
**Metallic coatings on non-metallic basis
materials — Measurement of coating
thickness — Micro-resistivity method**

*Revêtements métalliques sur matériaux non-métalliques — Mesurage
de l'épaisseur des revêtements — Méthode utilisant la micro-
résistivité*



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Contents

	Page
Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Measurement principle	1
5 Factors affecting measurement uncertainty	4
5.1 Range of measurement	4
5.2 Coating resistivity	4
5.3 Width of the sample	4
5.4 Curvature	5
5.5 Surface roughness	5
5.6 Temperature	5
5.7 Probe contact pressure	5
6 Calibration of instruments	5
6.1 General	5
6.2 Calibration standards	6
6.3 Verification	6
7 Procedure	6
7.1 General	6
7.2 Width of the sample	6
7.3 Curvature	6
7.4 Number of measurements	6
7.5 Surface cleanliness	7
8 Accuracy requirements	7
9 Test report	7
Annex A (informative) Method for determining the critical current path width	8
Bibliography	9

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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This document was prepared by Technical Committee ISO/TC 107, *Metallic and other inorganic coatings*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 262, *Metallic and other inorganic coatings, including for corrosion protection and corrosion testing of metals and alloys*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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Metallic coatings on non-metallic basis materials — Measurement of coating thickness — Micro-resistivity method

1 Scope

This document specifies a method for non-destructive measurements of the thickness of conductive coatings on non-conductive base materials. This method is based on the principle of the sheet resistivity measurement and is applicable to any conductive coatings and layers of metal and semiconductor materials. In general, the probe has to be adjusted to the conductivity and the thickness of the respective application. However, this document focuses on metallic coatings on non-conductive base materials (e.g. copper on plastic substrates, printed circuit boards).

This method is also applicable to thickness measurements of conductive coatings on conductive base materials, if the resistivity of the coating and the base material is significantly different. However, this case is not considered in this document.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

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 Measurement principle

The sheet resistivity method uses the so-called “four-point probe” as shown in [Figure 1](#). A row of four spring-loaded metal tips are placed in contact with the surface of the conductive coating. The tip distances between the outer and inner tips, S_1 and S_3 , are equal. Usually, a constant current is passed through the two outer contacts (labelled as 1). The introduced current penetrates the conductive material of the coating with the resistivity ρ . The resulting voltage drop is measured across the two inner contacts (labelled as 2).

In general, the flow of the introduced current is non-uniformly distributed over the cross-section of the coating and is not parallel to the coating (see [Figure 2](#)). The current density decreases with increasing distance from the direct line between the outer contacts labelled as 1 (with depth and width). If the current is effectively limited by the thickness of the coating, the voltage drop between the inner contacts labelled as 2 is a measure of the thickness.