

Field-Adjustable Light Distribution Example:

Standard Component FALD Listed in 1 Primary Use Designation

Introduction

In March 2019, DLC released a policy to address solid-state lighting products with field-adjustable light distribution (FALD). For the details of this policy, please see the details [here](#).

To add clarity to this new policy approach, the DLC has developed a number of illustrative examples to highlight how the policy can be used to qualify products with these field-adjustable features. This example covers a scenario where a manufacturer is seeking to qualify a luminaire that adjusts its distribution via **“standard components”**, and is applying to be listed on the QPL in **only one primary use designation (PUD)**.

The following is provided for illustration purposes only and is not intended to mimic any specific known product or manufacturer.

Product Description

Imagine a manufacturer that produces and sells an outdoor wall-mounted area luminaire. The optical distribution of the luminaire is primarily dictated by an interchangeable lens that is installed over the aperture. For flexibility with its customers and market channels, and simplicity in its inventory and ordering system, the manufacturer sells both lenses together with the base luminaire in all cases, allowing the end user and installer to simply install the lens appropriate for the given application as they desire.

One of these lenses (lens A) results in a semi-cutoff distribution, with 4% of its light output in the $>90^\circ$ from nadir zone, with an overall efficacy of 125 lm/W. The other lens (lens B) results in a full-cutoff distribution, with 100% of its lumens $<90^\circ$, with an efficacy of 105 lm/W. Both lenses are sold with the product, under one model number (Model ABC-123). That is, when a customer orders ABC-123, both lenses come in the box, without need for separate ordering codes (for clarity, the product is *not* sold under two model numbers: ABC-123-A and ABC-123-B).

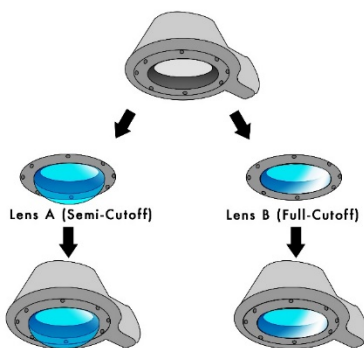


Figure 1: Model ABC-123, which ships with Lens A and Lens B

A summary of the product performance is presented in the following table:

Model, Lens	Light Output (lm)	Wattage (W)	Efficacy (lm/W)
ABC-123, Lens A	3,125	25	125
ABC-123, Lens B	2,678	25.5	105

Table 1: Basic summary of performance for product ABC-123, with each lens

Scenario Description

Due to the differences in distribution, the product with lens A installed is most appropriate for listing in the “Outdoor Non-Cutoff and Semi-Cutoff Wall-Mounted Area Luminaires” PUD, while the product with lens B installed is most appropriate for listing in the “Outdoor Full-Cutoff Wall-Mounted Area Luminaires” PUD. **Imagine that in this scenario, the manufacturer desires to have the product, ABC-123, listed on the QPL in only the “Outdoor Non-Cutoff and Semi-Cutoff Wall-Mounted Area Luminaires” PUD.**

Applying DLC rules for non-cutoff and semi-cutoff wall packs to the product performance as described, the functional efficacy of the product with lens A (zonal efficacy in the 0-90° zone) is 120 lm/W. Therefore, worst-case light output and efficacy are both on the product as configured with lens B (see Table 2, below). Let us also assume that, due to the smaller volume and tighter thermal constraints, the product with lens B installed is also hotter (worst-case thermally) than the product with lens A installed, and operates at a marginally worse power quality (THD and PF). Finally, for simplicity, assume that model ABC is offered at only one wattage level (nominally 25W), at only one color temperature and CRI (nominally 4000K, 70CRI), at only one input voltage (120V).

Model, Lens	Efficacy (lm/W)	0-90° Zonal Lumen	Zonal Efficacy (lm/W)
ABC-123, Lens A	125	96%; 3000 lm	120
ABC-123, Lens B	105	100%; 2,678 lm	105

Table 2: Basic summary of performance for product ABC-123, with each lens

Required Testing

Per the FALD policy, “testing shall be conducted in the light distribution settings that result in the worst-case performance for each of efficacy, wattage, lumen output, power quality, and thermal In-Situ Temperature Measurement Testing (ISTMT).” As all of these metrics are worst-case on ABC-123 when lens B is installed, the manufacturer must conduct:

- An LM-79 for efficacy, wattage, lumen output on ABC-123 with lens B installed;
- An (LED) ISTMT on product ABC-123 with lens B installed

Emphasis is added here to note that the testing must be conducted with lens B installed, despite the fact that the product is *not* applying for listing on the QPL in the PUD most associated with lens option B, because the product is worst-case when lens B is installed, and testing must be in the worst-case configuration.

Additionally:

- If the LM-79 described above does not include power quality metrics, product ABC-123 with lens B installed will need electrical testing conducted. This can be either via LM-79 methods or via benchtop testing.
- If the LM-79 described above does not include color metrics, an LM-79 on ABC-123 with *either* lens installed that includes color metrics will be needed.

For proving that the product meets the zonal-lumen distribution (ZLD) requirements, by policy the manufacturer must demonstrate that the product can meet the ZLD requirements of each PUD for which it is applying in at least one setting, via providing an IES file for the product in that setting that shows it passes the ZLD requirements. Additionally, manufacturers must submit a correlation sheet that directly associates products with an IES file corresponding to a distribution that they can achieve.

In this case, an IES file for the product with lens B installed would be meet this requirement, as in that configuration the product passes the ZLD requirements for the non-cutoff PUD.

Alternatively, an IES file for the product with lens A installed would suffice, as the product with lens A passes the ZLD requirements for the non-cutoff PUD as well. At least one of these IES files must be included, and either would be sufficient. Please note, however, that the “Adjustable Distribution Setting” field on the application form must match whichever configuration for which the IES file is provided.

Finally, please see the sample application form for this scenario [here](#). Please note the following:

- The product model number, applying for one listing
- As the reported performance rules state that the product performance in the “reported” field must match the tested orientation, the “reported” performance data for product listing is the performance with lens B. This is despite the likely use case that in the Non-Cutoff PUD, the product would be likely to be used with lens A.
- If the product is dimmable, default light output and default wattage performance fields have flexibility to allow the manufacturer to use as they would like. In the example, they reflect the performance of the product in the lens A configuration.
- The “Adjustable Distribution Setting” field indicates the setting under which the product meets the ZLD requirements of the PUD that line corresponds with. In this case, the field may list either lens B or lens A, as both pass the requirements, and must only correspond to the provided IES file, as noted above. This application form assumes providing the IES file for lens A.

What will the Application Fees Be?

Per policy, FALD products must submit as family grouping applications. The family grouping application fee scheduled is based on the number of LM-79s and ISTMTs needed to assess the product (“independent test reports” or “ITR”), as well as the number of additional family members and dimming variations.

In this application, there is one product, requiring 2 ITR's (one complete LM-79, and one ISTMT), with no additional family members. Therefore the application fee for this application would be \$1000.

How will the Product End Up Getting Listed?

This application results in one listing: one product, with test data, appearing with listings confirming that it is qualified in both the “Outdoor Non-Cutoff and Semi-Cutoff Wall-Mounted Area Luminaires” PUD.

- Both the test data the basic reported performance data would be for the performance of the product when installed with lens B, as that is the worst-case configuration. This is true even though it applied in a PUD more likely to be used with lens A.
- The listing would indicate that the “Adjustable Distribution Setting” for which the product meets the ZLD for the non-cutoff PUD, corresponding to the provided IES file. In this case, it is assumed the manufacturer provided the IES file for “Lens A”, and therefore that would be listed.