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Paints and varnishes — Electro-deposition coatings —

Part 2: Throwing power

Peintures et vernis — Peintures d'électrodéposition —

Partie 2: Pouvoir de pénétration

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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

An important quality characteristic of an electro-deposition coating material is the property of coating cavities inside a workpiece. As examples, rockers and pillars of car bodies can be mentioned. The obtained dry-film thickness has an influence on the corrosion protection.

Paints and varnishes — Electro-deposition coatings —

Part 2:
Throwing power

1 Scope

This document specifies two methods for the determination of the throwing power of electro-deposition coating 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 and ISO 22553-1 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/

4 Principle

For method A, a special test specimen is coated with an electro-deposition coating material under specified conditions.

For method B, special test specimens are coated with an electro-deposition coating material in a multiple-chamber system under specified conditions.

The coating is stoved and the dry-film thickness is measured on test panels in defined distances from the lower edge of the test specimen. For other test specimens, the dry-film thickness is determined on defined measuring points.

5 Number of determinations

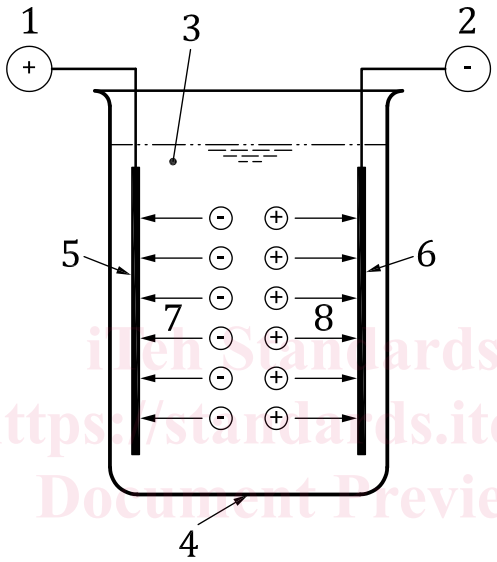
Carry out one single determination.

6 Method A — Single-chamber method

6.1 Apparatus and materials

Ordinary laboratory apparatus, together with the following.

6.1.1 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 an 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.

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

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

6.1.4 Timer, with a reading accuracy of 1 s.

6.1.5 Ruler, with a reading accuracy of 1 mm.

6.1.6 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).

6.2 Test panels

Use electrically conductive test panels with pretreatment as specified in ISO 1514 and with dimensions of approximately 300 mm × 105 mm × 0,75 mm.

6.3 Preparation of the test specimen

For a cathodic electro-deposition coating (cathodic e-coating), the test specimen consists of a spacer in the form of a plastic rack (see Figure 2), two test panels, two plastic fastening bars or tape, a fastening bolt (see Figures 3 and 4) as a cathode (negative pole) and an anode (positive pole) (see Figure 5). For an anodic electro-deposition coating (anodic e-coating), the test specimen is connected as anode and the counter electrode as cathode.

Position one test panel before and one behind each spacer in a way that a test side is facing inward and outward. Fasten both test panels to the rack by means of a bolt and thoroughly mount in place with two fastening bars or tape.

NOTE The test panel has no contact to the bottom of the deposition tank; the distance is at least 10 mm (see Figure 2).

6.4 Procedure

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.

Mount the test specimen (see Figures 3 and 4) on the coating unit (for an example, see Figure 5) and immerse by about 280 mm. Observe that the test specimen yields sufficient distance to the bottom of the tank (about 30 mm). No coating material shall be between test panels and spacers. 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.

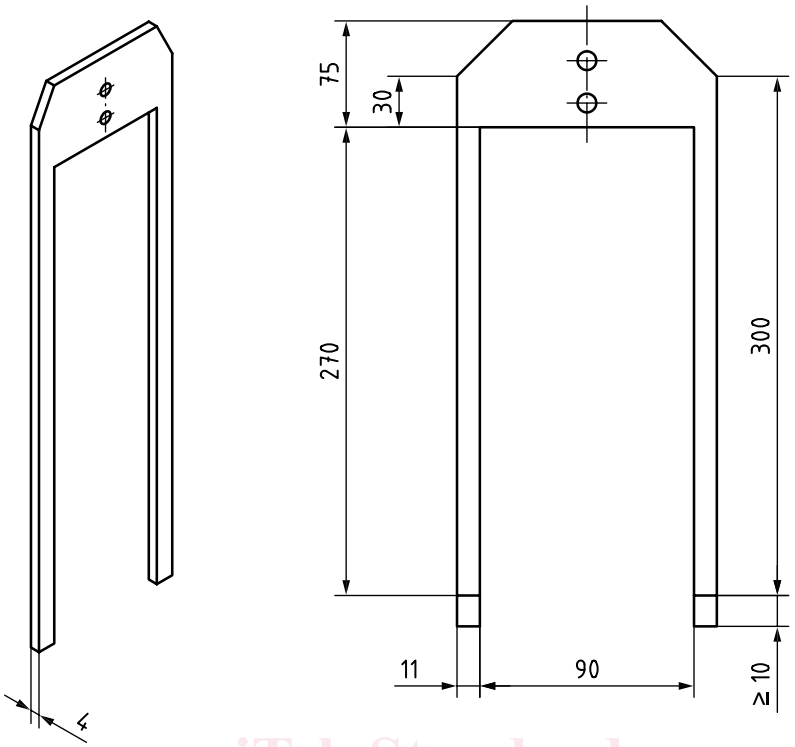
NOTE Usually the temperature is in the range of 25 °C to 35 °C.

Select the deposition voltage so that the film thickness of the electro-deposition coating on the outsides of the test panels corresponds to the nominal dry-film thickness of the electro-deposition coating.

Increase the voltage to the selected coating voltage (if necessary, without a series resistor). Maintain this voltage for a time that has been agreed.

Remove the coating unit after coating, rinse with demineralized water, disassemble and dry/stove the two test panels in accordance with the specification for the electro-deposition coating material.

Dimensions in millimetres



Key

300 length of the test panel;

≥ 10 distance from test panel to the bottom of the deposition tank;

11 width of the arms of the rack;

4 thickness of the arms of the rack.

Figure 2 — Spacer with dimensions