

INTERNATIONAL STANDARD

NORME INTERNATIONALE

**Horticultural lighting – LED packages for horticultural lighting –
Part 1: Specification sheet**

**Eclairage horticole – Boîtiers LED pour l'éclairage horticole –
Partie 1: Feuille de spécification**

[IEC 63403-1:2024](https://standards.iteh.ai/catalog/standards/iec/b1e83bc2-eb46-417d-9767-b1d9ac8e1600/iec-63403-1-2024)

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INTERNATIONAL ELECTROTECHNICAL COMMISSION

**HORTICULTURAL LIGHTING –
LED PACKAGES FOR HORTICULTURAL LIGHTING –****Part 1: Specification sheet**

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

Draft	Report on voting
34/1142/FDIS	34/1161/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 www.iec.ch/publications.

A list of all parts in the IEC 63403 series, published under the general title *Horticultural lighting – LED packages for horticultural lighting*, 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 webstore.iec.ch in the data related to the specific document. At this date, the document will be

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HORTICULTURAL LIGHTING – LED PACKAGES FOR HORTICULTURAL LIGHTING –

Part 1: Specification sheet

1 Scope

This part of IEC 63403 specifies the requirements for specification sheets relating to LED packages designed for horticultural lighting purposes.

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

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

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

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

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

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

3.1

LED package

single electric component comprising principally at least one LED die

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

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

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

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

[SOURCE: IEC 60050-845:2020, 845-27-065]

3.2 junction temperature

t_j
temperature at the p-n junction

Note 1 to entry: Junction temperature is expressed in degree Celsius (°C).

[SOURCE: IEC 60050-845:2020, 845-27-068]

3.3 bin

<property of LED dies or LED packages> specification of an LED die or LED package, or a set thereof, by means of a range of performance characteristics

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

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

[SOURCE: IEC 60050-845:2020, 845-27-066]

3.4 family

<of LED packages> set of LED packages characterized by common features

3.5 brand name

name used by a manufacturer to distinguish its products from products made by other manufacturers

3.6 centroid wavelength

λ_c
wavelength at the weighted centre of a spectrum

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

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

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

Note 2 to entry: The centroid wavelength is normally used for LED packages based on LED die(s) emitting nearly monochromatic radiation.

3.7 dominant wavelength

<of a colour stimulus> wavelength of the monochromatic stimulus that, when additively mixed in suitable proportions with the specified achromatic stimulus, matches the colour stimulus considered in the CIE 1931 x, y chromaticity diagram

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

[SOURCE: IEC 60050-845:2020, 845-23-062, modified – Note 1 to entry has been deleted.]

3.8 photon flux efficacy

photon flux emitted divided by the electrical input power of the LED

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

4 General requirements

4.1 Title of the specification sheet

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

NOTE The product name can be the name of an individual LED package or the name of a family.

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

4.2 Figures

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

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

5 Performance characteristics

5.1 General

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

5.2 Wavelength and chromaticity

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

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

NOTE The wavelength can be given as one typical value or value as minimum and maximum.

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

5.3 Spectral power distribution and spectral photon flux distribution

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

- a) wavelength on the horizontal axis including a 300 nm to 800 nm or a wider range;
- b) relative radiant power or relative photon flux on the vertical axis for a typical spectrum including information on the basis of the normalization (by total power or by spectral peak power);
- c) forward current used for binning;
- d) junction or case temperature.

5.4 Photon intensity distribution

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

- a) coordinates where 0° is assigned to the centre of the intensity distribution;
- b) relative photon intensity normalized to the maximum photon intensity;
- c) forward current used for binning;
- d) junction or case temperature;
- e) cross-section angle (e.g. 0° or 45°), if multiple cross-section angles are given.

5.5 Photon flux versus forward current

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

- a) forward current on the horizontal axis;
- b) relative photon flux on the vertical axis;
- c) reference current used for the normalization;
- d) junction or case temperature.

5.6 Photon flux versus temperature

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

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

5.7 Photon flux

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

The characteristics can be obtained either

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

5.8 Forward voltage

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

The characteristics can be obtained either

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

5.9 Photon flux maintenance

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

5.10 Spectrum maintenance

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