



DLC Solid-State Lighting Technical Requirements Tables Version 5.0

The Solid-State Lighting Technical Requirement Tables contain the complete set of minimum technical specifications that products must meet to be qualified on the DLC QPL. Please review the requirements carefully for your specific product type before submitting a product application. Products listed on the QPL under the V5.0 Technical Requirements version meet these requirements.

Applications to qualify products under the V5.0 requirements are accepted between February 18, 2020 and ~~October 31, 2020~~ **January 31, 2021**.

April 28, 2020 Update

To address the continuing disruptions to daily operations and supply chains due to COVID-19, dimming requirements for V5.0 Standard products have been revised and are highlighted and/or struck through in this document. Additionally, timelines for updating V4.4 products and V5.0 new product applications have been extended, as shown in the V5.0 and V5.1 Manufacturer & Industry Guidance document. Please contact info@designlights.org with any questions.

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DLC Solid-State Lighting Categories, General Applications, and Primary Use Designations (PUD)

Table 1: Categories, General Applications, and Primary Use Designations (PUD)

#	Category	General Application	Primary Use Designations (PUD)
1	Outdoor	Low Output	<ul style="list-style-type: none"> • Outdoor Pole/Arm-Mounted Area and Roadway Luminaires • Outdoor Pole/Arm-Mounted Decorative Luminaires • Outdoor Full-Cutoff Wall-Mounted Area Luminaires • Outdoor Non-Cutoff and Semi-Cutoff Wall-Mounted Area Luminaires • Bollards • Parking Garage Luminaires • Fuel Pump Canopy Luminaires • Landscape/Accent Flood and Spot Luminaires • Architectural Flood and Spot Luminaires • Stairwell and Passageway Luminaires • Specialty: _____
2		Mid Output	
3		High Output	
4		Very High Output	
5	Indoor	Interior Directional	<ul style="list-style-type: none"> • Wall Wash Luminaires • Track or Mono-Point Luminaires • Specialty: _____ • Display Case Luminaires • Horizontal Refrigerated Case Luminaires • Vertical Refrigerated Case Luminaires • Specialty: _____ • 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces • 1x4 Luminaires for Ambient Lighting of Interior Commercial Spaces • 2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces • Specialty: _____ • Direct Linear Ambient Luminaires • Linear Ambient Luminaires w/ Indirect component • Specialty: _____ • High-Bay Luminaires (Commercial and Industrial) • Low-Bay Luminaires (Commercial and Industrial) • High-Bay Aisle Luminaires • Specialty: _____
6		Case Lighting	
7		Troffer	
8		Linear Ambient	
9		High-Bay	
10	Outdoor Retrofit Kit	Low Output	<ul style="list-style-type: none"> • Retrofit Kits for Outdoor Pole/Arm-Mounted Area and Roadway Luminaires • Retrofit Kits for Outdoor Pole/Arm-Mounted Decorative Luminaires • Retrofit Kits for Large Outdoor Pole/Arm-Mounted Area and Roadway Luminaires • Retrofit Kits for Outdoor Full-Cutoff Wall-Mounted Area Luminaires • Retrofit Kits for Parking Garage Luminaires • Retrofit Kits for Fuel Pump Canopy Luminaires
11		Mid Output	
12		High Output	
13		Very High Output	
14	Indoor Retrofit Kit	Troffer	<ul style="list-style-type: none"> • Linear Retrofit Kits for 2x2 Luminaires • Integrated Retrofit Kits for 2x2 Luminaires • Linear Retrofit Kits for 1x4 Luminaires • Integrated Retrofit Kits for 1x4 Luminaires • Linear Retrofit Kits for 2x4 Luminaires • Integrated Retrofit Kits for 2x4 Luminaires • Retrofit Kits for Direct Linear Ambient Luminaires • Retrofit Kits for High-Bay Luminaires (Commercial and Industrial) • Retrofit Kits for Low-Bay Luminaires (Commercial and Industrial)
15		Linear Ambient	
16		High-Bay	

#	Category	General Application	Primary Use Designations (PUD)
17	Linear Replacement Lamps	2' T8 Lamps	<ul style="list-style-type: none"> • Replacement Lamps ("Plug and Play") (UL Type A) • Internal Driver/Line Voltage (UL Type B) Lamps
18		4' T8 Lamps	<ul style="list-style-type: none"> • 2-lamp External Driver (UL Type C) Lamps • 3-lamp External Driver (UL Type C) Lamps • 4-lamp External Driver (UL Type C) Lamps • Dual Mode Internal Driver (UL Type A or B)
19		4' T5 Lamps	
20		3' T8 Lamps	<ul style="list-style-type: none"> • Replacement Lamps ("Plug and Play") (UL Type A) • Internal Driver/Line Voltage (UL Type B) Lamps
21		8' T8 Lamps	<ul style="list-style-type: none"> • 2-lamp External Driver (UL Type C) Lamps • Dual Mode Internal Driver (UL Type A or B)
22		4' T5HO Lamps	<ul style="list-style-type: none"> • Replacement Lamps ("Plug and Play") (UL Type A) • Internal Driver/Line Voltage (UL Type B) Lamps • 3-lamp External Driver (UL Type C) Lamps • 4-lamp External Driver (UL Type C) Lamps • 6-lamp External Driver (UL Type C) Lamps • Dual Mode Internal Driver (UL Type A or B)
23		U-Bend Lamps	<ul style="list-style-type: none"> • Replacement Lamps ("Plug and Play") (UL Type A) • Internal Driver/Line Voltage Lamp-Style Retrofit Kits (UL Type B) • 2-lamp External Driver Lamp-Style Retrofit Kits (UL Type C) • 3-lamp External Driver Lamp-Style Retrofit Kits (UL Type C) • Dual Mode Internal Driver (UL Type A or B)
24	Mogul Screw-Base (E39) Replacements for HID Lamps	Outdoor – Low Output	<ul style="list-style-type: none"> • Replacement Lamps for Outdoor Pole/Arm-Mounted Area and Roadway Luminaires (UL Type B) • Replacement Lamps for Outdoor Pole/Arm-Mounted Decorative Luminaires (UL Type B) • Replacement Lamps for Outdoor Full-Cutoff Wall-Mounted Area Luminaires (UL Type B)
25		Outdoor – Mid Output	<ul style="list-style-type: none"> • Replacement Lamps for Parking Garage Luminaires (UL Type B) • Replacement Lamps for Fuel Pump Canopy Luminaires (UL Type B)
26		Outdoor – High Output	<ul style="list-style-type: none"> • Replacement Lamps for Outdoor Pole/Arm-Mounted Area and Roadway Luminaires (UL Type C) • Replacement Lamps for Outdoor Pole/Arm-Mounted Decorative Luminaires (UL Type C) • Replacement Lamps for Outdoor Full-Cutoff Wall-Mounted Area Luminaires (UL Type C)
27		Outdoor – Very High Output	<ul style="list-style-type: none"> • Replacement Lamps for Parking Garage Luminaires (UL Type C) • Replacement Lamps for Fuel Pump Canopy Luminaires (UL Type C)
28		High-Bay	<ul style="list-style-type: none"> • Replacement Lamps for High-Bay Luminaires (UL Type B) • Replacement Lamps for Low-Bay Luminaires (UL Type B) • Replacement Lamps for High-Bay Luminaires (UL Type C) • Replacement Lamps for Low-Bay Luminaires (UL Type C)
29	Four Pin-Base Replacement Lamps for CFLs	Vertically Mounted Lamps	<ul style="list-style-type: none"> • Replacement Lamps ("Plug and Play") (UL Type A)
30		Horizontally Mounted Lamps	
31		2G11 Base Lamps	<ul style="list-style-type: none"> • Replacement Lamps ("Plug and Play") (UL Type A) • Internal Driver/Line Voltage (UL Type B) Lamps • 2-lamp External Driver (UL Type C) Lamps • 3-lamp External Driver (UL Type C) Lamps • Dual Mode Internal Driver (UL Type A or B)

