TECHNICAL SPECIFICATIONS FOR LIGHTING FIXTURES

1.1 Scope :

Scope of work under this section shall include inspection at suppliers/manufacturer's premises at site, receiving at site, safe storage, transportation from point of storage to point of erection, erection and commissioning of light fittings, fixtures and accessories including all necessary supports, brackets, down rods and painting etc as required.

1.2 Standards :

The lighting and their associated accessories such as lamps, reflectors, housings, ballasts etc., shall comply with the latest applicable standards, more specifically the following:

General and safety requirements for Luminaries:

Part-1 Tubular fluorescent lamps	-	IS– 1913 (Part-1)
Industrial lighting fittings with metal reflectors	-	IS - 1777
Decorative lighting outfits	-	IS - 5077
Bayonet lamp holders	-	IS - 1258
Bi-pin lamp holders for tubular fluorescent lamps	-	IS - 3323
Electronic Ballasts for fluorescent lamps – General & Safety requirement	-	IS–13021 (Part-1
Electronic Ballasts for fluorescent lamps – Performance requirement	-	IS–13021(Part-2)
Ballast for HP MV lamps	-	IS - 6616
Tubular Fluorescent lamps	-	IS-249(Part-1 to 4)
Luminaries – General requirement	-	ARE – 10322 (Part-1)
Luminaries – Constructional requirement	-	ARE – 10322 (Part-2)
Luminaries – Screw and Screwless termination	-	IS – 10322 (Part-3)
Luminaries – Methods of Tests	-	ARE – 10322 (Part-4)
Particular requirement–General purpose Luminaries	-	IS–10322(Part-5/Sec-1)
Particular requirement – Recessed Luminaries	-	IS–10322(Part-5/Sec-2)
Particular requirement – Luminaries for Road and Street lighting	-	IS–10322(Part-5/Sec-3)
Particular requirement – Portable General purpose Luminaries	-	IS–10322(Part-5/Sec-4)

Particular requirement – Flood Lighting	-	IS–10322(Part-5/Sec-5)
High pressure mercury vapour lamps	-	IS – 9900 (Part-1)
Tungsten filament general electric lamps	-	IS – 49
General Lighting - LEDs and LED modules – Terms and Definitions	-	IS-16101 : 2012
Self- Ballasted LED Lamps for General Lighting Services Safety and performance Requirements	-	IS-16102(Part 1& 2) : 2012
Led Modules for General Lighting Safety and Performance Requirements	-	IS-16103(Part 1& 2) : 2012
Luminaires Performance	-	IS-16107(Part 1 & 2): 2012

1.3 Light Fittings-General Requirements :

Fittings shall be designed for continuous trouble free operation under atmospheric conditions without reduction in lamp life or without deterioration of materials and internal wiring. Degree of protection of enclosure shall be IP-65 for outdoor fittings except bulkhead fitting. Bulkhead fitting shall be provided with IP-54 protection.

Fittings shall be so designed as to facilitate easy maintenance including cleaning, replacement of lamps/ ballasts.

c). All fittings shall be supplied complete with lamps. All LED lamp fittings shall be complete with accessories like Connection Box clamping clips etc. Outdoor type fittings shall be provided with weather proof junction boxes (IP-55) and IP-54 Control gear boxes. All fittings should be flame proof as per schedule of quantities.

Each fitting shall have a terminal block suitable for loop-out connection by 1100 insulated copper conductor wires upto 4 sq.mm. The internal wiring should be completed by the manufacturer by means of standard copper wire and terminated on the terminal block.

All hardware's used in the fitting shall be suitably plated or anodized and passivated.

Earthing: Each lighting fitting shall be provided with an earthing terminal. All metal or metal enclosed parts of the housing shall be

bonded and connected to the earthing terminal so as to ensure satisfactory earthing continuity throughout the fixture.

Painting/Finish: All surfaces of the fittings shall be thoroughly cleaned and degreased and the fittings shall be free from scale, rust, sharp-edges, and burns.

The housing shall be powder coated/stove-enamelled or anodised as required. The surface shall be scratch resistant and shall show no sign of cracking or flaking when bent through 90 deg. over 12 mm dia mandrel.

