



Testing and Reporting Requirements for Field-Adjustable Light Distribution Products

Products with field-adjustable light distribution (FALD) are eligible to be listed on the DesignLights Consortium Solid-State Lighting Qualified Products List (DLC SSL QPL).

Definition

Field-Adjustable Light Distribution (FALD) products are lamps, luminaires, or retrofit kits whose light distribution can be intentionally adjusted from the default factory “as-shipped” configuration. Light distribution is considered adjusted when the light intensity in one direction changes relative to the intensity in any other direction. FALD products eligible for listing on the SSL QPL fall into one or both of two types based on the method used to intentionally adjust their light distribution:

- 1. Integral Field-Adjustable Light Distribution Products:** Products where the distribution can be adjusted by electrical or mechanical means without the addition, removal, or replacement of any parts or accessories. The adjustment must be integral to the product. For example, a luminaire with aimable light bars to direct the light at different angles would fall under this category.
 - Products within the following Primary Use Designations that are “aimable” but restrict tilt to ≤ 10 degrees to “level” the intensity distribution with the pavement are NOT required to list as FALD:
 - Outdoor Pole/Arm-Mounted Area and Roadway Luminaires
 - Outdoor Pole/Arm-Mounted Decorative Luminaires
 - Specialty: Hazardous Area Lighting
 - Specialty: Hazardous Outdoor Pole/Arm-Mounted Area and Roadway Luminaires
 - The DLC will rely on manufacturers and submitters to appropriately indicate whether their product has FALD capabilities. However, the DLC reserves the right to ask for additional information to clarify product capabilities related to tilting, aiming, and/or leveling.
- 2. Standard Component Field-Adjustable Light Distribution Products:** Products where the distribution is adjusted by adding or removing parts that are included with the product as sold under a single model number. These interchangeable components that come as standard with a single model number are defined as “Standard Components” for this policy. An example for this

type of FALD product is a luminaire that is shipped standard with three reflectors under a single model number, and for which the installer chooses one of the reflectors during the installation and stores or discards the other two reflectors.

- Products where the distribution is adjusted by adding parts that do not come standard with every order—termed “optional components” in this policy—are not considered FALD products and must be submitted under separate applications with separate model numbers for each component combination.

The testing and listing requirements are identical for the two FALD types above, as described in the Eligibility, Testing and Reporting, and Listing sections below. SSL QPL applications for FALD products will be required to specify which of the two types above, or both, apply to the product.

Products with adjustable light output that do not incorporate adjustable distribution pattern are defined as dimmable and must comply with the [Testing and Reporting Requirements for Dimmable and Field-Adjustable Light Output Products](#).

FALD TYPE	INTEGRAL FALD PRODUCTS	STANDARD COMPONENT FALD PRODUCTS	PRODUCTS WITH OPTIONAL DISTRIBUTION-ALTERING COMPONENTS	PRODUCTS WITH BOTH INTEGRAL AND STANDARD COMPONENT FALD	FALD PRODUCTS THAT MAY ALSO BE ORDERED WITH DISTRIBUTION-ALTERING OPTIONAL COMPONENTS
DEFINITION	Products where the distribution can be altered by means integral to the product, electrical or mechanical	Products where the distribution is altered by adding or removing parts that are included with every product order under a single model number	Products where the distribution is altered by adding or removing optional parts not included with every product order	Products where the distribution is altered by both integral means and by means of standard components included under a single model number	Products with integral distribution adjustment, distribution-altering standard components, or both, but also available with optional parts that alter light distribution
EXAMPLE	Luminaire with rotatable light bars to aim the light at different angles	Luminaire that is shipped standard with three reflectors under a single model number; the installer chooses one of the reflectors during installation and stores or discards the other two reflectors	Luminaire that is available with 3 different shape reflectors with 3 model number variations for each reflector, and the customer chooses via the model number which one reflector is shipped with the luminaire	Luminaire that has both rotatable light bars <u>and</u> three reflectors under a single model number; the installer chooses one of the reflectors during installation and stores or discards the other two reflectors	Luminaire that is shipped standard with three reflectors under a single model number and the installer chooses one, <u>and</u> may be ordered with a optical shielding option to reduce intensity in one direction
Is it Considered FALD and governed by this Policy?	Yes	Yes	No	Yes	Yes, but: requires separate FALD applications for the shielded and unshielded variations
Where must it meet Technical Requirements for efficacy, light output, color, power quality, and ISTMT?	At the full range of the product's light distribution settings	At every combination of distribution-altering parts that are included standard under a single model number	Not FALD products: must be submitted for listing as separate application line items	At the full range of integral distribution settings with every combination of distribution-altering parts	At all integral adjustment settings for every combination of distribution-altering parts, separately for each optional part
Where must it meet ZLD Technical Requirements for Category and PUD	At one manufacturer-designated setting	At one manufacturer-designated combination of distribution-altering parts that are included standard under a single model number		At one integral setting and combination of distribution-altering standard components	At one integral setting and combination of distribution-altering standard components, separately for each optional part
At what FALD setting will the light output, watts, efficacy, THD, power factor, CRI, CCT be listed on the QPL?	At the light distribution configuration that produces the worst-case efficacy performance, with product performance characteristics from that test			At the light distribution configuration that produces the worst-case efficacy performance	Listed separately for each optional part combination, at the distribution configuration that produces worst-case efficacy
At what FALD setting will the zonal lumen distribution and spacing criteria be listed on the QPL?	At the manufacturer-designated light distribution setting or component combination submitted to meet the ZLD requirement			At the manufacturer-designated light distribution setting or component combination	Listed separately for each optional part combination, at the manufacturer-designated setting or component combination
How will it be identified on the QPL?	The QPL field for Product Features will list "Field Adjustable: Light Distribution"				The QPL field for Product Features will list "Field Adjustable: Light Distribution"