Notes:

1. Luminaires may not qualify for DLC Premium using "Specialty: _____" as the Primary Use Designation.
2. Retrofit Kits and Replacement Lamps must be tested inside luminaires, per the policies for those products. See Retrofit Kit Policy, Screw-base Replacement Lamp Policy, and Four-pin Base Replacement Lamps for CFLs for details.
3. Retrofit Kits applications must designate one of the Primary Use Designations listed.

Minimum Light Output and Minimum Efficacy Requirements: Luminaires and Retrofit Kits

Table 2: Efficacy Requirements for DLC Standard and DLC Premium Luminaires and Retrofit Kits¹

Category	General Application	Minimum Light Output (lm) ²	Minimum Efficacy (lm/W)	
			DLC Standard	DLC Premium
Outdoor Luminaires	Low Output	250-5,000	105	120
	Mid Output	5,000-10,000	105	120
	High Output	10,000-30,000	105	120
	Very High Output	≥30,000	105	120
Indoor Luminaires	Interior Directional	≥250	80	95
	Case Lighting	≥50 lm/ft	95	110
	Troffer	≥1,500	110	125
	Linear Ambient	≥375 lm/ft	115	130
	High-Bay	≥10,000	120	135
	Low-Bay ³	5,000-10,000	115	130
Outdoor Retrofit Kits ¹	Low Output	250-5,000	105	120
	Mid Output	5,000-10,000	105	120
	High Output	≥10,000	105	120
	Very High Output	≥30,000	105	120
Indoor Retrofit Kits ¹	Troffer	≥1,500	110	125
	Linear Ambient	≥375 lm/ft	115	130
	High-Bay	≥10,000	120	135
	Low-Bay ³	5,000-10,000	115	130

¹ Retrofit Kits applications must designate one of the Primary Use Designations listed.

² Minimum Light Output requirements vary by Primary Use Designation (PUD); please refer to **Table 5** for specific requirements.

³ Due to IT system constraints, low-bay luminaires and retrofit kits will continue appearing under the High-Bay General Application until V5.1 applications open on July 1, 2020. Until that time, the V5.0 efficacy levels will be implemented for the Primary Use Designation of "Low-Bay", within the High-Bay General Application.

Minimum Light Output and Minimum Efficacy Requirements: Lamps

Table 3: Efficacy Requirements for DLC Standard Linear Replacement Lamps and Four Pin-Base Replacement Lamps for CFLs [In-Luminaire and Bare-Lamp]

Category	General Application	Minimum Light Output (lm)		Minimum Efficacy (lm/W)	
		In-Luminaire	Bare-Lamp	In-Luminaire	Bare-Lamp
Linear Replacement Lamps	2' T8 Lamps	2 lamps: 1,350 3 lamps: 2,000 4 lamps: 2,700	800	110	120
	3' T8 Lamps	2 lamps: 2,200	1,200	110	120
	4' T8 Lamps	2 lamps: 3,000 3 lamps: 4,500 4 lamps: 6,000	1,600	110	120
	4' T5 Lamps	2 lamps: 3,000 3 lamps: 4,500 4 lamps: 6,000	1,600	110	120
	4' T5HO Lamps	3 lamps: 7,500 4 lamps: 10,000 6 lamps: 15,000	3,200	115	120
	8' T8 Lamps	2 lamps: 6,000	3,200	110	120
	U-Bend Lamps	2 lamps: 2,500 3 lamps: 3,750	1,400	110	120
Four Pin-Base Replacement Lamps for CFLs	Vertically Mounted Lamps	1 lamp: 575	675	75	85
	Horizontally Mounted Lamps	2 lamps: 800	675	75	85
	2G11 Base Lamps	2 lamps: 1,350 3 lamps: 2,000	1,900	110	120

Table 4: Efficacy Requirements for DLC Standard Mogul Screw-Base (E39/E40) Replacements for HID Lamps [In-Luminaire]

Category	General Application	Minimum Light Output (lm) ²	Minimum Efficacy (lm/W)
		In-Luminaire	In-Luminaire
Mogul Screw-Base (E39/E40) Replacements for HID Lamps	Outdoor: Low Output	250-5,000	105
	Outdoor: Mid Output	5,000-10,000	105
	Outdoor: High Output	10,000-30,000	105
	Outdoor: Very High Output	≥30,000	105
	High-Bay	≥10,000	120
	Low-Bay	5,000-10,000	115

