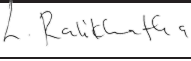


PERFORMANCE SPECIFICATION: LED PENDANT LUMINAIRES (TYPE 1)

Signatures						
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REVISION CONTROL

Date	Rev No	Description	Revised By
14/07/2026	A	Internal Review	Sudesh Sewdayal
22/07/2026	0	Authorised for use	M.Mlonzi

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1.0 SCOPE

- 1.1 This specification defines the performance and technical requirements for the supply of LED pendant luminaires for TNPA facilities.
- 1.2 This includes luminaire construction, materials and finishes, LED light sources, power supplies/drivers, optics, ingress protection, impact resistance, surge protection, emergency battery backup (where specified), wiring, earthing, electromagnetic compatibility, packaging, and associated documentation.
- 1.3 The luminaires are intended for use in TNPA Port environments, which are characterised by high humidity, saline atmospheres, and demanding operational conditions. All equipment supplied shall be designed and manufactured to withstand these conditions and provide reliable, long-term service.
- 1.4 This specification covers LED pendant luminaires, suitable for general indoor lighting applications, including offices, corridors, reception areas, and commercial spaces, as indicated in the relevant lighting design schedules.
- 1.5 The luminaires shall be supplied complete with all necessary mounting hardware, LED drivers, and all required certification and test documentation as specified herein. Where specified, luminaires shall be supplied with integrated emergency battery backup systems.

2.0 REFERENCES

All materials and manufacturing shall comply with the latest editions of the following standards, codes, and regulations, unless otherwise specified:

Luminaires & Performance

SANS 475 – Luminaires for interior lighting, street lighting and flood lighting – Performance requirements

SANS 60598-1 – Luminaires – Part 1: General requirements and tests

SANS 60598-2-1 – Luminaires – Part 2-1: Particular requirements – Fixed general purpose luminaires

SANS 60598-2-22 – Luminaires – Part 2-22: Particular requirements – Luminaires for emergency lighting

Enclosures & Protection

SANS 60529 – Degrees of protection provided by enclosures (IP Code)

SANS 62262 / IEC 62262 – Degrees of protection provided by enclosures for electrical

equipment against external mechanical impacts (IK Code)

Electrical Safety & Wiring

SANS 10142-1 – The wiring of premises – Part 1: Low-voltage installations

Emergency Lighting (where applicable)

IEC 61347-2-7 – Lamp controlgear – Part 2-7: Particular requirements for battery supplied electronic controlgear for emergency lighting (self-contained)

IEC 62034 – Automatic test systems for battery powered emergency escape lighting

Photometry & Lighting Design

IES LM-79 – Optical and Electrical Measurements of Solid-State Lighting Products

IES LM-80 – Measuring Lumen Maintenance of LED Light Sources

IES TM-21 – Projecting Long-term Lumen Maintenance of LED Light Sources

SANS 10098 – Public lighting: The lighting of public thoroughfares and certain specific areas

Electromagnetic Compatibility (EMC)

SANS 61000-3-2 – Electromagnetic compatibility (EMC) – Part 3-2: Limits – Limits for harmonic current emissions

SANS 61000-3-3 – Electromagnetic compatibility (EMC) – Part 3-3: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply systems

SANS 61000-4-5 – Electromagnetic compatibility (EMC) – Part 4-5: Testing and measurement techniques – Surge immunity test

IEC 55015 – Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment

IEC 61547 – Equipment for general lighting purposes – EMC immunity requirements

Materials & Finishes

ISO 9001 – Quality management systems – Requirements

ISO 12944 – Paints and varnishes – Corrosion protection of steel structures by protective paint systems

Quality & Compliance

ISO 9001 – Quality management systems – Requirements

OHSACT (Act 85 of 1993) – Occupational Health and Safety Act – Electrical Machinery Regulations (Earthing requirements)

3.0 SERVICE CONDITIONS

3.1 The luminaires shall be designed and manufactured to operate reliably under the following indoor service conditions typically encountered in TNPA port facilities (e.g., offices, corridors, reception areas, staircases and commercial spaces):

3.1.1 Environmental Conditions

- a. Ambient temperature range: 0°C to +45°C
- b. Relative humidity: 10% to 95% (non-condensing)
- c. Coastal environment: Saline coastal environment with potential for airborne salt spray, dust, and moisture ingress
- d. Dust and particulate matter: Moderate levels, typical of Port facilities

3.1.2 Electrical Supply Conditions

- a. Nominal supply voltage: 230 V AC $\pm$ 10%
- b. Supply frequency: 50 Hz $\pm$ 5%
- c. Voltage fluctuations and surges: Typical of industrial power networks with potential for switching transients

3.1.3 Mechanical Conditions

- a. Vibration: Low to moderate levels typical of buildings
- b. Mounting: Suspended mounting (standard)

3.2 All luminaires supplied shall be suitable for continuous operation under the above conditions without degradation of performance, reduction of service life, or failure of components.