Metal used in BODY of lighting fixtures shall be not less than 22 SWG or heavier if so required to comply with specification of standards. Sheet steel reflectors shall have a thickness of not less than 20 SWG. The metal parts of the fixtures shall be completely free from burns and tool marks. Solder shall not be used as mechanical fastening device on any part of the fixture.

2.0 LED Light Fixtures

2.1 Technical Requirement of LED Light Fixtures

LED efficiency system efficiency shall be greater than 120 Lumen/watt @ 350mA drive current. In case of LED of higher power ratings, drive current greater than 350mA can be accepted if LEDs LM 80/ I.S 16105 test report supports the same.

LED type shall be SMD (Surface mounted device) for all applications. COB type to be considered only for Highbays, Flood Lights and Flame proof Light Fittings.

Approved makes for different LED technology / tyoes shall be as follows:

LED Technology / Type	Approved Make
SMD	Nichia, Osram, Lumileds (Erstwhile Philips Lumileds), CREE
C.O.B	Citizen, Bridgelux
Domestic/ Decorative Luminaires	Everlight Taiwan, Edison Taiwan, Samsung Korea, Osram Germany along with makes approved for SMD.

Test report of Ambient temperature of 55 / 85 / 105 Deg. C at rated and maximum current shall be submitted for SMD type LED. For COB type LED, as soldering temperature is not applicable for COB technology, LM 80 test reports shall be submitted.

TM21 life projection calculation along with LM 80for all three ambient temperature of 55 / 85 / 105 Deg. C as per applicable standards shall be submitted to substantiate the life of LED chip shall be more than 50000 Hrs for both commercial and Industrial range and 25000 Hrs for LED bulb, domestic and decorative range.

Reported life span of LED used in the Luminaire shal be greater than 50000 Hrs at soldering point temperature of 85 deg.C.

The LEDs shall comply to Photo biological Safety norms as per IEC62471/EN62471/IS:16108 and should fall in the exempt group for indoor Luminaires and in exempt or low risk group for outdoor LED luminaires.

Colour temperature of the proposed white colour LED shall be from 5700K (i.e. 5665K+355K) to 6500K for indoor type luminaire Step 5 or Step 3 McAdam, as Per ANSI standard C78.377A, & 5700K (i.e. 5665K+355K). For outdoor type Luminaries, Step 7 McAdam, as per ANSI standard C78.377A, will be accepted On account of colour consistency. Colour Rendering Index (CRI) : CRI should include all colourranage from R1 to R15, shall be > 80 for Indoor luminaire and > 70 for Outdoor luminaire.

View angle shall be typical 120 deg.

2.2 Technical Specifications of LED drivers:

The minimum efficiency of LED driver shall 90% for driver power output rating <=40W and 87% for driver power output rating > 40W.

Power factor of LED driver shall be greater than 0.9.

In built high voltage cut off and short circuit/ overload protection.

THD less than 10% for upto20W and 10% more than 20W.

In – bilt high voltage cutoff:>=290Volt (High)

Driver Surge Protection standard: Surge Protection for minimum 2KV for indoor And minimum 3kV for Outdoor LED systems shall be provided. However, if a Site is prone to lighting and surge 10kV surge protection

shall be required. In Case of outdoor luminaires, the Surge Protection Devices (SPD) should be series Type with fail safe.

2.3 Warranty & Performance Guarantee:

The supply of LED lighting shall be covered by following minimum warranty from the Date of supply of the lighting:

60 Month warranty for Indoor & Outdoor commercial / Industrial complete

Luminaires including LED.

60 Months for LED Bulbs, Domestic or Decorative Luminaire including LEDs.

Defect liability period, for which 10% security deposit / Performance Bank

Guarantee shall be held towards performance as per following details:

5 years in case of Indoor & Outdoor commercial/ Industrial complete Luminaries including LED.

5 years in case of LED Bulbs, Domestic or Decorative Luminaries Including LEDs.

In case of composite tender which includes LED also, the above Mentioned defect liability period and performance BG of 10% will be for The LED part of the tender and for other works it will be as per existing Guidelines in practice.

Luminaire: Housing of outdoor and/or FLP shall be Pressure die-cast LM6/ADC12/LM24. For indoor, non-weather proof items like CRCA/PC/Aluminum Extrusion housing can be used.

