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Paints and varnishes — Natural weathering of coatings — Exposure and assessment

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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*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 139, Paints and varnishes, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This third edition cancels and replaces the second edition (ISO 2810:2004), which has been technically revised. The main changes compared to the previous edition are as follows:

— in Clause 4, the list in b) has been amended by radiant exposure and temperature;

— the time of wetness has been deleted from the list of additional observations on climate in A.2 and replaced by a note with the reference to ASTM Practice G84;

— the climate classification in Annex B has been updated to ISO 877-1:2009;

— the text has been editorially revised and the normative references have been updated.

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.

Paints and varnishes — Natural weathering of coatings — Exposure and assessment

1 Scope

This document specifies the conditions to take into consideration when selecting the type of natural weathering and the natural weathering procedure to determine the resistance of coatings or coating systems (direct weathering or weathering behind window glass).

Natural weathering is used to determine the resistance of coatings or coating systems (denoted in this document by coatings) to the sun's radiation and the atmosphere.

This document does not take into account special atmospheric influences, e.g. industrial pollution.

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 1514, *Paints and varnishes — Standard panels for testing*

ISO 2808, *Paints and varnishes — Determination of film thickness*

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

WMO Publication No, *8, Guide to meteorological instruments and methods of observation*, World Meteorological Organization, Geneva, 2012

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4618 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

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

3.1
durability
ability of a specimen to resist the deleterious effect of its environment

3.2
time of wetness
period during which an exposed coating has surface moisture present on it

4 General

The durability of a coating during natural weathering depends on how, where and when the coating is weathered. Therefore, these parameters and the intended use of the coating shall be taken into account when exposures are carried out.

In particular, the following parameters shall be considered:

a) the location of the exposure site, for example industrial, marine, rural; in choosing sites, those which differ markedly in the type or level of pollution from the normal shall be avoided, unless they are appropriate to the intended end use of the coating under test;

b) the height, angle and orientation of the exposure rack; these parameters govern the extent to which the specimens are affected, for example by radiant exposure, temperature, dew, frost and atmospheric pollutants;

c) the nature of the terrain on which the rack is constructed (for example concrete, grass, gravel); the terrain may affect the climatic conditions around the specimen under test; it would rarely be feasible to select an ideal terrain in practice, but the effect of such variations in climatic conditions will be minimized by ensuring that all specimens are situated sufficiently high above the ground (see Clause 5);

d) whether the performance of the coating on the front and/or the back of the specimen is of interest; certain types of degradation, for example rust formation and/or mould growth, are frequently more severe on the shaded parts of the specimen;

e) the intended use of the coating, including its substrate, and whether the coating is to be washed or polished in service.

The results of tests on an exposure rack apply precisely only to the environment in which they were obtained.

Provided that the test conditions are reasonably appropriate to the intended end use, the relative performance of a number of coatings tested at the same time enables valid deductions to be drawn. It is recommended that each series of specimens under evaluation include coatings of known performance to act as reference standards.

The results of natural weathering may vary according to the time of year during which the tests are carried out. The influence of these variations is reduced if the exposure period is sufficiently long. The exposure period should be at least one year, or a multiple of one year. The reproducibility of the results is improved if the exposure period always starts at the same time of year, preferably in spring.

Natural weathering tests are normally carried out for a fixed period of time. However, in many cases it is preferable to define the test period in terms of a certain degree of degradation or by the radiant exposure (dosage) of solar radiation to which the specimen is to be subjected (see Clause 6). The latter procedure can reduce the influence of seasonal variations but does not eliminate it.

Radiant exposure can be determined by measurement of irradiance, and integration of the measurements over the period of natural weathering.

The climatic conditions shall be monitored, and a complete record shall be reported, together with the other conditions of weathering.

Care is required in the selection of test specimens of substrates with variable (anisotropic) properties, for example wood or steel. In these cases, replication of the tests is essential to avoid misleading results.

Washing and polishing during exposure affects the durability of the coating. It shall therefore be mentioned in the test report.

5 Exposure racks

Unless otherwise specified or agreed, use exposure racks on which the specimens are facing towards the equator. The specimens shall be firmly held on the racks by attachments made of stainless steel or other corrosion-resistant material, in such a manner that they are mechanically stressed as little as possible.