STANDARD TECHNICAL SPECIFICATION COVER SHEET

Specification No. : ENG-GEN-4037

Specification Name : Specification for Lighting

Prepared by	Reviewed by	Reviewed by	Reviewed by	Approved by	Released by
Jyoti Ranjan Sahu	SHANTAPRIYA JENA	SWARUP NAYAK	JYOTIPRAKASH MOHANTY	Shailendra Kumar Jaiswal	SHIRISH SHARAD DIKAY
TPSODL	TPNODL	TPCODL	TPWODL	TPSODL	TPSODL
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Contents

1. SCOPE

The document covers the specific requirements for complete design, detailed engineering, manufacture, supply, inspection & testing at Bidder's work, packing, transportation, loading and unloading, delivery to site, storage at site, handling at site, erection, testing, commissioning, performance testing and handing over of Lighting System.

The scope covers:

The scope includes Design, Supply, Installation, Testing and commissioning of complete Lighting System consisting of the following:

- Indoor lighting for Office building/ control room building
- Outdoor lighting for Transformer yard lighting
- Peripheral lighting
- Outdoor lighting in Line termination area
- Road Lighting

All equipment, system and services covered under this specification shall comply with all current applicable statutory regulations and safety codes in the locality where the equipment is proposed to be installed. The equipment and systems shall also conform to the latest version of applicable codes and standards on the date of offer made by the Bidder unless otherwise indicated. Nothing in this specification shall be construed to relieve the Bidder of this responsibility

2. Codes & Standards.

2.1. The design, manufacture, performance testing and inspection of equipment shall comply with all currently applicable statutory regulations and safety codes in the locality, where the equipment will be installed. Nothing in this specification shall be construed to relieve the vendor of this responsibility.

2.2. Unless otherwise specified the equipment shall conform to the latest applicable IS, BS or IEC Standards.

1	Electrical Wiring Installations (System Voltage Not Exceeding 650 V)	IS-732
2	Code Of Practice For Interior Illumination	IS-3646 BS-8206 PART-I
3	Code Of Practice For Street Of Lighting Public Thorough Fares	IS-1944
4	Guide For Selection Of Electrical Equipment For Hazardous Areas	IS-5571
5	Code Of Practice For Industrial Lighting	IS-6665
6	Code Of Buildings Practice For Fire Safety Of Guide For Safety Procedures And Practices In Electrical Work	IS-5216
7	Ceiling Roses	IS-371
8	Guide for daylighting of buildings (second revision)	IS 2440: 1975
9	Flameproof electric lighting fittings: Part 1 Well glass and bulkhead types	IS 2206(Part 1) : 1984
10	Specification for waterproof electric lighting fittings	IS 3528 : 1966
11	Specification for watertight electric lighting fittings	IS 3553 : 1966
12	Specification for decorative lighting outfits	IS 5077 : 1969
13	Luminaires: Part 5 Particular requirements, Section 5 Flood lights	IS 10322 (Part 5/ Sec 5) : 2013
14	Conduits for electrical installations	IS 9537
15	Method for earthing	IS 3043

Latest CEA Regulation shall be followed for the above work including Technical Standards for Connectivity of the lighting system and Measures of Safety and Electricity supply and other regulations as applicable.

3. Design Requirements

3.1 Lighting System

3.1.1 General lighting Requirements

a. Bidder to carry out design calculations for complete lighting system for this project and submit the same to the owner for approval.

b. All fittings shall be pre-wired with all accessories as per manufacturer's catalogues.

c. All fixtures shall be of LED type only.

d. The contractor shall coordinate with the civil contractor/architect to confirm the type of false ceiling being used.(if required)

e. The single phase and three phase sockets shall have Powder coated Metallic enclosures and shall be IP54 for indoor application and IP65 for outdoor application.

f. In case of Fittings mounted in false ceiling (recess mounted fixtures), the contractor shall co-ordinate with false ceiling and HVAC vendor to avoid rework and smooth execution.

g. Two-way ON Switches will be used for ON/OFF operation of lighting circuits execution from different locations in basement, Stair case & control and Relay Panel room. Two-way switches shall be without Indicator. Fittings to be checked with site team.

h. All lighting fixtures for street & transformer yard lighting shall be IP65 protected suitable for 70W & 120W LED lamps respectively.

i. The indoor lighting panels shall be provided with one incoming 4P MCB & shall have per phase isolations with DP ELCB on each phase as sub- incomer. The outgoings shall be SP MCB‟s. The panel shall conform to IS-8623. Each floor shall have separate Lighting DBs.

j. For street & plot boundary lighting, average level of illumination over road surface will be 20 lux. All lighting poles will be 7.5m height above ground. (9m pole should be used).

k. For outdoor lighting four core aluminium conductor PVC insulated FRLS cable of suitable size shall be used for wiring between LDB for outdoor lighting & JB mounted on the pole & for looping between JB‟s of individual fixtures.

n. All cables shall be FRLS type and provided with anti-rodent treatment and shall comply with the Standard Specification of LV and MV cables. All cables above 16 sq. mm shall be with Aluminium conductor and below and up to 16 sq mm shall be with Copper conductor.

o. Earthing wire shall be an Insulated wire with green colour.

p. All vendors / contractor shall follow The Indian Green Building Council (IGBC) guidelines while designing lighting system.

3.2 Lighting Power Supply Distribution:

a. Total number of fittings, required to provide adequate illumination, shall be distributed on normal lighting scheme and emergency lighting scheme such that sufficient quantities of fittings are fed from emergency power supply so as to meet the required lux levels specified in the IS for emergency and remaining from normal power supply. The emergency and Normal lighting circuits shall be separate, and the emergency lighting shall be fed from UPS and shall be in continuous operation during normal working conditions. In case of failure of normal AC supply, all the emergency lighting fittings shall be continuous operation since these are fed from UPS which is backed up by Station battery. Vendor to carry out lux level calculation for normal lighting and emergency lighting separately and shall submit both these calculations for owner's approval.

b. The lighting distribution system shall consist of one main AC distribution board for the building, one lighting distribution board per floor as required for further distribution up to lighting fixtures & receptacles.

c. Three phase four wire aluminium, conductor, XLPE, PVC ST2 type inner sheath, Galvanized steel round wire armour, FRLS PVC ST2 type outer sheathed cable of suitable rating will be selected to supply power from ACDB to TPN LPs on each floor.

d. The incomer of LP shall be provided with TPN MCCB and each outgoing circuits shall be provided with either 6A,10A or 16A single pole MCB. Phase wise ELCB (30mA) shall be provided on the incomer to meet statutory requirement for human safety against electric shocks, caused by earth leakage currents. The maximum load on each outgoing shall not exceed 2000 to 2500 Watts.

e. The outdoors lighting shall consist of street and plot boundary area around the building. This outdoor area shall be fed from a separate LDB. Load shall be evenly distributed on all the phases.