Cover type: For outdoor type fitting, cover type shall be Toughened glass or UV Stabilized polycarbonate whereas, whereas, for indoor and non-weather proof items, UV stabilized Poly Carbonate can be used.

Housing ingress protection:

n.	Application Type	o.	Minimum Ingress Protection
p.	LED Street Light	q.	IP66
r.	Led Flood Light/Outdoor Industrial	s.	IP65
t.	Toilet fixture	u.	IP44

Industrial Indoor (Such as High bay w. IP54 fittings, Medium bay fittings)

3.0 LIGHTING FIXTURES

SCOPE

Manufacturer at works will test the light fitting specified in the tender. The same fittings will be purchased, transported, delivered to site. Necessary manufacturer's test certificate will be submitted to Project managers/Consultants/Architects.

STANDARDS

Lighting fittings covered against these specifications shall comply with the relevant latest Indian Standards and codes.

CONSTRUCTION

The fitting shall be suitable for 240 volts single phase AC supply +/- 5% and frequency 50 Hs. +/- 3%.

Industrial and decorative fittings shall comprise of mounting rails and other accessories. The decorative fitting shall be provided with louvers as specified. The decorative fittings should be suitable for recessed mounting in the false ceiling fully wired up to terminal block. Fittings will be with electromagnetic or high frequency electronic ballast as specified.

Where conductors are required to be drawn through tube or channel leading to the fitting the tube or channel must be free from sharp angles or projecting edge, and of such size as will enable them to be wired with the conductors used for the final circuit without removing the braiding or sheathing. As far as possible all such tubes or channels should be of sufficient size to permit looping back.

Wires used within prewired fittings shall be flexible with PVC insulation and14/0.193 mm (minimum) copper conductors. The leads shall be terminated on built-in terminal block, ceiling rose or connector.

All Fittings will have power factor correct capacitors mounted integrally. An earth terminal with suitable marking shall be provided for each fitting.

Fittings shall be installed such that the lamp is at a height of 2.5m above floor level, unless directed otherwise.

The lighting layouts furnished by consultant shall indicate approximate locations of lighting fixtures. The electrical contractor shall determine, with approval of the consultant or his authorized representative the exact locations of each fixture in order to avoid interference with mechanical equipment & also with a view to obtain as uniform illumination as practicable, & to avoid objectionable shadows. Conduit run shown on drawing is only indicative. These shall be laid out by the contractor to suit field conditions.

Once the installation will be over the contractor will take the illumination level and submit the report to consultant.

LIGHTING FITTING COMPONENTS/ACCESORIES

BALLASTS/CHOKES

These shall be compact in design copper wound, low power loss, good heat dissipation with no humming sand and filled with polyester or electronic as specified.

STARTERS

The starters shall have hermetically sealed glow switch and radio suppression capacitors suitably designed to withstand striking voltage of tube and to ensure long lamp life starter holder shall molded type either made up of phenol- formaldehyde.

CAPACITORS

These shall be low loss types to improve power factor up to 0.91 to 0.95 lag. apacitor housing made up of corrosion resistant material and shall be hermetically sealed type.

LAMP HOLDERS

These shall rotary spring-loaded resilient type either brass or molded from unre- Fromaldehyde.

The holder shall be rigid enough to maintain shape on application of a nominal external pressure. There should be sufficient threading for fixing the base to the lamp holder part so that they do not open out during attention to the lamp or shade.

Lamp holders for use on brackets and the like shall have not less than 1.3 cm nipple, and all those for use with flexible pendant shall be provided with cord grips.

LED LIGHT FIXTURE

Housing will be made of CRCA Sheet steel or extruded aluminium as specified.

In case of aluminium the same will act as Heat sink & better thermal management as compared to CRCA sheet.

Light fittings shall be with Edge-Lit technology and will give uniform light & higher spatial distribution with better luminaire to luminaire spacing.

Fittings shall have translucent highly efficient PMMA cover.

5. Luminaire luminous flux will be as per LED Wattage which is to be indicated.

Luminous efficiency of luminaire at least 100 lm/W or more with the development in the field of led technology.

Color temperature (CCT) will be 6000/4000 K (equivalent to cool white 86 or neutral white 84) in office area. However before procurement this will have to be get confirmed by supplier/contractor from architect.

