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BSI Standards Publication

Corrosion of metals and alloys — Corrosion tests in artificial atmospheres — Guidelines for selection of accelerated corrosion test for product qualification

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National foreword

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TECHNICAL REPORT

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Corrosion of metals and alloys — Corrosion tests in artificial atmospheres — Guidelines for selection of accelerated corrosion test for product qualification

Corrosion des métaux et alliages — Essais de corrosion en atmosphères artificielles — Lignes directrices pour un échantillon d'essais de corrosion accélérés pour la qualification du produit

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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.

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).

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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

The committee responsible for this document is ISO/TC 156, *Corrosion of metals and alloys.*

Introduction

This document is a guideline for selection of suitable accelerated corrosion tests and is a survey of different internationally standardized test methods.

For that reason, this document is not suitable to be standardized but the document is greatly needed by the industry and test institutes.

The document has for that reason been prepared as a Technical Report.

In corrosion testing there has been a development from qualitative to more quantitative methods and the prerequisites for corrosion testing in product qualification are changing. Modern technologies for control and regulation of climatic test parameters are adopted in test equipment so that the reproducibility of tests increases. To make possible a better translation of laboratory test results into in-service performance, quantitative methods for characterization of corrosivity have been introduced during recent years. To evaluate the effect of corrosion attack on product functional performance, quantitative methods are adopted for assessing changes in the functional properties, as well as in the associated chemical changes resulting from corrosion of the materials of the component.

Field-site exposure testing was and still is the traditional way to verify the corrosion resistance of new materials and products, especially for testing new surface treatment systems or coatings for corrosion protection. Field test sites can be selected at places of high corrosivity, as in marine or industrial areas. The field test sites therefore often represent worst cases of environments and as such the tests at those sites can be considered as accelerated tests. The degree of acceleration is, however, mostly moderate and it generally takes a long time to get an answer whether a tested material or product should be considered qualified with respect to its corrosion resistance.

For qualification of new materials and products with respect to corrosion resistance, therefore, accelerated corrosion tests generally need to be adopted during product design work. The higher the degree of acceleration of a corrosion test the more favourable the accelerated corrosion test will be in keeping the required testing time short. On the other hand, the higher the acceleration of the corrosion process needs to be during testing the harder it is to simulate properly the naturally occurring corrosion processes. This points at the main problem in designing meaningful accelerated corrosion tests for product qualification.

Large efforts have been made to develop accelerated corrosion tests for the purpose of product qualification. As a result of this work, a broad spectrum of methods now exists of which some are also available as International Standards. However, some of those tests are intended only for checking the comparative quality of a metallic material with or without corrosion protection, while others may even be useful for predicting or estimating the long-term performance of a product with metallic materials when exposed to corrosive stress representing in-service conditions.

To identify the most relevant method for one specific application requires knowledge that usually goes beyond what you can get from a single standard. This guideline therefore presents a framework for comparing existing accelerated corrosion tests so that the various aspects in the choice of best method and procedure can properly be taken into account.

TECHNICAL REPORT **ISO/TR 16335:2013(E)**

Corrosion of metals and alloys — Corrosion tests in artificial atmospheres — Guidelines for selection of accelerated corrosion test for product qualification

1 Scope

This Technical Report is applicable for the selection of suitable accelerated atmospheric corrosion tests for qualification of products with metallic materials without or with permanent corrosion protection or temporary corrosion protection. The characteristics of a number of standardized accelerated corrosion tests are also given to serve as a guide in the preparation of test specifications.

In this Technical Report the following aspects are taken into account:

— Categories of accelerated atmospheric corrosion tests

— Recommended fields of application for the different kinds of tests and their suitability

— Corrosivity of tests and relative corrosion rates of standard metals

— Requirements for test equipment, criteria for reproducibility and correlation with in-service performance

— Recommended procedures for product qualification

The main purpose of this Technical Report is to present a framework for comparing the different accelerated corrosion test methods, which presently are available as International Standards. The suitability of a test method varies with the requirements set by the intended application of the product.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 9223, *Corrosion of metals and alloys — Corrosivity of atmospheres — Classification, determination and estimation*

ISO 9224:2012, *Corrosion of metals and alloys — Corrosivity of atmospheres — Guiding values for the corrosivity categories*

ISO 9225, *Corrosion of metals and alloys — Corrosivity of atmospheres — Measurement of environmental parameters affecting corrosivity of atmospheres*

ISO 9226, *Corrosion of metals and alloys — Corrosivity of atmospheres — Determination of corrosion rate of standard specimens for the evaluation of corrosivity*

ISO 9227, *Corrosion tests in artificial atmospheres — Salt spray tests*

ISO 10062, *Corrosion tests in artificial atmosphere at very low concentrations of polluting gas(es)*

ISO 11130, *Corrosion of metals and alloys — Alternate immersion test in salt solution*

ISO 11474, *Corrosion of metals and alloys — Corrosion tests in artificial atmosphere — Accelerated outdoor test by intermittent spraying of a salt solution (Scab test)*

ISO 11844-1, *Corrosion of metals and alloys — Classification of low corrosivity of indoor atmospheres — Part 1: Determination and estimation of indoor corrosivity*