considers the aspects for measuring high-impedance samples by using appropriate dummy cells in a Faraday cage. However, most manufacturers offer complementary dummy cells in the low and medium impedance range. This allows checking the setup in the respective low impedance range.

2 Description of the dummy cells

2.1 General

A set of four equivalent circuits (dummy cells) is used to check the overall experimental arrangement. The dummy cells are mounted separately. Two types of equivalent circuit, A and B, are used, as shown in [Figure 1](#). The specific electrical components of these four cells are given in [Table 1](#). Dummy cells with low impedance values (10 Ω to 1 000 Ω) are described in ISO/TR 16208.

NOTE In [Clause 8](#), the results of an interlaboratory test are used to evaluate the precision of this method. During the interlaboratory test, the participating laboratories also measured a fifth dummy cell consisting of an equivalent circuit of type B with unknown component values.

2.2 Components of the dummy cells

Each dummy cell consists of a combination of resistors and capacitors which are soldered directly onto a printed-circuit board (see [Figures 1](#) and [2](#)). Such networks of resistors and capacitors (equivalent circuits) are often used in work on high-impedance coated specimens.

NOTE Because of the very high overall resistance of circuits A and B, the resistor simulating the electrolyte can be neglected. Typically, the values of resistances R_1 and R_2 are above 100 M Ω whereas the electrolyte resistance is around 100 Ω to 500 Ω . As a consequence, the electrolyte resistance is not significant in this kind of EIS application.

The values of the components of the four dummy cells are chosen in accordance with the following considerations.

- Dummy cell 1 should check the input resistance as well as the input capacitance of the measurement equipment.
- Dummy cells 2 to 4 should check the capability of the evaluation software and the impedance measurement equipment to distinguish between only slightly different resistor/capacitor combinations.