Colour rendering index (CRI) Ra > 80.

All indoor office area Degree of protection will be IP 40 and above.

System Connected load will be informed by supplier/contractor as per LED.

Electronic driver should be suitable for LED with THD < 10%,

Fixture shall be tested as per LM80 B10.

CIDCO should get minimum 5 years warranty

Fittings shall be certified with certificates to be provided.

Thermal measurement to be indicated for the fitting.

LED Vf- Forward Voltage that LED voltage difference on basis of LM80, TM21.

Fittings should be tested with LM 79 for photometric chart certification.

UGR should be <22 so that glare will be less. Following data to be filled in and to be submitted:

Sr. No	Description	Specification Requirement	Vendor to fill Data
	General Conditions		
1	LED Make	Osram/Cree/Nichia/ Phillips /Samsung	

Sr. No	Description	Specification Requirement	Vendor to fill Data
2	Country where it is manufactured		
3	Driver Make		
4	Country where it is manufactured		
5	Luminaire Make		
6	Country where it is manufactured		
7	Facility with Luminaire manufacturer		
8	Photometry lab		
9	IP Testing		
10	Temperature rise measurement		
11	Harmonics measurement		
12	Other facilities		
13	Any other Approval		
14	If spares available in India		
15	After sales service		
16	Number of Years of Old installation		
17	Name of customer		
18	Contact details of customer		
19	List of customer		
20	If IP / Patent is not infringe		
21	Warranty period		
22	End of life warranty		
	TECHNICAL SPECIFICATION		
1	LED Ambient Temp Range	5°C to 50°C	
2	Driver Ambient Temp Range	5°C to 50°C	
3	Luminaire Ambient Temp Range	5°C to 50°C	
4	Voltage range	150 to 270 Volts, AC 50Hz± 3%	

Sr. No	Description	Specification Requirement	Vendor to fill Data
5	P F	>0.95	
6	LED		
7	LED Efficacy	>100 lm/watt	
8	LED Vf		
9	LM 80 Certification for LED		
10	Is Certified LED is being used		
11	Colour Temperature	4000K-6000K	
12	LED life with L70 criteria	>50,000 operating hours	
13	CRI	>80	
14	Series Device	These Devices shall have a shunt	
15	Maximum Lumen depreciation at 50,000 hours @ 25 Deg ambient Temperature.	20%	
16	MCPCB/Thermal management used or not	For better heat transfer from LED junction.	
17	Temperature for LED to confirm compliance to LM80		
18	Actual junction temperature of LED used in the system at 25 Deg C.	70 Deg. C.	
19	Wattage of individual LEDs in operating condition.	Vendor to specify	
20	Number of LED	Vendor to specify	
21	Jn. Temperature of LED at 25 °C	≤ 70 °C	
22	Heat Sink temperature rise	≤30 °C	

Sr. No	Description	Specification Requirement	Vendor to fill Data
	above ambient		
	Luminaire		
1	Luminaire Efficacy	>100 lm/watt	
2	Luminaire Efficiency	>75%	
3	LM 79 Certification for Luminaire		
4	Diffuser/Optical compartment material	PMMA or equivalent or Glass or open	
5	Declared life of Diffuser for constant operation	30 years.	
6	Housing	Housing can be the conventional MS Body used for panel lighting with adequate heat sinking or extruded aluminium preferred.	
7	Heat Sink	High Grade Aluminium grade >6000, Aluminium Die cast/Die Formed/Die Extrusion	
	Driver		
1	Efficiency of driver	>90%	
2	THD (AC current 110 V to 250 V)	< 10%	
3	LED Drive Current	Vendor to specify	
4	Driver Vf		
5	Total System wattage including the Driver	Vendor to specify	
6	Driver Protection	4kV in Differential mode	

Sr. No	Description	Specification Requirement	Vendor to fill Data
7	Driver Operation	Constant Current and Constant Voltage	
8	Driver Construction	3 stage Galvanic Isolation Type.	
9	Life of Driver	500,000 Hours on MTBF	
10	If provision of Surge Protection	Yes	
11	If provision of phase reversal		
12	Mounting Arrangement	Depending on product	
	Other		
1	ROI Calculation		
2	Aesthetic approval from architect		