Eligibility

The following are eligibility rules for FALD products:

- **All FALD products must meet all DLC Technical Requirements except zonal lumen distribution (ZLD) and spacing criteria (if applicable) for the Category and Primary Use Designation (PUD) under which they are being submitted across the full range of the product’s light distribution integral settings and standard components.** This range includes all adjustment of either mechanical or electrical means, including software-based methods, and all possible combinations of distribution-adjusting parts that are included standard under a single model number. If a Standard Component FALD product may be installed without any distribution-adjusting component attached, then the product must meet all DLC Technical Requirements for the Category and PUD under which it is submitted, both with and without any standard components.
 - An exception to the above rule for evaluating light output of high bay and low bay FALD products occurs in the following situation. For both new luminaires and integrated retrofit kits within the high bay General Application, products will be deemed to meet the DLC Technical Requirements for light output if they meet the DLC technical requirement for minimum and maximum light output for any Primary Use Designation within the high bay General Application. Some PUDs—for example, High Bay Luminaires for Commercial and Industrial Buildings and Low Bay Luminaires for Commercial and Industrial Buildings—differ only in light output, with requirements above and below 10,000 lumens respectively. If field adjustment to the light distribution causes the light output of a high bay product to cross below the 10,000-lumen threshold, that product will still be eligible as long as it meets the light output requirement of the low bay PUD, i.e., as long as it maintains light output above 5,000 lumens.
- **All FALD products must meet the DLC Technical Requirements for zonal lumen distribution (ZLD) and spacing criteria (if applicable) for the PUD under which they are being submitted at one light distribution setting of the manufacturer’s choosing.** This setting must be one integral adjustment setting and/or one combination of distribution-adjusting standard components. The product is not required to meet the ZLD and spacing criteria (if applicable) requirements at other light distribution settings.
- **For products that include both Integral FALD and Standard Component FALD, the tested integral light distribution setting should be suitable for the intended use of each light distribution-adjusting component or accessory and need not be identical across all light distribution-adjusting accessories.**
- A product meeting the FALD definition above may also be offered with optional components or accessories that can be ordered separately or as an option within a unique model number for further adjusting its light distribution. **Products that include both FALD and optional components that adjust light distribution must be submitted as separate application line items with distinct model numbers for each distribution-adjusting component combination, each of which is treated as a FALD product.**



- **Listing a product under multiple PUDs:** As with non-field-adjustable products, any product that can meet the technical requirements of multiple PUDs and for which the manufacturer seeks qualification and listing under multiple PUDs, must be submitted on separate applications for each PUD with the necessary testing and application materials for each PUD it is to be listed under.
- FALD products will only be classified as DLC Premium if they meet all [DLC Premium classification requirements](#) for the Category and PUD under which they are being submitted.
- FALD products that fall under other DLC product Category and Primary Use eligibility rules, such as [Color-Tunable](#) or [Dimmable](#) products, are additionally subject to those respective Testing and Reporting Requirements. Please note that if the control that results in different distribution results in significantly different light output, provisions of the Dimmable and Field-Adjustable Light Output policy also apply.

Required Testing and Reporting

FALD products are only eligible to be submitted as Level 2 DLC applications, and submittals must conform to the following testing rules in addition to the requirements of the family grouping policy, with exception to “aimable” products. Specifically, “aimable” products such as Flood and Spot Luminaires and Track or Monopoint Luminaires, where aimable capabilities are the norm, and where ZLD evaluation is relative to the center beam rather than to the environment, may continue to use the Level 1 Application rather than the Level 2 Application, if desired.

Testing must be provided sufficient to bracket all products in the group per the DLC [family grouping requirements](#).

