



a world class African city



**TITLE: SPECIFICATION FOR SOLAR
LUMINAIRE**

| REFERENCE | REV |
|----------------------------|--------------|
| CP_NISSP_001 | 0 |
| DATE: FEBRUARY 2025 | |
| PAGE: 1 | OF 24 |

Table of contents

| | |
|--|----|
| FOREWORD..... | 3 |
| INTRODUCTION | 4 |
| 1. SCOPE | 4 |
| 2. NORMATIVE REFERENCES | 4 |
| 3. DEFINITIONS AND ABBREVIATIONS | 5 |
| 4. REQUIREMENTS | 6 |
| 4.1 General | 6 |
| 4.2 Construction | 7 |
| 4.3 Electrical Requirements..... | 7 |
| 4.3.1 PV Monocrystalline silicon solar panel | 7 |
| 4.3.2 Light Emitting Diode lamp (LED) with dusk and dawn | 7 |
| 4.3.3 Maximum Power Point Tracking (MPPT) | 7 |
| 4.3.4 Lithium-ion battery energy storage..... | 8 |
| 4.3.5 Wiring and connectors | 8 |
| 4.4 Photometric Performance..... | 8 |
| 4.5 Guarantee | 9 |
| 5. TESTS | 9 |
| 5.6 Design parameters | 10 |
| 5.7 Pole data | 11 |
| 5.8 LED Streetlight Equivalence of the 70Watt HPS/T: Sap No.4991 | 11 |
| 5.9 LED Streetlight Equivalence of the 100Watt HPS/T: Sap No.4992 | 11 |
| 5.10 LED Streetlight Equivalence of the 100Watt HPS/T: Sap No.4993 | 12 |
| 5.11 LED Streetlight Equivalence of the 100Watt HPS/T: Sap No.4994 | 12 |
| 6 DOCUMENTATION | 13 |
| 7 SECURITY AND MANAGEMENT SYSTEM | 13 |
| 8 MARKING AND PACKAGING..... | 14 |
| 9 TRAINING..... | 14 |
| 10 QUALITY MANAGEMENT..... | 14 |
| 11 HEALTH AND SAFETY | 14 |
| 12 ENVIRONMENTAL MANAGEMENT | 14 |
| Annex B - Revision information | 15 |
| ANNEXURE D | 16 |
| TECHNICAL SCHEDULES A & B: | 17 |
| TECHNICAL SCHEDULES A & B: | 18 |
| TECHNICAL SCHEDULES A & B: | 19 |
| TECHNICAL SCHEDULES A & B: | 20 |
| TECHNICAL SCHEDULES A & B: | 21 |
| TECHNICAL SCHEDULES A & B: | 22 |
| TECHNICAL SCHEDULES A & B: | 23 |
| TECHNICAL SCHEDULES A & B: | 24 |

FOREWORD

This specification was prepared by the following work group members:

Ntsako Mdaka

Technical Support

The work group was appointed by the Distribution Study Committee, which, at the time of approval, comprised of the following members:

Zamokuhle Magagula

Secondary Plant: Technical Support

Sixolele Toko

Secondary Plant: Technical Support

Johannes Letsholo

Secondary Plant: DC

Katlego Mamba

Secondary Plant: Protection

Nkele Simelane

Public Lighting

Archibald Masondo

Public Lighting

Sibongile Manqina

Public Lighting, Grid reliability and Expansion

Recommendations for corrections, additions or deletions should be addressed to the:

Technical Support - Chief Engineer

City Power Johannesburg (Pty) Ltd

P O Box 38766

Booyens

2016

INTRODUCTION

Integrated solar street lighting luminaires are used for the public thoroughfares and roadways, contributing to road safety as well as public safety. These lights will particularly focus on areas with high crime rates and frequent power outages. This initiative is part of a broader strategy to use renewable energy solutions to enhance community safety and reduce vandalism of streetlights infrastructure.

City Power desires to install solar powered public lighting luminaires across the City of Johannesburg to improve safety, reduce the impact of load shedding and in response to the ongoing challenges of theft and vandalism, which result in significant financial losses. To address this issue, the Municipality will integrate its Smart City Platform into the luminaires, enabling advanced monitoring and security features.

Additionally, City Power has plans to retrofit the convectional HID luminaires which are high pressure sodium and metal halide luminaires with the solar powered street light luminaires for public lighting in various parts of the city. It's a significant step towards City Power sustainable energy strategy and improving the quality of life for the residents.

1. SCOPE

The purpose of this specification is to procure solar-powered streetlights. The luminaires shall be designed using the latest solar technology with an integrated tele management system.

