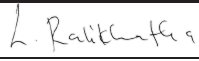


PERFORMANCE SPECIFICATION: LED STRIP LIGHTING SYSTEMS (TYPE 1)

Signatures						
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1.0 SCOPE

- 1.1 This specification defines the performance and technical requirements for the supply of continuous linear LED strip lighting systems for TNPA facilities.
- 1.2 This includes LED strip construction, extruded aluminium profiles, diffusers, remote constant-voltage LED drivers, dimming control systems (where specified), emergency battery backup (where specified), wiring, accessories, packaging, and associated documentation.
- 1.3 The LED strips are intended for use in TNPA port facilities, which are characterised by high humidity and saline atmospheres. All equipment supplied shall be designed and manufactured to withstand these conditions and provide reliable, long-term service.
- 1.4 This specification covers continuous linear LED strip lighting systems utilizing high-density dotless COB LED strip mounted within extruded aluminium corner profiles with opal diffusers, suitable for commercial, retail, hospitality, residential and architectural lighting applications, as indicated in the relevant lighting design schedules.
- 1.5 The LED strip lighting system shall be powered by a remote electronic constant-voltage LED driver and shall provide uniform, continuous illumination with no visible LED pixelation.
- 1.6 The LED strips shall be supplied complete with all necessary LED strip, aluminium profiles, diffusers, mounting accessories, remote LED drivers, and all required certification and test documentation as specified herein.
- 1.7 Where specified in the tender schedule, the LED strip shall be supplied with a compatible dimmable driver supporting DALI, 1–10 V, or Casambi dimming protocols.
- 1.8 Where specified in the tender schedule, the LED strip shall be capable of operation under emergency conditions by means of a remote self-contained emergency LED driver and battery pack compatible with 24 VDC constant-voltage LED strip systems, complying with IEC 60598-2-22.

2.0 REFERENCES

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

LED strips & Performance

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

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

SANS 60598-2-22 – Luminaires – Part 2-22: Particular requirements – LED strips for emergency lighting (where applicable)

Enclosures & Protection

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

Electrical Safety & Wiring

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

LED Strip & Components

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

IEC 62031 – LED modules for general lighting – Safety specifications

IEC 62471 – Photobiological safety of lamps and lamp systems

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

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)

3.0 SERVICE CONDITIONS

3.1 The LED strips 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 architectural applications):

3.1.1 Environmental Conditions

- a. Ambient temperature range: 0°C to +25°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: Low to moderate levels, typical of indoor commercial spaces

3.1.2 Electrical Supply Conditions

- a. Nominal supply voltage: 220V to 240V AC
- b. Supply frequency: 50 Hz $\pm$ 5%
- c. Voltage fluctuations and surges: Typical of commercial power networks

3.1.3 Mechanical Conditions

- a. Vibration: Low levels typical of buildings
- b. Mounting: Surface-mounted within aluminium profiles or recessed (as per tender schedule)

3.2 All LED strip lighting systems 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 extruded aluminium profile shall provide thermal management to ensure effective heat dissipation and extended LED life.

3.4 The LED driver shall be mounted in an accessible location for maintenance.

3.5 The LED strip lighting system is suitable for indoor use only.

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 LED strip shall be a flexible COB (Chip-on-Board) LED strip mounted on a heavy-duty printed circuit board designed for efficient heat dissipation and extended LED life.
- 5.2 The LED strip shall incorporate a high quality adhesive backing or approved equivalent for secure installation.
- 5.3 The aluminium profile shall be extruded aluminium, designed for corner mounting applications at approximately 45°, surface mounting at 90° or recessed mounting.
- 5.4 The diffuser shall be manufactured from opal polycarbonate, ensuring smooth, continuous light output and minimising direct LED visibility.
- 5.5 The profile system shall be supplied complete with:
 - Opal diffuser cover (round or square as specified)
 - End caps
 - Steel mounting clips
 - Corner connectors where required
- 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 LED strip shall comprise a continuous linear LED strip lighting system utilizing a high-density dotless COB LED strip mounted within an extruded aluminium corner profile with opal diffuser.
- 6.2 The system shall provide uniform, continuous illumination with no visible LED pixelation.

