Specification – LED Luminaires and PE Cells for Street Lighting

Standard Number: HPC-8DJ-14-0001-2013

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Revision Control		
Revision	**Date**	**Description**
3	15/02/2022	Removed drawings, add AstroTourism requirement, updated PE Cell requirements
2	19/04/2018	Control switch requirements, Insulated earth terminal allowed, spigot size range requirements. CCT requirement changed to ≤ 3000
1	15/01/2015	Altered in line with Tender Prototypes

STAKEHOLDERS *The following positions shall be consulted if an update or review is required:*	
Asset Managers	Manager Operational Technology
Digital Strategy & Innovation Manager	Manager Systems & Network Planning
Manager Assets Services	Project Directors
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1 SCOPE

This specification covers Horizon Power's technical requirements for the manufacture, supply, testing and delivery of street light Luminaires using LED (light emitting diode) technology and associated accessories. The Luminaires are to be used for lighting roads and public spaces and pathways shared by roads and public spaces.

The specification excludes street light poles, fixing brackets and other structural components.

Tests prescribed will evaluate the performance of the Luminaires and shall comply with this specification.

Approval in terms of this specification shall be obtained by one or a combination of the following:

1) Proof through calculations that a specific luminaire has equivalent or enhanced lighting performance capabilities in terms of this specification
2) Successful completion of the appropriate tests required by this specification by an independent and accredited test authority.
3) Provision of test certificates from an independent and accredited test authority based upon an alternative specification, with test requirements at least equivalent to this specification.

NOTE: Verification of accreditation of the test authority shall be provided by NATA (National Association of Testing Authorities) accredited test house or by a test house possessing accreditation from a NATA MRA (Mutual Recognition Agreement) partner.

2 NORMATIVE REFERENCES

2.1 Standards

The following documents contain provisions that, through reference in the text, constitute requirements of this specification. At the time of publication, the editions indicated were valid. 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. Information on currently valid national and international standards and specifications can be obtained from SAI Global – Standards On-Line data base or equivalent standards database.

Table 1 List of Applicable Standards

STANDARD	DESCRIPTION
AS/NZS 1158.0:2005	Lighting for Roads and public spaces - Introduction.
AS/NZS 1158.1.1:2005	Lighting for Roads and public spaces - Vehicular traffic (Category V) lighting - Performance & installation design requirements.

STANDARD	DESCRIPTION
AS/NZS 1158.1.2:2010	Road Lighting – Vehicular traffic (Category V) lighting - Guide to design, installation, operation and maintenance.
AS/NZS 1158.2:2020	Lighting for Roads and public spaces - Computer procedures for the calculation of light technical parameters for Category V Lighting and Category P Lighting.
AS/NZS 1158.3.1:2020	Lighting for Roads and public spaces - Pedestrian area (Category P) lighting - Performance and installation design requirements.
AS/NZS 1158.4:2015	Supplementary Lighting For Pedestrian Crossings
AS/NZS 1158.6:2015	Lighting for roads and public spaces - Luminaires
AS/NZS 1680.1:2006	Interior Lighting-General Principles and Recommendations & Amendment 1
AS 1798:2014	Lighting poles and Bracket arms – Recommended dimensions
AS 1874:2000	–Aluminium and aluminium alloys – Ingots and castings
AS/NZS 1906-Series	Retro reflective Materials and Devices for Road Traffic Control Purposes.
AS/NZS 2053-Series	Conduits and Fittings for electrical installations.
AS/NZS 3000:2018	Wiring Rules
AS/NZS 4268:2017	Radio equipment and systems - Short range devices - Limits and methods of measurement
AS/NZS 4282:2019	Control of Obtrusive effects of outdoor lighting
AS/NZS 4680:2017	Hot-dip galvanized (zinc) coatings on ferrous articles
AS/NZS 9000-Series	Quality Systems as applicable.
AS/NZS 60598-Series	Luminaires
AS/NZS CISPR 15:2002	Limits and methods of measurements of radio disturbance characteristics of electrical lighting and similar equipment.
AS/NZS CISPR 22:2009	Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
ANSI/IEEE C62.41.2	IEEE Recommended Practice on Characterisation of Surges in Low Voltage Power Circuits
ANSI/IEEE C62.45	IEEE Guide for Surge Testing for Equipment Connected to Low Voltage Power Circuits

STANDARD	DESCRIPTION
ANSI C136.41:2013	American National Standard for Roadway and Area Lighting Equipment – Dimming Control Between an External Locking Type Photocontrol and Ballast or Driver
ARPANSA	Australian Radiation Protection and Nuclear Safety Agency
Energy Safety	Western Australian Electrical Requirements.
LM-63-02	Illuminating Engineering Society – Standard File Format for Electronic Transfer of Photometric Data
LM-79-08	Illuminating Engineering Society – –Electrical and Photometric Measurements of Solid-State Lighting products
LM-80-15	Illuminating Engineering Society – Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules
IEC 60529:2004	Degrees of Protection Provided by Enclosures (IP code)
IEC 61643-331	Components for low-voltage surge protective devices Part 331: Specification for metal oxide varistors (MOV)
IEC 62262:2002	Degrees of Protection Provided by Enclosures for Electrical Equipment against External Mechanical Impacts (IK code)
TM-21-11	Projecting Long Term Lumen Maintenance of LED Light Sources
UPCOPWA:2016	Utility Providers Code of Practice for Western Australia

2.2 Definitions and Abbreviations

For the purposes of this specification the following definitions apply:

2.2.1 Definitions

1) **Luminaire:** equipment which houses the lamp(s) and directs the light in desired directions. It includes items necessary for fixing, protecting and operating the lamp(s).
2) **System Wattage:** total consumption wattage required to drive the luminaire, i.e. LED driver, LED pads and control switch.

2.2.2 Abbreviations

1) **AC:** Alternating Current
2) **AMF:** Approved Manufacturing Facility
3) **AS:** Australian Standard
4) **LV:** Low Voltage <1000 Vac

3 GENERAL REQUIREMENTS

3.1 Power System Particulars

3.1.1 Rated Voltages

The Luminaire shall operate within a voltage range of 230 V + 10% - 6% (single phase).

3.1.2 Nominal System Frequency

The Luminaire shall operate within a frequency band of 50 ± 5 Hz.

3.1.3 System Insulation Levels

The system insulation levels and standard withstand voltages are as follows:

Table 2 System Insulation Levels

Nominal System Voltage	System Highest Voltage (kV peak)	Lightning Impulse withstand Voltage (kV peak)	Power Frequency withstand Voltage (kV peak)
Up to 1 kV	1.0	6	2.5

3.2 Environmental Conditions

The Equipment shall be suitable for use throughout the state of Western Australia in conditions where a wide range of solar radiation, pollution (salt bearing and industrial), humidity and wind velocities are experienced. The Equipment shall be suitable for continuous operation under the environmental conditions stated in **HPC-9EJ-01-0001-2013 Horizon Power Environmental Conditions** for the duration of its design life.

3.3 Carbon Emission

The Vendor shall determine and quantify the following:

1) CO_2 emissions (Tonnes),
2) NO_x emissions (Tonnes),
3) SO_x emissions (Tonnes),

In undertaking the production of a singular pole and provide in the proposal, calculations detailing the methodology employed to determine the above.

3.4 Disposable Strategy

The Vendor shall provide details of its end-of-life strategy for the Equipment or in part thereof as part of the proposal. Horizon Power has preference for a recycling scheme offered by the Vendor. The recycling scheme shall have the following as a minimum:

- Point of Collection
- Transport
- Buy back value (i.e. scrap value)
- Other

The Luminaire shall be suitable for use throughout the state of Western Australia in conditions where a wide range of solar radiation, pollution (salt bearing and industrial), humidity and wind velocities are experienced. The Luminaire shall be suitable for continuous operation under the following environmental conditions for the duration of its design life:

4 LUMINAIRE REQUIREMENTS

4.1 General

4.1.1 Luminaire Assembly

Each Luminaire shall consist of an assembly that utilizes LED lamps as the light source. In addition, a complete Luminaire shall consist of a housing, LED lamps and electronic driver (power supply).

