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**125 W LED Luminaire**

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**Management Approval (If apply)**

<b>Approver</b> Name Position	Signature and Date N/A
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Department: Street Light Program

## Item Version History

Warehouse Catalog #	Asset Suite #	Version	Date
028-78110	78110	08	10/22/2024



## 1. Introduction

This is a general specification that covers the minimum requirements for 125W LED luminaires to be used as roadway lighting on a 120-240V, 60Hz distribution system in Puerto Rico. Further information will be provided by LUMA Energy at the time of order placement and will provide information on site specific conditions, quantity, and other requirements. This document includes the general electrical and mechanical characteristics of the material.

## 2. Special Requirements

Samples shall be furnished as requested by LUMA Energy. Vendors that have supplied this equipment/material to LUMA on previous orders will not have to furnish samples at bid opening. The equipment/material will be received at the LUMA's general warehouse (O11) at Palo Seco, Puerto Rico. Shipping will include transportation and unloading at the indicated warehouse.

## 3. Literature

- 3.1. Descriptive and technical literature must be supplied by the vendor at time of bidding. This literature must include, but is not limited to details of material, drawings, documented testing, and instructions for use and installation. **The literature must be an official document from and certified by the manufacturer.** Failure to submit documents on time and duly certified by the manufacturer will cause bidder disqualification.
- 3.2. If required by LUMA, final drawings and documentation shall be submitted by the vendor before the manufacturing and shipping process for approval.

## 4. Markings

- 4.1. Containers shall be marked outside with LUMA Energy's purchase order and item number.
- 4.2. The luminaire must be marked with the manufacturing date inside the power module with LUMA'S code number impressed inside the luminaire.
- 4.3. The letters "AEE" and wattage "125W (minimum of 2.5 inches) must be stamped on the housing so that it can be read from the street or sidewalk.
- 4.4. Luminaire box shall be identified with letters "125W" (minimum of 2.5 inches).
- 4.5. Package(s) to be delivered to the warehouse shall be clearly marked with manufacturer and item information (part number, serial number, quantity, etc.).
- 4.6. Packaging labels and tags shall be waterproof.

## 5. Packaging

- 5.1. All equipment/material shall be packaged and marked in such a way as to facilitate handling and protection from damage and that the receiving warehouse can readily identify it and send it, in one complete unit, to a field location without opening crates or boxes to sort items and/or parts.

## 6. Number per package (Logistics)

One (1) unit per box.

## 7. Acceptance criteria

- 7.1. Tests required shall be certified by qualified external laboratories.
- 7.2. Product shall be manufactured in accordance with the latest issue below (section 7.3). When conflicts occur between purchaser's specifications and the latest issue below, the purchaser's specification shall prevail.
- 7.3. Latest applicable codes, standards, and other regulations: ACI, ASCE, ASTM, IBC.

International Codes and References Standards:

ISO-9001 Quality Management Systems – Requirements.

IES LM-79 Approved Methods for Optical and Electrical Measurements of Solid-State Lighting Products.

IES LM-80 Approved Methods for Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays, and Modules.

IES TM-21 Technical Memorandum for Projecting Long-Term Lumen, Photon, and Radiant Flux Maintenance of Led Light Sources.

ANSI C136.2 Roadway and Area Lighting Equipment – Dielectric Withstand and Electrical Transient.

ANSI C136.41 Roadway and Area Lighting Equipment – Dimming Control Between an External Locking Type Photocontrol and Ballast or Driver.

4401.001 V02 LUMA Street Lighting System Design and Construction Manual.

- 7.4. If any other standards different from the ones indicated in this document are used, the supplier must provide information showing compatibility with the required ones.

## 8. Quality certifications and tests

- 8.1. The following certifications and tests shall be provided, including test reports, certificates, and supporting documentation:

IES LM-80 Test report, containing the model number of LED light source tested, report number, date, and Correlated Color Temperature (CCT). The

minimum test duration shall be 6,000h for a minimum sample size of 20 units.

IES TM-21 “Energy Star” test report (preferably in MS Excel format) based on the LM-80 testing details, containing the model number of LED light source tested, driver current, in-situ temperature data, and the expected L70 useful life.

IES LM-79 Test report, containing the name of the independent test laboratory, report number, date, product model/catalog number, photometry, and colorimetry measurements, IES classification (light distribution type), and driver current. The test shall be performed by a National Voluntary Laboratory Accreditation Program (NVLAP) accredited test facility.

