# Restructuring the DLC Technical Requirements Table: Guidance Document

The goal of this document is to help stakeholders understand the changes that are being proposed to the requirements in the Technical Requirements Table (now Draft Technical Requirements Table, V3.0). These changes are applicable to luminaires and retrofit kits only. The requirements and policies for linear replacement lamps remain the same as the current requirements (V2.1).

## Category Changes:

In this proposal, the current DLC categories for luminaires and retrofit kits have been combined into more general outdoor and indoor categories. These categories changes are intended to broaden the types of luminaires that are allowed to qualify for the DLC program. **However, the DLC reserves the right to reject any product it determines does not meet the intended definition for outdoor and indoor products.**

### Outdoor

The current nine outdoor luminaire categories have been grouped into three categories based on light output (low, mid, and high). This is depicted in Figure 1. Minimum efficacy requirements are tied to the to the respective light output levels. (Note, as discussed during the specification development process in summer 2013, higher light output products are assumed to replace higher wattage incumbent HID products. Because higher wattage HID lamps are more efficacious, the DLC requirements for higher lumen LED products must be higher to ensure members are still able to achieve meaningful savings.)

### Figure 1: Outdoor Luminaire Categories

Technical Requirements: Luminaires

| # | Category | General Application | Requirements | | | | | Informational/Reported Items | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Minimum Light Output (lm) | Minimum Efficacy (lm/W) | | Minimum Warranty (years) | | CCT / CRI / L70 | Primary Use | Distribution |
| | | | | Tier 1 | Tier 2* | Tier 1 | Tier 2 | | | |
| 1 | Outdoor | Outdoor - Low Output | 250-2000 | 65 | 90 | 5 | 10 | ≤5700 / ≥65 / ≥50,000 | • Outdoor Pole/Arm Mounted Area and Roadway<br>• Outdoor Pole/Arm Mounted Decorative<br>• Outdoor Wall-Mounted Area<br>• Bollards<br>• Parking Garage<br>• Fuel Pump Canopy<br>• Landscape/Accent Flood and Spot<br>• Architectural Flood and Spot<br>• Stairwell and Passageway<br>• Other | |
| 2 | | Outdoor - Mid Output | 2000-10,000 | 70 | 100 | | | | | |
| 3 | | Outdoor - High Output | ≥10,000 | 75 | 1[illegible] | | | | | |

The outdoor category encompasses products that are used specifically to illuminate outdoor applications in commercial and industrial settings.

The current six outdoor retrofit kit categories have been grouped into three categories based on light output (low, mid, and high) which mirror the luminaire categories. Similarly, minimum efficacy requirements are also tied to the to the respective light output levels. This is depicted in Figure 2.

## Figure 2: Outdoor Retrofit Kit Categories

Technical Requirements: Retrofit Kits****

| # | Category | General Application | Requirements | | | | | Informational/Reported Items | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Minimum Light Output (lm) | Minimum Efficacy (lm/W) | | Minimum Warranty (years) | | CCT / CRI / L70 | Primary Use | Distribution |
| | | | | Tier 1 | Tier 2 | Tier 1 | Tier 2 | | | |
| 9 | Outdoor Retrofit Kit | Outdoor - Low Output | 250-2000 | 65 | 90 | 5 | 10 | ≤5700 / ≥65 / ≥50,000 | • Retrofit Kits for Outdoor Pole/Arm-Mounted Area and Roadway Luminaires<br>• Retrofit Kits for Outdoor Pole/Arm-Mounted Decorative Luminaires<br>• Retrofit Kits for Large Outdoor Pole/Arm-Mounted Area and Roadway Luminaires<br>• Retrofit Kits for Outdoor Wall-Mounted Area Luminaires<br>• Retrofit Kits for Parking Garage Luminaires<br>• Retrofit Kits for Fuel Pump Canopy Luminaires<br>• Retrofit Kits for 2x2 Luminaires for | See Primary Use Zonal Lumen Density |
| 10 | | Outdoor - Mid Output | 2000-10,000 | 70 | 100 | | | | | |
| 11 | | Outdoor - High Output | ≥10,000 | 75 | 115 | | | | | |

