

## **LED LIGHT SPECIFICATIONS**

### **SUPPLY, LAYING, TESTING AND CONNECTING UNARMoured CABLE:**

The item includes supply, laying, testing and commissioning of round 3 X 1.5 sq. mm for LED luminaries flexible unarmoured single PVC insulated copper conductor cable 1100 V grade to be laid through the pole from luminaries to junction box by experienced technician without any damage. The cable joint shall not be allowed. Termination glands/lugs etc shall be included in the item.

### **SITC OF LED LIGHT LUMINAIRES:-**

#### **TECHNICAL SPECIFICATION FOR ENERGY EFFICIENT LED BASED LUMINAIRE UNIT FOR LED LIGHT: -**

This specification is for technical and general requirements design, development, manufacturing, testing and supply of energy efficient LED luminaire complete with all accessories, LED lamps with suitable current control driver circuit and required optics including mounting arrangement.

#### **CODES & STANDARDS: -**

IEC 60529 Classification of degree of protections provided by enclosures (IP Codes)  
EN 55015, CISPR15 Limits and methods of measurement of radio disturbance characteristic of electrical lighting and similar equipment.  
IEC 62031 LED modules for general lighting-Safety requirements  
IEC 61547-EMC Immunity requirement  
IEC 60598-2-1 Fixed general purpose luminaires  
IEC 60598-1 Luminaires - General requirement and tests  
IEC 61000-3-2 Electro Magnetic compatibility (EMC)- Limits for Harmonic current emission — (equipment input current  $\leq 16$  A per phase.  
IEC 60068-2-38 Environmental Testing: Test Z- AD: composite temperature/humidity cyclic test  
IEC 61347-2-13 Lamp control gear: particular requirements for DC or AC supplied electronic control gear for LED modules.  
IS 10322 Specification for the luminaires  
IS 4905 Method for random sampling  
LM 79 LED luminaire photometry measurement.  
LM 80 Lumen Maintenance  
IEC 62384 DC or AC supplied electronic control gear for LED modules performance requirements  
IEC/ PAS 62612 Self-ballasted LED lamps for general lighting services- Performance requirements

## **CONSTRUCTIONAL FEATURES:**

### **General:**

- a) Luminaries shall be made of die cast aluminium/ extruded Aluminium body with powder coated finish having safety.
- b) Heat sink used should be aluminium extrusion having high conductivity. Heat sink should be integrated within luminaries and efforts shall be made to keep the overall outer dimensions
- c) optimum such that it permits sufficient heat dissipation through the body itself so as to prevent abnormal temperature inside the luminaries and consequential damage to cover, gasket material, LEDs, lenses and drivers.
- d) LED must be mounted on Metal core PCB with suitable large area surface by means of fins to dissipate the conduct heat. The fins must be exposed to ambient flowing air.
- e) All luminaries shall be provided with toughened glass of min. 0.8 mm thickness of sufficient strength. UV stabilized Poly carbonate material is also acceptable. High efficiency prismatic diffuser/Lens under the LED chamber to protect the LED and luminaries shall be provided.
- f) The minimum IK protection of optic cover shall be IK 05. The test material certificate shall be provided.
- g) Suitable number of LED lamps shall be used in the luminaries. The manufacturer shall submit the proof of procurement of LEDs from OEMs at the time of testing.
- h) Suitable reflector/ lenses may also be provided to increase the illumination uniformity and distribution.
- i) The electrical component of the LED and LED driver must be suitably enclosed in sealed unit to function in environment conditions mentioned earlier.
- j) The connecting wires used inside the luminaries, shall be low smoke halogen free, fire retardant e-beam cable and fuse protection shall be provided in input side.
- k) Design of the thermal management shall be done in such a way that it shall not affect the properties of the diffuser.
- l) The equipment should be compliant to IEC 60598-1, IEC 62031 and IEC/PAS 62612 depending on the type of luminary.
- m) The LED Module(s), Driver gear, etc. shall be designed in such a way so that temperature of heat sink shall not exceed 70° C.
- n) All the material used in the luminaries shall be halogen free and fire retardant confirming to standard.
- o) The infrastructure for Quality Assurance facilities to verify/ test/ prove above specifications must be available at the manufacturing facility. The compliance shall be indicated clearly in the tender itself.
- p) All fasteners must be of stainless steel.
- q) All glands inside/ outside luminaries must be metallic
- r) Heat sink must be thermally connected to MCPCB/ LED light source.

