

RESTORATION OF OBRA 'B' TPS UNIT-12 &13

TECHNICAL SPECIFICATION

FOR

STATION LIGHTING SYSTEM

SPECIFICATION NO. : PE-TS-446-558-E001 R0



BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, UP [INDIA]



TECHNICAL SPECIFICATION FOR
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RESTORATION OF OBRA 'B' TPS UNIT-
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SPECIFICATION NO. PE-TS-446-558-E001

VOLUME II

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COMPLIANCE CERTIFICATE

The bidder shall confirm compliance to the following by signing/ stamping this compliance certificate and furnishing same with the offer.

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same.
2. There are no deviation with respect to specification other than those furnished in the 'schedule of deviations'.
3. Only those technical submittals which are specifically asked for in NIT to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of offer.
4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.
5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in BOQ-Cum-Price schedule of the specification shall not be considered (i.e. technical description & quantities as per specification shall prevail).

BIDDER'S STAMP & SIGNATURE



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SPECIFIC TECHNICAL REQUIREMENTS



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1.0 This specification covers the design, manufacture, assembly, testing and inspection at vendor's/sub-vendor's works, packing and despatch to site, site unloading & handling, site storage including storage facility, erection and commissioning of lighting system as described in the various sections of this specification. Lighting system shall generally conform to relevant standard. It is not the intent to completely specify all details of design and construction herein. However, the equipment shall conform to acceptable standards of design, engineering and workmanship and shall be capable of performing the required duties in a manner acceptable to Contractor, who shall be entitled to reject any work or materials, which in his opinion is not in conformity with the duty requirements.

2.0 SCOPE OF SUPPLY AND SERVICES

The scope of supply and services covers the complete supply of equipment and services for lighting and low voltage power services in accordance with the requirements of various sections of this specification.

2.1 The scope of supply shall be as per Price Schedule for Station Lighting System (Annexure- 1, and 2). The complete installation, testing, commissioning and performance testing of lighting and low voltage power services as per Schedule of Equipment & Services enclosed shall be in bidder scope.

2.2 Consumable such as conduit accessories, conduit boxes, saddles, clamps, screws, switch boxes, supports, down rods, ball and sockets, fixing hardware etc, as described in various clause shall deemed to be included by the bidders in the scope of supply and erection. Any item not mentioned in the BOQ but required to complete the work shall be supplied, erected, tested and commissioned by bidder without any techno-commercial implication to BHEL.

2.3 **SYSTEM DESIGN ENGINEERING:** System Design Engineering is included in vendor's scope, which includes design of complete lighting system for indoor and outdoor areas of the power plant. **Please refer the list of LLO/LDC/CLO/PDS drawings as per Annexure-C for the tentative areas to be covered by the lighting system.** The aspect of engineering covers preparation of electrical distribution and control schemes, quantity estimation, luminaire layout drawings, conduit layout drawings, wiring schemes upto luminaires, cable schedules and all associated design work not specifically mentioned in the specification. The quantity estimation to include all items required for the complete lighting system viz. lighting fixtures, lamps, Lighting DBs, Welding DBs, lighting panels, conduits, PVC wires etc.

2.4 Standard technical requirements of the lighting fixtures, lamps & miscellaneous items and lighting system design requirements are indicated in Section-II. Project specific requirements/changes are listed in Section-I.

2.5 In case of conflict between the corresponding requirements of Section-I and Section-II, section-I shall prevail.

2.6 The stipulations of Datasheet-A shall prevail in case of conflict between the corresponding requirements of Section-I and Datasheet-A.



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2.7 Review of sub-vendor's documents by the purchaser shall not relieve the vendor from the responsibility of design & supply.

2.8 The documents shall be in English language and MKS system of units.

3.0 TERMINAL POINTS

Terminal point shall be incoming power supply to lighting distribution boards. Termination at LDB end shall be in scope of the bidder.

4.0 EXCLUSIONS

4.1 Civil foundations of lighting distribution boards.

4.2 Supply and laying of incoming cables to LDBs and welding sockets (fed from MCC).

4.3 Supply of power cables from LDBs to LPs

4.4 Supply of control cables from DC LDB to AC normal board.

4.5 Supply & erection of cable trays.

5.0 Review of the sub-contractor's documents by the contractor shall not relieve the sub-contractor from his responsibility for the design, supply and construction/ installation.

6.0 SPECIFIC TECHNICAL REQUIREMENTS

6.1 Equipment and Material

Equipment and material shall comply with description, rating, type and size as detailed in this specification, drawings and annexure.

Equipment and materials furnished shall be complete and operative in all details.

All accessories, control devices, internal wiring, fittings, supports, hangers, anchor bolts etc. which form part of the equipment or which are necessary for safe and satisfactory installation and operation of the equipment shall be furnished.

All parts shall be made accurately to standard gauges so as to facilitate replacement and repair. All corresponding parts of similar equipment shall be interchangeable.

6.2 Lighting Fixtures

Description of fixtures shall be as mentioned below:



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SL. NO.	Type of Luminaire	Description		
1	FC02 (LED)	industrial box type base LED fixture		
2	FC06 (LED)	Industrial type LED fixture suitable for conduit /surface/ suspended mounting, with integral driver aesthetically designed for Switchgear / Equipment room		
3	FC26 (LED)	Panel (600 mm X 600 mm) LED luminaire suitable for recess mounting in false ceiling with integral driver aesthetically designed for Control Room/ Office		
4	FC81 (LED)	Corrosion proof, totally enclosed LED fixture suitable for Battery room		
5	SF63 (LED)	Flood light, heavy duty type LED fixture		
6	FC07	1 x 18 Fluorescent, industrial box type base and vitreous enamelled side reflectors operating on 220V DC input supply.		
7	FC33	1 x 18 Fluorescent, decorative, recessed type with mirror optic reflector operating on 220V DC input supply.		
8	FC34	1 x 18 Fluorescent, dust proof, totally enclosed type with sheet steel housing operating on 220V DC input supply		

Notes:

- 1) LED must comply with all the parameters of IS 16105 or IESNA LM-80-08.
- 2) The Luminaire must comply with all the parameters of IS 16106 or IESNA LM-79-08.
- 3) The LED driver should comply to IEC 61347-2-13, IS 15885: Part 2: Sec 13, IEC 62384, IS 16104 and CISPR 15.
- 4) The luminaire complete with all accessories shall comply with relevant specified standards.
- 5) All parameters mentioned in Section-II, Clause 5.2 are to be complied in totality.



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Lighting fixtures shall be designed for minimum glare. The surface finish shall be smooth, unobtrusive and scratch resistant.

The finish of the fixtures shall be such that no bright spots are produced either by direct light source or by reflection. The diffusers/ louvers used in fixtures shall be made of impact resistant polystyrene sheet and shall have no yellowing property over a prolonged period.

All fixtures shall be of a proven design for applications in power plant environment.

In false ceiling area LED luminaires shall be recessed mounting type & in non-false ceiling area the LED luminaires shall be surface mounting type.

Fixture shall be suitable for 20 mm conduit entry and 16 SWG GI earth wire connection.

CFL lamps shall be used for DC lighting.

For Indoor type of fixtures: -

(a) Surface/Pendent mounting: - IP 54 class of protection.

(b) Recess Mounting (False ceiling): - IP 20 class of protection

Fixtures shall be fully wired up to respective terminal blocks, suitable for loop in and loop out connection of PVC wires of following sizes:

- a) Lighting fixture : 2.5 mm² copper
- b) Flood light fixture : 2.5 mm² copper

The connecting wire used inside the system, shall be low smoke halogen free, fire retardant type and fuse protection shall be provided in input side specifically for LED luminaries.

- 6.3 Lighting system will be designed to ensure adequate uniform visual performance, safety & reliability and will be free from excessive glare and flicker from discharge lamp. In main control room, particular attention will be given to ensure that illumination is proper and aesthetic. Control room lighting will be such as to prevent any glare/ luminous patch on control board /panel/ VDUs when viewed from an angle.
- 6.4 All fixtures shall be of a proven design for applications in power plant environment. The lamps for external lighting and internal lighting of not completely closed building shall have protection class of IP 55 minimum.
- 6.5 LED medium bay fixtures will be installed in areas with sufficient minimum headroom of 4 meter.
- 6.6 In general, the type of fixtures, type of luminaries and illumination levels to be achieved will be as per enclosed Annexure-A.



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- 6.7 The lighting fixtures in the plant area will be group controlled from lighting panel, a maximum of 15 fittings per circuit will be connected to one phase. The lighting fixtures in office areas, control rooms etc. will be controlled by switches. In rooms such as offices, central control room, tearooms, corridors to office rooms, laboratory rooms, kitchen etc. the domestic power outlet (socket) shall be provided in adequate quantity concealed mounted. One power socket will be provided below each light switch. In the office & laboratory rooms, two flush mounted power socket will be fitted on walls. In corridors, relay room and tearooms one power outlet shall be arranged every 10 M.
- 6.8 Lighting panel (LP) for controlling lights with additional provision for manual control shall be provided with timer
- 6.9 The lighting cable installation in area with false ceiling such as CCR, office room, corridor to office room, will be exposed/ surface mounted above the false ceiling & concealed below false ceiling to suit aesthetics. Wiring in area without false ceiling such as kitchens, tea rooms, laboratory rooms, toilets will be concealed. Wiring in all other area will be exposed/ surface mounted.

7.0 ILLUMINATION DESIGN CALCULATION

- 7.1 Lighting design for indoor areas will be done by Point-by-Point method method only.

The Reflection Factor (RF) will be considered as given below:

	Ceiling (rc)	Wall (rw)	Floor (rf)
For air-conditioned area	50	30	10
For non air-conditioned area	30	30	10
Clear Areas such as switchgear room/ control room	70	50	10

Values of Maintenance Factor (MF), which includes the luminaire depreciation factor will be considered as given below:

- a) Control room & air conditioned area : 0.8
- b) Indoor area non-AC (LED fixture) : 0.7

- 7.2 Lighting design for indoor, outdoor area, open area shall be done by computer programme as per standard norms for lighting design to meet the specified lux level.



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8.0 LIGHTING SYSTEM DESCRIPTION

- a) Lighting system in main plant area will be provided with AC normal, AC emergency and DC emergency as listed against various areas as per Annexure-B enclosed.
- b) The sources of power supply are as below:
 - i) 415V AC Normal (ACN) Supply from different station PMCCs /MCCs
 - ii) 415V AC Emergency (ACE) Supply from Emergency Board
 - iii) 220V DC Emergency Supply from DC Distribution Board
 - iv) 24V AC Supply for maintenance

For main plant area normally all AC luminaries will be in service on normal AC supply. Approximate distribution of AC Luminaries on AC normal and AC emergency shall be decided during detail engineering stage.

For other auxiliary areas AC Normal lighting will provide 100% illumination level and normally all AC lighting fixture shall remain "ON" as long as normal AC supply is available. The max. Allowable voltage drop for low voltage distribution system shall be 3% for lighting loads & 5% for other applications.

Normally all DC luminaries shall be 'OFF'. Upon failure of AC supply, DC luminaries shall be automatically switched 'ON'. On restoration of AC Emergency lighting through DG, DC luminaries shall be put-off automatically after a time gap of about three minutes following the restoration of lighting to ACN or ACE lighting system.

Lighting level by DC emergency lighting will be provided to meet functional/ operational requirements. DC fixtures will be located at strategic locations such as near entrance, staircase, landings etc. for safe personnel movement and for access to important control points during emergency when both normal AC and emergency AC lighting system fail.

In areas where DC Emergency supply is not available, ELUs are envisaged for safe personal movement and for access to important control points. ELUs shall contain maintenance free Ni-Cd battery with 3 hours backup and 2x6W lamp. The fixtures shall be switched 'ON' automatically in case of failure of AC supply.

At least two sub circuits shall be used for illumination of a particular area. Sub circuit loading of each lighting panel shall be restricted to 2000 Watts (a maximum of 15 lights per circuit to be connected to one phase). At least 20% spare outgoing circuits shall be provided in the Lighting Distribution Boards & Lighting Panels.

In an area, the lighting fixtures shall be arranged in different phase/LPs such that even in case one lighting panel is faulty, complete lighting is not affected. In case of any location the lighting shall be arranged from different phases.



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Fixtures shall be suitable for 20 mm conduit entry and 2.5 mm² wire connection. Fixtures shall be fully wired up to respective terminal blocks, suitable for loop in and loop out connection of PVC wires of following sizes :

- a) Lighting fixture : 2.5 mm² Copper
- b) Flood Light fixture : 2x2.5 mm² Copper

8.1 A.C Normal Lighting Systems:

AC Normal lighting fixtures are fed through a number of conveniently located AC Lighting panel (ACLP) which are fed from Lighting Distribution Board (LDB). LDBs consisting of dry type isolation transformer housed in LDB with proper separation from distribution panels as per details indicated in Datasheet-A.

8.2 AC Emergency Lighting System:

AC Emergency lighting fixtures are fed through a number of conveniently located AC Lighting panel (ACLP) which are fed from AC Emergency Lighting Distribution Board (ELDB). ELDBs consisting of non-encapsulated, dry type isolation transformer housed in ELDB with proper separation from distribution panels as per details indicated in Datasheet -A.

8.3 220V DC Emergency Lighting System:

DC Emergency lighting fixtures fed through suitable numbers of conveniently located DC Emergency Lighting panel (DCELP) which are fed through DC Lighting Distribution Board (DCLDB). The DCLDB shall be fed from DCDB. The DC emergency lighting fixtures connected to this system shall remain normally 'OFF'. Upon failure of AC supply, DC luminaries shall be automatically switched 'ON' from DC supply system. DCLDB shall be equipped with AC under voltage relay and contactor for emergency auto changeover scheme. Other Technical particulars for the same shall be as per Datasheet-A.

8.4 LDB shall be provided with supply ON indicating lamps etc. All indicating lamps will be cluster LED type. The DOP and other technical particulars for LDB shall be as per Datasheet-A. 20% spare outgoing feeders will be provided at outgoing of LDB for future use.

8.5 Lighting circuit will be developed to ensure that no two consecutive fixtures will be fed from same phase/circuit and feeding of different LPs will be from separate LDBs. The circuit loading on each circuit will be restricted to 80% of the MCB rating. The voltage drop from LDB and any fixture will not exceed 3%.

9.0 Emergency lighting Unit

Emergency lighting Unit shall be provided through self-contained DC emergency fixtures with three (3) hours back-up duration, each shall be provided with Ni-cd battery, battery Charger & 2x6 W fluorescent lamps.



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10.0 24V Supply System

Each 24V AC supply module will have one no. dry type two winding, 1 phase transformer and necessary terminals for incoming and outgoing connections. The 240V terminals of 24V AC supply module will be fed from AC emergency lighting panels (ACELP). Details of 24V supply modules shall be as provided in Datasheet-A.

24V portable halogen lamp unit (for both units) along with flexible copper cable shall be supplied as per details mentioned in Datasheet-A.

11.0 Emergency EXIT lamps:

Emergency exit lamps backed up by battery shall be provided at strategic locations of the building for safe exit of personnel. These exit lamps will remain ON all the time and normally received power supply from ACELP.

Exit lamp unit shall contain maintenance free Ni-Cd battery with 3 hours backup capacity.

12.0 LOW VOLTAGE POWER SERVICES

12.1 Different type of receptacles as per details below will be provided:

(i) Decorative receptacle:

At least 01 number 6/16A, 3-Pin, 240V AC decorative socket will be provided in office, store, cabin etc. The decorative receptacle shall be flush mounted (concealed) to suit aesthetics.

In each kitchen, shower and washroom, six power outlets shall be provided. The power outlets in the shower and wash room shall have covers. In each toilet two power outlets (sockets) and one electric hand dryer, at least 1500W shall be provided.

Domestic power sockets shall be generally plastic-insulated power outlets for 240 V AC. For concealed wiring, they shall be mounted 300mm above the finished floor level except M&E rooms (e.g. Switchgear Room, Transformer Room, etc). The mounting height for switch socket outlet in M&E Room shall be at least 1.5m above the finished floor level. For exposed conduit wiring, the switch socket outlets shall be metalclad.

(ii) Industrial receptacle:

At least 01 number 20A, 3-Pin, 240V AC industrial type receptacles will be provided at suitable location in plant building like swgr room, MCC room (location will be decided during detailed engineering) . The receptacles shall be provided at interval of 20m or part thereof.

(iii) Welding receptacle:



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63A, 3-phase, 415V AC welding receptacles with isolating switch will be provided at specific points at every 40 meter (location will be decided during detailed engineering) . Maximum 03 nos. receptacles will be fed through one feeder. The socket outlets shall be metal-clad to IP 55, weatherproof and incorporate spring-return flap cover. Plug and socket shall be interlocked such that the unit cannot be switched on until the matching plug is fully inserted, nor can the plug be withdrawn with the switch closed.

- 12.2 Transformer rating for welding distribution board shall be 100kVA. Other construction details shall be identical to AC LDB.
- 13.3 Based on room size, suitable nos. of ceiling fans (1200mm sweep) with Stepped electronic regulator shall be provided in office rooms, store rooms and social buildings which are not covered by air-conditioned and ventilation system. In the office premises, one fan per 10 sq. metres shall be provided. A total of 10 nos. Pedestal fans (for both units) shall also be provided to meet client operational requirement.
- 14.4 For the maintenance of lighting fixtures within the power house, 1 nos. free standing adjustable aluminium ladder, adjustable from 05M to 10M shall be provided. For the maintenance of street lights, 01 no. of wheel mounted adjustable aluminium ladder shall be provided.

15.0 WIRING / CONDUITS

Wiring of lighting system will be done as follows:

- (i) Wiring installation will be done by multi-stranded, PVC insulated, unsheathed, copper, colour coded wires laid in GI conduits of 20 mm dia size (minimum) conforming to IS-9537. The thickness of conduits up to & including 25 mm dia will be 1.6 mm and conduits above 25 mm will be 2.0 mm. Colour of the PVC insulation of wires shall be Red, Yellow, Blue, black for R, Y, and B phases & neutral respectively and white & grey for DC positive & DC negative circuits respectively.
- (ii) Conduits will be heavy-duty type hot dip galvanised steel conforming to IS-9537. Conduit accessories will be hot dip galvanised. In corrosive area, conduits will have suitable epoxy coating additionally.
- (iii) Flexible conduits shall be water proof and rust proof made of heat resistant PVC coated steel.
- (iv) Conduits in office rooms, control room, service building, laboratory building and other air-conditioned areas will be surface mounted on the roof above false ceiling. However vertical drops of conduits will be concealed along walls and finally plastered for better aesthetics.
- (v) Filling area of wires in conduit shall not exceed 40% of the conduit area.



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(vi) Wiring for AC Normal, AC Emergency, and DC Emergency services will run in separate conduits

(vii) Lighting and receptacles will be fed from separate circuits. No two different phase circuits will be run in the same conduit. However, different circuits of same phase may be laid in the same conduit.

Following sizes of 1100 V grade, PVC insulated, single core, stranded copper conductor wires will be used:

Lighting Panel to Fixtures: 2.5 sq. mm (Cu)

Lighting Panel to JB's/ Switches: 2.5 sq. mm (Cu)

JB's/ switches to Fixtures: 2.5 sq. mm (Cu)

Panel to First receptacles: 4 sq. mm (Cu)

First receptacles to looping other receptacles (240V, 1 phase receptacles): 4 sq. mm (Cu)

In case of only one receptacles in ckt., Panel to receptacles (240V, 1 phase receptacles): 4 sq. mm (Cu)

Panel/ JB's to flood light fixtures: 2.5 sq. mm (Cu)

16.0 EARTHING

Earthing of lighting system will be done by using of following sizes of wire / flat:

Lighting Distribution Board: GS Flat 50x6 mm

Lighting Panels: GS Flat 35x6 mm

Lighting fixtures, receptacles, conduits, junction boxes & switch boxes: 16 SWG GI wire

Welding receptacles: GS Flat 35x6 mm

17.0 Ballasts

All fluorescent fixtures shall be provided with electronic ballasts.

All luminaires and their accessories and components shall be of type readily replaceable by available Indian makes.



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18.0 Fans & Regulators

The fans shall have three well balanced blades, and shall be reasonably free from noise.

The ceiling fans shall be suitable for operation on 240 V +/-10%, 50 Hz, AC supply comprising of class 'E' or better insulated copper wound single phase motor, 1200mm sweep, aerodynamically designed well balanced AL blades (3 Nos.), down rod, die cast aluminium housing, capacitor, suspension hook, canopies etc. finished in stove enamelled white or with electro static powder coating. Power factor of fans shall not be less than 0.9. Fan regulators shall be stepped electronic type suitable for operation on 240V +/- 10% AC supply.

19.0 Junction Boxes, Conduits, Fitting & Accessories, Pull Out Boxes:

Junction box for indoor lighting shall be made of fire retardant material. Material of JB shall be GS.

All switches and receptacles upto 16A shall be modular type. These shall be provided with pre-galvanized/galvanized modular switchbox & plate.

Conduits, Pipes and Accessories Galvanised heavy duty steel conduits for normal area and galvanised heavy duty steel conduits with an additional epoxy coating for corrosive area shall be offered.

Rigid steel conduits shall be heavy duty type, hot dip galvanised conforming to IS: 9537 Part-I & II shall be suitable for heavy mechanical stresses, threaded on both sides and threaded length shall be protected by zinc rich paint. Conduits shall be smooth from inside and outside.

Flexible conduit shall be water proof and rust proof made of PVC coated steel.

Pull out boxes shall be provided at suitable interval in a conduit run. Boxes shall be suitable for mounting on Walls, Columns, Structures, etc. Pull-out boxes shall have cover with screw and shall be provided with good quality gasket lining. Pull out boxes used outdoor shall be weather proof type suitable for IP: 55 degree of protection and those used indoor shall be suitable for IP: 52 degree of protection. Pull out box & its cover shall be hot dip galvanized.

The junction boxes shall be of following types:

Type of junction boxes:

Type	Description
JB-F	Provided with four (4) way stud type terminals for terminating upto 2Nos. 10 mm ² stranded aluminium conductors on each terminal, suitable for outdoor installations.



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JB-FE Same as above but with an additional epoxy coating of 50micron thickness.

Galvanisation shall be done corresponding to the sheet thickness and as per the applicable standard.

20.0 Switch & Switch Board

Switch boxes shall be made of 1.6 mm thick MS sheet with 3 mm thick decorative, Perspex cover. Switch box shall be hot dip galvanized.

Switch boards / boxes shall have conduit knock outs on the sides. Adequate provision shall be made for ventilation of these boxes.

Switches shall have quick make and quick break mechanism operated by a suitable external handle complete with position indicator.

The size of switch-boxes shall be adequately chosen to accommodate the no. of switches and fan regulator boxes specified below. Fan regulators shall be supplied separately.

Switch boxes shall be of following type

Type No.	Switch	Fan Regulator	Socket	JB type
SWB1	5A-2 Nos	-	-	SW1
SWB2	5A-3 Nos	-	5A-1 No	SW2
SWB3*	5A-5 Nos	1	5A-1 No	SW3
SWB4*	5A-7 Nos	3	5A-1 No	SW3
SWB5**	5A-5 Nos	-	5A-1 No	SW3

* Space provision shall be kept for fan regulator in switch boxes.

** Shall have the provision for mounting the 16A contactor.

JB details for lighting control switch boxes are as below:

JB-SW1
for Provided with four (4) way stud type terminals each terminal suitable terminating to 10mm² stranded aluminium conductor.

JB-SW2 Similar to the JB-SW1 but provided with ten (10) way terminals.



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JB-SW3

Similar to JB-SW1 but provided with eighteen (18) way terminals.

21.0 Maintenance Equipment

One (1) no. of wheel mounted adjustable aluminium ladder for the maintenance of street lights adjustable from 5 m to 10 m.

One (1) no. free standing adjustable aluminium ladder, adjustable from 5 m to 10 m.

22.0 Design engineering includes submission of data sheets, GA drawings of equipment, mounting details, various schedules, lighting design calculation sheets, lighting distribution scheme, lighting layout drawings and bill of material drawings. Conduit layout drawings shall be submitted to meet the E&C schedule.

23.0 Basic Design Documents covers: Drawings/ documents schedule, technical data sheets, GA drawings of equipment, quality plan, type test reports & type test proposal (as required) for Station Lighting System.

Basic design documents shall be submitted within one weeks of placement of the order and resubmission if any shall be made within three days of the receipt of the comments. Quantities amounting to 60% (approx.) of order value shall be finalised at kick off meeting.

24.0 Bidder after award of contract shall prepare all GA, schemes and lighting layout drawings in AUTOCAD. Both hard as well soft copies of drawing/documents will be required for the purchaser's review/ approval. All equipment shall be identified and addressed with its KKS designations (if required) in the Lighting design calculation, Lighting layout drawing and conduit layout drawing.

25.0 INSPECTION & TESTING

25.1 Standard quality plan of various items are enclosed as Annexure-E. For non-SQP items, bidder shall furnish their QP after award of contract. Inspection shall be carried out as per Quality Plan (QP) (Document number PE-QP-999-558-E001) approved by Customer/ BHEL without any implication on cost and delivery.

All material used for the construction of the equipment shall be new and in accordance with the requirements of this specification. Materials utilized shall be those which have established themselves for use in such applications.

25.2 All acceptance and routine tests as per relevant standards and specification shall be carried out by the manufacturer. Charges for all these routine and acceptance tests for all the materials shall be deemed to be included in the bid price.

25.3 Reports for type test of lighting fixtures and accessories covered in the specification shall be as per relevant standards

25.4 Type test reports shall be furnished by the bidder. Such Type tests should have been carried out within last five years at date of enquiry, on identical components / materials.



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materials. In absence of such type tests reports or in case such reports are not found to be meeting the specification/standards requirements, bidder shall conduct, free of cost to the purchaser, all such type tests according to the relevant standards and reports shall be submitted to the owner for approval.

All the components and completely assembled switchboards shall be tested as per the latest edition of standards.

- 26.0 Makes of sub-vendor and equipment/components mentioned in the list (indicative sub-vendor list as per enclosed Annexure-D are indicative and shall be subject to Customer/ BHEL approval during detailed engineering without any commercial implication to BHEL.
- 27.0 Bidder shall furnish Field QP after award of contract for purchaser's approval.
- 28.0 Bidder shall furnish various schedules/data sheets completely filled and duly stamped and signed as per various sections of this specification.
- 29.0 PRICES
- 29.1 The bidder shall quote prices for supply, erection, testing & commissioning of complete lighting system as per format attached with the specification.
- 29.2 The unit rates of supply & installation for all equipment and service quoted by the bidder shall be firm for a variation of quantities as per NIT.
- 29.3 Purchaser reserves the right to delete/add any equipment or services from the bidders scope, and for price adjustment in such cases, unit prices quoted by the bidder will be considered.
- 29.4 The bidder shall furnish unpriced price schedule of all equipment and services inclusive of commissioning spares, O&M spares and special tools & tackles along with the technical bid.
- 29.5 Bidder to note that the price quoted for System Engineering Design for lighting system shall be fixed for the project and will not vary with the change in scope of supply of equipment.
- 29.6 It is understood that Bidder has included unit price of all the equipment and the components like MCB's, switches, lamps etc. in the unit price of main items.
- 30.0 Bidder after award of contract shall prepare and submit the area drawings as per various sections of this specification within one weeks of the input given by the purchaser. The total engineering along with freezing of BOM shall be completed in line with specification requirement.

After completion of work at site, bidder shall prepare 'AS BUILT' drawings and furnish the same in CD ROM.

- 31.0 Structural steel requirement shall be informed by the bidder at contract stage and



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drawing approval for the same shall be subject to BHEL approval without any commercial implication.

