
**Gibke plošče z organskimi svetlečimi diodami (OLED) za splošno razsvetljavo -
Tehnične zahteve**

Flexible Organic Light Emitting Diode (OLED) panels for general lighting - Performance requirements

iTeh STANDARD PREVIEW

Panneaux à diodes électroluminescentes organiques (OLED) flexibles destinés à l'éclairage général - Exigences de performance

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TITLE:

Flexible Organic Light Emitting Diode (OLED) panels for general lighting — Performance requirements

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36 **INTERNATIONAL ELECTROTECHNICAL COMMISSION**

37
38
39 **FLEXIBLE ORGANIC LIGHT EMITTING DIODE (OLED) PANELS**
40 **FOR GENERAL LIGHTING — PERFORMANCE REQUIREMENTS**

41
42
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75 IEC technical committee 34: Lighting.

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

FDIS	Report on voting
XX/XX/FDIS	XX/XX/RVD

77
78 Full information on the voting for the approval of this standard can be found in the report on voting
79 indicated in the above table.

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

81

82 **FLEXIBLE ORGANIC LIGHT EMITTING DIODE (OLED) PANELS**
 83 **FOR GENERAL LIGHTING — PERFORMANCE REQUIREMENTS**
 84
 85

86 **1 Scope**

87 This document specifies the performance requirements of flexible organic light emitting diode tiles and panels for
 88 use on supplies up to 120 V ripple free DC for indoor and similar general lighting purpose and designed for being
 89 bent during the manufacturing process of curved luminaires.

90

91 **2 Normative references**

92 The following referenced documents are indispensable for the application of this document. For dated references,
 93 only the edition cited applies. For undated references, the latest edition of the referenced document (including any
 94 amendments) applies.

95

96 IEC 60050-845, *International Electrotechnical Vocabulary. Lighting*

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

98 IEC 62868-2-3:—¹, *Organic Light Emitting Diode (OLED) for general lighting – Safety – Part2-3: Particular*
 99 *requirement for flexible OLED tiles and panels*

100 IEC 62922:2016, *Organic light emitting diode (OLED) panels for general lighting – Performance requirements*

101 IEC 62922:2016/AMD1:—²

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

104 ISO/CIE 11664-5:2016, *Colorimetry – Part 5: CIE 1976 L*u*v* Colour space and u', v' uniform chromaticity scale*
 105 *diagram*

106 CIE 084:1989, *Measurement of luminous flux*

107 CIE 013.3:1995, *Method of measuring and specifying colour rendering properties of light sources*

108 CIE 015:2018, *Colorimetry 4th ed.*

109 CIE 242:2020, *Photometry of Curved and Flexible OLED and LED Sources*

¹ In preparation. Stage at the time of publication IEC AFDIS 62868-2-3:2020.

² In preparation. Stage at the time of publication IEC CFDIS 62922:2016/AMD1.

110 3 Terms and Definitions

111 For the purpose of this document, the terms and definitions given in IEC60050-845, IEC 62504, IEC
112 62868-2-3, IEC 62922, and IEC TS 62972 and the following apply.

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

- 114 • IEC Electropedia: available at <http://www.electropedia.org/>
- 115 • ISO Online browsing platform: available at <http://www.iso.org/obp>

116

117 3.1

118 minimum bending radius

119 <of performance> limit radius to which a flexible OLED panel may be bent in either a convex or concave curvature
120 without causing an operating failure

121

122 Note to entry: The minimum bending radius is normally declared by the manufacturer or responsible vendor.

123 3.2

124 maximum bent condition

125 condition of the panel bent to the minimum bending radius

126 3.3

127 maximum bending cycle

128 <of performance> maximum number of times a flexible OLED panel may be bent in either a convex and concave
129 curvature without causing an operating failure

130

131 Note to entry: The maximum bending cycle is normally declared by the manufacturer or responsible vendor.

132 3.4

133 convex configuration

134 convex curvature

135 flexible OLED curved along a surface of curvature with its light-emitting side directed outward

136 3.5

137 concave configuration

138 concave curvature

139 flexible OLED curved along a surface of curvature with its light-emitting side directed inward

140 3.6

141 flat configuration

142 flexible OLED without curvature in any direction.