3.3 Lighting & Point Wiring for Indoor Area

a. The Lighting point consists of wiring between circuits MCB (Lighting panel)/Switch to first lighting fitting in the circuit & looping henceforth. Similarly, power point shall consist of wiring between MCB to First Socket outlet in the circuit & looping remaining sockets henceforth. In case of Non integral fittings if any the wiring between Control gear and fitting shall form part of Short Point.

b. The Neutral for lighting points shall be looped from fitting to fitting for same phase.

c. The point wiring shall be carried out for lighting fitting and single-phase industrial socket outlets. Contractor shall provide the sleeves/conduits in brick walls required if any for routing of cables/wires etc. Contractor shall also do the cutting work in walls/PCC for routing the cables/wires/MS boxes concealed in walls. After laying the Cable/ Conduit / Sleeves and or installation of boxes in the wall, the surface shall be done to original finish. All consumables required shall be in contractor's scope including cement/sand/bricks etc.

d. The Point wiring shall include 25mm dia, 16 SWG, class B GI (Hot Dipped) Conduit, ISI approved (Heavy Duty) necessary bends, tees, nipples, reducers, inspection Bends, and G.I. Spacers, Saddles, and 1100 Volts grade PVC FR (Fire Retardant), Stranded copper wire. Only the Conduit JBs with and without terminals used in conduiting shall be paid extra.

e. The point wiring rate shall also be inclusive of cutting, chipping, in wall/PCC, redoing the surface to its original finish.

f. Lighting Point wiring shall be done with PVC FR insulated 2.5 sq.mm stranded copper wire.

g. The length of lighting point shall be segregated into three categories as short point, medium point & long point. The length of the short point shall be between 0-20 Meters, medium point shall be between 20-40 Meter & long point shall be between 40- 60 Meter.

h. Power point wiring shall be done with PVC insulated FR 4 sq. mm Stranded copper wire. The length of the Power point shall be segregated into three categories as short point, medium point & long point. The length of the short point shall be between 0-20 Meters, medium point shall be

between 20-40 Meter & long point shall be between 40-60 Meter. The Neutral for power point wiring shall be separate for each circuit.

i. The lighting Circuits shall be controlled from MCB for outdoor areas / Switch for indoor areas and these MCBs / Switches shall not form part of Point wiring.

j. The junction boxes shall have terminal blocks with disconnecting facility suitable for wires to be terminated.

3.4 Lighting & Point Wiring for Outdoor area (Peripheral, Road & Transformer Yard)

a. Primary point wiring for this area covers the wiring between the lighting distribution board/lighting panel to the junction box of the first lighting pole and between the junction boxes of the subsequent lighting poles connected to a circuit in the lighting distribution board/lighting panel.

b. Secondary point wiring covers the wiring between the junction box and the lighting fixture on the pole in case of street light and also between junction box and the flood light fixture. The above refers to the remaining fixtures covered under the circuit referred under primary point wiring. Secondary point also covers the wiring of the associated control fuses, switches, looping of terminals, etc. as required.

c. Supply and installation of suitable sized Al Conductor PVC insulated cable required to be wired between lighting DB/lighting Panel and junction box mounted on street lighting pole/flood lighting tower and also between junction box to metal enclosed control gear box and fixtures, supply and installation of all the termination accessories such as crimping type cable lugs and cable glands at each junction box and fixture, termination, testing and commissioning of cables. CONTRACTOR's scope of work also includes excavation, preparation of riddled soil bedding, supply and installation of protective covers over the cable, backfilling, ramming, supply and installation of route markers, supply and installation of hume pipes for road crossing, supply and installation of necessary cleating arrangement for cables on pole, etc.

d. Earthing of street light pole, control gear boxes, junction boxes, etc. are also included in the scope of CONTRACTOR. CONTRACTOR shall earth the street light pole to the nearest earthing grid provided by others. The cost of supply and installation of earthing wires shall be included in the cost of point wiring for outdoor lighting.

e. CONTRACTOR shall provide necessary foundation for erecting street light pole and install the same. CONTRACTOR shall furnish foundation drawings with necessary details to OWNER for approval.

f. Fixture locations are liable to be shifted marginally at site within a radius of 3 to 4 meters from what is shown in the layout drawings. Point wiring rates quoted by the CONTRACTOR shall hold good and no extra prices shall be admissible.

3.5 Earthing of lighting installation

a. The lighting fixtures, receptacles (6A/16A), switch, conduits and junction boxes will be properly earthed using copper wire of 2.5 / 4 Sq. mm size. Earthing wire will run outside the entire length of the conduit between the fixture and corresponding lighting board where it will be connected to nearest earthing pads. Three phase 63A receptacles will be earthed by 10 sq.mm Cu wires to the nearest earthing pads. Street light poles and junction boxes will be earthed by 2.5 sq. mm Cu wires. Street light fixtures will be earthed by 2.5 sq. mm Cu wires.

3.6 Lighting System Equipment

a. Constructional Features LDB and panels shall be of sheet steel enclosed and shall be fully dust and vermin proof, providing a degree of protection of IP 54 for busbars, incoming and outgoing feeding compartment. Outdoor panels shall in addition be completely weather-proof with a sloping canopy for protection against rain and providing a degree of protection of IP 65. The sheet steel used shall be cold rolled and 2 mm thick.

b. All boards and panels shall be provided with hinged doors for access to equipment. Doors shall be gasketed all round with neoprene gaskets. The floor mounted lighting distribution boards shall be provided with MCCB for incomer and MCBs for outgoing feeders arranged in tier formation. The hinged door of incomer shall be interlocked to prevent opening of the door when the switch is ON and to prevent closing of the switch with the door not fully closed. However, a device for bypassing the door interlock shall be provided to enable the operation of the switch with the door open, when necessary, for examination/maintenance. For wall mounting lighting panels when provided with ELCBs and MCBs a hinged, latched front door shall be provided with key-locking facility and a slotted Bakelite sheet inside. Only the ELCBs/MCBs operating knobs shall project out of the Bakelite sheet slots for safe operation and neat appearance.

c. All accessible live connection/metals shall be shrouded and it shall be possible to change individual fuses, switches, MCCB / MCBs from the front of the LDB without danger of contact with live parts.
d. For floor mounting type LDB, adequately sized mounting channels shall be supplied and for wall/column/structure mounting type panels suitable mounting straps shall be provided.
e. Adequate interior cabling space and suitable removable cable entry plates shall be provided for top/bottom entry of cables through glands and or conduits. Necessary number of glands to suit the specified cable sizes shall be provided. Cable glands shall be double compression screwed on type and made of chrome plated brass.
f. Copper earth bus shall be provided throughout the panel length. Earthing terminal shall be provided at either side of the panel to suit the earthing conductor/ wires.
g. All sheet steel parts shall undergo rust-proofing process which should include degreasing, de-scaling and a recognised phosphating process. The steel works shall then be painted with two coats of zinc chromate primer and two coats of final stove enamelled finish paint of colour. For chemical/corrosive areas, epoxy paint shall be used.

Busbars

a) Busbars shall be of aluminium alloy of E91E grade, unless otherwise specified.
b) Busbars shall be provided with minimum clearances in air.
c) Busbars shall be adequately sized for the continuous current rating such that the maximum temperature of the busbars, busbar risers/droppers and contacts does not exceed 85 deg C under site reference temperature. Busbar shall be covered with heat shrinkable coloured PVC sleeves.
d) The busbars, busbar connections and busbar support shall have sufficient strength to withstand thermal and electro-mechanical stresses of the fuse/ MCBs let through / cut off current associated with the specified short-circuit level of the system.
e) Busbar supports shall be made from suitable insulating material such as Hylam sheets; glass reinforced molded plastic materials, or cast resin. Separate supports shall be provided for each phase of the busbars. If a common support is provided for all three phases, anti- tracking barriers shall be incorporated.
f) The neutral bus of the main 3 phase, 4 wire distribution board shall be rated for full short circuit rating of main busbar. The neutral bus should have sufficient terminals and detachable links for full number of single phase / 3 phase 4 wire outgoing lighting circuits.