- 32.0 Engineering, Supply and E&C schedule:
As per NIT (Notice Inviting Tender).

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ANNEXURE-A
AVERAGE LUX LEVEL & TYPE OF FIXTURES

S. No.	LOCATION	Lux level	Type of lighting fixture (key see notes)
1	Washrooms, toilets, Pantry	200	FC02(LED)/ FC06(LED)/ FC26(LED)
2	Switchgear rooms/ Charger room	200	FC02(LED)/ FC06(LED)/ FC26(LED)
3	All offices, laboratory, supervisor room, plant manager room, Meeting rooms,	300	FC02(LED)/ FC06(LED)/ FC26(LED)
4	Control room	350	FC02(LED)/ FC06(LED)/ FC26(LED)
5	Cable Vault	80	FC02(LED)/ FC06(LED)/
6	Battery rooms	150	FC81(LED)
7	DC Lighting		FC07(LED)/ FC33(LED)/ FC34(LED) with CFL fixtures, 1X 18 W.

Notes:

1. Lux levels demonstration at site (as per approved CLO drawing) shall be part of performance guarantee by vendor. In case, the fixtures/lamps do not meet the rated Lux level output or area wise lux level requirement are not met after erection of complete system. Then, the vendor will rectify the Fixture/lamp/system to meet specification requirement of Lux levels.
2. Decorative type fixtures to be provided for false ceiling areas.



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ANNEXURE - B

LIGHTING & LV POWER SERVICES IN DIFFERENT AREAS

Sl. No..	AREA	AC N	AC E	DC E	5/15A Socket	20A Socket	63A Socket	EL U \$
01	Main Switchgear room	Y	Y	Y	Y	Y	Y	Y
02	Cable Vaults	Y	Y		(*)	(*)	Y	
03	Main Control Room	Y	Y	Y	Y	Y	Y	Y
04	Pantry, Kitchen, Toilets & other Misc. areas	Y	Y	Y	Y	Y	(*)	Y
05	Boiler Switchgear room	Y	Y	Y	Y	Y	(*)	Y
06	Battery Room	Y	Y	Y	Y	Y	Y	Y
07	Charger room	Y	Y	Y	Y	Y	(*)	

LEGEND:

ACN: AC Normal Lighting

ACE: AC Emergency Lighting

DCE: DC Emergency Lighting

Y: YES

(*) To be decided at detail engineering stage

\$: Emergency Lighting Unit (ELU) & 5/15A Switch socket for
ELU



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ANNEXURE-C

DOCUMENTS REQUIRED AFTER AWARD OF LOI

Sl. No.	DRAWING NUMBER	DRAWING TITLE	
Basic design documents			
1	PE-V0-446-558-E001	Station lighting system data sheet	
2	PE-V0-446-558-E002	Sub-vendor list	
3	PE-V0-446-558-E003	Manufacturing quality plan for luminaries	
4	PE-V0-446-558-E004	Manufacturing quality plan for LDBs & LPs	
5	PE-V0-446-558-E005	Manufacturing quality plan for Transformer	
7	PE-V0-446-558-E007	Manufacturing quality plan for Miscellaneous items	
8	PE-V0-446-558-E008	Manufacturing quality plan for Galvanised & epoxy coated rigid conduit	
9	PE-V0-446-558-E009	Type test report for luminaries	
10	PE-V0-446-558-E010	DOP of Lighting panels	
11	PE-V0-446-558-E011	Temp. rise test for LDB	
12	PE-V0-446-558-E012	MOUNTING ARRANGEMENT OF FIXTURES	
13	PE-V0-446-558-E013	MOUNTING ARRANGEMENT OF RECEPTACLES AND SWITCHBOARDS	
14	PE-V0-446-558-E014	FQP	
15	PE-V0-446-558-E015	GA DRAWING OF 24V SUPPLY MODULE & LAMP UNIT FIX TYPE	
17	PE-V0-446-558-E017	GA DRAWING OF AC LDB TYPE -F (O/G 8) and TYPE-H (O/G 12)	
18	PE-V0-446-558-E018	GA DRAWING OF CEILING FANS 1200 MM SWEEP	
19	PE-V0-446-558-E019	GA DRAWING OF DC LDB TYPE-D (O/G 6)	
20	PE-V0-446-558-E020	GA DRAWING OF SWITCH BOXES TYPE SWB1, SWB2, SWB3, SWB4	
21	PE-V0-446-558-E021	GA DRAWING OF EMERGENCY LIGHTING UNIT	
22	PE-V0-446-558-E022	GA DRAWING OF EXIT SIGN	
23	PE-V0-446-558-E023	GA DRAWING OF FREE STANDING LADDER and HEEL MOUNTED LADDER	
24	PE-V0-446-558-E024	GA DRAWING OF JUNCTION BOXES	



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		TYPE JB-F	
25	PE-V0-446-558-E025	GA DRAWING OF JUNCTION BOXES TYPE JB-FE	
26	PE-V0-446-558-E026	GA DRAWING AND SLD OF LIGHTING PANEL (DECORATIVE) TYPE-A (12)	
27	PE-V0-446-558-E027	GA DRAWING AND SLD OF LIGHTING PANEL INDOOR TYPE- LP-A (12)	
28	PE-V0-446-558-E028	GA DRAWING AND SLD OF LIGHTING PANEL INDOOR TYPE-LP-A (18)	
29	PE-V0-446-558-E029	GA DRAWING AND SLD OF LIGHTING PANEL INDOOR TYPE LP-D (6)	
30	PE-V0-446-558-E030	GA DRAWING OF PORTABLE HALOGEN LAMP UNIT	
31	PE-V0-446-558-E031	GA DRAWING OF RECEPTACLES TYPE RA	
32	PE-V0-446-558-E032	GA DRAWING OF RECEPTACLES TYPE RB	
33	PE-V0-446-558-E033	GA DRAWING OF RECEPTACLES TYPE RC	
34	PE-V0-446-558-E034	GA DRAWING OF TRANSFORMER 100 KVA AND TRANSFORMER 50KVA	
35	PE-V0-446-558-E035	GA DRAWING OF PEDESTAL FAN	
36	PE-V0-446-558-E036	GA DRAWING OF 5A,24V SOCKET & LAMP	
37	PE-V0-446-558-E066	GA DRAWING OF LUMINAIRES TYPE FC34	
38	PE-V0-446-558-E067	GA DRAWING OF LUMINAIRES TYPE FC07	
39	PE-V0-446-558-E068	GA DRAWING OF LIGHTING LAMP 18W CFL	
40	PE-V0-446-558-E069	GA DRAWING OF LUMINAIRES TYPE FC02(LED)	
41	PE-V0-446-558-E070	GA DRAWING OF LUMINAIRES TYPE FC81(LED)	
42	PE-V0-446-558-E073	GA DRAWING OF LUMINAIRES TYPE SF63(LED)	

Area Lighting design calculation, lighting layout and conduit layouts(Tentative)-

1	PE-V0-421-558-E101	LDC/ LLO/ CLO/ PDS FOR CABLE VAULT AT EL.(-)4.0M	
2	PE-V0-421-558-E102	LDC/LLO/ CLO/ PDS FOR SWITCHGEAR ROOM AT EL. 0.0M	
3	PE-V0-421-558-E103	LDC/ LLO/ CLO/ PDS FOR CABLE VAULT AT EL.5.0M	
4	PE-V0-421-558-E104	LDC/ LLO/ CLO/ PDS FOR MAIN CONTROL ROOM AT EL. 9.0M	



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5	PE-V0-421-558-E105	LDC/ LLO/ CLO/ PDS FOR BATTERY ROOM	-
6	PE-V0-421-558-E106	LDC/ LLO/ CLO/ PDS FOR CHARGER ROOM	
7	PE-V0-421-558-E107	LDC/ LLO/ CLO/ PDS FOR Stairs AND OTHER MISC. AREAS	
8	PE-V0-421-558-E108	LDC/ LLO/ CLO/ PDS FOR BOILER SWITCHGEAR ROOM	
9	PE-V0-421-558-E109	LDC/ LLO/ CLO/ PDS FOR OTHER AREAS	

6.26 DOCUMENTS SUBMISSION SCHEDULE FOR STATION LIGHTING PACKAGE

SL. No.	DOCUMENT TITLE	SUBMISSION SCHEDULE
1	Basic Design Documents	Within one weeks from the date of PO/ LOI.
2	Data sheets, manufacturing quality plan, field quality plan	Within one weeks from the date of LOI.
3	Resubmission of BHEL/ customer commented document	Within (3) three days from date of receipt of comments.
4	Type Test Report	Within (3) three days after conduction (if applicable) of Type test

Note:

1. Basic Design Documents covers: Drawings/ documents schedule, technical data sheets, GA drawings of equipment, quality plan, type test reports & type test proposal (as required) for Station Lighting System.
2. Further if submission of any documents is required during detail engineering then same submission/ re submission schedule shall be followed.
3. Inputs will be provided at contract stage (to be finalized during kick-off meeting). Input drawings will be furnished to vendor within a week for preparation of LDC and LLO drawings. Further, to facilitate design of station lighting system, vendor may require to visit the site at design engineering stage.
4. CLO drawings to be prepared by vendor after clearance for the same from BHEL.

LLO: Lighting Layout Drawing

CLO: Conduit Layout Drawing

LDC: Lighting Design Calculation

RESTORATION OF OBRA 'N' TPS UNIT-12 & 13
STATION LIGHTING SYSTEM (List of Sub vendor) Annexure-D

ITEM CODE	ITEM DESCRIPTION	SL NO.	VENDOR CODE	VENDOR NAME	ADDRESS	PHONE	REMARKS
ES1	AC CONTACTORS	1	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com	
	AC CONTACTORS	2	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	AC CONTACTORS	3	E1144	TELEMECHANIQUE/ SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	TAKEN OVER BY SCHNEIDER
	AC CONTACTORS	4	L01	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59	
	AC CONTACTORS	5	B04	BCH	20/4, MATHURA ROAD, FARIDABAD, HARYANA-121006	0129-4293000	
ES3	AC MCCB	1	C01	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-II, NEW DELHI-110020	011-3088 7520-28	
	AC MCCB	2	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	AC MCCB	3	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com	
	AC MCCB	4	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	AC MCCB	5	L01	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59	
	AC MCCB	6	C02	CROMPTON GREAVES	RAIL TRANSPORTATION SYSTEMS, VANDANA BUILDING, 11, TOLSTOY MARG, TOLSTOY MARG, NEW DELHI, DL 110001	011 3041 6300	
ES7	AUXILIARY RELAYS	1	A24	ABB	14, MATHURA ROAD, FARIDABAD, HARYANA-121003	0129-2567580, 09871799449	
	AUXILIARY RELAYS	2	G01	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479 0000	
	AUXILIARY RELAYS	3	E1075	JYOTI LTD.	JYOTI LIMITED, F&CS DIVISION, 3/15, BIDC, GORWA, VADODARA - 390 016, E-MAIL ID: ECS@JYOTI.COM	Ph. No. : +91-265-2281214 , Fax No. : +91-265-2281214	
	AUXILIARY RELAYS	4	E1099	OEN INDIA LTD	29/1479, VYTILLA, COCHIN - 682 019 KERALA, INDIA	Phone : +91 484 2301132, 2303709 Fax : +91 484 2302287, 2302221 sales@oenindia.com	
	AUXILIARY RELAYS	5	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com	
ES8	BIMETAL RELAYS	1	L01	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59	
	BIMETAL RELAYS	2	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	BIMETAL RELAYS	3	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com	
	BIMETAL RELAYS	4	E1144	TELEMECHANIQUE/ SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	TAKEN OVER BY SCHNEIDER
ES11	CABLE GLANDS	1	E1201	ALLIED TRADERS & EXPORTERS	C-124 A, SECTOR-2, NOIDA -201 301, UTTAR PRADESH, INDIA	Mr. Vijay Mohan Sood +91-(120) 2525694 +91-(120)-3052594 +91-(11)-23287156 vijay_mohansood@yahoo.com	
	CABLE GLANDS	2	F1017	ARUP ENGG & FOUNDRY WORKS	891/119, PRINCE ANWAR SHAH ROAD, CALCUTTA-700068	033 2473 0850	
	CABLE GLANDS	3	E1206	BALIGA LIGHTING EQPT. PVT. LTD.	63A, CP RAMASWAMY ROAD, ALWARPET, P. B. No 6910, CHENNAI-600018	44-24995505, 22680990-4	
	CABLE GLANDS	4	E1016	COMMET BRASS PRODUCTS	NUTAN CHEMICAL COMPOUND, WALBHAT ROAD, GOREGAON, MUMBAI-400063	91-022-26852961/62/63 comet@vsnl.net	
	CABLE GLANDS	5	DW08	DOWELLS	M/S. DOWELLS ELECTRICALS 47/47A, SATGURU INDUSTRIAL ESTATE, OFF AAREY ROAD, GOREGAON (EAST), MUMBAI 400 063.	CEO : Mr. Jayantibhai S. Patel TEL: 022-32504770, 022-29270876/ 022-29270878	
	CABLE GLANDS	6	E1044	ELECTROMAC INDUSTRIES	27/28AF NEW EMPIRE IND. ESTT., R. KRISHNA MANDIR RD, JB NGR, ANDHERI(E), MUMBAI-400059	91-22-28324825 / 66919034 devang@electromaclands.com	
	CABLE GLANDS	7	I01	INCAB	HARE STREET, KOLKATA, WEST BENGAL-700001	91-33-2480161/62/63/64 Fax : 91-33-2485766	
ES12	CABLE LUGS	1	E1040	DOWELLS	M/S. DOWELLS ELECTRICALS 47/47A, SATGURU INDUSTRIAL ESTATE, OFF AAREY ROAD, GOREGAON (EAST), 4, B. D. BAG (EAST) 90, STEPHEN HOUSE, 5TH FLR CALCUTTA-700001	CEO : Mr. Jayantibhai S. Patel TEL: 022-32504770, 022-29270876/ 033 2282 2540	
	CABLE LUGS	2	E1149	UNIVERSAL MACHINES LTD.			

ITEM CODE	ITEM DESCRIPTION	SL NO.	VENDOR CODE	VENDOR NAME	ADDRESS	PHONE	REMARKS
E513	D.C. MCCB	1	002	CROMPTON GREAVES	RAIL TRANSPORTATION SYSTEMS,VANDANA BUILDING, 11, TOLSTOY MARG, TOLSTOY MARG, NEW DELHI, DL 110001	011 3041 8300	
	D.C. MCCB	2	101	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59	
	D.C. MCCB	3	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL,	044-49681447	
	D.C. MCCB	4	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhaduria@siemens.com	
E514	EARTH LEAKAGE CB	1	101	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59	
	EARTH LEAKAGE CB	2	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhaduria@siemens.com	
	EARTH LEAKAGE CB	3	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	EARTH LEAKAGE CB	4	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	EARTH LEAKAGE CB	5	001	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI-110020	011-3088 7520-29	
	EARTH LEAKAGE CB	6	A24	ABB	14, MATHURA ROAD, FARIDABAD, HARYANA-121003	0129-2567580, 09871799449	
	EARTH LEAKAGE CB	7	E1068	INDO ASIAN	B-24, PHASE - II, NOIDA - 201305, U.P.	120-3642222	
	EARTH LEAKAGE CB	8	E1088	MDS SWITCHGEAR LTD	314-317511AH NAHAR ESTATE	011 - 25793021	
	EARTH LEAKAGE CB	9	E1120	S&S POWER SWITCHGEAR LTD.	NEW NO. 67, OLD NO. 19, DR. RANGA ROAD, MYLAPORE, CHENNAI - 600004	044 - 24988056, 044 - 24988057, 044 - 24988058	
E516	GI CONDUITS				BIS APPROVED MAKE		
E517	GI CONDUIT (EPOXY PAINTED)				BIS APPROVED MAKE		
E518	FLEXIBLE CONDUITS (LEAD COATED)	1	P03	PLICA INDIA PVT. LTD.	V.P.AGARWAL MANAGING DIRECTOR, PLICA INDIA PVT. LTD. 149, MODEL TOWN EAST GHAZIABAD - 201009	M - 9810052131 / 0120-4563979 / 9810557567 Mail: agr@plicaindia.com	
					REPUTED MAKE		
E519	FLEXIBLE CONDUIT (PVC COATED)						
E520	DC CONTACTORS	1	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	DC CONTACTORS	2	E1030	BHEL (BHOPAL)	HEAVY ELECTRICAL PLANT		
	DC CONTACTORS	3	E1044	ELECTROMAC INDUSTRIES	27/28AF NEW EMPIRE IND. ESTT., R.KRISHNA MANDIR RD. JB NGR. ANDHERI(E),MUMBAI-400059	91-22-28324629 / 66919034 devang@electromacplands.com	
	DC CONTACTORS	4	101	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59	
	DC CONTACTORS	5	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhaduria@siemens.com	
	DC CONTACTORS	6	E1144	TELEMECANIQUE/ SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	TAKEN OVER BY SCHNEIDER
	DC CONTACTORS	7	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
E521	CONTROL SWITCHES/ SELECTOR SWITCH	1	E1076	KAYCEE	KAYCEE INDUSTRIES LTD., C/O-CMS COMPUTERS LTD., 35A, REAR BLDG., KILOKARI, NEW DELHI-110014	Rajiv Sharma-9312004687	
	CONTROL SWITCHES/ SELECTOR SWITCH	2	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	CONTROL SWITCHES/ SELECTOR SWITCH	3	G01	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479000	
	CONTROL SWITCHES/ SELECTOR SWITCH	4	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	CONTROL SWITCHES/ SELECTOR SWITCH	5	SR01	M/s Shrenik & Co.	39A/3, PANCHRATNA INDUSTRIAL ESTATE, SARKHEJ-BAVLA ROAD, CHANGODAR,		
	CONTROL SWITCHES/ SELECTOR SWITCH	6	RE05	RECOM PVT. LTD.	M/S RECOM PVT. LTD., 16A, 2ND FLOOR A, WING RAU INDUSTRIAL COMPLEX, MILITARY	Mr. Chandrashekar Kamath (MD) : 09820249503	
E523	LT- CURRENT TRANSFORMER	1	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhaduria@siemens.com	
	LT- CURRENT TRANSFORMER	2	E1009	AUTOMATIC ELECTRIC LTD.	96 AB LONAVLA INDUSTRIAL ESTATE NANGARGAON, LONAVLA-410401	Phone : +91 2114323665 Fax : +91 2114273482	
	LT- CURRENT TRANSFORMER	3	E1066	INDCOH.	PLOT NO. A- 150/ 151, 23RD U ROAD, WAGLE ESTATE, THANE WEST, CST RD, FRIENDS COLONY, HALLOW PUL, KURLA WEST, MUMBAI, MAHARASHTRA 400070	Phone:022 2581 8305	
	LT- CURRENT TRANSFORMER	4	K18	KAPPA ELECTRICALS	KAPPA ELECTRICALS, KAPPA CONSOLIDATED PVT. LTD., SOUTHERN ELECTRICS 14, CART TRACK ROAD, MADUVANKARAI, CHENNAI - 600 042, INDIA.	PHONE: +91 - 44 - 22454709, 22454516, 22450794, 22450795 FAX: +91 - 44 - 22351662, 22451693 E-MAIL: mira@kappaelectricals.com sales@kappaelectricals.com	
	LT- CURRENT TRANSFORMER	5	E1104	FRAGATI ELECTRICALS	280/3,JI POKHRAN RD	5341779,5427041	

ITEM CODE	ITEM DESCRIPTION	SL NO.	VENDOR CODE	VENDOR NAME	ADDRESS	PHONE	REMARKS
	LT- CURRENT TRANSFORMER	6	E1106	PRECISE ELECTRICALS	47A-49A, CHAKALA ROAD ANDHERI(E), MUMBAI-99 MUMBAI, MAHARASHTRA, INDIA PIN-400 099	022-8323402 / 022-8216433	
	LT- CURRENT TRANSFORMER	7	E1128	SILKAANS ELECT.MFG.CO.PVT.LTD	PLOT NO: R-247, T.T.C. INDUSTRIAL AREA, M.I.D.C., RABALE, NAVI MUMBAI- 400 701 INDIA	+91-22- 27607787 / 27607927 +91-22- 27607997	
	LT- CURRENT TRANSFORMER	8	E1111	PRAYOG ELECTRICALS PVT. LTD.	GROUND FLOOR, THAKORE INDUSTRIAL COMPOUND, STATION ROAD, VIDYA VIHAR (W), NATHANI ROAD , OPP. AMBIKA TEMPLE, MUMBAI Mumbai - 400066, Maharashtra, India	91-22-25164288/25133146 Mr. P. U. PATWARDHAN (MANAGING DIRECTOR)	
	LT- CURRENT TRANSFORMER	9	CO1	CBS ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI-110020	011-3088 7520-29	
ES24	LT- POTENTIAL TRANSFORMER	1	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com	
	LT- POTENTIAL TRANSFORMER	2	E1009	AUTOMATIC ELECTRIC LTD.	96 AB LONAVLA INDUSTRIAL ESTATE NANGARGAON, LONAVLA-410401	Phone : +91 2114323665 Fax : +91 2114273402	
	LT- POTENTIAL TRANSFORMER	3	E1066	INDCOR.	PLOT NO. A- 150/ 151, 23RD U ROAD, WAGLE ESTATE, THANE WEST, CST RD, FRIENDS COLONY, HALLOW PUL, KURLA WEST, MUMBAI, MAHARASHTRA 400070	Phone:022 2583 8305	
	LT- POTENTIAL TRANSFORMER	4	K18	KAPPA ELECTRICALS	KAPPA ELECTRICALS, KAPPA CONSOLIDATED PVT. LTD., SOUTHERN ELETRIKS 14, CART TRACK ROAD, MADUVANKARAI, CHENNAI - 600 042, INDIA.	PHONE: +91 - 44 - 22454709, 22454516, 22450794, 22450795 FAX: +91 - 44 - 22351662, 22451693 E-MAIL: mira@kappaelectricals.com sales@kappaelectricals.com	
	LT- POTENTIAL TRANSFORMER	5	E1104	PRAGATI ELECTRICALS	280/3,JI POKHRAN RD	5341779,5427041	
	LT- POTENTIAL TRANSFORMER	6	E1106	PRECISE ELECTRICALS	47A-49A, CHAKALA ROAD ANDHERI(E), MUMBAI-99 MUMBAI, MAHARASHTRA, INDIA PIN-400 099	022-8323402 / 022-8216433	
	LT- POTENTIAL TRANSFORMER	7	E1128	SILKAANS ELECT.MFG.CO.PVT.LTD	PLOT NO: R-247, T.T.C. INDUSTRIAL AREA, M.I.D.C., RABALE, NAVI MUMBAI- 400 701 INDIA	+91-22- 27607787 / 27607927 +91-22- 27607997	
	LT- POTENTIAL TRANSFORMER	8	E1111	PRAYOG ELECTRICALS PVT. LTD.	GROUND FLOOR, THAKORE INDUSTRIAL COMPOUND, STATION ROAD, VIDYA VIHAR (W), NATHANI ROAD , OPP. AMBIKA TEMPLE, MUMBAI Mumbai - 400066, Maharashtra, India	91-22-25164288/25133146 Mr. P. U. PATWARDHAN (MANAGING DIRECTOR)	
ES25	DC SWITCH	1	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	DC SWITCH	2	E1076	KAYCEE	KAYCEE INDUSTRIES LTD., C/O-CMS COMPUTERS LTD., 35A, REAR BLDG., KILOKARI, NEW DELHI-110014	Rajiv Sharma-9312004687	
	DC SWITCH	3	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com	
ES26	DISTRIBUTION BOX	1	SR01	M/S SHRENIK & CO	39A/3, PANCHRATNA INDUSTRIAL ESTATE, SARKHEI-BAVLA ROAD, CHANGODAR, AHMEDABAD - 382 213		
ES27	EMER. PORTABLE LTG. SET	1	B05	BAJAJ ELECTRICALS	BAJAJ ELECTRICALS LTD. ENGINEERING & PROJECTS BU (NORTH) 3rd FLOOR, GULMOHARHOUSE, COMMUNITY CENTRE 161/B-4, GAUTAM NAGAR, YUSUF SARAI NEW DELHI - 110049	CONTACT PERSON : Mr. S. SREEMANY, SR. MANAGER (PROJECTS) CONTACT DETAILS : (+91) 9871025705, MAIL ID : srabams@bajajelectricals.com;	
	EMER. PORTABLE LTG. SET	2	B05	BAJAJ ELECTRICALS	BAJAJ ELECTRICALS LTD. ENGINEERING & PROJECTS BU (NORTH) 3rd FLOOR, GULMOHARHOUSE, COMMUNITY CENTRE 161/B-4, GAUTAM NAGAR, YUSUF SARAI NEW DELHI - 110049	SREEMANY, SR. MANAGER (PROJECTS) CONTACT DETAILS : (+91) 9871025705, MAIL ID : srabams@bajajelectricals.com;	
ES28	FUSE BASE	1	E1068	INDO ASIAN	B-24, PHASE - II, NOIDA - 201305, U.P.	120-3042222	
	FUSE BASE	2	G01	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	FUSE BASE	3	L01	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59	
	FUSE BASE	4	CO1	CBS ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI-110020	011-3088 7520-29	
	FUSE BASE	5	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com	
	FUSE BASE	6	A24	ABB	14, MATHURA ROAD, FARIDABAD, HARYANA-121003	0129-2567580, 09871799449	
	FUSE BASE	7	S02	SPACEAGE SWITCHGEARS LTD.	68 & 13-A INDUSTRIAL DEVELOPMENT COLONY, MEHRAULI ROAD GURGAON, HARYANA-122001	0124-2302711, 4085091	
	FUSE BASE	8	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	

