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colour inside

Printed electronics –
Part 203: Materials – Semiconductor ink

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ELECTROTECHNICAL
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PRINTED ELECTRONICS –

Part 203: Materials – Semiconductor ink

FOREWORD

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This redline version of the official IEC Standard allows the user to identify the changes made to the previous edition IEC 62899-203:2018. A vertical bar appears in the margin wherever a change has been made. Additions are in green text, deletions are in strikethrough red text.

IEC 62899-203 has been prepared by IEC technical committee 119: Printed Electronics. It is an International Standard.

This second edition cancels and replaces the first edition published in 2018. This edition constitutes a technical revision.

This edition includes the following significant technical changes with respect to the previous edition:

a) addition of 6.3.1.2.2 – Normalised on-current measurement of the TFT device;

b) in 6.3.2, correction of formula for calculation of permittivity.

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

Draft	Report on voting
119/485/FDIS	119/489/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.

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- revised.

IMPORTANT – The "colour inside" logo on the cover page of this document indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

The IEC 62899 series deals mainly with evaluation methods for materials of printed electronics. The series also includes storage methods, packaging and marking, and transportation conditions.

The IEC 62899 series is divided into several parts according to each material. Each part is prepared as a generic specification containing fundamental information for the area of ~~printing~~ printed electronics.

~~The IEC 62899 series consists of the following parts:~~

~~Part 1: Terminology~~

~~Part 201: Materials – Substrates~~

~~Part 202: Materials – Conductive ink~~

~~Part 203: Materials – Semiconductor ink~~

~~Part 250: Material technologies required in printed electronics for wearable smart devices~~

~~Part 301-X: Equipment – Contact printing – Rigid master~~

~~Part 302-X: Equipment – Inkjet~~

~~Part 303-X: Equipment – Roll-to-roll printing~~

~~Part 401: Printability – Overview~~

~~Part 402-X: Printability – Measurement of qualities~~

~~Part 403-X: Printability – Requirements for reproducibility~~

~~Part 502-X: Quality assessment – Organic light emitting diode (OLED) elements~~

~~Furthermore, sectional specifications, blank detail specifications, and detail specifications for each material will be based on these parts.~~

This part of IEC 62899 is prepared for inks containing semiconducting materials used in printed electronics and contains the test conditions, the evaluation methods and the storage conditions.

PRINTED ELECTRONICS –

Part 203: Materials – Semiconductor ink

1 Scope

This part of IEC 62899 defines terms and specifies standard methods for characterization and evaluation of semiconductor inks and semiconductive layers that are made from semiconductor inks.

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 62860, *Test methods for the characterization of organic transistors and materials*

ISO 5-2, *Photography and graphic technology – Density measurements – Part 2: Geometric conditions for transmittance density*

ISO 5-3, *Photography and graphic technology – Density measurements – Part 3: Spectral conditions*

ISO 124, *Latex, rubber – Determination of total solids content*

ISO 291, *Plastics – Standard atmospheres for conditioning and testing*

~~ISO 304, *Surface active agents – Determination of surface tension by drawing up liquid films*~~

ISO 489:~~1999~~2022, *Plastics – Determination of refractive index*

ISO 758, *Liquid chemical products for industrial use – Determination of density at 20 °C*

ISO 1183-1, *Plastics – Methods for determining the density of non-cellular plastics – Part 1: Immersion method, liquid pycnometer method and titration method*

ISO 2555, *Plastics – Resins in the liquid state or as emulsions or dispersions – Determination of apparent viscosity ~~by the Brookfield Test~~ using a single cylinder type rotational viscometer method*

ISO 2592, *Petroleum and related products – Determination of flash and fire points – Cleveland closed cup method*

ISO 2719, *Determination of flash point – Pensky-Martens closed cup method*

ISO 2811-1, *Paints and varnishes – Determination of density – Part 1: Pycnometer method*

ISO 2811-2, *Paints and varnishes – Determination of density – Part 2: Immersed body (plummet) method*

ISO 2884-1, *Paints and varnishes – Determination of viscosity using rotary viscometers – Part 1: Cone-and-plate viscometer operated at a high rate of shear*

ISO 3219, *Plastics – Polymers/resins in the liquid state or as emulsions or dispersions – Determination of viscosity using a rotational viscometer with defined shear rate*

ISO 3251, *Paints, varnishes and plastics – Determination of non-volatile-matter content*

ISO 3664, *Graphic technology and photography – Viewing conditions*

ISO 3679, ~~*Determination of flash no-flash and flash point – Rapid equilibrium closed cup method*~~ *Determination of flash point – Method for flash no-flash and flash point by small scale closed cup tester*

ISO 13468-1:~~1996~~2019, *Plastics – Determination of the total luminous transmittance of transparent materials – Part 1: Single-beam instrument*

ISO 13468-2:1999, *Plastics – Determination of the total luminous transmittance of transparent materials – Part 2: Double-beam instrument*

ISO 13655, *Graphic technology – Spectral measurement and colorimetric computation for graphic arts images*

ISO 14488, *Particulate materials – Sampling and sample splitting for the determination of particulate properties*

ISO 14782, *Plastics – Determination of haze for transparent materials*

ISO 15212-1, *Oscillation-type density meters – Part 1: Laboratory instrum*ents

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