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INTERNATIONAL STANDARD



**Environmental testing –
Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)**

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING –

Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)

FOREWORD

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as “IEC Publication(s)”). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

International Standard IEC 60068-2-52 has been prepared by IEC technical committee 104: Environmental conditions, classification and methods of test.

This third edition cancels and replaces the second edition published in 1996. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

- a) the entire content has been harmonized with ISO 9227 as far as possible;
- b) an introduction has been added;
- c) the scope has been simplified;
- d) normative references have been updated;
- e) the general description of the test has been changed;
- f) a dry chamber has been added to the test apparatus;
- g) severities have been changed to test methods;
- h) test methods 7 and 8 have been added;
- i) information on the test report has been added;
- j) Figure 1 has been changed to Table 1;
- k) a typical test apparatus example has been added in a new Annex A;
- l) a description of each test method has been added in a new Annex B;
- m) bibliographical references have been added.

The text of this International Standard is based on the following documents:

FDIS	Report on voting
104/751/FDIS	104/761/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 60068 series, published under the general title *Environmental testing*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "<http://webstore.iec.ch>" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

IMPORTANT – The “colour inside” logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this publication using a colour printer.

INTRODUCTION

The mechanism of ~~salt~~ corrosion on metallic materials in a chloride-containing atmosphere is electrochemical, whereas the degradation effects experienced on non-metallic materials are caused by complex chemical reactions of the salts with the materials involved. The rate at which corrosive action takes place is dependent, to a large extent, on the supply of oxygenated salt solution to the surface of the test specimen(s), the temperature of the test specimen(s) and the temperature and humidity of the environment.

Apart from the corrosive effects, this cyclic salt mist test may be used to indicate deterioration of some non-metallic materials by assimilation of salts. In the various test methods described in this document, the period of spraying with the relevant salt solution is sufficient to wet the test specimen(s) thoroughly. Because this wetting is repeated after intervals of storage under humid conditions ~~(severities (1) and (2)) and in some cases severities ((3) to (6))~~ supplemented by storage under a standard atmosphere ~~for testing~~, it goes some way to reproducing the effects of natural environments.

Furthermore, considering natural environments for corrosion on metallic materials, neutral or acidified salt solution spray, humid, and dry conditions are also important factors as a cyclic corrosion test. Each condition is repeated after intervals of other conditions in different combinations to achieve corrosion on metallic materials and to get acceleration of corrosion.

The tests described in this document are accelerated compared with most expected conditions of use. As a result, it may be difficult to establish an overall acceleration factor for all kinds of test specimens. This also means that it is often not possible to use results gained from these tests as a comparative guide to the long-term behaviour of different coating systems since the corrosion stress during these tests differs significantly from the corrosion stresses encountered during use. Nevertheless, the method described gives a means of checking that the comparative quality of a metallic material is maintained.

This document may involve hazardous materials, operations and equipment. This document does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this document to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

ENVIRONMENTAL TESTING –

Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)

1 Scope

~~This test is intended for application to components or equipment designed to withstand a salt-laden atmosphere, depending on the chosen severity. Salt can degrade the performance of parts manufactured using metallic and/or non-metallic materials.~~

~~Severities (1) and (2) are intended to be used for testing products which are used in a marine environment, or in close proximity to the sea. Severity (1) should be used to test products which are exposed to the environment for much of their operational life (e.g. ship radar, deck equipment). Severity (2) should be used to test products which may be exposed to the marine environment from time to time but will normally be protected by an enclosure (e.g. navigational equipment which will normally be used on the bridge or in a control room).~~

~~Additionally, severities (1) and (2) are commonly used as a general corrosion test in component quality assurance procedures.~~

~~Severities (3) to (6) are intended for products where, under normal use, there is a frequent change between salt-laden and dry atmosphere, e.g. automobiles and their parts.~~

~~Severities (3) to (6), compared to severities (1) and (2), therefore include an additional storage under a standard atmosphere for testing.~~

~~The period of dry atmosphere may happen, in practice, during breaks of operation, e.g. during the weekend. This inclusion of such a dry period in severities (3) to (6) leads to corrosion mechanism which can be quite different from those under constant humid conditions.~~

~~The test is accelerated compared with most service conditions. However, it is not possible to establish an overall acceleration factor for all kinds of specimens (see IEC 60355).~~

This part of IEC 60068-2 specifies the application of the cyclic salt mist test to components or equipment designed to withstand a salt-laden atmosphere as salt can degrade the performance of parts manufactured using metallic and/or non-metallic materials.

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.

IEC 60068-1: ~~1988~~, *Environmental testing – Part 1: General and guidance*

~~IEC 60068-2-3: 1969, *Environmental testing – Part 2: Tests – Test Ca: Damp heat, steady state*~~

IEC 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

~~IEC 60355: 1971, *An appraisal of the problems of accelerated testing for atmospheric corrosion*~~

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

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Environmental testing –
Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)**

**Essais d'environnement –
Partie 2-52: Essais – Essai Kb: Brouillard salin, essai cyclique (solution de
chlorure de sodium)**

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

ENVIRONMENTAL TESTING –

Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)

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104/751/FDIS	104/761/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

The French version of this standard has not been voted upon.

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ENVIRONMENTAL TESTING –

Part 2-52: Tests – Test Kb: Salt mist, cyclic (sodium chloride solution)

1 Scope

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IEC 60068-2-78, *Environmental testing – Part 2-78: Tests – Test Cab: Damp heat, steady state*

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

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COMMISSION ÉLECTROTECHNIQUE INTERNATIONALE

ESSAIS D'ENVIRONNEMENT –

Partie 2-52: Essais – Essai Kb: Brouillard salin, essai cyclique (solution de chlorure de sodium)

AVANT-PROPOS

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La Norme internationale IEC 60068-2-52 a été établie par le comité d'études 104 de l'IEC: Conditions, classification et essais d'environnement.

