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INTERNATIONAL STANDARD

colour inside

Printed electronics –
Part 202-9: Materials – Conductive ink – Printed patterns for mechanical test



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PRINTED ELECTRONICS –

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IEC 62899-202-9 has been prepared by IEC technical committee 119: Printed Electronics. It is an International Standard.

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

Draft	Report on voting
119/435/FDIS	119/449/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

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- withdrawn,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

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INTRODUCTION

Printing processes are highly promising technologies for the fabrication of flexible electronics such as flexible displays, sensors, batteries, printed circuit boards, etc. During their lifetime, flexible printed electronics can experience various mechanical deformations in random directions such as bending, torsion, creasing, and rolling. Repeated mechanical deformations lead to significant stress and can cause the failure of flexible electronics products. Therefore, a standard test method to evaluate the mechanical reliability of flexible printed electronics is recommended. Mechanical test methods for final products such as flexible displays, sensors, and batteries are recommended in the industry. Moreover, a mechanical test for printed circuits and printed devices is recommended because the printing materials will be used and commercialized as basic components to develop the final printed electronics.

To test the mechanical reliability of printed circuits and printed devices, a proper mechanical test method and a standard pattern are recommended. Several mechanical test methods for flexible printed electronics such as the bending test, rolling test, and torsion test are already proposed in IEC. These previous methods suggested mechanical test methods but they focused on measuring the device reliability of the final product such as the flexible display, sensor, and battery rather than the reliability of each component. Therefore, to test the mechanical reliability of printed circuits and printed devices, standard printed patterns are required to perform mechanical tests.

In this document, basic conductive traces and features of printed patterns are proposed for mechanical tests. The standard pattern in this document can be a useful guideline to test the mechanical reliability of new materials for flexible printed electronics. The information obtained by using the standard patterns in this document will be beneficial to the ink suppliers to figure out the best use of their ink and to the users to improve the reliability of their products.

PRINTED ELECTRONICS –

Part 202-9: Materials – Conductive ink – Printed patterns for mechanical test

1 Scope

This part of IEC 62899 describes basic patterns to evaluate the electrical reliability of a conductive layer under mechanical deformation. Using the standard pattern described in this document, the comparison of the electrical reliability of a conductive layer under mechanical deformation is possible when the sample dimension is identical.

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*

IEC 62899-201, *Printed electronics – Part 201: Materials - Substrate*

IEC 62899-202-5, *Printed electronics – Part 202-5: Materials - Conductive ink – Mechanical bending test of a printed conductive layer on an insulating substrate*

IEC 62899-502-1, *Printed electronics – Part 502-1: Quality assessment – Organic light emitting diode (OLED) elements – Mechanical stress testing of OLED elements formed on flexible substrates*

3 Terms and definitions

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

ISO and IEC maintain terminological 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
conductive ink
fluid intended for printing in which one or more molecules, polymers, or particles are dissolved or dispersed, and which becomes an electrically conductive layer by post treatment such as heating, UV and IR curing

[SOURCE: IEC-62899-202:2016, 3.2, modified – “intended for printing” and “UV and IR curing” have been added.]

3.2
bending test
deformation test by application of external stress perpendicular to the plane of a printed element