3.3 The luminaire's thermal management system shall be capable of maintaining LED junction temperatures within acceptable limits at the maximum specified ambient temperature of 45°C.

3.4 The luminaire's corrosion protection (marine-grade aluminium, powder coating, etc.) shall be sufficient to withstand the saline coastal atmosphere without deterioration during the warranted period.

4.0 STANDARD OF EQUIPMENT

4.1 Equipment shall be of a high-quality design and manufacture and shall comply with the relevant specifications and recommendations mentioned in this specification.

4.2 Every reasonable precaution and provision shall be incorporated in the design of the equipment for the safety and security of the system and of those concerned with its

operation and maintenance.

- 4.3 Any proposed alternative equipment or material not strictly complying with the specified requirements shall be submitted to the TNPA's Technical Officer for prior written approval. Such approval will not diminish the tenderer's responsibility to meet the performance requirements.

5.0 MATERIALS AND FINISHES

- 5.1 The luminaire heat sink shall be manufactured from marine-grade aluminium alloy EN 1706 AC-44300 (or superior), providing excellent thermal management and corrosion resistance. A certified Metallurgical Test Report (MTR) confirming the grade and quality of the aluminium shall be provided with the tender submission.
- 5.2 The luminaire bottom spinning shall be manufactured from aluminium sheet. The luminaire top spinning shall be manufactured from mild steel.
- 5.3 The luminaire shall be supplied with a textured powder-coated finish in a colour as specified in the tender schedule.
- 5.3.1 The powder coating shall be applied over a suitable pre-treatment process to ensure optimal adhesion.
- 5.3.2 The powder coating shall have a minimum thickness of 60 microns.
- 5.3.3 The powder coating shall be UV-stabilised to prevent chalking and discolouration over time.
- 5.3.4 The powder coating shall comply with the corrosion protection requirements of ISO 12944 for the relevant environment.
- 5.4 All coatings shall comply with the requirements for Corrosivity Category C4 or C5-M in accordance with ISO 12944.
- 5.5 The diffuser shall be manufactured from acrylic, providing uniform light distribution and low glare.
- 5.6 All external fasteners (bolts, screws, nuts, washers) shall be manufactured from stainless steel grade AISI 304 or higher.

6.0 SYSTEM DESCRIPTION

- 6.1 The luminaire shall be an LED pendant fitting with a slim, aesthetic design optimised for LED characteristics.
- 6.2 The luminaire shall bear the SANS 60598-1 safety mark and shall comply with the specifications as per SANS 60598-2-1.
- 6.3 The luminaire shall be tested in accordance with SANS 60598 and SANS 62262.
- 6.4 The luminaire shall be available in more than one size and shall be designed for

suspended mounting as standard.

- 6.5 Luminaires shall be delivered fully assembled with housing, LED driver, and LED modules.
- 6.6 The luminaire shall be designed with an LED disk to provide a halo effect with no upward lighting.
- 6.7 The luminaire shall be designed to be easy to install and for suspended mounting as standard.
- 6.8 Preference may be given to locally manufactured and assembled luminaires where local content policies apply.
- 6.9 Where specified, the luminaire shall be supplied with an integrated emergency battery backup system.

7.0 FUNCTIONAL AND PERFORMANCE REQUIREMENTS

7.1 Luminaire Construction

- 7.1.1 The luminaire heat sink shall be manufactured from marine-grade aluminium alloy EN 1706 AC-44300 or approved equivalent with equal or superior thermal and corrosion performance.
- 7.1.2 The luminaire shall incorporate a marine-grade aluminium heat sink for passive cooling of the LED light source. Active cooling (fans) or liquid cooling is prohibited.
- 7.1.3 The slim, aesthetic design shall be optimised for LED characteristics. The luminaire shall provide a halo effect with no upward lighting.
- 7.1.4 The design of the external surfaces shall prevent the accumulation of dirt and dust, ensuring continuous effective cooling.
- 7.1.5 Thermal protection shall be incorporated in the luminaire to prevent overheating.
- 7.1.6 All parts requiring maintenance and cleaning shall be easily accessible.
- 7.1.7 The design shall allow for servicing of the LED unit and driver without removing the entire luminaire from its mounting.