- 6.3 The system shall be suitable for cove lighting, shelving, joinery, architectural accent lighting, feature lighting and general decorative applications.
- 6.4 The complete system shall include:
- LED strip
 - Extruded aluminium profile
 - Opal diffuser
 - Mounting accessories (clips, end caps, corner connectors)
 - Remote constant-voltage LED driver
- 6.5 The LED strip shall be installed within a dedicated extruded aluminium profile to provide mechanical protection, thermal management and improved visual comfort.
- 6.6 Aluminium profiles shall be mandatory for installation.
- 6.7 The LED strip lighting system shall be capable of being powered by a remote electronic constant-voltage LED driver rated at 24 VDC.
- 6.8 Where specified in the tender schedule, the LED strip lighting system shall be capable of operation under emergency conditions by means of a remote self-contained emergency LED driver and battery pack compatible with 24 VDC constant-voltage LED strip systems.
- 6.9 The system shall be designed for indoor use only.

7.0 FUNCTIONAL AND PERFORMANCE REQUIREMENTS

7.1 LED Strip Construction

- 7.1.1 The light source shall be a flexible COB (Chip-on-Board) LED strip mounted on a heavy-duty printed circuit board designed for efficient heat dissipation and extended LED life.
- 7.1.2 The strip shall incorporate high quality adhesive backing or approved equivalent for secure installation.
- 7.1.3 The LED strip shall have the following physical dimensions:
- Width: 8 mm $\pm$ 0.5 mm
 - Height: 3.4 mm $\pm$ 0.3 mm
- 7.1.4 The LED strip shall be cuttable at intervals of 50 mm.
- 7.1.5 The LED strip shall provide uniform, low-glare downward illumination through the diffuser assembly.
- 7.1.6 The maximum continuous run without noticeable voltage drop shall be 5 metres.
- 7.1.7 All parts requiring maintenance and cleaning shall be easily accessible.

7.2 LED Strip Performance

- 7.2.1 The LED strip shall have a maximum power consumption of 10 W/m $\pm$ 10%.
- 7.2.2 The supply voltage shall be 24 VDC constant voltage.
- 7.2.3 The LED strip shall be available in the following correlated colour temperatures (CCT) of 3000K or 4000K as standard, with other colour temperatures available as specified in the tender schedule.
- 7.2.4 The luminous flux shall be a minimum of 1,100 lumens per metre.
- 7.2.5 The LED density shall be a minimum of 480 LEDs per metre.
- 7.2.6 The Colour Rendering Index (CRI) shall be greater than 90 (CRI >90).
- 7.2.7 The LED life expectancy @ Tq 25°C shall be 50,000 hours minimum (L70B10) or better.
- 7.2.8 The LED strip shall be dimmable when used with a compatible dimming control system.

7.3 Aluminium Profile

- 7.3.1 The LED strip shall be installed within a dedicated extruded aluminium profile to provide mechanical protection, thermal management and improved visual comfort.
- 7.3.2 The profile type shall be a corner or straight aluminium profile designed for corner (45°) or straight (90°) mounting applications.
- 7.3.3 The profile shall have the following dimensions:
 - Profile size: 16 mm $\times$ 16 mm $\pm$ 1 mm
 - Internal LED cavity: 10 mm minimum
- 7.3.4 The profile shall be supplied with:
 - Opal diffuser cover (round or square as specified)
 - End caps
 - Steel mounting clips
 - Corner connectors where required

7.4 Diffuser

- 7.4.1 The LED strip shall incorporate an opal polycarbonate diffuser to ensure smooth, continuous light output and to minimise direct LED visibility, producing a uniform dotless appearance.
- 7.4.2 The diffuser shall be UV-stabilised to prevent discolouration over time.