2. NORMATIVE REFERENCES

The following documents contain provisions that, through reference in the text, constitute requirements of this specification. All standards and specifications are subject to revision, and parties to agreements based on this specification are encouraged to investigate the possibility of applying the most recent editions of the documents listed below. All components and installations must comply with the relevant SANS/IEC standards, including but not limited to:

- *SANS 51706:2005 Aluminium and aluminium alloys — Castings — Chemical composition and mechanical properties.*
- *CIE Publication 27, Photometry of luminaires for street lighting.*
- *ISO 4762: Hexagon socket head cap screws*
- *SANS 60598-1: 2014 Luminaires – Part 1: General requirements and tests*
- *SANS 60598-2-3: 2013 Luminaires – Part 2: Particular requirements – Section 3: Luminaires for road and street lighting*
- *SANS 10098-1: 2007 Public lighting – Part 1: The lighting of public thoroughfares*

-
- *SANS 529: 2014 Heat-resistant cables*
 - *SANS 1088: 2004 Luminaire entries and spigots*
 - *SANS 1091: 2012 National colour standards for paints*
 - *SANS 475: 2008 Luminaires for interior lighting, streetlighting and floodlighting — Performance requirements*
 - *SANS 62133: of class II: Crystalline (mono) PV models design*
 - *ARP 035: 2014 SABS Standards division: Guideline for installation and maintenance of street lighting*
 - *SANS 1507: 2002 Electric cables with extruded solid dielectric insulation for fixed installations (300/500 V to 1 900/3 300 V) Part 1 - General and Part 2 – cables.*
 - *IEC 62040: Uninterruptible power system (UPS)- Part 1 safety requirements*
 - *SANS 60529: 2013 Degrees of protection provided by enclosures (IP Code)*
 - *IEC 62509: Battery charge controllers for photovoltaic systems – Performance and functioning*
 - *IEC 62133: Safety Testing for Lithium-Ion Batteries*
 - *IEC 62620: Secondary Cells and Batteries containing alkaline or other non-acid electrolytes.*
 - *IEC 62619: Safety requirements and tests for secondary lithium cells and batteries used in industrial applications*
 - *SANS 121: 2011 Hot-dip galvanised coatings on fabricated iron and steel articles – Specifications and test methods*
 - *IEC 61215: requirements for the design qualification of terrestrial photovoltaic modules suitable for long-term operation in open-air climates.*
 - *IEC 61730: global standard for photovoltaic (PV) module safety qualification.*
 - *VC 8011: Lampholders*
 - *CP_TSSPEC_011, Specification for discharge lamps*
 - *CP_TSSPEC_073, Specification for control gear for street lighting*
 - *CP_TSSPEC_012, Specification for photoelectric control units [PECU]*

3. DEFINITIONS AND ABBREVIATIONS

The definitions and abbreviations in the documents listed above shall apply to this standard. In addition, any reference to City Power shall mean City Power Johannesburg (Pty) Ltd.

Integrated – All components are built in one unit.

4. REQUIREMENTS

4.1 General

- 4.1.1** The Integrated solar street lighting luminaire shall comply with SANS 60598-1-2-3 and SANS 475.
- 4.1.2** The streetlight luminaire shall be supplied as a complete unit with LED modules, driver, battery, solar panel, and mounting brackets with an integrated tele management system.
- 4.1.3** All materials must be corrosion-resistant and vandal-proof.
- 4.1.4** The luminaire shall be robustly constructed from aluminium to prevent undue deterioration in its safe operation or appearance during normal life when operated in climatic conditions prevailing in the country. Bidders shall submit a metallurgical report from an independent metallurgist confirming the grade of aluminium for all luminaires offered.
- 4.1.5** The luminaires shall be designed such that no maintenance and/or replacement of the LED module, driver and/or any other component shall be required for at least 10 years.
- 4.1.6** Small components such as toggle clips, bolts, screws, nuts and washers shall be manufactured of stainless steel (grade 304 or better).
- 4.1.7** The optical unit shall be completely sealed with a smooth, clear tempered glass protector or impact resistant, non-degrading material to IP66 tightness to maintain its photometric performance over the rated life.
- 4.1.8** The battery, MPPT controller and the driver shall be mounted internally and not accessible by any form of tools.
- 4.1.9** The LED module or array shall be designed in such a way that the failure of one LED shall not cause additional LEDs to switch off.
- 4.1.10** Luminaires shall have a marking that is only visible with the use of UV light and an additional label shall be visible on the exterior of the luminaire showing that it is the property of City Power. The label shall be durable and not removable except by the supplier.
- 4.1.11** The luminaire shall include an integrated inline smart controller which shall be approved during the prototype approval by City Power before the first order can be placed.
- 4.1.12** The Integrated solar street lighting luminaire shall have monocrystalline panel.
- 4.1.13** All ratings must be certified by a test report confirming compliance with SANS/IEC 60598-1.
- 4.1.14** The PV module shall have a certificate of testing confirming compliance with IEC 61215/IEC 61730. The test report shall be issued by an accredited test authority acceptable to City Power.
- 4.1.15** The Integrated solar street lighting shall include quality Lithium Battery with a life span cycle of 10 years.
- 4.1.16** The integrated solar street lighting luminaire shall have a rated voltage range of 12- 48V battery with an allowable discharge capacity not exceeding 50%.
- 4.1.17** The Installation instructions and connection diagram shall be provided to the integrated solar street light luminaire leaflet.

4.1.18 Maintenance and operation guideline for the integrated solar street lighting luminaire shall be provided.

4.1.19 The system shall be provided with 2 LED indicators: Green - Fully charged and Red - Battery level is low.

4.1.20 PV module shall be able to charge the battery fully during the day.

4.1.21 No blackening or reduction in the luminaire output by more than 10%, shall be observed after 1000 ON/OFF cycles.

4.2 Construction

4.2.1 The Integrated solar street lighting luminaire shall be designed for use under conditions of heavy atmospheric pollution and exposure to high levels of solar (including ultraviolet) radiation, at a mean altitude of 1 800 m.