143

144

145 4 General statement and test condition

146 4.1 General

147 The requirements of this document apply in addition to the requirements of IEC 62868-2-3:—³.

³ In preparation. Stage at the time of publication IEC AFDIS 62868-2-3:2020.

148 The requirements apply for 95 % of the population (with a failure margin below 5 %, it is considered that the
149 product passed the test).

150 It is understood that reference to a flexible OLED panel also includes reference to flexible OLED tiles in the
151 requirements and tests of this document.

152

153 4.2 General test condition

154 Unless otherwise specified, all measurements shall be made in an ambient temperature of 25 °C under a draught
155 free condition.

156 The tests shall be carried out using a flexible OLED panel in the maximum of three configurations: flat
157 configuration under the test condition specified in IEC 62922:2016, bent to the maximum bent condition specified
158 by the manufacturer in both the concave and convex configurations. For those flexible OLED panels which are
159 specified for a specific curvature, the test for bent condition shall be conducted using a shape and condition
160 specified by the manufacturer.

161 The tests shall be conducted at the rated current or voltage unless otherwise specified in this document.

162 The test conditions for constant current and constant voltage operation according to IEC 62922:2016, 4.2 apply.

163

164 4.3 Stabilization

165 4.3.1 General requirements for stabilization

166 Test conditions according to 4.2 apply. If stabilization conditions, according to 4.3.2 or 4.3.3, are not achieved
167 within 45 min, the measurement shall be started and the observed fluctuations reported.

168 Stabilization shall be carried out using a flexible OLED panel bent to the maximum bent condition. For those
169 flexible OLED panels which are specified for a specific curvature, the test shall be conducted using the shape and
170 condition specified by the manufacturer.

171

172 4.3.2 Current-driven stabilization

173 The requirements according to IEC 62922:2016, 4.3.2 apply.

174

175 4.3.3 Voltage-driven stabilization

176 The requirements according to IEC 62922:2016, 4.3.3 apply.

177

178 5 Marking

179 5.1 Mandatory marking

180 Information on the parameters shown in Table 1 shall be provided by the manufacturer or responsible
181 vendor and be located as described.

182

183

184 **Table 1 - Mandatory marking and location of marking**

185

Parameters		Product	Packaging	Product datasheet, leaflet or website
	configuration			
a) Rated total luminous flux (lm)	flat			x
	convex			x

	concave			x
b) Rated average luminance (cd/m ²)	flat			x
	convex			x
	concave			x
c) Rated chromaticity coordinates and chromaticity coordinate range	flat			x
	convex			x
	concave			x
d) Rated correlated colour temperature (K)	flat			x
	convex			x
	concave			x
e) Rated colour rendering index	flat			x
	convex			x
	concave			x
f) Rated luminous efficacy (lm/W)	flat			x
	convex			x
	concave			x
g) Luminous intensity distribution	flat			x
	convex			x
	concave			x
h) Luminance uniformity (%)	flat			x
	convex			x
	concave			x
i) Surface chromaticity uniformity	flat			x
	convex			x
	concave			x
j) Angular chromaticity uniformity	flat			x
	convex			x
	concave			x
k) Minimum bending radius (performance) (mm)	convex	x		
	concave			
l) Maximum bending cycle (performance) (times)	convex	x		
	concave			
m) Rated median useful life (h)	flat			x
	convex			x
	concave			x
n) Rated luminous flux maintenance factor (%)	flat			x
	convex			x
	concave			x
o) Rated maintained operating voltage (V)	flat			x
	convex			x
	concave			x
p) Rated maintained chromaticity	flat			x

	convex			x
	concave			x

186

187 **5.2 Additional marking**

188 For flexible OLED panels, additional information of the parameters related to configurations other than
 189 flat or the maximum bent condition, may be provided by the manufacturer or responsible vendor. See
 190 Table 2 as an example.

191

Table 2 - Additional marking

192

Parameters	Configuration				
	flat	convex or concave			max. bent
	0 mm	radius XX ₁ (mm)*	radius XX ₂ (mm)*	radius XX _n (mm)*
a) rated luminous flux (lm)	YYY ₀ *	YYY ₁ *	YYY ₂ *	YYY _n *
b) rated average luminance uniformity (%)	ZZZ ₀ *	ZZZ ₁ *	ZZZ ₂ *	ZZZ _n *

*Values to be declared by the manufacturer or responsible vendor.