Light Output and Distribution Requirements by Primary Use Designation

Table 5: Primary Use Technical Requirements: Light Output and Distribution

Primary Use Letter	Primary Use Designation	Minimum Light Output (lm)	Zone/Spacing Criteria	ZLD/SC Nominal Requirement	ZLD/SC Tolerance	ZLD/SC Requirement with Tolerance
A	Outdoor Pole/Arm-Mounted Area and Roadway Luminaires	1,000	0-90°	100%	-1%	≥99%
			80-90°	≤10%	+3%	≤13%
B	Outdoor Pole/Arm-Mounted Decorative Luminaires	1,000	0-90°	≥65%	-3%	≥62%
C	Outdoor Full-Cutoff Wall-Mounted Area Luminaires	300	0-90°	100%	-3%	≥97%
			80-90°	≤10%	+3%	≤13%
D	Outdoor Non-Cutoff and Semi-Cutoff Wall-Mounted Area Luminaires	300 (0-90° zone)***	80-90°***	≤10%***	+3%	≤13%
E	Bollards	500	90-110°	≤15%	+3%	≤18%
			>110°	0%	+3%	≤3%
F	Parking Garage Luminaires	2,000	60-80°	≥30%	-3%	≥27%
			70-80°	≤25%	+3%	≤28%
G	Fuel Pump Canopy Luminaires	2,000	0-40°	≥40%	-3%	≥37%
			40-70°	≥40%	-3%	≥37%
H	Landscape/Accent Flood and Spot Luminaires	250 - 1,000	0-90°	≥85%	-3%	≥82%
I	Architectural Flood and Spot Luminaires	1,000	0-90°	≥85%	-3%	≥82%
J	Stairwell and Passageway Luminaires	750	0-90°	≥85%†	-3%	≥82%
K	Wall-wash Luminaires	575	0-90°	≥60%‡	-3%	≥57%
L	Track or Mono-Point Directional Luminaires	250	0-90°	≥85%	-3%	≥82%
M	Vertical Refrigerated Case Luminaires-center	100 lm/ft	10-90°†	≥95%†	-3%	≥92%
N	Vertical Refrigerated Case Luminaires-end	50 lm/ft	10-90°‡	≥95%‡	-5%	≥90%
O	Horizontal Refrigerated Case Luminaires	100 lm/ft	0-90°	≥95%	-3%	≥92%
P	Display Case Luminaires	50 lm/ft	0-80°	≥95%	-5%	≥90%
Q	2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces	2,000	SC: 0-180°	1.0-2.0	±0.1	0.9-2.1
			SC: 90-270°	1.0-2.0	±0.1	0.9-2.1
			ZL: 0-60°	≥75%	-3%	≥72%
R	1x4 Luminaires for Ambient Lighting of Interior Commercial Spaces	1,500	SC: 0-180°	1.0-2.0	±0.1	0.9-2.1
			SC: 90-270°	1.0-2.0	±0.1	0.9-2.1
			ZL: 0-60°	≥75%	-3%	≥72%

Primary Use Letter	Primary Use Designation	Minimum Light Output (lm)	Zone/Spacing Criteria	ZLD/SC Nominal Requirement	ZLD/SC Tolerance	ZLD/SC Requirement with Tolerance
S	2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces	3,000	SC:0-180°	1.0-2.0	±0.1	0.9-2.1
			SC:90-270°	1.0-2.0	±0.1	0.9-2.1
			ZL:0-60°	≥75%	-3%	≥72%
T	Linear Ambient Luminaires w/ Indirect Component	500 lm/ft	90-150°	≥35%	-3%	≥32%
U	Direct Linear Ambient Luminaires	375 lm/ft	0-60°	≥40%	-3%	≥37%
V	High-Bay Luminaires (Commercial and Industrial)	10,000	20-50°	≥30%	-10%	≥20%
W	High-Bay Aisle Luminaires	10,000	20-50°	≥50%	-10%	≥40%
			0-20°	≥30%	-10%	≥20%
X	Low-Bay Luminaires (Commercial and Industrial)	5,000 - 10,000	20-50°	≥30%	-10%	≥20%
Y	Retrofit Kits for Outdoor Pole/Arm-Mounted Area and Roadway Luminaires	1,000	0-90°	100%	-1%	≥99%
			80-90°	≤10%	3%	≤13%
Z	Retrofit Kits for Outdoor Pole/Arm-Mounted Decorative Luminaires	1,000	0-90°	≥65%	-3%	≥62%
AA	Retrofit Kits for Large Outdoor Pole/Arm-Mounted Area and Roadway Luminaires	1,000	0-90°	100%	-1%	≥99%
			80-90°	≤10%	3%	≤13%
AB	Retrofit Kits for Full-Cutoff Outdoor Wall-Mounted Area Luminaires	300	0-90°	100%	-3%	≥97%
			80-90°	≤10%	3%	≤13%
AC	Retrofit Kits for Parking Garage Luminaires	2,000	60-80°	≥30%	-3%	≥27%
			70-80°	≤25%	+3%	≤28%
AD	Retrofit Kits for Fuel Pump Canopy Luminaires	2,000	0-40°	≥40%	-3%	≥37%
			40-70°	≥40%	-3%	≥37%
AE	Retrofit Kits for 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces (all Primary Use Designations)	2,000	SC:0-180°	1.0-2.0	±0.1	0.9-2.1
			SC:90-270°	1.0-2.0	±0.1	0.9-2.1
			ZL:0-60°	≥75%	-3%	≥72%
AF	Retrofit Kits for 1x4 Luminaires for Ambient Lighting of Interior Commercial Spaces (all Primary Use Designations)	1,500	SC:0-180°	1.0-2.0	±0.1	0.9-2.1
			SC:90-270°	1.0-2.0	±0.1	0.9-2.1
			ZL:0-60°	≥75%	-3%	≥72%
AG	Retrofit Kits for 2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces (all Primary Use Designations)	3,000	SC:0-180°	1.0-2.0	±0.1	0.9-2.1
			SC:90-270°	1.0-2.0	±0.1	0.9-2.1
			ZL:0-60°	≥75%	-3%	≥72%