8.2. A sample computer modeling calculation of fixture light distribution shall be provided according to LUMA’s Street Lighting System Design Criteria - Appendix C from the Street Lighting System Design and Construction Manual. The calculation shall use the following sample parameters for each arm length. (4, 8, 12, or 15 ft.)

- a. Street width: 36 ft.
- b. Mounting height: 40 ft.
- c. Pole separation of 150 ft. (single-sided).
- d. The Average Illuminance (Eavg) shall be equal to or more than ( $\geq$ ) 0.6 foot-candles.
- e. The maximum Uniformity Ratio shall be equal to or less than ( $\leq$ ) 3/1.
- f. Total Light Loss Factor = 0.88.

8.3. Manufacturing facility requirements and certifications:

- a. The light engine manufacturing facility shall have the Restriction of Hazardous Substances (RoHS) certification by IPC (Association Connecting Electronics Industries).
- b. Electrostatic Discharge (ESD) flooring throughout the production area of the light engine manufacturing facility and power supply manufacturing facility is required (provide photographs of the production floor in both facilities and equivalent documentation).
- c. The company must provide corresponding information if it has other ESD protection measures.
- d. Nitrogen must be plumbed into soldering processes to improve quality yield (provide photographs of nitrogen tank in power supply and light engine manufacturing facilities or equivalent documentation).
- e. Certification of a minimum of five (5) years of experience in manufacturing LED-based lighting products.

- f. The luminaire must be qualified and listed at the Design Lights Consortium (DLC), and the product ID and Classification Type shall be informed. DLC LUNA qualified luminaires are eligible. The International Dark Sky Association (IDA) seal of approval is preferred.
- g. The Luminaire driver and surge arrester shall be UL-listed.

## 9. Description: Technical Characteristics

### 9.1. Lighting Performance and Design: The light Emitting Diode – LED 125W luminaire (200W HPS replacement) shall meet the following specifications:

- a. Power Consumption: 125 W (maximum).
- b. Initial lumens: 9,000 lm (minimum).
- c. Luminaire efficacy: greater than or equal to ( $\geq$ ) 90 lm/W.
- d. Manufacturer – Rated Nominal CCT (K): 3,000 K.
- e. Measured CCT allowance: 2,750 to 3,220 K (from LM-79 Report).
- f. Color rendering index (CRI): greater than or equal to ( $\geq$ ) 70 (Ra).
- g. Light distribution: Type III. For specific applications, light distribution types exception requests shall be reviewed by the LUMA Streetlight Standards Unit prior to final approval.
- h. BUG ratings: B3 (Maximum) – U1 (Maximum) – G3(Maximum), measured with or without protection louvers or shields.

### 9.2. Electrical System

- a. Input Voltage: 120-240 V.
- b. Frequency: 60 Hz.
- c. Power factor (PF): greater than or equal to ( $\geq$ ) 0.90.
- d. Total harmonic distortion (THD): less than 20% at full load.
- e. LED driver operating current (tested): 250mA to 1,300mA, with an allowance of  $\pm$  50mA. (tested)
- f. Dimming options: The LED driver shall have 0-10V dimming capability. Exceptionally, DALI 2 D4i dimming LED drivers are acceptable for special projects upon LUMA request or approval.
- g. Operating temperature range:  $-20^{\circ}\text{C}$  ( $-4^{\circ}\text{F}$ ) to  $40^{\circ}\text{C}$  ( $104^{\circ}\text{F}$ ).
- h. Operating junction temperature: shall not exceed 75% of the maximum rated junction temperature for the LED during operation at ambient temperature ( $T_A$ ) of  $30^{\circ}\text{C}$  ( $86^{\circ}\text{F}$ ), with an allowed  $T_A$  variation ( $\Delta T_A$ ) of  $5^{\circ}\text{C}$  (provide supporting documentation).