4.2.2 The Integrated solar street lighting luminaire shall be suitable to operate at ambient temperatures approximately -15°C to +65°C.

4.2.3 The Integrated solar street lighting luminaire shall be designed to accommodate extreme weather conditions.

4.2.4 The Integrated solar street lighting luminaire shall have an IP rating of 66.

4.2.5 Each component shall have its own housing and each housing shall comply with IP rating of 66.

4.2.6 The luminaire optic shall be internally mounted at an angle of 15 degrees.

4.3 Electrical Requirements

4.3.1 PV Monocrystalline silicon solar panel

- PV module shall be embedded on top of the luminaire structure.
- Shall have high quality efficiency and better power output per panel.
- Shall have a minimum life span of 10 years or more.
- PV shall be monocrystalline silicon and thin film technology module.
- PV module shall charge the battery and store energy during the day using the direct current (DC).
- PV module shall comply to IEC 61215 and IEC 61730

4.3.2 Light Emitting Diode lamp (LED) with dusk and dawn

- LED lamp shall automatically switch **ON** at dawn and switch **OFF** at dusk.
- LED lamp shall provide effectively quality performance of luminaire.
- Shall have a life span minimum of 10 years.
- LED lamp shall be controlled with direct current (DC) power.
- LED lamps are easily affected by high temperature so therefore LED lamp shall include heat dissipation elements e.g. heat sinks.
- The luminaire optic shall be internally mounted at an angle of 15 degrees.
- LED shall be applicable for outdoors therefore shall be dustproof, waterproof, anti-static and shocking resistance.

4.3.3 Maximum Power Point Tracking (MPPT)

- MPPT charge controller shall regulate and manages the flow of energy from the solar panel to the battery bank and control the operation of the LED light.

-
- Adequate protection shall be incorporated under no load conditions when the battery is fully charged
 - Built in MPPT charger controller shall be provided to monitor battery charging levels and protects against over-charging and deep discharge conditions.
 - MPPT charge controller shall be provided for a purpose of high quality and high efficiency solar radiation and shall be able to control the functionalities of the load.
 - MPPT charge controller shall be DC-DC converters.
 - High efficiency MPPT charge controller.
 - MPPT shall provide protection against short circuit and surge conditions.

4.3.4 Lithium-ion battery energy storage

- The battery bank shall be able to store the energy generated by the solar panel.
- The battery bank shall keep the integrated solar street light luminaire operating during cloudy weather condition (2 autonomy days).
- The quality lithium-ion battery with minimum of 10 years life span shall be provided.
- The Lithium-ion battery shall have adequate capacity storage and withstand to provide stable energy to the load.
- During sunset battery shall not charge but should be able to power the LED for a minimum of 12 hours.
- 50% of the rated capacity of the battery shall be between fully charged and load cut off condition.
- The battery shall be maintenance free.

4.3.5 Wiring and connectors

- Wiring and connection shall be used to interconnect the various components of the integrated solar streeting luminaire.
- Wiring and connection shall enable the efficient transfer of electricity between the solar panel, battery bank, LED light, and MPPT charge controller to ensure a reliable and safe electrical connection.

4.4 Photometric Performance

4.4.1 Photometric data shall be supplied with each tender. This data shall be issued by SANS or an independent accredited lighting test laboratory. The following data is required for each luminaire offered:

- Polar diagrams detailing the light distribution achieved by each luminaire and taken at 15° intervals with the luminaire mounted horizontally, in units of cd/klm. Alternatively, an isocandela diagram for the luminaire mounted horizontally and expressed in units of cd/klm shall be supplied.
- An Isolux diagram in ratios of mounting height to both the transverse and longitudinal distances for the luminaire mounted horizontally.
- Utilisation curves for the luminaire mounted horizontally.
- Principal vertical polar curve and polar curve in the vertical plane parallel to the axis of the street, in units of cd/klm.

4.4.2 The information submitted on the luminous intensity tables in accordance with CIE Publication 27, in a form compatible with the SANS 098 Road Lighting computer software.

4.4.3 In addition to the above requirements, technical data and luminaire performance tables for various wattages, luminaire spacing charts and horizontal illumination diagrams shall be provided.

4.4.4 Details of the optical and thermal properties of the diffuser as well as the light transmission depreciation over a period of not less than 10 years shall be provided.

4.5 Guarantee

- 4.5.1** A guarantee of each integrated solar street lighting luminaire for a minimum period of 10 years from the date of installation shall be provided.
- 4.5.2** This guarantee is primarily intended to be a material guarantee. This means that if any luminaire is unsuitable for use, or its IP ratings are compromised within a period of ten years from the date of delivery, it shall be replaced free of charge by the manufacturer.
- 4.5.3** Failure of the luminaire in terms of this clause would entail degradation of the luminaire material (e.g. Dough Molding Compound (DMC) or other polymeric material, or aluminium) by ultraviolet radiation for example, to a point where cracks or holes appear in the luminaire housing (or diffuser), thus compromising the structural integrity and IP rating of the luminaire it shall be replaced free of charge by the manufacturer.

5. TESTS

The test reports shall be from independent accredited laboratories.