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	FUSE BASE	9	G01	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479 0000	
	FUSE BASE	10	E1050	ESSEN DEINKI	FLAT NO. S02, SKYLINE HOUSE 85, NEHRU PLACE NEW DELHI	011-26217060	
ES29	HRC FUSES	1	E1068	INDO ASIAN	B-24, PHASE - II, NOIDA - 201305, U.P.	120-3042222	
	HRC FUSES	2	G01	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	HRC FUSES	3	L01	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41419554/59	
	HRC FUSES	4	C01	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI-110020	011-3088 7520-29	
	HRC FUSES	5	S01	SIEMENS	RC-III 15 NR DEL AREA, IIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhaduria@siemens.com	
	HRC FUSES	6	A24	ARB	14, MATHURA ROAD, FAKIDABAD, HARYANA-121003	0129-2567580, 09871799449	
	HRC FUSES	7	S02	SPACEAGE SWITCHGEARS LTD.	68 & 13-A INDUSTRIAL DEVELOPMENT COLONY, MEHRAULI ROAD GURGAON, HARYANA-122001	0124-2302711, 4085091	
	HRC FUSES	8	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	8TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	HRC FUSES	9	G01	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479 0000	
	HRC FUSES	10	E1050	ESSEN DEINKI	FLAT NO. S02, SKYLINE HOUSE 85, NEHRU PLACE NEW DELHI	011-26217060	
ES30	GALVANISING	1		Jenco Industrial Corporation	Chincholi Bunder Khkar Road Near Link Road Devruwadi Malad (W) Mumbai 400064		
	GALVANISING	2		National Galvanizing Company	66, Barrackpore Kamarhatt Trunk Road Calcutta-700058		
	GALVANISING	3		Sigma Galvanising Pvt. Ltd.	Plot No.C-169, TTC, MIDC Ind Area Navin Mumbai-400705	8725402,8725765	
	GALVANISING	4		B.P. Projects PVT LTD	167A, Vivekananda Road Kolkata-700006	033 2553 1254	
	GALVANISING	5		Standard Galvanisers	Makardah Road, Kabar Para, Bankra, Howrah -711403	28756318/28741986/28725402/28725765	
	GALVANISING	6		Steel Products	National Highway No. 6, Chamrahi, Kona, Howrah-711114		
	GALVANISING	7		Unitech Fabricators & Engineers Pvt. Ltd.	Village-Ajab Nagar, P.O. -Molla Simla, P.S. - Singur, Dist - Hooghly, Pin-712223	022-27686606/ 1907	
	GALVANISING	8		Shivam Engineers & Fabricators	A0-282-284, Industrial Area, South Side of G.T. Road, Ghaziabad, U.P.		
	GALVANISING	9		B.G. Shirke Construction Technology Pvt. Ltd.	72-76, Mundhawa, Pune - 401 036		
	GALVANISING	10		Galbro Ispat Galvanizers Pvt. Ltd.	GUT 11 AND 12, OPP. Kudus Steel Rolling Mill, Wada, Thane, Mumbai		
	GALVANISING	11		Eros Metals	G-97, MIDC, Bhutibori, Nagpur		
	GALVANISING	12		Industrial Perforation (India) Pvt. Ltd.	Gangarag, Katakhal, Kolkata-700132		
	GALVANISING	13		Indmark Formtech Pvt. Ltd.	Phase - 3, E - 11 / 1, M. I. D. C., Chakan, Pune - 410 501, Maharashtra, India.		
	GALVANISING	14		Namdhari Industrial Traders Pvt. Ltd.	Village Latton Dana, Chandigarh Road, Ludhiana		
	GALVANISING	15		Neha Galvaniser	Jalan Industrial Estate, Gate No-1, 1st Right Choise Lane, Near N.G-6, Jangalpur, PO Domjur Howrah - 700071, West Bengal, India		
	GALVANISING	16		Patny Systems (P) Ltd.	Unit-IV, Sy No. -228/9, Plot No. 6, IP Kuchavaram, Toopran(M) Dist.- Medak, Telagana -502336		
	GALVANISING	17		Parmar Metal Company	Survey No.207,Veraval (Shapar) Dist. Rajkot, India.		
	GALVANISING	18		Passive Infra Projects Pvt. Ltd.	8th KM Stone, Sampla Kharkhoda Road, Hassangarh, Rohtak, Haryana		
	GALVANISING	19		Rukmani Electrical & Fabricators Pvt. Ltd.	Urli Industrial Area, Urli Sarora Road, Raipur-493 221 (Chhattisgarh) Shankharidaha Banjyarah, Jalan Industrial Complex, Gate no.3, Lane no. 4, Domjur, Howrah, W.B -71141		
	GALVANISING	20		DMP Projects Pvt.Ltd.	Dulagarh Industrial Park, PS-Sankrail, Howrah -711302		
	GALVANISING	21		Vinfab Engineers India Private Limited	Gut no. 224/1 &2 Bhiwandi Wada State Highway, Village khupri, Dist. Thane, Maharashtra-421303		
	GALVANISING	22		Saral Projects & Processors	B-1, Industrial Area, Site-II, Amawan Road Rae Bareli		
	GALVANISING	23		Jamna Metal Company	D - 1513, DSIDC, Narela Industrial Area Delhi - 110040, India		

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	GALVANISING	24		Brahampuri Steels Limit	172 (F) Industrial Area, Jhotwara, Jaipur-302013		
	GALVANISING	25		Indiana Gratings PVT. L	F-5, MIDC Jejuri, Pune-412 303		
ES31	GI WIRE & FLAT	1	1039	INDUSTRIAL PERFORATION (I) PVT.LTD.	MR. A. K. SAHA 327, R.N.GUHA ROAD, DUM DUM KOLKATA-West Bengal-India Phone- 9830241788 Pincode : 700028 Email : ipipl@cal2.vsnl.net.in	011 2737 3579	
	GI WIRE & FLAT	2	1070	INDIA ELECTRICALS SYNDICATE	Mr. Suresh Kumar Agarwal 55, Etra Street, Kolkata-West Bengal-India Phone- 033-22354047 Pincode : 700001 Email : cabietray@vsnl.com	022-28511704	
	GI WIRE & FLAT	3	1072	INDMARK FORMTECH PVT. LTD.	Mr. Narendra R. Meher J Block, Plot No.-375, MIDC BHOSARI PUNE-MAHARASHTRA-INDIA Phone- 020-27130546 Pincode : 411026 Email : indmarkformtech@vsnl.net		
	GI WIRE & FLAT	4	P039	PREMIER POWER PRODUCTS (CAL) PVT. LTD.	Chatterjee International Centre, 33A, Jawaharal Nehru Road, 6th Floor, Suit No. - 11A, Kolkata, West Bengal-India Phone- 9331008739 Pincode : 700071 Email : hemantdaga@dagaventures.com		
	GI WIRE & FLAT	5	P050	PATNY SYSTEMS (P) LTD	PATNY PLAZA 160, SARDAR PATEL ROAD SEUNDRABAD SECUNDRABAD-TELANGANA-INDIA Phone- 040-27902451 Pincode : 500003 Email : mcr.mkt@patnysystems.com		
	GI WIRE & FLAT	6	P079	PASSIVE INFRA PROJECTS PVT. LTD.	MR. VARUN AGRAWAL 182, VAISHALI, PITAMPURA Delhi-DELHI-INDIA Phone- 9871183059 Pincode : 110086 Email : ATANU.SAHA@PASSIVEINFRA.COM		
	GI WIRE & FLAT	7	R036	RUKMANI ELECTRICAL & COMPONENTS PVT LTD	11A, MAHARISHI DEBENDRA ROAD 1ST FL., ROOM NO.4 KOLKATA-WEST BENGAL-INDIA Phone- Pincode : 700007 Email : maruthikabra@gmail.com		
	GI WIRE & FLAT	8	R037	RATAN PROJECTS & ENGINEERING CO. PVT.LTD.	MR. G.D. SINGHEE/MR. MAHESH SINGHEE 26, P.K. TAGORE STREET, MAIN BUILDING KOLKATA-WEST BENGAL-INDIA Phone- 9830177331 Pincode : 700006 Email : mahesh@ratans.com		
	GI WIRE & FLAT	9	R041	RABI ENGINEERING WORKS PVT. LTD.	MR. TAPAN KUMAR SEN/MR. SIDDHARTHA 327, R.N. GUHA ROAD, DUM DUM, KOLKATA-WEST BENGAL-INDIA Phone- 9748753002 Pincode : 700028 Email : rabiengineering@gmail.com		
	GI WIRE & FLAT	10	R200	RAJASTHAN METAL SMELTING CO.	Mr. R. K. Tibrewala D-80, Road No. 7, V.K.I.A., Jaipur-Rajasthan-India Phone- 0141-2332269 Pincode : 302013 Email : info@rmscoindia.com		
	GI WIRE & FLAT	11	S210	SARAL INDUSTRIES	Mr. Y. K. Gupta L-1, L-2, Industrial Area-1, Sultanpur Road Rae Bareilly-Uttar Pradesh-India Phone- 0535-2702474 Pincode : 223010 Email : saralindustries@gmail.com		
	GI WIRE & FLAT	12		PARCO Engineers Pvt. Ltd.	401, skyline Epitome Building, Near to Jolly Gym Khana, Kiroi Road, Vidhyavihar, MH 400086 India		
	GI WIRE & FLAT	13	U019	UNITECH FABRICATORS and ENGINEERS PVT LTD	INDRAPRASHTHA APARTMENT 24, M.B.ROAD, BIRATI KALABAGAN KOLKATA KOLKATA-WEST BENGAL-INDIA Phone- Pincode : 700051 Email : ufepi@vsnl.net; ufepi@rediffmail.com	022 - 26230814	
ES33	IND. POWER & WLDG SOCKETS	1	C02	CROMPTON GREAVES	3RD FLOOR, EXPRESS BUILDING, 9-10, BAHADUR SHAH ZAFAR MARG, NEAR ITO CROSSING, NEW DELHI-110002, INDIA	91 11 23460700 - 999 'Sunil.Das@cgglobal.com	
	IND. POWER & WLDG SOCKETS	2	E1207	CYCLO ELECTRIC DEVICE & SERV.CO.	A-3, NEAR ANTHEM BIOSCIENCE, KSSIDC INDUSTRIAL AREA, BOMMASANDRA, BOMMASANDRA INDUSTRIAL AREA, BANGALORE, KARNATAKA 560093	Mr. H.Jaishanker +919845039081, 080 - 27833102 , 080 - 27833103 +91 80 41460985 'cycloelectric@gmail.com	
	IND. POWER & WLDG SOCKETS	3	B04	BCH	20/4, MATHURA ROAD, FARIDABAD - 121006, HARYANA, INDIA	0129-4063000, 9015800189(Ramesh Giri) 'ramesh.giri@bchindia.com	
	IND. POWER & WLDG SOCKETS	4	B02	BEST & CROMPTON	Best & Crompton Engineering Ltd	Ph : +91 44 4551 4724 , MRKT	BEST &
	IND. POWER & WLDG SOCKETS	5	A03	AJMERIA INDUSTRIES & ENGG. WORKS	AJMERIA INDL AND ENGG. WORKS AJMERIA HOUSE, A-61 / KHAIRANE MIDC , TTC INDL AREA, NAVI MUMBAI - 400705.	Tel : 022 27620299 / 97 / 96 'mail@ajmeria.net	
ES34	INTERPOSING RELAY	1	A24	ABB	14, MATHURA ROAD, FARIDABAD, HARYANA-121003	0129-2567580, 09871799449	
	INTERPOSING RELAY	2	G01	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479 0000	
	INTERPOSING RELAY	3	E1075	JYOTI LTD.	JYOTI LIMITED, E&C DIVISION, 3/15, BIDC, GORWA, VADODARA - 390 016, E-MAIL ID: ECS@JYOTI.COM	Ph. No.:+91-265-2281214 , Fax No.:+91-265-2281214	
	INTERPOSING RELAY	4	E1099	OEN INDIA LTD	25/1479, VYTILLA, COCHIN - 682 019 KERALA, INDIA	Phone : +91 484 2301132, 2303709 Fax : +91 484 2302287, 2302221 sales@oenindia.com	
	INTERPOSING RELAY	5	S01	SIEMENS	RC-IN 15 NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhaduria@siemens.com	

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ES35	INDICATING LAMPS	1	B04	BCH	20/4, MATHURA ROAD, FARIDABAD, HARYANA-121006	0129-4293000	
	INDICATING LAMPS	2	C01	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI-110020	6832259, 6918834-37	
	INDICATING LAMPS	3	E1050	ESSEN DEINKE	FLAT NO. 502, SKYLINE HOUSE 85, NEHRU PLACE NEW DELHI	011-26217060	
	INDICATING LAMPS	4	E1153	VAISHNOI(HOTLINE SWGR & CONTROL)	G-19, SECTOR - 11, NOIDA - 201301, UTTAR PRADESH, INDIA	8377605157 9818338922	
	INDICATING LAMPS	5	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	9818338922	
	INDICATING LAMPS	6	S01	SIEMENS	RC-IN 1'S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhaduria@siemens.com	
	INDICATING LAMPS	7	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
ES36	JUNCTION BOXES (NON FLAME PROOF)	1	J01	JASPER ENGINEERS PVT. LTD.	A-23, SECTOR - 8, NOIDA-201301	0120-403520/533	
	JUNCTION BOXES (NON FLAME PROOF)	2	EC05	Electro Controls & Devices	M/S ELECTRO CONTROLS & DEVICES, F-41, SITE-C, SURAJPUR INDUSTRIAL AREA GREATER NOIDA, UTTAR PRADESH-201308	Mr. Sanjay Sharma (Chief Promoter) 0120-2569487, 2560100, 2560300	
	JUNCTION BOXES (NON FLAME PROOF)	3	SR01	M/s Shrenik & Co.	39A/3, PANCHRATHNA INDUSTRIAL ESTATE, SARKHEA-BAVLA ROAD, CHANGODAR, AHMEDABAD - 382 213	020-025708100	
	JUNCTION BOXES (NON FLAME PROOF)	4	PME-01	M/s PHOENIX MECANO LTD.,	388 BHARE, TALUKA MULSHI, POST GHOTAWADE, PIRANGOOT, INDUSTRIAL AREA, PUNE-412115	Awasthi(09971119006) Tel: ++91 20 6674 5103, Mobile: +91 90499 95985, Fax: ++91 20 6674 5126	
	JUNCTION BOXES (NON FLAME PROOF)	5	ACE01	Adroit Control Engineers Pvt.Ltd.	M/S ADROIT CONTROL ENGINEERS PVT.LTD. PLOT-3, KRISHNA IND. AREA, SECTOR-25 FARIDABAD - 121004	011-47600700, 0129-4251400	
	JUNCTION BOXES (NON FLAME PROOF)	6	PME-01	M/s PHOENIX MECANO LTD.,	388 BHARE, TALUKA MULSHI, POST GHOTAWADE, PIRANGOOT, INDUSTRIAL AREA, PUNE-412115	Awasthi(09971119006) Tel: ++91 20 6674 5103, Mobile: +91 90499 95985, Fax: ++91 20 6674 5126 contact person : Vishwa bandhu E-mail:d.gupta@pmpl-online.com ,admin@pmpl-online.com	
	JUNCTION BOXES (NON FLAME PROOF)	7	MK01	MIKA ENGINEERS	BRANCH OFFICE : D'-101, DHEERAJ HERITAGE RESIDENCY II, SHASTRI NAGAR, SANTACRUZ (W), MUMBAI 400 054.	Director : Mr. Asgar Karimi Email: asgar@mikaengineers.com E-mail : mika@mtnl.net.in Tel/Fax : 022-26610081/82/83/84 Tel : 02527 249066/70 Cell : 099230 74373	TYPE-S ONLY
	JUNCTION BOXES (NON FLAME PROOF)	8	PME-01	M/s PHOENIX MECANO LTD.,	388 BHARE, TALUKA MULSHI, POST GHOTAWADE, PIRANGOOT, INDUSTRIAL AREA, PUNE-412115	TEL: +912066745000 Awasthi(09971119006) Tel: ++91 20 6674 5103, Mobile: +91 90499 95985, Fax: ++91 20 6674 5126 contact person : Vishwa bandhu E-mail:d.gupta@pmpl-online.com ,admin@pmpl-online.com	
	JUNCTION BOXES (NON FLAME PROOF)	9	B05	BAJAJ ELECTRICALS	BAJAJ ELECTRICALS LTD. ENGINEERING & PROJECTS BU (NORTH) 3rd FLOOR, GULMOHARHOUSE, COMMUNITY CENTRE 161/B-4, GAUTAM NAGAR, YUSUF SARAI NEW DELHI - 110049	CONTACT PERSON : Mr. S. SREEMANY, SR. MANAGER (PROJECTS) CONTACT DETAILS : (+91) 9871025705, MAIL ID : srabans@bajajelectricals.com;	
	JUNCTION BOXES (NON FLAME PROOF)	10	A03	AJMER INDUSTRIES & ENGG. WORKS	AJMER IND. AND ENGG. WORKS. AJMER HOUSE, A-61/ KHAIRANI MIDC., TTC IND. AREA, NAVI MUMBAI - 400705.	Tel : 022 27620299 / 97 / 96 mail@ajmer.net	
	JUNCTION BOXES (NON FLAME PROOF)	11	S802	S.B. ELECTRICAL ENGINEERING CORPORATION	03, SARDAR GRIHA BUILDING, LOHAR CHAWAL, MUMBAI-400002	022- 22069831; 022-66637259	
	JUNCTION BOXES (NON FLAME PROOF)	12	RT13	RITTAL INDIA PVT. LTD.	Empire Building ,Level -1 A-41, Mohan Co-Operative Industrial Estate ,Mathura Road, New Delhi -110044	Amit Bansal Phone:011-42004000, D:011-42004033 - Mobile: +91 9717772245 - mailto:amit.b@rittal-india.com www.rittal-india.com	
ES37	JUNCTION BOXES (FLAME PROOF)	1	SS01	SUDHIR SWITCHGEAR	305/6, APEEJAY HOUSE, 130, BOMBAY SAMACHAR MARG, MUMBAI - 400 023, INDIA	Telephone Nos. : 40460000 (100 lines) Fax Nos. : ++91-22-22049381 Email : md@sudhirschwitchgears.com ; works@sudhirschwitchgears.com ; scod@vsnl.com	
	LIGHTING DISTRIBUTION BOARDS	1	E100?	ADVANCE ENGG. COMPANY	38,SETHI IND. ESTATE 10/E,SUREN RD,ANDHERI MUMBAI-400097	91-22-24360086	

ITEM CODE	ITEM DESCRIPTION	SL NO.	VENDOR CODE	VENDOR NAME	ADDRESS	PHONE	REMARKS
E538	LIGHTING DISTRIBUTION BOARDS	2	STRG01	Sterling Generators Pvt. Ltd.	C-56/38, INSTITUTIONAL AREA, SECTOR-62, NOIDA-201307, U.P.	Nityanand Engineer-Sales & Marketing (Panel Division) Noida, UP 201307, India Mobile:+91-8510022170	
	LIGHTING DISTRIBUTION BOARDS	3	E1091	MIKA ENGINEERS	BRANCH OFFICE : D-101, DHEERAJ HERITAGE RESIDENCY II, SHASTRI NAGAR, SANTACRUZ (W), MUMBAI 400 054.	Director : Mr. Asgar Karimi E-mail : mika@mini.net.in Tel : 022-26610081/82/83/84 Tel : 02527 249066/70 Cell : 099230 74373 ; Email : asgar@mikaengineers.com	
	LIGHTING DISTRIBUTION BOARDS	4	FD4	ELEXPRO ELECTRICALS PVT/ LTD.	C 1/27 & 37 GDIC KABILPORE NAVSARI-396424	02637-265140, Mr. Jask Kumar	
	LIGHTING DISTRIBUTION BOARDS	5	KM1	KMG ATOZ SYSTEMS	"ATOZ HOUSE" C-49, SECTOR-81, GAUTAM BUDDH NAGAR, NOIDA - 201 305 U. P. (INDIA)	Tel : +91-120-4207920 Fax : +91-120-4207921, 4327958 Phone: 098 10 802710	
	LIGHTING DISTRIBUTION BOARDS	6	E05	UNILEC ENGINEERS PVT. LTD.	BEHRAMPUR INDUSTRIAL AREA, BEGAMPUR KHATOLA ROAD, GURGAON-122001	0124 4030247, 248, 4559700, 9911087173	
	LIGHTING DISTRIBUTION BOARDS	7	AVA01	AVAIDS TECHNOVATORS LTD.	PLOT NO.25, SECTOR-3, JMTI-MANESAR, GURGEON-122050 (HARYANA)	KRISHNA KALRA- 09958096168	
	LIGHTING DISTRIBUTION BOARDS	8	ACE01	Adroit Control Engineers Pvt.Ltd.	M/S ADROIT CONTROL ENGINEERS PVT.LTD. PLOT-3, KRISHNA INDL. AREA, SECTOR-25 FARIDABAD - 121004	011-47600700, 0129-4251400	
	LIGHTING DISTRIBUTION BOARDS	9	JCO1	JACKSON ENGINEERS	A-43, HOSEIRY COMPLEX, OPPOSITE NSEZ, NOIDA-201305	0120-4302600, 2564923,27	
	LIGHTING DISTRIBUTION BOARDS	10	ADU01	Adlec Systems Private Limited	PLOT NO-277, SWARN PARK, UDYOG NAGAR, MUNDKA, MAIN ROHTAK ROAD, UDYOG NAGAR, NEW DELHI, DELHI 110041	011 2834 5061	
	LIGHTING DISTRIBUTION BOARDS	11	POP01	Popular Switchgears Pvt. Ltd	712, ARUN CHAMBERS, TARDEO MAIN ROAD, TARDEO, NEAR TARDEO AIRCONDITIONER MARKET, MUMBAI - 400034	-9362634406	
	LIGHTING DISTRIBUTION BOARDS	12	CS01	CANDS	1/202, ANSA INDUSTRIAL ESTATE, SAKI VIHAR ROAD, SAKINAKA, ANDHERI (EAST), MUMBAI-72	022-28570858	
	LIGHTING DISTRIBUTION BOARDS	13	PYR01	Pyrotech Electronics Pvt. Ltd.	M/s Pyrotech Electronics Pvt. Ltd.(Unit -1) Lert Light, Sensor Division F-16A, Road No.3 Mewar Industrial Area, Madri Udaipur -313003, Rajasthan,	Concern Person - Mr. Praveen sisodiya (psisodiya@pyrotechlighting.com) Ankit Kumar Sr. Engineer(North Region Sales & Marketing) # +91- 7340061769, 8287897309	
	LIGHTING DISTRIBUTION BOARDS	14	PCS01	Positronics Pvt. Ltd.	POSITRONICS HOUSE, 842/ 2, G.I.D.C. MAKARPURA, VADODARA 390010 GUJARAT	+91 265 2642496 Fax: +91 265 264 7033 / 234 0944 E-mail : info@positronicsindia.com Website:www.positronicsindia.com	
	LIGHTING DISTRIBUTION BOARDS	15	ISC01	Industrial Switchgears & Control Pvt Ltd	S-02 AMARDEEP MAHAL, NANDA PATKAR RD, VILE PARLE EAST, MUMBAI - 400057	(91)-22-76182011	
	LIGHTING DISTRIBUTION BOARDS	16	VC01	M/s Vidhyut Control (I) Pvt.Ltd.	D-12 & 13, SECTOR-17, KAVI NAGAR (INDIA AREA - GHAZIABAD - 201002 (DELHI NCR) U.P. INDIA		
	LIGHTING DISTRIBUTION BOARDS	17	MIL01	MILESTONE SWITCHGEARS PVT. LTD.	MILESTONE SWITCHGEARS PVT. LTD. 97, UDYOG VIHAR, PHASE-1, GURGEON HARYANA - 122016	Phone Nos.: 0124-4994900 (30 Lines) Fax: 0124-4002973 Email: jaideep.ahuja@milestonesindia.com URL: www.milestonesindia.com	
E539	LIGHTING FIXTURES (NON LED)	#REF!	E1206	BALIGA LIGHTING EQPT PVT LTD	63A, CP RAMASWAMY ROAD, PB NO 6910, CHENNAI-600028	44-24995505, 22680990-4	
	LIGHTING FIXTURES (NON LED)	#REF!	FD4	ELEXPRO ELECTRICALS PVT/ LTD.	C 1/27 & 37 GDIC KABILPORE NAVSARI-396424	02637-265140, Mr. Jask Kumar	
	LIGHTING FIXTURES (NON LED)	#REF!	B05	BAJAJ ELECTRICALS	BAJAJ ELECTRICALS LTD. ENGINEERING & PROJECTS BU (NORTH) 3rd FLOOR, GULMOHARHOUSE, COMMUNITY CENTRE 161/B-4, GAUTAM NAGAR, YUSUF SARAI NEW DELHI - 110049	CONTACT PERSON : Mr. S. SREEMANY, SR. MANAGER (PROJECTS) CONTACT DETAILS : (+91) 9871025705. MAIL ID : srabams@bajajelectricals.com;	
	LIGHTING FIXTURES (NON LED)	#REF!	CO2	CROMPTON GREAVES	3RD FLOOR, EXPRESS BUILDING, 9-10, BAHADUR SHAH ZAFAR MARG, NEAR ITO CROSSING, NEW DELHI-110002, INDIA.	91 11 23460700 - 999 Sunil.Das@cglobal.com, Mr. Prathant Wewhare 9930095703	
	LIGHTING FIXTURES (NON LED)	#REF!	E1051	EVERGREEN ENGG. CO.	EVERGREEN ENGG COMPANY WORKS-S, PLOT NO. 9,10,11,12, SURVEY NO. 242, CHINCH PADA, VASAI EAST-401208	(0250) 6458250	
	LIGHTING FIXTURES (NON LED)	#REF!	P01	PHILIPS	9TH FLOOR, DLF 9B, DLF CYBER CITY, DLF PHASE-III, GURGAON-122002	01244606001, Sharad (+919871150447)	

ITEM CODE	ITEM DESCRIPTION	SL NO.	VENDOR CODE	VENDOR NAME	ADDRESS	PHONE	REMARKS
4422	LIGHTING FIXTURES (LED)	#REF!	WPO1	WIPRO LTD.	WIPRO CONSUMER CARE AND LIGHTING, 5TH FLOOR, GODREJ ETERNIA -C, OLD PUNE- MUMBAI ROAD, SHIVAJINAGAR, PUNE -411005	020-66096700	
	LIGHTING FIXTURES (LED)	#REF!	HP01	M/S HPL ELECTRIC & POWER PVT. LTD.	M/S HPL ELECTRIC & POWER PVT. LTD. PLOT NO. 76-8, PHASE-IV, SEC-57, HSIIDC, INDL AREA, KUNDLI, DIST. SONENPAT (HARYANA) - 131028	mohitsharma@hplindia.com	
	LIGHTING FIXTURES (LED)	#REF!	SR01	SURYA ROSHNI LIMITED	PADMA TOWER, RAJENDRA PLACE, RAJENDRA PLACE, NEW DELHI	011-25810093 ; 9810071832 (Akhilesh Agrawal) aagrawal@stroshni.com	
	LIGHTING FIXTURES (LED)	#REF!	HI02	HAVELLS INDIA LIMITED	QRG TOWERS, 2D SECTOR-126, NOIDA- 201301	GIRISH KUMAR SHRIYASTAVA +91-9810528922	
	LIGHTING FIXTURES (LED)	#REF!	HN13	M/s Halonix Technologies Limited	M/s Halonix Technologies Limited B-31, Phase -II, Noida Distt. Gautam Budh Nagar (U.P.) Pin- 201305	Mr. Mohit Gautam Tel: +919568152111 mohit.gautam@halonix.co.in; rahul.singh@halonix.co.in	