**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 85° C (max) at operating current shall be more than 50,000 working hours of accumulative operation and shall be suitable for continuous operation of 24 hours per day. These features shall be supported with datasheet.
- b) Adequate heat sink with proper thermal management shall be provided.
- c) Lumen maintenance report as per LM 80 guidelines shall be produced for the power LEDs used.
- d) Thermal management shall be in such a way that LED soldering point temperature shall not go beyond 75° C.
- e) The LED luminaries shall be free of glare.

**LED DRIVER specification:**

- a) Current waveform should meet relevant nation and international standard.
- b) LED Driver shall withstand, withstand voltage up to level mentioned elsewhere in tender and restore once normal working when normal voltage is applied.
- c) The life of the driver should more than 25000 Hrs.
- d) Maximum Temperature rise  $\leq 30^{\circ}\text{C}$  @  $45^{\circ}\text{C}$   $T_{\text{amb}}$ . With safety margin of  $10^{\circ}\text{C}$ .
- e) The control gear should be compliant to IEC 61347-2-13, IEC 62031 and IEC 62384 as per the requirements.
- f) The driver of the luminaries should have Short Circuit, Over Voltage, over current, over temperature, Under Voltage, String Open protections.

**The electronic components used shall be as follows:-**

- a) The protective cum adhesive coating used on PCBs should be cleared and transparent and should not affect colour code of electronic components or the product code of the company.
- b) The construction of PCBs and the assembly for components for PCBs should be as per IS standards.

**Illumination Level:**

The luminaries shall be so designed that the illumination level shall be evenly distributed and shall be free from glare. The lux distribution curve/ graph/ spatial distribution shall be submitted.

**GENERAL DATA SHEET**

Sr. No.	Parameter	Value/Detail
•	Rated Supply Voltage	230 V ~, 50 Hz
•	Input supply voltage range	120-270 V
•	Expected Input Frequency	50 Hz +/- 3%

•	Working Temperature	+5° to +50° C
•	Working Humidity	10% - 90% RH
•	Usage hours	Dusk to dawn
•	Power Factor	≥0.90
•	Index of Protection Level	IP 66 as per IEC 60529.
•	Surge Protection	4 KV
•	LED Chip efficacy	≥ 120 lm/ W
•	Driver Efficiency	> 85%
•	Junction Temperature of LED	< 85° C
•	Rated Life @ L70	50,000 burning hours at 35° C ambient
•	Nominal Correlated Colour Temperature	5000° K to 6000° K
•	Dispersion Angle	Minimum 120°
•	Tilting angle	Adjustable
•	Maintenance factor of	0.85
•	Colour Rendering Index	≥75
•	Total Harmonic Distortion	< 10 % (EMI/ EMC Certification)
•	LED MAKE	Cree/ Osram/ Nichia/ Philips Lumileds

**Particulars and Details to be submitted by the bidder:**

In order to properly assess and due diligence on submissions, the Bidder should provide following information on the quality and photometric of proposed luminaries.

**1. General Description**

Following details of the proposed luminary shall be submitted

**2. Electrical specifications**

Electrical ratings of the proposed luminary product shall be submitted

**3. LED chip and driver information**

LED chip and driver information of the proposed luminary product shall be submitted

**4. Photometric information to be submitted**

**TESTS & CERTIFICATES:**

Tests are classified as:—

Type test

Acceptance test

Routine test.

The luminaries' should be tested as per IEC 60598-2-3: 2002 standards and following test reports should be submitted: -

- (i) Heat Resistance Test
- (ii) Thermal In SITU Test
- (iii) Ingress Protection Test
- (iv) Drop Test
- (v) Electrical/ Insulation Resistance Test,
- (vi) Endurance Test,
- (vii) Humidity Test,
- (viii) Electrical and Photometric Measurements Test Report (IES LM 79)
- (ix) LED Lumen Maintenance Test Report (IES LM 80)
- (x) Vibration test as per ANSI

**Type Test: -**

Type test certificates for both the luminaries' shall be provided with the technical-bid.

**Acceptance Tests: -**

These tests are carried out by an inspecting authority at the supplier's premises on sample taken from a lot for the purpose of acceptance of a lot. Acceptance tests shall not be carried out from particular size from the lot on which type tests have already been conducted. Recommended sampling plan is given below.

**Sample size and criteria for conformity**

The luminaries shall be selected from the lot at random. In order to ensure randomness of selection, procedures given in IS 4905-1968 (Reaffirmed 2001) may be followed.

