

[EQ. TO SOR 2025-2026 CAT-III]

11. TECHNICAL  
SPECIFICATIONS FOR  
EXTERNAL LIGHTNING

## Technical Specifications For External Decorative Lighting with Data Sheet

### TECHNICAL SPECIFICATIONS FOR EXTERNAL STREET LIGHT POLE

#### 1.0

#### SCOPE OF WORK

This section relates to specifications for Design, Supply (wherever called for), Installation, Connection, Testing and Commissioning of Decorative STREET LIGHT Luminaire

The Scope includes:

1. Loading-Unloading at site
2. Unpacking
- 1.1 3. Assembling
4. LED street light luminaire c/w Driver and Pressure Die Cast Aluminum Decorative Poles.
5. Decorative LED luminaire
6. Fixing and connecting wiring to the fixture
7. Testing and commissioning

#### 2.0

#### CODES & STANDARDS

#### 2.1

Sr.	Item	Relevant IS	Relevant IEC
1	General and safety requirements for light fittings	IS 1913	
2	Code of practice for lighting public thoroughfares	IS 1944	
3	Water proof electric lighting fittings	IS 3528	
4	Water tight electric lighting fittings	IS 3553	
5	M.S. tubular and other wrought steel pipe fittings	IS 1239	
6	Luminaries for street lighting. (Parts/Sec. 3)	IS 10322	
7	Classification of degree of protections provided by enclosures.		IEC 60529
8	Fixed general purpose luminaries		IEC 60598-2-1
9	General requirement and tests		IEC 60598-1
10	Limits for Harmonic current emission —THD < 10%		IEC 61000-3-2
11	Specification for Permitted Humidity Test		IEC 60068-2-38
12	Method for random sampling	IS 4905	
13	LED luminaire photometry measurement.	LM 79	
14	Lumen Maintenance	LM 80	

#### 3.0

#### DESIGN BASIS & SITE CONDITIONS AND DESIGN CRITERIA FOR VENDORS

- 3.1 All the equipment and components provided and accessories shall be suitably designed for installation and satisfactory operation as specified below.

Site conditions	
Location <b>Gujarat</b>	Site altitude <b>81 M above</b> mean sea level
Ambient temperature	Relative humidity
Maximum <b>45 ° C</b>	Maximum <b>85 %</b>
Minimum <b>13 ° C</b>	Minimum <b>25 %</b>
Design <b>50 ° C</b>	Design <b>98 % at 50 ° C</b>
Seismic factor <b>Zone III</b> as per IS:1893	Environmental <b>Tropical/humid/corrosive/Dusty conditions</b>
Electrical system data:	
Power supply for Equipment	
Voltage <b>230 V ± 5 %</b>	Frequency <b>50 Hz ± 3 %</b>

### 3.2 DESIGN CRITERIA FOR VENDORS

- The lighting calculations are to be carried out using the computer programme DIALUX 4.10 OR AGI 32 and shall include the average horizontal illuminance on the pathway, the average horizontal illuminance for ROAD on either side of the POLE / luminaire location, the glare, and the uniformity ratios including the average to minimum and the maximum to minimum.

- 3.2.2 The following parameters are to be specifically adhered to:

1. The average horizontal and vertical illuminance on the pathway shall be 10-12 LUX uniformly distributed when measured between poles located at spacing between poles shown in drawings and similar distance on perpendicular either side of the post top location.
2. Uniformity ratio maximum to minimum shall not exceed 5:1.
3. Uniformity ratio average to minimum shall not exceed 3:1.
4. Glare shall be minimum almost No Glare.

- 3.2.2 The lighting calculations will be based on a light loss factor (or) Maintenance Factor of 0.8 and a calculation grid of 1 metre intervals along the pathway and 0.5 metre intervals across the pathway.

- 3.2.3 The pole spacing will be governed by the drawings provided along with the tenders. In general the design shall be based on pole spacing as shown in tender drawings between each pole.