4.1.2 Luminaire Life

Each Luminaire shall be rated for a minimum operational life of 82,000 hours, assuming each Luminaire will operate for 11 hours per night every day of the year for 20 years, assuming an average night-time temperature of 40°C.

Minimum operational life is defined here as the B10 life, i.e. only 10% of units will fail before reaching this minimum operational life. The vendor shall state the B10 life of the Luminaire as a whole (excluding the control switch, unless it is hard-wired), to a statistical confidence level of 95%.

Each Luminaire shall meet all the requirements of this specification throughout the minimum operational life when operating under the service conditions listed in section 3.2.

4.1.3 Life Cycle Costs

Information and data submitted by Vendors shall be evaluated by Horizon Power with a strong focus on whole-of-life costs. Maintenance requirements, if any, during the operational life of the Luminaire shall be clearly stated, including maintenance frequency and man hours, and spares required for maintenance.

4.1.4 Catastrophic Failures

The individual LED lamps shall be connected such that a catastrophic loss or failure of one LED lamp will not result in the loss of the entire Luminaire.

4.1.5 Markings

Each Luminaire shall have markings as specified in clause 1.6.1 of AS/NZS 1158.6:2015, with lamp type “L” to indicate LED. Insulation Class shall be clearly marked.

Label Inside Fitting:

1) Manufacturer
2) Model/Year
3) System Wattage/Lamp Wattage/Voltage
4) HP Stock Number

4.2 Other Technical Requirements

4.2.1 Power Factor

The Luminaire shall have a power factor between 0.85 and 1.0.

4.2.2 Total Harmonic Distortion

Total harmonic distortion (current and voltage) induced into Horizon Power's low voltage distribution network by a Luminaire must not exceed 8% at the point of connection to the network.

4.2.3 Flicker

The Luminaire circuitry shall prevent perceptible flicker to the unaided eye over the voltage range specified in clause 3.1.1.

4.2.4 Radio Frequency Interference

Interference suppression shall be fitted to Luminaires in compliance with clause 4.5 of AS/NZS 1158.6:2015.

4.2.5 Electrical Safety

Horizon Power installs streetlights to a standard that provides electrical safety in compliance with clause 1.5.5.4 of AS/NZS 3000:2018. Streetlight poles are not earthed and there is no provision for earthing of Luminaire components. To satisfy these requirements Luminaires shall be Class II in compliance with AS/NZS 60598.1:2017, with the following qualifications:

- Note 4 to clause 1.2.23 of AS/NZS 60598.1:2017 allows an earth terminal for the purpose of retaining earth continuity where the supply cable is looped in and out of the enclosure.
- This earth terminal must be insulated from conductive elements (including the enclosure) by insulation at least equivalent to reinforced or double insulation.
- This earth terminal shall be marked with either an 'E' or earth symbol.

Horizon Power may consider Luminaires that comply with clause 1.5.7 of AS/NZS 3000:2018 where basic and fault protection is provided by operating at extra low voltage. Such Luminaires shall be Class III in compliance with AS/NZS 60598.1:2017.

Full details shall be provided of any electrical protection devices (e.g., fuses, circuit breakers) that form part the electrical safety system. This shall include rating curves and serviceability details.

4.2.6 Cable, Cable Entry and Termination

All luminaires shall be prewired with 2 core circular flexible cable, 1.5 mm^2 0.6/1 kV heavy duty, thermo-plastic PVC, cross-linked polyolefin or cross-linked elastomer insulated and sheathed cable (compliant to relevant Australian Standard). The cable entry recess shall comply with the requirements of clause 3.5 of AS/NZS 1158.6:2015 and have a have waterproof cable entry gland.

For category P luminaires, length of the cable shall be 8 meters.

For category V luminaires, length of the cable shall be 15 meters.

The cable entry gland shall be suitable for mechanical protection of the cable being installed vertically within the streetlight pole (that is otherwise unsupported along its entire length for up to 12 m) without compromising the Class II installation and IP rating of the luminaire for the expected luminaire service life.

All electrical equipment shall meet the requirements of Class II luminaire as specified in AS/NZS 60598.1:2015 with electrical circuits having the insulation colour coded in accordance with AS 3000:2007.

The terminal blocks shall meet the requirements of AS/NZS 1158.6:2015 clause 3.6 with incoming terminal blocks marked to clearly identify the active (A) and neutral (N) terminals.

The cable shall not be subject to abrasion from any corrugations or sharp surfaces along the cable path. The cable grommet/gland shall be aligned with the spigot as shown in Figure 1.

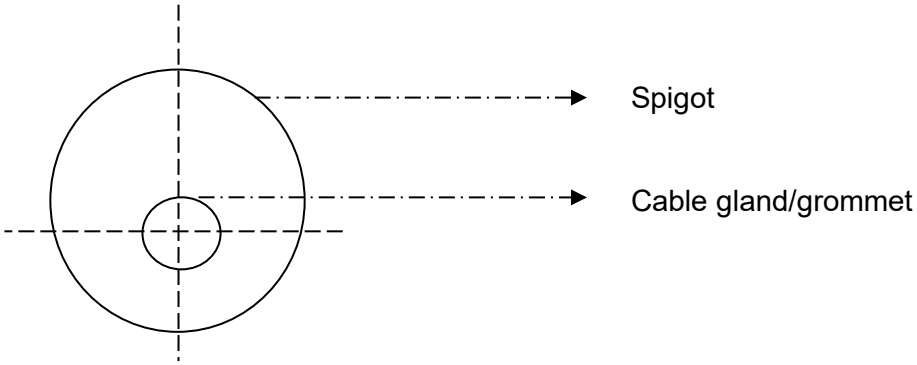

Figure 1 Spigot and cable gland arrangement

4.2.7 Luminaire Internal Wiring

Wiring and insulation shall comply with clauses 5.3 of AS/NZS 60598.1:2017. Wiring colour codes shall be:

Wiring connections to the photoelectric cells shall be:

1) Active - red
2) Load - white
3) Neutral - black

Wiring connections to the LED Driver shall be:

1) Load - brown
2) Neutral - blue

4.2.8 LED Driver

The LED Driver shall:

1) be contained inside the Luminaire, rated for outdoor operation and have a minimum IP 66 rating
2) be double insulated with plastic housing without any earth connection/grounding
3) be rated for a minimum life expectancy equal to or greater than the minimum operation life of the Luminaire as per clause 4.1
4) not have its case temperature rise by more than 10 °C in free air with no additional heat sinks
5) have two leads to accept standard 0-10 V dimming controls compatible with IEC 60929 Annexure E and wired up to the NEMA Socket
6) be programmable, minimum DALI, preferably DALI-2/D4i
7) default to 100% power if the control leads are open or control signal is lost

The following features are preferred but not essential:

8) Constant lumen output (CLO) dimming functionality, matched to the LED lumen depreciation curve
9) Safety Extra-Low Voltage (SELV) isolation between driver input and output

4.2.9 Socket for Photoelectric Cell Switch

A NEMA socket 7 contact pattern base, complying with ANSI C136.41, shall be provided for photoelectric cell with all spare contacts wired to spare terminals.

The vendor shall state the materials used for the power and dimming/signal contacts, and the respective current-carrying capacity in Amperes.

The socket shall be located on the bottom of the luminaire and be clearly shown on product drawings.

Note: The vendor to provide a suitable cover on the PE socket to prevent moisture ingress into the internal casing during storage and/or transport.

4.3 Physical Characteristics

4.3.1 General

The Luminaire shall be a single, self-contained device, not requiring on-site assembly for installation. The power supply (driver) shall be a modular unit to facilitate replacement if required.

All internal components shall be adequately supported to withstand mechanical shock and vibration from high winds and other sources.

