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INTERNATIONAL STANDARD

Organic light emitting diode (OLED) Light sources for general lighting – Safety – Part 1: General requirements and tests

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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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ORGANIC LIGHT EMITTING DIODE (OLED) LIGHT SOURCES FOR GENERAL LIGHTING – SAFETY –

Part 1: General requirements and tests

FOREWORD

1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.

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8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.

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This consolidated version of the official IEC Standard and its amendment has been prepared for user convenience.

IEC 62868-1 edition 1.1 contains the first edition (2020-05) [documents 34A/2177/FDIS and 34A/2185/RVD] and its amendment 1 (2025-02) [documents 34A/2421/FDIS and 34A/2433/RVD].

In this Redline version, a vertical line in the margin shows where the technical content is modified by amendment 1. Additions are in green text, deletions are in strikethrough red text. A separate Final version with all changes accepted is available in this publication.

International Standard IEC 62868-1 has been prepared by subcommittee 34A: Lamps, of IEC technical committee 34: Lamps and related equipment.

This first edition cancels and replaces IEC 62868 published in 2014.

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

A list of all parts in the IEC 62868 series, published under the general title *Organic light emitting diode (OLED) light sources for general lighting – Safety*, can be found on the IEC website.

In this document, the following print types are used:

– requirements: roman type,

– *test specifications: italic type,*

– notes: smaller roman type.

The committee has decided that the contents of this document and its amendment 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, or
- revised.

INTRODUCTION

This part of IEC 62868 provides a set of general safety requirements and tests of OLED light sources which are applicable to general indoor lightings. This document specifies the requirements and tests for simple OLED light sources which do not include active electronic components and consist of rigid substrates. It applies to the common requirements and tests to verify the safety of all types of OLED light sources such as OLED modules and flexible OLED panels. This document applies to OLED panels and tiles which consist of rigid substrates. It also applies to any OLED light sources which are not specified in IEC 62868-2 (all parts)[1].

The parts which make up the IEC 62868-2 series, in referring to any clauses of this document, specify the extent of application of this document; they also include additional requirements and tests as necessary.

Where the requirements of any clauses of this document are referred to in the various parts that make up the IEC 62868-2 series by the phrase "The requirements of Clause n of IEC 62868-1 apply", this phrase will be interpreted as meaning that all requirements of the clauses in question of this document apply, except any which are clearly inapplicable to a particular type of OLED light source covered by the Part n of the IEC 62868-2 series concerned.

The safety requirements of this document are intended to ensure that electrical lightings constructed in accordance with this document do not endanger the safety of users or properties when the light sources are properly installed, maintained and used in applications.

Particular requirements and tests for OLED light sources which include any active electronic components and consist of flexible substrate will be the subject of a separate standard, as the need arises.

[1] Under preparation. Stage at the time of publication IEC AFDIS 62868-2-1:2020, IEC AFDIS 62868-2-2:2020 and IEC ACDV 62868-2-3:2020.

ORGANIC LIGHT EMITTING DIODE (OLED) LIGHT SOURCES FOR GENERAL LIGHTING – SAFETY –

Part 1: General requirements and tests

1 Scope

~~This part of IEC 62868 specifies general safety requirements of OLED products for use on DC supplies up to 1000 V or AC supplies up to 1000 V at 50 Hz or 60 Hz for indoors and similar general lighting purposes.~~

~~This document applies to any OLED light sources which are not covered by IEC 62868-2 (all parts).~~

~~NOTE 1 Only test methods for DC operated OLED light sources are provided in this document. Provisions for AC operated OLED products are under consideration.~~

~~NOTE 2 The construction of OLED tiles and panels is illustrated in Figure A.1 to Figure A.4 in Annex A.~~

~~NOTE 3 The OLED lighting system consisting of OLED panels or modules is illustrated in Annex D.~~

~~NOTE 4 This document applies to OLED light sources (tiles, panels, modules) which are composed of OLED luminaires or OLED lamps, and it is intended so that the OLED light source in accordance with this document fits in IEC 60598 (all parts) as a component of lighting equipment, in combination with other components.~~

~~NOTE 5 Where an appropriate Part 2 of IEC 62868 for an OLED light source does not exist, the nearest applicable Part 2 of IEC 62868 can be used as a guide to the requirements and tests.~~

This part of IEC 62868 specifies general safety requirements of organic light emitting diode (OLED) light sources (tiles, panels and modules and OLED lamps) for use on DC supplies up to 1 000 V or AC supplies up to 1 000 V at 50 Hz or 60 Hz for indoors and similar general lighting purposes.

Where an appropriate part of the IEC 62868-2 series for an OLED light source does not exist, the applicable part with the nearest configuration of the IEC 62868-2 series can be used as a guide to the requirements and tests in conjunction with this document.