Required testing is summarized below, with the full requirements for each type of FALD product described in detail below the table. For the purposes of this policy, the worst-case light distribution setting means the combination of the Integral FALD setting and the component combination for Standard Component FALD that together result in the worst or extreme value for the specified requirement.

Technical Requirement	FALD Testing Required
LM-79 Report Required:	<ul style="list-style-type: none"> • Worst-case efficacy • Maximum power consumption • Worst-case light output • Representative highest CCT • Representative lowest CCT • Representative lowest CRI
Bench Test Required:	<ul style="list-style-type: none"> • Worst-case power quality (THD & PF)
In-Situ Temperature Measurement Test (ISTMT) Required:	<ul style="list-style-type: none"> • Worst-case thermal condition • For Premium classification, worst-case driver thermal condition
Photometric Distribution data required:	<ul style="list-style-type: none"> • All optical variations excluding variations due to Integral FALD adjustability • One FALD setting designated for meeting ZLD requirements and listing on QPL

Required Testing

For all FALD products, 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). The combination of product and FALD setting tested must result in the worst-case performance within the family for each tested value and may require testing at multiple FALD settings: up to three LM-79 tests, one power quality bench test, and two ISTMT tests.

- LM-79 testing is required for the product and FALD setting combinations that represent the following worst cases:
 - The worst-case efficacy product and setting within the group
 - The maximum wattage product and setting within the group
 - The worst-case lumen output product and setting within the group
 - The worst-case power quality (THD, PF) product(s) and setting(s) within the group (may bench-tested)
 - Representative highest CCT
 - Representative lowest CCT
 - Representative lowest CRI
- In-Situ Temperature Measurement Testing (ISTMT) is required for the product and FALD setting combination that results in the worst-case thermal condition.
- If applying for Premium, ISTMT is required for the product and FALD setting combination that result in the worst-case driver thermal condition.



The Manufacturer shall provide photometric distribution data that meets the Zonal Lumen Distribution Requirements of the PUD for which it is being submitted in .ies file format.

Every family member must produce at least one photometric distribution that meets the PUD's ZLD (and Spacing Criteria if applicable) requirements. Manufacturers will be required to identify the submitted .ies file that represents, for each family member, a relative photometric distribution that the family member can achieve. Each identified .ies file must meet the PUD's ZLD requirements. This IES-file-to-product correlation information shall be contained in a separate document, uploaded within the application portal, under the section in the "Documents" tab of the application titled "Additional Documentation Required for Field Adjustable Light Distribution (FALD) Products". Manufacturers may use the [DLC-provided template](#), or their own reporting document, as they desire.

Additionally, the following information must be provided with the DLC application materials:

- Is the product capable of field-adjustable light distribution? The applicant shall indicate in the application form, one of the following: "Integral FALD", "Standard Component FALD", "Integral and Standard Component FALD", or "No".
- The manufacturer shall complete a new field in the application form describing the Adjustable Distribution Setting designated to meet the zonal lumen distribution requirement for the PUD. This description will be displayed on the QPL in a new text field.
- The manufacturer shall describe in a separate document the adjustable setting position and/or the Standard Component combination that was used for each worst-case test submitted, and shall provide a written statement to justify why this setting and/or combination creates the extreme- or worst-case value in this test for each of the 8 requirements above (9 for Premium classification). The description and justification shall be provided for each test in this separate document, uploaded within the application portal. A separate document with justification is required even when the Integral distribution setting or Standard Component combination is also included in the test report. Please see note below for how to document the setting(s) with "aimable" products.

Note: all products where the light direction or intensity can change in the field, including "aimable" products like floods and track lights, are considered to have Field Adjustable Light Distribution as of March 7, 2019. For products such as Flood and Spot Luminaires and Track or Monopoint Luminaires, where aimable capabilities are the norm, and where ZLD evaluation is relative to the center beam rather than to the environment, DLC will expect most technical justifications to describe that while the product is aimable, the characteristics of the beam are otherwise static, and therefore beam performance is expected to be nominally constant in different "settings" (aiming orientations). The application form should note these products as "Integral FALD" in the "Field Adjustable Type" column, and note the orientation they were in during goniophotometric testing in the "Adjustable Distribution Setting" column.

Additionally, products with multiple mounting options, one of which is aimable, will continue to be allowed to be listed with mountings noted in wildcards or a bracketed set of options within a single model number (product ID on the QPL). The application form should note these products as "Integral FALD" in the "Field Adjustable Type" column, and note both the mounting and orientation they were in



during goniophotometric testing in the “Adjustable Distribution Setting” column; the mounting variation and tested orientation should also be described in the technical justification, as noted above.