### 9.3. LED driver safety and reliability

- a. The LED driver shall be IP-64, RoHS compliant, UL or cURus compliant, and comply with CFR (FCC) Title 47, part 15 - class A for Radiofrequency interference.
- b. Safety: Driver Output type shall be Class 2 in accordance with UL1310 and NEC NFPA 70. Exception: for luminaires that require more than 96W and 30V output (42.4 volts peak), Class 1 drivers are acceptable.
- c. Surge protection (preferable): minimum built-in 6kV/3kA surge capability (in protection class I or II).
- d. Optional: Mean Time Between Failure (MTBF): The power supply shall be tested by an independent laboratory for the MTBF, and results shall exceed 200,000 hours at an ambient temperature  $T_A$  of 25°C (77°F) following the MIL-HDBK-217F method, or 1,000,000 hours an ambient temperature  $T_A$  of 30°C (86°F), per the Telcordia SR-332 method. The MTBF calculation results must be indicated in the LED driver specification sheet, or support documentation shall be provided. Alternatively, Mean Time to Failure (MTTF) results shall exceed 300,000h at case temperature  $T_C$  of 90°C (194°F), with an allowed  $T_C$  variation ( $\Delta T_C$ ) of 5°C.

### 9.4. System rated life

- a. L70 estimated Lumen maintenance (required): LED module(s)/array(s) shall deliver at least 70% of initial lumens for a minimum of 90,000h at tested or in-situ case temperature ( $T_C$ ) of 75°C (167°F), with an allowed  $T_C$  variation ( $\Delta T_C$ ) of 10°C, based on TM-21 test results.
- b. L90 estimated Lumen maintenance (preferable): LED module(s)/array(s) shall deliver at least 90% of initial lumens for a minimum of 60,000h at tested or in-situ case temperature ( $T_C$ ) of 75°C (167°F), with an allowed  $T_C$  variation ( $\Delta T_C$ ) of 10°C, based on TM-21 test results.

### 9.5. Electrical Transient Immunity and Surge Protection

- a. The luminaire shall meet or exceed ANSI C136.2 (latest version) Enhanced Level 10kV/5kA and IEEE C62.41.2 (latest version) Location Category C Low Exposure.
- b. The surge protector device shall comply with UL 1449 safety standards, minimally withstand a maximum discharge current of 10,000 A, automatically resist, and contain a fail-open to protect the driver in subsequent events.
- c. The surge protection device shall be field-replaceable and be installed using a series connection, and IP-65 rated. The specification sheet and part number shall be provided.

### 9.6. Control Receptacle Interface

The control socket shall be twist-lock type 7-pin cooper-nickel contacts, conforming to requirements detailed in ANSI C136.41.

#### 9.7. Off-State Power

Luminaire shall not draw power in the off-state. Identify the information in the documentation. Exception: luminaires with integral occupancy, motion, photocontrol, or individually addressable fixtures with an external control and intelligence shall not exceed 0.5 watts when in the off state.

#### 9.8. Housing

- a. Construction: The Luminaire housing shall be made of die-cast aluminum with a heat sink incorporated directly into the unit,
  1. All hardware shall be corrosion-resistant.
- b. Ingress Protection (IP): The fixture optical cavity shall be IP-65, and the electrical cavity or electrical components shall be a minimum of IP-54.
  1. The test reports shall be provided and conducted according to ANSI C136.25 (provide test results).
- c. Mechanical impact (IK): shall be equal to or more than ( $\geq$ ) IK08 for the housing and ( $\geq$ ) IK09 for the lenses, in compliance with IEC 62262:2002.
  1. This requirement is optional unless expressly required by LUMA in special purchase orders.
- d. Lenses: shall be made of clear UV-resistant acrylic, polycarbonate, or borosilicate glass.
- e. Luminaire opening shall be at the bottom of the luminaire.
  1. The opening plate shall be equipped with a latch or a similar maneuverable fastening option to safely enclose the housing and provide easy access for luminaire inspection.
  2. The luminaire preferably should contain a built-in leveling tool to facilitate luminaire alignment (not mandatory).
  3. A photo or diagram of the luminaire opening shall be provided.

#### 9.9. Mounting

Horizontal Tenon, Mast Arm, or Arm mount with **1 ¼ to 2 3/8** inches pipe bracket and minimum adjustable tilt of 5 degrees, with optional slip-fitter pole adaptor or vertical tenon mount.

#### 9.10. Fixture weight

Shall be less than ( $<$ ) 25 lbs.

#### 9.11. Finish

- a. Corrosion-resistant polyester powder painted, with a minimum thickness of 2.0 mils (50 micrometers), including the internal part of the luminaire.
  1. The finish thickness information must be indicated in the specification sheet, or a supporting document shall be provided.
- b. The standard color must be light gray or silver.

