



Family Grouping Application Requirements for LED-based Horticultural Lighting

Version 2.0

Effective Date: March 31, 2021

Note: Family grouping applications will follow an interim application process utilizing both the application portal and email communication from April to June 2021. Please reference the [Interim Application Period Guidance for V2.0](#) for submission details.

The DLC allows family grouping applications for horticultural lighting products starting with the V2.0 Technical Requirements effective date (March 31, 2021). Family grouping applications are designed to reduce the total testing and application fees required to list groups of products that comply with the family grouping definition. Typically, parent products are based on tested data from worst-case models within a family group, and child products are based on reported data. Generally, limited testing can be provided if the worst-case models demonstrate compliance with the Technical Requirements.

Family grouping application eligibility, testing, and application guidance are described below. For additional information on the Technical Requirements, please review the [V2.0 Testing and Reporting Requirements for LED-based Horticultural Lighting](#).

Family Grouping Application Eligibility

To submit a family grouping application, a product family must meet the following definition:

- A family may contain a single LED package/module/array, a standardized set of LED packages/modules/arrays, and/or variations in standardized sets of LED packages/modules/arrays.
 - Families comprised of different models that correlate to fixture-level variations of spectral distribution will be grouped in spectral sub-groups.
 - Spectral sub-groups are defined as distinct product offering spectrum variations within the family. This is commonly shown on specification sheets as a “light color” or “spectrum” options.

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- Child products are required to emit the same relative Spectral Quantum Distribution (SQD) as a representative parent. If not the same relative SQD, a separate spectral sub-group is required.
 - The DLC acknowledges that different lumen packages, optics, etc. can cause small changes to SQD. These variations do not typically result in different spectral sub-groups. However, differences that result from changes to specific LED type, relative quantities of LEDs, etc., do specifically require spectral sub-groups or separate family grouping applications.
 - To limit testing burden, SQD images generated from parent-level spectral data will be used to represent child products.
 - Products employing multiple types of LEDs – that is, those that are not dual-sourcing and/or utilizing ‘equivalent’ LEDs – are eligible, so long as the construction, types, and quantities of the LED packages/modules/arrays are documented.
 - An LM-80, ISTMT, and TM-21 projection is required for each type of LED present in the product. As per normal testing rules, ISTMTs should measure the applicable temperature measurement point (TMP) and must be conducted on the hottest LED of each type.
 - Each LED must demonstrate the required $Q_{90} \geq 36,000$ hours, with exceptions noted in the [Testing and Reporting Requirements for LED-based Horticultural Lighting V2.0 policy](#).
 - If variable numbers of LEDs are dynamically chosen, and therefore the precise construction of any given product is not defined, the products are not eligible for family grouping applications. Policy development for appropriate evaluation of this type of product is under consideration.
 - Products employing varying output channels beyond simple, single-axis dimming of the whole product (i.e. spectrally-tunable products) are eligible so long as testing and reporting requirements as described in the “Special Considerations for Spectrally-Tunable Devices” subsection of the [Testing and Reporting Requirements for LED-based Horticultural Lighting V2.0 policy](#) are satisfied.
 - The family must demonstrate scalability or modular use of the identical LED packages/modules/arrays, electronics, optics, heat sinking, and any other applicable features employed in the fixture.
 - Provided that the impact on performance is well understood and explained by the applicant, other design parameters and components, such as electronics, optics, heat sinking, and other performance-affecting and non-performance-affecting features, are typically allowed to vary. The DLC reserves the right to request additional information confirming that these features do not affect performance.
 - A family may contain multiple driver variations as well as different LED drive currents achieved by a programmable driver. Please refer to the testing requirements for fixtures with multiple

66 drivers described in the [Testing and Reporting Requirements for LED-based Horticultural](#)
67 [Lighting V2.0 policy](#) for specific instructions.

- 68 • The overall physical fixture housing and assembly of the fixtures in the family group must be of
69 identical material and construction, and may only differ in overall physical dimensions for
70 different models within the grouping.
- 71 • A family may contain variations in fixture mounting systems provided that the mounting systems
72 do not change thermal management characteristics.
- 73 • In all application submissions, manufacturers must list full and complete model numbers that
74 clearly demonstrate all fixture options offered in the family grouping.

- 75 ○ “Full and complete model numbers” means model numbers that include all
76 performance-affecting and non-performance-affecting variations offered, and which do
77 not omit any option that is available to customers in the market. In general, options that
78 do not affect the performance of the fixture can be submitted as a single model number
79 with multiple options bracketed in the model number.

