



SLOVENSKI STANDARD
oSIST prEN IEC 63403-1:2023
01-julij-2023

Ohišja svetlečih diod (LED) za vrtnarsko razsvetljavo - 1. del: Specifikacijski list

LED packages for horticultural lighting - Part 1: Specification sheet

iTeh STANDARD PREVIEW
(standards.iteh.ai)

Ta slovenski standard je istoveten z: prEN IEC 63403-1:2023

<https://standards.iteh.ai/catalog/standards/sist/db273e15-6b7b-481a-8df7-60e4730e91c9/osist-pr-en-iec-63403-1-2023>

ICS:

29.140.99	Drugi standardi v zvezi z žarnicami	Other standards related to lamps
65.060.70	Vrtnarska oprema	Horticultural equipment

oSIST prEN IEC 63403-1:2023

en



34/1031/CDV

COMMITTEE DRAFT FOR VOTE (CDV)

PROJECT NUMBER: IEC 63403-1 ED1	
DATE OF CIRCULATION: 2023-05-05	CLOSING DATE FOR VOTING: 2023-07-28
SUPERSEDES DOCUMENTS: 34/886/CD, 34/911B/CC	

IEC TC 34 : LIGHTING	
SECRETARIAT: United Kingdom	SECRETARY: Mr Petar Luzajic
OF INTEREST TO THE FOLLOWING COMMITTEES: SC 47E	PROPOSED HORIZONTAL STANDARD: <input type="checkbox"/> Other TC/SCs are requested to indicate their interest, if any, in this CDV to the secretary.
FUNCTIONS CONCERNED: <input type="checkbox"/> EMC <input type="checkbox"/> ENVIRONMENT <input type="checkbox"/> QUALITY ASSURANCE <input type="checkbox"/> SAFETY	
<input checked="" type="checkbox"/> SUBMITTED FOR CENELEC PARALLEL VOTING Attention IEC-CENELEC parallel voting The attention of IEC National Committees, members of CENELEC, is drawn to the fact that this Committee Draft for Vote (CDV) is submitted for parallel voting. The CENELEC members are invited to vote through the CENELEC online voting system.	<input type="checkbox"/> NOT SUBMITTED FOR CENELEC PARALLEL VOTING

This document is still under study and subject to change. It should not be used for reference purposes.

Recipients of this document are invited to submit, with their comments, notification of

- any relevant patent rights of which they are aware and to provide supporting documentation,
- any relevant "in some countries" clauses to be included should this proposal proceed. Recipients are reminded that the enquiry stage is the final stage for submitting "in some countries" clauses. See AC/22/2007.

TITLE:

LED packages for horticultural lighting - Part 1: Specification sheet

PROPOSED STABILITY DATE: 2026

NOTE FROM TC/SC OFFICERS:

Copyright © 2023 International Electrotechnical Commission, IEC. All rights reserved. It is permitted to download this electronic file, to make a copy and to print out the content for the sole purpose of preparing National Committee positions. You may not copy or "mirror" the file or printed version of the document, or any part of it, for any other purpose without permission in writing from IEC.

CONTENTS

1		
2		
3	FOREWORD.....	3
4	1 Scope.....	5
5	2 Normative references	5
6	3 Terms and definitions	5
7	4 General requirements	7
8	4.1 Title of the specification sheet	7
9	4.2 Figures	7
10	5 Performance characteristics.....	7
11	5.1 General.....	7
12	5.2 Wavelength and chromaticity	7
13	5.3 Spectral power distribution and spectral photon flux distribution	7
14	5.4 Photon intensity distribution	8
15	5.5 Photon flux versus forward current	8
16	5.6 Photon flux versus temperature	8
17	5.7 Photon flux	8
18	5.8 Forward voltage	8
19	5.9 Photon flux maintenance	8
20	5.10 Spectrum maintenance.....	8
21	5.11 Spectral change versus temperature.....	9
22	5.12 Spectral change versus forward current	9
23	5.13 Photon flux efficacy versus forward current.....	9
24	6 Operational characteristics.....	9
25	6.1 Operating limits.....	9
26	6.2 Thermal and electrical characteristics.....	9
27	6.3 Forward current versus forward voltage	9
28	6.4 Maximum forward current versus temperature.....	10
29	6.5 Forward voltage versus temperature.....	10
30	7 Dimensional and mechanical characteristics.....	10
31	8 Processing characteristics	10
32	9 Packing information	10
33	Bibliography	11
34		
35		
36		

INTERNATIONAL ELECTROTECHNICAL COMMISSION

LED PACKAGES FOR HORTICULTURAL LIGHTING

Part 1: Specification sheet

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.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 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.
- 9) Attention is drawn to the possibility that some of the elements of this IEC Publication may be the subject of patent rights. IEC shall not be held responsible for identifying any or all such patent rights.