ITEM CODE	ITEM DESCRIPTION	SL NO.	VENDOR CODE	VENDOR NAME	ADDRESS	PHONE	REMARKS
ES40	LIGHTING FIXTURES (LED)	1	NE01	Neev Luminaries	D-115, OKHLA INDUSTRIAL AREA, PHASE-1 NEW DELHI - 110020	Phone: +91 11 4060 4830 Fax: +91 11 4060 4831 info@naeenergy.in	
	LIGHTING FIXTURES (LED)	2	HI01	HAVELLS INDIA LIMITED	QRG TOWERS, 2D SECTOR-126, NOIDA- 201301	GIRISH KUMAR SHRIVASTAVA +91-9810528922, gksh.srivastava@havelis.com	
	LIGHTING FIXTURES (LED)	3	B05	BAJAJ ELECTRICALS	BAJAJ ELECTRICALS LTD. ENGINEERING & PROJECTS BU (NORTH) 3rd FLOOR, GULMOHARHOUSE, COMMUNITY CENTRE 161/B-4, GAUTAM NAGAR, YUSUF SARAI NEW DELHI - 110049	CONTACT PERSON : Mr. S. SREEMANY. SR. MANAGER (PROJECTS) CONTACT DETAILS : (+91) 9871025705 MAIL ID : srabans@bajajelectricals.com;	
	LIGHTING FIXTURES (LED)	4	SR01	SURYA ROSHNI LIMITED		011-25810093 ; 9810071832 (Akhilesh Agrawal) aagrawal@roshni.com	
	LIGHTING FIXTURES (LED)	5	PH01	PHILIPS	9TH FLOOR, DLF 9B, DLF CYBER CITY, DLF PHASE-III, GURGAON-122002	01244606001, Sharad (+919871150447), Mr. Gurseelan M 8939693949, Mr Ashish Sethi 9007077089	
	LIGHTING FIXTURES (LED)	6	HP01	M/S HPL ELECTRIC & POWER PVT. LTD	M/S HPL ELECTRIC & POWER PVT. LTD. PLOT NO. 76-B, PHASE-IV, SEC-57, HSIIDC, INDL AREA, KUNDU, DIST. - SONEPAT (HARYANA) - 131028	mohitsharma@hplindia.com, Mr Nitesh Verma 8851036938, Mr Ajay lakra 9560045423	
	LIGHTING FIXTURES (LED)	7	INS1	INSTA POWER	PLOT NO. - 457 PHASE - V, UDYOG VIHAR, GURGAON - 122016	124-4124000, Mr amit Bhardwar: 8800508090	
	LIGHTING FIXTURES (LED)	8	PT13	Pyrotech Electronics Pvt. Ltd.	M/s Pyrotech Electronics Pvt. Ltd(Unit -1) Led Light, Sensor Division F-16A, Road No.3 Mewar Industrial Area, Madni Udaipur -313003, Rajasthan,	Concern Person - Mr. Praveen stodiya : 9314310042(psisodiya@pyrotechdig hting.com) Ms Ritika 9509245814	
	LIGHTING FIXTURES (LED)	9	HN13	M/s Halonix Technologies Limited	M/s Halonix Technologies Limited B-31, Phase -II, Noida Distt. Gautam Budh Nagar (U.P.) Pin- 201305	Mr. Mohit Gautam 'Tel: +919568152111 'mohit.gautam@halonix.co.in'; M: 9891868793'rahul.singh@halonix.c o.in'	
	LIGHTING FIXTURES (LED)	10	JA13	M/s JAQUAR & COMPANY PVT. LTD.	M/s JAQUAR & COMPANY PVT. LTD. Plot No.3, Sector M-11, IMT Manesar, Gurgaon- 122050 Haryana	Mr. Dhruv Kumar 'Tel: +919350043727 dhruv.kumar@jaquar.com ; gaurav.bhalia@jaquar.com ; 9582950282	
	LIGHTING FIXTURES (LED)	11	CR13	M/s CROMPTON GREAVES CONSUMER ELECTRICALS LTD.	M/s CROMPTON GREAVES CONSUMER ELECTRICALS LTD Tower-3, 1st Floor, East Wing Equinox Business Park LBS Marg, Kurla (West), Mumbai-400070	Mr S L Sivakumar 'Sivakumar L' 'csivakumar.sl@crompton.co.in'; M: 9176609363	
	LIGHTING FIXTURES (LED)	12	WI13	M/s WIPRO ENTERPRISES PRIVATE LTD.	M/s WIPRO ENTERPRISES PRIVATE LTD. L-8, MIDC Waluj, Aurangabad-431136, Maharashtra, India	Ms Dhanya K K 'dhanya.kk@wipro.com' M: 9891815476, Mr Puneet kalia 'puneet.kalia@wipro.com'	
ES42	LIGHTING LAMP (NON LED)	1	WPO1	WIPRO LTD.	WIPRO CONSUMER CARE AND LIGHTING, 5TH FLOOR, GOOREJ ETERNIA -C, OLD PUNE-	020-66098700	
	LIGHTING LAMP (NON LED)	2	E1050	ESSEN DEINKI	FLAT NO. 502, SKYLINE HOUSE B5, NEHRU PLACE NEW DELHI	9816338922	
	LIGHTING LAMP (NON LED)	3	B05	BAJAJ ELECTRICALS	BAJAJ ELECTRICALS LTD. ENGINEERING & PROJECTS BU (NORTH) 3rd FLOOR, GULMOHARHOUSE, COMMUNITY CENTRE 161/B-4, GAUTAM NAGAR, YUSUF SARAI NEW DELHI - 110049	CONTACT PERSON : Mr. S. SREEMANY. SR. MANAGER (PROJECTS) CONTACT DETAILS : (+91) 9871025705 MAIL ID : srabans@bajajelectricals.com;	
	LIGHTING LAMP (NON LED)	4	INS1	INSTA POWER	PLOT NO. - 457 PHASE - V, UDYOG VIHAR, GURGAON - 122016	124-4124000	
	LIGHTING LAMP (NON LED)	5	PH01	PHILIPS	9TH FLOOR, DLF 9B, DLF CYBER CITY, DLF PHASE-III, GURGAON-122002	01244606001, Sharad (+919871150447)	
	LIGHTING LAMP (NON LED)	6	HI01	HAVELLS INDIA LIMITED	QRG TOWERS, 2D SECTOR-126, NOIDA- 201301	GIRISH KUMAR SHRIVASTAVA +91-9810528922	
	LIGHTING LAMP (NON LED)	7	HP01	HPL	M/S HPL ELECTRIC & POWER PVT. LTD. PLOT NO. 76-B, PHASE-IV, SEC-57, HSIIDC, INDL AREA, KUNDU, DIST. - SONEPAT (HARYANA) - 131028	mohitsharma@hplindia.com'	
	LIGHTING LAMP (NON LED)	8	SR01	SURYA ROSHNI LIMITED	PAOMA TOWER, RAJENDRA PLACE, RAJENDRA PLACE NEW DELHI	011-25810093 ; 9810071832 (Akhilesh Agrawal) aagrawal@roshni.com	
	LIGHTING LAMP (NON LED)	9	HN13	M/s Halonix Technologies Limited	M/s Halonix Technologies Limited B-31, Phase -II, Noida Distt. Gautam Budh Nagar (U.P.) Pin- 201305	Mr. Mohit Gautam 'Tel: +919568152111 'mohit.gautam@halonix.co.in'; 'rahul.singh@halonix.co.in'	
	LIGHTING LAMP (LED)	1	NE01	Neev Luminaries	D-115, OKHLA INDUSTRIAL AREA, PHASE-1 NEW DELHI - 110020	Phone: +91 11 4060 4830 Fax: +91 11 4060 4831 info@neevenergy.in	

ITEM CODE	ITEM DESCRIPTION	SL NO.	VENDOR CODE	VENDOR NAME	ADDRESS	PHONE	REMARKS
ES43	LIGHTING LAMP (LED)	2	H01	HAVELLS INDIA LIMITED	ORG TOWERS , 2D SECTOR-126, NOIDA- 201301	GIRISH KUMAR SHRIVASTAVA +91-9810528922	
	LIGHTING LAMP (LED)	3	B05	BAJAJ ELECTRICALS	BAJAJ ELECTRICALS LTD. ENGINEERING & PROJECTS BU (NORTH) 3rd FLOOR, GUJMOHARHOUSE, COMMUNITY CENTRE 151/B-4, GAUTAM NAGAR, YUSUF SARAI NEW DELHI - 110049	CONTACT PERSON : Mr. S. SREEMANY. SR. MANAGER (PROJECTS) CONTACT DETAILS : +91 9871025700 MAIL ID : srabans@bajajelectricals.com;	
	LIGHTING LAMP (LED)	4	SR01	SURVA ROSHNI LIMITED	PADMA TOWER, RAJENDRA PLACE, RAJENDRA PLACE NEW DELHI	011-25810093 ; 9810071832 (Akhilash Agrawal) aagrawal@srroshni.com	
	LIGHTING LAMP (LED)	5	P01	PHILIPS	9TH FLOOR, DLF 9B, DLF CYBER CITY, DLF PHASE- III, GURGAON-122002	01244606001, Sharad (+919871150447)	
	LIGHTING LAMP (LED)	6	HP01	M/S HPL ELECTRIC & POWER PVT. LTD	M/S HPL ELECTRIC & POWER PVT. LTD. PLOT NO. 76-B, PHASE-IV, SEC-57, HSHDC, INDL AREA, KUNDLI, DIST. SONENPAT (HARYANA) - 131028	mohitsharma@hplindia.com	
	LIGHTING LAMP (LED)	7	INS1	INSTA POWER	PLOT NO. - 457 PHASE - V, UDYOG VIHAR, GURGAON - 122016	124-4124000	
	LIGHTING LAMP (LED)	8	PT13	Pyrotech Electronics Pvt. Ltd.	M/s Pyrotech Electronics Pvt. Ltd (Unit-1) Led Light, Sensor Division F-16A, Road No.3 Mewar Industrial Area, Madri Udaipur -313003, Rajasthan.	Concern Person - Mr. Praveen sisodiya (psodiya@pyrotechlighting.com) Ankit Kumar Sr. Engineer (North Region -Sales & Marketing) # +91- 7340061769, 8287897309	
ES45	LIGHTING LAMP (LED)	9	HN13	M/s Halonix Technologies Limited	M/s Halonix Technologies Limited B-21, Phase -II, Noida Distt. Gautam Budh Nagar (U.P.) Pin- 201305	Mr. Mohit Gautam Tel: +919568152111 mohit.gautam@halonix.co.in; rahul.singh@halonix.co.in	
	LIGHTING SWITCH, SOCKET & S/F UNIT	1	F04	ELEXPRO ELECTRICALS PVT. LTD.	C 1/27 & 37 GIDC KABILPORE NAVSARI-396424	02637-265140, Mr. Jssk kumar	
	LIGHTING SWITCH, SOCKET & S/F UNIT	2	E1012	ANCHOR	STEEL HOUSE, B WING, PLOT NO. 24, MAHAL INDUSTRIAL ESTATE, MAHAKALI CAVES ROAD, NEAR PAPER BOX, ANDHERI (E), MUMBAI, MAHARASHTRA - 400093	022-30418888	
	LIGHTING SWITCH, SOCKET & S/F UNIT	3	E1076	KAYCEE	KAYCEE INDUSTRIES LTD., C/O-CMS COMPUTERS LTD., 35A, REAR BLDG., KILOKARI, NEW DELHI-110014	Rajiv Sharma-9312004687	
	LIGHTING SWITCH, SOCKET & S/F UNIT	4	L01	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI- 110015	011-41419554/59	
	LIGHTING SWITCH, SOCKET & S/F UNIT	5	S01	SIEMENS	RC-IN I S NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadraurja@siemens.com	
	LIGHTING SWITCH, SOCKET & S/F UNIT	6	E1068	INDO ASIAN	B-24, PHASE - II, NOIDA - 201305, U.P.	120-3042222	
ES46	LIGHTING TRANSFORMER	1	E1021	AUTOMATIC ELECTRIC LTD.	ADDRESS: 96 AB LONAVLA INDUSTRIAL ESTATE HANGARGAON, LONAVLA-410401	Phone : +91 2114323665 Fax : +91 2114273482	
	LIGHTING TRANSFORMER	2	E1066	INDCOIL	PLOT NO. A- 150/ 151, 23RD U ROAD, WAGLE ESTATE, THANE WEST, CST RD, FRIENDS COLONY, HALLOW PUL, KURLA WEST, MUMBAI, MAHARASHTRA 400070	Phone:022 2583 8305	
	LIGHTING TRANSFORMER	3	E1103	POWER PACK ENTERPRISES	POWER PACK ENTERPRISES MR. NEHAL SHAH / MR. SHARAD SHAH (PARTNER) NO. 3, JAYSHREE SADAN, 1ST FLOOR, OLD NAGARDAS ROAD, ANDHERI EAST MUMBAI - 400069, MAHARASHTRA, INDIA	Call Us:08447573761 Mobile: +91-9821787821 (+91)-9821035604	
	LIGHTING TRANSFORMER	4	E1155	VUAY ELECTRICALS LTD.	G-3-648/18/2, OFF RAI BHAVAN ROAD, SOMAJIGUDA, HYDERABAD - 500 082, ANDHRA PRADESH, INDIA.	Vijay Electricals Mr. Bharat Giri / Ajay Giri (CEO) B 79, Gali No. 60, Sanjay Colony, Sector-23 Faridabad - 121005, Haryana, India Call Us: 09953353612 websales@vijayelectricals.com	
	LIGHTING TRANSFORMER	5	E1097	GILBERT & MAXWELL	WORKS PLOT G-2R, M.I.D.C., AMBAO NASHIK - 422010, MAHARASHTRA, INDIA	Mr. Sanjeev Kulkarni, (Marketing Manager) Cell: 9822586724 sanjeevkulkarni@gilbert- maxwell.in Phone : + 91 - 253 - 238 25 51 Fax : + 91 - 253 - 238 25 52	

ITEM CODE	ITEM DESCRIPTION	SL NO.	VENDOR CODE	VENDOR NAME	ADDRESS	PHONE	REMARKS
	LIGHTING TRANSFORMER	6	K18	KAPPA ELECTRICALS	KAPPA ELECTRICALS, KAPPA CONSOLIDATED PVT. LTD., SOUTHERN ELECTRICS 14, CART TRACK ROAD, MADUVANKARAI, CHENNAI - 600 042, INDIA.	PHONE: +91 - 44 - 22454709, 22454516, 22450794, 22450795 FAX: +91 - 44 - 22351662, 22451693 E-MAIL: mira@kappaelectricals.com sales@kappaelectricals.com	
	LIGHTING TRANSFORMER	7	AIE01	Amer Impex Electricals Pvt. Ltd.	C-18/1207, PHASE IV, GIDC NARODA, AHMEDABAD, GUJARAT 382330	Phone: 079 2282 1548	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	8	A35	GE-POWER	KAMAK TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKAUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	9	E1019	ASIATIC	A-58 NARAINA IND. AREA, PHASE-I, NEW DELHI 110028	011 - 25796330, 25796617	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	10	CD1	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI- 110020	011 - 25793021	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	11	E1051	EVERGREEN ENGG. CO.	EVERGREEN ENGS COMPANY WORKS-S, PLOT NO. 9, 10, 11, 12, SURVEY NO. 242, CHINCH PADA, VASAI EAST-401208	02501 6458250	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	12	E1145	TECKNIC CONTROLS	703, MADHAVA, BANDRA, KURLA COMPLEX, BANDRA EAST, MUMBAI, MAHARASHTRA 400051	022-42532507/00 022-24451648	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	13	E1053	EX-PROTECTA LIGHTING EQUIPMENT	305-306, GIDC ESTATE, VITHAL VIDYOGNAGAR - 388121 DIST. ANAND, GUJARAT 388121 INDIA	02692-237823	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	14	E1206	BALIGA ELECTRICALS	63A, CP RAMASWAMY ROAD, PB NO 6930, CHENNAI-600018	44-24995505, 22580990-4	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	15	E1210	ENPRO ENGG.	NO. 995P, DIAMOND PLAZA, 2ND FLOOR, 12TH MAIN ROAD, ANNA NAGAR, CHENNAI-40	044 - 42611526 / 42170338 / 26262716 enproengg@enproengineering.co m	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	16	E1132	STERLING SWGR CONTROL PVT. LTD.	P.O. BOX NO. 17023, SORAB HOUSE, 2ND FLOOR, 555, S.B. MARG, DADAR, MUMBAI - 400028, MAHARASHTRA, INDIA	91-22- 24222297/24222298/242224236	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	17	FD4	ELEXPRO ELECTRICALS PVT/ LTD.	C 1/27 & 37 GIDC KABILPORE NAVSARI-396424	02637-265140, Mr. Jask kumar	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	18	E1153	VAISHNO(HOTLINE SWGR & CONTROL)	G-19, SECTOR - 11, NOIDA - 201301, UTTAR PRADESH, INDIA	8377805157 9818338922	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	19	J01	JASPER ENGINEERS PVT. LTD.	A-23, SECTOR - 8, NOIDA-201301	0120-4033520/533	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	20	KM1	KMG ATOZ SYSTEMS	C-49, SECTOR-81, NOIDA-201305	120-4207920, 08527897328	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	21	E05	UNILEC ENGINEERS PVT. LTD.	BEHRAMPUR INDUSTRIAL AREA, BEGAMPUR KHATOLA ROAD, GURGAON-122001	0124-4030247, 248, 4559700, 9911087173	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	22	B04	BCH	20/4, MATHURA ROAD, FARIDABAD, HARYANA- 121006	0129-4293000	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	23	E1035	CANDS	J/202, ANSA INDUSTRIAL ESTATE, SAKI VIHAR ROAD, SAKINAKA, ANDHERI (EAST), MUMBAI-72	022-28570858	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	24	S01	SIEMENS	RC-IN 15 NR DEL AREA, IIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhaduria@siemens.com	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	25	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	26	E1143	TECKNIC CONTROLS	703, MADHAVA, BANDRA, KURLA COMPLEX, BANDRA EAST, MUMBAI, MAHARASHTRA 400051	022-42532507/00 022-24451648	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	27	E1148	UNITED ELECTRIC	97 VIDYOG VIHAR PHASE-I, GURGAON 122015, HARYANA	124 4002970 72	
	LOCAL PUSH BUTTON STATION (NON FLAME PROOF)	28	SR01	M/s Shrenik & Co.	39A/3, PANCHRATNA INDUSTRIAL ESTATE, SARKHEJ-BAVLA ROAD, CHANGODAR, AHMEDABAD - 382 213		
	LOCAL PUSH BUTTON STATION (FLAME PROOF)						
	LIGHTING PANEL (NON FLAME PROOF)	1	E1091	MIKA ENGINEERS	D-101, DHEERAJ HERITAGE RESIDENCY II, SHASTRI NAGAR, SANTACRUZ (W), MUMBAI 400 054.	Director : Mr. Agar Karimi E-mail : mika@mtel.net.in Tel/fax : 022-26610081/82/83/84 Tel : 02527 249066/70 Cell : 999230	
	LIGHTING PANEL (NON FLAME PROOF)	2	FD4	ELEXPRO ELECTRICALS PVT/ LTD.	C 1/27 & 37 GIDC KABILPORE NAVSARI-396424	02637-265140, Mr. Jask kumar	
	LIGHTING PANEL (NON FLAME PROOF)	3	VCD1	Vidhyut Controls (India) Pvt. Ltd.	M/S VIDHYUT CONTROL (I) PVT. LTD. D-12 & 13, SECTOR-17, KAVI NAGAR INDLAREA, GHAZIABAD - 201002 (DELHI NCR) U.P. INDIA	0120-4186400, 0120-4186423, 8527005590(DK GUFTA)	
	LIGHTING PANEL (NON FLAME PROOF)	4	KM1	KMG ATOZ SYSTEMS	"ATQZ HOUSE" C-49, SECTOR-81, GAUTAM BUDDH NAGAR, NOIDA - 201 305 U. P. (INDIA)	Tel : +91-120-4207920 Fax : +91-120-4207921, 4327958 Phone-098 10 802710	
	LIGHTING PANEL (NON FLAME PROOF)	5	E05	UNILEC ENGINEERS PVT. LTD.	BEHRAMPUR INDUSTRIAL AREA, BEGAMPUR KHATOLA ROAD, GURGAON-122001	0124-4030247, 248, 4559700, 9911087173	

ITEM CODE	ITEM DESCRIPTION	SL NO.	VENDOR CODE	VENDOR NAME	ADDRESS	PHONE	REMARKS
ESS0	LIGHTING PANEL (NON FLAME PROOF)	6	AVA01	AVAIOS TECHNOVATORS LTD.	PLOT NO.25, SECTOR-3, JMT-MANESAR, GURGEON-122050 (HARYANA)	KRISHNA KALRA- 09958096168	
	LIGHTING PANEL (NON FLAME PROOF)	7	ACE01	Adroit Control Engineers Pvt. Ltd.	M/S ADROIT CONTROL ENGINEERS PVT LTD. PLOT-3, KRISHNA INDL. AREA, SECTOR-25 FARIDABAD - 121004	011-47600700, 0129-4251400	
	LIGHTING PANEL (NON FLAME PROOF)	8	JCO1	JACKSON ENGINEERS	A-43, HOSEIRY COMPLEX, OPPOSITE NSEZ, NOIDA-201305	0120-4302600, 2568923,27	
	LIGHTING PANEL (NON FLAME PROOF)	9	MIL01	MILESTONE SWITCHGEARS PVT. LTD.	97, UDYOG VIHAR, PHASE-1, GURGEON HARYANA - 122016	Phone Nos.: 0124-4994900 (30 Lines) Fax: 0124-4002973 Email: jaldeep.ahuja@milestonesindia.com URL: www.milestonesindia.com	
	LIGHTING PANEL (NON FLAME PROOF)	10	PCS01	Positronics Pvt. Ltd.	POSITRONICS HOUSE, B&2/ 2, G.I.D.C., MAKARPURA, VADODARA 390010 GUJARAT	+91 265 2642496 Fax: +91 265 264 7033 / 234 0944 E-mail: info@positronicsindia.com Website: www.positronicsindia.com	
	LIGHTING PANEL (NON FLAME PROOF)	11	PYRE01	Pyrotech Electronics Pvt. Ltd.	M/s Pyrotech Electronics Pvt. Ltd.(Unit -1) Led Light, Sensor Division F-15A, Road No.3 Mewar Industrial Area, Madri Udaipur -313003, Rajasthan,	Concern Person - Mr. Praveen sisodiya (psisodiya@pyrotechlighting.com) Ankit Kumar Sr. Engineer (North Region -Sales & Marketing) # +91- 7340061769, 8287897309	
ESS1	MCB	1	E1088	MDS SWITCHGEAR LTD.	314-317SHAH NAHAR ESTATE	011 - 25793071	
	MCB	2	E1068	INDO ASIAN	B-24, PHASE - II, NOIDA - 201305, U.P.	120-3040222	
	MCB	3	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	MCB	4	E1120	S&S POWER SWITCHGEAR LTD.	NEW NO. 67, OLD NO. 19, DR. RANGA ROAD, MYLAPORE, CHENNAI - 600004	044 - 24988056, 044 - 24988057, 044 - 24988058	
ESS5	MODULAR SWITCH BOARD	1	E1012	ANCHOR	STEEL HOUSE, B WING, PLOT NO. 24, MAHAL INDUSTRIAL ESTATE, MAHAKALI CAVES ROAD, NEAR PAPER BOX, ANDHERI (E), MUMBAI, MAHARASHTRA - 400093	022-30418888	
	MODULAR SWITCH BOARD	2	F04	ELEXPRO ELECTRICALS PVT/ LTD.	C 1/27 & 37 GIDC KABILPORE NAVSARI-396424	02637-265140, Mr. Jask kumar	
	MODULAR SWITCH BOARD	3	H01	HAVELLS INDIA LIMITED	ORG TOWERS, 2D SECTOR-126, NOIDA- 201301	GIRISH KUMAR SHRIVASTAVA +91-9810528922	
ESS9	RECEPTACLES - DECORATIVE	1	E1012	ANCHOR	STEEL HOUSE, B WING, PLOT NO. 24, MAHAL INDUSTRIAL ESTATE, MAHAKALI CAVES ROAD, NEAR PAPER BOX, ANDHERI (E), MUMBAI, MAHARASHTRA - 400093	022-30418888	
	RECEPTACLES - DECORATIVE	2	F04	ELEXPRO ELECTRICALS PVT/ LTD.	C 1/27 & 37 GIDC KABILPORE NAVSARI-396424	02637-265140, Mr. Jask kumar	
	RECEPTACLES - DECORATIVE	3	B05	BAJAJ ELECTRICALS	BAJAJ ELECTRICALS LTD. ENGINEERING & PROJECTS BU (NORTH) 3rd FLOOR, GULMOHARHOUSE, COMMUNITY CENTRE 161/B-4, GAUTAM NAGAR, YUSUF SARAI NEW DELHI - 110049	CONTACT PERSON : Mr. S. SREEMANY. SR. MANAGER (PROJECTS) CONTACT DETAILS : (+91) 9871025705. MAIL ID : srabans@bajajelectricals.com;	
	RECEPTACLES - DECORATIVE	4	A03	AJIMERA INDUSTRIES & ENGG. WORKS	AJIMERA INDL. AND ENGG. WORKS. AJIMERA HOUSE, A-61 / KHAIKANE MIDC., TTC INDL. AREA, NAVI MUMBAI - 400705.	Tel : 022 27620299 / 97 / 96 mail@ajimera.net	
ESS61	SWITCH BOX	1	E1012	ANCHOR	STEEL HOUSE, B WING, PLOT NO. 24, MAHAL INDUSTRIAL ESTATE, MAHAKALI CAVES ROAD, NEAR PAPER BOX, ANDHERI (E), MUMBAI, MAHARASHTRA - 400093	022-30418888	
	SWITCH BOX	2	F04	ELEXPRO ELECTRICALS PVT/ LTD.	C 1/27 & 37 GIDC KABILPORE NAVSARI-396424	02637-265140, Mr. Jask kumar	
	SWITCH BOX	3	B05	BAJAJ ELECTRICALS	BAJAJ ELECTRICALS LTD. ENGINEERING & PROJECTS BU (NORTH) 3rd FLOOR, GULMOHARHOUSE, COMMUNITY CENTRE 161/B-4, GAUTAM NAGAR, YUSUF SARAI NEW DELHI - 110049	CONTACT PERSON : Mr. S. SREEMANY. SR. MANAGER (PROJECTS) CONTACT DETAILS : (+91) 9871025705. MAIL ID : srabans@bajajelectricals.com;	
	SWITCH BOX	4	A03	AJIMERA INDUSTRIES & ENGG. WORKS	AJIMERA INDL. AND ENGG. WORKS. AJIMERA HOUSE, A-61 / KHAIKANE MIDC., TTC INDL. AREA, NAVI MUMBAI - 400705.	Tel : 022 27620299 / 97 / 96 mail@ajimera.net	
	SWITCH BOX	5	SB02	S.B. ELECTRICAL ENGINEERING CORPORATION	03, SARDAR GRHA BUILDING, LOHAR CHAWAL, MUMBAI-400002	022-22069831; 022-66637259	
	TERMINAL BLOCKS	1	C01	WAGO-CONTROLS	C 27, GREATER NOIDA, SECTOR 58, C BLOCK, SECTOR 58, NOIDA, UTTAR PRADESH 201307	0120-2580409/10	
	TERMINAL BLOCKS	2	E1038	CONNECT WELL	309A/4, 3RD FLOOR, KAIKALI, OKHLA IND AREA PH-2, GOVINDPURJ, NEW DELHI. DL 110019	9811861085 09871419996 011-65908877	