#### 9.12. Salt fog and vibration tests

- a. Luminaire components and applied finishes shall meet the 2,000-hour salt spray testing as per ASTM B117 and meet ASTM D523 gloss retention. The test report shall be provided.
- b. The luminaire shall comply with ANSI C136.31 3G vibration standards.

### 10. Sample Fixture

- 10.1. A sample fixture shall be provided for lab test and field trial review and evaluation when requested by LUMA Energy.
  - a. Quantity: One unit
  - b. Descriptive and technical literature shall be supplied.
  - c. Markings: The container and luminaire shall be properly labeled for testing and/or analysis and identified as described in item 4 (Markings).

### 11. Warranty

- 11.1. A limited ten (10) years system warranty shall be provided for the replacement or repair of the luminaire due to any electrical failure, including the light source and/or power supplies/drivers, and substantial luminaire housing deterioration. The following written documentation shall be provided:
  - a. Ten (10) years replacement material warranty for defective or non-starting LED assemblies, including on-site replacement material warranty in case of significant color/spectral shifts.
  - b. Ten (10) years replacement material warranty for all electronic components, including drivers, power supplies, and surge arresters.
  - c. Ten (10) years on-site replacement material warranty covering fixture finish, including a warranty against luminaire failure or substantial luminaire housing deterioration such as corrosion, blistering, cracking, or peeling.
- 11.2. LUMA Energy will evaluate the failure rates in Puerto Rico and take appropriate actions if over 10% of the total number of LED luminaires acquired or installed present any inoperable components causing luminaire early failure during the ten (10) year period.
- 11.3. The warranty period shall begin on the date of possession.



11.4. The supplier shall provide LUMA with formally signed warranty certificates.

## 12. Inspection

The acceptance of any equipment/material shall in no way relieve the vendor from his responsibility to meet all the requirements of this specification, and it would not prevent subsequent rejection if such equipment/material were found later to be defective or not compliant with any requirement described in this document.

## 13. Proposal Information

13.1. Submitted proposals must include:

- a. Technical information
- b. Table of Compliance completed by the bidder with reference. (See Appendix 1)

13.2. Table 1: Warehouse and Asset Suite Identification Number

Warehouse Number	Asset Suite	Description
028-78110	78110	125W LED Luminaire

— End of Specification —



## Appendix



## Appendix 1: Table of Compliance

Item	Criteria	Description	Pass/Fail (P / F)	Comments
1	Specification	The Proponent complies with the corresponding specification document 4402.002.		
2	Markings	The container shall be marked outside with LUMA'S purchase order and code number.		
		The letters "AEE" and wattage "125W (minimum of 2.5 inches): stamped, and box.		
3	Package	One unit per box.		
4	Acceptance Criteria	Certificated: ISO-9001		
		ANSI C136.2		
		ANSI C136.41		
5	Quality Certifications and tests	Report: IES LM-80-6,000h for a minimum		
		Report: IES TM-21-Energy Star" test report		
		Report: IES LM-79-Test report		
6	Computer modeling Calculation	Street width: 36 ft.		
		Mounting height: 40 ft.		
		Pole separation of 150 ft. (single-sided).		
		The Average Illuminance (Eavg) shall be equal to or more than ( $\geq$ ) 0.6 foot-candles.		
		The maximum Uniformity Ratio shall be equal to or less than ( $\leq$ ) 3/1.		
7	Manufacturing facility requirements and certifications	Total Light Loss Factor = 0.88.		
		(RoHS) certification by IPC (Association Connecting Electronics Industries).		
		Electrostatic Discharge (ESD) flooring throughout the production area (provide photographs and equivalent documentation).		
		Other ESD protection measures.		
		Nitrogen must be plumbed into soldering processes to improve quality yield (provide photographs and light engine manufacturing facilities or equivalent documentation).		
		Certification of a minimum of five (5) years of experience in manufacturing LED-based lighting products.		
8	Technical Characteristics	Qualified and listed at the Design Lights Consortium (DLC), The International Dark Sky Association (IDA) seal of approval is preferred.		
		Certification: UL Listed		
		Power Consumption: 125 W (maximum).		
		Initial lumens: 9,000 lm (minimum).		
		Luminaire efficacy: greater than or equal to ( $\geq$ ) 90 lm/W.		
		Manufacturer – Rated Nominal CCT (K): 3,000 K.		
		Measured CCT allowance: 2,750 to 3,220 K (from LM-79 Report).		
9	Electrical System	Color rendering index (CRI): greater than or equal to ( $\geq$ ) 70 (Ra).		
		Light distribution: Type III.		
		BUG ratings: B3 (Maximum) – U1 (Maximum) – G3(Maximum)		
		Input Voltage: 120-240 V.		
		Frequency: 60 Hz.		
		PF: greater than or equal to ( $\geq$ ) 0.90.		
		Total harmonic distortion (THD): less than 20% at full load.		
		LED driver operating current (tested): 250mA to 1,300mA, with an allowance of $\pm$ 50mA. (tested)		
10	LED driver safety and reliability	Dimming options: The LED driver shall have 0-10V dimming capability. Exceptionally, DALI 2 D4i dimming LED drivers are acceptable for special projects upon LUMA request or approval.		
		Operating temperature range: -20°C (-4°F) to 40°C (104°F).		
		Operating junction temperature: shall not exceed 75% of the maximum rated junction temperature for the LED during operation at ambient temperature (TA) of 30°C (86°F), with an allowed TA variation ( $\Delta$ TA) of 5°C (provide supporting documentation).		
11	System rated life	IP-64 or Damp Location rated, RoHS compliant, and UL or cURus compliant, and comply with CFR (FCC) Title 47, part 15 - class A		
		Safety: Driver Output type shall be Class 2 in accordance with UL1310 and NEC NFPA 70.		
		Surge protection (preferable): minimum built-in 6kV/3kA surge capability (in protection class I or II).		
		L70: minimum of 90,000h		



