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Paints and varnishes — Electrodeposition coatings —

Part 15: Permeate residues

Peintures et vernis — Peintures d'électrodéposition —

Partie 15: Résidus de perméat

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Foreword

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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).

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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 22553 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.

Introduction

During the curing of the electro-deposition coating, residues from the rinsing process after electro-deposition coating (permeate residues) can lead to deteriorations such as colour changes and changes of the surface of the electro-deposition coat. The test method described in this document specifies a test method for estimating the influence of jetting liquids on a coating.

Paints and varnishes — Electro-deposition coatings —

Part 15:
Permeate residues

1 Scope

This document specifies a test method for estimating the influence of jetting liquids from the rinsing process after electro-deposition coating (permeate residues) on a coating.

It applies to electro-deposition coatings for automotive industries and other general industrial applications, e.g. chiller units, consumer products, radiators, aerospace, agriculture.

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 1520, *Paints and varnishes — Cupping test*

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

ISO 4628-1:2016, *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 13076, *Paints and varnishes — Lighting and procedure for visual assessments of coatings*

ISO 22553-1, *Paints and varnishes — Electro-deposition coatings — Part 1: Vocabulary*

ISO 23321, *Solvents for paints and varnishes — Demineralized water for industrial applications — Specification and test methods*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 4618, ISO 22553-1 and the following 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/

3.1
permeate
fluids passing through the membrane in membrane filtering processes

[SOURCE: EN 12255-14:2003, 3.11]

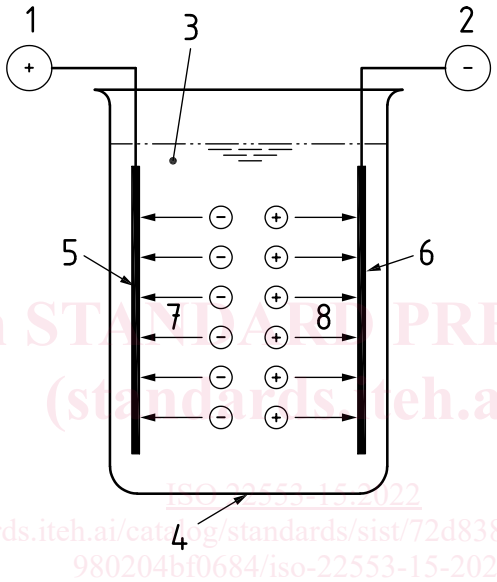
4 Principle

A phosphate panel is provided with indentations. This panel is coated with the electro-deposition coating material. The materials under test are introduced into the indentations. Then the coat is stoved. The stoved e-coat is examined visually. If agreed, a corrosion test can be performed after the visual examination.

5 Apparatus and test equipment

Ordinary laboratory apparatus together with the following.

5.1 Laboratory deposition system, consisting of a deposition tank with tank circulation system and DC voltage equipment. See Figure 1 for an example.



Key

1	anode	5	anode (counter electrode for cathodic e-coat)
2	cathode	6	cathode (test panel for cathodic e-coat)
3 and 8	electro-deposition coating material	7	acid
4	deposition tank		

Figure 1 — Schematic diagram of a laboratory deposition system cathodic electro-deposition coating material (cathodic e-coat)

The tank circulation system consists of a stirring machine, or a magnet stirrer or a pump.

The deposition conditions are adjusted according to the specifications.