4.3.2 Housing including Visor

The Luminaire body shall be made of aluminium alloy in compliance with AS 1874 and explained in clause 2.5 of AS/NZS 1158.6:2015. The housing shall contain an integrated heat sink.

The housing (including visor) shall be designed to prevent the build-up of water and dust on top of the housing. Exposed heat sink fins, if available, shall be oriented so that water can freely run off the Luminaire and carry dust and other accumulated debris away from the unit.

Visors attached to the Luminaire housing shall comply with clause 2.4 of AS/NZS 1158.6:2015. Polycarbonate material if used shall be UV stabilised. The use of polycarbonate or other materials that may discolour or degrade in the light transmission elements can impact on the lumen output.

Visors that are shaped to be 'self cleaning' are preferred.

The housing shall be easily opened and closed without the use of a tool. There shall be additional room available in the wiring compartment for placing adaptive controls in the future.

4.3.3 Colour

Two exterior colour options are permissible:

1) Raw unpainted aluminium or
2) Light grey or silver colour.

Corrosion resistant surfaces are preferred.

4.3.4 Dimensions, Weight and Fixing

Luminaires shall be suitable for fixing into streetlight brackets/outreach arms currently installed by Horizon Power on streetlight poles see section 4.3.7. Luminaire physical specifications shall comply with clause 2.9 of AS/NZS 1158.6:2015 and dimensions shall be such as to not exceed the maximum wind rating considering the effective projected area. Loading impact on fixing structures shall be specified with the maximum weight of one luminaire being ≤20 kg.

Fixing spigot entry shall comply with the requirements of clause 2.8 of AS/NZS 1158.6:2015.

4.3.5 Ingress Protection

Luminaires shall be rated minimum IP65 with photoelectric cell fitted as per AS 60529:2004 in terms of dust and moisture ingress, and the optical assembly of the Luminaire shall be protected against dust and moisture intrusion to a minimum IP 66 standard.

4.3.6 Vandal Proofing

Luminaires shall have a minimum IK08 rating in terms of resistance to vandalism. Luminaires with IK10 vandal rating shall be made available on request.

4.3.7 Spigot

The vendor shall supply adjustable fixing spigot arrangement with a minimum of four contact points. This shall suit existing streetlight brackets/outreach arms of sizes 25NB (for P-class luminaires) and 40NB (for V-class luminaires).

The vendor shall state the minimum and maximum spigot sizes for each luminaire tendered.

4.4 Thermal Management

4.4.1 Junction Temperature

This is the temperature of the electronic junction of the LED Luminaire. The junction temperature is critical in determining the photometric performance, operational life and preventing catastrophic LED failures. The designed maximum junction temperature shall not exceed 105°C and the junction to ambient thermal resistance shall be 15°C/Watt or less.

4.4.2 Passive Design

There shall be adequate thermal management of LEDs to ensure sufficient heat dissipation to assure proper operation of the Luminaire over the minimum operational life as specified in clause 4.1.2.

The heat sink material shall be aluminium or other material of equal or lower thermal resistance. The use of fans or other mechanical devices shall not be allowed.

The Luminaire may contain circuitry that will automatically reduce power to the LEDs to a level that will ensure that the maximum junction temperature is not exceeded.

4.5 Photometric Requirements

4.5.1 Typical Installation Parameters

Table 3 indicates the typical physical locations the Luminaires are to be installed to provide lighting to vehicles and pedestrians. Luminaires supplied shall be suitable for each lighting category and comply with Luminaire Performance Standards in clause 4.6.1.

Table 3 Lighting Categories for Roadway/Public Spacing and Accompanying Pole Heights

Type of Public Spacing/Roadways	Lighting Category	Typical Spacing (m)	Typical Road Reserve Width (m)	Possible Luminaire Mounting Height (m)
Major	V3	65 - 100	30 - 40	10.5 or 12.5
Commercial and Industrial precinct	V3	65 - 80	30 - 40	10.5 or 12.5
Minor/Principal	V4	65 - 100	30 - 40	10.5 or 12.5
Cycle-way/Footpath	PP4	(40 - 65)* or (65 - 100)**	Any***	All
Residential or Local road	PR5	40 - 65	15 - 20	6.5
Cul-de-sacs	PR5	40 - 65	15 - 20	6.5
Residential or Local road	PR6	65 - 100	15 - 20	6.5 or 10.5
Shopping Mall	PA2	20 - 40	Any***	6.5 or 10.5
Civic square or Retail precinct	PA2	20 - 40	30 - 40	6.5 or 10.5
Transport Interchange	PA2	20 - 40	N/A	6.5 or 10.5
Open Car Park	PC2	20 - 40	Any***	6.5 or 10.5

Notes:

* For Footpath with Residential or Local road

** For Footpath with Major roads

*** Could be any width

4.5.2 Streetlight Pole Location

As required by the Utility Providers Code of Practice for Western Australia, streetlight poles are located 2.7 m (2.4 m to 3.0 m alignment) or 0.3 m (0 to 0.6 m alignment) from property boundaries.

4.6 Luminaire Performance

4.6.1 Performance Standards

The Luminaire performance shall comply with the requirements for vehicular traffic (category V) in Table 2.2 of AS/NZS 1158.1.1:2015 and the requirements for pedestrian area (category P) lighting in Tables 2.6, 2.7 and 2.9 of AS/NZS 1158.3.1:2020.

The following dimensions are according to AS 1798:2014 Appendix B.

Table 4 Horizon Power standard light pole dimensions

Nominal mounting height (m)	Intended Lighting Categories	Arm projection (m)	Pole setback (m)	Upcast angle (°)	Pipe spigot
6.5	PA2, PC2, PP4, PR5, PR6	1.5	2.3	5	DN25, 120 mm long
10.5	PA2, PC2, PR6, V1, V2, V3, V4, V5	3.0	2.3	5	DN40, 150 mm long
12.5	V1, V2, V3, V4, V5	3.0	2.3	5	DN40, 150 mm long
Cycle-way/Footpath	PP4	(40 - 65)* or (65 - 100)**	2.3	All	
Residential or Local road	PR5, PR6	40 - 65	2.3	5	

4.6.2 Luminous Output Maintenance

The extrapolated life in hours of the Luminaire when the luminous output depreciates 30% from initial value (L70) shall be at least the minimum operational life specified in clause 4.1.2.

Constant lumen output (CLO) dimming functionality in LED drivers is preferred.

4.6.3 Colour Temperature and Colour Rendition Index

The Luminaire shall have a correlated colour temperature (CCT) not greater than 3000 K. The preferred colour CCT is 3000 K.

The colour rendition index shall be 70 or greater.

4.6.4 Lumen Projections

The Luminaire shall not allow more than 10% of rated lumens to project above 80° from the vertical and 2.5% of rated lumens to project above 90° from the vertical.

4.6.5 AstroTourism – Dark Sky Sensitive Streetlights

Preference will be given to Luminaire's that comply with AS/NZS 4282:2019 requirement for spill light, with AS/NZS 1158.3.1:2020 section 3.7 on the control of glare and upward waste light as well as having a 0% Upward Waste Light Ratio (UWLR) in its installed position.

5 PHOTOELECTRIC CELL REQUIREMENTS

Where there is a requirement to complement a Luminaire with a plug-in photoelectric cell, the requirements shall be as described herein.

5.1 Functionality

At a minimum the photoelectric cell would need to:

1) be suited to the luminaires voltage range as stated in section 3.1.1,

2) have a current range of 10A RMS with the maximum being 10A load current, and

3) have controlled switching

5.2 Life

The photoelectric cell shall be rated for a minimum life expectancy equal to or greater than 10 years.

The photoelectric cell shall have a minimum warranty of eight years.

The cell's relay shall have contacts closed when de-energised, and shall fail in a closed state.

