INTERNATIONAL STANDARD

ISO 22553-4

First edition
2019-10

Paints and varnishes — Electro-deposition coatings —

Part 4: Compatibility of electro-deposition coating materials with liquid, paste-like and solid foreign materials

Peintures et vernis — Peintures d'électrodéposition — Partie 4: Compatibilité des peintures d'électrodéposition avec des matières liquides, pâteuses et solides

Reference number
ISO 22553-4:2019(E)

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Published in Switzerland

Contents

Page

Foreword ..... **iv**
Introduction ..... **v**
1 Scope **1**
2 Normative references **1**
3 Terms and definitions **1**
4 Principles **2**
5 Apparatus and materials **2**
6 Reagents **3**
7 Foreign materials **3**
8 Test panels **3**
9 Method A — Direct contamination **3**
9.1 Blank test 3
9.2 Number of determinations 4
9.3 Contamination of the electro-deposition tank with foreign material 4
9.3.1 Liquid foreign material 4
9.3.2 Paste-like foreign material 4
9.3.3 Solid foreign materials 5
9.4 Coating of the test panels 6
9.5 Evaluation 6
10 Method B — Contact contamination **6**
10.1 Blank test 6
10.2 Number of determinations 6
10.3 Contamination of the test panels 6
10.4 Coating of the test panels 6
10.5 Evaluation 7
11 Method C — Contamination during the stoving process **7**
11.1 Blank test 7
11.2 Number of determinations 7
11.3 Coating of the test panel 7
11.4 Preparation of the base panel with the foreign material 7
11.5 Stoving of the test specimens 8
11.6 Evaluation 8
12 Precision **8**
13 Test report **9**
Bibliography **10**

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 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 electro-deposition coating process, foreign materials used in downstream production processes pass through the electro-deposition coating tank. Consequently, contamination of the electro-deposition coating tank material or defects in the surface of the coating can occur. Foreign materials can be, for example, oils, adhesives, insulating material and plastic building components.

Test methods for determining the compatibility of electro-deposition coating materials with a reference oil, which influences the properties of the electro-deposition coating, are described in ISO 22553-3.

Paints and varnishes — Electro-deposition coatings —

Part 4:
Compatibility of electro-deposition coating materials with liquid, paste-like and solid foreign materials

1 Scope

This document specifies three different methods of electro-deposition coating material contamination with liquid, paste-like and solid foreign materials.

It is applicable 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 2808, *Paints and varnishes — Determination of film thickness*

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

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 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
foreign material
conscious or unconscious contaminant, used in all downstream processes up to the stoving of the electro-deposition coating

EXAMPLE Adhesive, insulating material, drawing oil, corrosion protection oil, prelubes (special oil with the properties of a drawing and corrosion protection oil).

4 Principles

Method A: The electro-deposition coating material is contaminated directly with foreign material. Then, the test panel is coated.

Method B: The test panel is contaminated with solid foreign material and is subsequently immersed in the electro-deposition coating material and coated.

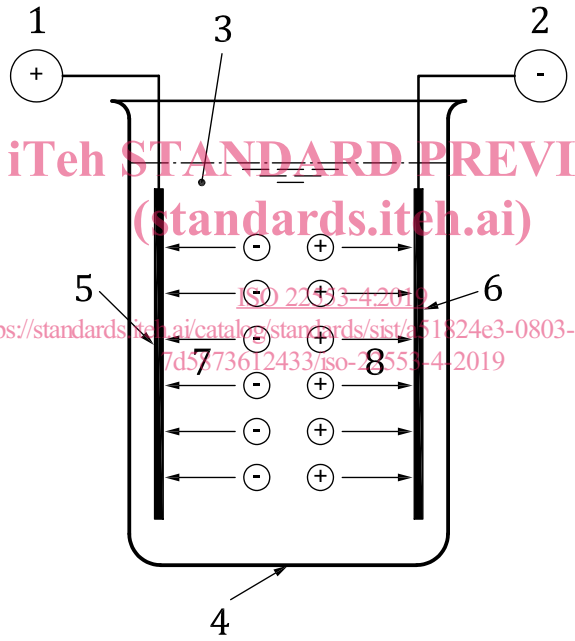
Method C: Paste-like or solid foreign material is applied on the base panel. A test panel coated with the electro-deposition coating material is put on this base panel at a specified distance and is stoved.

Subsequently, the coating of all the test panels is visually evaluated for surface defects.

5 Apparatus and materials

Ordinary laboratory apparatus, together with the following.

5.1 Laboratory deposition system, consisting of a deposition tank with tank recirculation and DC voltage equipment, see Figure 1.



Key

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

Figure 1 — Schematic diagram of a laboratory deposition system with cathodic e-coat material as example

The container of the deposition system is filled with the electro-deposition coating material and the tank circulation (stirrer or pump) is initiated. Subsequently, the test panels are immersed in the container. The deposition conditions are adjusted according to the specification and the deposition process is initiated. Upon completion of the deposition process, remove the test panels from the container and thoroughly rinse using demineralized water as specified in ISO 23321, so that any excess of the electro-deposition coating material (cream coat) is removed.

5.2 5-l container.

5.3 Film thickness measuring device, with a maximum permissible error of 0,1 µm.

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

5.5 Pipette, with a reading accuracy of 1 µl.

5.6 Oven, in which the test can be carried out reliably and where 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 Reagents

6.1 Butyl glycol, CAS-No 111-76-2, technically pure.

7 Foreign materials

Use one or several foreign material(s), as agreed by the contracting parties.

Observe that the foreign materials will not be contaminated during handling. Sample containers shall be clean. Disposable gloves shall be worn during sampling.

8 Test panels

Use electrically conductive test panels with pretreatment as specified in ISO 1514 and with dimensions of approximately 190 mm × 105 mm × 0,75 mm.

9 Method A — Direct contamination

9.1 Blank test

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

Put the test panel in the laboratory deposition system (5.1) and connect the anode and cathode to the current source. Maintain stirring 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 dry-film thickness to be expected 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 a series resistor). Maintain that voltage over the selected time.

Remove the test panel after coating, rinse with demineralized water and stove the electro-deposition coating in accordance with its specifications.