a world class African city

TITLE: **SPECIFICATION FOR SOLAR LUMINAIRE**

REFERENCE	REV
CP_NISSP_001	0

DATE: **FEBRUARY 2025**

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FOREWORD

This specification was prepared by the following work group members:

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

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2016

INTRODUCTION

Integrated solar street lighting luminaires are used for the public throughfares 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 the 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 1safety 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 galvanized 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.*
- *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

i. The Integrated solar street lighting luminaire shall comply with SANS 60598-1-2-3 and SANS 475.
ii. 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.
iii. All materials must be corrosion-resistant and vandal-proof.
iv. The luminaire shall be robustly constructed from aluminum to prevent undue deterioration in its safe operation or appearance during normal life when operated in climatic conditions prevailing in the country.
v. 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.
vi. Small components such as toggle clips, bolts, screws, nuts and washers shall be manufactured of stainless steel (grade 304 or better).
vii. 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.
viii. The battery, MPPT controller and the driver shall be mounted internally and not accessible by any form of tools.
ix. 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.
x. 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.
xi. 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.
xii. The Integrated solar street lighting luminaire shall have monocrystalline panel.
xiii. All ratings must be certified by a test report confirming compliance with SANS/IEC 60598-1.
xiv. 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.
xv. The Integrated solar street lighting shall include quality Lithium Battery with a life span of 10 years.
xvi. The integrated solar street lighting luminaire shall have a rated voltage range of 12- 48V battery with an allowable discharge capacity not exceeding 50%.
xvii. The Installation instructions and connection diagram shall be provided to the integrated solar streetlight luminaire leaflet.

xviii. Maintenance and operation guidelines for the integrated solar street lighting luminaire shall be provided.

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

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

xxi. 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 should 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

- Photometric data shall be provided.
- 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.

4.4.1 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.

4.4.2 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.

4.4.3 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 aluminum) 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

5.1.2 The Integrated Luminaire special test reports shall include the following:

- Colour temperature
- Luminaire efficacy

5.1.3 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

5.1.4. 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

5.1.5. Batteries tests

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

5.2. Design data

5.2.1 All designs for the below should be based on pole spacing of 40m (250w equivalence and 400w equivalence)

5.2.2 Data from the same luminaire equivalence should be used for all types of road within the category (e.g. one luminaire series should meet all the requirements)

5.2.3 No interchangeability of luminaire within the same category will be accepted

5.2.4 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)

1.11.1. Parameters shall be utilized for the designs

1. Maintenance factor of 80%
2. 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)
3. For 250W and 400W equivalence road arrangement with no median and 4 lanes with a maximum of 2 luminaire per pole (Single Spigot)
4. Luminaire losses of 80% minimum
5. Boom length of 0.5
6. Boom angle between 0 and 15°
7. Angle of rotation 0
8. Tar surface R3
9. Wet Surface W3
10. Longitudinal displacement of 0
11. The lane width is 4.5m (A type road)

12. Design should be based on the 600 cars per hour as per SANS 10098

1.11.2 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

1.11.3 LED STREETLIGHT EQUIVALENCE OF THE 70 WATT 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

1.11.4 LED Streetlight Equivalence of the 100 Watt 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

1.11.5 LED Streetlight Equivalence of the 250 Watt HPS/T: Sap No. 4993

Item	Maximum Luminaire equivalence (W)	Pole type	Pole Spacing	Type of road
1.	112	A5	30 to 40	A1
2.	112	A6	30 to 40	A1
3.	112	S1	30 to 40	A1
4.	112	S2	30 to 40	A1
6.	112	A5	30 to 40	A2
7.	112	A6	30 to 40	A2
8.	112	S1	30 to 40	A2
9.	112	S2	30 to 40	A2
11.	112	A5	30 to 40	A3
12.	112	A6	30 to 40	A3
13.	112	S1	30 to 40	A3
14.	112	S2	30 to 40	A3

16.	112	A5	30 to 40	A4
17.	112	A6	30 to 40	A4
18.	112	S1	30 to 40	A4
19.	112	S2	30 to 40	A4

1.11.6 LED Streetlight Equivalence Of 400 Watt HPS/T: Sap No. 4994

Item	Maximum Luminaire equivalence (W)	Pole type	Pole Spacing	Type of road
1.	180	A5	30 to 40	A1
2.	180	A6	30 to 40	A1
3.	180	S1	30 to 40	A1
4.	180	S2	30 to 40	A1
6.	180	A5	30 to 40	A2
7.	180	A6	30 to 40	A2
8.	180	S1	30 to 40	A2
9.	180	S2	30 to 40	A2
11.	180	A5	30 to 40	A3
12.	180	A6	30 to 40	A3
13.	180	S1	30 to 40	A3
14.	180	S2	30 to 40	A3
16.	180	A5	30 to 40	A4
17.	180	A6	30 to 40	A4
18.	180	S1	30 to 40	A4
19.	180	S2	30 to 40	A4

6. DOCUMENTATION

i. 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 more than 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.

7.1.1 City Power will provide suppliers with an integrated smart controller, which should 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.

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

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

7.1.4 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.

7.1.5 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 to prevent damage during handling, transportation and storage. The cartoons should 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	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	4000K – 5000K	
12	Luminaire efficacy (lm/W)	150 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: _____

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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	4000K – 5000K	
12	Luminaire efficacy (lm/W)	150 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

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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	4000K – 5000K	
12	Luminaire efficacy (lm/W)	150 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	

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