NOTE 1 The OLED lighting system consisting of OLED panels or modules is illustrated in Annex D.

NOTE 2 This document applies to OLED light sources (tiles, panels, modules and lamps), and it is intended so that the OLED light source in accordance with this document fits in the IEC 60598 series as a component of lighting equipment, in combination with other components.

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 60598-1:~~2014~~2020, *Luminaires – Part 1: General requirements and tests*
~~IEC 60598-1:2014/AMD1:2017~~

IEC 60068-2-6:2007, *Environmental testing – Part 2-6: Tests – Test Fc: Vibration (sinusoidal)*

IEC 60598 (all parts), *Luminaires*

IEC 60838-2-2, *Miscellaneous lampholders – Part 2-2: Particular requirements – Connectors for LED-modules*

IEC 62504, *General lighting – Light emitting diode (LED) products and related equipment – Terms and definitions*

IEC TR 62854:2014, *Sharp edge testing apparatus and test procedure for lighting equipment – Tests for sharpness of edge*

IEC TS 62972, *General lighting – Organic light emitting diode (OLED) products and related equipment – Terms and definitions*

ISO 4046-4:2016, *Paper, board, pulps and related terms – Vocabulary – Part 4: Paper and board grades and converted products*

3 Terms and definitions

For the purpose of this document, the terms and definitions given in IEC 62504 and IEC TS 62972 and the following apply.

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

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

3.1
organic light emitting diode
OLED
light emitting semiconductor consisting of an electroluminescent zone made of organic compounds, situated between two electrodes

~~Note 1 to entry: This note applies to the French language only.~~

3.2
OLED tile
smallest functional OLED light source which cannot be separated into smaller OLED lighting elements containing at least one contact ledge with at least one positive and one negative pole for connection to the electrical power supply

3.3
OLED panel
independently operable unit OLED ~~product~~ light source containing an OLED tile and means of connection to the electrical supply

Note 1 to entry: An OLED panel may have a connector, PCB (printed circuit board), passive electronic components and optionally a frame.

3.4
OLED module
assembly of one or more OLED panels and active electronic components

~~Note 1 to entry: The classification of OLED modules is given in Annex E.~~

3.5
semi-integrated OLED module
OLEDsi module
OLED module which carries the control unit of the controlgear, and is operated by the separated power supply of the controlgear

3.6
integrated OLED module
OLEDi module
OLED module incorporating controlgear and any additional elements necessary for stable operation of the light source, designed for direct connection to the supply voltage

3.7
integral OLED ~~module~~
OLED ~~module~~, designed to form a non-replaceable ~~part~~ component of a luminaire

Note 1 to entry: Refer to Annex D.

3.8
built-in OLED ~~module~~
OLED ~~module~~, designed to form a replaceable ~~part~~ component to be built into a luminaire and into a module~~, a box, an enclosure or the like and not intended to be mounted outside a luminaire~~

Note 1 to entry: Refer to Annex D.

3.9
independent OLED ~~module~~
OLED ~~module~~, designed for being mounted or placed separately from a luminaire, from an additional box or enclosure or the like

~~Note 1 to entry: The independent OLED module provides all the necessary protection with regard to safety according to its classification and marking.~~

~~Note 2 to entry: An example of an independent OLED module is a system where the OLED module is connected via a glass fibre with the luminaire head.~~

Note 1 to entry: Refer to Annex D.

Note 2 to entry: Independent OLED light sources can be considered as an OLED luminaire.

3.10
rated value
quantity value for a characteristic of a ~~product~~ light source for specific operating conditions with the values and the conditions specified in the relevant standard, or assigned by the manufacturer or responsible vendor

3.11
type test
test or series of tests made on a type test sample for the purpose of checking compliance of the design of a given ~~product~~ light source with the requirements of the relevant standard

3.12
stabilization
<of OLED ~~products~~ light sources> keeping of an OLED ~~product~~ light source switched on under specified electrical input to obtain stable operation

Note 1 to entry: The mentioned operation can be photometric or electrical under specified conditions in the relevant test clause.

3.13
dark spot
small area remarkably darker than the surrounding light output area on the OLED ~~product~~ light source

Note 1 to entry: A dark spot can be due to lower current density or an open circuit in that area.

3.14
internal short circuit
unintentional conductive path between the OLED anode and OLED cathode localized on a small area

Note 1 to entry: An internal short circuit can look like a dark spot. It can lead to a significant heat generation in that area.

4 General

4.1 General requirements

An OLED ~~product~~ light source shall be designed and manufactured in such a way as to operate safely during its intended use and not to cause any danger to persons and the environment.