## Indoor

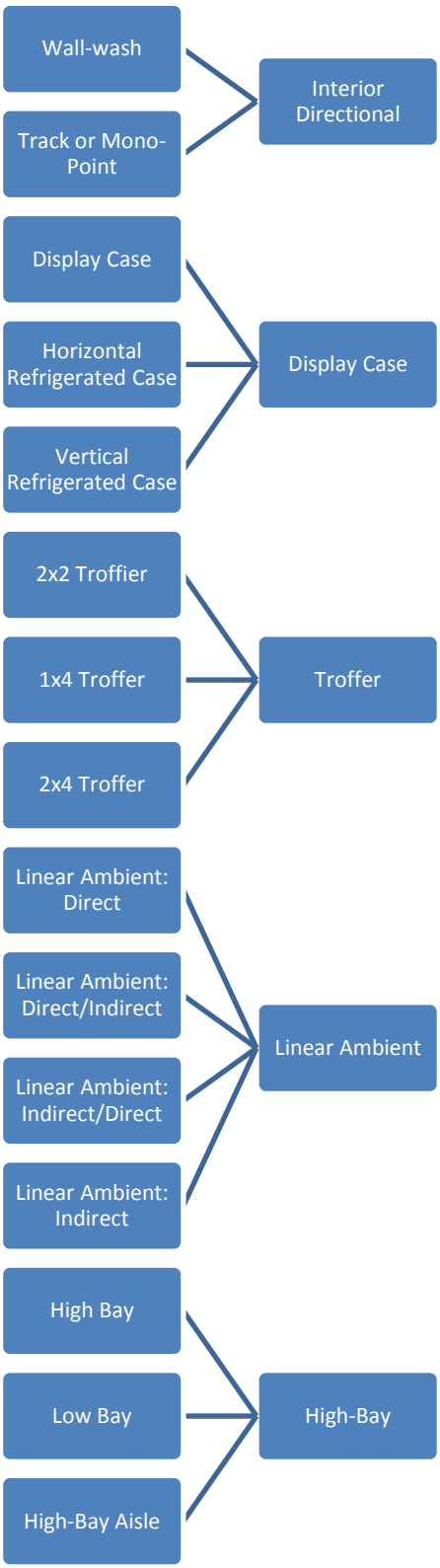
Indoor luminaire categories have been combined into five categories as outlined in 3 and 4. At this time, the Interior Directional category explicitly excludes downlights since this product area is currently covered by the ENERGY STAR® program.

The indoor category encompasses products that are used specifically to illuminate indoor commercial and industrial spaces.

## Figure 3: Indoor Categories

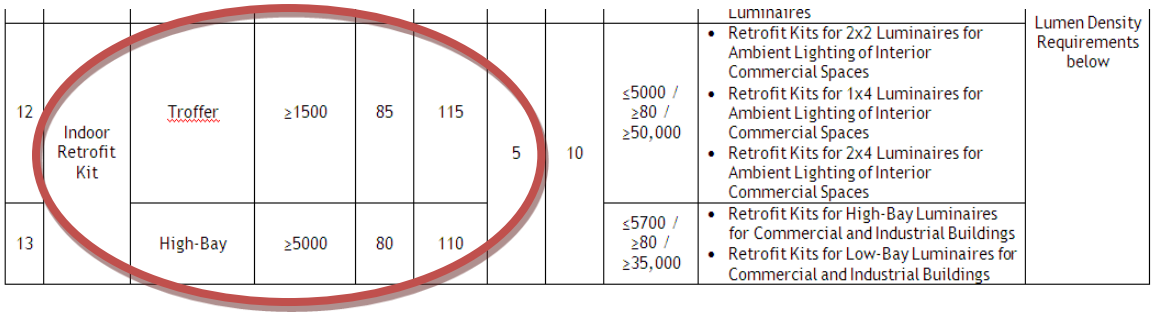
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | • Other | See Primary Use Zonal Lumen Density Requirements below |
| 4 | Indoor | Interior Directional | 575-4500 | 45 | 60 | 5 | 10 | ≤5000 / ≥80 / ≥50,000 | • Wall-wash<br>• Track or Mono-Point<br>• Other | |
| 5 | | Display Case | 50-375 lm/ft | 50 | 70 | | | | • Display case<br>• Horizontal Refrigerated Case Lighting<br>• Vertical Refrigerated Case Lighting<br>• Other | |
| 6 | | Troffer | ≥1500 | 85 | 115 | | | | • 2x2<br>• 1x4<br>• 2x4<br>• Other | |
| 7 | | Linear Ambient | ≥375 lm/ft | 85 | 115 | | | | • Direct<br>• Direct/Indirect<br>• Indirect/Direct<br>• Indirect<br>• Other | |
| 8 | | High-Bay | ≥5000 | 80 | 110 | | | ≤5700 / ≥70 / ≥35,000 | • High-Bay<br>• Low-Bay<br>• High-Bay Aisle<br>• Other | |

## Figure 4: Interior Luminaire Category Changes



The indoor retrofit categories have been combined into two categories (troffers and high-bays) as outlined in Figure 5.