Board Mounted Components

a. MCCB/MCBs/ELCBs shall be hand operated, air break, quick make, quick break type conforming to applicable standards.
b. The feeders shall be provided with MCB/MCCB for overload/short circuit protection. ELCBs of suitable rating shall be provided for earth leakage protection.
c. Switch shall have provision for locking in both fully open and closed positions.
d. MCBs/ELCBs shall be provided with locking facility.
e. Whenever required, instruments and meters shall be of the flush mounting type. They shall be suitably mounted so as to provide for easy access to CTs and associated wiring.
f. Instruments shall be of minimum 96 mm square size, shall have provision for zero adjustment outside the cover and black numerals on white dial.
g. Watthour meters shall be of direct reading electro-dynamometer type complete with cyclometer type dials and reverse running stops.
h. Ammeter/voltmeter selector switches having 3 positions and off, with stay put contacts rated 10 A shall be provided when specified.

Indicating Lamps

Indicating lamps shall be of the clustered LED type and low watt consumption. Lamps shall be provided with series resistors.

Internal Wiring

a. LDB and panels shall be supplied completely wired, ready for the OWNER‟s external connections at the terminal blocks. Wiring shall be carried out with 1100 V grade, PVC insulated, stranded copper conductors. Conductors of adequate sizes shall be used to suit the rated circuit current.
b. Engraved identification ferrules, marked to correspond with the wiring diagram shall be fitted at both ends of each wire.
c. All wiring shall be terminated on terminal blocks. Terminal blocks shall be one piece molded, 1100 V, of reputed make, preferably stud type for higher current ratings such that wires are connected by cable lugs and complete with nuts and washers. Terminals shall be adequately rated for the circuit current; the minimum rating shall be 20 A.
d. Terminals for circuits with voltage exceeding 125 V shall be shrouded.
e. Terminals shall be numbered and provided with identification strip for identification of the circuit and additional 20% spares shall be provided.

Labels & Diagram Plate

a. All door mounted equipment as well as equipment mounted inside the boards/panels shall be provided with individual labels with equipment designation/rating. Also, the boards/panels shall be provided on the front with a label engraved with the designation of the board/panel as furnished by the OWNER.

b. Labels shall be made of non-rusting metal, 3 ply lamicoid or engraved PVC.

c. Inside the door of lighting panels, a circuit diagram/description shall be fixed for reference and identification

Power Panel/Emergency Lighting Panel /Remote Lighting Panel /Switches Power Panel

a. This panel feeds to single phase Receptacles. The panel construction shall be similar to lighting.

Emergency AC Lighting Panel

a. Emergency AC lighting panel shall have one (1) incomer controlled by double pole MCB (along with 30 mA ELCB) and shall have number of outgoing circuits controlled by MCB. This emergency Lighting panel shall be fed from UPS DB and shall be continuously fed from UPS even during normal operation. The panel construction shall be similar to normal lighting panel.

3.7 Light Control Switches

a. Light control switches of ratings and types, i.e. decorative/industrial/flame proof, shall be supplied as indicated in project layout drawings/price schedule. The switches shall be suitable for use on 240 V, 1 phase, 50 Hz supply.

b. Switches shall be of flush type for mounting behind an insulated plate or incorporated with a switch or switch box/suitable enclosure. The switch box/ enclosure may be recessed into or mounted on wall as per the requirements of project layouts.

c. The size of enclosure boxes shall be chosen to accommodate the number of switches to be installed at the location. The enclosures shall be made of 1.2 mm thick CRCA sheet steel, stove enamelled/galvanized. The enclosure box shall be covered with Perspex/insulating cover. An enclosure intended for surface mounting shall not have holes or gaps in its sides other than those expressly provided for cable entry.

d. Flame proof switch shall be of rotary type construction, enclosed in a flame proof enclosure and rated for 15 Amps. As a standard feature, unless otherwise specified, switch shall have two bottom entries, one of which shall be provided with a flame proof stopper plug.

e. The switches shall conform to the relevant standards.

3.8 Receptacle Units

a. Receptacle units shall consist of socket outlet with associated switch, neon indicating lamp and plug. The socket outlet and switch or MCB shall be flush mounted within a stove enamelled/ galvanized 1.2 mm thick CRCA sheet steel enclosure with Perspex/insulating cover. The box may be recessed into or mounted on a wall as per requirements of project layouts.

b. The outdoor type receptacles shall be housed in a 2 mm thick CRCA sheet steel epoxy painted enclosure with gasketed, hinged door having locking arrangement. The enclosure shall be with rain canopy and removable gland plate entry from bottom. Composite receptacle with switch modules housed in a box shall be with degree of protection IP66.

c. The receptacle units shall be suitable for 240 V, 1 phase, 50Hz/415V, 3 phase, 50 Hz supply as indicated in project layout drawings/price schedule.

d. Single phase receptacles shall be associated with a switch/MCB of same current rating and the receptacle shall become live only when the associated switch/MCB is in “ON” position.

e. Three phase receptacles shall be associated with a TPN switch housed in the same enclosure.

f. The receptacle shall become live only when the associated switch is in “ON” position, and it shall not be possible to withdraw the plug with the switch in “ON” position.

g. The plugs shall be provided with cord grips to prevent strain and damage to conductors/wires at connection and entry points.

h. The types and current ratings of receptacle units shall be as indicated in the Project layout drawing/price schedule, and they shall conform to the applicable standards indicated in Table 1.

3.9 Flameproof Equipment

a. The enclosure of all flameproof equipment for use in hazardous areas where gases/vapours of Group I, IIA, IIB are present, shall be of cast iron/cast aluminium, stove enamel finished. Chemical corrosion resistant epoxy finish shall be provided. The construction shall comply with relevant applicable standards mentioned in Table1.

b. If the enclosures are additionally required to be weatherproof, neoprene gaskets shall be provided to make the enclosure dust and weather proof providing a degree of protection of IP54

c. All ferrous parts, exposed to atmosphere shall be suitably plated / galvanized.

d. All internal wiring shall be connected to terminal blocks provided in terminal enclosure on incoming side.
e. Flameproof cable gland entries shall be provided suitable for the OWNERS specified cable sizes. The number of required cable entries for junction/terminal boxes as required for branching, terminating of cables for lighting distribution shall be provided. All unused cable entries shall be closed by flameproof plugs.
f. Flameproof receptacle unit (socket with associated switch/MCB and plug) shall have interlocked feature such that plug cannot be inserted or taken out with switch/MCB in "ON" position.
g. Two external earthing terminals shall be provided on the enclosure to suit the OWNER‟s specified conductor. Additionally, one internal earthing terminal shall be provided in junction/terminal boxes.
h. Adequate mounting lugs with necessary hardware shall be provided for mounting the equipment on wall/structure.
i. These enclosures shall have inscription warning against opening the enclosure unless the circuit is isolated. Equipment rating and ON/OFF positions of switches/MCBs shall also be designated.
j. The BIDDER shall indicate that the enclosures have been tested and certified by relevant statutory authorities for use in hazardous areas.

