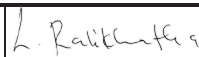


**PERFORMANCE SPECIFICATION: LED DECORATIVE WALL MOUNTED LUMINAIRES
(TYPE 3)**

Signatures						
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1.0 SCOPE

- 1.1 This specification defines the performance and technical requirements for the supply of LED wall mounted luminaires for TNPA facilities.
- 1.2 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.
- 1.3 This includes luminaire construction, materials and finishes, LED light sources, power supplies/drivers, optics, ingress protection, surge protection, mounting systems, emergency battery backup (where specified), wiring, earthing, electromagnetic compatibility, packaging, and associated documentation.
- 1.4 The luminaires shall be supplied complete with all necessary mounting hardware for the specified mounting method, and all required certification and test documentation as specified herein.
- 1.5 Where specified, luminaires shall be supplied with integrated emergency battery backup systems.
- 1.6 Where specified in the tender schedule, the luminaires shall be supplied with an optional integrated movement or daylight sensor for further energy savings.

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 / IEC 60598-2-22 – Luminaires – Part 2-22: Particular requirements – Luminaires for emergency lighting (where applicable)

Enclosures & Protection

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

SANS 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

IEC 61347-1 – Lamp controlgear – Part 1: General and safety requirements

IEC 61347-2-13 – Lamp controlgear – Part 2-13: Particular requirements for DC or AC supplied electronic controlgear for LED modules

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

EN 1706 – Aluminium and aluminium alloys – Castings – Chemical composition and mechanical properties

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)

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

3.0 SERVICE CONDITIONS

3.1 The luminaires shall be designed and manufactured to operate reliably under the following service conditions typically encountered in TNPA Port facilities (e.g., warehouses, loading bays, storage areas, administrative buildings, corridors, external covered walkways and stairwells):

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 and dust ingress. (Corrosion category C5-M in accordance with ISO 12944)
- d. Dust and particulate matter: moderate to high levels typical of industrial port facilities

3.1.2 Electrical Supply Conditions

- a. Nominal supply voltage: 198 – 264 V AC ($\pm 10\%$ of 230V)
- 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 industrial buildings
- b. Mounting: Wall mounting with removable back plate

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 (high-pressure die-cast aluminium housing, powder coating, stainless steel fasteners, 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 housing shall be manufactured from high-pressure die-cast aluminium, providing excellent thermal management, durability, and corrosion resistance.
- 5.2 The luminaire shall be supplied with a textured powder-coated finish in Black (RAL 9017), providing a durable, corrosion-resistant surface suitable for industrial and commercial environments.
 - 5.2.1 The powder coating shall be applied over a suitable pre-treatment process to ensure optimal adhesion.
 - 5.2.2 The powder coating shall have a minimum thickness of 60 microns.
 - 5.2.3 The powder coating shall be UV-stabilised to prevent chalking and discolouration over time.
 - 5.2.4 The powder coating shall comply with the corrosion protection requirements of ISO 12944 for the relevant environment.
- 5.3 The colour shall be as specified in the tender schedule or as agreed with the Engineer.
- 5.4 The luminaire protector (diffuser) shall be manufactured from glass, providing excellent light transmission and durability.
- 5.5 All external fasteners (bolts, screws, nuts, washers) shall be manufactured from stainless steel grade AISI 304 or higher.
- 5.6 To prevent galvanic and dissimilar metal corrosion between stainless steel fasteners and the aluminium base, all trim ring fixing holes shall be provided with stainless steel helicoil inserts.

6.0 SYSTEM DESCRIPTION

- 6.1 The luminaire shall be a versatile, high-performance and reliable LED mounted

outdoor fitting.

- 6.2 The luminaire shall bear the SANS 60598 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 of the totally enclosed type.
- 6.5 Luminaires shall be delivered fully assembled with housing, LED driver, LED module, and glass protector.
- 6.6 The luminaire shall feature easy installation with a removable back plate to maintain the IP rating of the luminaire.
- 6.7 The luminaire shall be designed for wall mounting.
- 6.8 The luminaire shall provide high visual comfort with white light and a high colour rendering index.
- 6.9 The luminaire shall be designed to be future-proof and upgradable, allowing for servicing of the LED unit and driver without discarding the entire unit.
- 6.10 Preference may be given to locally manufactured products where permitted by procurement requirements.
- 6.11 The luminaire shall have a design for ease of installation without compromising product lifetime.
- 6.12 Where specified in the tender schedule, the luminaire shall be supplied with an optional integrated movement or daylight sensor for further energy savings.

