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Paints and varnishes — Electro-deposition coatings —

Part 3: Compatibility of electro-deposition coating materials with a reference oil

Peintures et vernis — Peintures d'électrodéposition — Partie 3: Compatibilité des peintures d'électrodéposition avec d'une huile référence

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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

In practice, surface-reactive substances often contaminate the electro-deposition coating material inside the tank. These contaminants could be materials that are used in downstream production processes, e.g. forming additives, corrosion protection oils and chain lubricants.

These surface-active substances can lead to surface defects in the e-coat and/or subsequent coats.

Test methods for the determination of the compatibility of electro-deposition coating materials with liquid, paste-like and solid foreign substances, which influence the properties of the electro-deposition coating, are described in ISO 22553-4.

Paints and varnishes — Electro-deposition coatings —

Part 3:
Compatibility of electro-deposition coating materials with a reference oil

1 Scope

The document specifies a method for the determination of the compatibility of electro-deposition coating materials with a reference oil.

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 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 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
surface active agent
surfactant
substance that affects the interfacial or surface tension markedly, when present in very low concentrations

[SOURCE: ISO 2080:2008, 3.187]

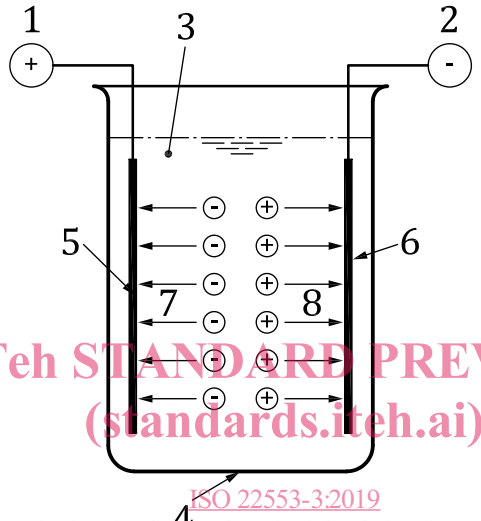
4 Principle

The test panel is coated with an electro-deposition coating material. Subsequently, this electro-deposition coating is contaminated with a reference oil and further test panels are coated. Then, the stoved coating of each test panel is visually evaluated.

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 Timer, with a reading accuracy of 1 s.

5.6 Pipette, with a reading accuracy of 1 µl.

5.7 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.

6.2 Reference oil[1].

7 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.

8 Number of determinations

Carry out the determination in triplicate.

9 Procedure

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 dry/stove the test panel in accordance with the specification for the electro-deposition coating material.

9.2 Testing with reference oil as surface active agent

Mix 10 ml of the reference oil (6.2) and 90 ml butyl glycol (6.1). Add 2,5 ml of this mixture to 5 l of the electro-deposition coating material. Homogenize the sample for 24 h, 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.

1) Information about sources of supply: DIN Standards Committee Coating materials and coatings, Burggrafenstr. 6, D-10787 Berlin.