## 4.0 TECHNICAL REQUIREMENTS

### 4.1 SYSTEM

- 4.1.1 The lighting installation for the project shall be carried out by use of outdoor type, weather proof luminaries, to be mounted on pole and as shown in drawings.
- 4.1.2 Fitting including all accessories having IP66 protection Class (Optics Compartment)
- 4.1.3 The control gear shall be designed in such a way so that temperature rise of heat sink shall not be more than 40 Deg. C with respect to ambient temperature.
- 4.1.4 For External street lighting, luminaire shall be low glare such that it shall not cause inconvenience to the public viewed directly.

- 4.1.5 In general all luminaires shall be Dark Sky Compliant as required by ECBC / Green Building Norms.
- 4.1.6 Variation in illumination level shall be  $\pm 1\%$  is allowed in input voltage range from 120 V AC to 270 V AC.
- 4.1.7 Electric power supply at 415 volt, three phase, four wire, 50 Hz. to be tapped from the lighting panel / or 230 V will be available at each pole foundation.
- 4.1.8 The electric power shall be distributed to the lighting poles through electric cables and shall be distributed equally on three phase of the electric power supply system.
- 4.1.9 Wherever required and suiting to aesthetic value Individual control fuse with junction box shall be provided on each poles. The junction box shall be weather proof (IP-66, IK-10), having gasketed lockable hinged cover.
- 4.1.10 The light poles shall be earthed individually with coil type earth station using 8 SWG G.I wire.
- 4.1.11 Electric cable required for the street lighting installation shall be 1100 volt grade, PVC insulated and sheathed, armoured cable having stranded Al/Cu. conductor of rating as mentioned in the drawing / BOQ.
- 4.1.12 Technical details of the fixtures IP & IK etc should be clearly mentioned in catalogue on website. Any deviation in the technical criteria must be supported by test from UL or ERDA lab and must be presented at the time of tender submission
- 4.2 LED LUMINAIRES:
- 4.2.1 High power and high lumen efficient LEDs suitable for following features shall be used:
- a The working life of the lamp at junction temperature of 110 Deg. Centigrade for 350 mA to 700 mA current shall be more than 50,000 hours of accumulative operation and shall be suitable for continuous operation of 24 hours per day .these features shall be supported with datasheet. After 50,000 burning hours, the luminaire intensity shall be at least 70%.
- b Adequate heat sink with proper thermal management shall be provided.
- c Color temperature of the proposed white color LED shall be 3000k – 3500 k.
- d The direct output of LED shall be more than 115 lumen per watt at minimal operating current and shall ensure guaranteed operation life of 50,000 burning hours with Controlled junction temperature of 110 Deg. Centigrade.
- e System Efficiency including all LED, driver electronics etc. shall be more than 85%.
- f Power factor of complete fitting shall be more than 0.95.
- g The driver card shall withstand 440V and shall resume normal working when nominal voltage is applied again.
- h Thermal management shall be designed in such a way that the LED junction temperature shall not exceed beyond 40 Deg. Centigrade over ambient temperature. Design ambient conditions are mentioned above in the specifications.
- i The manufacturer will have to submit the LM-79, LM-80, L70 and B50 life expectancy performance reports to support the above compliance.
- j LEDs should be fitted with wide angle low glare and high transmittance lenses and zero upward light ratios with full cut off beyond 80°.

