INTERNATIONAL STANDARD

**ISO 11997-3**

First edition
2022-07

# Paints and varnishes — Determination of resistance to cyclic corrosion conditions —

## Part 3: Testing of coating systems on materials and components in automotive construction

*Peintures et vernis — Détermination de la résistance aux conditions cycliques de corrosion —*

*Partie 3: Essais de systèmes de revêtements sur matériaux et composants en construction automobile*

Reference number
ISO 11997-3:2022(E)

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Published in Switzerland



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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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

A list of all parts in the ISO 11997 series can be found on the ISO website.

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

This document was prepared on the basis of SEP 1850[9] and VDA 233-102[10].

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# Paints and varnishes — Determination of resistance to cyclic corrosion conditions —

# Part 3: Testing of coating systems on materials and components in automotive construction

## 1 Scope

This document specifies a method based on a cyclic corrosion test for testing the corrosion protection of automobiles using coating systems on aluminium, steel or galvanized steel.

The test method uses corrosive conditions (temperature and humidity ramps and salt spray) to create realistic corrosion patterns. These corrosion patterns are typical for automobiles, and they are comparable in the case of sufficiently similar protective coating systems. In particular, the accelerated test investigates the delamination/corrosion creep that results from defined artificial damage to a coating. Investigations of surface and edge corrosion or investigations of adhesive specimens or components are also covered. This cyclic corrosion test is also suitable for testing corrosion in flanged areas or near gaps.

This document was developed for the assessment of coated substrates (test specimens, bodywork and mounted parts) in the automotive industry. Other applications, such as components with unpainted metallic coatings, were not part of the scope of the standardization work. This document was originally developed for coating systems on aluminium, steel or galvanized steel but it can also be used for the assessment of the corrosion resistance of coating systems on other metals and their alloys.

## 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 2409, *Paints and varnishes — Cross-cut test*

ISO 3574, *Cold-reduced carbon steel sheet of commercial and drawing qualities*

ISO 4618, *Paints and varnishes — Terms and definitions*

ISO 4628-1, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 1: General introduction and designation system*

ISO 4628-2, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 2: Assessment of degree of blistering*

ISO 4628-3, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 3: Assessment of degree of rusting*

ISO 4628-4, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 4: Assessment of degree of cracking*

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ISO 4628-5, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 5: Assessment of degree of flaking*

ISO 4628-8, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 8: Assessment of degree of delamination and corrosion around a scribe or other artificial defect*

ISO 4628-10, *Paints and varnishes — Evaluation of degradation of coatings — Designation of quantity and size of defects, and of intensity of uniform changes in appearance — Part 10: Assessment of degree of filiform corrosion*

ISO 9227:2017, *Corrosion tests in artificial atmospheres — Salt spray tests*

ISO 17872, *Paints and varnishes — Guidelines for the introduction of scribe marks through coatings on metallic panels for corrosion testing*

ISO 20567-1, *Paints and varnishes — Determination of stone-chip resistance of coatings — Part 1: Multi-impact testing*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4618 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/

## 4 Principle

**WARNING — 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.**

The test specimens are tested in a cyclic test that involves salt spray, humidity ramps and temperature ramps. In this way, realistic corrosion patterns are created for coated substrates of steel, galvanized steel and aluminium. The results of the tests are assessed based on subjective criteria that are agreed beforehand between the contractual partners.

## 5 Apparatus and test equipment

The typical laboratory and glass or plastics apparatus, together with the following.

### 5.1 Corrosion test chamber

All parts of the test chamber that come into contact with salt spray, condensate or test solutions shall be made of a material that is resistant to attack by the test solutions and does not itself affect the action of the test solutions or the salt spray/condensate on the test specimens.

The test may be carried out in separate chambers as long as the climatic conditions for the cycles are met. Chambers that can perform all conditions are available and recommended.

Test chambers shall consist of a cooling unit, heating, pressure equalization as well as the necessary measurement and control equipment to set and maintain the climate data described in Annex B (temperature ±2 °C, relative humidity ±5 %) as measured at a reference point in the closed chamber at defined temperature/relative humidity values. When passing through temperature ramps in phases with constant relative humidity, deviations in relative humidity of −8 % to +5 % are permitted.


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