5.1 Integrated luminaire tests

- Endurance test and thermal test
- Resistance to corrosion
- Insulation resistance and electric strength
- Humidity test
- Mechanical strength test
- Electrical test
- IP rating test
- Power factor

5.2 MPPT Tests

- Battery to PV generator leakage current test
- Charging cycle test
- Load disconnect/load reconnect test
- Standby self-consumption test
- Efficiency test
- Voltage Drop
- Thermal performance test (Charge state with load output)
- PV overcurrent protection test
- Battery reverse polarity test
- Solar panel test

5.3 PV modules tests

- Visual inspection test
- Hail test
- Maximum Power Determination
- Insulation Test

-
- Measurement of Temperature Coefficients
 - Performance at low irradiance.
 - Hot-spot endurance test
 - Thermal cycling test
 - Humidity freeze test
 - Damp heat test
 - Robustness of termination test
 - Wet leakage current test
 - Mechanical load test
 - Bypass diode thermal

5.4 Batteries tests

- Short Circuit test
- Free Fall
- Overcharge
- Transport Tests
- Vibration and Mechanical Shock
- Thermal
- The crush test

5.5 Design data

- 5.5.1** All designs for the below should be based on pole spacing of 40m (250w equivalence and 400w equivalence).
- 5.5.2** Data from the same luminaire equivalence should be used for all types of roads within the category (e.g. one luminaire series should meet all the requirements).
- 5.5.3** No interchangeability of luminaire within the same category will be accepted.
- 5.5.4** The following data should reflect on the design report:
- Colour temperature as per spec.
 - Luminaire efficacy as per spec
 - Flux as per spec
 - Power factor as per spec
 - Driver current as per spec
 - Lux (cd/m²)

5.6 Design parameters

- a) Maintenance factor of 80%.
- b) For 250W and 400W equivalence road arrangement of median 1 of 2m-3m and 4 lanes with a maximum of 2 luminaire per pole (double Spigot).
- c) For 250W and 400W equivalence road arrangement with no median and 4 lanes with a maximum of 2 luminaire per pole (Single Spigot).

- d) Luminaire losses of 80% minimum.
- e) Boom length of 0.5.
- f) Boom angle between 0 and 15°.
- g) Angle of rotation 0.
- h) Tar surface R3.
- i) Wet Surface W3.
- j) Longitudinal displacement of 0.
- k) The lane width is 4.5m (A type road).
- l) Design should be based on the 600 cars per hour as per SANS 10098

5.7 Pole data

| Pole description | Pole height | Pole Mounting Height |
|-------------------------|--------------------|-----------------------------|
| A2 | 5m | 4m |
| A4 | 7,2m | 6m |
| A5 | 13,8m | 12m |
| A6 | 11,5m | 10m |
| A7 | 9,2m | 8m |
| S1 (single arm 2m) | 11.5m | 10m |
| S2(single arm 3m) | 11.5m | 10m |
| S3(single arm 2m) | 9,2m | 8m |
| M1 (high mast) | 17m | 15m |
| M3 (high mast) | 21m | 19m |

5.8 LED Streetlight Equivalence of the 70Watt HPS/T: Sap No.4991

| Item | Maximum Luminaire equivalence (W) | Pole type | Pole Spacing | Type of road |
|-------------|--|------------------|---------------------|---------------------|
| 1. | 25 | A2 | 25 to 30 | B1 |
| 2. | 25 | A4 | 25 to 30 | B1 |
| 3. | 25 | A7 | 25 to 30 | B1 |
| 4. | 25 | S3 | 25 to 30 | B1 |
| 5. | 25 | A2 | 25 to 30 | B2 |
| 6. | 25 | A4 | 25 to 30 | B2 |
| 7. | 25 | A7 | 25 to 30 | B2 |
| 8. | 25 | S3 | 25 to 30 | B2 |
| 9. | 25 | A2 | 25 to 30 | B3 |
| 10 | 25 | A4 | 25 to 30 | B3 |
| 11. | 25 | A7 | 25 to 30 | B3 |
| 12. | 25 | S3 | 25 to 30 | B3 |

5.9 LED Streetlight Equivalence of the 100Watt HPS/T: Sap No.4992

| Item | Maximum Luminaire equivalence (W) | Pole type | Pole Spacing | Type of road |
|-------------|--|------------------|---------------------|---------------------|
| 1. | 35 | A2 | 25 to 30 | B1 |
| 2. | 35 | A4 | 25 to 30 | B1 |

| | | | | |
|-----|----|----|----------|----|
| 3. | 35 | A7 | 25 to 30 | B1 |
| 4. | 35 | S3 | 25 to 30 | B1 |
| 5. | 35 | A2 | 25 to 30 | B2 |
| 6. | 35 | A4 | 25 to 30 | B2 |
| 7. | 35 | A7 | 25 to 30 | B2 |
| 8. | 35 | S3 | 25 to 30 | B2 |
| 9. | 35 | A2 | 25 to 30 | B3 |
| 10. | 35 | A4 | 25 to 30 | B3 |
| 11. | 35 | A7 | 25 to 30 | B3 |
| 12. | 35 | S3 | 25 to 30 | B3 |

