

# Material and Performance Specifications

## Luminaires Utility and Underdeck LED

Revised 9/16/2021

### 1 General Information

This specification describes the material and performance requirements for the Wisconsin Department of Transportation's (WisDOT) approved LED utility, underdeck, high mast and walkway luminaire bid items. These requirements apply to the LED luminaires as a complete unit, generally described as including the following components: housing, driver, LED optics, surge protection device, hardware, and internal wiring.

#### 1.1 Definitions

Lighting terminology shall be as defined in IES RP-18, unless referenced otherwise herein.

#### 1.2 Approvals

Specifications as written in this document reflect standards that are based on current market availability. Materials that do not fully conform to this specification, but that may offer advancements in system performance, may be considered on a trial basis and are encouraged to submit for evaluation by WisDOT.

#### 1.3 References

Technical references applicable to this specification shall be in accordance with the *ANSI/IES RP-8-18 Recommended Practice for Design and Maintenance of Roadway and Parking Facility Lighting*, as well as the "Normative References" section as listed in the most current version of the *Municipal Solid-State Street Lighting Consortium – Model Specification for LED Roadway Luminaires* document, sponsored by the U.S. Department of Energy.

Internet Link: <https://energy.gov/eere/ssl/downloads/model-specification-led-roadway-luminaires-v20>

### 2 Material Specifications

This section includes requirements that apply to all WisDOT approved utility, underdeck high mast, and walkway luminaires. These requirements shall apply consistently for all approved luminaires and will not vary between bid item categories.

#### 2.1 Housing

Luminaire housing shall consist of die-cast A380 aluminum alloy in continuous sections without seams or welds, or of a material with similar durability. The luminaire housing size and shape shall be compact, promote efficient shedding of water, and be resistant to the accumulation of insects, dirt and debris. The luminaire housing shall promote efficient heat dissipation and internal thermal management.

A range of walkway luminaire housing types may be submitted, provided they meet the criteria specified in this document. Walkway luminaire housing types may include traditional lantern style as well as other modern post-top alternatives.

#### 2.2 Finish

Luminaire housing shall have a durable factory finish that is corrosion and UV-resistant. Approved finishes include unpainted anodized aluminum, or powder-coated gray in accordance with AAMA 2605 and ASTM B117 standards. Exterior surfaces shall be smooth, uniform, free of burrs, scratches, or other defects.

#### 2.3 Access

Luminaires shall be designed for tool-free electrical component access. Housing doors and hinges shall be designed to maintain positive control of the door to the luminaire body, so as not to allow disengagement.

#### 2.4 Mounting/Hardware/Grommets/Internal Wiring

Utility and high mast luminaire and mounting shall be compatible with all WisDOT approved luminaire arms as described in WisDOT's Standard Specification section 657.2, with preference to double clamp brackets.

Underdeck luminaires shall be designed to mount directly on a wall for surface wiring, or over a recessed outlet box for embedded wiring.

Walkway luminaire mounting shall fit a 2 3/8" – 3" O.D. pole and be secured by a minimum of (3) set screws.

All hardware, nuts, bolts, and washers shall be made from non-corrosive material. Grommets shall be installed for all cable entry holes. All internal wiring shall be neatly secured with tie-wraps as needed to prevent pinch points, and to allow for trouble-shooting and maintenance.

Internal components shall be assembled and pre-wired using modular electrical connections. Terminal blocks shall be used for incoming wiring and allow for easy maintenance access.

All fixtures shall meet ANSI C136.31 3G Vibration test standards.

## **2.5 Ingress Protection Requirements**

Luminaires shall have dust and moisture ingress protection ratings as follows: UL listed, or similar from a Nationally Recognized Testing Laboratory (US Department of Labor) for luminaire electrical components (driver and surge protection) / IP-66 for LED optical components.

## **2.6 Labeling Requirements**

Luminaires shall have external and internal labels per ANSI C136.15 and ANSI C136.22, respectively. Internal labels shall identify the manufacturer, date of manufacture, and the manufacturer's part number. External labels shall be NEMA sized and identify the luminaire type using one character (i.e. "A/B/C/D") and be fixed to the bottom of the luminaire so as to be easily visible from the ground when applicable. No labeling requirements are established for high mast and walkway luminaires.

## **2.7 LED Driver**

Luminaire driver shall be equipped with voltage sensing to accommodate 120-277 & 347-480 volt input power (+/- 10% voltage fluctuations), with a 90% power factor, and 20% THD maximum at full loading. Drivers shall be rated for operating within a temperature range from -40 to +40 degrees Celsius. Drivers shall allow for 0V-10V dimming operations. Driver shall have thermal overload protection, and be rated for an operating life of 100K hours (minimum) when operated at an ambient temperature of 25 degrees C (77 degrees F).

## **2.8 Surge Protection**

Utility, walkway, and underdeck Luminaires shall include a minimum 10kV/5kA integral surge protection meeting ANSI C136.2 standards. High mast luminaires shall include a 20kV/10kA integral surge protection meeting ANSI C136.2 standards. All surge protection devices shall fail to the off position.