		L90: minimum of 60,000h		
12	Electrical Transient Immunity and Surge Protection	Meet or exceed ANSI C136.2, Enhanced Level 10kV/5kA and IEEE C62.41.2 (latest version)		
		Comply with UL 1449 safety standards, minimally withstand a maximum discharge current of 10,000 A, automatically resist, and contain a fail-open to protect the driver in subsequent events.		
		Surge protection device shall be field-replaceable and be installed using a series connection, and IP-65 rated. The specification sheet and part number shall be provided.		
13	Control Receptacle Interface	7-pin cooper-nickel contacts: ANSI C136.41.		
14	Housing	Construction: All hardware shall be corrosion-resistant.		
		IP: IP-65, electrical cavity or electrical components shall be a minimum of IP-54.		
		The test reports shall be provided and conducted according to ANSI C136.25 (provide test results).		
		IK: equal to or more than (≥) IK08 for the housing and (≥) IK09 for the lenses, in compliance with IEC 62262:2002.		
		Lenses: made of clear UV-resistant acrylic, polycarbonate, or borosilicate glass.		
		Luminaire opening shall be at the bottom of the luminaire: A photo or diagram of the luminaire opening shall be provided.		
15	Mounting	Horizontal Tenon, Mast Arm, or Arm mount with 1 ¼ to 2 3/8 inches pipe bracket and minimum adjustable tilt of 5 degrees, with optional slip-fitter pole adaptor or vertical tenon mount.		
16	Weight	Less than (<) 25 lbs.		
17	Finish	Corrosion-resistant polyester powder painted, with a minimum thickness of 2.0 mils (50 micrometers), including the internal part of the luminaire.		
		The finish thickness information must be indicated in the specification sheet, or a supporting document shall be provided.		
		The standard color must be light gray or silver.		
18	Salt fog and vibration tests	Luminaire components and applied finishes shall meet the 2,000-hour salt spray testing as per ASTM B117 and meet ASTM D523 gloss retention. Test report.		
		The luminaire shall comply with ANSI C136.31 3G vibration standards, Certificate.		
19	Sample Fixture	Sample fixture shall be provided for lab test and field trial review and evaluation when requested by LUMA Energy.		
20	Warranty	Limited ten (10) years system warranty shall be provided for the replacement or repair of the luminaire due to any electrical failure, including the light source and/or power supplies/drivers, and substantial luminaire housing deterioration. (See Section 11.1 for more details).		

**NOTE: This table is only a checklist for reference. The compliance must be with the complete document. Filling out the table with “PASS” won’t be accepted as a compliance without the technical information required to certify it.**











# 4402.002 125 W LED Luminaire (Replacement of 200W HPS)(10-22-2024)


Final Audit Report

2024-10-25

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