IEC 63403-1 has been prepared by IEC technical committee 34: LIGHTING. It is an International Standard.

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

Draft	Report on voting
XX/XX/FDIS	XX/XX/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 <http://www.iec.ch/standardsdev/publications>.

89 The committee has decided that the contents of this document will remain unchanged until the
90 stability date indicated on the IEC website under webstore.iec.ch in the data related to the
91 specific document. At this date, the document will be

- 92 • reconfirmed,
- 93 • withdrawn,
- 94 • replaced by a revised edition, or
- 95 • amended.

96

97

iTeh STANDARD PREVIEW (standards.iteh.ai)

[oSIST prEN IEC 63403-1:2023](https://standards.iteh.ai/catalog/standards/sist/db273e15-6b7b-481a-8df7-60e4730e9fc9/osist-pren-iec-63403-1-2023)

<https://standards.iteh.ai/catalog/standards/sist/db273e15-6b7b-481a-8df7-60e4730e9fc9/osist-pren-iec-63403-1-2023>

LED PACKAGES FOR HORTICULTURAL LIGHTING

Part 1: Specification sheet

98
99
100
101
102
103

104 **1 Scope**

105 This document specifies the requirements for specification sheets relating to LED packages
106 designed for horticultural lighting purposes.

107 LED packages designed for horticultural lighting purposes in this document can be designed
108 for emission of white light or emission of light at specified wavelengths.

109 LED packages for horticultural lighting purposes are usually designed into LED modules or
110 luminaires.

111 This document does not contain compliance criteria, which can be affected by module or
112 luminaire design, and are assumed to be plant species and growth stage dependent.

113 **2 Normative references**

114 There are no normative references in this document.

115 **3 Terms and definitions**

116 For the purposes of this document, the following terms and definitions apply.

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

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

121 **3.1**

122 **LED package**

123 single electric component comprising principally at least one LED die

124 Note 1 to entry: The LED packages does not include the control unit of the control gear, does not include a cap, is
125 not connected directly to the supply voltage and does not include active electronic components.

126 Note 2 to entry: An LED package is a discrete component and part of the LED module or LED lamp.

127 Note 3 to entry: An LED package can include one or more of the following:

- 128 • optical elements;
- 129 • light converters (phosphors);
- 130 • thermal, mechanical, and electric interfaces;
- 131 • components to address ESD concerns.

132 [SOURCE: IEC 60050-845, 845-27-065]

133 **3.2**
 134 **junction temperature**
 135 t_j
 136 temperature at the p-n junction

137 Note 1 to entry: Junction temperature is expressed in degrees Celsius (°C)

138 [SOURCE: IEC 60050-845, 845 27-068]

139 **3.3**
 140 **bin, <property of LED dies or LED packages>**
 141 specification of an LED die or LED package, or a set thereof, by means of a range of
 142 performance characteristics

143 Note 1 to entry: The characteristic can include chromaticity, photometric, radiometric, and electrical performance.

144 Note 2 to entry: The designation of a bin is often referred to as the “bin code”.

145 [SOURCE: IEC 60050-845, 845-27-066]

146 **3.4**
 147 **family, <of LED packages>**
 148 set of LED packages characterized by a common feature

149 [SOURCE: IEC 60050-845, 845-27-135 modified – “light sources” is replaced by “LED
 150 packages”]

151 **3.5**
 152 **brand name**
 153 name used by a manufacturer to distinguish its products from products made by other
 154 manufacturers

155 **3.6**
 156 **centroid wavelength**
 157 λ_c
 158 wavelength at the weighted center of a spectrum

159 Note 1 to entry: This is the weighted average of each wavelength and can be calculated as

$$160 \lambda_c = \frac{\int_0^{\infty} \lambda \cdot S(\lambda) d\lambda}{\int_0^{\infty} S(\lambda) d\lambda}$$

161 where λ is the wavelength and $S(\lambda)$ is the spectral power distribution.

162 Note 2 to entry; Centroid wavelength is normally used for LED package based on LED die(s) emitting nearly
 163 monochromatic radiation.

