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Corrosion of metals and alloys — Corrosion in artificial atmosphere — Accelerated corrosion test involving exposure under controlled conditions of humidity cycling and intermittent spraying of a salt solution

Corrosion des métaux et alliages — Corrosion en atmosphère artificielle — Essai de corrosion accélérée comprenant des expositions sous conditions contrôlées à des cycles d'humidité et à des vaporisations intermittentes de solution saline

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Foreword

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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 document 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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This document was prepared by Technical Committee ISO/TC 156, *Corrosion of metals and alloys*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 262, *Metallic and other inorganic coatings, including for corrosion protection and corrosion testing of metals and alloys,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 16701:2015), which has been technically revised.

The main changes are as follows:

— The test cycle has been revised with the same intended acceptance criteria to improve field correlation and reproducibility, when performed in various exposure chambers.

— An alternative cycle with alternating temperature in the climate cycling (constant dew point instead of constant temperature) is introduced. It is a modification of the so called ACT1 (originally Volvo Standard 423-0014), however within the same scope and intended acceptance criteria.

— Extensive requirements and guidelines on quality assurance of test equipment and control procedures have been incorporated, mainly as normative and informative annexes.

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.

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Introduction

Atmospheric corrosion of metallic materials, with or without corrosion protection, is influenced by many environmental factors. Their corrosion impact varies with the type of exposed material system. It is therefore not possible to design a laboratory corrosion test in such a way that the complexity and variations of real, in-service conditions are fully represented. Acceleration (forced conditions) as such can also have a negative impact on the correlation-to-field performance. Nevertheless, tests with humidity cycling and only intermittent exposure to a salt solution provide a better correlation-to-field performance than tests using continuous salt spray.

This document was developed in the automotive context, where the major contributor to corrosion is the use of wintertime de-icing road salt in cool/cold temperate areas, most often as sodium chloride depositions that act in cyclic humidity conditions. The test procedure is moderately forced by humidity and salt. It is intended to be applicable for quality assurance of the metals and corrosion protections typically encountered in motor vehicles.[1]-[4] The method is also relevant in other areas of application, provided they have similar climatic conditions with an influence of sodium chloride depositions.[5][6]

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Corrosion of metals and alloys — Corrosion in artificial atmosphere — Accelerated corrosion test involving exposure under controlled conditions of humidity cycling and intermittent spraying of a salt solution

1 Scope

This document specifies an atmospheric accelerated test procedure in two closely related variants that contain intermittent salt exposure combined with dynamic humidity patterns: variant A at constant dew point and variant B at constant temperature. These variants are used in assessing the corrosion resistance of metals in environments where there is a significant influence of chloride ions, mainly as sodium chloride from, for example, winter road de-icing salt. The results obtained do not permit far-reaching conclusions on the corrosion resistance of the tested metallic material under the whole range of environmental conditions in which it can be used. Nevertheless, the method provides information on the relative corrosion resistance of a material exposed to a salt-contaminated environment with varying humidity conditions.

The two accelerated laboratory corrosion test variants are applicable to:

— metals and their alloys (ferrous and non-ferrous);

— metallic coatings;

— chemical conversion coatings;

— organic coating on metals;

— a combination of materials and coatings that include galvanic interactions and/or crevice conditions.

NOTE 1 If testing low-alloy stainless steels according to this document, especially austenitic grades, there is a risk of exaggerated pitting, which is not representative of most service environments.

NOTE 2 This document is not suitable for testing of wax and oil-based rust protection agents, due to the constantly elevated temperature condition of the test.

This document also specifies requirements on the test equipment and contains detailed procedures for quality control, including recommended instrumentation.

This document does not specify the dimensions of the tests specimens, the exposure period to be used for a particular product, or the interpretation of the results. Such details are provided in the appropriate product specifications.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

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