7.5 Remote LED Driver

- 7.5.1 The LED strip shall be powered from a remote constant-voltage electronic LED driver.
- 7.5.2 The driver shall be mounted in an accessible location for maintenance.
- 7.5.3 The driver shall meet the following specifications:
- Driver Type: Constant Voltage (CV)
 - Output Voltage: 24 VDC
 - Rated Power: Design dependant.
 - Input Voltage: 220 – 240V AC
 - Input Frequency: 50/60 Hz
 - Total Harmonic Distortion (THD): $\leq 1\%$
 - Surge Protection: Minimum 1 kV
 - Operating Temperature: -10°C to $+40^{\circ}\text{C}$
 - Enclosure Rating: IP20 minimum
 - Housing Material: Aluminium
 - Certifications: CE, EMC and IEC61347
- 7.5.4 The driver shall incorporate the following protection features:
- Overload protection
 - Short circuit protection
 - Thermal protection
- 7.6 Dimming Control (Where Specified)**
- 7.6.1 Where specified in the tender schedule, the LED strip lighting system shall be supplied with a compatible dimmable 24 V constant-voltage driver.
 The dimmable driver shall support one or more of the following dimming protocols as specified:
- DALI dimming
 - 1–10 V dimming
 - Casambi wireless dimming
- 7.6.2 The dimmable driver shall provide smooth, flicker-free dimming from 1% to 100%.
- 7.6.3 Where a non-dimmable driver is specified, the standard constant-voltage driver shall be provided.
- 7.7 Emergency Battery Backup System (Where Specified)**
- 7.7.1 Where specified in the tender schedule, the LED strip lighting system shall be capable of operation under emergency conditions by means of a remote self-contained emergency LED driver and battery pack compatible with 24 VDC constant-

voltage LED strip systems, complying with IEC 60598-2-22.

- 7.7.2 Upon failure of the normal mains supply, the emergency control gear shall automatically energize a designated section of the LED strip for a minimum duration as specified.
- 7.7.3 The emergency system shall incorporate:
- Automatic battery charging
 - Changeover circuitry
 - Deep-discharge protection
 - Battery status indication
 - Test facilities for routine functional testing
- 7.7.4 The emergency battery shall be Lithium Iron Phosphate (LiFePO₄) or approved equivalent technology.
- 7.7.5 The emergency system shall incorporate automatic changeover upon mains failure, with seamless transition between modes.
- 7.7.6 The emergency system shall be available in maintained or non-maintained operation as specified in the tender schedule.
- 7.7.7 The emergency control gear shall incorporate the following protection features:
- Battery reverse polarity protection
 - Overcharge protection
 - Over-discharge protection
 - Short circuit protection
- 7.7.8 The emergency control gear shall have a hardware warranty as specified in Section 9.0.

7.8 **Wiring and Electrical Connections**

- 7.8.1 The internal wiring of the LED strips shall be flexible and suitably insulated to withstand the voltage and temperature encountered in service.
- 7.8.2 The LED strip shall be factory pre-wired for connection to the remote driver.
- 7.8.3 The supply terminals shall accept the appropriate conductor sizes and be easily accessible.

7.9 **Earthing**

- 7.9.1 The LED strip lighting system shall be designed to facilitate earthing as per the Electrical Machinery Regulations of the OHSACT (Act 85 of 1993).
- 7.9.2 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.

7.9.3 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.

7.9.4 Earth connections shall be by means of suitable lugs, designed to prevent electrolytic corrosion.

7.10 **Electromagnetic Compatibility**

7.10.1 The LED strip shall comply with IEC 55015 (Limits and methods of measurement of radio disturbance characteristics of electrical lighting and similar equipment).

7.11 **Packaging and Transport**

7.11.1 The LED strip lighting systems shall be packed in a manner that ensures protection during handling and transport by road, rail, or sea.

7.11.2 The packaging shall be designed to prevent vibration damage to the LED modules and control gear during transit.

7.11.3 Where sea transport is involved, a suitable dehydrating agent (desiccant) shall be included in the packaging to prevent corrosion.

7.11.4 Where lithium iron phosphate (LiFePO₄) battery packs are supplied for emergency backup, they shall be transported in accordance with applicable dangerous goods regulations (e.g., IATA, IMDG, ADR).

8.0 **CERTIFICATION AND TEST REPORTS**

8.1 The tenderer shall provide the following documentation:

- a. Product data sheets and catalogues.
- b. Type test reports for the LED driver, conforming to IEC 61347-2-13.
- c. Type test reports for the LED strip, conforming to IEC 62031.
- d. Test reports for the IEC 60598-2-22 emergency lighting safety mark (where applicable).
- e. LM-80 (Measuring Lumen Maintenance of LED Light Sources) report.
- f. Photometric test reports and photometric data files (IES/LDT format).
- g. Emergency battery backup system test reports (where applicable), including:
 - Emergency duration test report confirming minimum specified runtime
 - 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 as specified in the tender schedule. 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 strip, aluminium profiles, driver, and accessories.
- 9.3 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.
- 9.4 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 LED strip lighting system 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 components for inspection and approval by the Engineer. Samples shall be subject to testing to verify compliance with the performance requirements specified herein.