164 **3.7**
 165 **dominant wavelength, <of a colour stimulus>**
 166 wavelength of the monochromatic stimulus that, when additively mixed in suitable proportions
 167 with the specified achromatic stimulus, matches the colour stimulus considered in the CIE 1931
 168 x, y chromaticity diagram

169 Note 1 to entry: The dominant wavelength is expressed in nanometre (nm).

170 [SOURCE: IEC 60050-845, 845-23-062, modified – Note 1 to entry has been deleted.]

171 **3.8**
 172 **photon flux efficacy**
 173 photon flux emitted divided by the electrical input power of the LED

174 Note 1 to entry: The photon flux efficacy for horticultural lighting is expressed in micromole per Joule ($\mu\text{mol}\cdot\text{J}^{-1}$).

175

176 **4 General requirements**

177 **4.1 Title of the specification sheet**

178 The title of the specification sheet shall indicate the brand name and the product name.

179 Note: Product name can be name of individual LED package or name of a family of LED packages.

180 Applicability for horticultural lighting shall be clearly indicated either in title or other places on
181 the first page of the specification sheet.

182 **4.2 Figures**

183 The specification sheet shall provide photos or renderings of the LED package or a
184 representative member of the family at the beginning of the specification information.

185 Figures shall be given in linear scale and fully saturated colours. Any legends shall be placed
186 outside the graphic display area. Graph axes shall be provided with characteristic and units
187 using a minimum 8-point typeface. No background shall be used behind the figures.

188 **5 Performance characteristics**

189 **5.1 General**

190 Typical values and characteristics of LED packages of the same model shall be indicated in the
191 specification sheet.

192 **5.2 Wavelength and chromaticity**

193 For LED packages based on LED dies emitting monochromatic radiation, the specification sheet
194 shall indicate

- 195 a) the centroid wavelength in nm or
- 196 b) the dominant wavelength in nm.

197 Note: The wavelength can be given as one typical value or value as minimum and maximum.

198 For the polychromatic LED packages, the specification sheet shall indicate the chromaticity
199 coordinates.

200 **5.3 Spectral power distribution and spectral photon flux distribution**

201 The specification sheet shall provide the spectral power distribution or the spectral photon flux
202 distribution in a graphical format. The distribution shall be normalized by the total power or by
203 the peak spectral power. Information shall include the following:

- 204 a) Wavelength on the horizontal axis including 300 nm to 800 nm or a wider range;
- 205 b) Relative radiant power or relative photon flux on the vertical axis for a typical spectrum
206 including information on the basis of the normalization (by total power or by spectral peak
207 power);
- 208 c) Forward current used for binning;
- 209 d) Junction or case temperature.

210 **5.4 Photon intensity distribution**

211 The specification sheet shall provide the photon intensity (angular) distribution in polar or
212 Cartesian coordinates in a graphical format together with the following information:

- 213 a) Coordinates where 0° is assigned to the center of the intensity distribution;
- 214 b) Relative photon intensity normalized to the maximum photon intensity;
- 215 c) Forward current used for binning;
- 216 d) Junction or case temperature;
- 217 e) Cross section angle (e. g. 0° or 45°), if multiple cross-section angles are given.

218 **5.5 Photon flux versus forward current**

219 The specification sheet shall provide photon flux versus forward current in a graphical format
220 together with the following information:

- 221 a) Forward current on the horizontal axis;
- 222 b) Relative photon flux on the vertical axis;
- 223 c) Reference current used for the normalization;
- 224 d) Junction or case temperature.

225 **5.6 Photon flux versus temperature**

226 The specification sheet shall provide relative photon flux versus temperature in a graphical
227 format with the following information:

- 228 a) Junction or case temperature in $^\circ\text{C}$ on the horizontal axis;
- 229 b) Relative photon flux, the ratio of photon flux at a junction or case temperature versus the
230 reference temperature on the vertical axis with the reference temperature specified;
- 231 c) Forward current used for binning.

232 **5.7 Photon flux**

233 The specification sheet shall provide the photon flux bins at a junction temperature of 85°C .

234 The characteristics can be obtained either

- 235 a) by a measurement at 85°C or
- 236 b) by a measurement at 25°C and a calculation.

237 **5.8 Forward voltage**

238 The specification sheet shall provide the forward voltage bins at 85°C .

239 The characteristics can be obtained either

- 240 a) by a measurement at 85°C or
- 241 b) by a measurement at 25°C and a calculation.

242 **5.9 Photon flux maintenance**

243 The specification sheet should specify the photon flux maintenance and projection obtained
244 according to IEC 63013 if available.

245 **5.10 Spectrum maintenance**

246 The specification sheet should specify the wavelength shift over time obtained according to
247 ANSI/IES LM-80-20 if available.