

DLC Requirements for LED Fixtures

In October 2018, the DesignLights Consortium (DLC) published the requirements for testing and reporting horticultural lighting fixtures that contain light-emitting diodes (LEDs). This is important for commercial plant growers because the DLC essentially sets the eligibility standards of lighting products for potential energy efficiency incentives and rebates from utility companies throughout the U.S. and Canada. Before this document was published, energy efficiency programs for horticultural LED fixtures were inconsistent and sometimes were based on standards developed for people, not plants.

The DLC is a non-profit organization “dedicated to accelerating the widespread adoption of high-performing commercial lighting solutions.” Among other things, they collaborate with 85 utilities and energy efficiency programs, plus lighting manufacturers and government entities, to establish product quality specifications. Their 13-page document, “Testing and Reporting Requirements for LED-based Horticultural Lighting,” version 1.0, is available free through their website, www.designlights.org. An LED product that meets these requirements is eligible for listing on their Horticultural Lighting Qualified Products List.

There are 13 technical requirements for horticultural LED fixtures that relate their performance in terms of the light emitted, efficacy, longevity, durability and safety. Briefly, here are highlights of some of the requirements:

Reported informational metrics

- The photon flux emitted by a fixture, which is the amount of light (in μmol) that each fixture delivers per second. The photosynthetic photon flux (400–700 nm) must be reported, as well as the flux of blue (400–500 nm), green (500–600 nm), red (600–700 nm) and far red (700–800 nm) wavebands of radiation.
- The spectral distribution of the light emitted by a fixture from 400 to 800 nm at 1-nm intervals. This provides detailed information on the light spectrum, and enables one to identify the wavelength peaks and valleys emitted by a fixture.
- The way that light emitted from a fixture is distributed — in other words, its directionality pattern to plants below.

Required performance metrics

- The LED fixture must have a minimum efficacy (efficiency) of 1.9 μmol per joule ($\mu\text{mol}/\text{J}$). This value relates the amount of photosynthetic light emitted per electrical input watt. The most effective high-pressure sodium lamp type (those with double-ended bulbs and electronic ballasts) have an efficacy of around 1.7 $\mu\text{mol}/\text{J}$. This means that for an LED fixture to



The DesignLights Consortium (DLC) recently published requirements for testing and reporting horticultural lighting fixtures that contain light-emitting diodes (LEDs), which should help commercial growers with energy incentives from utility companies. The full report is available at www.designlights.org.

be on the DLC Qualified Products List, its efficacy must be at least 10–12 percent greater than that of the most efficient conventional fixture. The minimum efficacy value of 1.9 $\mu\text{mol}/\text{J}$ will increase in the years ahead as LED technology advances.

- The minimum time it takes for photosynthetic light to decrease to 90 percent of its initial value, referred to as the Q90, is 36,000 hours. To put this value in perspective, many seasonal greenhouse growers (such as producers of plugs and liners) who use supplemental lighting operate fixtures for 1,000 to 2,000 hours per year. Thus, Qualified Products should last most growers two or three decades before light depreciation is noticeable.
- The driver of the LEDs and fans (if present) must last a minimum of 50,000 hours. In addition, the complete fixture must have a minimum warranty of five years. These requirements help ensure LED fixtures can tolerate greenhouse conditions, are durable and well-constructed.
- The fixtures must be safety certified by a relevant certification body in the U.S. or Canada.

In my opinion, the DLC developed these parameters in a fair and transparent manner, and the metrics are reasonably attainable by lighting companies. Experts had the opportunity to provide input on two drafts of the proposal before the document was finalized and published. Companies with fixtures that are on the DLC Qualified Product list can boast about their performance, and in many instances, the fixtures will be recognized by utility providers when considering energy incentives. [gpn](#)



Erik Runkle is professor and floriculture extension specialist in the department of horticulture at Michigan State Univ. He thanks David Hamby (OSRAM Innovation) and Kurt Liepmann (OSRAM OptoSemiconductors) for their contributions to the article. Runkle can be reached at runkleer@msu.edu.