- k Ambient Operating temperature - 10°C to + 50°C.
- l The system should also be provided with suitable protections against voltage peaks/ surges.
- 4.2 LIGHTING POLES / CONSTRUCTION
- 4.2.1 DECORATIVE LED STREET LIGHT LUMINAIRE
- 4.2.1.1 The quality and performance is expected to be of EN60598-1 CEI 34-21 (European) standards & degree of protection should be according to EN 60529 European standards.
- 4.2.1.2 Street light fitting should Providing Street light pole bracket consisting of" B" Class MS .pipe of 4.2 cms. outside dia. complete with suitable MS sleeve tubing of required size and length suitable for 76.5mm/80mm/require size of pole top having nuts and bolts for fixing the brackets and having spread of 0.5 mtr. Length with 110 deg. with vertical plane and suitable welded stiffener reducer and nipple with check knut complete painted with one coat. of Red oxide / PU base primer and two coats of Aluminum / PU paint. paint The luminaries shall be generally having direct type but low glare considering public promenade.
- 4.2.1.3 Street light pole shall be tropicalised for local conditions as defined in the specifications above and vendor shall guarantee the performance requirements are met as per defined in the tender documents.
- 4.2.1.4 The luminaire housing shall be completely made of pressure die cast aluminum with higher thermal conductivity, corrosion resistant pressure die cast body with suitable epoxy powder coated / PU painted. The color in general shall be Dark Grey / Graphite Black.
- 4.2.1.5 The luminaire complete with LED section, Optics etc shall be dust and Weather proof (Min IP-66) protection as per IEC – 60529.
- 4.2.1.6 The complete assembly along with optics and diffuser shall be Vandal proof; minimum of IK-08 protection is required for post top luminaires. The diffuser shall be made from high quality, UV stabilized and Non-Yellowing Polycarbonate / PMMA.
- 4.2.1.7 The street lightluminaire shall be suitable for direct mounting on pole bracket
- 4.2.1.8 The gasket shall be EPDM or Silicon Rubber Gaskets only; all screws shall be Allen-Key type or requires special tools for opening of the housing / control gear box and shall be of Stainless Steel.
- 4.2.1.10 The base compartment (Control Gear Compartment) shall be provided with wooden back board and enough space to terminate 4 Core 16 Sq. mm Aluminum Armored cable with loop in and loop out multi way connectors strips; 2 A DP MCB along with the Driver fixed on the wooden back board, 2 nos. Earthing Studs etc
- 4.2.1.11 The compartment door shall be secured with tamper resistant special bolts requiring special tools and shall be provided with suitable gasket to comply with IP 66 requirements.
- 4.2.1.12 The pole shall be complete with all mounting accessories, switchgear and connector strips.
- 4.2.1.13 The poles shall conform to the drawings and where such drawing is not available, the contractor shall make such drawing and have it approved before fabricated.
- 4.2.1.14 The poles shall be PU painted; the color of the paint shall match the post top luminaire with 2 coats of epoxy primer applied before painting.
- 4.2.1.15 The luminaire lumen output shall be enough at minimum system wattage so as to cover

	wide area.
4.2.1.16	The luminaire Color Temperature to be as per datasheet.
4.2.1.17	Vendor to submit the detailed calculation for lux level with uniform distribution including the lux distribution curve /graph/spatial distribution with dimension.
4.2.1.18	Supplier will be solely responsible for testing and performance compliance of the luminaries after installation and shall also ensure the specified and uniform illumination and comfort level on the horizontal plane at plaza level.
4.3	CABLE LAYING (NOT APPLICABLE)
4.3.1	Electric cable for the street lighting installation shall follow specification under the heading “ <b>L.T XLPE cable</b> ”.
4.3.2	Cable shall be terminated in a 4-way terminal block inside the pole or to the attached junction box as shown on drawings.
4.3.3	Cable route shall be as shown on the drawings or the contractor shall mark out the route and lay the cables only upon approval of the route.
4.3.4	Cable laying shall be done with excavation, backfilling of trench with sand & bricks at bottom & top.
4.4	EARTHING
4.4.1	All light fixtures and poles shall be earthed as specified under section “EARTHING”.
4.4.2	Earth electrode shall be of 8 SWG coil type and shall otherwise meet to the specification given under heading “Earthing”.
5.0	INSTALLATION OF SYSTEM
	Lighting installation shall be carried out as per details shown in the drawing.
	The poles shall be erected in perfect plumb with concrete foundation at a location shown in the drawing. The foundation shall be designed to withstand the static load as well as wind velocity and bending moment of the pole and shall be approved by the client prior to execution.
	The civil foundation will be provided by Civil Contractor. The Cables will be provided at the foundation; based on the distribution luminaire vendor to install the pole and connect the power and earthing cables.
	The luminaries shall also be installed on the pole and be electrically wired to the respective driver at base compartment..
	Earthing installation shall follow the details for the same shown in the drawing.
	On completion of the installation, the street light poles shall be painted with two coats of metal primer (Red Oxide) followed by two coats of Synthetic enamel of the shade as approved by the Engineer-in-charge.
6.0	DRAWING & INFORMATION
6.1	On award of the contract, the contractor shall submit the fully dimensioned general arrangement drawings complete with plan, elevation and sectional views. As built drawing should be submitted indicating cable rout, exact position of light fixtures.