Primary Use Letter	Primary Use Designation	Minimum Light Output (lm)		Zone/Spacing Criteria	ZLD/SC Nominal Requirement	ZLD/SC Tolerance	ZLD/SC Requirement with Tolerance
AH	Retrofit Kits for Direct Linear Ambient Luminaires	375 lm/ft		0-60°	≥40%	-3%	≥37%
AI	Retrofit Kits for High-Bay Luminaires (Commercial and Industrial)	10,000		20-50°	≥30%	-10%	≥20%
AJ	Retrofit Kits for Low-Bay Luminaires (Commercial and Industrial)	5,000 (<10,000)		20-50°	≥30%	-10%	≥20%
AK	Four-Foot Linear Replacement Lamps (T8, T5: all Primary Use Designations)††	In luminaire: 2 lamps: 3,000 3 lamps: 4,500 4 lamps: 6,000	Bare Lamp: 1,600	SC:0-180°	1.0-2.0	±0.1	0.9-2.1
				SC:90-270°	1.0-2.0	±0.1	0.9-2.1
				ZL:0-60°	≥75%	-3%	≥72%
AL	Four-Foot Linear Replacement Lamps (T5HO: all Primary Use Designations)	In luminaire: 3 lamps: 7,500 4 lamps: 10,000 6-lamps: 15,000	Bare Lamp: 3,200	ZL: 20-50°	≥30%	-10%	≥20%
AM	Two-Foot Linear Replacement Lamps (all Primary Use Designations)††	In luminaire: 2 lamps: 1,350 3 lamps: 2,000 4 lamps: 2,700	Bare lamp: 800	SC:0-180°	1.0-2.0	±0.1	0.9-2.1
				SC:90-270°	1.0-2.0	±0.1	0.9-2.1
				ZL:0-60°	≥75%	-3%	≥72%
AN	U-Bend Replacement Lamps (all Primary Use Designations)††	In luminaire: 2 lamps: 2,500 3 lamps: 3,750	Bare lamp: 1,400	SC:0-180°	1.0-2.0	±0.1	0.9-2.1
				SC:90-270°	1.0-2.0	±0.1	0.9-2.1
				ZL:0-60°	≥75%	-3%	≥72%
AO	Three-Foot Linear Replacement Lamps (all Primary Use Designations)††	In luminaire: 2 lamps: 2,200	Bare lamp: 1,200	0-60°	≥40%	-3%	≥37%
AP	Eight-Foot Linear Replacement Lamps (all Primary Use Designations)††	In luminaire: 2 lamps: 6,000	Bare lamp: 3,200	0-60°	≥40%	-3%	≥37%
AQ	Screw-Base Replacements for HID Lamps in Outdoor Pole/Arm-mounted Area and Roadway Luminaires	In luminaire: 1,000		0-90°	100%	-1%	≥99%
				80-90°	≤10%	3%	≤13%
AR	Screw-Base Replacements for HID Lamps in Outdoor Pole/Arm-mounted Decorative Luminaires	In luminaire: 1,000		0-90°	≥65%	-3%	≥62%
AS	Screw-Base Replacements for HID Lamps in Outdoor Full Cut-off Wall-mounted Area Luminaires	In luminaire: 300		0-90°	100%	-3%	≥97%
				80-90°	≤10%	3%	≤13%
AT	Screw-Base Replacements for HID Lamps in Parking Garage Luminaires	In luminaire: 2,000		60-80°	≥30%	-3%	≥27%
				70-80°	≤25%	+3%	≤28%

Primary Use Letter	Primary Use Designation	Minimum Light Output (lm)		Zone/Spacing Criteria	ZLD/SC Nominal Requirement	ZLD/SC Tolerance	ZLD/SC Requirement with Tolerance
AU	Screw-Base Replacements for HID Lamps in Fuel Pump Canopy Luminaires	In luminaire: 2,000		0-40°	≥40%	-3%	≥37%
				40-70°	≥40%	-3%	≥37%
AV	Screw-Base Replacements for HID Lamps in High-Bay Luminaires (Commercial and Industrial)	In luminaire: 10,000		20-50°	≥30%	-10%	≥20%
AW	Screw-Base Replacements for HID Lamps in Low-Bay Luminaires (Commercial and Industrial)	In luminaire: 5,000 (<10,000)		20-50°	≥30%	-10%	≥20%
AX	Vertically Mounted Four Pin-Base Replacement Lamps for CFLs	In luminaire: 575 (1-lamp configuration)	Bare lamp: 675	ZL:0-60°	≥75%	-3%	≥72%
AY	Horizontally Mounted Four Pin-Base Replacement Lamps for CFLs	In luminaire: 800 (2-lamp configuration)	Bare lamp: 675	ZL:0-60°	≥75%	-3%	≥72%
AZ	2G11 Base Replacement Lamps for CFLs	In luminaire: 2 lamps: 1,350 3 lamps: 2,000	Bare lamp: 1,900	SC:0-180°	1.0-2.0	±0.1	0.9-2.1
				SC:90-270°	1.0-2.0	±0.1	0.9-2.1
				ZL:0-60°	≥75%	-3%	≥72%

*** Lumen output and efficacy are evaluated considering the light output in the 0-90° zone only. See non-cutoff wall-mounted area luminaires details below.

† Bilateral, symmetric light distribution on two hemispheres

‡ One-sided, single hemisphere light distribution

‡ Bilateral for surface-mounted units, single hemisphere for corner-mounted units

†† For Type C linear replacement lamps, light output requirements out of the luminaire are dependent on the number of lamps in the kit. See Linear Replacement Lamps Policy for more details.

Controllability Requirements

Table 6: Controllability Requirements for DLC Standard and DLC Premium

Metric	DLC Standard Requirements	DLC Premium Requirements
Dimming	<i>Indoor luminaires and retrofit kits, excluding case lighting and Specialty primary uses intended for hazardous locations:</i> Continuous dimming capability required.	All products (indoor and outdoor) must be capable of continuous dimming.
	<i>All other DLC Standard products:</i> Required reporting of dimming capability.	
Integral Controls	Optional reporting of integral controls capability.	All products must report on the availability of integral controls.*

* Please see [Version 5.1 Technical Requirements policy document, Controllability section](#) for more details

DLC Premium

DLC Premium is a higher-performance classification for luminaires and retrofit kits. The Premium classification is intended to differentiate products that can achieve higher performance that exceeds DLC Standard requirements. If a manufacturer seeks qualification of its product(s) to the DLC Premium classification, it must provide all the necessary testing to demonstrate that the product(s) meet the Premium classification's requirements in addition to meeting all base Standard requirements. Only luminaires and retrofit kits are eligible for qualification under DLC Premium; replacement lamps and any products with a Primary Use designated as "Specialty" are not eligible to qualify for the DLC Premium classification.