3.10 Lighting Wires

a. The wires for wiring in lighting system shall be 1100 V, 1 core, PVC insulated, unarmoured with stranded copper conductors. The wires shall conform to the applicable standards specified in Table 1.
b. The minimum area of conductors shall be 2.5 sq.mm for light fittings and 5A receptacles and 4 sq.mm for receptacles rated 15 A.
c. The wires shall be coded white for phase/positive of DC and black for neutral/ negative of DC.

3.11 Conduits

a. GI conduits and their associated fittings shall conform to applicable standards in Table 1. The minimum size of conduit shall be 20 mm for surface installation and 25 mm diameter for concealed installation.

b. GI conduits shall be hot dip galvanized unless otherwise specified. They shall be supplied in standard lengths of 5 m.

c. Supply of conduits shall include all associated fittings like couplers, bends and tees as required for lighting installation work.

d. The approximate quantities of conduits shall be indicated by the OWNERS only when conduits are not covered in the CONTRACTOR‟s “Point Wiring” work under lighting system installation works.

3.12 Junction Boxes

a. Junction boxes with terminals shall be supplied for branching and terminating lighting cables when required for outdoor areas, 3 phase receptacles etc.

b. The junction boxes shall be dust and vermin proof and shall be fabricated from 1.5 mm to 2 mm CRCA sheet steel depending on the size of the junction box and shall be complete with removable cover plate with gaskets, two earthing terminals each with nut, bolt and washer. Boxes shall be additionally weather proof when specified.

c. The boxes shall have provision for wall, column, pole or structure mounting and shall be provided with cable/conduit entry knock outs, terminal blocks, HRC fuses, as indicated in the Project drawing.

d. The terminal blocks, with specified number of terminals, shall be mounted securely on brackets welded to the back sheet of the box. The terminals shall be 1100 V grade, one piece construction complete with terminals, insulation barriers, galvanized nuts, bolts and washers and provided with identification strips of PVC. The terminals shall be made of copper alloy and shall be of box clamp type.

e. The boxes shall be hot dip galvanized/painted with one shop coat of red oxide zinc chromate primer followed by a finishing coat of paint as specified.

3.13 Lighting Poles

a. Lighting poles for streetlights and flood lights shall be of octagonal/stepped tubular/swaged type steel poles. Octagonal poles shall conform to BS EN 40- 3:2000 and it shall be designed to withstand the maximum wind speed as per IS 875. Poles shall be hot dip galvanized internally and externally after fabrication as per IS 2629/ IS 2633 / IS 4759 standards. The steel sheet used to manufacture steel poles shall be of minimum thickness of 3 mm and shall conform to BSEN 10025. Junction boxes shall be of shade- RAL-7032 and shall be provided with weather proof flush doors and

locking facility. Bidder shall design and furnish the foundation drawings for the poles to withstand basic wind speed of minimum 50 meter/sec.

b. The supply of poles shall be complete with fixing bracket/necessary pipe reducer for fixing the fitting and also include the necessary associated pole mounted junction boxes. The required sizes of poles and the junction box shall be as indicated in the attached drawings.

3.14 Complete Lighting DB, Panels shall comply with the following requirements:

A1.	415 V Switchgear & Busbar Rating		
1.0	Rated voltage, Phase & Frequency		415V , Three phase, 50 Hz for AC
2.0	System Neutral Earthing		Solidly Grounded
3.0	Maximum system voltage	Volts	440V
4.0	A) One-minute Power frequency voltage	Volts	2500V for power circuit 2500V for control circuit
	B) Impulse voltage with-stand	Volts	2500 V
5.0	Continuous current rating of bus bars under site reference ambient temperature	Amps	
6.0	Reference ambient Temperature	Deg. C	50^0C
7.0	Maximum Temperature of Bus bars, Droppers and Contacts at continuous current rating under site reference ambient temperature	Deg. C	90^0C
8.0	Short circuit withstand for Bus bars and droppers		25 kA 1 sec
	A) Short time (1 sec) at 415 V	kA (RMS)	25 kA(RMS)-ACDB
	B) Dynamic rating	kA	110kA-ACDB

9.0	Standard Applicable				IS 13947 / IS 8623 / IS 10118	
10.0	Thickness of Sheet steel (CRCA)			Mm	2.5mm (Frame), 1.6mm (Doors and Covers)	
11.0	Degree of protection as per IS:13947				For indoor type - IP 54 for outdoor type - IP 65	
12.0	Earthing bus material and size				Copper of min 25X3 sq.mm	
13.0	Main Busbar Material				Aluminium	
14.0	Clearances in air of live parts				Phase to Phase: 30 mm Phase to Earth: 30 mm	
15.0	Mounting arrangement				Floor mounting with stand wherever required	
16.0	Colour (power coating)				Light Grey shade 631 of IS 5 / RAL 7032	
17.0	Designation	Bus-bar Details		Cable entry	Indoor / outdoor	
		Amp	Current Density	TP/TPN		
	415 V Switchgear	1.25 times Incomer MCCB Rating	**For Al:** 0.8 A / sq.mm	TPN	Bottom	Indoor

Supply of MCCB / MCB for I/C and B/C and outgoing shall be as follows:

I/C and B/C Rating	**Requirement**
< 63 A	**MCB**
>=63 A and < 400A	**MCCB**

MCCBs/MCBs:

i. MCCBs shall be hand operated, air break, heavy duty, quick make, quick break type conforming to applicable standards.

ii. MCCBs shall be provided with overload/ short-circuit protective device and handle (as hand operated). The tripping time of the MCCB's shall be less than 20 msec.

iii. It shall be the responsibility of the VENDOR to fully coordinate the overload and short circuit tripping of the MCCBs with the downstream fuses to provide satisfactory discrimination. iv. Switch handle shall have provision for locking in both fully open and fully closed positions.

v. All outgoing feeder modules shall be operated in local mode. MCCBs / MCBs shall be provided with separator links.

vi. All MCCBs/MCBs shall be provided with 2 nos. potential free Aux contact for status indication to SCADA.

vii. For DCDBs, DC MCCB/MCB shall be used.

1.	**AC MCCB / MCB:**	
1.0	Voltage, frequency & Phases	415V , 50 Hz , 3 Phase
2.0	Current	As per load list
2.0	Rated operating duty	B – 3 min – MB – 3 min – MB
3.0	Rated breaking capacity	For MCB: 25KA & MCCB : 35KA
4.0	Rated making capacity	62.5 kA (peak)
5.0	Protections	Overload, short circuit (variable setting) & earth fault release
6.0	Standard applicable	IS 8828 / IS 13947
7.0	Standard ratings of MCCBs	63A/100A/125A/150A/200A/250A
8.0	Standard ratings of MCBs	4A/6A/10A/16A/20/32A/40A/50A

Indicating LEDs:

a. Indicating LEDs shall be Cluster LED with control fuse shall be provided for indication RYB phase of incomer supply and for outgoing feeders for ON/OFF/Trip indication.