In case of a failure of an OLED ~~product~~ light source it shall fail safely.

~~Reference to an OLED product also includes reference to OLED tiles in the requirements and tests of this document.~~

4.2 General test requirements

Tests according to this document are type tests.

The tests, unless otherwise specified, are carried out at an ambient temperature of 25 °C ± 5 °C.

The tests shall be conducted at the rated current with a tolerance of 1 % unless otherwise specified in this document.

The OLED ~~product~~ light source under test shall be mounted in accordance with the manufacturer's installation instructions. If more than one way of mounting is specified, the most onerous way shall be chosen for each test. For electrical tests, this is the position leading to the largest heat build-up of the light emitting surface. The orientation of the OLED ~~product~~ light source shall be maintained during the entire test.

Integral OLED light sources shall be regarded as integral components of luminaires according to IEC 60598-1:2020, 0.5.1.

In addition to the requirements of this document, independent OLED light sources shall comply with the IEC 60598 series.

5 Marking

5.1 Contents and location

Marking of the OLED ~~product~~ light source shall be done in accordance with Table 1.

Table 1 – Contents and location of marking

Parameters	Product	Packaging or product datasheet or leaflet
Manufacturer (or responsible vendor) or trademark	Mandatory	Mandatory
Polarity (in case of DC power supply)	Mandatory	
Neutral or earthing terminal	Mandatory	
Model number or production code	Mandatory	Mandatory
Rated current or rated current range		Mandatory
Rated voltage or rated voltage range		Mandatory
Rated power		Mandatory
Type of power supply (DC or AC) and frequency		Mandatory
Shape and dimension		Mandatory
Connecting information		Mandatory
Mounting instruction		Mandatory
Operating temperature range		Mandatory
IP number		Mandatory
Information for luminaire design		Mandatory

The connecting information shall include methods of mechanical and electrical connection. The information of the electrical connection may include the type of driver.

For marking of the IP number, symbols for degree of protection shall be in accordance with Section 3 of ~~IEC 60598-1:2014 and IEC 60598-1:2014/AMD1:2017~~ IEC 60598-1:2020.

5.2 Durability and legibility of marking

Marking shall be durable and legible.

~~*Compliance is checked by visual inspection and (for marking on the OLED product) by trying to remove the marking by rubbing the area lightly by hand for 15 s with a piece of smooth cloth, dampened with water.*~~

Compliance is checked by the following.

1) *Presence and legibility of the marking required in 5.1 – by visual inspection.*
2) *The durability of the marking is checked by trying to remove it by rubbing lightly for 15 s with a piece of cloth soaked in water. After the test, the marking shall be legible, marking labels shall not be easily removable and they shall show no curling.*
3) *Availability of information required in 5.1 – by visual inspection.*

6 Construction

6.1 General

Wood, cotton, silk, paper and similar fibrous material shall not be used as insulation.

Compliance is checked by inspection.

6.2 Mechanical strength

6.2.1 Requirements

The OLED ~~product~~ panel shall have sufficient mechanical strength which shall be checked in accordance with 6.2.2.

6.2.2 Vibration test

The OLED light source shall have sufficient mechanical strength.

The following vibration test shall be performed.

Compliance is checked by the vibration test.

For the vibration test, the OLED ~~product~~ light source shall be mounted in accordance with 4.2.

A sinusoidal vibration test is conducted in accordance with IEC 60068-2-6 with the following parameters:

– displacement: 0,35 mm;
– acceleration: 50 m/s^2;
– frequency range: 10 Hz to 500 Hz;
– axes of vibration: 3;
– duration: 3 × 10 cycles (10 times per axis).

After completion of the vibration test, the OLED ~~product~~ light source shall be operated for 15 min under the conditions specified in 4.2.

Compliance is checked as follows:

After the test, the OLED ~~product~~ light source is checked by inspection. Any splintered or broken glass is not accepted. Fire, smoke or flammable gas shall not be produced. The OLED ~~product~~ light source shall have no loosened parts which could impair safety.

~~*Electrical contacts which could not be touched before the vibration test (e.g. those in OLED products in accordance with Figure A.3 and Figure A.4) shall not have become accessible after the test.*~~

6.3 Internal short circuit

An OLED ~~product~~ light source with internal short circuit shall not cause any hazard.

The following internal short test shall be performed.

Compliance is checked by the internal short test.

An internal short circuit shall be provoked intentionally in the OLED ~~product~~ light source under test in accordance with instructions given by the manufacturer or in accordance with a method described in Annex C. The location of this internal short circuit shall be close to the edge of the light output area at around 2 mm distance.

Before starting the test, the test sample of the OLED ~~product~~ light source shall not be operated.