Table 7: DLC Premium Requirements Summary

Metric	DLC Premium Requirements
Efficacy	+15 lumens per watt over V5.1 Standard efficacy requirements
Controllability	All products (indoor and outdoor) must be capable of continuous dimming . Step dimming is not acceptable for Premium qualification. All products must report on the availability of integral controls.
Driver ISTMT	TMP _{ps} ≤ driver operating temp specification (See Driver Spec Sheet & Driver ISTMT)
Lumen Maintenance	L ₉₀ > 36,000 hours, as evaluated using TM-21.

Driver ISTMT

As part of the DLC Premium application process, manufacturers must provide the following:

1. Test report from a lab that meets the DLC's Laboratory Requirements for ISTMTs. The report must include the measured temperature from the TMP_{ps}.
2. A picture of the TMP_{ps} location with an arrow indicating the thermocouple attachment point.
3. Documentation from the driver manufacturer that indicates the maximum case temperature for which the driver is designed to last ≥50,000 hours, as well as the TMP location it designates for thermal testing.
 - a. Custom and integrated drivers must provide documentation equivalent to that required for drivers from third-party vendors. Manufacturers must supply documentation indicating the maximum acceptable temperature for the driver for 50,000-hour life, as well as the TMP to be used during thermal testing and evaluation.

The luminaire passes the driver ISTMT requirements if the measured temperature at the TMP_{ps} is less than or equal to the allowable operating temperature specified by the power supply manufacturer. Drivers shall be tested *in-situ* under steady-state operating conditions, with case temperature measured at the designated TMP.

One or more additional thermocouples are attached to the power supply/driver at the TMP_{ps}. For off-the-shelf remote power supplies, manufacturers typically provide a measurement location (case temperature designated by a "dot" adjacent to a (t_c) symbol) for warranty purposes. In situations where the TMP_{ps} is not designated by the manufacturer, or where power supplies are integrated with the LED package(s), array, or module(s), luminaire manufacturers should identify

the TMP_{ps} to be used for warranty purposes. Note that this includes situations where the driver/power supply is not purchased from an outside vendor, and where the driver/power supply is integrated into the luminaire or lamp.

The thermocouple tolerance shall conform to ASTM E230 Table 1 “Special Limits” ($\leq 1.1^{\circ}C$ or 0.4%, whichever is greater).

Lumen Maintenance

The Lumen Maintenance requirements for DLC Standard and DLC Premium are shown in **Table 8**:

Table 8: Lumen Maintenance requirements for DLC Standard and DLC Premium

DLC Standard	DLC Premium
$L_{70} \geq 50,000$ hours	$L_{90} \geq 36,000$ hours

The DLC has two options for demonstrating lumen maintenance compliance.

- **Lumen Maintenance Option 1:** Using component-level performance through the TM-21 protocols, which leverage the LM-80 performance and in-situ temperature of the LED device.
- **Lumen Maintenance Option 2:** Using luminaire-level performance through TM-28 protocols, which leverage the LM-84 test performance. More information is available in the [Application Instructions](#).

LM-80 Applicability

The DLC refers to current [ENERGY STAR Requirements for Use of LM-80 Data](#) when determining applicability of LM-80 data for submitted products.

L₇₀ Evaluation

DLC relies on the results from the [ENERGY STAR TM-21 Calculator](#) for evaluating compliance with the lumen maintenance requirements. For products that have sufficient LM-80 data to project to 50,000 hours per the TM-21 limits of projection rules, the calculator must show a L₇₀ of 50,000 or more. In the current version of the ENERGY STAR calculator (dated 6-18-2018), this is shown in cell I42 when “70” is entered into cell I35.

For products where the DLC required lumen maintenance period is longer than the TM-21 projection method allows, DLC will evaluate the lumen maintenance percentage at the end point for the allowed projection period. The necessary lumen maintenance minimums, which result from solving an exponential decay function for 50,000 hours, are presented in **Table 9** for common end-points <50,000 hours. Refer to **Table 9** for TM-21 projection requirements based on LM-80 reports less than ~8,500 hours of testing for a sample size of ≥ 20 , or LM-80 reports based on less than ~9,500 hours of testing for a sample size of ≤ 19 . In the current version of the ENERGY STAR calculator, this means that cell I41 must show at least the value in the table below when cell I40 is set to the appropriate time interval, based on the allowable projection period for TM-21.

Table 9: Option 1 TM-21 Projected Lumen Maintenance Requirements

Projection End Point (hours)	Required Lumen Maintenance for 50,000-Hour Products
33,000	≥79.03%
36,000	≥77.35%
38,500	≥75.98%
42,000	≥74.11%
44,000	≥73.06%
48,000	≥71.01%
49,500	≥70.25%
50,000	≥70.00%

L₉₀ Evaluation for Premium Products

Products applying for DLC Premium must meet an additional lumen maintenance requirement of L₉₀ ≥36,000 hours. DLC relies on the results from the ENERGY STAR TM-21 Calculator for evaluating compliance with the lumen maintenance requirements. The results in the ENERGY STAR TM-21 calculator must show a lumen maintenance value of no less than 36,000 in cell I42, when cell I35 is set to 90, to meet the Premium lumen maintenance requirement. There are no provisions for shorter projection periods for this L₉₀ requirement; to qualify for Premium there must be sufficient LM-80 data to project to at least 36,000 hours per TM-21 rules.

LM-84 and TM-28

Option 2 is to conduct luminaire-level testing according to the LM-84-14 test standard and apply the TM-28-14 projection methodology. For Option 2, the DLC uses a pass/fail threshold for lumen maintenance compliance. The projection from TM-28 must project to at least 6,000 hours and the lumen maintenance projection at the projection end point must be consistent with an L₇₀ of 50,000 hours. If choosing Option 2 for lumen maintenance determination, please contact the DLC at info@designlights.org.

Tolerances

When applying the lumen maintenance in accordance with these protocols, the DLC applies a tolerance of 5% to drive currents tested under LM-80, and a 1.1°C to the temperature measured in ISTMT results.

Color Rendering and Color Appearance Requirements

The DLC has minimum CRI and maximum CCT requirements, which are the same for both DLC Standard and DLC Premium. Performance of a product family is verified at the minimum and maximum CCT within the family. LM-79 testing on the min and max CCT are required to validate performance and ensure the CCT is with the approved ANSI bin standard tolerances.