Supporting Documentation

The DLC will evaluate manufacturer’s claims of FALD capability by ensuring that the adjustability claims are clearly published in the product specification sheet(s) and correspond with the unique model numbers submitted. The DLC will also evaluate the manufacturer’s product installation instructions to determine eligibility. Documentation must include instructions for adjusting light distribution, including any required device or software. The instructions must be the same ones provided to the intended market actors or consumers who will be making the light distribution adjustments. DLC reviewers may check web listings and other marketing materials and reserve the right to request additional information to demonstrate capability if information in product specification sheets is not sufficient.

Listing on the QPL

FALD products will be identified as such under the “Product Features” tab on the SSL Qualified Products List (QPL) as either “Integral FALD”, “Standard Component FALD”, or “Integral and Standard Component FALD”.

FALD products will be listed on the QPL at the light distribution setting that produces the worst-case efficacy, with the following product performance characteristics from that LM-79 testing at that setting: light output, watts, efficacy, THD, power factor, CRI, CCT.

The Zonal Lumen Distribution listing on the QPL for each family member will be calculated from the .ies file designated by the manufacturer as applicable to that family member.

The highest power consumption reported on the worst-case wattage LM-79 test will be listed on the QPL in the **Max. Tested Wattage** field for the tested family member. The highest power consumption provided for each family member on the application Reported Performance Tab will be listed on the QPL in the **Max. Wattage** field.

- Note that the FALD policy states that products will be listed at the lowest-efficacy setting, while the Field Adjustable Light Output (FALO) policy states they will be listed at the highest output (most consumptive) setting. In the event a product falls under both FALD and FALO policies, and that the lowest efficacy setting and the maximum output setting are distinct, products will be generally listed at the lowest efficacy setting, with maximum possible wattage provided in the **Max. Wattage** fields (rated and tested, as appropriate).

A new text field, **Adjustable Distribution Setting**, will be added on the QPL for Integral FALD products to document the light distribution setting or Standard Component configuration designated by the manufacturer to meet the zonal lumen distribution requirement for the PUD.

Updating Listings

Following the release of this policy, outdoor products in eligible PUDs that are aimable but restrict tilt to only level the distribution with the ground surface may be listed as having FALD capabilities or listed without these capabilities.

Manufacturers who wish to update their listings due to this policy change can do so by submitting an [update application](#). A fee (dependent on the quantity of products) will be applied to these types of update applications based on the [updating dimming information fee schedule](#).

Surveillance of FALD Products

When a FALD product is selected for surveillance, performance across the full range of adjustment and all combinations of Standard Components should meet DLC requirements at any tested position or Standard Component combination with exception to ZLD. The DLC may test the product(s) at up to three adjustment positions/settings or configurations, and the product must meet DLC requirements (excluding ZLD) for any tested position per this policy.

Notes

Considerations for Flood, Spot, Track, and Monopoint Luminaires

For products such as Flood and Spot Luminaires and Track or Monopoint Luminaires, where aimable capabilities are the norm, and where ZLD evaluation is relative to the center beam rather than to the environment, the DLC will expect most technical justifications to describe that while the product is aimable, the characteristics of the beam are otherwise static, and therefore beam performance is expected to be nominally constant in different “settings” (aiming orientations). The application form should note these products as “Integral FALD” in the “Field-Adjustable Type” column, and note the orientation they were in during goniophotometric testing in the “Adjustable Distribution Setting” column.

Considerations for Area Lighting with Aimable Mountings

For products such as area lighting with aimable mountings, such products will likewise be required to select “Integral FALD” in the “Field-Adjustable Type” column, and note the orientation they were in during goniophotometric testing in the “Adjustable Distribution Setting” column. In the case of aimable non-cutoff wall-mounted area luminaires, the provided IES file should be shown in a “straight down” orientation, enabling reviewers to calculate the zonal efficacy in that setting appropriately.

Considerations for LED CFL Replacements (“CFLEDs”)

For horizontally-mounted LED replacements for pin-based CFLs (“CFLEDs”), because CFLED policy has historically required such products to be rotatable, testing in an appropriate orientation where the light from the lamp is directed out of the recessed can housing is appropriate. Additional adjustability, such as “heads” on the end of the lamp that can point in multiple directions, will be required to meet the additional provisions of the FALD policy and test in a worst-case orientation.



Considerations for Products with Multiple Mounting Options

Products with multiple mounting options, one of which is aimable, will continue to be allowed to be listed with mountings noted in wildcards or a bracketed set of options within a single model number (product ID on the QPL). The application form should note these products as “Integral FALD” in the “Field-Adjustable Type” column, and note both the mounting and orientation they were in during goniophotometric testing in the “Adjustable Distribution Setting” column; the mounting variation and tested orientation should also be described in the technical justification, as noted above.