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7.0

## INSPECTION & TESTING

Test certificate should be produced for IR test carried out on all LT cables and panels. All the lamps should be controlled as per required control logic. Operation of timer, contactor circuits should be tested.

Tests are classified as:-

7.1

Prototype test  
Type test  
Acceptance test  
Routine test.

Report of actual Lux level should be submitted.

8.0

## METHOD OF MEASUREMENT

8.1

Supply, Installation, connection, testing and commissioning of each light fitting with lamp, control gear, earthing etc. shall be considered as one unit for measurement and payment.

Supply, installation, connection, testing and commissioning of each lighting pole, concrete coping/foundation, base plate, junction box/access panel, internal connection from fuse to the light fixture with 2.5 mm.<sup>2</sup> copper conductor wire, earthing etc. shall be considered as one unit for measurement and payment.

All cabling work shall be measured on the basis of unit length and the cost shall include, cost of cable, excavation, laying, back filling, cable terminations and connection in junction box or pole terminal box etc.

9.0

## TEST

i) Visual and Dimensional Check:

The unit shall be checked visually for all dimensions as per approved design and drawing. General workmanship should be good; all the components properly secured and sharp edges shall be rounded off. Check the marking and quality of the workmanship visually. Check the rating and make of electronic / electrical items.

ii) Checking of documents of purchase of LED

iii) Check Document of purchase of LED lamps of approved sources

iv) Resistance to humidity test

This is carried out by suspending the painted panels in corrosion chamber maintained at 100% RH and temperature cycle of 42 to 48 deg. C for 7 days and examining it for any sign of deterioration and corrosion of metal surface.

v) Insulation resistance test

The insulation resistance of the unit between earth and current carrying parts shorted together shall not be less than 2 M when measured with 500V megger.

vi) HV test

Immediately after insulation resistance test, an AC voltage of 1.72 KV RMS (1500 + 2x rated voltage) of sine wave form of 50 Hz shall be applied for one minute between the live parts and frame. There shall not be any kind of break down, flashover or tripping of supply.

vii) Over voltage protection

The Luminaire shall withstand at 300V AC for two minutes.

viii) Surge protection

It shall withstand a surge of 1.5kV 3% for 50 microsecond's 20 % at the input terminals for all types. (Tests shall comply with Clause 5.4 of latest IEC 60571-1).

ix) Temperature rise Test:

Temperature rise Test shall be conducted at 180VAC with full load. The temperature rise shall be recorded by temperature detectors mounted at the specified reference points on the body of semiconductors, capacitors and other components as agreed between purchaser and manufacturer. The maximum-recorded temperature under worst conditions shall be corrected to 55°C and compared with maximum permissible temperature (for power devices at junction). Under loading conditions as specified above, the corrected temperature of the power devices shall have a safety margin of minimum 100 C.

Temperature at junction shall not exceed 100 0 C when corrected to 55°C. The Luminaire shall also be subjected for short time rating after continuous loading to ensure the temperature rise is within the permissible limit. The maximum temperature rise of the electronics devices on the PCBs shall be in limit for industrial grade components suitable for 85°C environment.

x) Ra (Colour Rendering Index) measurement test

The lumen is the unit of luminous flux, which is equal to the flux emitted in a solid angle of one Steradian by a uniform point source of one candela.