Interior Lighting and Receptacle:

b. Control cabinet shall be provided with a 240 V, 1 phase, 50 Hz, 40 W LED lighting fixture for interior illumination controlled by door operated a 'ON-OFF' switch and 240 V, 1 phase, 6/16 amp, 3 pin receptacle. Power source for interior lighting and receptacles shall be completely independent of control power source.

Cabinet Internal Wiring / Accessories:

c. Control cabinets shall be supplied completely wired, ready for the Owner's external connections at the terminal blocks. All wiring shall be carried out with 1100V grade, FRLS PVC insulated with anti-rodent treatment, stranded conductors. Power circuits shall be wired with stranded copper conductors of adequate sizes to suit the rated circuit current the minimum size shall be 4 sq.mm. Control, alarm and indication circuits shall be wired with stranded copper conductors of at least 2.5 sq.mm for CT, PT and 1.5 sq.mm for the other circuits.

d. Engraved identification ferrules marked to correspond with the wiring diagram shall be fitted at both ends of each wire. All wiring shall be terminated on terminal blocks by means of rounded type crimped. Forked type lugs shall not be used. Not more than 2 wires shall be terminated on each terminal. Terminals shall be adequately rated for the circuit current; the minimum rating shall be 20A.

e. Terminal Blocks shall be of Fed through 1100V grade, 10 Amps rated complete with insulated barriers. All spare contacts and terminals of the cubicle mounted equipment and devices to be wired to terminal blocks ready for Owner’s external cable connections.

f. The terminal blocks shall be suitable for connecting the following conductors of the cables on each side:
    a. All circuits except CT circuits: Minimum of 2.5 mm2 copper.

g. There shall be a minimum clearance of 250 mm between the first row of terminal blocks and the associated cable gland plate. Also, the clearance between two rows of terminal blocks shall be a minimum of 150 mm.

Earthing:

h. An earthing bus shall be provided and extended throughout the length of the switchgear. It shall be bolted to the framework of each unit and brazed each breaker earthing contact bar.

i. The earth bus shall have sufficient cross section to carry the momentary short circuit and short time fault current for at least one second or higher without exceeding maximum allowable temperature rise causing damage to the switchgear (LV – 10kA for 1 Sec.)

Painting:

l. The panels shall be complete with wiring, earthing terminals and shall be duly degreased, de-rusted, phosphate, given two coats of red oxide primer and two coats of enamel-based paint of shade as indicated. The final finished thickness of paint film on steel shall not be less than 100 microns and shall not be more than 150 microns.

3.15 LIGHTING FIXTURES AND ACCESSORIES Codes & Standards

a. The items of supply shall confirm to the latest applicable electrical rules, all currently applicable standards codes of practice indicated in Table 2, regulations and safety codes of the locality where the equipment are to be installed. In case of conflict between these standards and specification, requirements of this specification shall govern. Nothing in this specification shall be construed to relieve the CONTRACTOR of his responsibility. Where no standards are available, the supply items shall be backed by test results shall be of good quality and workmanship and any supply items which are bought out by the VENDOR shall be procured from approved manufacturers acceptable to the OWNER/ENGINEER.

	Equipment/Components	**Applicable Standards**
1	Electric Lighting Fittings General and	IS:1913
2	Safety Requirements	BS:4533
3	Luminaires - Part 1: General requirements and tests	IEC:60598
4	Code OF Practice for Industrial Lighting	IS:6665
5	Calculation of Co-efficient of Utilization	IS:3646
6	Industrial Lighting Fittings with Metal Reflectors	IS:1777 IEC:60598
7	Decorative Lighting Outfits	IS:5077
8	Dust Proof Electric Lighting Fittings	IS:4012 IEC:60598
9	Dust Tight Electric Lighting Fittings	IS:4013
10	Electric Lighting Fittings for Division 2 Areas as per IS:5572 (P1)	IS:8224 BS:4533 IEC: Part II SECT 2

11	Flame Proof Lighting Fittings	IS:4013
12	Flame Proof Enclosure	IS:2148
13	Flood Lights	IS:10322 BS:4533 IEC: Pt-V SECT-5
14	Luminaries for Street Lighting	IS:10322 BS: IEC: Pt-V SECT-3
15	Waterproof Electric Lighting Fittings	IS:3528 BS:4533 IEC: BS:5225 (1)
16	Bayonet Lamp Holders	IS:1258
17	Edison Screw Lamp Holders	IS:10276
18	Bi-Pin Lamp Holders for Tubular	IS:3323
19	Emergency Lighting Units	IS:9583
20	Ignition Proof Enclosures, Dust-Tight for	IS:11005
21	Luminaires (Part 1 to V)	IS:10322

e. All codes and standards referred to in the specification shall be understood to be the latest version on the date of offer made by the bidder unless otherwise indicated.
f. The CONTRACTOR shall ensure that instruments and gauges to be used for testing and inspection of critical parameters as identified in the specification have valid calibration and the accuracy can be traced to National standards.

3.16 Lighting Fixtures (Luminaires)

General Requirements

a. Luminaires shall be designed for continuous trouble-free operation under atmospheric conditions as specified in Project Information Memorandum without reduction in lamp life or without deterioration of materials and internal wiring. Outdoor fittings shall be weather- proof and water-proof type.

b. For each type of luminaire, the VENDOR shall furnish the utilization factor tables to indicate the proportion of the light emitted by the bare lamps which falls on the working plane.

c. All luminaries shall be supplied complete with lamps suitable for operation on supply voltage and the variation in supply voltage and frequency.

d. Each luminaire shall have a terminal block suitable for loop-in, loop-out and T-off connection by 1100 V, 1 core, PVC insulated copper conductor wires up to 4 sq.mm in size. In outdoor, corrosive and hazardous areas the termination at the luminaire shall be suitable for 1100 V, PVC insulated, copper conductor, armoured cables of sizes up to 6 sq.mm conductors. Terminals shall be of stud or clamp type. The internal wiring should be completed by the MANUFACTURER by means of stranded copper wire of minimum 1 sq.mm size and terminated on the terminal block. Terminal blocks shall be mounted with minimum two fixing screws.

e. Mounting facility and conduit knockouts for the luminaires shall be provided.

f. All hardware used in the luminaire shall be suitably plated or anodized and passivated for use in chemical, industrial and power plants.

Earthing

a. Each luminaire shall be provided with an earthing terminal suitable for connection to the OWNER‟s earthing conductor of suitable sized Cu wire unless otherwise specified.

b. Where separate control gear box is provided for housing the accessories the same shall be provided with an earthing terminal suitable for connecting OWNER‟s earthing conductor of suitable sized Cu wire unless otherwise specified.

c. All metal or metal enclosed parts of the luminaire / control gear box shall be bonded and connected to the earthing terminal so as to ensure satisfactory earthing continuity.