ITEM CODE	ITEM DESCRIPTION	SL NO.	VENDOR CODE	VENDOR NAME	ADDRESS	PHONE	REMARKS
E562	TERMINAL BLOCKS	3	E1047	ELMEX CONTROLS PVT. LTD.	12 G. I.D.C. ESTATE, MUKARPURA ROAD, VADODRA-390010	9374631074	
	TERMINAL BLOCKS	4	E1050	ESSEN DEINKI	FLAT NO. 502, SKYLINE HOUSE 85, NEHRU PLACE NEW DELHI	011-26217060	
	TERMINAL BLOCKS	5	E1142	TECHNOPLAST	OPP. I.M. INTER COLLEGE, REGUM SARAI KHURD ROAD, AMROHA - 244221, U.P.	PH: 05922 264006 CELL NO: 9012676000, 9319520799, 9319582467	
	TERMINAL BLOCKS	6	PME-01	M/s PHOENIX MECANO LTD.,	388 BHARE, TALUKA MULSHI, POST GHOTAWADE, PIRANGOOT, INDUSTRIAL AREA, PUNE-412115	TEL: +912066745000 Awasthi(09971119006) Tel: +91 20 6674 5103, Mobile: +91 90499 95985, Fax: +91 20 6674 5126 contact person : Vishwa bandhu E-mail: d.gupta@pmpl-online.com ; admin@pmpl-online.com	
	TERMINAL BLOCKS	7	E1050	ESSEN DEINKI	FLAT NO. 502, SKYLINE HOUSE 85, NEHRU PLACE NEW DELHI	011-26217060	
E563	TIMERS - PNEUMATIC	1	B04	BCH	20/4, MATHURA ROAD, FARIDABAD, HARYANA-121006	0129-4293000	
	TIMERS - PNEUMATIC	2	G01	ALSTOM LTD	A-7, SEC-65, NOIDA	0120-479 0000	
	TIMERS - PNEUMATIC	3	L01	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011-41619534/59	
	TIMERS - PNEUMATIC	4	E1144	TELEMECHANIQUE/ SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	TAKEN OVER BY SCHNEIDER.
	TIMERS - PNEUMATIC	5	S03	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	TIMERS - PNEUMATIC	6	E01	ELECTRONIC AUTOMATION PVT. LTD.	20, KHB INDUSTRIAL AREA YELAHANKA BANGLORE-560064	080 -28567561 / 080 -28567562 / 080 -42802345	
	TIMERS - ELECTRONIC	1	E1050	ESSEN DEINKI	FLAT NO. 502, SKYLINE HOUSE 85, NEHRU PLACE NEW DELHI	011-26217060	
E565	TRANSDUCERS	1	E1021	AUTOMATIC ELECTRIC LTD.	ADDRESS : 96 AB LONAVLA INDUSTRIAL ESTATE NANGARGAON, LONAVLA-410401	Phone : +91 2114323665 Fax : +91 2114273482	
	TRANSDUCERS	2	E1202	SOUTHERN TRANSDUCERS	INTERTECH B-85, FLATTED FACTORY COMPLEX, NEAR MODI MILLS, OKHLA, NEW DELHI-110020	Mr. Gurmohit Singh 011-41020365 / 9891402128	
E568	RECEPTACLE (NON FLAME PROOF)	1	A03	AJMERIA INDUSTRIES & ENGG. WORKS	AJMERIA IND. AND ENGG. WORKS. AJMERIA HOUSE, A-61 / KHAIRANE MIDC., TTC IND. AREA, NAVI. MUMBAI - 400705.	Tel : 022 27620299 / 97 / 96 *mail@ajmeria.net	
	RECEPTACLE (NON FLAME PROOF)	2	C02	CROMPTON GREAVES	3RD FLOOR, EXPRESS BUILDING, 9-10, BAHADUR SHAH ZAFAR MARG, NEAR ITO CROSSING, NEW DELHI-110002, INDIA	91 11 23460700 - 999 Sunil.Das@csglobal.com	
	RECEPTACLE (NON FLAME PROOF)	3	E1207	CYCLO ELECTRIC DEVICE & SERV.CO.	A-3, NEAR ANTHEM BIOSCIENCE, KSSIDC INDUSTRIAL AREA, BOMMASANDRA, BOMMASANDRA INDUSTRIAL AREA, BANGALORE, KARNATAKA 560099	Mr. H.Jaishanker +919845039081, 080 - 27833102, 080 - 27833103 +91 80 41460985 *cycloelectric@gmail.com	
	RECEPTACLE (NON FLAME PROOF)	4	B04	BCH	20/4, MATHURA ROAD, FARIDABAD - 121006, HARYANA, INDIA	0(129)-4063000, 9015800189(Ramesh Giri) *ramesh.giri@bchindia.com	
	RECEPTACLE (NON FLAME PROOF)	5	B02	BEST & CROMPTON	BEST & CROMPTON ENGINEERING LTD 28C, AMBATTUR INDUSTRIAL ESTATE (NORTH) AMBATTUR, CHENNAI - 600 098	Ph : +91 44 4551 4724 , MRKT OGM Mr. Vi Raj: 9840593411 bestcromptonviraj@gmail.com	
E569	EMERGENCY LIGHTING UNIT (FIXED & PORTABLE TYPE)- NON FLAME PROOF	1	B05	BAJAJ ELECTRICALS	BAJAJ ELECTRICALS LTD. ENGINEERING & PROJECTS BU (NORTH) 3rd FLOOR, GULMOHARHOUSE, COMMUNITY CENTRE 161/B-4, GAUTAM NAGAR, YUSUF SARAI NEW DELHI - 110049	CONTACT PERSON : Mr. S. SREEMANY, SR. MANAGER (PROJECTS) CONTACT DETAILS : (+91) 9871025705. MAIL ID : srabans@bajajelectricals.com	
	EMERGENCY LIGHTING UNIT (FIXED & PORTABLE TYPE)- NON FLAME PROOF	2	PEP05	PROLITE AUTOGLD LIMITED,	PROLITE AUTOGLD LTD 25 SINGH INDUSTRIAL ESTATE NO. 3, RAM MANDIR ROAD., GOREGAON (W), MUMBAI, MAHARASHTRA 400104, INDIA	022-67868100 sales@prolite.com	
E570	EMERGENCY LIGHTING UNIT (FIXED & PORTABLE TYPE)- FLAME PROOF	1					
E571	24V SUPPLY MODULE WITH COMPLETE ACCESSORIES	1	E1103	POWER PACK ENTERPRISES	POWER PACK ENTERPRISES MR. NEHAL SHAH / MR. SHARAD SHAH (PARTNER) NO. 3, JAYSHREE SADAN, 1ST FLOOR, OLD NAGARDAS ROAD, ANDHERI EAST MUMBAI - 400069, MAHARASHTRA, INDIA	Call Us:08647573761 Mobile: +(91)-9821787821 +(91)-9821035604	
	24V SUPPLY MODULE WITH COMPLETE ACCESSORIES	2	E1066	INDCOIL	ADDRESS: PLOT NO. A- 150/ 151, 23RD U ROAD, WAGLE ESTATE, THANE WEST, CST RD, FRIENDS COLONY, HALLOW PUL, KURLA WEST, MUMBAI, MAHARASHTRA 400070	Phone:022 2583 8305	
	24V SUPPLY MODULE WITH COMPLETE ACCESSORIES	3	AJE01	Ames Impres Electricals Pvt. Ltd	C-18/1207, PHASE IV, GIDC NARODA, AHMEDABAD, GUJARAT 382330	Phone:079 2282 1648	
E574	AMMETER	1	E1009	AUTOMATIC ELECTRIC LTD.	96 AB LONAVLA INDUSTRIAL ESTATE NANGARGAON, LONAVLA-410401	Phone : +91 2114323665 Fax : +91 2114273482	
	AMMETER	2	R01	RISHABH INST. PVT LTD	RISHABH INSTRUMENTS PVT. LTD. F-31, MIDC, SATPUR NASHIK - 422007 MAHARASHTRA INDIA	mayketline@rshabph.co.in 91-253 270272/203 Fax: 91 253 2351064	

ITEM CODE	ITEM DESCRIPTION	SL NO.	VENDOR CODE	VENDOR NAME	ADDRESS	PHONE	REMARKS
ES75	VOLTMETER	1	E1009	AUTOMATIC ELECTRIC LTD.	96 AB LONAVLA INDUSTRIAL ESTATE NANGARGAOK, LONAVLA-410401	Phone : +91 2114323665 Fax : +91 2114273442	
	VOLTMETER	2	RQ1	RISHABH INST.PVT LTD	RISHABH INSTRUMENTS PVT. LTD. F-31, MIDC, SATPUR NASHIK - 422007 MAHARASHTRA INDIA	marketing@rishabh.co.in 91-253 2202702/203 Fax: 91 253 2351064	
ES79	RCCB	1	CO1	C&S ELECTRIC LTD.	222, OKHLA IND. ESTATE, PH-III, NEW DELHI-110070	011-3088 7520-29	
	RCCB	2	SO3	SCHNEIDER ELECTRIC INDIA PVT. LTD.	9TH FLOOR, BLDG. NO. 10, TOWER-C, DLF CYBER CITY, PH-II, GURGAON-122002	0124-3940400	
	RCCB	3	SO1	SIEMENS	RC-IN 15 NR DEL AREA, JIL BUILDING, TOWER-B, PLOT NO. 78, SECTOR 18, GURGAON-122015, INDIA	0124-2842000, 9873424331 amit.bhadauria@siemens.com	
	RCCB	4	A35	GE-POWER	KAMAR TOWER, 3RD FLOOR, PLOT NO. 12-A, TVK INDUSTRIAL ESTATE, EKKADUTHANGAL, GUINDY, CHENNAI-600032	044-49681447	
	RCCB	5	LO1	L&T	32, SHIVAJI MARG, P.O. BOX- 6223, NEW DELHI-110015	011 41439554/59	
	RCCB	6	CO2	CROMPTON GREAVES	RAIL TRANSPORTATION SYSTEMS,VANDANA BUILDING, 11, TOLSTOY MARG, TOLSTOY MARG, NEW DELHI, DL 110001	011 3041 8300	
ES80	PVC WIRES				BIS APPROVED MAKE		
ES81	PEDESTAL FAN & CEILING FAN				REPUTED MAKE		
ES82	EXIT SIGN (FLAME PROOF)				REPUTED MAKE		
ES83	EXIT SIGN (NON FLAME PROOF)				REPUTED MAKE		
ES84	LADDER				REPUTED MAKE		
ES85	HUME PIPE				REPUTED MAKE		
ES86	PHOTOELECTRIC SWITCH				REPUTED MAKE		
ES87	DICHORIC SPOT LIGHTING FIXTURE				REPUTED MAKE		
ES88	HAND LAMP UNIT				REPUTED MAKE		



TECHNICAL SPECIFICATION FOR STATION LIGHTING SYSTEM

**RESTORATION OF OBRA 'B' TPS
UNIT-12 &13**

SPECIFICATION NO. PE-TS-446-558-E001

VOLUME II

SECTION - I

REVISION 0 DATE:

SHEET 1 OF 14

DATA SHEET -A

S. No.	Description	Unit	Value
1.0	SYSTEM DESIGN DATA		
1.1	Design ambient	°C	50
1.2	AC Supply		
a)	Rated voltage	V	415
b)	Rated frequency	Hz	50
c)	Voltage variation (permissible)	%	+10% to -10%
d)	Frequency variation (permissible)	%	+5% to -5%
e)	Combined voltage & frequency variation (sum of absolutes permissible)	%	10%
f)	System fault level & duration	kA, sec.	50kA for 1 sec.
1.3	DC Supply		
a)	Rated voltage	V	220
b)	Voltage variation (permissible)	%	+10% to -15%
c)	System fault level & duration	kA	25kA for 1 sec
2.0	SCOPE OF SYSTEM DESIGN ENGINEERING		Included in vendor's scope
3.0	Lighting Concept		
3.1	Types of supplies considered (other than AC Normal)		
a)	AC emergency		☒ Yes ☐ No
b)	DC emergency		☒ Yes ☐ No
c)	DC Normal		☐ Yes ☒ No
3.2	Diversity Factor for Sockets	%	25%
4.0	LUMINAIRES, LAMPS & ACCESSORIES		
4.1	Type of false ceiling for recessed fluorescent luminaire		Grid False ceiling (600mm X 600mm) for Main Control room



TECHNICAL SPECIFICATION FOR STATION LIGHTING SYSTEM

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4.2	Degree of protection for drip proof luminaires		IP65
4.3	Non-integral controlgear box for HPMV/HPSV lamps		
a)	Material		☐ CRCA sheet steel ☒ Cast Aluminium LM6
b)	Sheet thickness	mm	☐ 2 for CRCA sheet ☒ 3 for Cast Aluminium LM6
c)	Degree of protection		IP55
d)	Surface treatment		☒ Painted ☐ Galvanized
e)	If galvanized		NOT APPLICABLE
	Process		-
	Weight of zinc	g/m ²	-
f)	If painted		
	Paint shade		As per IS 5
	Minimum paint thickness (DFT)	micron	140
4.5	Lamps		
a)	Type of Fluorescent Lamps (CFL)		☒ Cool Daylight ☒ White Light
b)	Type of cap for incandescent lamp		☐ Screw type ☐ Pin type ☒ Not Applicable
c)	Type of HPMV lamp		☒ Clear ☐ Fluorescent powder coated
d)	Type of cap for HPMV & HPSV lamp		Screw type
e)	Type of beam for		
	HPMV lamps		☐ Short beam ☐ Long beam ☒ Both
	HPSV lamps		☐ Short beam ☐ Long beam ☒ Both
4.6	Emergency Lighting Unit		
a)	Lamp type		☒ FLT ☐ CFL ☒ LED



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7.0	Decorative Receptacle		
a)	Enclosure material		☐ Cast aluminium alloy ☒ CRCA Sheet Steel
b)	Enclosure thickness	mm	☐ 3 for cast aluminium alloy ☒ 2 for CRCA sheet
c)	Surface treatment		☐ Painted ☒ Galvanized/ Electro-plated
d)	If galvanized		
	Process		Hot dip
	Weight of zinc	g/m ²	460 (65 micron)
e)	If painted		NOT APPLICABLE
	Paint shade		
	Minimum paint thickness	micron	
f)	Degree of protection		IP-42 / IP 62(dusty area)
8.0	Switch Box		
a)	Enclosure material		☐ FRP ☒ CRCA Sheet.
b)	Enclosure thickness	mm	2 MM CRCA sheet with 6mm thick Bakelite cover
c)	Galvanized		☒ Yes ☐ No
d)	Degree of protection		IP-55
9.0	Conduit (Flexible)		
a)	Type		☒ Electrogalvanized cold rolled annealed ☐ Lead coated
b)	Size	mm	20
c)	Standard length	m	25 to 50
d)	Thickness of Galvanization	microns	25 micron
10	Cable Glands		By vendor for all incoming and outgoing cables
a)	Type		☒ Double compression ☐ Single compression
b)	Material		Brass
c)	Nickel Plating provided		☒ Yes ☐ No
11	Cable Lugs		By vendor for all incoming and



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			outgoing cables
a)	Type		Crimping type/ ring type
b)	Material		Tinned copper
12.0	LADDERS		
a)	Type		[] Free standing [] wheel mounted [√] both
b)	Material		[] Steel [√] Aluminium
c)	Duty		[] Heavy [√] Medium
d)	Surface treatment		[] Galvanised [√] Painted
e)	Reference Standard		IS: 4571, 3696
13.0	LIGHTING/ WELDING DISTRIBUTION BOARDS		
13.1	Operational Front		Single Front
13.2	Type of execution of modules (functional unit)		[√] Fixed [] Draw out
13.3	Type of sheet		CRCA with min 80 micron Epoxy painting
13.4	Sheet thickness (minimum)		
a)	Non-load bearing covers	mm	2.0 mm
b)	Non-load bearing partitions	mm	2.0 mm
c)	Load bearing members	mm	2.0 mm
d)	Frames	mm	2.0 mm
e)	Door	mm	2.0 mm
f)	Withdrawable unit (if applicable)	mm	2.0 mm
13.5	Cable alley width (minimum)	mm	250
13.6	Bus bar material		[√] Aluminium grade E 91E
13.7	Earth bus bar material		[√] GI Strip [] Aluminium [] Copper
13.8	Degree of Protection		
a)	Main Panel		IP-52
b)	Transformer cubicle		IP-42
13.9	Gland plate thickness	mm	3.0
13.10	AC LDB/ WDB		



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a)	No. of Incomers		☐ One ☒ Two
b)	Bus coupler required		☒ Yes ☐ No
c)	Incomer and Bus coupler rating	A	As per transformer rating
d)	Type of Incomer and Bus coupler		☐ SFU ☒ MCCB
e)	Type of Outgoing Feeders		☒ SFU ☐ MCCB
f)	Outgoing feeders rating	A	100
g)	Cable entry		☒ Bottom ☐ Top
13.1 1	Lighting Transformer		
a)	Rating	kVA	100 / 50
b)	Type of cooling		Air natural
c)	Voltage ratio	V	415/433
d)	Rated frequency	Hz	50
e)	No. of phases		3
f)	Vector group		Dyn11
g)	Off circuit taps		
	Tap range, steps	%	+5% to -5% in steps of 2.5%
	Voltage of each tap	V	As per manufacturer's data
h)	Impedance at rated current, frequency at 75 °C	%	AS PER RELEVANT STANDARD
i)	Rated current		
	Primary	A	As per manufacturer's data
	Secondary	A	As per manufacturer's data
j)	Transformer type		☒ Cast resin / ☐ Encapsulated / ☒ Non-Encapsulated
k)	Transformer winding insulation		Class-F or better
l)	Transformer winding insulation temperature rise limit		90 degree C above 50 degree C, ambient
n)	Type of ventilation arrangement provided for transformer enclosure		As per manufacturer's data
o)	Winding conductor material		Copper
p)	Iron loss at 50 Hz and 100% rated voltage	kW	As per manufacturer's data
q)	Copper loss at rated load at 75 °C	kW	As per manufacturer's data



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r)	Regulation at full load at 75 °C and 0.8 p.f. lagging		As per manufacturer's data
s)	Weight	kg	As per manufacturer's data
13.1	DC LDB		
2			
a)	No. of Incomers		☒ One ☐ Two
b)	DC incomer Type		DP Switch fuse unit with contactor
c)	DC incomer rating	A	100
d)	AC incomer type		TPN SFU
e)	AC incomer rating	A	100
f)	Bus coupler required		☐ Yes ☒ No
g)	Incomer and Bus coupler rating	A	100
h)	Type of Incomer and Bus coupler		☒ SFU ☐ DP MCCB
i)	Type of Outgoing Feeders		☒ SFU ☐ MCCB ☐ DP MCB
j)	Outgoing Feeders rating	A	32
k)	Changeover required in DC LDB		☐ Yes (Converter for Conversion of AC to DC) ☒ No
l)	Provision of Manual override		☒ Yes ☐ No
m)	Cable Entry		☒ Bottom ☐ Top
14.0	LIGHTING PANELS		
14.1	Application		☒ Indoor ☐ Outdoor ☐ Both
14.2	Type of sheet		CRCA
14.3	SHEET thickness (minimum)	mm	2.0
14.4	Degree of Protection		IP-54
14.5	Bus bar material		☒ Aluminium ☐ Copper
14.6	Earth bus bar required		☐ Yes ☒ No
14.7	Earth bus bar material (if applicable)		
14.8	Gland Plate	mm	3.0
14.9	Earthing studs required		☒ Yes ☐ No



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14.1 0	Hinged door with locking facility		☒ Yes ☐ No
14.1 1	AC Lighting Panel		
a)	Incomer rating	A	63A
b)	Type of Incomer		☒ SFU ☐ TPN MCB
c)	Earth Leakage Circuit Breaker (ELCB) in incomer required		☒ Yes ☐ No
d)	Type of Outgoing Feeders (non-flameproof panel)		☒ SPN MCB ☐ TPN MCB
e)	Timer required for panel		☒ Yes ☐ No
g)	Outgoing feeders rating	A	20
14.2 2	DC Lighting Panel		
a)	Incomer rating	A	20
b)	Type of Incomer		☒ DP SFU ☐ DP MCCB
c)	Type of Outgoing Feeders (non-flameproof panel)		☒ DP SFU
d)	Outgoing feeders rating	A	16
15.0	COMPONENTS OF LIGHTING SYSTEM EQUIPMENT		
15.1	Moulded Case Circuit Breaker (MCCB)		
a)	Rated voltage	V	415
b)	Number of poles		TPN
c)	Rated short circuit duty	kA	50
d)	Rated breaking capacity (rms)	kA	50
e)	Rated making current (peak)	kA	105
f)	Release with short circuit		YES
g)	Release with overload		YES
h)	Release with under voltage		NO
i)	Auxiliary contacts		
	Numbers	NO+NC	2NO+2NC
	Rating	A	As per manufacturer data
15.2	Switch-Fuse Unit		



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a)	Utilisation category for main contacts		AC23
b)	Breaking Capacity: With conditions: a) Voltage b) Power Factor		3 times rated current 110% of rated voltage 0.3
15.3	Miniature Circuit Breaker		
a)	SPN MCB rating (min)	A	Refer Sl. No. 14.1 & 14.2
b)	DP MCB rating (min)	A	Refer Sl. No. 14.1 & 14.2
c)	TPN MCB rating (min)	A	Refer Sl. No. 14.1 & 14.2
d)	Short time rating	kA	10
e)	Magnetic short circuit protection required		☒ Yes ☐ No
f)	Thermal overload protection required		☒ Yes ☐ No
15.4	Current Transformer		
a)	Type		Cast resin
b)	Secondary current rating	A	☒ 1 ☐ 5
c)	Burden	VA	10
d)	Accuracy class		1.0
e)	Instrument Safety Factor		<5
15.5	Voltage Transformer		
a)	Type		Cast resin
b)	Secondary terminal voltage (phase-phase)	V	110 V
c)	Burden	VA	10
d)	Accuracy class		1.0
e)	Winding configuration		Star/ Star
f)	System grounding		☒ Effective ☐ Non-effective
15.6	Indicating Meters		
15.6.1	Ammeter		
a)	Type		Analog
b)	Shape		Square
c)	Size		96mm x 96mm



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d)	Accuracy		1.0
e)	Current coil rating	A	1
f)	Angle of deflection	deg	90
15.6.2	Voltmeter		
a)	Type		Analog
b)	Shape		Square
c)	Size		96mm x 96mm
d)	Accuracy		1.0
e)	AC voltage coil rating	V	0-500
f)	DC voltage coil rating	V	0-250
g)	Angle of deflection	deg	90
15.6.3	Energy meter (if applicable)		
a)	Type		☒ Analog ☐ Digital
b)	Accuracy		1.0
c)	Current coil rating	A	1
d)	Voltage coil rating	V	0-500
15.7	Power Contactors		
a)	Coil voltage (nominal)		
	AC contactors	V	240
	DC contactors	V	220
b)	Current rating of contacts		
	Power	A	As per manufacturer data
	Control	A	As per manufacturer data
15.8	Under voltage relay		
a)	Type		☒ Electromagnetic ☐ Static
b)	Coil voltage rating	V	110
c)	Means for in-built testing provided		As per manufacturer data
15.9	Timer		
15.9.1	Time switch		



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a)	Type		Digital synchronous
b)	Range	hr	0-24
c)	Coil voltage rating	V	240
15.9.2	Timer for AC-DC changeover		
a)	No. of contacts		
	ON time delay	NO+NC	As per scheme requirement
	OFF time delay	NO+NC	As per scheme requirement
	Instantaneous	NO+NC	As per scheme requirement
b)	Coil voltage rating		
	AC timer	V	240
	DC timer	V	220
c)	Time delay range		
	AC timer	sec	0-5
	DC timer	Sec	0-180
15.10	Selector switch		
a)	Type of selector switch		☒ Stay put ☐ Wing knob
b)	Lockable		☐ Yes ☒ No
15.11	Push Button		
a)	Voltage grade	V	500
b)	Potential free contacts		2NO+2NC
15.12	Indicating Lamps		
a)	Lens Colour		
	ON condition		Red
	OFF condition		Green
b)	Circuit voltage	V	240V
15.13	Cable Glands		By vendor for all incoming and outgoing cables
a)	Type		☒ Double compression ☐ Single compression
b)	Material		Brass



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c)	Nickel Plating provided		☒ Yes ☐ No
d)	Flameproof glands with flameproof equipment		☒ Yes ☐ No
15.1 4	Cable Lugs		By vendor for all incoming and outgoing cables
a)	Type		Crimping type/ ring type
b)	Material		Tinned copper
16.0	PAINTING		
16.1	Paint shade		
a)	LDBs		Two coats of Red oxide primer followed by two coats of battleship Siemen's Grey RAL 7032.
b)	LPs		Two coats of Red oxide primer followed by two coats of battleship Siemen's Grey RAL 7032.
16.2	Paint Finish		NA
a)	Interior		☐ Matt ☒ Semi-glossy
b)	Exterior		☒ Semi-glossy ☐ Full-glossy
16.3	Paint Thickness	Microns	50 micron
21.0	Conduit (Rigid)		
A	Make		☐ BIS approved ☒ As per enclosed sub-vendor list
B	Material		Hot/Cold rolled mild steel
C	Sizes		As per BOQ cum price schedule
D	Standard length	meter	3 – 5
E	Classification as per mechanical properties		Heavy
F	Conduit thickness (minimum)	mm	1.6 upto 32 mm dia, 2.0 above 32 mm & upto 50 mm dia
G	Surface treatment		Hot dip galvanizing on inside & outside surface
H	Epoxy thickness	micron	50 (applicable for epoxy coated conduits only)
21.1	Surface Treatment of Conduits		
A	Pre-treatment		As per IS 6005 standard prior to galvanising
B	Type		Hot dip galvanizing as per IS2629
C	Min. Thickness of zinc coating	microns	48 (upto 32 mm dia), 65 (above 32 mm & upto 50 mm dia)



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D	Min. Weight of zinc coating	(gm/m ²)	340 (upto 32 mm dia) 460 (above 32 mm & upto 50 mm dia)
E	Tests for galvanizing		a) Weight of zinc coating as per IS : 6745 b) Thickness of zinc coating as per IS : 4759 c) Uniformity of zinc coating as per IS : 2633 d) Adhesion as per IS: 2629
22	Wires		
22.1	Make		BIS Approved
22.2	Type of wire		Non-FRLS/ FR Type
22.3	CONDUCTOR		
(a)	NO. OF CORES		1
(b)	MATERIAL		High conductivity untinned annealed copper
(c)	CLASS		Class-2 as per IS: 8130
(d)	MINIMUM NUMBER OF STRANDS		As per IS 8130 (table-2)
(e)	MAX. RESISTANCE OF CONDUCTOR		As per IS 8130 (table-2)
22.4	INSULATION		
(a)	INSULATION MATERIAL		PVC, Type-A as per IS :5831
(b)	NOMINAL INSULATION THICKNESS		As per IS 694 (table-3)
22.5	MAX. OVERALL DIA		As per IS 694 (table-3)
22.6	STANDARD BUNDLE LENGTH		90-100 meters (For all sizes)
22.7	Applicable Standards and codes		a) IS:694 PVC insulated unsheathed and sheathed cables/cords with rigid and flexible conductor b) IS:5831 PVC insulation and sheath of electric cables c) IS:8130 Conductors for insulated electric cables and flexible cords. d) IS:10810 Methods of tests for cables.

Note:

1. Detailed luminaire and lamp data shall be placed by vendor after award of contract.
2. Galvanization wherever applicable shall be hot dip galvanized with weight of Zinc as 460g/m² (65micron).