5.3 Interface

Vendors shall supply a suitable photoelectric cell with an enclosure that complies with ANSI C136.41:2013 standard and suitable base that is safe when inserted into the socket designed as per clause 4.2.9. The electrical safety requirements shall be in compliance with clause 4.2.5. The photoelectric cell shall be rated for minimum IP65 while fitted to the luminaire, this may be done with a Nitrile O-ring or similar seal having an equivalent diameter to the NEMA base and a minimum thickness of greater than 6 mm.

5.4 Enclosure

The enclosure shall be suited to the environmental conditions as stated in section 3.2, with regard to resistance to UV, temperature extremes, fire and corrosion. Thermoplastic materials such as acrylic or polytetrafluoroethylene (PTFE), or silicone thermosetting plastics are preferred. In terms of dust and moisture ingress, the photoelectric cell shall be protected against dust and moisture intrusion to a minimum IP rating as stated in section 4.3.5.

The location of the PE Cell shall be clearly shown on product drawings and the weight of the PE cell shall not exceed 300 grams.

5.5 Controlled Switching

5.5.1 Default Thresholds and Delays

The default delay for both switch-on and switch-off shall be 30 seconds.

The default operating thresholds shall be:

- 10 Lux for switching on
- 30 Lux for switching off

5.5.2 Power Consumption

The vendor shall state the power consumption of the switching unit, in both states. A chart can be used to demonstrate power usage.

Power consumption in either state shall not exceed on average 0.5 W.

Power factor during all states shall be between 0.85 lagging and unity.

5.5.3 Protection

The control switch shall be equipped with surge protection to IEEE/ANSI C62.41.2 and IEC 61643-331.

6 STORAGE

The Luminaire shall be capable of being stored without deterioration within the temperature range of -10°C to +45°C for at least 24 months. Special storage requirements, if any and shelf life shall be clearly stated.

7 RELIABILITY

Vendors shall provide information on the reliability of the Luminaire and the performance of the materials offered over Luminaire operational life under the specified field of application and conditions of service.

Information provided shall evidence the claimed reliability and performance for the Luminaire offered, including information on Failure Mode and Effect Analysis.

8 SAFETY

Material Safety Data Sheets (MSDS) applicable for each different Luminaire or chemical ingredient in the Luminaire which is considered harmful to personnel or environment in any manner shall be supplied with the Proposal.

Special loading requirements shall be clearly stated.

9 ENVIRONMENTAL CONSIDERATIONS

Vendors shall provide information on the environmental soundness of the design and the materials used in the manufacture of the Luminaire offered. In particular, information should address such issues as recyclability and disposability at the end of service life as well as disposability of materials supplied.

10 TESTS

10.1 Design Qualification Testing

10.1.1 Approved Testing Lab

Design Qualification Testing shall be performed in a NATA (National Association of Testing Authorities) approved testing lab on new Luminaire designs and when a major design change has been implemented on an existing design. A major design change is defined as a design change (electrical or physical) which changes any of the performance characteristics of the Luminaire, results in a different circuit configuration for the LED driver or changes the layout of the individual LED lights in the module. Testing performed by an accredited test house or by a test house possessing accreditation from a NATA MRA (Mutual Recognition Agreement) partner shall be acceptable. A formal report covering the outcome of the testing shall be made available to Horizon Power.

10.1.2 Number of Samples

Two units of each design shall be submitted for Design Qualification Testing.

10.1.3 Testing Data

Testing data shall be submitted to Horizon Power after testing is complete. Product submittals shall be accompanied by product specification sheets or other documentation that includes the design parameters as detailed in this specification. These parameters include (but not limited to):

- Maximum power in Watts.
- Maximum designed junction temperature.
- Heat sink area in square millimetres.
- Designed junction to ambient thermal resistance calculation with thermal resistance components clearly defined.
- L70 in hours, when extrapolated for the average night time temperature (as per section 4.1).

10.1.4 Model Test

Product submittals shall be accompanied by IES LM-79 and IES LM-80 compliant test reports from a NATA approved testing lab, for the specific model being submitted.

10.1.5 Photometric Test

Product submittals shall be accompanied by IES LM-63 compliant photometric file based on IES LM-79 test report.

10.1.6 Lumen Depreciation Test

Product submittals shall be accompanied by initial and depreciated lumen charts showing the specified minimum luminance curve for that particular application.

- The charts shall be calibrated to metres and show a 40 m by 40 m grid.
- The charts shall be calibrated to the mounting height specified for that particular application.
- The depreciated lumen curve shall be calculated at the minimum operational life.

In addition to these charts, the data on which the charts are based shall be provided, in accordance with IES LM-80. Lumen depreciation extrapolated beyond 6000 hours shall use IES TM-21.

10.1.7 Vibration Test

Product submittals shall be accompanied by a test report showing that the Luminaire resistance to vibration complies with the requirements in clause 5.8 of AS/NZS 1158.6:2015.

10.1.8 Ingress Protection Test

Product submittals shall be accompanied by a test report showing that the Luminaire's ingress protection complies with section 9 of AS/NZS 60598.1, with the supplier's photoelectric cell fixed to the base of the Luminaire.

10.1.9 Mechanical Impact Test

Product submittals shall be accompanied by a test report showing that the Luminaire's resistance to external mechanical impact complies with IEC 62262.

10.1.10 Right to Reject

The passing of such tests shall not prejudice the right of Horizon Power to reject the Luminaire if it does not comply with the specification when installed.

10.2 Production Quality Testing

Horizon Power reserves the right to witness an agreed program of routine tests to be assured of the competence of the manufacturing facility to deliver consistently conforming Luminaires. The Vendor shall in all cases make all necessary provisions with the testing and/or manufacturing facilities to enable witnessing to take place. An Inspection and Test Plan (ITP) shall be provided to Horizon Power prior to witnessing of tests.

Prior to first delivery of Luminaires, the Vendor shall submit to Horizon Power all production quality tests performed on that batch of Luminaires.

11 DOCUMENTATION AND SAMPLES

11.1 Type Test Certificates/Reports/Computer Models

Test certificates, test reports or any other supporting documents supplied as evidence for compliance to relevant standards shall be made available in English for review by Horizon Power.

Relevant computer models (software file) for each Luminaire shall be provided.

11.2 Samples

Any deviations between the supplied as a sample to Horizon Power and the Luminaire offered in the Proposal shall be detailed by the Vendor.

11.2.1 Test Samples

For the purpose of evaluation, test samples of the Luminaire may be requested by Horizon Power. Each sample shall be labelled with a robust tag stating:

1) Vendor Name;
2) Luminaire Number;
3) Batch Number; and
4) Stock Code.

When requested, the Vendor shall supply Horizon Power test samples free of charge and within four weeks of the request.

12 PACKAGING REQUIREMENTS

The Luminaire shall be suitably packaged, such that it is “fit for use” at any location in Horizon Power’s operational area. Packaging shall be capable of preventing damage whilst in storage and during transit to remote locations. The Vendor is required to nominate standard pack quantities and standard packs shall be clearly marked with the following information:

1) Manufacturer’s name
2) Manufacturer’s part reference number
3) Batch Number
4) Horizon Power Order Number
5) Horizon Power Stock Number

APPENDIX A REVISION INFORMATION

(Informative) Horizon Power has endeavoured to provide standards of the highest quality and would appreciate notification of errors or queries.

Each Standard makes use of its own comment sheet which is maintained throughout the life of the standard, which lists all comments made by stakeholders regarding the standard.

A comment sheet found in **DM # 1812249** can be used to record any errors or queries found in or pertaining to this standard. This comment sheet will be referred to each time the standard is updated.