Painting / Finish

a. All surfaces of the luminaire / control gearbox housing accessories shall be thoroughly cleaned and degreased. It shall be free from scale, rust, sharp edges and burrs.

b. When enamel finish is specified, it shall have a minimum thickness of 2 mils for outside surface and 1.5 mils for inside surfaces. The finish shall be non- porous and free from blemishes, blisters and fading.

c. The luminaire housing shall be stove-enamelled / epoxy stove-enamelled- vitreous enamelled or anodized as indicated under various types of fittings. Aluminium paint on flameproof fittings is prohibited.

d. The surface shall be scratch resistant and shall show no sign of cracking or flaking when bent through 90 deg. over 12.5 mm dia mandrel.

e. The finish of the luminaire shall be such that no bright spots are produced either by direct light source or by reflection.

f. External control gearbox provided for housing accessories shall be painted or galvanized.

3.17 Following table to be referred for Illumination levels and type of Lighting fixtures:

Area which are not covered under this list shall comply with the latest IS 665 Minimum Lux level.

Sl.No	Room	Min. Lux level for Normal Lighting (in lumen)	Type of Fixtures	Type of lamp
1	Control room	500	Decorative recessed type with wide-angle mirror optic reflector	LED
2	Battery room	50	Totally enclosed flame and corrosion proof with clear acrylic cover	LED
3	Auxiliary room (chargers, rectifiers)	50	Industrial type with vitreous enamel reflector (surface mounted)	LED
4	Pantry	300	Industrial type with vitreous enameled reflector	LED
5	office	500	Decorative recessed type with wide angle mirror optic reflector	LED
6	Toilet/Washroom	100	Industrial type with vitreous enameled reflector	LED
7	Conference room	300	Decorative recessed type with wide angle mirror optic reflector	LED
8	Maintenance room	150	Industrial type with vitreous enamel reflectors/industrial high bay	LED
9	Corridor/passage	100	Industrial type with vitreous enamel reflectors/channel mounted box type	LED
10	Staircase	100	Decorative	LED
11	DG set	100	bay for mounting heights above 5m	LED
12	Security cabins	150	Industrial type with vitreous enamelled reflector	LED

13	Store room	50	Industrial type with vitreous enamelled reflector	LED
14	lobby	75	Decorative recessed type with wide-angle mirror optic reflector.	LED
15	Switchgear room	150	Industrial type with vitreous enamel reflector (surface mounted)	LED
16	Lift	100	Industrial type with vitreous enamel reflector	LED
17	Switchyard	20	Weather proof, flood light medium beam type mounted on lighting / lightning masts	LED
18	Transformer yard	15	Dust proof / dust tight well glass on fire partition walls	LED
19	Road lighting	20	Street light with clear acrylic cover semi cut- off type with integral mounted control gear	LED
20	Peripheral lighting	15	Street light with clear acrylic cover semi cut- off type with integral mounted control gear/general purpose flood light	LED

minimum of 50 lux lighting shall be maintained in the roads, parking area, boundary wall and other general areas of the habitat.

Lighting for Walkways

Lighting for walkways shall be as given below:

a. Lighting should illuminate the walkway; lighting fixtures not exceeding a height of 4 mfrom ground level should be provided.
b. Lighting shall be provided every 20 m to 30m, focusing light not on the car lanes, but on the walkways.
c. White lighting at average 35 to 40 lux is recommended to ensure colour contrast of tactile blocks and to ensure visibility at night to persons with low vision.
d. Lower-level light poles are preferred to avoid shadow where there are high trees.

3.18 LIGHTING SYSTEM INSTALLATION WORK

INSTALLATION WORK

a. The installation of lighting fixtures shall be based on the mounting arrangement shown in the layout drawings prepared by Contractor and approved by Owner. The shall be included in the cost of installation of lighting fixtures.

b. Installation of receptacles and switches shall be carried out suitably as per the lighting layout drawings prepared by Contractor and approved by Owner. Switch shall be mounted in flush with the front cover plate.

c. Lighting distribution boards shall be installed in the location indicated in the layout drawings prepared by Contractor and approved by Owner. Each floor should have lighting DB. Outdoor lighting distribution boards shall be installed on a concrete plinth. The top of plinth shall be 1000mm (min.) above the grade level. No cement and steel will be supplied by OWNER. Installation cost of lighting distribution board shall include cost of installation of earthing conductor from LDB to the nearest earthing grid.

Point Wiring

Point wiring also covers the wiring of the associated control switches of lighting fixtures/control switches of receptacle units.

Primary Point Wiring

a. Primary point wiring covers the wiring between a circuits of the lighting panel to the first lighting fixture/ receptacle unit, connected to that circuit of the lighting panel. In some cases where there are junction boxes, the primary point covers the wiring between junction box and the first lighting fixture /receptacle unit in that circuit.

Secondary Point Wiring

b. Secondary point wiring covers the wiring of the remaining lighting fixtures/ receptacle units other than that covered under primary point of that circuit in the lighting panel.

c. Secondary point wiring also covers the wiring of the associated control switches of lighting fixtures/control switches of receptacle units.

d. Secondary point wiring covers the wiring between the junction box and the lighting fixture on the pole in case of street light and between junction box mounted near the base of the tower and all subsequent junction boxes mounted on that tower and also between junction box and the flood light fixture. The above refers to the remaining fixtures covered under the circuit referred under primary

point wiring. Secondary point also covers the wiring of the associated control fuses, switches, looping of terminals, etc. as required.

Supply and Installation of Conduit Point Wiring

e. Only G.I conduit shall be used for all exposed/embedded wiring including above false ceiling

f. Wires used for conduit point wiring of lighting fixtures and receptacles shall be 1100 V grade, PVC insulated, single core, stranded copper conductor wires of sizes not less than 2.5 sq.mm/ and 4 sq.mm respectively. Wires shall conform to IS-694 and shall bear the ISI mark. In conference hall, administrative block, and control room and in buildings where there is false ceiling, concealed wiring shall be adopted. Bidder shall Include necessary control switches. The control switches shall be housed in galvanized box of sheet steel.

g. Bidder shall take into consideration necessary galvanized MS fixing clamps when the wiring conduits are to be supported from steel roof truss/structural members.

h. Wherever concealed conduit wiring is required, the supply and installation of rigid conduits in ceiling/walls from lighting panels to lighting fixtures/receptacles shall be in CONTRACTOR‟s scope. Routing of conduits shall also be in the scope of CONTRACTOR. As no conduit layout will be furnished to CONTRACTOR, the CONTRACTOR shall coordinate closely with the Civil CONTRACTOR, prepare and furnish drawings indicating the locations of embedded conduits/junction boxes/pull boxes/inspection boxes based on OWNERs lighting layout drawings.

i. Bidder shall conform to the relevant clauses for conduits, junction boxes and lighting wires in Clause 6.5 (Lighting System Equipment) of Lighting System.

Supply and Installation of Cable Point Wiring

j. The point wiring shall include supply of necessary materials for the cable wiring such as 1100 V grade multicore, stranded aluminium conductor, PVC insulated, armoured cables of sizes 4 sq.mm and 6 sq.mm (conforming to IS 1554), for wiring of lighting and receptacles in buildings and outdoor areas, where cable wiring is specified, MS fixing saddles with spacing plates, junction boxes, nylon / fibre fixing plugs galvanized MS fixing screws, control switches and installation/termination of cables including supply of cable glands as required, installation of control switches, junction boxes, drilling holes in brick walls/RCC roof and grouting necessary conduit sleeves for taking the cables and any other work materials necessary for making the point wiring complete in all respects.

k. Bidder shall take into consideration necessary galvanized MS fixing clamps when the wiring cables are to be cleated along steel roof trusses/structural members.

l. Bidder shall take into consideration specific material finish if any, other than galvanizing, such as corrosion resistant painting epoxy painting or chlorinated rubber painting of all the installation accessories as called for in the relevant lighting layout drawings/BOQ.