Table 10: Color Rendering and Color Appearance Requirements

Categories	Minimum CRI (R _a)	Maximum CCT (Degrees Kelvin)
Outdoor Luminaires and Retrofit Kits	65	5700
Indoor Luminaires and Retrofit Kits (not including high-bay)	80	5000
High-bay Luminaires, Retrofit Kits, and Mogul Screw-Base (E39/E40) Replacements for High-bay applications	70	5700
Linear Replacement Lamps and Four Pin-Base Replacement Lamps for CFLs	80	5000
Mogul Screw-Base (E39/E40) Replacements for HID Lamps (not including high-bay)	65	5700

TM-30

IES TM-30-18 is a document approved by the Illuminating Engineering Society (IES) that describes a method for evaluating light source color rendition. The method encompasses several individual measures and graphics that complement one another and provide a comprehensive characterization of how the light will affect the color appearance of objects. The three highest-level components of the system are the Fidelity Index (R_f), Gamut Index (R_g), and the Color Vector Graphic. Starting with the V4.0 Technical Requirements, the DLC will allow reporting of R_f and R_g for products on the QPL. At this time, these are optional metrics, and are not required for listing. To list these metrics for products on the QPL, using the official Excel version of the TM-30 calculation tool offered with the IES standard is required. Either basic or advanced versions of the Excel tool will be accepted. For more information on IES TM-30-18, please go to <http://energy.gov/eere/ssl/tm-30-frequently-asked-questions>.

Multiple CCTs

If your product family includes variations in performance other than CCT (including wattage, light output, light distribution, etc.), you must submit in accordance with the family grouping policy.

If applying for multiple CCT variations, note that the testing must be conducted on the worst-case variation (likely the lowest CCT); colorimetry data for the highest CCT variation (LM-79 section 12 measurements) from an accredited lab must also be included.

Colorimetry data is required to verify that all additional CCT variations included in a Single Product Application meet the CCT requirement. If the manufacturer cannot provide the reviewer this information, the reviewer can qualify only the model number for which test data has been provided until test data is available for the additional CCT variations.

Products that use more than one CCT of a given LED are eligible. As with the general multiple-LED-types policy, LM-80 and ISTMT testing must be provided that covers both LEDs. If the LEDs are covered by the same LM-80, only the hottest LED overall will need to be tested. Please note, that DLC normally expects that, if other parameters are equal, lower CCT will be hotter than higher CCTs.

LEDs with more than one CCT that are dynamically controlled for purposes of color-tuning must meet the requirements of the Color Tuning Policy.

Allowances

Table 11 presents allowances to minimum efficacy requirements that apply to products with specific features, in specific categories. Additional information will be incorporated in this section as allowances are defined. To participate in the discussion around the development of these allowances, please contact info@designlights.org.

Table 11: Allowances to Efficacy Requirements

Feature	Performance Metric	Allowance to Efficacy
CCT	$\leq 3000\text{K}, >2700\text{K}$	-3%
	$\leq 2700\text{K}$	-5%
CRI*	$R_a \geq 90$	-5%

*Must also conduct TM-30 testing and report results; see below for TM-30 guidance

Please note that allowances are not cumulative. That is, products may not take multiple allowances, even if they exhibit more than one feature for which an allowance is available. For example, a 2700K, 90CRI product may utilize a maximum allowance of 5%, to be applied to the efficacy requirement for the Category and General Application to which it is applying. However, a product may take advantage of an efficacy allowance in conjunction with the luminaire efficacy tolerance, as stated in **Table 12**.

Tolerances

Table 12 presents tolerances that apply to all metrics listed in the above in the Technical Requirements Tables. These tolerances are referenced in the [ENERGY STAR® Manufacturer's Guide](#). For zonal lumen tolerances specific to each Primary Use Designation, please refer to **Table 5**.

Table 12: Tolerances

Performance Metric	Tolerance
Light Output	±10%
Luminaire Efficacy	-3%
Allowable CCT	Defined by ANSI C78.377-2015†
CRI	-2 points
Power Factor	-3%
Total Harmonic Distortion	+5%

†ANSI C78.377-2015 also referred to for D_{uv} and (x, y) chromaticity coordinates tolerances for indoor categories.

Power Factor and Total Harmonic Distortion

In addition to the specific requirements above, all DLC-qualified luminaires must have a power factor of ≥ 0.9 , and a THDi of $\leq 20\%$. This applies to every category listed in the above Technical Requirements Tables. Qualified products must meet the requirements in their worst-case loading conditions.

Multiple LEDs

Products employing multiple types of LEDs are eligible under the following conditions: 1) the types and quantities of the LED packages/modules/arrays are known, and 2) the LEDs are not dynamically controlled, other than for dimming purposes. That is, products where variable numbers of LEDs are dynamically chosen and therefore the precise construction of any given product is not defined are not eligible. Policy development for appropriate evaluation of this type of product is under consideration.

For products using multiple LED types, an LM-80, ISTMT, and TM-21 projection will be needed for each type of LED present in the product. As per normal thermal testing rules, ISTMTs must be conducted on the hottest LED of each type. Each LED must demonstrate the required L_{70} of 50,000 hours.

Warranty

The DLC requires a minimum warranty period of 5 years on all products listed on the QPL. The warranty must cover the complete luminaire or retrofit kit/replacement lamp when applicable. Note that the “luminaire” includes light source, housing, heat sink, power supplies and other electrical components, optics, and any other components of the luminaire. Warranty documentation must clearly explain the terms and conditions associated with the warranty.

Warranties that only cover certain components of the luminaire or retrofit kit/replacement lamp are not sufficient to meet the requirement. Warranty statements are reviewed on a case-by-case basis and the DLC reserves the right to seek additional clarification if necessary.

Warranty terms and conditions can vary widely from manufacturer to manufacturer. The DLC explicitly defines a warranty period of 5 years and does not have specific requirements for warranty claim terms other than those listed above. The DLC does not verify or validate a manufacturer’s terms, conditions or process for customer warranty claims. The DLC does not monitor field failure rates of qualified products, or policy warranty redemption or history among manufacturers. Industry stakeholders are urged to review warranty terms and conditions as part of the purchasing decision process.