Date	Rev No.	Notes
15/02/2022	3	Update Australian Standards, section 2.3 – removed, section 4.2.8 – add DALI requirements, section 4.2.9 – removed option for onboard switching and added wiring requirements for NEMA 7 pin connector, section 4.2.10 – removed, added section 4.6.5 Astrotourism – Dark Sky Sensitive Streetlights, section 5 – PE Cell being more descriptive.
19/04/2018	2	Control switch requirements added to section 5, Insulated earth terminal allowed as per AS/NZS 60598.1:2017, spigot size range requirements. CCT requirement changed to ≤ 3000.
17/12/2014	1	Surge Protection and Surge Protection Test removed Supply Cable Entry and Termination – Alignment of Cable Gland and Spigot added LED Driver- Double Insulation specified PE Cell – IP Rating, Type of mounting – Onboard/Off board and warranty specified Luminaire IP Rating – Changed from IP55 to IP65 with PE Cell fitted IK Vandal Rating –IK10 Option specified for high vandal areas Spigot – Minimum of 4 contact points specified suitable for 25NB, 32NB and 40NB specified Clause number specified in Schedules A and B
28/08/2013	0	First Issue

APPENDIX B QUALITY ASSURANCE (TO BE COMPLETED BY STORES)

DOCUMENT NUMBER	HPC-8DJ-14-0001-2013		**QUALITY ASSURANCE**	**DM NUMBER**		
DEVICE DESCRIPTION	**LABEL MATERIAL NO.**		**LUMINAIRE PURCHASE**	**ASSET OWNER**		
	ASSET ID/ STOCK NO					
MANUFACTURER		**DIMENSION**				

ITEM	OPERATION/EQUIPMENT/FACILITY	DOCUMENT REF.	WHO CHECKS	INITIAL	DATE/ TIME	QUALITY ASSURANCE CRITERIA	PASS Y/N	COMMENTS
1								
1.1	Name of Manufacturer					*******		
1.2	Week & Year of Manufacture					*******		
1.3	Horizon Power Order Number					*******		
1.4	Horizon Power Stock Number					*******		
1.5	Box (outside)					Sealed properly and not tampered with		
1.6	Box (outside)					Packaging not tampered with and intact		
1.7	Name Plate					Legible		
1.8	Physical Appearance							
1.8.1	Weight clearly shown on Box Cover					Legible		

ITEM	OPERATION/EQUIPMENT/FACILITY	DOCUMENT REF.	WHO CHECKS	INITIAL	DATE/ TIME	QUALITY ASSURANCE CRITERIA	PASS Y/N	COMMENTS
2	DOCUMENTATION							
2.1	Material Safety Data Sheets					Clear, Legible and in English		
2.2	Luminaire Documentation (including calculations) & Drawings					Clear, Legible and in English		
2.3	Test and Inspection Reports					Clear, Legible and in English		

SYMBOLS AND ABBREVIATIONS								
H = HOLD POINT	S = SUPERVISOR							
W = WITNESS POINT	T = TECHNICIAN, EL = ELECTRICIAN	REVISION						
V = VERIFICATION POINT	E = ENGINEER	DATE						
S/C = SUBCONTRACTOR	PM = PROJECT MANAGER	APPROVED BY						

APPENDIX C SCHEDULES A & B

HORIZON POWER	**SPECIFICATION ENQUIRY**	**HPC-8DJ-14-0001-2013**
	VENDOR'S NAME	
	DATE	

TECHNICAL SCHEDULES
ITEMS: Luminaire V3 Category

SPACING	65-80 m	65-80 m	65-100 m		
ROAD WIDTH	30-40 m	30-40 m	30-40 m		
Height/ Category	10.5 m Commercial & Ind Precinct	12.5 m Commercial & Ind Precinct	10.5 m Major	12.5 m Major	
	1.1	1.2	1.3	1.4	

SCHEDULE A : Horizon Power's specific requirements
SCHEDULE B: Particulars to be completed by Vendor for each ITEM offered

No	Clause	Description		Schedule A	Schedule B
1		**General**			
1.1	11	Manufacturer			
1.2		Brand / Catalogue No. / Model			
1.3		Country of Manufacture			
2		**Dimensions**			
2.1	4.3.4	Width	(mm)		
2.2		Height	(mm)		
2.3		Length	(mm)		
2.4		Mass	(kg)	≤20 kg	
2.5	4.3.7	Side entry mounting fits Pipe OD range	(mm)		
2.6	4.3.7	Adapter kit if available diameter range	(mm)		
2.7	4.2.9	PE Cell Socket		NEMA 7pin	
3		**Particulars of Luminaire**			
3.1	3.1.1	Rated Voltage Range	(V)	216-253	
3.2	3.1.2	Frequency Range	(Hz)	45-55	
3.3	4.2.1	Power Factor		≥ 0.9	
3.4	4.2.2	Total Harmonic Distortion	(%)	≤ 8%	
3.5	4.1.5	Power Input	(watts)		
3.6	4.6.2	Lumen Output	(Lumens)		
3.7	4.1.2	Life (L70)	(Hours)	82, 000	
3.8	4.6.3	Correlated Colour Temperature (CCT)		≤3000	
3.9	4.6.3	Colour Rending Index (CRI)		≥ 70	
3.10	4.3.5	IP Rating of Optical Assembly		66	
3.11		Driver Current	(mA)		
3.12	4.2.8	Driver Rated Life	(Hours)	82, 000	
3.13	4.2.8	Driver IP Rating		66	
3.14	4.2.8	Driver Programmable Interface		min. DALI	
3.15	4.3.5	IP Rating of Luminaire		65	
3.16	4.3.6	IK Rating of Luminaire		08	
3.17	4.2.5	Insulation Class of Luminaire	(I, II or III)	II	
3.18	4.1.3	Maintenance Frequency	(0 or 'x' yearly)	0	
3.19	4.1.3	Maintenance Man Hours	(Hours)	0	
4		**Particulars of Connection Electrical and Mechanical**			
4.1	4.5.1	Pipe Spigot Size		DN40	
4.2	4.5.1	Pipe Spigot Length	(mm)	150	
4.3	4.2.6	Cable Length	(m)	15	

HORIZON POWER	**SPECIFICATION ENQUIRY**	**HPC-8DJ-14-0001-2013**
	VENDOR'S NAME	
	DATE	

TECHNICAL SCHEDULES
ITEMS: Luminaire V4 Category

SPACING	65-100 m							
ROAD WIDTH	30-40 m							
Height/ Category	10.5 m Minor/Principal		12.5 m Minor/Principal					
ITEM	2.1	2.2	2.3	2.4				

SCHEDULE A : Horizon Power's specific requirements
SCHEDULE B: Particulars to be completed by Vendor for each ITEM offered

No	Clause	Description		Schedule A	Schedule B
1		**General**			
1.1	11	Manufacturer			
1.2		Brand / Catalogue No. / Model			
1.3		Country of Manufacture			
2		**Dimensions**			
2.1	4.3.4	Width	(mm)		
2.2		Height	(mm)		
2.3		Length	(mm)		
2.4		Mass	(kg)	≤20 kg	
2.5	4.3.7	Side entry mounting fits Pipe OD range	(mm)		
2.6	4.3.7	Adapter kit if available diameter range	(mm)		
2.7	4.2.9	PE Cell Socket		NEMA 7pin	
3		**Particulars of Luminaire**			
3.1	3.1.1	Rated Voltage Range	(V)	216-253	
3.2	3.1.2	Frequency Range	(Hz)	45-55	
3.3	4.2.1	Power Factor		≥ 0.9	
3.4	4.2.2	Total Harmonic Distortion	(%)	≤ 8%	
3.5	4.1.5	Power Input	(watts)		
3.6	4.6.2	Lumen Output	(Lumens)		
3.7	4.1.2	Life (L70)	(Hours)	82, 000	
3.8	4.6.3	Correlated Colour Temperature (CCT)		≤3000	
3.9	4.6.3	Colour Rending Index (CRI)		≥ 70	
3.10	4.3.5	IP Rating of Optical Assembly		66	
3.11		Driver Current	(mA)		
3.12	4.2.8	Driver Rated Life	(Hours)	82, 000	
3.14	4.2.8	Driver IP Rating		66	
3.14	4.2.8	Driver Programmable Interface		min. DALI	
3.15	4.3.5	IP Rating of Luminaire		65	
3.16	4.3.6	IK Rating of Luminaire		08	
3.17	4.2.5	Insulation Class of Luminaire	(I, II or III)	II	
3.18	4.1.3	Maintenance Frequency	(0 or 'x' yearly)	0	
3.19	4.1.	Maintenance Man Hours	(Hours	0	
4		**Particulars of Connection Electrical and Mechanical**			
4.1	4.5.1	Pipe Spigot Size		DN40	
4.2	4.5.1	Pipe Spigot Length	(mm)	150	
4.3	4.2.6	Cable Length	(m)	15	

