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Corrosion tests in artificial atmosphere at very low concentrations of polluting gas(es)

Essais de corrosion en atmosphère artificielle à très faible concentration en gaz polluants

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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 of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

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,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 10062:2006), which has been technically revised.

The main changes compared to the previous edition are as follows:

— simplified method has been deleted due to safety issues for operator;

— warnings about each gas have been added in 5.1.2;

— Annex A has been changed to normative annex;

— the installation environment has been added to Annex A.

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

Products with, for example, sensitive electrical functions, can, during storage or operation in indoor locations, be affected by atmospheric corrosion dependent on climatic factors such as temperature, relative humidity, air velocity and rate of change caused by temperature and humidity. Additionally, gaseous pollutants can seriously affect the rate of corrosion, as well as the occurrence of different corrosion mechanisms. Contaminants on the surface, such as salt, dust, oil and compounds liberated from plastics, can also affect the rate and mechanism of corrosion.

Different corrosion-promoting gaseous pollutants dominate in different field environments:

— sulfur dioxide and nitrogen oxides in atmospheres influenced by combustion of fossil fuels and in traffic environments,

— hydrogen sulfide in atmospheres in the vicinity of petrochemical and steel industry, decaying organic matter, stagnant waters and animal shelters, and

— hydrogen sulfide and chlorine compounds in the vicinity of pulp and paper industry; if chlorine is used for bleaching.

Those gaseous pollutants are known to act as single corrosion-promoting factors. However, in atmospheres where more than one gaseous pollutant is present, synergistic effects can be initiated. As a result, a considerable increase in the corrosion rate can occur, compared to the case when the different gaseous pollutants act as single corrosion-promoting factors.

This document is intended to

a) specify a general method using atmospheres polluted by one or more gases at very low volume fractions $\leq 10^{-6}$ under specified conditions of temperature and relative humidity, so as to avoid condensation phenomena during the test,

b) specify the test apparatus and procedure required to achieve the best possible reproducibility, and

c) assess performance under test conditions which accelerate corrosion; as knowledge of operating conditions proceeds, more suitable pollutants or pollutant mixtures can be used.

This document is not intended to be used for comparative testing as a means of ranking different materials relative to each other with respect to corrosion resistance or as a means of predicting long-term corrosion resistance of the tested material.

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Corrosion tests in artificial atmosphere at very low concentrations of polluting gas(es)

1 Scope

This document specifies tests which are intended to determine the influence of one or more flowing polluting gas(es) at volume fractions less than or equal to 10^{-6} on test samples and/or articles of metals and alloys with or without corrosion protection under determined conditions of temperature and relative humidity.

This document is applicable to

a) metals and their alloys,

b) metallic coatings (anodic and cathodic),

c) metals with conversion coatings,

d) metals with anodic oxide coatings, and

e) metals with organic coatings.

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 554, *Standard atmospheres for conditioning and/or testing — Specifications*

ISO 558, *Conditioning and testing — Standard atmospheres — Definitions*

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

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

3.1
exposure time
interval of time elapsed between the moment when the specimens are introduced into the test chamber and the end of the test

3.2
test duration
interval of time during which the specimens are exposed to polluting gases

4 Apparatus

WARNING — Safety rules for personnel: Handling of the gases used for testing can be hazardous and shall be done by skilled personnel trained to handle such gases. The test equipment shall be

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