7.2 LED Light Source

- 7.2.1 The LEDs shall be high efficiency, delivering minimum effective lumens of 111 lm/W at 25°C or better.
- 7.2.2 The effective lumen package and wattage of the fitting shall be as specified in the tender schedule.
- 7.2.3 The light source shall have a correlated colour temperature (CCT) of 3000K or 4000K.
- 7.2.4 The Colour Rendering Index (CRI) shall be 80 minimum (CRI ≥80).

- 7.2.5 The luminaire shall provide low glare lighting suitable for indoor applications.
- 7.2.6 The LED life expectancy @ Tq 25°C shall be 98,000 hours minimum (L70B10)
- 7.2.7 LED driver design life shall be not less than 100 000 hours at Tq 25°C and 230V ±10%, 50Hz.
- 7.2.8 The luminaire shall have a long lifetime and low maintenance, with no lamp replacement required for more than 10 years.

7.3 **Power Supply / Driver**

- 7.3.1 The power supply (driver) compartment shall be designed to allow for the safe and easy replacement of components or repairs.
- 7.3.2 The driver shall be of the constant-current type.
- 7.3.3 The driver shall be flicker-free in all operating modes.
- 7.3.4 The driver shall incorporate the following protection features:
 - Overload protection
 - Short circuit protection
 - Surge protection
- 7.3.5 The driver shall support the following electrical characteristics:
 - Rated supply voltage: 198 – 264 V AC
 - Mains frequency: 50 / 60 Hz
 - Rated power: As specified in the tender schedule
 - Power Factor (PF) ≥ 0.90
 - Total Harmonic Distortion (THD) ≤ 10%
 - Driver efficiency ≥ 95% at full load

7.4 **Emergency Battery Backup System (Where Specified)**

- 7.4.1 Where specified, the luminaire shall be equipped with an integrated emergency battery backup system, complying with SANS 60598-2-22 / IEC 60598-2-22.
- 7.4.2 The emergency control gear shall be suitable for operation with LED modules.
- 7.4.3 The emergency system shall automatically provide illumination during mains failure sufficient to achieve the emergency lighting levels required by applicable regulations.
- 7.4.4 The emergency duration shall be a minimum of as specified in the tender schedule.
- 7.4.5 The battery type shall be suitable for the specified emergency duration and shall be replaceable.
- 7.4.6 Charging indication shall be provided via an external LED pilot light indicating active battery charging status.

- 7.4.7 The emergency control gear shall incorporate the following protection features:
- Battery reverse polarity protection
 - Overcharge protection
 - Over-discharge protection
 - Short circuit protection
- 7.4.8 The emergency system shall be designed to automatically switch to emergency mode upon mains supply failure and automatically revert to normal operation upon mains restoration, with seamless transition between modes.
- 7.4.9 The battery type shall be Lithium-ion (Li-ion) or equivalent.
- 7.4.10 The emergency control gear shall have a hardware warranty as specified in Section 9.0.

7.5 Optics and Diffuser

- 7.5.1 The luminaire shall be equipped with an acrylic diffuser, providing uniform light distribution.
- 7.5.2 Where specified, a specular aluminium reflector shall be provided with a high light output ratio (LOR) of up to 86%.
- 7.5.3 The reflector and diffuser combination shall provide low glare illumination.
- 7.5.4 The diffuser shall be UV-stabilised to prevent discolouration over time.

7.6 Ingress Protection and Impact Resistance

- 7.6.1 The luminaire shall have an Ingress Protection (IP) rating of IP20, suitable for indoor applications.
- 7.6.2 The LED compartment shall form a seal to prevent the entry of dust and moisture.
- 7.6.3 The luminaire shall be rated at IK08 and tested in accordance with SANS 62262 for impact resistance.
- 7.6.4 The IP and IK ratings shall be certified by test reports for the specific luminaire model.

