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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

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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

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Introduction

As an alternative to the continuous salt spray test methods of ISO 9227^[3], intermittent salt spray test methods may be used. The results of such tests provide a better correlation with the effects of exposure in environments where there is a significant influence of chloride ions, such as from a marine source or road de-icing salt.

Accelerated corrosion tests to simulate atmospheric corrosion in such environments should include cyclic exposure to the following conditions.

- a) A wet phase, during which the test object is repeatedly subjected first to a spray of aqueous salt-containing solution then to a wet stand-by period during which residual wetness remains on the test object. This sequence provides a prolonged period of continuous exposure to wetness, extending over several hours.
- b) A phase of controlled cyclic humidity conditions, where the test object is subjected to an environment which alternates between high humidity and comparative dryness.

These two phases should be cycled for an appropriate number of times.

The test method described in this International Standard conforms with these requirements, as follows.

In the first (wet) phase of exposure, the test objects are sprayed for 15 min with a 1 % (mass fraction) aqueous solution of sodium chloride acidified to pH 4,2, to simulate the rather acidic precipitation present in industrialized areas, followed by a 1 h 45 min period of wet stand-by. This sequence is repeated three times to give a total of 6 h exposure to wetness. The whole of this first phase of the test cycle is repeated twice a week. If spraying is carried out more frequently or a more concentrated solution of sodium chloride is used during this phase, phenomena may appear that are seldom experienced in the field, e.g. severe diffusion blocking by red rust or excessive dissolution of zinc.

The major part of the test cycle, however, consists of humidity cycling between the two levels of 95 % RH and 50 % RH at a constant temperature of 35 °C. To simulate the wet phase of humidity cycling, the humidity level has been set close to the condensation limit, but at a level at which test conditions can be satisfactorily controlled. Introducing 100 % humidity conditions, inevitably results in loss of control of the amount of salt deposited on a test object.

The test method described in this International Standard is mainly intended for comparative testing and 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 within which it may be used. Nevertheless, the method provides valuable information on the relative performance of materials exposed to salt-contaminated environments similar to those used in the test. See Annex A.