ANNEXURE-1
RESTORATION OF OBRA 'B' TPS UNIT-12 &13: Price Schedule for Supply for Main items
of Station Lighting System

Item Code	Sl. No.	DESCRIPTION MAIN SUPPLY ITEMS	UOM	QTY.	UNIT EX- WORKS PRICE (DULY PACKED) (Rs.)	TOTAL EX- WORKS PRICE (DULY PACKED) (Rs.)
	1.0	Lighting/ Welding Distribution Board (LDB/WDB)				
558-11013-A	1.1	AC WDB Type WDB-H (12) without transformer (including cubicle suitable for 2 nos. 100 kVA transformer)	Nos.	1		
558-11136-A	1.2	100kVA transformer for housing in 1.1 - Normal Non encapsulated type	Nos.	2		
558-11010-A	1.3	AC LDB Type LDB-F (8) without transformer (including cubicle suitable for 2 nos. 50 kVA transformer)	Nos.	3		
558-11139-A	1.4	50kVA transformer for housing in 1.3 - Normal Non encapsulated type	Nos.	6		
558-11019-A	1.5	DC LDB Type LDB-D (6)	Nos.	1		
	2.0	Lighting Panels (LP)				
558-11074-A	2.1	AC Normal /Emergency indoor Type LP – A (12) [with timer]	Nos.	4		
558-11075-A	2.2	AC Normal /Emergency indoor Type LP – A (18) [with timer]	Nos.	9		
558-11072-A	2.3	AC Normal /Emergency (Decorative) Type LP – A (12) [with timer]	Nos.	5		
558-11217-A	2.4	DC indoor Type LP – D (6)	Nos.	4		
	3.0	Lighting Luminaires (complete with accessories)				
558-11284-A	3.1	Industrial type LED tube fixture suitable for conduit/surface/suspended mounting, with integral driver aesthetically designed for switchgear/ equipment room (Equivalent to FC06)	Nos.	402		
558-11285-A	3.2	Panel (600X600) LED luminaire suitable for recess mounting in false ceiling with integral driver aesthetically designed for control room/office (Equivalent to FC26)	Nos.	563		
558-11286-A	3.3	LED fixture corrosion proof, totally enclosed type for battery room (Equivalent to FC81)	Nos.	132		
558-11283-A	3.4	LED tube fixture with industrial box type base without any cover (Equivalent to FC02) for Stair Case	Nos.	20		
558-11311-A	3.5	LED Flood Light heavy duty type SF63	Nos.	5		
558-11269-A	3.6	FC07 (1 x 18) Fluorescent, industrial box type base and vitreous enamelled side reflectors operating on 220V DC input supply. (Switchgear Room DC lighting)	Nos.	36		
558-11267-A	3.7	FC33 (1 x 18) Fluorescent, decorative, recessed type with mirror optic reflector operating on 220V DC input supply. (Control Room DC lighting)	Nos.	37		

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558-11268-A	3.8	FC34 (1 x 18) Fluorescent, dust proof, totally enclosed type with sheet steel housing operating on 220V DC input supply. (Misc. Area DC lighting)	Nos.	10		
558-11271-A	3.9	18W CFL for DC LIGHTING	Nos.	83		
	4.0	24V supply module & lamp unit complete with all accessories (For tehcnical detail please refer specification)				
558-11002-A	4.1	Fixed type 24V supply modules	Nos.	13		
558-11120-A	4.2	Portable halogen lamp unit	Nos.	6		
558-11263-A	4.3	SA, 24V industrial type sockets	Nos.	17		
	5.0	Switch boxes for individual control of circuits (Switchboards consisting of switch boxes, switches, switch plates and fixing accessories.)				
558-11132-A	5.1	Type SWB1	Nos.	12		
558-11133-A	5.2	Type SWB2	Nos.	12		
558-11134-A	5.3	Type SWB3	Nos.	23		
558-11250-A	5.4	Type SWB4	Nos.	14		
	6.0	Junction boxes				
558-11038-A	6.1	Type JB-F	Nos.	1165		
558-11039-A	6.2	Type JB-FE	Nos.	123		
	7.0	Receptacles				
558-11121-A	7.1	Type RA	Nos.	23		
558-11123-A	7.2	Type RB	Nos.	135		
558-11124-A	7.3	Type RC	Nos.	5		
	8.0	Ceiling fans with electronic regulators				
558-11014-A	8.1	1200 mm sweep	Nos.	1		
558-11024-A	9.0	Emergency lighting Units (With Ni-Cd battery, Charger and 2 CFL lamp)	Nos.	15		
	10.0	Wires				
558-11145-A	10.1	1x2.5 mm ² Cu PVC	mtrs.	37700		
558-11146-A	10.2	1x 4 mm ² Cu PVC	mtrs.	13700		
	11.0	Hot dip Galvanised Rigid Steel Conduits (Heavy Duty)				
558-11030-A	11.1	20 mm dia GI conduit, 1.6 mm thick	mtrs.	12700		
558-11031-A	11.2	25 mm dia GI conduit, 1.6 mm thick	mtrs.	1700		
558-11149-A	11.3	20 mm dia GI conduit with epoxy coating, 1.6 mm thick	mtrs.	1000		
	12.0	Flexible PVC coated conduit				
558-11026-A	12.1	20 mm dia PVC coated conduit	mtrs.	3220		
558-11127-A	13.0	Structural steel	MT	3.5		
	14.0	Ladder				
558-11028-A	14.1	Free standing ladder	Nos.	1		
558-11142-A	14.2	Wheel mounted ladder	Nos.	1		

ANNEXURE-1
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558-11025-A	15.0	EXIT SIGN	Nos.	28		
558-11170-A	16.0	Pedestal Fan	Nos.	5		
558-11006-A	17.0	35X6 mm GI flat	mtrs.	132		
558-11008-A	18.0	50X6mm GI flat	mtrs.	30		
558-11035-A	19.0	16 SWG Wire	Meter	18075		

NOTES:

- Items shall be cleared for manufacturing and supply in stages (Lots) on the basis of engineering progress. Required information of engineering progress to be furnished by vendor who is responsible for engineering of lighting system
- 'Basic Design Documents' cover: Drawings/ documents schedule, technical data sheets, GA dwgs. of equipments, quality plan, type test reports for Station Lighting System.
- Erection & commissioning materials (such as double compression cable glands, conduit fittings viz. couplers, elbows, bends, tees, circular boxes etc., conduit accessories viz. clips, saddles, spacing plates, entry bushes, lock nuts, plugs, heavy duty lugs, ferrules, expansion fastners, covers for power outlets, ball & sockets, earth clips, fan boxes, clamps, screws, ceiling rose, casing and capings etc. form part of erection activities) and accessories including commissioning & operational spares upto system handing over to customer has to be worked out for complete and successful erection & commissioning of the total supply as per BOQ. The price to be quoted for SUPPLY accordingly for equipment and fittings.
- Design engineering charges are considered to be included in main equipment supply price. No separate charges shall be applicable.
- Fabrication & painting charges of structural steel shall be part of erection charges of those equipment for which the same is being used.
- Installation of lamp shall be part of E&C of respective fixture. The E&C price of fixtures to be quoted accordingly.
- All measuring and testing instruments required during erection, testing, commissioning and performance testing shall be arranged by the bidder.

ANNEXURE-2
RESTORATION OF OBRA 'B' TPS UNIT-12 &13: Price Schedule for E & C for Station Lighting System

Sl. No.	Item Code	DESCRIPTION	UOM	QTY.	UNIT E & C PRICE (Rs.)	TOTAL E & C PRICE (Rs.)
1.0		Lighting/ Welding Distribution Board (LDB/WDB)				
1.1	558-11013-C	AC WDB Type LDB-H (12) without transformer (including cubicle suitable for 2 nos. 100 kVA transformer)	Nos.	1		
1.2	558-11136-C	100kVA transformer for housing in 1.1 - Normal Non encapsulated type	Nos.	2		
1.3	558-11010-C	AC LDB Type LDB-F (8) without transformer (including cubicle suitable for 2 nos. 50 kVA transformer)	Nos.	3		
1.4	558-11139-C	50kVA transformer for housing in 1.3 - Normal Non encapsulated type	Nos.	6		
1.5	558-11019-C	DCLDB Type LDB-D (6)	Nos.	1		
2.0		Lighting Panels (LP)				
2.1	558-11074-C	AC Normal /Emergency indoor Type LP – A (12) [with timer]	Nos.	4		
2.2	558-11075-C	AC Normal /Emergency indoor Type LP – A (18) [with timer]	Nos.	9		
2.3	558-11072-C	AC Normal /Emergency (Decorative) Type LP – A (12) [with timer]	Nos.	5		
2.4	558-11217-C	DC indoor Type LP – D (6)	Nos.	4		
3.0		Lighting Luminaires (complete with accessories)				
3.1	558-11284-C	Industrial type LED tube fixture suitable for conduit/surface/suspended mounting, with integral driver aesthetically designed for switchgear/ equipment room (Equivalent to FC06)	Nos.	402		
3.2	558-11285-C	Panel (600X600) LED luminaire suitable for recess mounting in false ceiling with integral driver aesthetically designed for control room/office (Equivalent to FC26)	Nos.	563		
3.3	558-11286-C	LED fixture corrosion proof, totally enclosed type for battery room (Equivalent to FC81)	Nos.	132		
3.4	558-11283-C	LED tube fixture with industrail box type base without any cover (Equivalent to FC02) for Stair Case	Nos.	20		
3.5	558-11311-C	LED Flood Light heavy duty type SF63	Nos.	5		

ANNEXURE-2
RESTORATION OF OBRA 'B' TPS UNIT-12 &13: Price Schedule for E & C for Station Lighting System

Sl. No.	Item Code	DESCRIPTION	UOM	QTY.	UNIT E & C PRICE (Rs.)	TOTAL E & C PRICE (Rs.)
3.6	558-11269-C	FC07 (1 x 18) Fluorescent, industrial box type base and vitreous enamelled side reflectors operating on 220V DC input supply. (Switchgear Room DC lighting)	Nos.	36		
3.7	558-11267-C	FC33 (1 x 18) Fluorescent, decorative, recessed type with mirror optic reflector operating on 220V DC input supply. (Control Room DC lighting)	Nos.	37		
3.8	558-11268-C	FC34 (1 x 18) Fluorescent, dust proof, totally enclosed type with sheet steel housing operating on 220V DC input supply. (Misc. Area DC lighting)	Nos.	10		
4.0		24V supply module & lamp unit complete with all accessories (For tehcnical detail please refer specification)				
4.1	558-11002-C	Fixed type 24V supply modules	Nos.	13		
4.3	558-11263-C	5A, 24V industrial type sockets	Nos.	17		
5.0		Switch boxes for individual control of circuits (Switchboards consisting of switch boxes, switches, switch plates and fixing accessories.)				
5.1	558-11132-C	Type SWB1	Nos.	12		
5.2	558-11133-C	Type SWB2	Nos.	12		
5.3	558-11134-C	Type SWB3	Nos.	23		
5.4	558-11250-C	Type SWB4	Nos.	14		
6.0		Junction boxes				
6.1	558-11038-C	Type JB-F	Nos.	1165		
6.2	558-11039-C	Type JB-FE	Nos.	123		
7.0		Receptacles				
7.1	558-11121-C	Type RA	Nos.	23		
7.2	558-11123-C	Type RB	Nos.	135		
7.3	558-11124-C	Type RC	Nos.	5		
8.0		Ceiling fans with electronic regulators				
8.1	558-11014-C	1200 mm sweep	Nos.	1		
9.0	558-11024-C	Emergency lighting Units (With Ni-Cd battery, Charger and 2 CFL lamp)	Nos.	15		
10.0		Wires				
10.1	558-11145-C	1x2.5 mm ² Cu PVC	mtrs.	37700		
10.2	558-11146-C	1x 4 mm ² Cu PVC	mtrs.	13700		
11.0		Hot dip Galvanised Rigid Steel Conduits (Heavy Duty)				

ANNEXURE-2
RESTORATION OF OBRA 'B' TPS UNIT-12 &13: Price Schedule for E & C for Station Lighting System

Sl. No.	Item Code	DESCRIPTION	UOM	QTY.	UNIT E & C PRICE (Rs.)	TOTAL E & C PRICE (Rs.)
11.1	558-11030-C	20 mm dia GI conduit, 1.6 mm thick	mtrs.	12700		
11.2	558-11031-C	25 mm dia GI conduit, 1.6 mm thick	mtrs.	1700		
11.3	558-11149-C	20 mm dia GI conduit with epoxy coating, 1.6 mm thick	mtrs.	1000		
12.0		Flexible PVC coated conduit				
12.1	558-11026-C	20 mm dia PVC coated conduit	mtrs.	3220		
13.0	558-11025-C	EXIT SIGN	Nos.	28		
14.0	558-11006-C	35X6 mm GI flat	mtrs.	132		
15.0	558-11008-C	50X6mm GI flat	mtrs.	30		
16.0	558-11035-C	16 SWG Wire	Meter	18075		
17.0		Laying & termination of cables (cables to be laid on tray)				
17.1	558-11175-C	3.5C X 95 mm ²	Meter	100		
17.2	558-11173-C	3.5C X 50 mm ²	Meter	50		
17.3	558-11171-C	3.5C X 25mm ²	Meter	25		
17.4	558-11207-C	3C X 2.5 mm ² armoured cable	Meter	25		
17.5	558-11185-C	2C X 25 mm ²	Meter	25		
18.0		Laying & termination of cables (Cables to be buried under ground)				
18.1	558-11193-C	3.5C X 95 mm ²	Meter	10		
18.2	558-11191-C	3.5C X 50 mm ²	Meter	10		
18.3	558-11189-C	3.5C X 25mm ²	Meter	10		
18.4	558-11203-C	2C X 25 mm ²	Meter	10		

NOTES:

1.Erection & commissioning materials (such as double compression cable glands, conduit fittings viz. couplers, elbows, bends,tees, circular boxes etc., conduit accessories viz. clips, saddles, spacing plates, entry bushes, lock nuts, plugs, heavy duty lugs,ferrules, expansion fastners, covers for power outlets in wash rooms and showers, ball & sockets, earth clips, fan boxes,clamps, screws, ceiling rose, casing and capings etc. form part of erection activities) and accessories including commissioning & operational spares upto system handing over to customer has to be worked out for complete and successful erection & commissioning of the total supply as per BOQ. The price to be quoted for SUPPLY accordingly for equipment and fittings.

2.Fabrication & painting charges of structural steel shall be part of erection charges of those equipment for which the same is being used.

3. Installation of lamp shall be part of E&C of respective fixture. The E&C price of fixtures to be quoted accordingly.

4. All measuring and testing instruments required during erection, testing, commissioning and performance testing shall be arranged by the bidder and taken back.

Restoration of Obra 'B' TPS Unit-12&13
Standard Quality Plan (PE-QP-999-558-E001)

		QUALITY PLAN		CUSTOMER : GUJARAT STATE		PROJECT TITLE :-		SPECIFICATION NO. :-					
SHEET		QUALITY PLAN		BIDDER/ VENDOR :		QUALITY PLAN NO.		SPECIFICATION TITLE:-					
SL. NO.	COMPONENT/OPERATION	CHARACTERISTIC CHECK	CAT.	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	SECTION II			VOLUME II	REMARKS
									AGENCY	P	W		
1	2	3	4	5	6	7	8	9	10			11	
1.0	LIGHTING PANELS AND LIGHTING DISTRIBUTION BOARDS	1.DIMENSIONS 2.PAINT SHADE/ THICKNESS 3.VERIFICATION OF GA & BOM 4.FUNCTIONAL TESTS (INCLUDING WIRING CONTINUITY) 5.HV/IR/HV 6.DEGREE OF PROTECTION (INCLUDING EXPLOSION PROOF IF ANY) 7.TEMPERATURE RISE TEST (FOR COMPLETE ASSEMBLED LDB/LP)	MA MA CR MA MA MA MA	MEASUREMENT VISUAL/ MEASUREMENT VISUAL ELECT. ELECT TESTS ELECT	SAMPLE SAMPLE 100% 100% 100% 1/SIZE & RATING 1/RATING	APPROVED DRG. APPROVED DRG. APPROVED DRG. APPROVED DRG / BHEL SPEC. HV -2.5KV AC FOR 1 MINUTE IR - >50 M OHM BHEL SPEC/ RELEVANT IS BHEL SPEC/ RELEVANT IS	APPROVED DRG. APPROVED DRG. APPROVED DRG. APPROVED DRG. / BHEL SPEC. HV -2.5KV AC FOR 1 MINUTE IR - >50 M OHM BHEL SPEC/ RELEVANT IS BHEL SPEC/ RELEVANT IS	INSPT. REPORT INSPT. REPORT INSPT. REPORT INSPT. REPORT INSPT. REPORT TEST REPORT TEST REPORT	3/2 3/2 3/2 3/2 3/2 3/2 3/2	2.1 2.1 2.1 2.1 2.1 - 2.1	- - - - - - -	COMPONENTS TO BE OF APPROVED MAKE	
LEGEND : 1- BHEL/ CUSTOMER 2-VENDOR 3- SUB- VENDOR P- PERFORM W - WITNESS V - VERIFICATION													
BHEL		PARTICULARS		BIDDER/VENDOR									
		NAME											
		SIGNATURE											
		DATE				BIDDER'S/VENDORS COMPANY SEAL							

SPECIFICATION NO. :-		PROJECT TITLE :-		CUSTOMER :	QUALITY PLAN		CUSTOMER :		BIDDER/VENDOR :		QUALITY PLAN NO.		SPECIFICATION TITLE:-	
S.L. NO.	COMPONENT/OPERATION SHEET	CHARACTERISTIC CHECK	CAT.	TYPE/METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	SECTION II			VOLUME II		
									AGENCY	P	W	V	REMARKS	
1	2	3	4	5	6	7	8	9	10			11		
2.0	LIGHTING TRANSFORMER	1. ROUTINE TEST a) TYPE / RATING b) WINDING RESISTANCE c) VOLTAGE RATIO VECTOR d) Z VOLTI/Z SCKT e) LOAD LOSS/CURRENT f) NO LOAD LOSS & NO LOAD CURRENT g) SOURCE WITHSTAND h) INDUCED OV 2. TYPE TEST	CR CR CR CR CR CR CR MA	VISUAL TEST TEST TEST TEST TEST TEST TEST	100% 100% 100% 100% 100% 100% 100% 11RATING	IS 11171 / BH-EL SPEC IS 11171 / BH-EL SPEC IS 11171 / BH-EL SPEC IS 11171 / BH-EL SPEC IS 11171 / BH-EL SPEC IS 11171 / BH-EL SPEC IS 11171 / BH-EL SPEC IS 11171 / BH-EL SPEC	IS 11171 / BH-EL SPEC IS 11171 / BH-EL SPEC IS 11171 / BH-EL SPEC IS 11171 / BH-EL SPEC IS 11171 / BH-EL SPEC IS 11171 / BH-EL SPEC IS 11171 / BH-EL SPEC IS 11171 / BH-EL SPEC	INSPT. REPORT INSPT. REPORT INSPT. REPORT INSPT. REPORT INSPT. REPORT INSPT. REPORT INSPT. REPORT TEST CERTIFICATE	3 3 3 3 3 3 3 3	- - - - - - - -	2.1 2.1 2.1 2.1 2.1 2.1 2.1 2.1	TYPE TESTS CERTIFICATE CLEARANCE FROM BH-EL/CUSTOMER		
LEGEND : 1- BH-EL/ CUSTOMER 2-VENDOR 3- SUB- VENDOR P- PERFORM W . WITNESS V - VERIFICATION														
BH-EL														
PARTICULARS														
NAME														
SIGNATURE														
DATE														
BIDDER/SENDER'S COMPANY SEAL														

[illegible]

SHEET NO.		QUALITY PLAN		CUSTOMER :		PROJECT :		SPECIFICATION :			
COMPONENT/OPERATION		CHARACTERISTIC CHECK		BIDDER/ VENDOR SYSTEM		QUALITY PLAN NUMBER PED-568-00-Q-001, REV.03		SPECIFICATION TITLE			
SL NO.	SHEET	CHARACTERISTIC CHECK	CAT	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORM	FORMAT OF RECORD	VOLUME III REMARKS		
1	2	3	4	5	6	7	8	9	10		
LED LUMINAIRES	1	3. TYPE TEST	CR	TEST	IS 16102	IS 16102 PART 1 & PART 2/ BHEL Spec	IS 16102 PART 1 & PART 2/ BHEL Spec	TEST CERT	3/2	1	
		1. ACCEPTANCE TEST									
		a) VISUAL									
		i) MARKING	CR	PHYSICAL	IS 16107	IS 16107 PT2/ BHEL SPEC	IS 16107 PT2/ BHEL SPEC	INSPT, REPO	3/2	1	
		ii) VISUAL	CR	VISUAL	100%				3/2	1	
		i) PACKING	MA	VISUAL	100%				3/2	1	
	2	b) IR (Dry)	CR	ELECTRICAL	IS 10322	IS 10322 / BHEL SPEC	IS 10322/ BHEL SPEC	-DO-	3/2	1	
		c) HIGH VOLTAGE	CR	ELECTRICAL	-DO-	-DO-	-DO-	-DO-	3/2	1	
		d) PHOTOMETRIC	CR	ELECTRICAL	1/ TYPE	IEC LM79/ IS 16106/ BHEL SPEC	IEC LM79/ IS 16106/ BHEL SPEC	-DO-	3/2	1	
		e) FUNCTIONAL TEST	CR	ELECTRICAL	IS 16107	IS 16107 PT2/ BHEL SPEC	IS 16107 PT2/ BHEL SPEC	-DO-	3/2	1	
TEST INCLUDES LUMINAIRE POWER, LUMINOUS FLUX, LIGHTING INTENSITY, ANGULAR BEAM DISTRIBUTION, LUMINAIRE INTENSITY DISTRIBUTION, LUMINAIRE EFFICACY, CCT AND CRI.											
BHEL											
PARTICULARS											
NAME											
SIGNATURE											
DATE											

Restoration of Obra 'B' TPS Unit-12&13
Standard Quality Plan (PE-QP-999-558-E001)

QUALITY PLAN		CUSTOMER - NTPC		PROJECT :		SPECIFICATION	
SHEET		BIDDER/ VENDOR SYSTEM		TITLE		NUMBER	
COMPONENT/OPERATION		CHARACTERISTIC CHECK		ITEM ILLUMINATION REFERENCE DOCUMENT		SECTION AGENCY	
SL NO		CAT	TYPE/ METHOD OF CHECK	EXTENT OF CHECK	7	8	9
1	2	4	5	6	7	8	9
3. TYPE TEST							
	a) LED MODULE	MA	TEST	1/ TYPE	IS 16103 PART 1 & PART-2/ BHEL Spec/ IEC LM80	IS 16103 PART 1 & PART-2/ BHEL Spec/ IEC LM80	TEST CERT
	b) PHOTOMETRIC	CR	ELECTRICAL	1/ TYPE	IEC LM79/ IS 16106/ BHEL SPEC	IEC LM79/ IS 16106/ BHEL SPEC	-DO-
	c) LED LUMINAIRE	MA	TEST	IS 16107	IS 16107 PART 2/ BHEL Spec	IS 16107 PART 2/ BHEL Spec	TEST CERT
	d) CONTROL GEAR	MA	TEST	1/TYPE	IS 15885 PART 2 SEC 13/ BHEL Spec	IS 15885 PART 2 SEC 13/ BHEL Spec	TEST CERT
CONVENTIONAL LUMINAIRES & LAMPS							
	1. ACCEPTANCE TEST						
	a) VISUAL	MA	VISUAL	IS 10322 (PART 5 SEC 1)	IS 10322 / BHEL SPEC	IS 10322 / BHEL SPEC	TEST CERT
	b) IR (Dry)	CR	ELECTRICAL	IS 10322	-DO-	-DO-	-DO-
	c) HIGH VOLTAGE	CR	ELECTRICAL	-DO-	-DO-	-DO-	-DO-
	d) DUST PROOF	CR	ELECTRICAL	-DO-	-DO-	-DO-	-DO-
	e) PHOTOMETRIC	CR	ELECTRICAL	*	-DO-	-DO-	-DO-
	2. ROUTINE TEST						
	a) VISUAL	MA	VISUAL	100%	IS 10322 / BHEL SPEC	IS 10322 / BHEL SPEC	TEST CERT
	b) IR (Dry)	CR	ELECTRICAL	-DO-	-DO-	-DO-	-DO-
	c) HIGH VOLTAGE	CR	ELECTRICAL	-DO-	-DO-	-DO-	-DO-
BHEL		PARTICULARS		BIDDER/VENDOR			
		NAME		SIGNATURE			
		DATE					

[illegible]

R, C - CONTRACTOR, P - PERFORM, W - WITNESS, V - VERIFICATION

2) In case of FR type wires, FR properties test (Oxygen Index & Temp. Index) are also applicable.

SL. NO.		COMPONENT/OPERATION		SHEET	QUALITY PLAN		CUSTOMER :		PROJECT		SPECIFICATION :	
							BIDDER/ VENDOR	TITLE	QUALITY PLAN NUMBER	PE-QP-999-558-E002/ R1	NUMBER	TITLE
							SYSTEM		ITEM : RIGID STEEL CONDUITS	ACCEPTANCE NORM	FORMAT OF RECORD	SECTION II
					TYPE/ METHOD OF CHECK	EXTENT OF CHECK	CAT.		REFERENCE DOCUMENT			AGENCY
												P W V
												REMARKS
1	2	3	4	5	6	7	8	9	10	11		
1.0	CONDUITS	1.MATERIAL	MA	VISUAL, MECH, & CHEMICAL	-	Appd Datasheet	Appd Datasheet	TEST CERT.	M	C, B		For same manufacturer, 1st Lot will be witnessed by BH&L, subsequent Lot shall be cleared based on test witnessed by main vendor.
		2.DIMENSIONS	MA	MEASUREMENT	IS 9537-II	IS-9537/Appd Datasheet	IS-9537/Appd Datasheet	INSPT. REPORT	M	C, B		
		3. MECH. PROPERTIES	CR	TEST	IS 9537-II	IS-9537	IS-9537	INSPT. REPORT	M	C, B		
		a) BENDING TEST	CR	TEST	IS 9537-II	IS-9537	IS-9537	INSPT. REPORT	M	C, B		
		b) COMPRESSION TEST	CR	TEST	IS 9537-II	IS-9537	IS-9537	INSPT. REPORT	M	C, B		
		4. GALVANISATION TEST	CR	TEST	IS 9537-II	IS-2633/ APPD DS	IS-2633/ APPD DS	INSPT. REPORT	M	C, B		
		a) UNIFORMITY OF ZINC COATING	CR	TEST	IS 9537-II	IS-6745/ APPD DS	IS-6745/ APPD DS	INSPT. REPORT	M	C, B		
		b) MASS OF ZINC COAT.	CR	TEST	IS 9537-II	IS-4759/ APPD DS	IS-4759/ APPD DS	INSPT. REPORT	M	C, B		BY ELCOMETER
		c) COATING THICKNESS	CR	TEST	IS 9537-II	50 MICRONS	50 MICRONS	INSPT. REPORT	M	C, B		AS APPLICABLE
		d) EPOXY THICKNESS	MA	VISUAL/PHYSICAL	IS 9537-II	BHEL spec.	BHEL spec.	INSPT. REPORT	M	C, B		
		5. PACKING & MARKING	CR	VISUAL/PHYSICAL	IS 9537-II	BHEL spec.	BHEL spec.	INSPT. REPORT	M	C, B		

LEGEND **B - BH&L / BH&L's CUSTOMER** **M - MANUFACTURER** **C - CONTRACTOR** **P - PERFORM** **W - WITNESS** **V - VERIFY**

BH&L

PARTICULARS		BIDDER/VENDOR
NAME		
SIGNATURE		
DATE		

BIDDER'S/VENDOR'S COMPANY SEAL



**2X660 MW BIPCL MAITREE KHULNA
STPP (BANGLADESH)
TECHNICAL SPECIFICATION FOR
STATION LIGHTING SYSTEM**

DOC. NO. PE-TS-421-558-E002

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SECTION – ‘II’

STANDARD TECHNICAL SPECIFICATION



**TECHNICAL SPECIFICATION FOR
LIGHTING SYSTEM (SUPPLY)**

SPECIFICATION NO. PE-SS-999-558-E001

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**TECHNICAL SPECIFICATION FOR
LIGHTING SYSTEM (SUPPLY)
SPECIFICATION NO. PE-SS-999-558-E001**



TECHNICAL SPECIFICATION FOR LIGHTING SYSTEM (SUPPLY)

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2.0	CODES & STANDARDS
3.0	LIGHTING SYSTEM DESCRIPTION (CONCEPTUAL VIEW)
4.0	SYSTEM DESIGN ENGINEERING
4.1	ENGINEERING INPUTS
4.2	DESIGN CRITERIA
4.3	ENGINEERING OUTPUTS
5.0	LUMINAIRES, ACCESSORIES AND LAMPS
5.1	GENERAL REQUIREMENTS OF LUMINAIRES
5.2	LUMINAIRE TYPES
5.3	CONTROLGEAR BOX (NON-INTEGRAL TYPE)
5.4	REFLECTORS
5.5	LAMP HOLDERS
5.6	STARTER HOLDERS
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5.8	STARTERS
5.9	CAPACITORS
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6.1.1	General Requirements of LDBs/WDBs
6.1.2	LDBs/WDBs with transformers (Additional Features)
6.1.3	Lighting Transformer/Welding Transformer



TECHNICAL SPECIFICATION FOR LIGHTING SYSTEM (SUPPLY)

SPECIFICATION NO. PE-SS-999-558-E001

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- 6.1.5 Wiring and Terminations
- 6.1.6 Controls
- 6.1.7 Switch-Fuse Units
- 6.1.8 Cable Terminations
- 6.1.9 Earthing
- 6.1.10 Type of LDBs
- 6.2 LIGHTING PANELS (LPs)
 - 6.2.1 General Requirements of Lighting Panels
 - 6.2.2 Types of Lighting Panels
 - 6.2.3 AC Lighting Panel
 - 6.2.4 DC Lighting Panel
 - 6.2.5 Decorative Type Lighting Panel
 - 6.2.6 Street Lighting Panel
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TECHNICAL SPECIFICATION FOR LIGHTING SYSTEM (SUPPLY)

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7.4	CURRENT TRANSFORMERS
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7.8	RELAYS
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7.10	SELECTOR SWITCHES
7.11	PUSH BUTTONS
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7.13	CABLE GLANDS
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8.0	LABELING
9.0	SURFACE TREATMENT
10.0	PACKING
11.0	GUARANTEED PERFORMANCE REQUIREMENTS
12.0	INSPECTION & TESTING
13.0	QUANTITY VARIATION
14.0	SPARES
15.0	TOOLS & TACKLES
16.0	DOCUMENTATION
	ANNEXURE-I



TECHNICAL SPECIFICATION FOR LIGHTING SYSTEM (SUPPLY)

SPECIFICATION NO. PE-SS-999-558-E001

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1.0 SCOPE

1.1 GENERAL

- a) This specification covers the design, manufacture, assembly, testing and inspection at vendor's / sub-vendor's works, packing and despatch to site of lighting system and low voltage power services equipment.
- b) The "design" shall broadly cover the selection of components, materials, sizes etc. for the equipment of supply in vendor's scope. Complete responsibility of establishing the correctness of equipment design rests with the vendor.
- c) It is not the intent to specify here all the details of design and manufacture. However, the equipment shall conform in all respects to high standards of design, engineering and workmanship, and shall be capable of performing the required duties in a manner acceptable to Engineer / purchaser, who will interpret the meaning of drawings and specifications and shall be entitled to reject any work or material, which in his judgement is not in full accordance herewith.
- d) Make of all equipment and components shall be to the approval of purchaser. Bidder to comply to Sub-vendor list enclosed as Annexure, however same shall be subjected to end client approval without any commercial implication.

