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Printed electronics –
Part 505: Quality assessment – Flexible gas sensor – Mechanical and thermal testing

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CONTENTS

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International Standard IEC 62899-505 has been prepared by IEC technical committee 119: Printed Electronics.

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

FDIS	Report on voting
119/305/FDIS	119/309/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

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 "http://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- withdrawn,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.

INTRODUCTION

There is an increasing worldwide demand for flexible and/or wearable gas sensors for fire fighter's garment, industrial workwear, wearable patch, etc. In recent years, many efforts have been spent to develop and commercialize flexible and/or wearable gas sensors composed of a flexible substrate, electrode, and gas sensing layer. These printed flexible gas sensors should provide information about the level of gases in the surrounding environment regardless of mechanical deformations, which might happen for a flexible movement. Further, the surrounding temperature and humidity have a crucial effect on the performance of the gas sensor, since the sensing parts face directly outwards to detect gaseous molecules. However, these mechanical and thermal durabilities have been treated only to a minor extent. This document helps to unify the testing and qualification of printed flexible gas sensors manufactured using the printing process in order to push the commercial production of reliable printed flexible gas sensors containing wearable products.

PRINTED ELECTRONICS –

Part 505: Quality assessment – Flexible gas sensor – Mechanical and thermal testing

1 Scope

This part of IEC 62899 specifies mechanical and thermal test methods for the determination of the reliability characteristics of a printed flexible gas sensor, which is operated at relatively low temperature and is composed of a flexible substrate, electrode, and gas sensing layer. The examples of target gas include in-door air pollutants, combustion gas from a fire situation, and industrial flue gas.

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 60068-2-14, *Environmental testing – Part 2-14: Tests – Test N: Change of temperature*

IEC 60721-3-7, *Classification of environmental conditions – Part 3: Classification of groups of environmental parameters and their severities – Section 7: Portable and non-stationary use*

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

IEC 62899-501-1, *Printed electronics – Quality assessment – Part 501-1: Failure modes and mechanical testing – Flexible and/or bendable primary or secondary cells*

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*

ISO 11999-3, *PPE for firefighters – Test methods and requirements for PPE used by firefighters who are at risk of exposure to high levels of heat and/or flame while fighting fires occurring in structures – Part 3: Clothing*