
**Paints and varnishes — Artificial
weathering including acidic deposition**

Peintures et vernis — Vieillessement artificiel comportant un dépôt acide



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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.

ISO 15110 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee SC 9, *General test methods for paints and varnishes*.

Introduction

This International Standard specifies a method of simulating the damaging effect of outdoor weathering with relevance to acidic atmospheric precipitation on polymeric products. In addition to the classical environmental variables of temperature and humidity, acidic atmospheric precipitation can also have a significant effect on the photochemical ageing of polymers, e.g. by attacking the stabilizers. The mechanisms differ from those of harmful gases, which essentially constitute the initial products of acidic precipitation.

Arising from changing industrial air pollution and additionally diffused by the stochastic wind and cloud distribution, acidic precipitation occurs sporadically. Thus, especially regarding acidic precipitation, outdoor weathering effects vary enormously within different years. Therefore, it is practically impossible to obtain reliable outdoor exposure results from just one season. These fluctuations can be avoided through the use of a laboratory test, where all weathering parameters, including the acidic deposition, can be controlled.

The method is based on VDI Guideline VDI 3958-12.[\[9\]](#)

Paints and varnishes — Artificial weathering including acidic deposition

1 Scope

This International Standard specifies a so-called acid dew and fog test (ADF test) as an accelerated laboratory test method for simulating, by the use of artificial acidic precipitation, the damaging effects of acidic atmospheric precipitation in association with UV radiation, neutral condensed precipitation, and changing temperature and humidity. This test method is intended to be used in evaluating, on the basis of relative performance rankings, the suitability of polymeric materials for use in outdoor environments with acidic precipitation. It is not intended to generate the same extent of damage or the same damage pattern as in outdoor weathering, but rather to give a ranking which is similar to that which would be obtained in outdoor weathering. The method produces damage which is more homogeneous, allows fewer specimens to be exposed (and hence more rapid testing) and enables evaluation of the exposed specimens to be carried out using methods which are more objective than visual assessment.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 4892-1, *Plastics — Methods of exposure to laboratory light sources — Part 1: General guidance*

ISO 4892-2:2006, *Plastics — Methods of exposure to laboratory light sources — Part 2: Xenon-arc lamps*

ISO 4892-3:2006, *Plastics — Methods of exposure to laboratory light sources — Part 3: Fluorescent UV lamps*

3 Principle

The combined action of solar UV radiation, heat, humidity, wetting and acidic deposition is simulated in weathering devices similar to those described in ISO 4892-2 and ISO 16474-2 for xenon-arc lamps, and in ISO 4892-3 and ISO 16474-3 for fluorescent UV lamps.

Included in the artificial exposure is an acidic exposure, which is accomplished by a once-per-day spraying of acid. The aim of this test is not to reproduce the visual damage patterns which result from outdoor exposures, which show a very widespread distribution that is hard to evaluate. Rather, the aim is to reproduce the same ranking which would be obtained with an outdoor exposure, by causing damage by the same mechanisms but creating a homogeneous distribution on a smaller scale that can be evaluated in an objective way.

Accelerated weathering is achieved by the serial arrangement of the worst conceivable combinations of environmental conditions for the object under test (referred to hereafter as the “worst-case scenario”). This is accomplished by reproducing these environmental conditions in a more compressed sequence than would be the case outdoors and by including artificial acidic precipitation. However, the values of the environmental conditions used do not significantly exceed those encountered in practice outdoors.