La présente version bilingue (2019-07) correspond à la version anglaise monolingue publiée en 2017-11.

Cette troisième édition annule et remplace la deuxième édition parue en 1996. Cette édition constitue une révision technique.

Cette édition inclut les modifications techniques majeures suivantes par rapport à l'édition précédente:

- a) le contenu a été harmonisé autant que possible avec l'ISO 9227;
- b) une introduction a été ajoutée;
- c) le domaine d'application a été simplifié;
- d) les références normatives ont été mises à jour;
- e) la description générale de l'essai a été modifiée;
- f) une chambre sèche a été ajoutée à l'appareillage d'essai;
- g) les sévérités ont été remplacées par les méthodes d'essai;
- h) les méthodes d'essai 7 et 8 ont été ajoutées;
- i) des informations sur le rapport d'essai ont été ajoutées;
- j) la Figure 1 a été remplacée par le Tableau 1;
- k) un exemple d'appareillage d'essai type a été ajouté à la nouvelle Annexe A;
- l) une description de chaque méthode d'essai a été ajoutée à la nouvelle Annexe B;
- m) des références bibliographiques ont été ajoutées.

Le texte anglais de cette norme est issu des documents 104/751/FDIS et 104/761/RVD.

Le rapport de vote 104/761/RVD donne toute information sur le vote ayant abouti à l'approbation de cette norme.

La version française de cette norme n'a pas été soumise au vote.

Ce document a été rédigé selon les Directives ISO/IEC, Partie 2.

Une liste de toutes les parties de la série IEC 60068, publiées sous le titre général *Essais d'environnement*, peut être consultée sur le site web de l'IEC.

Le comité a décidé que le contenu de ce document ne sera pas modifié avant la date de stabilité indiquée sur le site web de l'IEC sous "<http://webstore.iec.ch>" dans les données relatives au document recherché. A cette date, le document sera

- reconduit,
- supprimé,
- remplacé par une édition révisée, ou
- amendé.

INTRODUCTION

Le processus de corrosion s'appliquant aux matériaux métalliques dans une atmosphère contenant du chlorure est de nature électrochimique, alors que les effets de dégradation relevés sur les matériaux non métalliques sont dus à des réactions chimiques complexes des sels avec les matériaux en présence. La vitesse de l'action de la corrosion dépend dans une large mesure de la quantité de solution saline oxygénée à la surface du ou des spécimens d'essai, de la température du ou des spécimens d'essai, et de la température et de l'humidité de l'environnement.

Outre la mise en évidence des effets dus à la corrosion, cet essai cyclique au brouillard salin peut être utilisé pour signaler la détérioration de certains matériaux non métalliques, par absorption de sels. Dans les diverses méthodes d'essai décrites dans le présent document, la durée de vaporisation avec la solution saline appropriée est suffisante pour humidifier complètement le ou les spécimens d'essai. Puisque cette humidification est répétée après des périodes de stockage dans des conditions d'humidité complétées par un stockage dans des conditions atmosphériques normales, elle tend à reproduire en quelque sorte les effets d'un environnement naturel.

En outre, compte tenu de l'environnement naturel corrosif sur les matériaux métalliques, la vaporisation de solution saline neutre ou acide et les conditions humides et sèches sont aussi des facteurs importants pour un essai de corrosion cyclique. Chaque condition est répétée après des périodes où d'autres conditions sont appliquées dans différentes combinaisons, pour obtenir une corrosion sur les matériaux métalliques et pour accélérer cette corrosion.

Les essais décrits dans le présent document sont accélérés comparativement à la plupart des conditions d'utilisation attendues. Par conséquent, il peut être difficile d'établir un facteur d'accélération global pour tous les types de spécimens d'essai. Cela signifie également qu'il est souvent impossible d'utiliser les résultats de ces essais comme un guide comparatif du comportement à long terme des différents systèmes de revêtement, étant donné que la contrainte de corrosion au cours de ces essais diffère considérablement des contraintes de corrosion rencontrées pendant l'utilisation. Néanmoins, la méthode décrite permet de vérifier le maintien de la qualité comparative d'un matériau métallique.

Le présent document peut impliquer des matériaux, un fonctionnement et du matériel dangereux. Le présent document n'a pas pour but de traiter tous les problèmes de sécurité qui sont, le cas échéant, liés à son utilisation. Il incombe à l'utilisateur du présent document d'établir, avant de l'utiliser, des pratiques d'hygiène et de sécurité appropriées et de déterminer l'applicabilité des restrictions réglementaires.

ESSAIS D'ENVIRONNEMENT –

Partie 2-52: Essais – Essai Kb: Brouillard salin, essai cyclique (solution de chlorure de sodium)

1 Domaine d'application

La présente partie de l'IEC 60068-2 spécifie l'application de l'essai cyclique au brouillard salin aux composants ou équipements conçus pour résister à une atmosphère chargée en sel, car le sel peut détériorer le fonctionnement des parties fabriquées à partir de matériaux métalliques et/ou non métalliques.

2 Références normatives

Les documents suivants sont cités dans le texte de sorte qu'ils constituent, pour tout ou partie de leur contenu, des exigences du présent document. Pour les références datées, seule l'édition citée s'applique. Pour les références non datées, la dernière édition du document de référence s'applique (y compris les éventuels amendements).

IEC 60068-1, *Essais d'environnement – Partie 1: Généralités et lignes directrices*

IEC 60068-2-78, *Essais d'environnement – Partie 2-78: Essais – Essai Cab: Chaleur humide, essai continu*

ISO 9227, *Essais de corrosion en atmosphères artificielles – Essais aux brouillards salins*