ICS 87.040
CCS G 50

NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 39482.3-2020

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

Issued on: November 19, 2020 **Implemented on: October 1, 2021**

Issued by: State Administration for Market Regulation, China National Standardization Administration

Table of Contents

Foreword

GB/T 39482 "Electrochemical Impedance Spectroscopy (EIS) of Painted and Unpainted Metal Samples" is divided into 4 parts.

---Part 1.Terms and definitions;

---Part 2.Data Collection;

---Part 3.Processing and analysis of data obtained from the simulated electrolytic cell;

---Part 4.Examples of spectra of coated and uncoated polymer samples.

This part is Part 3 of GB/T 39482.

This section was drafted in accordance with the rules given in GB/T 1.1-2009.

This part uses the redrafting method to modify and adopt ISO 16773-3.2016 ``Electrochemical impedance spectroscopy of painted and unpainted metal samples

(EIS) Part 3.Processing and analysis of data obtained from simulated electrolytic cells.

Compared with ISO 16773-3.2016, the structure of this part has been adjusted. Appendix A lists the chapters of this part and ISO 16773-3.2016.

List of article number comparison.

Compared with ISO 16773-3.2016, this part has technical differences, and the clauses related to these differences have been passed on the outer margins.

The vertical single line ( ) of the position is marked, and a list of the corresponding technical differences and their reasons is given in Appendix B.

This part was proposed by the China Petroleum and Chemical Industry Federation.

This part is under the jurisdiction of the National Paint and Pigment Standardization Technical Committee (SAC/TC5).

Drafting organizations of this section. Institute of Oceanology, Chinese Academy of Sciences, 725th Research Institute of China Shipbuilding Industry Corporation, Changzhou Guanghui New Materials

Research Institute Co., Ltd., China Southern Power Grid Peak and Frequency Modulation Power Generation Co., Ltd., CNOOC Changzhou Coating Chemical Research Institute Co., Ltd., Haihong Old Man

Coatings (Guangzhou) Co., Ltd., Jiangsu Daupeng Technology Co., Ltd., Qingdao Technological University.

1 Scope

This part of GB/T 39482 specifies a procedure for evaluating EIS test equipment for high-impedance painted samples. To achieve this goal,

A simulated electrolytic cell is used to simulate high-impedance paint samples. Based on the equivalent circuit described, this section gives the

Guidelines for the credibility of the test plan, including experimental testing, curve fitting and data presentation.

This section applies to the processing and analysis of EIS data of painted and unpainted metal samples obtained from simulated electrolytic cells.

Note. Due to the nature of the test, the test of high-impedance painted samples is more susceptible to electromagnetic interference from external factors. Therefore, this section considers the use of

The solution cell is placed in a Faraday box to test the high impedance sample. However, most manufacturers provide analog electrolytic cells assisted by low and medium impedance ranges.

Used for the inspection of EIS test equipment in the relatively low impedance range.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this document.

For undated references, the latest version (including all amendments) applies to this document.

ISO 16773-2.2016 Electrochemical impedance spectroscopy (EIS) of painted and unpainted metal samples Part 2.Data collection

3.1 General

A set of devices (simulated electrolytic cells) with four equivalent circuits is used to check the overall test device. The simulated electrolytic cell should be installed separately,

Two types of equivalent circuits, A and B, are used (see Figure 1). The circuit component values defined by these four electrolytic cells are shown in Table 1.

ISO /T R16208 describes an analog electrolytic cell with a low impedance value of 10ohm~1000ohm.

Note. In Chapter 9, inter-laboratory test results are used to evaluate the precision of this method. During the inter-laboratory testing process, the participating laboratories also measured the fifth

A simulated electrolytic cell, which consists of an equivalent circuit B with unknown component values.

3.2 Simulate electrolytic cell components

Each analog electrolytic cell is composed of resistors and capacitors, and is directly soldered on the printed circuit board (see Figure 1 and Figure 2). This kind of electricity

The combined system of resistor and capacitor (equivalent circuit) is often used to test high-impedance painted samples.

Note. Since the total resistance of circuits A and B is very high, the resistance of the analog electrolytic cell can be ignored. Normally, the resistance values of R1 and R2 are higher than

100Mohm, and the resistance of the electrolytic cell is about 100ohm~500ohm. Therefore, the resistance of the electrolytic cell has no obvious influence in this type of EIS application.

The selection of the values of the components in the four simulated electrolytic cells should be based on the following considerations.

---The simulated electrolytic cell 1 should be able to verify the input resistance and capacitance of the test equipment;

---The simulated electrolytic cell 2~the simulated electrolytic cell 4 should have the ability to inspect and evaluate software and impedance test equipment to distinguish between resistors and

The small difference in the container combination circuit.