7.0 FUNCTIONAL AND PERFORMANCE REQUIREMENTS

7.1 Luminaire Construction

- 7.1.1 The luminaire housing shall be manufactured from high-pressure die-cast aluminium, providing excellent thermal management, durability, and corrosion resistance.
- 7.1.2 The luminaire shall incorporate a high-pressure die-cast aluminium heat sink for passive cooling of the LED light source. Active cooling (fans) or liquid cooling is prohibited.
- 7.1.3 The luminaire shall be designed to operate LED light sources of up to 36W without reducing the useful lifetime of up to 80,000 hours, at a lumen depreciation of not more than 30% (L70).
- 7.1.4 The luminaire shall feature easy installation with a removable back plate to maintain the IP rating of the luminaire.
- 7.1.5 The design of the external surfaces shall prevent the accumulation of dirt and dust, ensuring continuous effective cooling.
- 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 highly efficient, with a luminaire efficacy of 150 lm/W minimum.
- 7.2.2 The effective lumen package of the fitting shall be as specified in the tender schedule.
- 7.2.3 The delivered luminaire flux measured according to LM-79 shall be not less than 2,250 lumens.
- 7.2.4 The light source shall be available in the following correlated colour temperatures (CCT):
- 4000K (Neutral white 840)
 - 3000K (Warm white 830)
- 7.2.5 The Colour Rendering Index (CRI) shall be 80 minimum (CRI $\geq$ 80).
- 7.2.6 The luminaire shall provide uniform light distribution with low glare.
- 7.2.7 The LED lifetime @ Tq 25°C shall be 80,000 hours minimum (L70B10).
- 7.2.8 The driver lifetime @ Tq 25°C shall be 100,000 hours minimum ($\leq$ 10% failure rate).

7.3 Power Supply / Driver

- 7.3.1 The power supply (driver) compartment shall be designed with sufficient space 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 incorporate the following protection features:
- Overload protection
 - Short circuit protection
 - Surge protection
- 7.3.4 The driver shall operate at a Power Factor (PF) of 0.90 or greater.
- 7.3.5 The driver shall be flicker-free in all operating modes.
- 7.3.6 The driver shall have a lifetime of 100,000 hours minimum ($\leq$ 10% failure rate) at Tq 25°C.
- 7.3.7 The driver shall support the following electrical characteristics:
- Rated supply voltage: 198 – 264 V AC
 - Mains frequency: 50 Hz
 - Rated power: As specified in the tender schedule

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 provide emergency lighting illumination during mains failure transitions to maintain regulatory emergency lux levels
- 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 (LiFePO₄) 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 a glass protector, providing excellent light transmission and durability.
- 7.5.2 The protector shall be UV-stabilised to prevent discolouration over time.

7.6 **Surge Protection**

- 7.6.1 luminaire shall be equipped with surge protection as standard minimum 10 kV / 10 kA surge protection.
- 7.6.2 The surge protection device shall be field-replaceable and shall fail in an open-circuit mode to protect the luminaire from further surges.

7.7 **Ingress Protection and Impact Resistance**

- 7.7.1 The luminaire shall have an Ingress Protection (IP) rating appropriate for its intended outdoor and indoor application.

- 7.7.2 The luminaire shall be tested in accordance with SANS 62262 for impact resistance.
- 7.7.3 The IP and IK ratings shall be certified by test reports for the specific luminaire model.

7.8 **Wiring and Electrical Connections**

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

7.9 **Optional Integrated Movement or Daylight Sensor (Where Specified)**

- 7.9.1 Where specified in the tender schedule, the luminaire shall be equipped with an optional integrated movement or daylight sensor for additional energy savings.
- 7.9.2 The sensor shall be field-adjustable to suit different application requirements.
- 7.9.3 The daylight sensor shall be capable of detecting ambient light levels and adjusting luminaire output accordingly.
- 7.9.4 The movement sensor shall provide detection of motion within the designated area and shall switch the luminaire between full output and standby dimming modes.

7.10 **Earthing**

- 7.10.1 Luminaires shall be designed to facilitate earthing as per the Electrical Machinery Regulations of the OHSACT (Act 85 of 1993).
- 7.10.2 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.
- 7.10.3 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.
- 7.10.4 Earth connections shall be by means of suitable lugs, designed to prevent electrolytic corrosion.

7.11 **Electromagnetic Compatibility**

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

7.12 **Packaging and Transport**

- 7.12.1 The luminaires shall be packed in a manner that ensures protection during handling

and transport by road, rail, or sea.

- 7.12.2 The packaging shall be designed to prevent vibration damage to the LED modules and control gear during transit.
- 7.12.3 Where sea transport is involved, a suitable dehydrating agent (desiccant) shall be included in the packaging to prevent corrosion.

8.0 CERTIFICATION AND TEST REPORTS

- 8.1 The tenderer shall provide the following documentation:
- Product data sheets, catalogues, and operation/maintenance manuals
 - Type test reports for the luminaire, conforming to SANS 60598-1.
 - Test reports for the SANS 60598-2-1 safety mark.
 - Test reports for the SANS 60598-2-22 emergency lighting safety mark (where applicable).
 - SANS 62262 (IK rating) test report for the luminaire.
 - LM-80 (Measuring Lumen Maintenance of LED Light Sources) report confirming 80,000 hours L70B10.
 - LM-79 compliant absolute photometric report (including IES/LDT files).
 - TM-21 (LED Lifetime prediction extrapolation method) report.
 - Photometric test reports with effective data for both normal and emergency modes (where applicable).
 - Powder coating performance test report confirming film thickness, cross-hatch adhesion, and corrosion resistance.
 - IP rating test reports for the complete luminaire in accordance with SANS 60529.
 - Surge protection test reports confirming 10 kV / 10 kA capability.
 - 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 60-month 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 guarantee terms and conditions shall be provided with the tender submission.
- 9.6 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 Where emergency lighting is supplied, the emergency lighting function 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
- 10.7 The luminaire shall be manufactured and tested according to SANS 60598 general requirements.