5.10 LED Streetlight Equivalence of the 100Watt HPS/T: Sap No.4993

| Item | Maximum Luminaire equivalence (W) | Pole type | Pole Spacing | Type of road |
|------|-----------------------------------|-----------|--------------|--------------|
| 1. | 85 | A5 | 30 to 40 | A1 |
| 2. | 85 | A6 | 30 to 40 | A1 |
| 3. | 85 | S1 | 30 to 40 | A1 |
| 4. | 85 | S2 | 30 to 40 | A1 |
| 6. | 85 | A5 | 30 to 40 | A2 |
| 7. | 85 | A6 | 30 to 40 | A2 |
| 8. | 85 | S1 | 30 to 40 | A2 |
| 9. | 85 | S2 | 30 to 40 | A2 |
| 11. | 85 | A5 | 30 to 40 | A3 |
| 12. | 85 | A6 | 30 to 40 | A3 |
| 13. | 85 | S1 | 30 to 40 | A3 |
| 14. | 85 | S2 | 30 to 40 | A3 |
| 16. | 85 | A5 | 30 to 40 | A4 |
| 17. | 85 | A6 | 30 to 40 | A4 |
| 18. | 85 | S1 | 30 to 40 | A4 |
| 19. | 85 | S2 | 30 to 40 | A4 |

5.11 LED Streetlight Equivalence of the 100Watt HPS/T: Sap No.4994

| Item | Maximum Luminaire equivalence (W) | Pole type | Pole Spacing | Type of road |
|------|-----------------------------------|-----------|--------------|--------------|
| 1. | 135 | A5 | 30 to 40 | A1 |
| 2. | 135 | A6 | 30 to 40 | A1 |
| 3. | 135 | S1 | 30 to 40 | A1 |
| 4. | 135 | S2 | 30 to 40 | A1 |
| 6. | 135 | A5 | 30 to 40 | A2 |
| 7. | 135 | A6 | 30 to 40 | A2 |
| 8. | 135 | S1 | 30 to 40 | A2 |
| 9. | 135 | S2 | 30 to 40 | A2 |
| 11. | 135 | A5 | 30 to 40 | A3 |
| 12. | 135 | A6 | 30 to 40 | A3 |
| 13. | 135 | S1 | 30 to 40 | A3 |
| 14. | 135 | S2 | 30 to 40 | A3 |
| 16. | 135 | A5 | 30 to 40 | A4 |
| 17. | 135 | A6 | 30 to 40 | A4 |
| 18. | 135 | S1 | 30 to 40 | A4 |
| 19. | 135 | S2 | 30 to 40 | A4 |

6 DOCUMENTATION

6.1 Full technical and descriptive details, relating to the luminaires offered shall be submitted so that the offer can be fully evaluated. This shall include, but not limited to the following details:

- a) Manufacture and country of origin
- b) Name of LED luminaire
- c) Catalogue number of the luminaire
- d) Standards to which luminaire comply (SANS / IEC)
- e) Luminaire type test reports in English (From an accredited testing laboratory)
- f) Luminaire special test reports in English (From an accredited testing laboratory)
- g) Actual design data and results, and luminaire data files
- h) Mortality curves
- i) Dimension and weight of luminaire
- j) Proof of calculation to achieve 50% savings
- k) Details of cooling mechanism of luminaire to adequately dissipate heat
- l) Lifespan of LED module driver and LED Module
- m) The design reports shall be done on Dialux or Relux simulation packages and submit IES and / or LTD files.

7 SECURITY AND MANAGEMENT SYSTEM

7.1 City Power is committed to enhancing the security of its streetlight luminaires in response to the ongoing challenges of theft and vandalism, which result in significant financial losses. To address this issue, the Municipality will integrate its Smart City Platform into the luminaires, enabling advanced monitoring and security features.

7.2 City Power will provide suppliers with an integrated smart controller, which shall be installed within the driver compartment of the luminaires. This controller will enable smart monitoring capabilities, ensuring real-time surveillance, fault detection, and proactive maintenance.

7.3 The luminaire control gear compartment shall include a designated space for an integrated inline smart controller supplied by City Power.

7.4 The provision within the driver compartment of the luminaire for the smart controller shall be the following dimensions not exceed Length: 140mm, Width: 80mm and Height: 60mm

7.5 The smart controller shall be incorporated during the manufacturing stage. The smart controller shall be securely integrated to ensure that any tampering results in the luminaire becoming inoperative.

7.6 Compliance with all relevant electrical standards and best practices to maintain the integrity and functionality of the luminaire system shall be adhered to.

8 MARKING AND PACKAGING

8.1 Luminaires shall have a marking that is only visible with the use of UV light and an additional label shall be visible on the exterior of the luminaire showing that it is the property of City Power. The label shall be durable and not removable.

8.2 Each luminaire shall be marked, by means of a suitable sticker or similar, in 25 mm lettering, with the rated wattage of the luminaire and the lamp type. In addition, each luminaire shall be marked with a coloured dot indicating the type of lamp with which a luminaire is designed to be used. The diameter of the dot shall not be less than 20 mm, and colored as follows:

- The colours shall be as close as possible to primary colours and shall be heat-resistant and shall not fade for the duration of the life of the luminaire. Since the dots will be exposed to weather, the stickers should be of a material suitable for use in this application e.g. UV stabilised vinyl.
- Each streetlight shall have its own unique identification number.
- Each luminaire shall be individually packed in a sturdy cardboard box in order to prevent damage during handling, transportation and storage. The cartons shall be clearly marked with the appropriate description of the luminaire contained therein.