HORIZON POWER	**SPECIFICATION ENQUIRY**	**HPC-8DJ-14-0001-2013**
	VENDOR'S NAME	
	DATE	

TECHNICAL SCHEDULES
ITEMS: Luminaire PP4 Category

SPACING	40-65 m	65-100 m	40-65 m	65-100 m	40-65 m	65-100 m		
ROAD WIDTH	Any	Any	Any	Any	Any	Any		
Category/ Height	Cycle-way/footpath 6.5 m		Cycle-way/footpath 10.5 m		Cycle-way/footpath 12.5 m			
ITEM	3.1		3.2		3.3			

SCHEDULE A : Horizon Power's specific requirements
SCHEDULE B: Particulars to be completed by Vendor for each ITEM offered

No	Clause	Description		Schedule A	Schedule B
1		**General**			
1.1	11	Manufacturer			
1.2		Brand / Catalogue No. / Model			
1.3		Country of Manufacture			
2		**Dimensions**			
2.1	4.3.4	Width	(mm)		
2.2		Height	(mm)		
2.3		Length	(mm)		
2.4		Mass	(kg)	≤20 kg	
2.5	4.3.7	Side entry mounting fits Pipe OD range	(mm)		
2.6	4.3.7	Adapter kit if available diameter range	(mm)		
2.7	4.2.9	PE Cell Socket		NEMA 7pin	
3		**Particulars of Luminaire**			
3.1	3.1.1	Rated Voltage Range	(V)	216-253	
3.2	3.1.2	Frequency Range	(Hz)	45-55	
3.3	4.2.1	Power Factor		≥ 0.9	
3.4	4.2.2	Total Harmonic Distortion	(%)	≤ 8%	
3.5	4.1.5	Power Input	(watts)		
3.6	4.6.2	Lumen Output	(Lumens)		
3.7	4.1.2	Life (L70)	(Hours)	82, 000	
3.8	4.6.3	Correlated Colour Temperature (CCT)		≤3000	
3.9	4.6.3	Colour Rending Index (CRI)		≥ 70	
3.10	4.3.5	IP Rating of Optical Assembly		66	
3.11		Driver Current	(mA)		
3.12	4.2.8	Driver Rated Life	(Hours)	82, 000	
3.13	4.2.8	Driver IP Rating		66	
3.14	4.2.8	Driver Programmable Interface		min. DALI	
3.15	4.3.5	IP Rating of Luminaire		65	
3.16	4.3.6	IK Rating of Luminaire		08	
3.17	4.2.5	Insulation Class of Luminaire	(I, II or III)	II	
3.18	4.1.3	Maintenance Frequency	(0 or 'x' yearly)	0	
3.19	4.1.3	Maintenance Man Hours	(Hours)	0	
4		**Particulars of Connection Electrical and Mechanical**			
4.1	4.5.1	6.5 m Pipe Spigot Size		DN25	
4.2	4.5.1	6.5 m Pipe Spigot Length	(mm)	120	
4.3	4.2.6	6.5 m Cable Length	(m)	8	
4.4	4.5.1	10.5 m & 12.5 m Pipe Spigot Size		DN40	
4.5	4.5.1	10.5 m & 12.5 m Pipe Spigot Length	(mm)	150	
4.6	4.2.6	10.5 m & 12.5 m Cable Length	(m)	15	

HORIZON POWER	**SPECIFICATION ENQUIRY**	**HPC-8DJ-14-0001-2013**
	VENDOR'S NAME	
	DATE	

TECHNICAL SCHEDULES
ITEMS: Luminaire PR5 Category

SPACING	40-65 m		40-65 m				
ROAD WIDTH	15-20 m	15-20 m	15-20 m	15-20 m			
Category/ Height	Cul-de-sacs 6.5 m		Residential or Local Road 6.5 m				
ITEM	4.1		4.2				

SCHEDULE A : Horizon Power's specific requirements
SCHEDULE B: Particulars to be completed by Vendor for each ITEM offered

No	Clause	Description		Schedule A	Schedule B
1		**General**			
1.1	11	Manufacturer			
1.2		Brand / Catalogue No. / Model			
1.3		Country of Manufacture			
2		**Dimensions**			
2.1	4.3.4	Width	(mm)		
2.2		Height	(mm)		
2.3		Length	(mm)		
2.4		Mass	(kg)	≤20 kg	
2.5	4.3.7	Side entry mounting fits Pipe OD range	(mm)		
2.6	4.3.7	Adapter kit if available diameter range	(mm)		
2.7	4.2.9	PE Cell Socket		NEMA 7pin	
3		**Particulars of Luminaire**			
3.1	3.1.1	Rated Voltage Range	(V)	216-253	
3.2	3.1.2	Frequency Range	(Hz)	45-55	
3.3	4.2.1	Power Factor		≥ 0.9	
3.4	4.2.2	Total Harmonic Distortion	(%)	≤ 8%	
3.5	4.1.5	Power Input	(watts)		
3.6	4.6.2	Lumen Output	(Lumens)		
3.7	4.1.2	Life (L70)	(Hours)	82, 000	
3.8	4.6.3	Correlated Colour Temperature (CCT)		≤3000	
3.9	4.6.3	Colour Rending Index (CRI)		≥ 70	
3.10	4.3.5	IP Rating of Optical Assembly		66	
3.11		Driver Current	(mA)		
3.12	4.2.8	Driver Rated Life	(Hours)	82, 000	
3.13	4.2.8	Driver IP Rating		66	
3.14	4.2.8	Driver Programmable Interface		min. DALI	
3.15	4.3.5	IP Rating of Luminaire		65	
3.16	4.3.6	IK Rating of Luminaire		08	
3.17	4.2.5	Insulation Class of Luminaire	(I, II or III)	II	
3.18	4.1.3	Maintenance Frequency	(0 or 'x' yearly)	0	
3.19	4.1.3	Maintenance Man Hours	(Hours)	0	
4		**Particulars of Connection Electrical and Mechanical**			
4.1	4.5.1	Pipe Spigot Size		DN25	
4.2	4.5.1	Pipe Spigot Length	(mm)	120	
4.3	4.2.6	Cable Length	(m)	8	

HORIZON POWER	**SPECIFICATION ENQUIRY**	**HPC-8DJ-14-0001-2013**
	VENDOR'S NAME	
	DATE	

TECHNICAL SCHEDULES
ITEMS: Luminaire PR6 Category

SPACING	40-65 m		65-100 m		40-65 m		65-100 m	
ROAD WIDTH	15-20 m	15-20 m	15-20 m	15-20 m	15-20 m	15-20 m	15-20 m	15-20 m
Category/ Height	Residential or Local Road 6.5 m		Residential or Local Road 6.5 m		Residential or Local Road 10.5 m		Residential or Local Road 10.5 m	
ITEM	4.1		4.2		4.3		4.4	

SCHEDULE A : Horizon Power's specific requirements
SCHEDULE B: Particulars to be completed by Vendor for each ITEM offered