7.7 Wiring and Electrical Connections

- 7.7.1 The internal wiring of the luminaires shall be flexible and suitably insulated to withstand the voltage and temperature encountered in service.
- 7.7.2 The supply terminals shall accept the appropriate conductor sizes and be easily accessible.

7.8 Earthing

- 7.8.1 Luminaires shall be designed to facilitate earthing as per the Electrical Machinery

Regulations of the OHSACT (Act 85 of 1993).

- 7.8.2 Metal parts that may become live in the event of an insulation fault shall be permanently and reliably connected to an earthing terminal, complying with the test specified in SANS 60598-2-1.
- 7.8.3 Earthing terminals shall comply with clause 7.2 of SANS 60598-1. All parts of an earth terminal shall be made of brass or other corrosion-resistant metal, with bare (unpainted/varnished) contact surfaces.
- 7.8.4 Earth connections shall be by means of suitable lugs, designed to prevent electrolytic corrosion.

7.9 **Electromagnetic Compatibility**

- 7.9.1 The luminaire shall comply with IEC 55015 (Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment).

7.10 **Packaging and Transport**

- 7.10.1 The luminaires shall be packed in a manner that ensures protection during handling and transport by road, rail, or sea.
- 7.10.2 The packaging shall be designed to prevent vibration damage to the LED modules and control gear during transit.
- 7.10.3 Where sea transport is involved, a suitable dehydrating agent (desiccant) shall be included in the packaging to prevent corrosion.
- 7.10.4 Lithium-ion battery packs (where specified) shall be transported in accordance with applicable dangerous goods regulations.

8.0 **CERTIFICATION AND TEST REPORTS**

- 8.1 The tenderer shall provide the following documentation:
 - a. Product data sheets and catalogues.
 - b. Type Test Report conforming to SANS 60598-1.
 - c. Test reports for the SANS 60598-2-1 safety mark.
 - d. Test reports for the SANS 60598-2-22 emergency lighting safety mark (where applicable).
 - e. SANS 62262 (IK rating) test report for the luminaire.
 - f. LM-80 (Measuring Lumen Maintenance of LED Light Sources) report.
 - g. LM-79 (Electrical and Photometric Measurements of Solid-State Lighting Products) report.
 - h. TM-21 (LED Lifetime prediction extrapolation method) report.

- i. IP rating test reports for the complete luminaire.
- j. Photometric test reports and photometric data files (IES/LDT format).
- k. Where specified, emergency lighting test report conforming to SANS 60598-2-22, including:
 - Emergency duration test report
 - Battery charging and discharge characteristics
 - Battery temperature range compliance
 - Compliance with IEC 61347-2-7

9.0 WARRANTY AND DOCUMENTATION

- 9.1 The tenderer shall guarantee all equipment supplied against this specification for a period of five (5) years (60 months) from the date of delivery or as otherwise agreed in the purchase order. The tenderer shall explicitly state their compliance herewith.
- 9.2 This guarantee shall cover all materials, parts, workmanship, performance, and efficiency of the equipment supplied, including the LED module, driver, and powder-coated finish.
- 9.3 Where emergency battery backup is supplied, the emergency battery pack warranty shall be held with the battery manufacturer and shall cover the battery for the full warranty period.
- 9.4 Should any part or equipment fail during the guarantee period due to defective materials or workmanship, the supplier shall immediately replace such part or equipment free of charge, including all costs for transport and associated logistics.
- 9.5 The Contractor shall submit all required documentation as detailed in Section 8.0.

10.0 QUALITY ASSURANCE

- 10.1 The design, assembly, and testing of the luminaire shall be undertaken in an ISO 9001:2015 certified facility.
- 10.2 The Contractor's quality management system shall comply with the requirements of SANS/ISO 9001. These requirements are mandatory for all items supplied against this specification.
- 10.3 All products shall be factory tested and quality-assured prior to dispatch.
- 10.4 All devices shall operate without perceptible delay, flicker, or interference under normal service conditions.
- 10.5 Prior to bulk delivery, the Contractor shall supply a full set of sample luminaires for inspection and approval by the Engineer. Samples shall be subject to testing to verify compliance with the performance requirements specified herein.

- 10.6 The emergency lighting function, where specified, shall be tested at the factory prior to dispatch to verify:
- Correct transition to emergency mode upon mains failure
 - Minimum specified emergency duration
 - Correct recharging function upon mains restoration