9 TRAINING

The following certified training courses shall be offered for City Power's staff at no cost:

- Correct handling and care of the luminaires; and
- Correct and safe installation and maintenance of the luminaires.

10 QUALITY MANAGEMENT

A quality management system shall be set up in order to assure the quality of the luminaires during manufacture, installation, removal, transportation and disposal of scrap material/Waste/E-waste. Guidance on the requirements for a quality management system may be found in the following standards: ISO 9001:2015. The details shall be subject to an agreement between the purchaser and supplier.

11 HEALTH AND SAFETY

A health and safety plan shall be set up in order to ensure proper management and compliance during manufacture, installation, removal, transportation, and disposal. Guidance on the requirements of a health and safety plan shall be found in ISO 45001:2018 standards. The details shall be subject to an agreement between City Power and the Supplier.

12 ENVIRONMENTAL MANAGEMENT

An environmental management plan shall be set up in order to ensure the proper environmental management and compliance is adhered to during manufacture, installation, removal, transportation, and disposal. Guidance on the requirements for an environmental management system shall be found in ISO 14001:2015 standards. The details shall be subject to an agreement between City Power and the Supplier. This is to ensure that the asset created conforms to environmental standards and City Power SHERQ Policy.

Annex B - Revision information

| DATE | REV. NO. | NOTES |
|-------------|-----------------|-----------------|
| FEB 2025 | 0 | First issue |
| FEB 2025 | 0 | General editing |

ANNEXURE D

| Material | SAP short description | Matl grp | SAP long description |
|-----------------|---|-----------------|---|
| 4991 | LED Streetlight PV Powered 70W HPS Equi | LUMIN-SLT | Streetlight, LED, PV Powered; Replaces: 70W HPS; Maximum Rated Power: 35W; Minimum Nominal Flux: 6750lm; Item Specification: CP_NISSP_001 |
| 4992 | LED Streetlight PV Powered 100W HPS Equi | LUMIN-SLT | Streetlight, LED, PV Powered; Replaces: 100W HPS; Maximum Rated Power: 45W; Minimum Nominal Flux: 8775lm; Item Specification CP_NISSP_001 |
| 4993 | LED Streetlight PV Powered 250W HPS Equi | LUMIN-SLT | Streetlight, LED, PV Powered; Replaces: 250W HPS; Maximum Rated Power: 85W; Minimum Nominal Flux: 16800lm; Item Specification CP_NISSP_001 |
| 4994 | LED Streetlight PV Powered 400W HPS Equi | LUMIN-SLT | Streetlight, LED, PV Powered; Replaces: 400W HPS; Maximum Rated Power: 135W; Minimum Nominal Flux: 27000lm; Item Specification CP_NISSP_001 |

TECHNICAL SCHEDULES A & B:

ITEM No. 1 SAP No. 4991: LED Solar Streetlight Luminaire – Equivalence of the 70 Watt HPS/T streetlight luminaire

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

| Item | Technical Details | Schedule A | Schedule B |
|------|---|--|------------|
| 1 | Manufacturer Name of the luminaire | Required | |
| 2 | Place of manufacturer | Required | |
| 3 | Type of solar luminaire | integrated | |
| 4 | Standard to which LED luminaire complies | IEC 60598 | |
| 5 | Optic mounting angle | 15 degrees | |
| 6 | Nominal flux at Tq of 35°C at 100% | 5000lm (minimum) | |
| 7 | Class and type of luminaire | Class 1 of IEC 60598 – 1 and totally enclosed type | |
| 8 | Streetlight luminaire to be replaced | 70W HPS | |
| 9 | Rated Wattage of the equivalent luminaire | 25W (maximum) | |
| 10 | Mass of luminaire / Battery / Solar Panel | 20kg (maximum) | |
| 11 | Colour temperature | Between 4000K – 5000K | |
| 12 | Luminaire efficacy (lm/W) | 200 lm/W (minimum) | |
| 13 | Colour rendering index | 70 (minimum) | |
| 14 | Lighting design standard to comply | ARP 035 | |
| 15 | Luminaire dimming profile | Required | |
| 16 | Degree of protection | IP 66 (minimum) | |
| 17 | Material of Solar LED luminaire housing | Aluminium | |
| 18 | Type and nominal size of spigot entry | Bottom entry, Inside diameter of 76 mm | |
| 19 | Maximum length of spigot entry | 125mm | |

Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA [“To Be Advice”] will not be accepted

Tender Number: _____

Tenderer's Authorised Signatory: _____ Name in block letter _____ Signature _____

Full name of company: _____

TECHNICAL SCHEDULES A & B:

ITEM No. 1 SAP No. 4991: LED Solar Streetlight Luminaire – Equivalence of the 70 Watt HPS/T streetlight luminaire continues

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

| Item | Description | Schedule A | Schedule B |
|-----------|---------------------------------------|------------------|------------|
| 20 | Battery | | |
| | Battery Type | Lithium ion | |
| | Battery Ampere Hour | Required | |
| | Battery Voltage | 12- 48 V | |
| | Battery charging & discharging cycles | 1000 | |
| | Battery cell protection | Yes | |
| | Charge controller type | MPPT | |
| 21 | Autonomy days | 2 days | |
| 22 | Solar Panel | | |
| | Panel Type | Mono crystalline | |
| | Panel Voltage | Required | |
| | Number of Cells | Required | |
| 23 | Max peak power | Required | |
| 24 | Max Current | Required | |
| 25 | Operating Temperature | -15 to +65 | |
| 26 | MPPT Controller | | |
| | Controller Type | MPPT | |
| | Programmable | Yes | |
| | Controller communication mode | Specify | |
| 27 | Smart Monitoring | | |
| | Integrated Smart controller | Yes | |
| | Photometric data enclosed | Required | |
| | Material safety datasheet attached | Required | |
| | Test reports submitted | Required | |
| | Special test reports submitted | Required | |
| | Data dot and labelling | Required | |