The initial reading of the chromaticity co-ordinates x & y shall be within 5 SDCM (Standards Deviation for Colour matching) from the standardised rated value as per Annex. D of IEC 60081 - 1997.

The initial reading of the general colour-rendering index (Ra) shall not be less than the rated value decreased by 3.

The lumen maintenance of the lamp shall not be less than 80% of the initial lumen after 20000 burning hours and 70% of the initial lumen after 50000 hours. The initial lumen will be taken after 100 hours aging.

Photometric test shall be conducted as per annexure B of IEC 60081-97.

The lumen maintenance test shall be done as per annexure C of IEC 60081-97.

xi) Lux measurement

Lux measurement with the help of Lux meter shall be done at a distance as shown above. Value obtained shall not be less than the Lux specified in the table therein, considering 10% Lumen is absorbed by the reflector.

xii) Fire retardant Test

Fire Retardant test shall be conducted as per IEC 332-1 of the wire used in the fittings.

xiii) Test for IP66 protection

This test shall be conducted as per IEC

xiv) Environmental tests

The Luminaire shall meet the following tests as prescribed in IEC – 60571.

- a) Dry heat test.
  - b) Damp heat test
  - c) Test in corrosive atmosphere
  - d) Combined dust, humidity and heat test
- xv) Reliability Test

The reliability can only be determined in actual service. However, the following tests shall be carried out on the prototype to simulate as close as possible, the service conditions. There shall be no failure during this test.

- a) The light unit shall be mounted in an oven maintained at 75°C.
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b) The light will be operated at the specified maximum voltage and at 75°C for a period of 100 hours.

xvi) Life Test

The lumen maintenance & life test shall be done as per annexure C of IEC 60081-97.

xvii) Endurance Test

The Luminaire shall be kept "ON" with input voltage of 250VAC for 200 hours. After this the Luminaire is subjected to 20,000 cycles of "ON" and "OFF", each cycle consisting of 3 seconds "ON" and 10 seconds "OFF" period. Luminaire should survive this test. Test is to be continued for one lakh cycles, followed by Performance test.

xviii) Safety:

The Luminaire shall comply with the safety requirements as per IEC 61195.

## 9.0 TRANSPORT, DELIVERY & STORAGE

9.1 The prices shall be F.O.R. site basis including packing & forwarding charges. The quoted price must include all the costs for necessary mode of transportation up to the final location or site store. All incidental expenses during transportation shall be part of quoted prices including transit insurance. The charges for loading and unloading of equipments at site should form part of offer.

## 10.0 GUARANTEE & WARRENTY

10.1 The Bidder shall stand un-conditional guarantee for the performance of entire luminaire equipment and control gear components with LED lamp for 5 years from the date of commissioning

DATASHEET

SR. NO.	PARTICULARS	REQUIRED DATA FROM VENDOR FOR POST TOP LANTERN
1.	Over all Power Consumption	
2.	Power Factor	
3.	Frequency	
4.	Type of LED	
5.	Lumen/LED	
6.	Driver Voltage Range	
	No Load Power Consumption of Driver	
	Full Load Efficiency of Driver	
	Load Regulation of Driver	
	Driver Voltage withstand capacity in hours	
8.	Driver Current (should be variable voltage constant current) (120 Volt AC to 270 Volt AC)	
9.	Type of Heat Sink	
10.	Temperature capacity of Heat Sink	
11.	Protection Class of Lamp Compartment	
12.	Protection Class of Control Gear	
	IK RATING- (IK 08)	
13.	Material Of Fitting	
14.	Material Of Housing	
15.	Material Of Pole	
16.	Luminous Flux (lm)	
17.	Color temperature (K) – 3000k OR 3500k	
18.	Color Rendering Index	
19.	THD in %	
19.	Average life time with a flux maintained at 70% of initial flux.E.g.-L70- X hours- 50,000 hours min.	
20.	Unified Glare Ration(UGR)	
21.	Vendor be a original manufacturer of LED post of lantern worldwide or collaboration and since	
22.	Replacement Guarantee years(min. 5 years)	