80 For example, a fixture that has multiple non-performance-affecting mounting options
81 may include all mounting options in brackets (e.g. “[M1, M2, M3]”). Low and high
82 voltage options may be submitted as a single model number (e.g. “ABC PAR [120V-277V,
83 347V-480V] M1”) with the worst-case performance reported. Multiple or alternate
84 drivers may also be listed in a single model number as long as the drivers perform
85 nominally the same. If the alternate drivers perform nominally differently (that is, they
86 are not presented to customers as having the same performance other than input
87 voltage, and result in different ordering codes) then the unique drivers must be listed in
88 separate model numbers. Options that affect photosynthetic photon flux (PPF) output,
89 presence or lack of fans, dimming, or spectral tuning capabilities, etc. may not be
90 bracketed and submitted as a single model number.

- 91 ○ DLC reviewers may check web listings and other marketing materials and reserve the
92 right to request additional information to document the full and complete model
93 number. A lack of clarity in model numbers will result in delayed application processing.
94 Misrepresentation of model numbers discovered outside the application process will
95 generally be considered a violation of the DLC program rules and [Logo and Trademark](#)
96 [Use Guidelines](#).

- 97 ○ Each model number may only represent the fixture under a single brand. If the fixture
98 can be sold under multiple brands, model numbers must be listed separately for each
99 brand.

- 100 • Decisions on whether a given group of fixtures are eligible to be submitted in the same family
101 grouping application are at the sole discretion of the DLC. Variation in materials, designs that
102 change the position of key components relative to one another, and other variations that, by the
103 judgement of the DLC, have potential to cause differences in spectral, optical, electrical, or
104 thermal performance, will not be allowed within the same family group or spectral sub-group, as
105 appropriate.

106 Please review the [V2.0 Testing and Reporting Requirements](#) for additional policy clarifications and
 107 contact horticulture@designlights.org with any questions about submitting an application to the DLC.

108 Testing Family Grouping Products

109 The family grouping testing policy is designed to reduce testing burden as well as to reduce the total
 110 application fees required to list groups of horticultural products, as compared to listing products
 111 individually. By identifying the models with the worst-case performance within a family group, limited
 112 testing can be provided if the worst-case models demonstrate compliance with the Technical
 113 Requirements.

114 Testing Product Families under Technical Requirements V2.0

115 An example of the typical testing and reporting required under V2.0 for a family of products is provided
 116 in **Table 1**. Specific testing and reporting requirements for each of the Technical Requirements can be
 117 found in the corresponding sections of the V2.0 policy.

- 118 • As necessary, family groups are further separated into spectral sub-groups. In general, a product
 119 family application with configurations correlated to different spectral distribution variations will
 120 be required to report spectral sub-groups.
- 121 • Each family group or spectral sub-group, as applicable, requires testing and reporting for each of
 122 the criterion below. Descriptions of all the criterion in Table 1 (below) can be found in the
 123 guidance section that follows for each family and each spectral sub-group, as applicable.

124 **Table 1: Worst-case Criteria Descriptions**

| Criterion | Which Model(s) | Test Required |
|--|---|--|
| Minimum PPF | Worst-case photosynthetic photon flux output variation | LM-79, including accompanying TM-33-18 document. Note: A single LM-79 report may fulfill several criteria |
| Minimum Photosynthetic Photon Efficacy (PPE) | Worst-case efficacy | |
| Photosynthetic Photon Intensity Distribution (PPID) | Each unique optical and distribution pattern | |
| Minimum Q_{90} Photon Flux Maintenance, Photosynthetic (PFM _p) | ISTMT at worst-case thermal conditions for each unique LED type | ISTMT |
| | LM-80 for each LED package/module/array as required for flux maintenance projection | LM-80/LM-84 |
| | | TM-21/TM-28 |

| | | |
|--|---|--------------------------------------|
| Driver Lifetime | Worst-case driver temperature for each non-relatable driver | ISTMT |
| Fan Lifetime | Worst-case fan temperature for each unique fan | ISTMT |
| Power Quality: Total Harmonic Distortion – Current (THDi) and Power Factor (PF) | Worst-case performing driver | Benchtop Electrical Testing or LM-79 |

125 **Testing Guidance for Technical Requirements V2.0**

126 The following provides detail on the testing requirements for worst-case fixtures within family
 127 applications under the V2.0 Technical Requirements.

128 **Minimum PPF Output**

- 129 • The fixture in each family group and spectral sub-group (as applicable) that is expected to have
 130 the lowest overall photosynthetic photon flux output must be tested and an LM-79 report must
 131 be provided.
- 132 • In general, this is expected to be the fixture with the fewest number of LEDs, lowest drive
 133 current, and least efficient optic within the family group or each spectral sub-group (as
 134 applicable).