1.2 ENGINEERING

- a) Specification also covers the aspect of System Design Engineering generally termed as "Engineering". Engineering shall be the responsibility of vendor if indicated in Data Sheet A. Engineering inputs shall be furnished by the purchaser to the successful bidder.
- b) Engineering, if covered in vendor's scope, shall include design of complete lighting system for indoor and outdoor areas. The aspect of engineering covers preparation of electrical distribution and control schemes, quantity estimation, luminaire layout drawings, conduit layout drawings, wiring schemes upto luminaires, cable schedules and all associated design work not specifically mentioned in the specification.
- c) Complete engineering shall be as per the guidelines of purchaser and shall be subject to the purchaser's approval.

1.3 The requirements given in enclosed drawings, documents and Data Sheet A form part of this specification and shall be fully complied with. In case any discrepancy arises, the requirements of Data Sheet A shall prevail.

1.4 In case of any deviation, the bidder shall indicate the same clause-by-clause in the enclosed "Schedule of Deviations". In the absence of duly filled schedules it will be construed that the bid conforms strictly to the specification.

2.0 CODES & STANDARDS



TECHNICAL SPECIFICATION FOR LIGHTING SYSTEM (SUPPLY)

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2.1 The material shall comply with all currently applicable safety codes and statutory regulations of India as well as of the locality where the material is to be installed.

2.2 The material, construction, manufacture, inspection and testing shall conform to the latest revisions of standards as specified in Data Sheet-A.

2.3 In case of conflict between the applicable reference standard and this specification, stringent requirement shall govern.

3.0 LIGHTING SYSTEM DESCRIPTION (CONCEPTUAL VIEW)

3.1 All areas of plant (indoor and outdoor) shall be provided with suitable lighting arrangement to meet the functional requirements by use of various types of luminaires so as to achieve the desired quality and level of illumination.

3.2 Lighting system shall also cover the low voltage power services such as power receptacles and single phase feeders.

3.3 Lighting system shall be fed through various power sources such as AC Normal, AC Emergency and DC Normal and DC Emergency supply to achieve the desired reliability.

3.4 Power tapped from various sources shall be distributed through lighting distribution boards and lighting panels upto the various luminaires and power outlet sockets / feeders.

4.0 SYSTEM DESIGN ENGINEERING

Engineering shall be done by the vendor only during the contract engineering stage if the same is covered in his scope. During tender stage, bidder shall make his quotation on the basis of BOQ furnished by the purchaser with the tender document.

4.1 ENGINEERING INPUTS: Complete engineering shall be done by the vendor on the basis of documents listed below. The engineering inputs shall be furnished by purchaser.

4.1.1 Indoor Areas

a) Room dimensions (details as covered in various layout drawings)

b) Lighting System Design Data (LSDD) covering typical values for various types of indoor areas, indicating :

i. Required average illumination level

ii. Reflection factors for walls, ceiling and floor

iii. Maintenance factor

iv. Type of luminaire



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v. Mounting height of luminaire

vi. Height of working plane

c) AC Emergency lighting requirements

d) DC lighting requirements

e) Requirement of sockets

f) Requirement of exhaust fans and fan points

4.1.2 Outdoor Areas

a) Area geometry (details as covered in various layout drawings)

b) Lighting System Design Data (LSDD) covering typical values for various types of outdoor areas, indicating :

i. Average illumination level

ii. Type of luminaire

iii. Preferred pole heights / mounting height

iv. AC Emergency lighting requirement

v. DC lighting requirements

c) Requirement of sockets

4.1.3 Other inputs

a) Plot plan, Main equipment plan and TG hall floor plans (to assess quantum of area lighting drawings)

b) Suggestive location of LDBs

c) Suggestive power distribution scheme (SLDs)

d) Control schemes

e) Single phase feeder details

f) No. of sockets / criteria for computation of no. of sockets / location of sockets etc.

g) LDB/WDB details

h) LP details



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- i) Poles & Masts details
- j) Conduit sizes
- k) Wire sizes
- l) Earthing material sizes

4.2 DESIGN CRITERIA :

4.2.1 General Requirements of Design

- a) Lighting system shall be provided to ensure adequate visual performance, safety and reliability and shall be free from excessive glare and flicker from discharge lamps. Particular attention shall be paid to ensure that level of illumination is satisfactory in all respects including viewing of all instruments, alarms, annunciators and indicating lamps.
- b) Complete system design shall be done on the basis of inputs provided by the purchaser and in line with the laid down criteria.
- c) Requirements of sockets shall be as per the criteria / number of sockets given by the purchaser during detailed engineering stage.
- d) Complete power distribution system shall be designed keeping following criteria in view :
 - Simplicity
 - Controlled voltage drop
 - Cost effectiveness

4.2.2 Sources of Power Supply

- a) The illumination of various indoor and outdoor areas in the main plant and off site areas shall comprise of one or more of the following systems:
 - Normal AC Lighting System
 - Emergency AC Lighting System
 - DC Lighting System
- b) Arrangement and distribution of power shall depend upon the functional requirements of areas and therefore supply from all types of power sources shall not be made available to all areas. Lighting & LV power services in different areas shall be provided as per Annexure enclosed.
- c) 24V AC lighting for maintenance purposes (for hand lamps and/or hand operated tools) shall be supplied from 240/24V fixed/ portable lighting module.

4.2.3 Lighting philosophy



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a) Normal AC Lighting System

Normal AC lighting system 415V, 3 phase, 4 wire, will be fed from lighting panels (LPs) which in turn will be fed from the lighting distribution boards (LDBs). Street lights/ flood lights shall be fed from Street Lighting Panel (SLP), Welding receptacles shall be fed from Welding DB/ MCC in offsite areas.

b) Emergency AC Lighting System

This system shall be provided for certain important areas in the main plant. The lighting fixtures connected to this system shall be normally "ON" along with the normal AC system. These will be fed from emergency lighting panels (ELPs) which in turn will be fed from 3-phase, 4-wire supply from the emergency lighting distribution boards (ELDB'S). These lights will go off for a few seconds in case of AC supply failure at Emergency Switchgear, but shall be automatically restored when Emergency Switchgear is energised by Diesel generator set.

c) DC Lighting System

At strategic locations in the main plant, a few lighting fixtures fed from 220V DC supply, shall be provided to enable safe movement of operating personnel and access to important control points during an emergency, when both the normal AC and Emergency Lighting system fail. These lighting fixtures will be fed from 220V DC LPs which in turn will be fed from DC LDBs.

The supply to the DC lighting panels shall be automatically switched ON in case of loss of AC supply at station service switchgear as well as Emergency switch-gear. The DC supply will be automatically switched OFF after about 3 minutes following the restoration of supply to normal AC or emergency AC lighting system.

In auxiliary /off site buildings, emergency DC lighting is to be provided through self contained DC emergency fixture at strategic locations. The fixtures shall be switched 'ON' automatically in case of failure of AC supply.

d) Street Lighting/ Flood Lighting

Street lights / flood lights will be fed from Street Lighting Panel (SLP). The number of street lights / flood lights shall be grouped in such a way that they will be fed from the nearest SLP available. Street lights shall have provision of automatic switching ON and OFF in any one of the following modes and as per the purchaser's scheme:

- i. Manual
- ii. Automatic through 00 - 24 hrs time switch
- iii. Automatic through combination of 00 - 24 hrs time switch and a remote sensing device for monitoring external illumination level. Each SLP shall be provided with a time switch and a remote light sensing device.



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4.2.4 Number of Luminaires

a) All calculations shall be done as per the input data covered under “Engineering Inputs”.

b) Total AC luminaires

Total number of AC luminaires for indoor and outdoor areas shall be calculated on the basis of point to point method by an established computer program. Optimisation criteria shall form part of street lighting calculations.

For AC emergency lighting, a specified percentage of total AC luminaires shall be considered as AC emergency luminaires.

4.2.5 Layout Considerations

a) General Layout Considerations

- i. Layout of equipment such as LDBs and LPs shall be on the basis of following criteria :
 - Ease of operation
 - Maintainability
 - Aesthetics
- ii. Luminaires shall be located to meet the functional requirements of the area. Aesthetics shall form part of layout considerations.
- iii. Due considerations shall be given to the mounting arrangement depending upon location and type of area.
- iv. While preparing lighting system layout drawings for air conditioned control rooms/areas having false ceilings, the vendor shall be required to interface with the Air Conditioning / Ventilation Duct layout and false ceiling layout drawings to avoid fouling / interference.
- v. The poles shall be located 1.5m away from the road edge. The buried cable shall run in hume pipe / duct bank wherever it is crossing the roads.
- vi. 240V AC, 6/16A universal socket (at least two number) shall be provided in office, store, cabin etc. The receptacles shall be provided at interval of 20m or part thereof for hand tools etc. One no. 20A, 240V AC industrial type receptacle shall be provided at suitable location in all other area as required. The receptacles shall be controlled through switch/MCBs. In hazardous area, receptacles shall be flame proof.
- vii. Suitable nos. of 63A/125A, 3 phase, 415V industrial receptacle with switch shall be provided at specific points in power plant area for welding purposes. At least one 63A/125A receptacle shall be provided in each off-site building.



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viii. 1200mm/ 1400mm sweep ceiling fans with stepped electronic regulator shall be provided for office room, store rooms and social buildings which are not covered by air-conditioned and ventilation system.

ix. All fans including pedestal fans shall comply to relevant IS.

b) Conduit System

- i. Unless indicated otherwise, conduits shall originate from respective lighting panels and shall continue upto the luminaires for all indoor areas.
- ii. Conduits shall run in straight runs, parallel to building columns, walls etc. as far as practicable.
- iii. Unnecessary bends and crossings shall be avoided.
- iv. In the corrosive environment, conduit installations shall be made with corrosion proof conduits. Such requirements shall be clearly indicated while preparing BOQ.
- v. Conduits in control room and other air-conditioned areas shall be surface mounted on the roof above false ceiling. However vertical drops of conduits shall be through column flanges or grooved to the wall, finally covered for better aesthetics.

c) Wiring

- i. Each circuit from LP shall be taken in a separate conduit.
- ii. Wiring of AC normal, AC emergency & DC emergency lighting system shall be carried out in separate conduits.
- iii. Receptacle wiring shall be distinct from lighting conduits. No two phase circuits shall be run in the same conduit. However different circuits of same phase may be laid in the same conduit.
- iv. Maximum five nos. of receptacles shall be loop-in & loop-out in a circuit.
- v. Filling area of wires in conduit shall not exceed 40% of the conduit area.
- vi. Wiring shall be done with following conductor sizes :
 - Luminaires – 2.5 sq. mm
 - 6A plug & socket – 2.5 sq. mm
 - 6/16A and 20A plug & socket – 4 sq.mm
- vii. Wiring shall be designed for the uniformly distributed spread of luminaires on each phase i.e. R, Y,B. Distribution of luminaires on these phases shall be such so that there is generally uniform light intensity in the event of failure of one or two phases.



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- viii. Luminaires located in offices, stores, laboratories, toilets etc. shall be individually or group controlled.

d) Cabling

- i. Cables shall be considered wherever it is not desirable to run the insulated wires due to long runs or for any other valid reason.
- ii. Cable Schedule shall be prepared for all cable connections.

4.3 ENGINEERING OUTPUTS:

Vendor shall prepare and submit following documents and drawings for purchaser's approval :

- a) Lighting calculations for indoor areas covering details such as room dimensions (length, width, height), illumination level, reflection factors (walls, ceiling, floor), maintenance factor, type of luminaire, mounting height of luminaire, room index, coefficient of utilisation, no. of luminaires (AC Normal & AC Emergency), lumen output of each luminaire, reference drawings and remarks.
- b) Lighting calculations for outdoor areas covering average illumination level, type of luminaire, chart for illumination level at various points in the area; location (coordinates), number and height of poles; type, number (normal + emergency) and orientation of luminaires etc. Calculated values of average and minimum illumination level as obtained through computer package shall also be furnished. Dot density plots for lux level shall be furnished if available in the computer package.
- c) Single line diagrams of power distribution upto Lighting Panels. Separate drawing for complete lighting distribution shall also be prepared by vendor.
- d) Loads on each phase of LP and LDB with consideration of diversity factor for sockets.
- e) Layout drawings for each indoor area indicating location of luminaires, sockets, fan points, exhaust fans, LDBs and LPs. Details of type of luminaires, source of power supply (AC Normal, AC Emergency, DC Normal and DC Emergency). Bill of Material shall also be covered which shall include unit wise requirements of luminaires and other items.
- f) Layout drawings for each outdoor area indicating location of poles / towers, orientation of luminaires, sockets and LPs. Details of pole height / mounting height, type of luminaires, source of power supply (AC Normal, AC Emergency, DC Emergency). Bill of Material shall also be covered for various types of luminaires.
- g) Conduit layout drawings with wiring and load distribution details as superimposed on the area layout drawings indicated above. Drawings shall include Bill of Material for conduits, wires etc.
- h) Wiring and load distribution details for outdoor areas.



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- i) Master Bill of Material (to be submitted at regular intervals of engineering progress) including all items required for the complete lighting system viz. lighting fixtures, lamps, Lighting DBs, Welding DBs, lighting panels, conduits, PVC wires etc.
- j) In case of revised inputs or site feedback, preparation and submission of revised engineering outputs shall also be in the scope of vendor.

5.0 LUMINAIRES, ACCESSORIES AND LAMPS

5.1 GENERAL REQUIREMENTS OF LUMINAIRES

- a) All luminaires and accessories shall be designed for continuous operation and shall be suitable for the system design data given in Data Sheet A.
- b) Luminaires shall be complete with accessories mounted inside the luminaire assembly. Lamps shall be supplied separately as per BOQ.
- c) All luminaires and accessories shall be suitable for operation in the atmospheric conditions prevailing at site.
- d) Power factor for fluorescent lamp luminaires shall be 0.9 or more and that for HPMV/ HPSV luminaires shall be 0.85 or more. Power factor correction capacitors shall be provided for this purpose.
- e) Luminaires shall be designed for minimum glare. No bright spots should appear from the lamp or from the reflectors.
- f) All accessories shall be wired upto a terminal block or a separate weather proof metallic terminal box suitable for 2.5 sq. mm. copper wire termination.
- g) All internal wiring shall be of PVC or silicon rubber insulation, capable of withstanding the maximum temperature to which it will be subjected under specified service conditions without deterioration.
- h) All luminaires and accessories including the breathing holes shall be vermin proof.
- i) Surface Treatment:
 - All surfaces after manufacture shall be thoroughly cleaned and degreased. Pre-treatment of surfaces shall be as per the applicable standard. Pretreated surfaces shall be free from rust, sharp edges, scales and burrs.
 - Finish of surfaces shall be non-porous, smooth and unfaded.
- j) All metal parts of the luminaires shall be bonded and connected to the earthing terminal. Earthing terminal shall be suitable for connecting 14 SWG Cu wire.



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- k) Flood lights shall be provided with base frame / base plate for mounting on structural steel members / wall.
- l) All weather proof luminaires shall have the control gear housed in a weather proof enclosure with necessary gaskets, mounting bracket, locking screws etc

5.2 LUMINAIRE TYPES & OTHER ITEMS

5.2.1 General requirements depending upon type of luminaire are listed below. Specific requirements of each luminaire are indicated in "Luminaire Details" enclosed as Annexure-I.

a) Channel Mounted Luminaires (Fluorescent Luminaires)

- Channel mounted luminaires, except the special purpose luminaires, shall have CRCA sheet steel base plate / rail / channel / box / side panels / housing as per "Luminaire Details". Sheet shall be completely stove enameled unless mentioned vitreous enameled in "Luminaire Details". Colour of enamel shall be grey on all non-reflecting surfaces and white on reflecting surfaces.
- Twin fluorescent luminaires shall be wired in lead-lag circuit to minimise stroboscopic effect.
- Luminaires suitable for surface mounting shall also be suitable for pendant mounting. Knockouts of 20mm ET conduit fixation shall be provided for this purpose.

b) Decorative Fluorescent Luminaires

- Decorative luminaires shall be provided with one of the following as per "Luminaire Details" :
 - i. Perspex acrylic diffuser.
 - ii. High purity, anodised aluminium, mirror optic reflectors with anodised aluminium matt finish transverse fins to control glare.
 - iii. Opal polystyrene louvers and sheet steel side panels.
 - iv. Vertical metallic louvers finished in stove enamelled white and with sheet steel side panels.
- End plates of decorative luminaires shall be of high impact polystyrene or sheet metal finished in black colour.



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- Diffusers and louvers for the fluorescent lamps shall be made of high impact polystyrene sheet and shall have no yellowing property over a prolonged period of use.
- Recessed type decorative luminaires shall be suitable for mounting with gypsum boards / luxalon / plaster of Paris/aluminium frame false ceiling of standard size as per Data Sheet A and “Luminaire details”.

c) Industrial Fluorescent Luminaires (General Purpose)

- Additional reflectors, wherever provided, shall be easily removable type.

d) Industrial Fluorescent Luminaires (Special Purpose)

- Luminaires for chemical vapour (acidic / alkaline) laden environment shall be of cast aluminium controlgear box and end boxes. Controlgear housing shall have detachable, one piece neoprene gasket cover to make it weather proof. Design shall be suitable for chemically charged environment.
- Luminaires for corrosive and dust laden environment shall be made of tray type sheet steel housing and transparent acrylic visor supported by a galvanised sheet steel frame, fitted to the housing with gasket all around. Cable entry shall be from the side of luminaire. Luminaire shall be totally dust and vapour proof.
- Luminaires for highly corrosive environment shall have with sheet aluminium/ polycarbonate housing. controlgear housing, CRCA sheet steel controlgear tray with a stove enamelled white reflector. A clear acrylic cover of dish shape, secured to canopy by stainless steel toggle and neoprene gasket lining, shall be provided at the bottom.
- Luminaires for drip proof environment such as street lighting fluorescent luminaire shall have sheet aluminium canopy, a detachable reflector-cum-controlgear housing, clear ribbed acrylic cover held in aluminium frame. Luminaire shall have the degree of protection IP:55 unless mentioned otherwise in Data Sheet A. Luminaire shall be suitable for side entry mounting with the pole bracket arm.

e) Bay Type Luminaires

- Luminaires shall be designed for following indoor applications:
 - i) High bay
 - ii) Medium bay
 - iii) Low bay



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- Luminaires shall have top mounted, cast aluminium controlgear housing. Housing shall have cooling fins and canopy for easy access to the components. Canopy shall be hinged at one end and wing screw bolted at the other end.
- Controlgear shall be connected to the detachable lamp housing at the bottom such that heat dissipation is proper and distributed.
- Lamp housing-cum-reflector shall be made from spun aluminium, electrochemically brightened and anodised.
- Lamp housing for the dust laden environment shall be totally enclosed type. A clear toughened glass cover shall be attached to the lamp housing with an aluminium frame and neoprene gasket. Luminaire shall be provided with a safety chain for toughened glass.
- Mounting arrangement shall consist of MS brackets with an anti-vibration eye-bolt.
- Side mounted controlgear box shall be provided for low bay luminaires, if mentioned in "Luminaire Details".

f) Well Glass Luminaires

- Well glass luminaires shall be suitable for dust and vapour laden environment.
- Luminaires shall be provided with a die-cast aluminium canopy and heat resistant well glass, fitted with a ring type gasket.
- All well glass luminaires shall be provided with vitreous enamelled reflector.
- Zinc plated MS wire guard shall be provided for protection of well glass.
- Separate side mounted and top connected control gear box shall be provided for use with HPMV & HPSV lamps.
- Integral control gear box, where applicable, shall be of die cast aluminium material with one piece neoprene gasket between the box and its cover to make it dust and vapour proof.
- Luminaires shall be conduit mounted type for incandescent lamps and surface mounting type for HPMV & HPSV lamps.

g) Flame Proof Well Glass Luminaires

- Housing material shall be cast aluminium alloy LM6. Housing outer surface shall be provided with cooling fins.



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- Flame proof luminaires shall be provided with heavy toughened well glass cemented in a retaining ring.
- Zinc-coated / chrome-plated MS chain connected to the main body and glass retaining ring shall be provided.
- A detachable terminal box at the top shall be provided.
- Neoprene gaskets, where needed, shall be provided for weather proof construction and indoor and outdoor application.
- Two cable entries of 20mm ET conduit shall be provided with one flame proof plug.
- Luminaires shall be suitable for the hazardous areas as classified in Data Sheet A. Design of flame proof luminaire shall be supported by the type test report for flame proofness from a government or government approved independent laboratory.

h) Street Lighting Luminaires (Other than Fluorescent Luminaire)

- These luminaires shall be suitable for street lighting and general purpose outdoor area lighting.
- Luminaire housing shall be one piece cast aluminium alloy to accommodate lamp housing and controlgear for lamp wattage upto 150 watts. For lamp wattage above 150 watts, controlgear housing shall be of cast aluminium alloy whereas lamp housing shall be of deep drawn aluminium.
- Inside finish of the lamp housing shall be stove enamelled white. Optical control shall be provided with two high purity, electro brightened and anodised side reflectors.
- Clear acrylic bowl fitted with a rubber gasket and easily removable type shall be secured to the lamp housing.
- Provision shall be made for adjustment of lamp location for proper focussing.
- Luminaires shall be suitable for mounting with pole bracket arm.

i) Flood Lighting Luminaires

- Flood light lamp housing and reflector shall be separate from controlgear box. Requirements of controlgear box are specified elsewhere.
- Lamp reflectors shall be of high purity spun aluminium attached to the cast aluminium lamp holder housing at the rear. Lamp holder housing shall be provided with cooling fins.



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- Reflector shall be closed from the front by heat resistant toughened glass and synthetic “S” type weather proof gasket.
- Luminaire shall be provided with special lamp centering and focussing device ensuring good beam control.
- MS mounting bracket shall allow fixation of the flood light in any position in a horizontal plane and the flood light can be locked in at any set angle in the vertical plane. Cast iron base and / or two protector scales shall also be provided where specified in “Luminaire Details”
- Design shall permit replacement of lamp from the rear without disturbing the previously set aiming angles. Special guide pins shall also be provided for protecting the lamps from damage while replacing.

j) Halogen Flood Lighting Luminaire

- Luminaires shall be compact in design with aluminium alloy housing and three piece highly polished and anodised reflector assembly.
- Toughened glass panel in the front shall be provided with silicon gaskets.
- Lamp replacement from the front is also acceptable.

k) Post Top Lanterns

- Luminaire shall comprise of a spun aluminium canopy, opal acrylic diffuser and a cast aluminium spigot.
- Controlgear shall be integral type and shall be housed in the spigot.
- Luminaire shall be supplied without mounting pole.

l) Bulk Head (Flame Proof)

- Bulk head luminaires shall be used for the locations where explosion or fire hazard exists.
- Luminaire shall be made of cast iron housing with integral terminal box.
- Front of the luminaire shall be covered with flat toughened glass cemented into a retaining ring.
- Lamp replacement shall be from the front.
- Controlgear box for HPMV lamps shall be integral to the housing.
- MS fixing straps shall be provided for mounting.



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- Luminaire shall be stove enameled grey outside and white inside.
- Terminal box shall be provided with 20 mm ET conduit entry.
- Complete luminaire shall be suitable for the hazardous area as classified in Data Sheet A. Type test certificate for flame proofness test from government or government approved independent laboratory shall be submitted.

m) Bulk Head (Weather Proof)

- Luminaire shall be suitable for indoor / outdoor applications having weather proof features.
- The luminaire shall comprise of die cast aluminium alloy body of dish shape.
- Luminaire shall have a heat resistant prismatic cover held in a weather proof gasket.
- Luminaire shall be stove enamelled grey outside and white inside.
- Glass cover shall have a galvanised wire protection.
- Luminaire shall be provided with locking arrangement with Allen key to prevent pilferage.
- Luminaire shall be suitable for use with incandescent lamp upto 100W.
- Provision for 20 mm ET conduit entry shall be provided at the bottom.

n) LED type Luminaires:

- LED Luminaires shall be used for the lighting if specified in BOQ as part of NIT.
- In false ceiling area LED luminaires shall be recessed mounting type & in non-false ceiling area the LED luminaires shall be surface mounting type.
- The individual lamp wattage for LED shall be upto 3 watt.
- The luminaire efficacy shall be not less than 90 Lm/W.
- The LED used in the luminaires shall have colour rendering index (CRI) of Min 65. Colour designation of LED shall be "cool day light" (min 5700K) type.
- The LED luminaire shall have minimum life of 25,000 burning hours with 80% of lumen maintenance at the end of the life.
- The beam angle for LED chip shall be 120 degrees.