5.2 Apparatus for introducing the indentations, in accordance with ISO 1520.

5.3 Pipette for introducing 0,1 ml of the test substance.

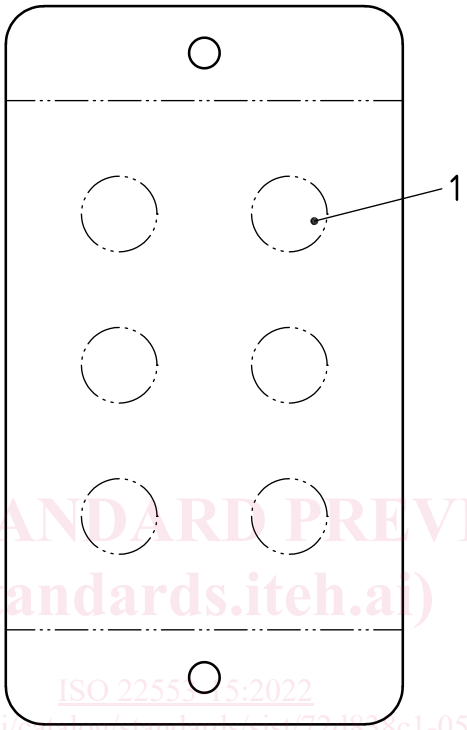
5.4 Thermometer, with a reading accuracy of 0,1 °C.

5.5 Oven, in which the test can be carried out reliably and in which the specified or agreed test temperature can be held to within ±2 °C (for temperatures up to 150 °C) or ±3,5 °C (for temperatures between 150 °C and 200 °C).

6 Test panels

Use electrically conductive test panels with pre-treatment as specified in ISO 1514 with dimensions of about 190 mm × 105 mm × 0,75 mm.

The test panel shall have six indentations. The indentations shall be large enough for taking the test substances. A depth of 2,5 mm has been proven suitable in practice. An example of a test panel is shown in Figure 2.



Key

1 indentation

Figure 2 — Example of a test panel showing the position of the indentations

7 Number of determinations

Carry out the determination in duplicate on one test panel, i.e. each test substance is introduced into two indentations.

8 Procedure

8.1 Coating of the test panels

Fill the tank with the electro-deposition coating material up to about 1 cm below the upper part of the tank and homogenize the coating material, for example, using a stirring machine with paddle stirrer (minimum diameter of 50 mm) at 500 min^{-1}, so that sufficient tank circulation is visually detectable.

Immerse the test panel with the indentations in the laboratory deposition system and connect the anode and cathode to the current source. Maintain stirring of the electro-deposition coating material with a stirring machine or a magnet stirrer.

Set the bath temperature to the temperature specifically required for the product to ±0,5 °C.

NOTE Usually the temperature is in the range of 25 °C to 35 °C.

Select the deposition voltage and deposition time so that the expected dry film thickness of the electro-deposition coating on the test panel corresponds to the nominal dry film thickness.

Increase the voltage to the selected coating voltage (if necessary without series resistor). Maintain that voltage over the selected time.

After completion of the deposition process, remove the coated test panel from the tank. Rinse it thoroughly using demineralized water specified in ISO 23321, so that any excess of the electro-deposition coating material (cream coat) is removed. Place the panel vertical and allow to dry for 30 min.

8.2 Blank test

Stove a test panel coated as described in 8.1 specifically required for the product. Store this panel as a blank panel for comparative evaluation.

8.3 General of test substances

Place the test panel horizontally and introduce one drop of about 0,1 ml of each test substance using the pipette (5.3). Each test substance is introduced into two adjoining indentations.

EXAMPLE Examples for test substances are:

— ultrafiltrate of the electro-deposition coating material used;

— demineralized water according to ISO 23321;

— the electro-deposition coating material which has been used for the test.

Immediately after introducing the test substances, place the test panel horizontally in the oven (5.5) and stove the electro-deposition coating in accordance with its specifications.

The stoving temperature shall be the object temperature, not the indicated oven temperature.

NOTE The stoving temperature is usually between 140 °C and 180 °C.

9 Evaluation

Assess the changes of the e-coat in comparison to the blank-test panel (8.2) under defined conditions as specified in ISO 13076 and evaluate the changes visually as specified in ISO 4628-1.

Examine the indentations for colour changes and/or deteriorations of the surface. State the result in accordance with Table 1 and describe it, if necessary.

Table 1 — Rating scheme for designating the intensity of changes [a]

Rating	Intensity of edge corrosion on the hole
0	unchanged, i.e. no perceptible change
1	very slight, i.e. just perceptible change
2	slight, i.e. clearly perceptible change
3	moderate, i.e. very clearly perceptible change
4	considerable, i.e. pronounced change
5	very marked change

[a] In accordance with ISO 4628-1:2016, Table 3.