Safety Certification

Single Product / Family Grouping / Product Updates

1. All products are required to submit a compliance certificate from an approved safety certification organization relevant in the United States or Canada. This compliance document shall bear the manufacturer’s name and will be proof that the products listed have been investigated by the safety organization and found to be in compliance with the standards listed on the certificate. The name of this document varies by safety organization, however, is commonly referred to as a Certificate of Compliance or Authorization to Mark.
2. During the application process, manufacturers will be required to digitally sign an agreement confirming that the safety documentation they are providing with the application covers ALL models they wish to be listed on the QPL and that the products being sold will bear the proper markings from the safety organization.

Note: If, after qualification, the safety documentation gets updated so that any model number(s) listed on the QPL are no longer covered by the original safety certificate, it is the responsibility of the manufacturer to submit the revised documentation so that the DLC records can be updated accordingly. Failure to do so may result in the product and any associated family members or private labels of the product being delisted.

Private Label

1. All products are required to submit a compliance certificate from an approved safety certification organization relevant in the United States or Canada. This compliance document shall bear the Original Equipment Manufacturer’s (OEM) name and will be proof that the products listed have been investigated by the safety organization and found to be in compliance with the standards listed on the certificate. The name of this document varies by safety organization, however, is commonly referred to as a Certificate of Compliance or Authorization to Mark. If the submitted compliance certificate is different from the one on file from the OEM’s submission to the DLC, the OEM must update their records prior to the private label submission being formally processed.

2. In addition to a compliance certificate from the OEM, the private labeler must also submit a compliance certificate from an approved safety certification organization which bears the private labelers name and unique file number.
3. All products are required to submit a Multiple Listing correlation sheet issued by the approved safety organization which cross references the OEM model numbers with private label model numbers.
4. During the application process, manufacturers will be required to digitally sign an agreement confirming that the safety documentation provided covers ALL models they wish to be listed on the QPL and that the products being sold will bear the proper markings from the safety organization.

Note: If the safety documentation gets updated so that any model number(s) listed on the QPL are no longer covered by the original safety certificate, it is the responsibility of the manufacturer to submit the revised documentation so that the DLC records can be updated accordingly. Failure to do so may result in the product and any associated family members being delisted.

Verification of Model Numbers

The DLC will be performing a limited review of the safety documentation being submitted by the manufacturer. It is the responsibility of the applicant to verify that ALL of the model numbers that are being submitted for qualification be covered by the safety certification documents. If the model numbers being submitted are found to not have been covered by the safety certification documents that were originally submitted, the models will be removed from the QPL and further action may be taken, if necessary.

Additional Guidance for Products Seeking Qualification under the "Specialty" Primary Use Designation

This designation has been developed as an additional tool for the DLC and its Member programs to employ in seeking to identify high-quality, energy-saving LED luminaires in commercial and industrial applications for certain niche applications for which the DLC has not yet developed a specific Primary Use Designation.

To prevent the "Specialty" designation from being a loophole to get around requirements in other categories, the DLC will employ a number of principles in evaluating products submitted with this classification, including the following:

1. Products with a Specialty designation must meet the intention of the broader category and general application group under which they are designated. For example, products seeking qualification with a classification of Outdoor-Low Output-Specialty: _____ must be intended for use in outdoor applications.
2. Products with a Specialty designation must meet the minimum performance specifications of the broader category under which they are designated. This includes minimum light output, efficacy, CCT, CRI, L₇₀, THD, and PF requirements.
3. Products with a Specialty designation must specify the end-use for which they are intended. For example, products that are intended to be used for stadium lighting that seek qualification under the specialty designation must indicate on the application form that their intended use is "Specialty: Stadium Lighting". DLC staff will monitor terminology and may make minor modifications to descriptor terms to ensure consistency (for example "Specialty: Stadium Lighting vs. "Specialty: Stadium Luminaire"). Changes in descriptor terms will be made in consultation with the applicant.

4. As part of its evaluation for any new Specialty designation, DLC will make a determination on what dimming requirements will apply to that designation. Additional detail on the application and market for the end-use may be requested of the applicant to assist in making this determination.
5. The DLC retains the right to deny access to the Specialty designation for any product it does not believe meets the intention of the designation. Judgment on eligibility will be at the sole discretion of the DLC program staff.

Seeking qualification of a product using this Primary Use Designation is an acknowledgement of the rules of the program and a confirmation that the applicant agrees to abide by the decisions of the program.

Products with a Specialty designation are not eligible for DLC Premium classification.

Products seeking qualification on the QPL that would like to identify themselves as suitable for Hazardous Locations using the Specialty designations must provide documentation to demonstrate the appropriateness of their products for Hazardous Locations. Refer to the [Testing and Reporting Requirements for Hazardous Location Lighting](#) for additional details.

Additional Guidance for Reporting Requirements

In addition to designating a Primary Use and meeting Zonal Lumen Density requirements, manufacturers submitting to the DLC need to indicate whether their products are capable of dimming and/or field-adjustability. Refer to the [DLC Dimming and Field Adjustable Light Output policy](#) and [DLC Field Adjustable Distribution](#) policy for additional details.

For products that are color-tunable, manufacturers must indicate which of the following sub-categories applies: White-Tunable and/or Warm-Dimming. For white-tunable products, manufacturers must submit appropriate LM-79 reports according to the [Testing and Reporting Requirements for Color-Tunable Products](#) and report measured CCT (K), power consumption (W), lumen output (LM) and input control signal applied. The DLC may revise the color tunable testing requirements to align with any future industry standards published with full bodied supporting data. For Warm-Dimming products, manufacturers must submit a single LM-79 report performed at the maximum setting of the dimming input control.

Manufacturers submitting products to DLC Premium will also need to indicate whether the product can be ordered with integral controls (occupancy sensors or photo sensors). The DLC will evaluate a manufacturer's claims of integral controls capability by ensuring that these features are clearly identified on the product specification sheet. DLC reviewers may check web listings and other marketing materials and reserve the right to request additional information to demonstrate integral controls capability if product specification sheets are not sufficient.