**Figure 5: Indoor Retrofit Kit Categories**



| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | Luminaires | |
| 12 | Indoor Retrofit Kit | Troffer | ≥1500 | 85 | 115 | 5 | 10 | ≤5000 / ≥80 / ≥50,000 | • Retrofit Kits for 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces<br>• Retrofit Kits for 1x4 Luminaires for Ambient Lighting of Interior Commercial Spaces<br>• Retrofit Kits for 2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces | Lumen Density Requirements below |
| 13 | | High-Bay | ≥5000 | 80 | 110 | | | ≤5700 / ≥80 / ≥35,000 | • Retrofit Kits for High-Bay Luminaires for Commercial and Industrial Buildings<br>• Retrofit Kits for Low-Bay Luminaires for Commercial and Industrial Buildings | |

## Informational/Reported Items

As part of this proposal for change related to the category modifications, manufacturers will be able to designate their products in one or more of the "Primary Use" subcategories. For luminaires, these categories are the same categories as the current categories (V2.1) with the addition of an "Other" designation for any product not falling within the current primary use designations. Note that the "other" designation is intended for product types for which there is currently not a specific "primary use" subcategory, or which do not meet the specific light distribution requirements of a given subcategory. Note that manufacturers desiring to be qualified as a "tier 2" product *must* meet the definitions and requirements of at least one primary use subcategory. Products designated as "other" will not be eligible for Tier 2 designation.

For retrofit kits, manufacturers will be *required* to designate a primary use subcategory with their application. That is, this proposal does not broaden retrofit eligibility at this time, and there is no "Other" category for retrofit kits. Models must meet the current definitions (V2.1) for the respective category and the primary use zonal lumen density requirements (also the same as the V2.1 requirements) to receive the primary use designation.

For example, if a manufacturer wants a model to be identified as a parking garage luminaire then the product will need to meet both the definition of a parking garage luminaire and the zonal lumen density requirements for parking garage luminaires. If the manufacturer does not have a preference for designating a primary use the primary use will be listed as "Other" and there is no zonal lumen density requirement. As mentioned above DLC reserves the right to reject any product it determines does not meet the intended definition for general application or primary use.

## Tier 2

In addition to the proposed changes to categories, NEEP is also proposing to add higher performance tiers for luminaires and retrofit kits to the DLC specification. This higher performance tiers (Tier 2) have more stringent efficacy and warranty requirements than the baseline tiers (Tier 1). Figures 6 and 7 show the two performance tiers for both luminaires and retrofit kits.

## Figure 6: Tier 2 Proposed Requirements for Luminaires

Technical Requirements: Luminaires

| # | Category | General Application | Requirements | | | | | Informational/Reported Items | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Minimum Light Output (lm) | Minimum Efficacy (lm/W) | | Minimum Warranty (years) | | CCT / CRI / L70 | Primary Use | Distribution |
| | | | | Tier 1 | Tier 2* | Tier 1 | Tier 2 | | | |
| 1 | Outdoor | Outdoor - Low Output | 250-2000 | 65 | 90 | 5 | 10 | ≤5700 / ≥65 / ≥50,000 | • Outdoor Pole/Arm Mounted Area and Roadway Luminaires<br>• Outdoor Pole/Arm Mounted Decorative Luminaires<br>• Outdoor Wall-Mounted Area Luminaires<br>• Bollards<br>• Parking Garage Luminaires<br>• Fuel Pump Canopy Luminaires<br>• Landscape/Accent Flood and Spot Luminaires<br>• Architectural Flood and Spot Luminaires<br>• Stairwell and Passageway Luminaires<br>• Other | See Primary Use Zonal Lumen Density Requirements below |
| 2 | | Outdoor - Mid Output | 2000-10,000 | 70 | 100 | | | | | |
| 3 | | Outdoor - High Output | ≥10,000 | 75 | 115 | | | | | |
| 4 | Indoor | Interior Directional | 575-4500 | 45 | 60 | 5 | 10 | ≤5000 / ≥80 / ≥50,000 | • Wall-wash Luminaires<br>• Track or Mono-Point Luminaires<br>• Other | |
| 5 | | Display Case | 0-375 lm/ft | 50 | 70 | | | | • Display case Luminaires<br>• Horizontal Refrigerated Case Luminaires<br>• Vertical Refrigerated Case Luminaires<br>• Other | |
| 6 | | Troffer | ≥4500 | 85 | 115 | | | | • 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces<br>• 1x4 Luminaires for Ambient Lighting of Interior Commercial Spaces<br>• 2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces<br>• Other | |
| 7 | | Linear Ambient | ≥375 lm/ft | 85 | 115 | | | | • Linear Ambient Luminaires: Direct<br>• Linear Ambient Luminaires: Direct/Indirect<br>• Linear Ambient Luminaires: Indirect/Direct<br>• Linear Ambient Luminaires: Indirect<br>• Other | |
| 8 | | High-Bay | ≥5000 | 80 | 110 | | | ≤5700 / ≥70 / ≥35,000 | • High-Bay Luminaires for Commercial and Industrial Buildings<br>• Low-Bay Luminaires for Commercial and Industrial Buildings<br>• High-Bay Aisle Luminaires<br>• Other | |