No	Clause	Description		Schedule A	Schedule B
1		**General**			
1.1	11	Manufacturer			
1.2		Brand / Catalogue No. / Model			
1.3		Country of Manufacture			
2		**Dimensions**			
2.1	4.3.4	Width	(mm)		
2.2		Height	(mm)		
2.3		Length	(mm)		
2.4		Mass	(kg)	≤20 kg	
2.5	4.3.7	Side entry mounting fits Pipe OD range	(mm)		
2.6	4.3.7	Adapter kit if available diameter range	(mm)		
2.7	4.2.9	PE Cell Socket		NEMA 7pin	
3		**Particulars of Luminaire**			
3.1	3.1.1	Rated Voltage Range	(V)	216-253	
3.2	3.1.2	Frequency Range	(Hz)	45-55	
3.3	4.2.1	Power Factor		≥ 0.9	
3.4	4.2.2	Total Harmonic Distortion	(%)	≤ 8%	
3.5	4.1.5	Power Input	(watts)		
3.6	4.6.2	Lumen Output	(Lumens)		
3.7	4.1.2	Life (L70)	(Hours)	82, 000	
3.8	4.6.3	Correlated Colour Temperature (CCT)		≤3000	
3.9	4.6.3	Colour Rending Index (CRI)		≥ 70	
3.10	4.3.5	IP Rating of Optical Assembly		66	
3.11		Driver Current	(mA)		
3.12	4.2.8	Driver Rated Life	(Hours)	82, 000	
3.13	4.2.8	Driver IP Rating		66	
3.14	4.2.8	Driver Programmable Interface		min. DALI	
3.15	4.3.5	IP Rating of Luminaire		65	
3.16	4.3.6	IK Rating of Luminaire		08	
3.17	4.2.5	Insulation Class of Luminaire	(I, II or III)	II	
3.18	4.1.3	Maintenance Frequency	(0 or 'x' yearly)	0	
3.19	4.1.3	Maintenance Man Hours	(Hours)	0	
4		**Particulars of Connection Electrical and Mechanical**			
4.1	4.5.1	6.5 m Pipe Spigot Size		DN25	
4.2	4.5.1	6.5 m Pipe Spigot Length	(mm)	120	
4.3	4.2.6	6.5 m Cable Length	(m)	8	
4.4	4.5.1	10.5 m Pipe Spigot Size		DN40	
4.5	4.5.1	10.5 m Pipe Spigot Length	(mm)	150	
4.6	4.2.6	10.5 m Cable Length	(m)	15	

HORIZON POWER	**SPECIFICATION ENQUIRY**	**HPC-8DJ-14-0001-2013**
	VENDOR'S NAME	
	DATE	

TECHNICAL SCHEDULES
ITEMS: Luminaire PA2 Category

SPACING	20-40 m	20-40 m	20-40 m	20-40 m	20-40 m	20-40 m
ROAD WIDTH	Any	Any	30-40 m	30-40 m	N/A	N/A
Category/ Height	Shopping mall 6.5 m	Shopping mall 10.5 m	Civic sq or Retail Complex 6.5 m	Civic sq or Retail Complex 10.5 m	Transport Interchange 6.5 m	Transport Interchange 10.5 m
ITEM	5.1	5.2	5.3	5.4	5.5	5.6

SCHEDULE A : Horizon Power's specific requirements
SCHEDULE B: Particulars to be completed by Vendor for each ITEM offered

No	Clause	Description		Schedule A	Schedule B
1		**General**			
1.1	11	Manufacturer			
1.2		Brand / Catalogue No. / Model			
1.3		Country of Manufacture			
2		**Dimensions**			
2.1	4.3.4	Width	(mm)		
2.2		Height	(mm)		
2.3		Length	(mm)		
2.4		Mass	(kg)	≤20 kg	
2.5	4.3.7	Side entry mounting fits Pipe OD range	(mm)		
2.6	4.3.7	Adapter kit if available diameter range	(mm)		
2.7	4.2.9	PE Cell Socket		NEMA 7pin	
3		**Particulars of Luminaire**			
3.1	3.1.1	Rated Voltage Range	(V)	216-253	
3.2	3.1.2	Frequency Range	(Hz)	45-55	
3.3	4.2.1	Power Factor		≥ 0.9	
3.4	4.2.2	Total Harmonic Distortion	(%)	≤ 8%	
3.5	4.1.5	Power Input	(watts)		
3.6	4.6.2	Lumen Output	(Lumens)		
3.7	4.1.2	Life (L70)	(Hours)	82, 000	
3.8	4.6.3	Correlated Colour Temperature (CCT)		≤3000	
3.9	4.6.3	Colour Rending Index (CRI)		≥ 70	
3.10	4.3.5	IP Rating of Optical Assembly		66	
3.11		Driver Current	(mA)		
3.12	4.2.8	Driver Rated Life	(Hours)	82, 000	
3.13	4.2.8	Driver IP Rating		66	
3.14	4.2.8	Driver Programmable Interface		min. DALI	
3.15	4.3.5	IP Rating of Luminaire		65	
3.16	4.3.6	IK Rating of Luminaire		08	
3.17	4.2.5	Insulation Class of Luminaire	(I, II or III)	II	
3.18	4.1.3	Maintenance Frequency	(0 or 'x' yearly)	0	
3.19	4.1.3	Maintenance Man Hours	(Hours)	0	
4		**Particulars of Connection Electrical and Mechanical**			
4.1	4.5.1	6.5 m Pipe Spigot Size		DN25	
4.2	4.5.1	6.5 m Pipe Spigot Length	(mm)	120	
4.3	4.2.6	6.5 m Cable Length	(m)	8	
4.4	4.5.1	10.5 m Pipe Spigot Size		DN40	
4.5	4.5.1	10.5 m Pipe Spigot Length	(mm)	150	
4.6	4.2.6	10.5 m Cable Length	(m)	15	

HORIZON POWER	**SPECIFICATION ENQUIRY**	**HPC-8DJ-14-0001-2013**
	VENDOR'S NAME	
	DATE	

TECHNICAL SCHEDULES
ITEMS: Luminaire PC2 Category

SPACING	20-40 m	20-40 m				
ROAD WIDTH	Any	Any				
Category/ Height	Open Car Park 6.5 m	Open Car Park 10.5 m				
ITEM	6.1	6.2				

SCHEDULE A : Horizon Power's specific requirements
SCHEDULE B: Particulars to be completed by Vendor for each ITEM offered

No	Clause	Description		Schedule A	Schedule B
1		**General**			
1.1	11	Manufacturer			
1.2		Brand / Catalogue No. / Model			
1.3		Country of Manufacture			
2		**Dimensions**			
2.1	4.3.4	Width	(mm)		
2.2		Height	(mm)		
2.3		Length	(mm)		
2.4		Mass	(kg)	≤20 kg	
2.5	4.3.7	Side entry mounting fits Pipe OD range	(mm)		
2.6	4.3.7	Adapter kit if available diameter range	(mm)		
2.7	4.2.9	PE Cell Socket		NEMA 7pin	
3		**Particulars of Luminaire**			
3.1	3.1.1	Rated Voltage Range	(V)	216-253	
3.2	3.1.2	Frequency Range	(Hz)	45-55	
3.3	4.2.1	Power Factor		≥ 0.9	
3.4	4.2.2	Total Harmonic Distortion	(%)	≤ 8%	
3.5	4.1.5	Power Input	(watts)		
3.6	4.6.2	Lumen Output	(Lumens)		
3.7	4.1.2	Life (L70)	(Hours)	82, 000	
3.8	4.6.3	Correlated Colour Temperature (CCT)		≤3000	
3.9	4.6.3	Colour Rending Index (CRI)		≥ 70	
3.10	4.3.5	IP Rating of Optical Assembly		66	
3.11		Driver Current	(mA)		
3.12	4.2.8	Driver Rated Life	(Hours)	82, 000	
3.13	4.2.8	Driver IP Rating		66	
3.14	4.2.8	Driver Programmable Interface		min. DALI	
3.15	4.3.5	IP Rating of Luminaire		65	
3.16	4.3.6	IK Rating of Luminaire		08	
3.17	4.2.5	Insulation Class of Luminaire	(I, II or III)	II	
3.18	4.1.3	Maintenance Frequency	(0 or 'x' yearly)	0	
3.19	4.1.3	Maintenance Man Hours	(Hours)	0	
4		**Particulars of Connection Electrical and Mechanical**			
4.1	4.5.1	Pipe Spigot Size		DN25	
4.2	4.5.1	Pipe Spigot Length	(mm)	120	
4.3	4.2.6	Cable Length	(m)	8	