3.19 Supply & Installation of Point Wiring for Street and Flood Lighting

The scope shall include supply and installation of cables required between LDB and junction box mounted on street lighting pole/flood lighting tower and also between junction box to metal enclosed control gear box located near light fixture, supply and installation of all the termination accessories such as crimping type cable lugs and double compression cable glands at each junction box and fixture, termination, testing and commissioning of cables. CONTRACTOR‟s scope of work also includes excavation, preparation of riddled soil bedding, supply and installation of protective covers over the cable, backfilling, ramming, supply and installation of route. Supply and installation of HDPE pipes for road crossing, etc, supply and installation of necessary cleating arrangement for cabling on flood light tower, supply of labor, supervision, welding equipment, all tools and tackles and testing equipment as required. CONTRACTOR shall plan and cut the cables in such a way that there is no wastage and no cable jointing is required in any run. However, should any joint become necessary the same shall be provided by the CONTRACTOR and a joint marker shall also be provided at no extra cost. Earthing of street light pole/ flood light tower, lighting fixtures, control gear boxes, junction boxes etc. are included under point wiring. The CONTRACTOR shall earth street light pole / flood light poles and junction boxes with Cu flat tapped off from Cu earthing grid. The CONTRACTOR shall interconnect his earth grid to the main earth grid of the plant at first and last pole of each feeder circuit and at some intermediate poles. Flood lighting tower earthing shall be carried out. The Lighting fixture shall be earthed by 2.5 sq mm Cu flexible FRLS wires (unless otherwise specified).

Point wiring rates shall also include/hold good for the following:

a) Supply and installation of lighting control switches and switch boxes complete with fixing accessories.
b) Drilling holes in brick/RCC wall and roof for taking cable or conduit, sealing and refinishing with cement plaster.
c) Marginal shifting of any fixture / accessory from the location indicated in the lighting layout drawings.,

d) Testing, commissioning and handing over the lighting system in commercial working condition.

e) CONTRACTOR shall provide necessary foundation for erecting street light pole/flood light tower and install the same. CONTRACTOR shall prepare and submit foundation drawings with necessary details to OWNER/CONSULTANT for approval.

3.20 Supply and Installation of Lighting Poles /High Mast for Outdoor Lighting (Street and Flood Lighting)

a. Supply and installation of street light poles and flood light towers including associated junction boxes with fuses, links and terminals near each flood light fixture.

b. Street light poles and flood light towers shall conform to relevant standard drawings. All street light poles and towers shall be painted with one shop coat of red oxide oil primer followed by two coats of aluminium alkyd paint.

c. The CONTRACTOR shall be responsible for the safe erection and installation of the High Mast in mechanically and structurally safe working condition for the design life of the Mast. The holding down bolts shall be of high tensile strength and shall be supplied complete with anchor plate of 6 mm thick for casting into the foundation. The precision-made steel template with tube holes shall be provided to ensure correct verticality and horizontality of bolt alignment.

d. The Lantern Carriage shall be so installed that it does not cause any damage to the surface of the Mast and is provided with protective buffer arrangement. The complete Lantern Carriage shall be hot dip galvanized after fabrication.

e. Supply and Installation of Lighting Distribution Boards, Lighting Panels (AC & DC), 24 V AC 1 PH Distribution Boards, Remote Control Panels for Street and Boundary Lighting

f. Supply and installation of lighting distribution boards, lighting panels, etc. as per latest IS/IEC standards

g. Installation of above items shall include necessary foundation channels, bolts/nuts, etc. for grouting lighting distribution boards, Iron brackets/grouting brackets, bolts/nuts for wall/column mounted panels and associated civil works.

Wiring

a. All wires shall be FRLS and Fire survival type. Wiring shall have provision for easy inspection. Exposed wiring when run along wall shall be as near the ceiling as possible. Where cable wiring is specified, cable shall be cleated on to the wall as close to the ceiling as possible. In all types of wiring, due consideration shall be given for neatness and appearance.

b. Wherever emergency lighting is provided, emergency lighting wires shall run in a separate conduit.

c. Wherever lighting system has three phase distribution, separate conduits shall be used for different phases. For easy identification of phases and neutral wires the following color wires shall be used.

d. R - Phase -	Red
e. Y - Phase -	Yellow
f. B - Phase -	Blue
g. Neutral -	Black
h. Earthing-	Green

i. There shall be a circuit breaker or a linked switch on each live conductor of supply mains at the point of entry. The wiring throughout the installation shall be such that there is no break in neutral wire in the form of switch or fuse unit.

j. Receptacles and lighting fittings in general shall be fed from different circuits. Five amps receptacles for toilet or small rooms can be fed from the lighting circuit with proper isolating arrangement.

k. Each final sub-circuit from a lighting panel shall be controlled by a single pole switch/MCB connected to the live conductor.

l. For long conduit wiring runs, inspection/pull boxes shall be provided at intervals not extending 10 m. Such facilities shall also be provided at conduit bends.

General Practices

a. All receptacles and switches to be installed in offices and control rooms shall be flush mounted within the wall and those in other areas shall be wall or column mounted.
b. Ceiling roses shall not embody fuse terminals as an integral part. For voltages exceeding 250 volts, a ceiling rose or any similar attachment shall not be used.
c. A socket outlet shall not embody fuse terminals as an integral part of it. The switch controlling the socket outlet shall be on the live side of the line.
d. All exposed metal parts of the plug, when the plug is in complete engagement with the socket outlet, shall be in effective electrical connection with the earthing pin.
e. Conduits and fittings shall be earthed by suitable sized GI wires (unless otherwise stated), run along the length of the conduit and secured by means of suitable clamps efficiently fastened to conduit. To achieve perfect electrical continuity, the conduits shall be bonded effectively on either end of a coupling and other joints.

f. Conduits shall be grounded at the ends adjacent to switch boards at which they originate or otherwise at the earth clip, clamp or gland, in effective electrical contact with the conduit.

g. In hazardous areas, and where wiring is done with multicore armoured cables, the third core of each single-phase circuit shall be used as earthing conductor and connected to the fitting / junction box internal earthing terminal. The external earthing terminal of each junction box shall be earthed by 2.5 Sq mm Cu for wire for smaller size DBs or 4 sq mm Cu wire for large DBs (unless otherwise specified) to the nearest earth grid.

3.21 LAYOUT REQUIREMENTS FOR THE EQUIPMENT / SYSTEM

a. The design of the lighting system shall be carried out by the Bidder based on site layout. Installation of Lighting system shall be carried out by the Contractor as per Lighting Layout drawings prepared by Contractor and approved by the Owner.

4. OPERATIONAL REQUIREMENTS

4.1 Lighting system shall be designed and installed so as to have adequate lighting in the station to meet operational requirements satisfactorily.

4.2 MAINTENACE REQUIRMENT

Contractor to provide catalogue and O& M manual of all components of Lighting system.

