

ENERGY EFFICIENT LED STREETLIGHT SPECIFICATIONS

The Contractor shall furnish and install the complete LED streetlight luminaires as described in the Tender Specifications. The specific wattages of the LED luminaires are to be indicated in individual luminaire specifications.

1 LED Streetlight Luminaire Housing

The luminaire shall have a full die cast housing to provide adequate rigidity and strength and also ensure proper heat dissipation. The luminaire housing shall have separate Driver and LED lamp cavity to ensure cooler operation of LED lamps and good electrical separation.

The optical LED compartment shall have a thermally hardened glass cover and high quality silicon gasket system. The glass cover shall be tightly secured with the housing. The complete luminaire shall be rated for IP 66 (Ingress Protection).

The housing shall feature highly reflective components and films to increase light output.

The weight of the luminaire shall not be more than stipulated below:-

- 1) Up to 10,00 lumens < 7 kg
- 2) Up to 15,000 lumens < 9 kg
- 3) Up to 31,000 lumens < 15 kg

2 Optics

The luminaire shall have flexible optical system to achieve lighting parameters, as stipulated by CUSTOMER NAME for various kinds of road from M1 to M6. The luminaire shall offer a composite system efficiency of at least 90 Lumen/Watt and a lumen package of up to 31,000 lumens. The luminaire shall use high efficiency LED and optics system to achieve at least XX% energy savings compared to present High Pressure Sodium road-lighting system used by CUSTOMER NAME.

Specially designed lens system with unique inner and outer profile for high efficiency LED to ensure maximum spacing between the poles and cover higher road widths. Multi layer optics design to ensure adequate luminance and illuminance uniformity in the unlikely event of individual LED failure. The luminaire should offer choice of narrow beam, medium beam and wide beam light distribution.

3 Future Compatibility

The luminaire shall be fully compatible with future LED upgrades when they become available. It shall have a modular design to upgrade / replace with new LED modules or LED drivers at site. All electronic components/drivers shall be mounted on a separate gear tray with tool-less access and replacement.

The luminaire shall have space available inside for communications antenna or equipment to be integrated into the luminaire for future tele-management control system implementation. Evidence showing tele-management capability shall be provided.

4 Surge Protection

The proposed luminaire shall have an in-built surge protection system to protect the electronic driver and the LED module with a minimum surge protection rating of 10KV.

5 Ingress Protection (IP) & Impact Resistance

The luminaire shall have Full IP 66 protection to ensure long reliable performance and to minimize maintenance requirement and an Impact resistance of IK 08. No chemical glue is to be used as that may cause breakdown of water-proof and dust-proof seal.

6 Maintenance

The Driver compartment cavity and gear tray shall be designed with tool-less access for maintenance and replacement.

7 Mounting

The mounting of the luminaire will be in axial orientation through Ø 48-60mm sidearm.

8 Thermal Management

Managing thermal properties in LED luminaires are most critical to ensure optimum performance of LEDs and reliability of the system.

The housing shell under the circuit board (PCB) should be specially designed to ensure perfect contact between the board and the luminaire housing for efficient heat dissipation. The PCB shall be designed to maximize heat transfer and should be mounted on the housing using a highly efficient thermal interface material. Use of Silicon glue is not acceptable.

The housing over the Driver compartment cavity shall have adequate surface area to ensure fast heat dissipation.

9 Color Rendering Index and Color Temperature

The luminaire should have a minimum color rendering index (Ra) of 70+/- 10 and a color temperature of 3000K, 4000K or 5700K. The LED shall have a color consistency preferably within 7 SDCM (standard deviation of color matching) as defined by McAdam. The color temperature variation of the LEDs should be restricted as per ANSI C78.377A with CCT variation limiting within 500K for nominal CCT of 3000K, 4000K or 5700K.

10 Useful Life Hours

The LED luminaire shall be designed for lumen maintenance of L70 or 70% at the end of useful life at ambient temperature of 35 deg C. The complete luminaire shall have a useful life of 50,000 burning hours. The luminaire including the driver will include a warranty of 3 years against manufacturing defects.

11 Standards Conformity

The luminaire should fully conform to following specification:-

- 1) IEC 60598-2-3 - Part 2: Particular requirements: Section Three – Luminaires for road and street lighting
- 2) IEC 62471 – Photo-biological safety of lamps and lamp systems
- 3) IEC 62493 – Assessment of lighting equipment related to human exposure to Electromagnetic Fields
- 4) EN 55015: 2006 and 2007 – Limits and methods of radio disturbance characteristics of electrical lighting.
- 5) EN 61547:1995 / +A1:2000 – Equipment for general lighting purpose EMC immunity requirements.
- 6) EN 61000-3-2:2006 – Limitation of harmonic current emission.