135 **Minimum PPE**

- 136 • The fixture in each family group and each spectral sub-group (as applicable) that is expected to
 137 have the lowest micromoles per Joule must be tested and an LM-79 report must be provided.
- 138 • When determining minimum PPE, manufacturers must demonstrate that they are factoring in all
 139 variations that will affect this metric, including light output (LED counts and drive current),
 140 optical efficiencies, driver and applicable operating conditions, and thermal effects.
- 141 • There are many factors that can influence efficacy. Manufacturers shall determine and justify
 142 the combination of factors that result in the worst-case efficacy of the family and each spectral
 143 sub-group (as applicable). The DLC reserves the right to ask for additional information to clarify
 144 or verify technical justification.
- 145 • If the family group or spectral sub-group contains multiple drivers, benchtop electrical testing
 146 must be provided documenting the fixture wattage at the applicable loading conditions and at
 147 the applicable input voltages for each driver. From this electrical characterization testing, the
 148 product and conditions representing worst-case efficacy must undergo formal LM-79 testing.

149 **PPID**

- 150 • All fixture variations that result in a different optical and/or distribution pattern in each family
 151 group or spectral sub-group (as applicable) must be tested. An accompanying TM-33-18
 152 document and .jpg image must be provided for each PPID variation within the family group or



153 spectral sub-group (as applicable). To facilitate time for accredited labs to develop or purchase
154 TM-33-18 reporting software, the DLC offers a 9-month grace period for applicants to provide
155 LM-63 and TM-27 (i.e. .ies and .spdx files, respectively) for parent products.

156 **Minimum Q₉₀ PFM_p**

- 157 • To demonstrate compliance with the minimum Q₉₀ PFM_p (Photosynthetic Photon Flux
158 Maintenance) requirement, thermal testing must be conducted on the worst-case configuration
159 within the family group or spectral sub-group (as applicable).
 - 160 ○ In general, this is expected to be on the fixture where the LED is operating at its highest
161 temperature within the group. An ISTMT conducted on the hottest LED (for each LED
162 type) in this hottest fixture must be submitted to support TM-21 projections for Q₉₀
163 PFM_p.
- 164 • Worst-case thermal measurements are required for each family group or spectral sub-group (as
165 applicable).

166 **Driver Lifetime**

- 167 • The family group must demonstrate that the driver(s) used in the family meet the driver lifetime
168 requirements. An ISTMT of the driver(s) must be conducted on the worst-case fixture within the
169 family and spectral sub-group (as applicable) and must be supplied along with the appropriate
170 driver specification sheets showing TMP location and reliability under allowable operating
171 temperatures.
- 172 • In general, the worst-case model is expected to be the highest wattage model within the family
173 and spectral sub-group (as applicable).
- 174 • The ISTMT report must be conducted at the applicable TMP location on the driver for the fixture
175 where the driver operating temperature is worst-case. The temperature at the tested TMP
176 location must be equal to or lower than temperature noted on the driver specification sheet to
177 predict a lifetime ≥ 50,000 hours.
- 178 • If multiple drivers exist within the family group or spectral sub-group, manufacturers are
179 required to demonstrate which driver will result with the worst-case condition. Thermal testing
180 for each non-relatable driver variation is required. In general, drivers are considered to be
181 relatable if defined on driver specification sheets as being in the same series by the driver
182 manufacturer. The DLC reserves the right to require thermal test data on each unique driver if
183 rationale is not specific enough to demonstrate worst-case.

184 **Fan Lifetime**

- 185 • The manufacturer must demonstrate that the fan(s) used in the family group meet the fan
186 lifetime requirements. An ISTMT of the fan(s) must be conducted on the worst-case fixture
187 within the family and spectral sub-group (as applicable) and must be supplied along with the
188 appropriate fan specification sheets showing TMP location and reliability under allowable
189 operating temperatures.

- 190 ○ In general, the worst-case model is expected to be the highest wattage model within the
191 family and spectral sub-group (as applicable).
- 192 ● The ISTMT report must be conducted at the applicable TMP location on the fan for the fixture
193 where the fan operating temperature is worst-case. The temperature at the tested TMP location
194 must be equal to or lower than temperature noted on the fan specification sheet to predict a
195 lifetime $\geq 50,000$ hours.

196 **Power Quality (THDi and PF)**

- 197 ● Electrical testing must be provided for the fixture that is expected to have the worst-case THDi
198 and PF in the family group or the spectral sub-group (as applicable).
- 199 ○ In-house (i.e. non-accredited lab) testing is allowed.
- 200 ● In general, this is expected to be on the fixture with the driver with the worst-case loading and
201 output condition. In situations where there is more than one driver in the group or spectral sub-
202 group, in-house testing is needed to demonstrate that the worst-case driver, loading condition,
203 and input voltage have been selected for testing.
- 204 ● For each unique driver used within a family group or spectral sub-group, manufacturers must
205 provide electrical testing to demonstrate which driver variation will result in the overall worst-
206 case metrics identified.
- 207 ● The testing should include the input voltage, current, and wattage; the output voltage, current,
208 and wattage; and the THDi and PF, for the worst-case loading condition of each driver within the
209 family group or spectral sub-group (as applicable). This information should be factored into the
210 scaled performance methodology and identification of worst-case efficacy and power quality.