Additional Guidance for Specific Types of Products

Non-Cutoff and Semi-Cutoff Wall-Mounted Area Luminaires

In this version of the Technical Requirements Tables, non-cutoff and semi-cutoff wall packs are eligible under this Primary Use Designation, distinct from full-cutoff wall packs. For non-cutoff and semi-cutoff wall packs, light output, efficacy, and zonal lumen distribution requirements are evaluated based on the lumens in the 0-90° zone only, rather than total lumens produced by the luminaire. The lumen output for these products must be ≥ 300 lm in the 0-90° zone; the “efficacy” calculations will include only lumens in the 0-90° zone, divided by the total wattage; and the zonal lumen requirement of $\leq 10\%$ light output in the 80-90° glare zone will be calculated by dividing the lumens in that zone by the lumen total in the 0-90° zone. Please note that while whether a product passes the requirements is based on the lumens in the 0-90° zone only, the general application (low, mid, high, or very-high output, and associated efficacy requirements) is determined based on the full light output from the product.

Flood and Spot Luminaires

For Architectural and Landscape/Accent Flood and Spot Luminaires products, manufacturers must declare the NEMA Beam Classification of their luminaire in the 0-180° and 90-270° planes. The DLC will verify these claims against the IES files provided.

Table 13: NEMA Beam Classification

NEMA Beam Classification	Beam Spread Range
1	10-18°
2	18-29°
3	29-46°
4	46-70°
5	70-100°
6	100-130°
7	$\geq 130^\circ$

Wall Wash Luminaires

The zonal lumen criteria for this Primary Use is that $\geq 60\%$ of the lumens must be produced in the “forward” hemisphere, toward the wall.

Stairwell and Passageway Lighting

The DLC requires that products in the Stairwell and Passageway Lighting Primary Use Designation meet one of the following conditions:

1. Luminaires that include integral controls for occupancy sensing and bi-level dimming.
2. Luminaires that operate off remote occupancy sensors, including wireless options, where a remote sensor(s) is sold packaged together with a luminaire(s) under a single model number or ordering code.

3. Luminaires that operate off remote occupancy sensors, including wireless options, where the luminaire and sensor are sold separately, but the luminaire has features enabling communication with a remote sensor(s).

Documentation must be provided to demonstrate compliance with one of the options above, including clear documentation of at least bi-level dimming functionality (required), and communications ability (if applicable). Features must be designated clearly in the model number. Manufacturers must also declare whether the unit is intended to be surface-mounted or corner-mounted. All performance requirements in the Technical Requirements Tables refer to the full power operating mode.

Linear Ambient Luminaires

For the purposes of family grouping, linear ambient luminaires that are available as continuous runs:

- End cap variations are not considered optical variations for family grouping and listing purposes. These product variations may be included within a given product model number or listing as bracketed options or wildcard characters.
 - Continuous runs are considered to be multiple linear ambient luminaires connected end-to-end without breaks; end caps are defined as the finish piece applied to the either end of a continuous run.
 - End caps must be less than 3” in width. End caps that do not meet these requirements will be considered performance-affecting and may not be included in bracketing for a given model number.

Retrofit Kits

The DLC will accept QPL applications for SSL retrofit kits for the Primary Use Designations listed in the Technical Requirements Tables. Retrofit kits falling outside of one of the Primary Use Designations listed will not be accepted. The testing and reporting requirements described in the link below are intended to subject the retrofit kits to real-world thermal conditions to assure confidence in lumen maintenance. For more information, please refer to the [Testing and Reporting Requirements for Retrofit Kits](#).

Linear Replacement Lamps

The DLC will accept QPL applications for linear tube-style products intended to replace fluorescent lamps in these categories. The testing and reporting requirements described in the link below are intended to evaluate the performance of the lamp itself and its performance in reference troffers, the most common application. For more information, please refer to the [Testing and Reporting Requirements for Linear Replacement Lamps](#). Note that this category covers all LED tubes, including those that are direct replacements for fluorescent tubes and those that require modifications to the existing luminaire (such as bypassing the existing ballast). Linear replacement lamps are eligible for the DLC Standard classification only.

Screw-Base Replacement Lamps

The DLC will accept QPL applications for screw-base replacement products intended to replace HID lamps in these categories. The testing and reporting requirements described in the link below are intended to evaluate the performance of the lamp installed in specific end-use applications. For more information,

please refer to the [Testing and Reporting Requirements for Screw-Base Replacements for HID Lamps](#). Note that this category covers only Type B and Type C replacement lamps and qualifies only products in specific end-uses. Replacement lamps are eligible for the DLC Standard classification only.

Four Pin-Base Replacement Lamps

The DLC will accept applications for four-pin (i.e. G24q/GX24q and 2G11 base) replacement lamps. At this time, G24q/GX24q and 2G11 UL Type A lamps, and 2G11 UL type B, C, or A-B lamps are included. G24q/GX24q base UL Type B lamps (designed to operate directly using line voltage) and UL Type C products (designed to operate utilizing a non-integral driver), as well as products with other bases (including two pin products), remain under consideration for future development.

The testing and reporting requirements described below are intended to subject the lamps to conditions found in typical luminaires in order to assure confidence in performance. For more information, please refer to the [Testing and Reporting Requirements for Four Pin-Base Replacement Lamps for CFLs](#). Note that this category covers only Type A replacement lamps (lamps that are direct replacements for CFLs and do not require bypassing the CFL ballast). Replacement lamps are eligible for the DLC Standard classification only.

Testing Constraints

DLC understands that in some scenarios, products that are required to be tested may not physically fit within the testing apparatus needed to conduct testing. This is often seen with 8-foot linear-type luminaires that do not fit in standard goniophotometers, though other restrictions may exist. In the event that a product is identified as requiring testing for a DLC application, but cannot be tested due to the constraints of the testing equipment, DLC will need to understand and collect the following information:

1. Specific reasons why the product in question cannot be tested.
2. A proposal from the manufacturer on how to evaluate the performance of the product. Proposals must be technically sound and demonstrate a thorough understanding of the product's construction and performance affecting variables.
3. Rationale for why the proposal is representative of the product's performance.

Proposals, once complete with the details mentioned above, will be reviewed on a case-by-case basis by DLC program management. Please provide this information ahead of submitting an application as proposals need to be approved prior to allowing the use of alternate data within an application. This will help ensure application reviews are completed as efficiently as possible. As always, DLC reserves the right to require additional information, and manufacturers should be prepared to provide documentation that addresses concerns that arise.

Development of standard procedures for evaluating performance of products that are too large for testing equipment is on the DLC policy development wish list. DLC welcomes proposals for standardizing this process and should be sent to info@designlights.org.