The equipment offered shall be suitable for continuous operation under the above conditions at the full rated capacity. The equipment offered shall be suitable for heavily polluted atmosphere.

5. Technical Parameters of Equipment including DATA SHEET

Sr. NO	DETAILS	UNIT	TPSODL/TPCODL/TPNODL/TPWODL Specification	By Bidder
1	Switchgear designations		As per SLD	
2	Single front or double front	SF/DF	SF	
3	Applicable Standard		Refer Specs	
4	Fully draw out/semi draw out/Fixed	FD/SD/F	F	
5	Total dimensions of each complete switchgear L x W x D	mm	By Bidder	
6	Width of each vertical	mm	By Bidder	

	section with cable alley			
7	Width of cable alley only	mm	By Bidder	
8	Minimum clear space required			
	a) In front	mm	By Bidder	
	b) Back	mm	By Bidder	
9	Max. cubicle weight with components	kg	By Bidder	
10	Have all the feeders and components specified in enclosed Drawings		By Bidder	
11	GENERAL PARTICULARS			
12	Sheet steel			
	a) Cold rolled/Hot rolled		Cold rolled	
	b) Thickness :			
	i) Frames	mm	2.5	
	ii) Door	mm	2	
	iii) Rear cover	mm	2	
	iv) Side and top covers	mm	2	
	v) Panel partitions	mm	1.6	
13	Degree of protections provided by the enclosure (As per IS : 13947)		IP 54 for indoor IP 65 for outdoor	
14	Earth busbar size	Sq.mm	25 x 3 sq mm, Copper	
15	Earthing Wire	Sq.mm	2.5 sq mm / 4 sq mm	
16	BUSBAR			
	a) Material of busbars		Al	
	b) Section	Sq.mm	By Bidder	
	c) Continuous current rating under site conditions	A	As per SLD	

	d) Whether busbars have been insulated	Y/N	YES	
17	DETAILS	UNIT	TPSODL/TPNODL/TPCODL/TPWODL Specification	By Bidder
	a) Type of insulation		By Bidder	
	b) Temperature rise over the reference ambient when carrying rated current	°C	105	
	c) Material of busbar supports		By Bidder	
	d) Clearance in air :			
	e) Between phases	mm	25.4	
	i) Between phases earth	mm	19.4	
	f) Short time rating (One Sec.)	kA	25	
	g) Momentary rating (peak)	kA	62.5	
18	MCCBs & MCB			
	Make		MCCB- Siemens, L&T, ABB, C&S, Schneider, havells MCB- Siemens, ABB, Legrand, Schneider, havells	
	a. Moulded case circuit breakers provided	YES/NO	YES	
	c. Voltage, frequency & no. Of phases		415V, 3ph, 50Hz	
	d. Rated operating duty		S1	
	e. Rated breaking capacity (at 415v 0.25 p.f.)	kA	25	
	f. Rated making current	kA	62.5	
	g. Rated current at site reference			
	h. ambient temperature			

	k. ON/OFF operation :			
	l. Manual	YES/NO	YES	
	m. Releases required :			
	n. Overload	YES/NO	YES	
	o. Earth Fault	YES/NO	YES	
	p. Rated voltage	V	415	
	q. Rated current for individual circuits to be provided as per requirements of protection coordination	YES/NO	YES	
19	INDICATING LAMPS			
	a. Make		By Bidder	
	b. Type		Cluster type LED	
	c. Voltage	V	220V /110V DC	
	d. Wattage of lamp	W	By Bidder	
20	PUSH BUTTONS			
	a. Make		By Bidder	
	b. No of contacts:			
21	WIRING AND TERMINAL BLOCKS			
	a. Voltage grade	kV	1.1kV	
	b. Insulation		PVC	
	c. Minimum size of conductor for :			
	i) Power wiring	Sq.mm	2.5	
	ii) Control wiring	Sq.mm	1.5	
22	Type of terminal blocks :			
	i) For withdrawable Type		Stud	
	ii) For Fixed type		Stud	
23	Minimum current rating of terminal blocks	A	10	

24	Switch, sockets & lighting fittings, Cables		Make: Switch & socket: Anchor, cona, havells, Legrand Lighting: Bajaj, Crompton, havells, Philips, syska, wipro Cable: KEI, Polytech, Havells, Finolex or equivalent	

6.Tests:-

The bidder shall submit Type test reports obtained from NABL/ International Accredited Lab for the equipment / material offered. The type tests should have been conducted on the equipment / material of the same design. The type tests should have been conducted within 5 years prior to the date of bid opening. Time period for type test can be extended by another 5 years as a special case, if there is no change in design / material of construction (MOC). In case the type test reports furnished are not for the quoted equipment / material but for the equipment / material with higher voltage class and/or different capacity, then type test shall be carried out for the offered equipment / material from NABL / International Accredited Lab without any cost implication to the owner and the Type Test reports shall be submitted before dispatch of the equipment / material.

6.1 Type test:

- Degree of protection
- Short circuit making breaking capacities

6.2 Routine Test:

- Visual dimension check
- Bus bar joints, wire termination, nut & bolt tighten check
- Measurement of resistance of main circuit
- Verification of Clearance & creepage distance
- Verification of correct wiring & continuity of circuit
- Tests after erection on site.

a. All test routine test, performance test, special tests, type tests and acceptance test as per the relevant standards and approved MQP shall be carried out.

7. Performance Guarantee Parameters

a. Lighting lux levels as per table 1 in Lighting fixtures and Luminaries in various areas of the substation shall be satisfactorily complied with.

Warranty

b. Bidder shall warrant that the equipment hardware is free of defects in material and workmanship or faults in design, in so far as the equipment fails to meet the requirements of this technical specification, for a period of 60 months from the date of final acceptance by the purchaser after completion of 30 days trouble free operation.

8. Mandatory Spares

10% of supplied quantity of luminaries shall be provided.

9. Data Submission By Bidder

Drawings and Data

a. As part of the proposal the BIDDER shall furnish relevant technical/ descriptive literature of all quoted items and the general arrangement drawing showing dimensioned views for Lighting Distribution boards and lighting panels and junction boxes.

9.1 Bidder shall submit the following information along with the Technical Bid.

a. Acknowledgement of Bid receipt by duly signing all the pages of the bid documents.
b. Bid Qualifying Data.
c. Organization Chart
d. Manufacturing Capacity and list of products manufactured
e. List of Projects executed with Reference List
f. Technical Literature of Product offered with all details
g. Guaranteed Technical parameters of cables and accessories with drawings offered in this bid duly signed and acknowledged.
h. Type Test Reports wherever applicable
i. Testing Facility and Testing Plan for the cable system offered.
j. Data Sheets duly filled.
k. Unpriced copy of price schedule along with technical bid.

10. **SCHEDULED DEVIATIONS:**

(TO BE ENCLOSED WITH TECHNICAL BID)

All deviations from this specification shall be set out by the Bidders, clause by Clause in this schedule. Unless specifically mentioned in this Schedule, the tender shall be deemed to confirm the purchaser's specifications

Sl no	Clause No	Details deviation with justification

We confirm that there are no deviations apart from those detailed above.

Seal of the Company:

Signature
Designation