IEC 62868

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INTERNATIONAL STANDARD

NORME INTERNATIONALE

colour inside

Organic light emitting diode (OLED) panels for general lighting – Safety requirements

Panneaux à diodes électroluminescentes organiques (OLED) destinés à l'éclairage général – Exigences de sécurité

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

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

FOREWORD

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The text of this standard is based on the following documents:

FDIS	Report on voting
34A/1786FDIS	34A/1806/RVD

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

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

In this standard, 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 publication will remain unchanged until the stability date indicated on the IEC web site under "http://webstore.iec.ch" in the data related to the specific publication. At this date, the publication will be

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

1 Scope

This International Standard specifies the safety requirements of OLED tiles and panels for use on d.c. supplies up to 120 V or a.c. supplies up to 50 V at 50 Hz or 60 Hz for indoor and similar general lighting purpose.

NOTE 1 At this moment only test methods for d.c. operated OLED panels are provided. Provisions for a.c. operated OLED panels are under consideration.

NOTE 2 The construction of OLED tiles and panels is illustrated in Annex A.

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

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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, *Luminaires – Part 1: General requirements and tests*

IEC 60050 (all parts): *International electrotechnical vocabulary* (available at <http://www.electropedia.org>)

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

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

ISO 4046-4:2002, *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 60050-845 and the following apply.

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 containing an OLED tile and means of connection to electrical supply such as 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

3.5
rated value
quantity value for a characteristic of a product for specific operating conditions with the values and the conditions specified in the relevant standard, or assigned by the manufacturer or responsible vendor

3.6
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 with the requirements of the relevant standard

3.7
stabilization
keeping an OLED panel switched on under specified electrical input to obtain stable conditions

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

3.8
stabilization time
time, which the OLED panel requires to obtain stable conditions with specified electrical input

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

3.9
dark spot
small area remarkably darker than surrounding light output area on the OLED panel

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

3.10
internal short circuit
unintentional conductive path between 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 panel shall be designed and manufactured in such a way as to operate safely during normal operation and not to cause any danger to persons and the environment.

In case of a failure of an OLED panel it shall fail safely.

It is understood that reference to an OLED panel also includes reference to OLED tiles in the requirements and tests of this standard.

4.2 General test requirements

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 standard.

The OLED panel under test shall be mounted according to 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 panel shall be maintained during the entire test.

5 Marking

5.1 Contents and location

Marking of the OLED panel shall be done according to Table 1.

Table 1 – Contents and location of marking

Parameters	Product	Packaging or product datasheet or leaflet
Manufacturer (or responsible vendor) or trademark	Mandatory	
Polarity	Mandatory	
Model number or production code	Mandatory	Mandatory
Rated current or rated current range	Mandatory	Mandatory
Rated voltage or rated voltage range	Mandatory	Mandatory
Rated power		Mandatory
Type of power supply (d.c. or a.c.) 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 IP number, symbols for degree of protection shall be in accordance with Section 3 of IEC 60598-1.

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 panel) 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.

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

The OLED panel shall have sufficient mechanical strength.

Compliance is checked by the vibration test.

For the vibration test, the OLED panel shall be mounted according to 4.2.

A sinusoidal vibration test is conducted according to 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 panel shall be operated for 15 min under conditions according to 4.2.

Compliance:

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

Electrical contacts which could not be touched before the vibration test (e.g. those in OLED panels according to Figure A.3 and Figure A.4) shall not have become accessible after the test.

6.3 Internal short circuit

An OLED panel with internal short circuit shall not cause any hazard.

Compliance is checked by the following test:

An internal short circuit shall be provoked intentionally in the OLED panel under test according to instructions given by the manufacturer or according to 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 panel shall not be operated.

The test sample of the OLED panel shall be operated at the rated current for 30 min for testing.

If the test sample does not generate the internal short circuit during the test operation, the internal short circuit test shall be repeated with the same sample.

If none of the methods described in the manufacturer's instruction and Annex C generate an internal short circuit after three attempts, the test sample passes the test.

Compliance: An OLED panel passes this test if there is no emission of flames or molten material during the test. Any hot material from the sample shall not ignite a tissue paper, as specified in 4.187 of ISO 4046-4:2002, spread below the OLED panel. Any splintered or broken glass is not accepted.

6.4 Wireways

Wireways shall be smooth and free from sharp edges, burrs, flashes and the like, which might cause abrasion of the insulation of the wiring. Parts such as sharp-edged screws shall not protrude into wireways.

Compliance is checked by inspection.

6.5 Resistance to dust, solid objects and moisture

If an IP number is rated, the OLED panel shall comply with Section 9 of IEC 60598-1.

NOTE IP numbers for degrees of protection are explained in IEC 60598-1 Annex J.

7 Mechanical hazard

An OLED panel with glass edges or corners shall be free from sharp edges or points that could create hazards during installation, normal operation or maintenance.

An OLED panel with thin metal foil or thin plastic film shall have protections against sharp edges or points that could during installation, normal operation, or maintenance, create hazards.

Compliance is checked by inspection and means of the sharp edge tester according to IEC TR 62854.

8 Fault conditions

An OLED panel shall not impair safety under fault conditions that may occur during the intended use.

Compliance is checked with the following overpower test.

The overpower test shall be conducted at an ambient temperature of 25 °C ± 5 °C unless otherwise specified by the manufacturer or responsible vendor. The temperature shall be maintained within ± 2 °C during the test.

The OLED panel shall be operated with rated current. The power shall be monitored at the input side. The input power shall be increased until 150 % of the rated current or power is reached. The test shall be continued for 15 min.

Compliance is checked by inspection. An OLED panel passes this fault test if there is no emission of flames or molten material during the test. Any hot material from the sample shall not ignite a tissue paper, as specified in 4.187 of ISO 4046-4:2002, spread below the OLED panel. Any splintered or broken glass is not accepted.

9 Insulation resistance and electric strength

9.1 Insulation resistance

The requirements according to 10.2.1 of IEC 60598-1 apply.

9.2 Electric strength

The requirements according to 10.2.2 of IEC 60598-1 apply.

10 Thermal stress

OLED panels shall sustain thermal stress.

The thermal stress test shall be conducted at a specified ambient temperature in a climate chamber. The temperature shall be any convenient temperature in the range between 60 °C and 70 °C. The temperature shall be maintained within ± 2 °C during the stabilization and test.

The OLED panel shall be operated with rated current. After stabilization the test shall be continued for 60 min.

Compliance is checked by inspection. An OLED panel passes this test, if no failure occurs. In case of performance failure, an OLED panel is considered to pass this test, if no fire, smoke or flammable gas is produced. Any splintered or broken glass is not accepted.

11 Creepage distances and clearances

Section 11 of IEC 60598-1 applies to individual OLED panels.

12 Resistance to heat and fire

12.1 Resistance to heat

An OLED panel shall have sufficient heat resistance. The exterior of the insulation material should have a function of protecting an electric shock and have heat resistance.

External parts of insulating material providing protection against electric shock, and parts of insulating material retaining live parts in position shall be sufficiently resistant to heat.

The ball pressure test does not have to be applied to plastic parts of an OLED panel which provide supplementary insulation.

Compliance is checked by the ball pressure test according to13.2.1 of IEC 60598-1.

12.2 Resistance to fire

Parts of insulating material retaining live parts in position, and external parts of insulating material providing protection against electric shock shall be resistant to flame and ignition.

Compliance is checked by the test of Section 13 of IEC 60598-1 for materials other than ceramic.

The test specimen is the entire OLED panel.