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INTERNATIONAL STANDARD

colour inside

Printed electronics –
Part 202-10: Materials – Resistance measurement method for thermoformable conducting layer

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IEC Secretariat
3, rue de Varembé
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

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The text of this International Standard is based on the following documents:

Draft	Report on voting
119/436/FDIS	119/448/RVD

Full information on the voting for its approval can be found in the report on voting indicated in the above table.

The language used for the development of this International Standard is English.

This document was drafted in accordance with ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/publications.

A list of all parts in the IEC 62899 series, published under the general title *Printed electronics*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under webstore.iec.ch in the data related to the specific document. At this date, the document will be

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- withdrawn,
- replaced by a revised edition, or
- amended.

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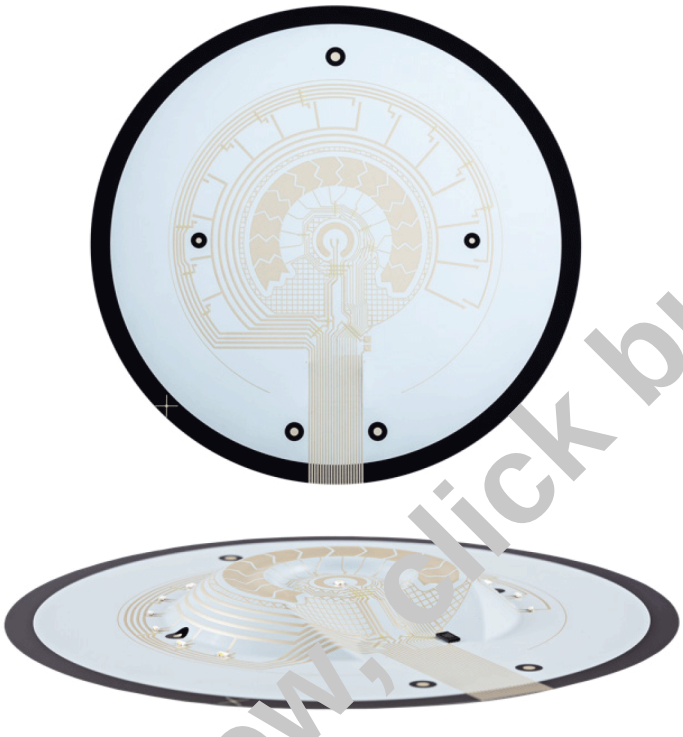
INTRODUCTION

In-mould-electronics (IME) manufacturing can include thermoforming during which two-dimensional electric films with conducting layers are thermoformed into three-dimensional shapes. During thermoforming, the substrate and printed layers will experience plastic strain leading to elongation (see Figure 1). The conductive layer's resistance increases as a function of plastic strain. Designers of electric circuitry should know how much the resistance changes. Using a standardized measurement method ensures comparability of the results.



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NOTE 1 The top image shows a 2D substrate and ink stack after printing and cure.

NOTE 2 The bottom image shows a substrate and ink stack after thermoforming into a 3D shape. The ink layers have been elongated.

Figure 1 – Substrate with ink stack in 2D (top) and 3D (bottom) shape

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Part 202-10: Materials – Resistance measurement method for thermoformable conducting layer

1 Scope

This part of IEC 62899 defines terminology and measurement methods for the resistance change of conductive ink layer(s) as a function of thermoplastic elongation. The method measures resistance changes in-situ or post-elongation.

This document is applicable to thermoformable substrates with conductive ink layers. The thermoformable substrates can have printed graphic ink as well and cover insulation layers.

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.

IEC 62899-202, *Printed electronics – Part 202: Materials – Conductive ink*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at https://www.electropedia.org/
- ISO Online browsing platform: available at https://www.iso.org/obp

3.1
in-mould-electronics
IME
3D circuit manufactured by integrating and embedding printed electronics and electronic components within shaped structures

Note 1 to entry: Manufacturing steps include, but are not limited to, printing, surface mounting, thermoforming and injection moulding.

3.2
thermoforming
process of shaping heated thermoplastic sheets or other articles, generally on a mould, followed by cooling

Note 1 to entry: In this document, the test structures are elongated in the measurement equipment; they are not thermoformed on a mould.

[SOURCE: ISO 472:2013, 2.1172, modified – Note 1 has been added.]