TECHNICAL SCHEDULES A & B:

ITEM No. 1 SAP No. 4992: LED Solar Streetlight Luminaire – Equivalence of the 100 Watt HPS/T streetlight luminaire

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

| Item | Technical Details | Schedule A | Schedule B |
|------|---|--|------------|
| 1 | Manufacturer Name of the luminaire | Required | |
| 2 | Place of manufacturer | Required | |
| 3 | Type of solar luminaire | integrated | |
| 4 | Standard to which LED luminaire complies | IEC 60598 | |
| 5 | Optic mounting angle | 15 degrees | |
| 6 | Nominal flux at Tq of 35°C at 100% | 7000lm (minimum) | |
| 7 | Class and type of luminaire | Class 1 of IEC 60598 – 1 and totally enclosed type | |
| 8 | Streetlight luminaire to be replaced | 70W HPS | |
| 9 | Rated Wattage of the equivalent luminaire | 35W (maximum) | |
| 10 | Mass of luminaire / Battery / Solar Panel | 20kg (maximum) | |
| 11 | Colour temperature | Between 4000K – 5000K | |
| 12 | Luminaire efficacy (lm/W) | 200 lm/W (minimum) | |
| 13 | Colour rendering index | 70 (minimum) | |
| 14 | Lighting design standard to comply | ARP 035 | |
| 15 | Luminaire dimming profile | Required | |
| 16 | Degree of protection | IP 66 (minimum) | |
| 17 | Material of Solar LED luminaire housing | Aluminium | |
| 18 | Type and nominal size of spigot entry | Bottom entry, Inside diameter of 76 mm | |
| 19 | Maximum length of spigot entry | 125mm | |

Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA [“To Be Advice”] will not be accepted

Tender Number: _____

Tenderer's Authorised Signatory: _____ Name in block letter _____ Signature _____

Full name of company: _____

TECHNICAL SCHEDULES A & B:

ITEM No. 1 SAP No. 4992: LED Solar Streetlight Luminaire – Equivalence of the 100 Watt HPS/T streetlight luminaire continues

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

| Item | Description | Schedule A | Schedule B |
|-----------|---------------------------------------|------------------|------------|
| 20 | Battery | | |
| | Battery Type | Lithium ion | |
| | Battery Ampere Hour | Required | |
| | Battery Voltage | 12- 48 V | |
| | Battery charging & discharging cycles | 1000 | |
| | Battery cell protection | Yes | |
| | Charge controller type | MPPT | |
| 21 | Autonomy days | 2 days | |
| 22 | Solar Panel | | |
| | Panel Type | Mono crystalline | |
| | Panel Voltage | Required | |
| | Number of Cells | Required | |
| 23 | Max peak power | Required | |
| 24 | Max Current | Required | |
| 25 | Operating Temperature | -15 to +65 | |
| 26 | MPPT Controller | | |
| | Controller Type | MPPT | |
| | Programmable | Yes | |
| | Controller communication mode | Specify | |
| 27 | Smart Monitoring | | |
| | Integrated Smart controller | Yes | |
| | Photometric data enclosed | Required | |
| | Material safety datasheet attached | Required | |
| | Test reports submitted | Required | |
| | Special test reports submitted | Required | |
| | Data dot and labelling | Required | |

TECHNICAL SCHEDULES A & B:

ITEM No. 1 SAP No. 4993: LED Solar Streetlight Luminaire – Equivalence of the 250 Watt HPS/T streetlight luminaire

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

| Item | Technical Details | Schedule A | Schedule B |
|------|---|--|------------|
| 1 | Manufacturer Name of the luminaire | Required | |
| 2 | Place of manufacturer | Required | |
| 3 | Type of solar luminaire | integrated | |
| 4 | Standard to which LED luminaire complies | IEC 60598 | |
| 5 | Optic mounting angle | 15 degrees | |
| 6 | Nominal flux at Tq of 35°C at 100% | 17000lm (minimum) | |
| 7 | Class and type of luminaire | Class 1 of IEC 60598 – 1 and totally enclosed type | |
| 8 | Streetlight luminaire to be replaced | 250W HPS | |
| 9 | Rated Wattage of the equivalent luminaire | 85W (maximum) | |
| 10 | Mass of luminaire / Battery / Solar Panel | 50kg (maximum) | |
| 11 | Colour temperature | Between 4000K – 5000K | |
| 12 | Luminaire efficacy (lm/W) | 200 lm/W (minimum) | |
| 13 | Colour rendering index | 70 (minimum) | |
| 14 | Lighting design standard to comply | ARP 035 | |
| 15 | Luminaire dimming profile | Required | |
| 16 | Degree of protection | IP 66 (minimum) | |
| 17 | Material of Solar LED luminaire housing | Aluminium | |
| 18 | Type and nominal size of spigot entry | Bottom entry, Inside diameter of 76 mm | |
| 19 | Maximum length of spigot entry | 125mm | |

Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA [“To Be Advice”] will not be accepted

Tender Number: _____

Tenderer's Authorised Signatory: _____ Name in block
letter _____ Signature _____

Full name of company: _____

TECHNICAL SCHEDULES A & B:

ITEM No. 1 SAP No. 4993: LED Solar Streetlight Luminaire – Equivalence of the 250 Watt HPS/T streetlight luminaire continues

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

| Item | Description | Schedule A | Schedule B |
|-----------|---------------------------------------|------------------|------------|
| 20 | Battery | | |
| | Battery Type | Lithium ion | |
| | Battery Ampere Hour | Required | |
| | Battery Voltage | 12- 48 V | |
| | Battery charging & discharging cycles | 1000 | |
| | Battery cell protection | Yes | |
| | Charge controller type | MPPT | |
| 21 | Autonomy days | 2 days | |
| 22 | Solar Panel | | |
| | Panel Type | Mono crystalline | |
| | Panel Voltage | Required | |
| | Number of Cells | Required | |
| 23 | Max peak power | Required | |
| 24 | Max Current | Required | |
| 25 | Operating Temperature | -15 to +65 | |
| 26 | MPPT Controller | | |
| | Controller Type | MPPT | |
| | Programmable | Yes | |
| | Controller communication mode | Specify | |
| 27 | Smart Monitoring | | |
| | Integrated Smart controller | Yes | |
| | Photometric data enclosed | Required | |
| | Material safety datasheet attached | Required | |
| | Test reports submitted | Required | |
| | Special test reports submitted | Required | |
| | Data dot and labelling | Required | |

TECHNICAL SCHEDULES A & B:

ITEM No. 1 SAP No. 4994: LED Solar Streetlight Luminaire – Equivalence of the 400 Watt HPS/T streetlight luminaire

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

| Item | Technical Details | Schedule A | Schedule B |
|------|---|--|------------|
| 1 | Manufacturer Name of the luminaire | Required | |
| 2 | Place of manufacturer | Required | |
| 3 | Type of solar luminaire | integrated | |
| 4 | Standard to which LED luminaire complies | IEC 60598 | |
| 5 | Optic mounting angle | 15 degrees | |
| 6 | Nominal flux at Tq of 35°C at 100% | 27000lm (minimum) | |
| 7 | Class and type of luminaire | Class 1 of IEC 60598 – 1 and totally enclosed type | |
| 8 | Streetlight luminaire to be replaced | 400W HPS | |
| 9 | Rated Wattage of the equivalent luminaire | 135W (maximum) | |
| 10 | Mass of luminaire / Battery / Solar Panel | 60kg (maximum) | |
| 11 | Colour temperature | Between 4000K – 5000K | |
| 12 | Luminaire efficacy (lm/W) | 200 lm/W (minimum) | |
| 13 | Colour rendering index | 70 (minimum) | |
| 14 | Lighting design standard to comply | ARP 035 | |
| 15 | Luminaire dimming profile | Required | |
| 16 | Degree of protection | IP 66 (minimum) | |
| 17 | Material of Solar LED luminaire housing | Aluminium | |
| 18 | Type and nominal size of spigot entry | Bottom entry, Inside diameter of 76 mm | |
| 19 | Maximum length of spigot entry | 125mm | |

Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA [“To Be Advice”] will not be accepted

Tender Number: _____

Tenderer's Authorised Signatory: _____ Name in block letter _____ Signature _____

Full name of company: _____

TECHNICAL SCHEDULES A & B:

ITEM No. 1 SAP No. 4994: LED Solar Streetlight Luminaire – Equivalence of the 400 Watt HPS/T streetlight luminaire continues

Schedule A: Purchaser's specific requirements

Schedule B: Guarantees and technical particulars of equipment offered

| Item | Description | Schedule A | Schedule B |
|-----------|---------------------------------------|------------------|------------|
| 20 | Battery | | |
| | Battery Type | Lithium ion | |
| | Battery Ampere Hour | Required | |
| | Battery Voltage | 12- 48 V | |
| | Battery charging & discharging cycles | 1000 | |
| | Battery cell protection | Yes | |
| | Charge controller type | MPPT | |
| 21 | Autonomy days | 2 days | |
| 22 | Solar Panel | | |
| | Panel Type | Mono crystalline | |
| | Panel Voltage | Required | |
| | Number of Cells | Required | |
| 23 | Max peak power | Required | |
| 24 | Max Current | Required | |
| 25 | Operating Temperature | -15 to +65 | |
| 26 | MPPT Controller | | |
| | Controller Type | MPPT | |
| | Programmable | Yes | |
| | Controller communication mode | Specify | |
| 27 | Smart Monitoring | | |
| | Integrated Smart controller | Yes | |
| | Photometric data enclosed | Required | |
| | Material safety datasheet attached | Required | |
| | Test reports submitted | Required | |
| | Special test reports submitted | Required | |
| | Data dot and labelling | Required | |

Note: Ticks, Cross [√, X], Astrick [*], Word [Noted] or TBA ["To Be Advice"] will not be accepted

Tender Number: _____

Tenderer's Authorised Signatory: _____ Name in block
letter _____ Signature _____

Full name of company: _____