- 7) EN 61000-3-3:2008 – Limitation of voltage fluctuation and flicker.

12 LED Driver Specifications

The LED driver shall be designed to operate large array of high power LED's through current controlled output. The driver shall be suitable for nominal 220V-240V 50/60Hz mains supply. The LED driver shall have an efficiency of at least 90%.

The LED driver shall incorporate multiple control interfaces for dimming capability. It shall enable DALI, & 1-10V DC interface dimming control. It shall also have a programmable feature to allow pre-programming of step dimming lighting levels based on the ON time. [Optional]

The LED driver shall fully conform to following specifications:-

- 1) IEC61347-1 - General and safety requirements.
- 2) IEC61347-2-13 - Particular requirements for DC or AC supplied electronic control gear for LED modules.
- 3) IEC62384 - DC or AC supplied electronic control gear for LED modules.

13 LED Chip Specifications

The luminaire should have LED chip from following acceptable manufacturers:-

- A) Philips Lumiled
- B) Cree
- C) Nichia
- D) Osram

14 Ambient Temperature

The luminaire shall be suitable for ambient temperature range of between -40 to 45 degrees Celsius. 3rd party IEC60598 Test Report shall be measured/corrected for Ta = 35 degrees Celsius.

15 Manufacturers Declarations and Submittals

Following manufacturer declarations and submissions should be provided with the tender submission:-

| S/no | Parameters | Technical Specifications | Documents to be provided |
|------|----------------------------------|--|---|
| 1 | System Power | Not more than XXXW +/-5W | Manufacturer's Declaration |
| 2 | System Efficacy | ≥ 90lm/W | Manufacturer's Declaration |
| 3 | System Voltage | 220V to 240V 50Hz | Laboratory Test Report |
| 4 | Power Factor | Not less than 0.90 | Laboratory Test Report |
| 5 | Surge Protection | ≥ 10KV | Manufacturer's Declaration |
| 6 | LED Driver | Programmable for Dimming with:- - 1-10V DC - DALI - On board standalone program | Manufacturer's Declaration |
| 7 | Lumen Maintenance | L70 at 50,000 hours or better | LM80 Report |
| 8 | Colour Temperature | Warm White ~ 3000K ± 500K Neutral White ~ 4000K ± 500K Cool White ~ 5700K ± 500K | Manufacturer's Declaration |
| 9 | Colour Rendering Index | 70 +/- 10 | Manufacturer's Declaration |
| 10 | Ambient Temperature | -40 to 45 Degrees Celsius | Manufacturer's Declaration |
| 11 | IP Rating | ≥ IP66 without glue | Laboratory Test Report |
| 12 | IK Rating | ≥ IK08 | Laboratory Test Report |
| 13 | Cover | Tempered Glass Cover | Manufacturer's Declaration |
| 14 | Housing | High Pressure Die-Cast Aluminum with heat management system | Manufacturer's Declaration |
| 15 | Maintenance | Tool-less Driver Cavity Opening Tool-less Gear Tray Change | Manufacturer's Declaration |
| 16 | Tele-management Controls | Integrated Antenna or communications equipment into luminaire housing | Manufacturer's Declaration & Evidence to show capability |
| 17 | 3rd Party Test Report | Laboratory facility must be accredited according to ISO17025 and recognized by ILAC/APLAC for testing of LED products. | - IEC60598 Report (IEC60598-2-3) - LM 80 LED Test Report - Lumen Depreciation Test Reports (up to 3000 hours) - EMC Test Report (EN55015, EN61547, 61000-3-2) - Photo-biological Safety Test Report (IEC62471) - EMF Test Report (IEC62493) - Factory Certificates (ISO14001, ISO9001, OHSAS18001) - Certificates for Test Laboratory (ISO17025) |
| 18 | 3rd Party LED Driver Test Report | Laboratory facility must be accredited according to ISO17025 | - IEC61347-1, -2-13 Test Report - IEC62384 Test Report |
| 19 | Additional Test Reports | Manufacturer's Test Report | - Salt Spray Test Report (Minimum 500 hours, Natural Salt Spray) - Vibration Test Report - Road Lighting Simulations based on given configurations |