## **2.9 Control Receptacle**

Luminaires shall include a minimum 7-pin ANSI C136.41 compliant receptacle for use with future communications and controls. Shorting caps shall be provided to cover the receptacle for all luminaires.

## **2.10 Optics**

Chip-On-Board (COB) LED technology is not approved for utility, underdeck, and walkway luminaires. High mast luminaires are approved to utilize this technology. Luminaires which utilize glass substrate embedded LED's are not approved for use at this time. Lens material shall be durable and resistant to discoloration.

## **2.11 Output and Performance**

LED output shall provide 4,000K CCT, and 70 CRI (minimum). Luminaires shall have a maximum lamp lumen depreciation (LLD) factor of 0.85 (or better) at 100K hours of operation, at 25 degrees C per TM21 standards.

## **2.12 Miscellaneous Requirements**

Luminaires shall meet the following additional requirements:

- Maximum weight:
  - Utility Luminaires – 20 lbs
  - Underdeck Luminaires – 20 lbs
  - High Mast Luminaires – 65 lbs
  - Walkway Luminaires – 40 lbs
- Maximum Effective Projected Area (EPA) – 1.5 square feet

- Have an internal bubble level (Utility Luminaires Only)
- Be rated for minimum 3G vibration per ANSI C136.31
- Be rated for wet locations, UL listed and labeled
- Be RoHS compliant, and be mercury and lead free
- Luminaires shall be tested and reported per LM-63, LM-79, and TM-15 (IESNA) to certify uniformity and performance characteristics.
- Luminaire lifespan testing shall be performed by an accredited lab and reported in accordance with IESNA LM-80 and TM-21.
- Preferred that all luminaires include a service tag indicating luminaire model number and production date.

### 3 Performance Specifications

This section identifies the unique performance requirements that apply to each WisDOT approved utility and underdeck luminaire under each bid item type.

LED Luminaire Performance Criteria by Type					
LED Type	Maximum Allowable Wattage (W)	Required Lumen Output (Lm)	Allowable IES Distribution(s)	Luminous Efficacy (Lm/W)	B.U.G. Rating
Luminaires Utility Items					
LED A	80	8K – 12K	Type III	> 105	B2-U0-G1
LED B	120	12K – 16K	Type III	> 105	B2-U0-G1
LED C	160	16K – 22K	Type III	> 105	B3-U0-G3
LED D	220	22K – 26K	Type III	> 105	B3-U0-G3
Luminaires Underdeck Items					
LED A	40	2.5K – 4.5K	Type III	> 60	B0-U3-G2
LED B	75	4.5K – 6.5K	Type III	> 60	B1-U3-G3
LED C	105	6.5K – 8.5K	Type III	> 60	B1-U3-G3
Luminaires High Mast Items					
LED	500	60K – 75K	Type III	> 130	B4-U0-G5
Luminaires Walkway Items					
LED	70	4K-6.5K	Type III	>80	B2-U2-G2

### 4 Warranty and Manufacturer Requirements

Provide a minimum 10-year warranty applying to the maintained integrity and functionality of the luminaire housing, wiring and connections, LED light source(s), driver(s), and surge protection device. Warranty period shall begin at the date of shipment, or as dictated by specific contract requirements.

Terms of the warranty coverage shall account for reimbursement or direct payment by the vendor for shipping costs incurred to return defective equipment and for sending warranty replacements. Vendor shall account for all costs to remove and replace defective equipment in the event of a systematic product failure that involves five (5) or more units that exhibit similar malfunction. Vendors shall address all warranty claims within 30 days otherwise will risk being removed from WisDOT’s Qualified Products List.

The luminaire manufacturer shall have no less than five (5) years of experience in manufacturing LED lighting products and should be able to provide products meeting at least 3 LED types. The manufacturer or local representative, shall provide installation and troubleshooting support via in-person meetings, telephone, and email correspondence.

### 5 Product Qualification Information

This section describes the required documentation for submitting LED luminaires to be considered for WisDOT pre-qualification.

### 5.1 General Requirements

Luminaires shall meet the criteria provided in the body of this specification, and the unique criteria for each luminaire type as identified in Section 3.

The following disclaimers shall apply to all qualified luminaires:

- QPL listing does not relieve the burden of review for design conformance
- Products can be removed from the QPL at any time if deemed inadequate

### 5.2 Required Submittal Contents

Luminaires submitted for consideration shall include the following documentation:

- Manufacturer shall provide a sample identical to the product configuration submitted for consideration under each type
- Luminaire cut sheets with complete catalog number, including drawings for LED optics, driver, and surge protection
- LM-79 testing data shall include (at a minimum) reporting for all applicable criteria discussed in this specification and be certified by a NVLAP accredited laboratory
- IES photometric file per IES LM-63 format
- Instructions for installation and maintenance
- Image of product
- Summary of luminaire recycled content and recyclability per the FTC Green Guides (expressed by percentage of luminaire weight)
- A completed Appendix A form