193

194 **5.3 Information on reliability of electrical connection**

195 The requirements according to IEC 62922:2016, 5.2 apply.

196

197 **6 Initial photometric and electrical characteristics**198 **6.1 General**

199 The initial photometric and electrical measurement of the flexible OLED panel shall be conducted with the rated
 200 current at the flat configuration, the maximum bent condition and other configurations if declared according to
 201 Table 2.

202 The panel shall be supported by a semi-cylinder of each configuration.

203 In case some measurements cannot be conducted in the maximum bent condition, appropriate conditions shall be
 204 declared in the data sheet.

205 The initial values of photometric characteristics shall be measured after stabilization of the flexible OLED panel.

206 For operation, stabilization and test conditions of the flexible OLED panel, 4.2 and 4.3 apply.

207 Unless otherwise specified, for general conditions of photometric and colorimetric measurements, CIE S 025:2015
 208 and CIE S 025-SP1:2019 apply.

209 An image luminance measurement device (ILMD) is not recommended to measure luminance of flexible OLED
 210 panels in convex or concave configurations, as the distance between the ILMD and the flexible OLED panel does
 211 not remain the same due to the curvature.

212 Note : For use of ILMD, see CIE 242:2020, 3.

213

214 **6.2 Input power**

215 The input power test of the flexible OLED panel shall be conducted with the rated DC current or DC voltage.

216 *Compliance:*

217 *For all the tested samples, the measured input power shall not exceed the rated power by more than 10 % after*
 218 *stabilization.*

219

220 6.3 Luminous flux

221 For the measurement of the luminous flux of a flexible OLED panel in the flat configuration, IEC
222 62922:2016, 7.2 applies. For the convex or concave configurations, Annex A applies.

223 *Compliance:*

224 *For all the tested samples, the initial luminous flux (flat), the initial luminous flux (convex) and the initial*
225 *luminous flux (concave) shall not be less than 90 % of their respective rated initial values.*

226

227 6.4 Luminous efficacy

228 Flexible OLED panel efficacy shall be calculated from the measured initial luminous flux of the individual OLED
229 panel, divided by the measured initial input power of the same individual flexible OLED panel in each
230 configuration.

231 *Compliance:*

232 *For all the tested samples, the luminous efficacy (flat), the initial luminous efficacy (convex) and the*
233 *initial luminous efficacy (concave) shall not be less than 90 % of their respective rated initial values.*

234

235 6.5 Chromaticity coordinates

236 If the spectral information is obtained through the luminous flux measurement, the chromaticity
237 coordinates can be calculated in accordance with IEC 62922:2016, 7.4. Otherwise, the spectral power
238 distribution measurement shall be conducted and the chromaticity coordinates shall be calculated from
239 the spectral distribution in each configuration shall be reported. For the bent configurations, Annex A
240 applies.

241 The measurement configuration and measurement position for each measurement shall be the same.

242 *Compliance:*

243 *Where only a rated chromaticity coordinate pair is given in the datasheet: the chromaticity difference*
244 *$\Delta(u',v')$ between the rated and measured chromaticity coordinates shall be less than 0,005. Where a*
245 *range of chromaticity coordinates is declared, the measured chromaticity coordinates of an OLED panel*
246 *shall not fall outside the rated range of chromaticity coordinates.*

247

248 6.6 Correlated colour temperature (CCT)

249 If the spectral information is obtained through the luminous flux measurement, the CCT can be calculated in
250 accordance with IEC 62922:2016, 7.5. Otherwise, the spectral power distribution measurement shall be
251 conducted and the CCT shall be calculated from the spectral distribution in each configuration shall be reported.
252 For the bent configurations, Annex A applies.

253 The measurement configuration and measurement position for each measurement shall be the
254 same.

255

256 6.7 Colour rendering index (CRI)

257 If the spectral information is obtained through the luminous flux measurement, the CRI can be calculated
258 in accordance with IEC 62922:2016, 7.6. Otherwise, the spectral power distribution measurement shall
259 be conducted and the CRI shall be calculated from the spectral distribution in each configuration shall be
260 reported. For the bent configurations, Annex A applies.

261 The measurement configuration and measurement position for each measurement shall be the same.