**Routine Tests:**

These tests shall be performed by the manufacturer on each complete unit of the same type and the results shall be submitted to the inspecting agency, prior to offering the lot for acceptance test. The firm shall maintain the records with traceability.

**Test Scheme & Quality Assurance**

**Method of Testing: -**

**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.

**Checking of documents of purchase of LED**

Check Document of purchase of LED lamps of approved sources viz. NICHIA/ OSRAM/ PHILIPS LUMILEDS/ CREE.

**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° C for 7 days and examining it for any sign of deterioration and corrosion of metal surface.

**Insulation resistance test**

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

**HV test**

Immediately after insulation resistance test, an AC voltage of 1.72 KV rms (1500 + 2 x 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.

**Over voltage protection**

The LED Driver Shall be cut off once voltage exceeds 288 V AC. It shall be reconnected when supply comes within limit.

**Surge protection**

It shall withstand a surge of 4 KV at the input terminals for all types.

**Reverse polarity**

The Luminaries' shall withstand polarity reversal. It shall be operated with reverse voltage for Min. 1 minute at maximum value of voltage range. At the end of this period, the supply shall be made correct polarity and Luminary shall operate in a normal way.

**Temperature rise Test:**

Temperature rise Test shall be conducted at 100 V ~ 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 10° C.

Temperature at junction shall not exceed 100° C when corrected to 55° C. The Luminaries' 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. In case of exceeding limit, use of MIL-grade component shall be considered keeping RDSO informed.

#### **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 20,000 burning hours and 70% of the initial lumen after 50,000 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.

#### **Fire retardant Test**

Fire Retardant test shall be conducted as per IEC 60332-1 of the wire used in the luminaries.

#### **Test for IP 65 protection**

This test shall be conducted as per IEC 60529.

#### **Environmental tests (Proto type Test)**

The Luminary shall meet the following tests as prescribed in IEC-60571.

- (i) Dry heat test.
- (ii) Damp heat test
- (iii) Test in corrosive atmosphere
- (iv) Combined dust, humidity and heat test

#### **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.

- (i) The light unit shall be mounted in an oven maintained at 45° C.

- (ii) The light will be operated at the specified maximum voltage and at 45° C for a period of 100 hours.

**Photometry Test: -**

**The test shall be carried out for Total Luminous Flux, Luminous Intensity Distribution, Electrical Power, Luminous Efficacy (calculation), Color Characteristics– Chromaticity, CCT & CRI etc. as per IES LM 79.**

**Life Test**

**The lumen maintenance & life test shall be done as per IES LM 80 for LEDs.**

**Endurance Test**

The Luminaire shall be kept “ON” with input voltage of 250 V ~ 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 20,000 cycles, followed by performance test.

**Safety:**

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

**All Tests defined for acceptance other than LM 79 and LM 80 are allowed to carry out at Manufacturer works.**

**4. INFRINGEMENT OF PATENT RIGHTS**

Client shall not be responsible for infringement of patent rights arising due to similarity in design, manufacturing process, use of the components, used in design, development and manufacturing of these light luminaires and any other factor which may cause such dispute. The responsibility to settle any issue rises with the manufacturer.

**5. MARKING:**

The following information shall be distinctly and indelibly marked on the housing:

Year of manufacture/ Batch Number/ Serial Number  
Name of Manufacturer (Engraving only, stickers not allowed)  
Rated watt and voltage  
Input frequency

**6. METHOD OF MEASUREMENT**

Supply of the fixture including transport to site, loading and unloading etc. as specified will be treated as one unit for measurement and payment.



**7. TRANSPORT, DELIVERY AND STORAGE**

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 of fixture or site store. The fixture should be supplied with required storage arrangements suitable for placing in open storage yard. 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.

**8. GUARANTEE AND WARRENTY**

The Bidder shall stand guarantee for the performance of entire fixtures and components for twenty four (24) months from the date of commissioning or from issuance date of completion certificate, whichever is earlier, as agreed up on and as reproduced in the purchase order within the tolerance specified or as permitted by the relevant standards for the equipment in his scope of supply. The Purchaser also reserves the right to use the rejected equipment or part thereof until the new equipment meeting the guaranteed performance is supplied by the Bidder.

**9. SPARES**

The bidder shall quote for minimum spares required for two years safe operation of light fixtures along with the offer separately.