HORIZON POWER	**SPECIFICATION ENQUIRY**	**HPC-8DJ-14-0001-2013**
	VENDOR'S NAME	
	DATE	

TECHNICAL SCHEDULES
ITEMS: Luminaire PE Cell

SCHEDULE A : Horizon Power's specific requirements
SCHEDULE B: Particulars to be completed by Vendor for each ITEM offered

No	Clause	Description		Schedule A	Schedule B
1		**General**			
1.1	11	Manufacturer			
1.2		Brand / Catalogue No. / Model			
1.3		Country of Manufacture			
2		**Device Specifications**			
2.1		Width	(mm)		
2.2		Height	(mm)		
2.3	4.3.5 / 5.3	IP Rating of PE Cell		≥65	
2.4	3.2	Temperature			
2.5	5.4	Enclosure Material			
2.6	3.2	Humidity			
2.7	5.3	PE Cell interface Gasket/Seal			
2.8	5.4	Mass	(g)	<300	
2.9	5.1	Current Range	(A_{RMS})	10	
2.10	5.1	Current Maximum	(A)	10	
3		**Particulars PE Cell**			
3.1	5.2	Life (L70)	(Hours)	10 years	
3.2					
3.3	3.1.1	Rated Voltage Range	(Vac)	216-253	
3.4	3.1.2	Frequency Range	(Hz)	50	
3.5	5.5.2	Power Input	(watts)	≤5	
3.6	5.5.2	Power Factor		≥0.85	
3.7	5.5.3	Surge Protection			
3.8	5.5.1	Switch On	(Lux)	10	
3.9	5.5.1	Switch Off	(Lux)	30	
3.10	5.5.1	Delay on Switching	(sec.)	30	

APPENDIX D COMPLIANCE DOCUMENT

The Vendor shall indicate below whether this offer is fully compliant with the nominated clause in this Specification. A YES shall ONLY be indicated if the offer is 100% compliant with the relevant clause. If NO is indicated and supporting documents are submitted, then mark the ATT box with the attachment number

CLAUSE NUMBER		YES	NO	ATT.
3.	REQUIREMENTS			
3.1	Power System Particulars			
3.1.1	*Rated Voltages*	☐	☐	☐
3.1.2	*Nominal System Frequency*	☐	☐	☐
3.1.3	*System Insulation Levels*	☐	☐	☐
3.2	Environmental Conditions	☐	☐	☐
3.3	Carbon Emission	☐	☐	☐
3.4	Disposable Strategy	☐	☐	☐
4.	LUMINAIRE REQUIREMENTS			
4.1	General			
4.1.1	*Luminaire Assembly*	☐	☐	☐
4.1.2	*Luminaire Life*	☐	☐	☐
4.1.3	*Life Cycle Costs*	☐	☐	☐
4.1.4	*Catastrophic Failures*	☐	☐	☐
4.1.5	*Markings*	☐	☐	☐
4.2	Other Technical Requirements			
4.2.1	*Power Factor*	☐	☐	☐
4.2.2	*Total Harmonic Distortion*	☐	☐	☐
4.2.3	*Flicker*	☐	☐	☐
4.2.4	*Radio Frequency Interference*	☐	☐	☐
4.2.5	*Electrical Safety*	☐	☐	☐
4.2.6	*Cable, Cable Entry and Termination*	☐	☐	☐
4.2.7	*Luminaire Internal Wiring*	☐	☐	☐
4.2.8	*LED Driver*	☐	☐	☐
4.2.9	*Socket for Photoelectric Cell Switch*	☐	☐	☐
4.3	Physical Characteristics			
4.3.1	*General*	☐	☐	☐
4.3.2	*Housing including Visor*	☐	☐	☐
4.3.3	*Colour*	☐	☐	☐

CLAUSE NUMBER		YES	NO	ATT.
4.3.4	*Dimensions, Weight and Fixing*	☐	☐	☐
4.3.5	*Ingress Protection*	☐	☐	☐
4.3.6	*Vandal Proofing*	☐	☐	☐
4.3.7	*Spigot*	☐	☐	☐
4.4	Thermal Management			
4.4.1	*Junction Temperature*	☐	☐	☐
4.4.2	*Passive Design*	☐	☐	☐
4.5	Photometric Requirements			
4.5.1	*Typical Installation Parameters*	☐	☐	☐
4.5.2	*Streetlight Pole Location*	☐	☐	☐
4.6	Luminaire Performance			
4.6.1	*Performance Standards*	☐	☐	☐
4.6.2	*Luminous Output Maintenance*	☐	☐	☐
4.6.3	*Colour Temperature and Colour Rendition Index*	☐	☐	☐
4.6.4	*Lumen Projections*	☐	☐	☐
4.6.5	*AstroTourism – Dark Sky Sensitive Streetlights*	☐	☐	☐
5.	PE CELL REQUIREMENTS	☐	☐	☐
5.1	Functionality	☐	☐	☐
5.2	Life	☐	☐	☐
5.3	Interface	☐	☐	☐
5.4	Enclosure	☐	☐	☐
5.5	Controlled Switching	☐	☐	☐
5.5.1	*Default Thresholds and Delays*	☐	☐	☐
5.5.2	*Power Consumption*	☐	☐	☐
5.5.3	*Protection*	☐	☐	☐
6.	STORAGE	☐	☐	☐
7.	RELIABILITY	☐	☐	☐
8.	SAFETY	☐	☐	☐
9.	ENVIRONMENTAL CONDITIONS	☐	☐	☐
10.	TESTS			
10.1	Design Qualification Testing			

CLAUSE NUMBER		YES	NO	ATT.
10.1.1	*Approved Testing Lab*	☐	☐	☐
10.1.2	*Number of Samples*	☐	☐	☐
10.1.3	*Testing Data*	☐	☐	☐
10.1.4	*Model Test*	☐	☐	☐
10.1.5	*Photometric Test*	☐	☐	☐
10.1.6	*Lumen Depreciation Test*	☐	☐	☐
10.1.7	*Vibration Test*	☐	☐	☐
10.1.8	*Ingress Protection Test*	☐	☐	☐
10.1.9	*Mechanical Impact Test*	☐	☐	☐
10.1.10	*Right to Reject*			
10.2	Production Quality Testing			
11.	DOCUMENTATION AND STANDARDS			
11.1	*Type Test Certificates/Reports*	☐	☐	☐
11.2	*Samples*	☐	☐	☐
11.2.1	*Test Samples*	☐	☐	☐
12.	PACKAGING REQUIREMENTS	☐	☐	☐

APPENDIX E DEPARTURES FROM TECHNICAL SPECIFICATION

The Vendor shall nominate the clause and describe the departure:

CLAUSE NO	DEPARTURE

APPENDIX F IMPACT ASSESSMENT

HORIZON POWER	**Impact Assessment**			
	Document Title:	**LED Streetlights Specification**		
	Document No:	HPC-8DJ-14-0001-2013	**Revision No:**	3
	DM No:			

Activity	**Detail**
1. What training is required to implement this specification?	None
2. Who will require training?	N/A
3. What equipment will be required for training?	None
4. What special tools/equipment will be required for training?	None
5. Time period for training to be completed	N/A
6. Does the document affect the budget?	No
7. Time period for implementation of requirements after training is completed.	Nil
8. Were the critical points in the document determined?	N/A

Business Change Control	Total Implementation period	N/A
	Total training cost	None
	Total cost of tools/equipment	None
	Total cost involved	Zero

Comments: This specification is for Tendering purposes, as there are already similar equipment in the field

Documentation will be minimal.

Assessment Compiled by:		**Recommended by (Functional Responsibility)**	
Name:	Paul Savig	Name:	
Designation:	Senior Standards Engineer	Designation:	
Department:	Asset Management Services	Department:	
Date:		Date:	