## Figure 7: Tier 2 Proposed Requirements for Retrofit Kits

Technical Requirements: Retrofit Kits****

| # | Category | General Application | Requirements | | | | | Informational/Reported Items | |
|---|---|---|---|---|---|---|---|---|---|
| | | | Minimum Light Output (lm) | Minimum Efficacy (lm/W) | | Minimum Warranty (years) | | CCT / CRI / L70 | Primary Use | Distribution |
| | | | | Tier 1 | Tier 2 | Tier 1 | Tier 2 | | | |
| 9 | Outdoor Retrofit Kit | Outdoor - Low Output | 250-[illegible]000 | 65 | 90 | 5 | 10 | ≤5700 / ≥65 / ≥50,000 | • Retrofit Kits for Outdoor Pole/Arm-Mounted Area and Roadway Luminaires<br>• Retrofit Kits for Outdoor Pole/Arm-Mounted Decorative Luminaires<br>• Retrofit Kits for Large Outdoor Pole/Arm-Mounted Area and Roadway Luminaires<br>• Retrofit Kits for Outdoor Wall-Mounted Area Luminaires<br>• Retrofit Kits for Parking Garage Luminaires<br>• Retrofit Kits for Fuel Pump Canopy Luminaires | See Primary Use Zonal Lumen Density Requirements below |
| 10 | | Outdoor - Mid Output | 2[illegible]00-1[illegible],000 | 70 | 100 | | | | | |
| 11 | | Outdoor - High Output | ≥[illegible]0,000 | 75 | 115 | | | | | |
| 12 | Indoor Retrofit Kit | Troffer | ≥[illegible]500 | 85 | 115 | 5 | 10 | ≤5000 / ≥80 / ≥50,000 | • Retrofit Kits for 2x2 Luminaires for Ambient Lighting of Interior Commercial Spaces<br>• Retrofit Kits for 1x4 Luminaires for Ambient Lighting of Interior Commercial Spaces<br>• Retrofit Kits for 2x4 Luminaires for Ambient Lighting of Interior Commercial Spaces | |
| 13 | | High-Bay | ≥5000 | 80 | 110 | | | ≤5700 / ≥80 / ≥35,000 | • Retrofit Kits for High-Bay Luminaires for Commercial and Industrial Buildings<br>• Retrofit Kits for Low-Bay Luminaires for Commercial and Industrial Buildings | |

In addition to the higher efficacy and warranty levels, Tier 2 qualified products are required to have an ISTMT conducted on the driver. The ISTMT will help provide additional assurance that products are likely to last their projected lifetime.

Tier 2 performance requirements are optional. Manufacturers can choose if they want to qualify their products to the higher tier, but must provide all the necessary testing and meet the requirements to qualify products to Tier 2. If a manufacturer submits a family and some products meet only the Tier 1 criteria, but the manufacturer would like to qualify the remaining part of the family to Tier 2 then the manufacturer will need to provide worst-case photometric and electrical testing for the family members to demonstrate that they meet the Tier 2 requirements.

Luminaire products with a primary use designated as "Other" are not eligible to qualify for Tier 2. Manufacturers must select a specific primary use category in order to apply under Tier 2.

### Driver ISTMT Proposed Requirements

Manufacturers will be required to provide the following:

1. Test report from a lab which meets DLC's Laboratory Requirements for ISTMTs. The report will need to include the measured temperature from the $TMP_{ps}$.
2. Diagram/picture of the $TMP_{ps}$ location (if not permanently marked on the circuit board or power supply case) with an arrow indicating the thermocouple attachment point.
3. Warranty from the driver manufacturer which indicates the maximum driver case temperature for which a minimum 10 year warranty is offered.

The luminaire passes the driver (power supply) requirements if the measured temperature at the $TMP_{ps}$ is less than or equal to the warranted temperature specified by the power supply manufacturer. Power

supplies integrated with the LED package(s), array(s) or module(s), or enclosed within the fixture shall be tested in situ under steady-state operating conditions, with power supply case temperature measured at the designated $TMP_{ps}$.

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), fixture manufacturers should identify the $TMP_{ps}$ to be used for warranty purposes. The thermocouple tolerance shall conform to ASTM E230 Table 1 "Special Limits" (≤1.1°C or 0.4%, whichever is greater).