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Corrosion of metals and alloys — Multielectrode arrays for corrosion measurement

Corrosion des métaux et alliages — Assemblages multi-électrodes pour la mesure de la corrosion

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Foreword

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This document was prepared by Technical Committee ISO/TC 156, *Corrosion of metals and alloys*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Introduction

Multielectrode array technology has been used to study electrochemical behaviours and the localized corrosion of metals and alloys since the 1970s[1] to [5]. It has been demonstrated that multielectrode arrays are highly powerful tools for studying the spatiotemporal behaviour of metals in laboratories[2] to [16] and for monitoring non-uniform corrosion, especially localized corrosion in laboratories and plants[17]. Multielectrode arrays are also used as high throughput probes for studying the statistical behaviour of metal corrosion[1][18] and for the evaluation of inhibitors[19].

This document is designed to outline the requirements and procedures for conducting corrosion measurements using multielectrode arrays.

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Corrosion of metals and alloys — Multielectrode arrays for corrosion measurement

1 Scope

This document specifies the methodology of using multielectrode arrays for the measurement of the corrosion, especially localized corrosion, of metals and alloys. It can be used as a powerful tool for studying the initiation and propagation processes of localized corrosion. It is also a useful tool for long-term corrosion monitoring in the field, especially for localized corrosion, and for obtaining high throughput results for the evaluation of metals with different compositions and/or physical properties in different environments and the screening of a large number of inhibitors. Additionally, the galvanic coupling current and potential distribution of dissimilar metal parings can be assessed by multielectrode arrays. Multielectrode arrays can be implemented in full-immersion, thin-film, spray and alternating wet–dry cycle exposures.

This document is not intended to be used for measurements of corrosion caused by a non-electrochemical mechanism.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 8407, *Corrosion of metals and alloys — Removal of corrosion products from corrosion test specimens*

ISO 8044, *Corrosion of metals and alloys — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 8044 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
uneven general corrosion
corrosion that occurs over the whole exposed area of a metal at different rates across the exposed area

Note 1 to entry: It is a type of general corrosion, as defined in ISO 8044, that produces an uneven or wave-like surface[20][21] where the thickness reduction at the more corroded areas is significantly larger than the thickness reduction at the less corroded areas or the average corroded areas.

3.2
non-uniform corrosion
corrosion that occurs at different rates over a metal surface where there is a localized surplus of net anodic or net cathodic rates such that a localized area does not exhibit charge neutrality and electrons flow within the metal from the anodic-dominant areas to the cathodic-dominant areas

Note 1 to entry: Non-uniform corrosion includes both localized corrosion, as defined in ISO 8044, and *uneven general corrosion* (3.1). Non-uniform corrosion also includes the type of general corrosion that produces even surfaces at the end of a large time interval, but uneven surfaces within small time intervals.