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- The max. junction temperature of LED shall be 85 deg C, further the lumen maintenance at this temperature shall be min 90%.
- The THD of LED Luminaires shall be less than 10%. Further the EMC shall be as per IS 14700. The power factor of the luminaire shall not be less than 0.9.
- The marking on luminaire & safety requirements of luminaire shall be as per IS standards.
- Suitable heat sink with proper thermal management shall be designed & provided in the luminaire.
- The connecting wires used inside the system, shall be low smoke halogen free, fire retardant PTFE cable.
- Fuse protection shall be provided in input side specifically for LED luminaires.
- Care shall be taken in the design that there is no water stagnation anywhere. The entire housing shall be dust and water proof protection as per IS 12063.
- Driver Circuit: LED modules and drivers shall be compatible to each other. The LED module driver's ratings and makes shall be as recommended by corresponding LED manufacturer. LED Drivers may have following control & protections:
 - Suitable precision current control of LED.
 - Open Circuit Protection
 - Short Circuit Protection
 - Over Temperature Protection
 - Overload Protection

o) Emergency Lighting Luminaires

- The luminaire shall be automatic having in-built battery.
- Battery shall have integral charging unit.
- Charger shall be suitable for operation as per system design data.
- The battery enclosure shall be suitably painted and ventilated for the performance with sealed lead acid battery, as applicable



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5.3 CONTROLGEAR BOX (NON-INTEGRAL TYPE)

- a) Boxes shall have weatherproof construction and shall be provided with one piece neoprene gasket.
- b) Boxes shall be provided with HRC fuse mounted on a removable tray. Boxes shall be provided with all necessary components having a neat layout arrangement such that it is possible to test, inspect or replace any component without difficulty.
- c) Boxes shall be suitable for mounting on structures, walls and columns.
- d) Suitable number of terminals shall be provided for looping-in and looping-out of cable connections and also connections to the luminaire(s).
- e) Cable / conduit knock-outs shall be for each loop-in and loop-out connection and also connection to the luminaire(s).

5.4 REFLECTORS

- a) Reflectors shall be made of sheet steel or aluminium as applicable.
- b) The aluminium reflectors shall be made of high purity aluminium sheet. Sheet will be polished, electrochemically brightened and anodised.
- c) Wherever reflectors are separate from housing, they shall be securely attached to the luminaire by means of easily accessible fastening devices such that they are readily removable from the housing for maintenance.

5.5 LAMP HOLDERS

- a) Holders shall be resistant to wear and shall be smooth in operation.
- b) Contacts shall be of durable quality.
- c) Holders shall hold the lamp under condition of shock and vibration.
- d) Lamp holders for fluorescent lamp shall be spring loaded, bi-pin, rotor type with low contact resistance.
- e) Live parts of the holder shall not be exposed when the lamp is inserted or removed in case of fluorescent luminaires.
- f) Lamp holders for HPMV & HPSV lamps shall be of porcelain material.
- g) Holders shall be screw type for HPSV & HPMV lamps. Holders for incandescent lamps shall be screw type, unless mentioned otherwise in Data sheet A.
- h) Lamp holders for incandescent lamps shall be of brass or porcelain.



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5.6 STARTER HOLDERS

- a) Starter holders shall be designed and manufactured as per the applicable standard.

5.7 BALLASTS

- a) Fluorescent fixtures shall have electronic ballasts. Ballasts shall be totally enclosed type.
- b) Ballasts shall be easily removable type.
- c) Core shall be made of low loss, electrical grading stampings.
- d) End connections shall be made available in a terminal block, rigidly fixed to the ballast enclosure.
- e) Ballasts shall be free from humming.
- f) Ballast shall be provided separately for each lamp in a multi-lamp luminaire.
- g) Tappings shall be provided to set the voltage within range for HPMV & HPSV luminaires.

5.8 STARTERS

- a) Starters shall be made of aluminium material. Plastic or any other material if used shall be subject to purchaser's approval.
- b) Starters shall have bi-metal electrodes.
- c) Starter shall be replaceable without the use of any tool and without disturbing any accessory or lamp.
- d) Starters shall have high mechanical strength.
- e) Starters shall be provided with radio interference suppressing capacitors.
- f) Starters shall have brass contacts.

5.9 CAPACITORS

- a) Capacitors shall have constant value of capacitance, suitable for operation at supply voltage.
- b) Capacitors shall be hermetically sealed, preferably in a metal enclosure to prevent seepage of impregnant and ingress of moisture.



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5.10 LAMPS

- a) Lamps shall be suitable for use in any position.
- b) Lamps shall be capable of withstanding small vibrations without breakage to filaments / electrodes and lead-in wire.

5.10.1 Type of Lamps

- a) Fluorescent Lamp
 - i. Anode rings shall be provided to prevent blackening of the ends.
 - ii. Lamp caps shall be two pin type at each end.
- b) Incandescent (GLS) Lamps
 - i. Incandescent lamps shall be “clear” type.
- c) Mercury Vapour Lamps
 - i. Lamp caps shall be screw type.
- d) Sodium Vapour Lamps
 - i. Lamps shall be ovoid shaped with diffusing powder coating.
 - ii. Lamps shall be provided with external igniters and rapid restart facility.
 - iii. Lamp caps shall be screw type.
- e) Halogen Lamps
 - i. Lamps shall be double ended linear type.
 - ii. Lamps shall be of immediate start type.
 - iii. Design of lamps shall ensure high performance and high efficiency.

6.0 DESIGN REQUIREMENTS (MAIN EQUIPMENT EXCEPT LUMINAIRES AND LAMPS)

6.1 LIGHTING DISTRIBUTION BOARD (LDB) / WELDING DISTRIBUTION BOARD (WDB)

6.1.1 General Requirements of LDBs/ WDBs

- a) LDB/WDB shall be totally enclosed, modular in construction, indoor type and suitable for electrical system data as specified in Data Sheet-A. The LDB/ WDB shall be free standing type suitable for installation on cable trenches / floor.



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- b) LDB/ WDB shall consist of dust and vermin proof cubicles without the use of louvers (except the transformer compartment, where applicable).
- c) Good quality synthetic rubber / neoprene gaskets shall be put around the door, cover edges and cut-out edges for push button, lamps etc. for protection against dust. The door when closed, shall compress the gasket uniformly.
- d) Cut-out edges for instruments, relays etc. shall have sufficient overlap surface to minimize the dust entry. The arrangement for the front mounting of switch handles shall render the LDB/ WDB reasonably dust free such that the normal operations are not affected.
- e) The LDB/ WDB shall be designed to prevent contact with live parts both within the modules and in the cable alley.
- f) The bidder shall be responsible to check and coordinate the MCB characteristic with back up fuses etc. provided.
- g) All equipment shall be constructed of non-hygroscopic and non-inflammable materials.
- h) All components mounted in the LDB/ WDB shall be accessible and shall not impede access to wiring or terminals. All faults except busbar fault which may occur within any individual unit shall be confined within that unit only and shall not cause shutdown of any section of the board other than the affected unit itself. Maintenance and inspection shall be possible in any individual unit without affecting other units.
- i) Incoming unit shall comprise of either switch-fuse/ composite switch-fuse unit or MCCB as per Data Sheet A. Outgoing units shall be either switch-fuse/ composite switch-fuse unit or MCCB as per data Sheet A.
- j) Interlock between compartment door and modules shall be provided such that the door cannot be opened without switching off the power supply to the module.
- k) Defeat interlock shall be provided for the units comprising of switch or moulded case circuit breaker as a means of isolation device, such that it is possible to open the door with device ON. It shall not be possible to close the door till the interlock has been reinstated.
- l) Each LDB/ WDB shall be fitted with base frame made of angle or channel.
- m) All fixing nuts and bolts together with grounding bolts shall be provided.
- n) Lifting lugs shall be provided for each shipping section of LDB/ WDB. Removal of such lugs or hooks shall leave no opening in the LDB/ WDB.

6.1.2 LDB/ WDB with transformers (Additional Features)



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- a) The LDB/ WDB shall be arranged in two adjacent but separate compartments, one compartment for the lighting transformer and the other for the incoming & outgoing feeders etc.
- b) The transformer shall be mounted on the base channel and it shall be possible to easily remove the transformer from the cubicle after opening the door. Necessary portable ramp made of mild steel shall be supplied along with each LDB/ WDB.
- c) Independent gasket hinged door with operating handle shall be provided for access to transformer & its taps. Operating handle shall have built-in key locking arrangement.
- d) Suitable ventilation arrangement for the transformer compartment to dissipate the heat of the transformer shall be provided. The arrangement shall be in the form of louvers and the same shall be provided with galvanised wire mesh with dust catchers on the inside.
- e) Connections between transformer secondary terminals and the busbars shall be made by using PVC insulated flexible copper cables or busbars.
- f) Warning plate shall be provided on transformer enclosure. The inscription of warning plate shall be as given below:
 - DO NOT OPEN DOORS WHEN ENERGISED
 - KEEP TAPS AT SAME POSITION FOR ALL PHASES
- g) Transformer enclosure shall be provided with a danger plate.

6.1.3 Lighting Transformer/ Welding Transformer

- a) Transformer, where specified, shall form an integral part of LDB/ WDB.
- b) Lighting transformer shall be dry type, natural air cooled and suitable for mounting inside the lighting distribution board. Transformer particulars shall be as specified in Data Sheet A.
- c) Rating of transformer shall be as per BOQ.
- d) Winding shall be of copper material and maximum winding temperature at full load and under site conditions shall not exceed 120 °C.
- e) Transformer shall be suitable for cable connections on the primary side and flexible cable or busbar connection on the secondary side.
- f) The secondary neutral of the transformer shall be brought out for getting a grounded 4 wire supply system.
- g) The transformer neutral shall be brought outside the LDB/ WDB for earthing. The neutral bus bar shall be insulated from the LDB/ WDB enclosure.



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- h) Transformers shall be provided with the rollers, pulling holes, lifting lugs, jacking positions etc.

6.1.4 Busbars, Connections and Joints

- a) Busbars shall be supported on non-hygroscopic and non-inflammable insulators of material such as glass reinforced moulded plastic material, epoxy cast resin etc. Separate supports shall be provided for each phase of the busbars. Insulation level of neutral busbar shall be same as that of phase busbars.
- b) Busbars shall be contained in a separate vermin-proof compartment within the LDB/ WDB and shall have bolted sheet steel covers for providing suitable access.
- c) Busbar clearances in the air shall be as per applicable standard for 415V, 3 phase system.
- d) Temperature for busbars, droppers and connections shall not exceed 90 deg.C for an ambient of 50 deg.C while carrying maximum continuous current.
- e) The busbar, busbar connections and supports shall have sufficient strength to withstand thermal and electromechanical stresses produced by the specified short circuit level of the system.
- f) Busbars (including neutral busbar) shall be capable of carrying the short-time current specified in Data Sheet A. The duration of short-time current shall be 1 sec unless mentioned otherwise in Data Sheet A. For the specified current and duration, there shall be no damage to the equipment.
- g) The neutral bus shall be rated same as phase bus.
- h) Main busbars and connections shall be prominently marked and displaced for standard sequence counting from rear to front, top to bottom, or left to right as viewed from the switching device operating mechanism side.
- i) Busbars and connections shall be provided with colour coded PVC sleeves. All live parts shall be properly shrouded with insulating material.
- j) Earth busbar shall be provided separately.
- k) Busbar Joints
- Busbar and tap off joints shall be bolted type.
 - Busbars shall be thoroughly cleaned before jointing. Suitable contact grease shall be applied to remove oxide film just before jointing.
 - For copper busbars, the connecting portion shall be tinned or silver plated.

6.1.5 Wiring and Terminals



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- a) All internal wiring for connections to remote equipment shall be brought to terminal boards. Spare contacts of devices shall also be wired upto terminal board as per schemes. Wires shall not be jointed or teed-off except at terminal points.
- b) Wiring shall be made by 1100 volt grade three / seven strand PVC insulated copper wire having a cross-sectional area of not less than 2.5 sq.mm. All connections from CT leads upto instruments, terminals shall be made by copper wires of minimum 2.5 sq.mm size.
- c) All wiring shall be made with the Colour Codes specified below :
- i) 3 phase AC Connections
 - Phase 1 (R) Red
 - Phase 2 (Y) Yellow
 - Phase 3 (B) Blue
 - Neutral Black
 - ii) 1 phase AC Connections
 - Phase Red / Yellow / Blue (as per associated circuit)
 - Neutral Black
 - iii) DC Connections
 - Positive White
 - Negative Grey
 - iv) Earth Connection Green
- d) Where wiring passes from one compartment to another, the aperture shall be 'Bushed' to prevent damage to wires against sheet metal edges. Bushes may comprise of good quality rubber / PVC grommets.
- e) Every wire end shall be fitted with numbered ferrules of white or yellow colour having glossy finish with identification number engraved in black. Ferrules shall be made of moisture and oil resisting insulating material. Ferrules shall be of interlocked type or tight fitting type. Ferrules shall be so fitted that they will not get detached, when the wire is removed from the terminal.
- f) System of marking of wiring shall be as per applicable standard.
- g) All wires used internally shall have crimped on tinned copper lugs for terminations.
- h) Terminal boards shall be stud type with insulating barriers of adequate height.
- i) Terminal boards shall have separate terminals for incoming and outgoing wires with not more than two wires connected to any one terminal.



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- j) Terminal boards shall be mounted vertically or in the horizontal rows and properly spaced to have clean wiring arrangement, adequate access for putting ferrules, making terminations etc. It shall be possible to read the ferrule numbers when the wiring is complete. Where terminals may be live when the equipment is isolated from the main supply, these shall be clearly marked near the terminal boards.

6.1.6 Controls

The controls shall be provided as per purchaser's requirements covered in the specification and control schemes.

6.1.7 Switch Fuse Units

Refer clause 7.0 (COMPONENTS OF MAIN EQUIPMENT)

6.1.8 Cable Terminations

- a) All cables, either incoming or outgoing to the LDB/ WDB, shall be terminated in a cable chamber. For each panel, there shall be a cable chamber on the side. The door of cable chamber should open or be locked with the help of a tool. Unless stated otherwise in Data Sheet A, all cables shall enter from the bottom.
- b) Removable undrilled gland plates of sheet steel shall be provided in the cable chamber for entry of cables. Minimum thickness of gland plate shall be as per Data Sheet-A. The gland plate shall be of adequate size for connecting requisite number of cable glands for power and control cables.
- c) Heavy duty bolt-on termination tinned copper lugs of compression type shall be used for power cable termination. The tinned copper cable lugs for all incoming and outgoing power cables shall be supplied by the vendor.
- d) For supporting and clamping of cable cores at regular interval in cable alleys, suitable slotted angle upto the respective terminal blocks shall be provided.

6.1.9 Earthing

- a) An earth busbar of adequate size shall be provided at the bottom for the entire length of the LDB/ WDB. Material of earth busbar shall be GI unless mentioned otherwise in Data Sheet A
- b) Every metal part other than those forming parts of an electrical circuit shall be connected to the earth bus by means of high conductivity copper wire of size not less than 2.5 sq. mm. cross-sectional area.
- c) Doors shall have a flexible copper wire for earth connection to fixed unit.
- d) Each LDB/ WDB shall be fitted with two earthing studs located in accessible position on sides for connection of internal earth busbar to the external earthing connection.
- e) Earth busbar shall be brought outside LDB/ WDB for making external connections.



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6.1.10 Types of LDB/ WDB

a) The LDB/ WDB shall be of following type:

- LDB/ WDB-H (n) - AC LDB/ WDB with ta100 kVA transformer
- LDB/ WDB-F (n) - AC LDB/ WDB with 50 kVA transformer
- LDB/ WDB-N (n) - AC LDB/ WDB with no transformer
- LDB-D (n) - DC LDB

NOTE: (n) indicates number of outgoing feeders.

b) AC LDB/ WDB (LDB/ WDB-H, LDB/ WDB-F, LDB/ WDB-N)

Each LDB/ WDB shall comprise of the following and comply with Data Sheet A :

- i. One lighting/welding transformer (LDB/WDB-H & LDB/WDB-F).
- ii. Incomer(s) of TP / TPN switch-fuse unit or MCCB / MCCB with neutral link as per Data Sheet A. It shall be provided on the primary side of transformer for LDB/WDB type LDB/WDB-H & LDB/WDB-F.
- iii. Set of busbars with 3 phase and neutral.
- iv. TPN switchfuse units or MCBs for each outgoing circuit.
- v. Three indicating lamps with fuses for indicating bus supply ON.
- vi. CT operated ammeter with selector switch.
- vii. VT operated voltmeter with selector switch.
- viii. Power & control terminals, earth-stud, earth busbar, designation labels, internal wiring, power cable lugs, glands etc. shall be provided to complete the LDB/ WDB in all respects.

c) DC LDB (LDB-D)

Each LDB shall comprise of following and comply with enclosed Data Sheet A :

- i. Incomer & Outgoing feeders shall be as per Datasheet-A.
- ii. Two pole DC contactor on the incoming circuit for changeover to DC in case of AC normal supply failure.
- iii. One under voltage relay of suitable range, if required.



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- iv. One ON delay timer.
- v. One test push button.
- vi. Set of busbars for positive and negative.
- vii. Two indicating lamps with fuses for indicating bus supply ON.
- viii. Power & control terminals, earth-stud, earth busbar, designation labels, internal wiring, power cable lugs, glands etc. shall be provided to complete the LDB in all respects.

6.2 LIGHTING PANELS (LPs)

6.2.1 General Requirements of Lighting Panels

- a) LPs shall be totally enclosed, suitable for electrical system data as specified in Data Sheet A. The LP shall be suitable for mounting on wall / column / structure.
- b) Panels shall be suitable for indoor / outdoor application as per Data Sheet A.
- c) All components of the LP shall be fully mounted inside the panel. LPs shall have only one operational front. Door shall be provided to give full access to all the components. Door shall have padlocking arrangement.
- d) LPs shall consist of dust and vermin proof cubicles without the use of louvers.
- e) Good quality synthetic rubber / neoprene gaskets shall be put around the door. The door when closed, shall compress the gasket uniformly.
- f) The LPs shall be designed to prevent contact with live parts when the front door is open.
- g) All busbars (phase, neutral, positive, negative as applicable) within a panel shall be of the same size.
- h) All control wiring inside the panels shall be carried out with 1100 V grade, PVC insulated flexible copper wire of 2.5 sq. mm size.
- i) The rated continuous current of the equipment and components shall be as given in Datasheet-A. These ratings shall be obtained with the components mounted in their housing as in service without exceeding the permissible temperature rise.
- j) Each LP shall be fitted with M.S. mounting brackets.
- k) Panel shall be suitable for top / bottom cable / conduit entries. However, outdoor LPs shall have bottom cable / conduit entry. Removable undrilled gland plate of sheet steel shall be provided for entry of cables. Minimum thickness of gland plate shall be



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as per Data Sheet-A. The gland plate shall be of adequate size having knock-outs for requisite number cable connections. Gland plate shall be provided with gasket.

- l) The lighting panel shall be complete with copper busbars, and shall incorporate incomer and outgoing circuits as per Data Sheet-A. Number of outgoing circuits shall be as per BOQ.
- m) Each lighting panel shall be fitted with two GI earth studs located in accessible position on the outside of the panel on opposite sides.
- n) All metal parts of the panel except current carrying parts shall be bonded together electrically to the earthing stud.
- o) Each panel shall be fitted with phase barriers of fireproof insulating material in such a manner that it is not readily possible for personnel to touch the phase busbars. Insulating sheet shall be fitted around the MCBs such that only the surface and toggle of the MCBs are available on the front.
- p) The supply of cable lugs for power and control cable connections forms part of the supply of equipment.
- q) Each panel shall be provided with a circuit directory plate with inscriptions neatly typed and laminated, fitted on the inside of door.

6.2.2 Type of Lighting Panels

- a) LP-A (n) - AC Lighting Panel
- b) LP-D (n) - DC Lighting Panel
- c) LP-F (n) - Fancy Lighting Panel (Decorative)
- d) LP-S (n) - Street Lighting Panel

NOTE: (n) indicates number of outgoing circuits.

6.2.3 AC Lighting Panel (LP-A)

- a) LPs shall be provided with incomer and requisite number of outgoing circuits as per Data Sheet-A. Number of outgoing circuits shall be as per BOQ.
- b) Separate neutral shall be available at terminal block for each outgoing circuit.
- c) Construction of AC Normal and AC Emergency panels shall be same.

6.2.4 DC Lighting Panels (LP-D)

- a) LPs shall be provided with incomer and requisite number of outgoing circuits as per Data Sheet-A. Number of outgoing circuits shall be as per BOQ.



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6.2.5 Decorative Type Lighting Panels (LP-A)

- a) Decorative lighting panels shall be designed for use in areas like administrative building, service building, canteen, residential premises etc.
- b) Thickness of sheet steel shall be as per manufacturer's practice.
- c) LPs shall be of tone colour with elegant finish.
- d) LPs shall be provided with incomer and requisite number of outgoing circuits as per Data Sheet-A. Number of outgoing circuits shall be as per BOQ.
- e) LPs shall be suitable for either surface or flush mounting. Flush mounted panels shall have the collared door suitable for matching with the wall.
- f) Lighting Panels may be provided with transparent acrylic cover for operation of MCBs.
- g) LPs shall be provided with knockouts on the top, bottom and sides.

6.2.6 Street Lighting Panel (LP-S)

- a) Street Lighting Panels shall be provided for feeding power supply to luminaires of street light poles, flood lighting poles, lighting masts, watch towers etc.
- b) Each Street Lighting Panel shall comprise of the following :
 - i. One TPN door interlocked switch-fuse unit incomer. Interlock defeat feature shall also be provided.
 - ii. Three pole AC Contactor
 - iii. 0 - 24 hrs timer and/or photo-electric switch for automatic switching of contactor
 - iv. Three phase & neutral busbars
 - v. Single pole or three pole MCBs for each outgoing circuit as per Data Sheet A
 - vi. Two lamps for bus supply ON & OFF indications
 - vii. Complete wiring arrangement as per control scheme.
 - viii. Auto-Manual selector switch
 - ix. ON push button
 - x. OFF push button



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- c) Switching ON and switching OFF shall be through both 0 - 24 hrs timer and light sensor in automatic mode.
- d) One number light sensor in weather proof enclosure having IP:55 degree of protection shall be supplied loose along with each SLP.
- e) Internal power wiring shall be done with PVC insulated Cu wire of suitable size. All control wiring inside the panel shall be carried out with 1100 V grade, PVC insulated flexible copper wires.
- f) Two nos. outgoing circuit in each panel shall be tapped before contactor for watch tower supply.

6.3 LIGHTING POLES

6.3.1 Lighting poles as required for street lighting and flood lighting shall be of swaged/stepped tubular steel of swan neck construction as per applicable standard.

6.3.2 Where painted type of poles is specified (to be done at vendor's works);

- a) The poles shall be coated with black bituminous paint, conforming to applicable standard, throughout on the inside surface and on the outside surface up to the level which is embedded in ground.
- b) Exposed outside surface shall be painted with two coats of red oxide and zinc chromate in synthetic compound primer.
- c) Final painting shall be done at site after installation. Same is not in vendor's scope.

6.3.3 Where galvanization of poles is specified;

- a) All inside and outside surfaces of the pole and base plate shall be hot dip galvanised as per manufacturer's practice.
- b) Base plate shall be galvanised after welding to the pole base.
- c) Weight and thickness of zinc coating shall be as per Datasheet-A.

6.3.4 Each street lighting pole shall be supplied with necessary pipe-reducer / fixing-bracket for fixing the luminaire.

6.3.5 Each street lighting pole shall be suitably provided with weather proof, galvanised steel junction box and two numbers fixing brackets suiting the diameter of the pole. The requirements of junction box are stipulated elsewhere. The fixing brackets shall be supplied loose.

6.3.6 Street lighting pole shall be provided with wiring hole. The location shall be coordinated with mounting position of street lighting pole JB. The diameter of hole shall be 20 mm. The hole shall be provided with a rubber / PVC grommet.

6.3.7 Flood lighting pole shall be provided with painted MS plate and shall be suitable for the number of flood lighting luminaires and controlgear boxes.

6.3.8 Provision for earthing shall be provided for flood / street lighting poles at a height 1 metre above the ground (MS flat size shall be informed during detailed engineering). The pole shall be earthed at two points.

6.3.9 Types of Lighting Poles



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Exact type and designation of lighting pole is as given in Data Sheet A. Basic types are as follows:

- a) PS1 - Street Lighting Pole for one luminaire with 1200mm bracket arm.
- b) PS2 - Street Lighting Pole for one luminaire with 1800mm bracket arm.
- c) PS4 - Street Lighting Pole for two luminaires with 1800mm bracket arm each.
- d) PF1 - Flood Lighting Pole for one luminaire.
- e) PF2 - Flood Lighting Pole for two luminaires.

Details of luminaire shall be provided during detailed engineering.

6.4 POLE JUNCTION BOXES JB(S)

6.4.1 Junction boxes with terminals shall be supplied for branching and terminating lighting wires/cables.

6.4.2 Construction Features

- (a) The junction boxes shall be fabricated out of material specified in Datasheet-A and shall be of rectangular shape. The cover shall be hinged or bolted with captive nuts and bolts and shall be provided with neoprene gasket lining all over.
- (b) The junction boxes shall be provided with suitable knock outs/ gland plates for conduit/ cable connection. The conduit connection shall be properly sealed. The junction boxes meant for cable connection shall be complete with removable gland plates, glands and cable lugs, as required. The junction boxes shall be provided with two earthing terminals suitable for 14SWG CU earthing wires.
- (c) The junction boxes shall be weather proof type. Junction boxes for street light poles and lighting/lightning masts shall be provided with hinged doors and allen keys with bolts as locking arrangement
- (d) The boxes and cover shall be hot dip galvanised.
- (e) The junction boxes shall be suitable for mounting on lighting poles, mast etc. The brackets, bolts, nuts, screws and any other erection accessories required for erection shall be provided along with the junction box.

6.4.3 Terminals

- (a) Multiway terminal blocks of approved type and make complete with galvanised screws, nuts, washers and marking strips shall be furnished for terminating the lighting wires.
- (b) All the terminals blocks shall be of 650V grade one piece construction with insulating barriers. These terminals shall be made of copper alloy and shall be stud type. Each terminal provided on junction box shall be suitable for terminating two numbers of aluminium conductors of the size as specified without any damage to the conductors or looseness.

6.4.4 The junction boxes shall be of following types:

Type	Description
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JB-S These are to be made of thermoplastic material with transparent cover, fitted with fuse base and fuse, also connecting terminals for low voltage cables to a maximum of three cables each 4 x 6 mm²/ two no. 4CX16 mm² copper cables, including cable glands.
Earthing screws with suitable bimetallic feature are to be provided for attaching the lead-coated copper conductor of the earthing system

JB-M: These are to be made of thermoplastic material with transparent cover, fitted with fuse base and fuse, also connecting terminals for low voltage cables to a maximum of three cables each 4 x 6 mm²/ two no. 4CX16 mm² copper cables, including cable glands.
Earthing screws with suitable bimetallic feature are to be provided for attaching the lead-coated copper conductor of the earthing system

6.5 LIGHTING MASTS

- 6.5.1 Lighting mast shall be continuously tapered polygonal cross section hot dip galvanised. The Mast shall be of height as specified in Datasheet-A with lantern carriage to enable raising/lowering for ease of maintenance, including the Head Frame, Double Drum Winch, continuous stainless steel wire rope, in built power tool, aviation warning light, lightning protection arrangement along with necessary power cables within the mast. The mast shall be delivered only in three sections & shall be joined together by slip stressed fit method without carrying out any welding or bolting of joints at site. Lantern carriage shall be suitable for mounting flood light fixtures, numbers as specified in Datasheet-A (fixture details shall be provided during detailed engineering). Carriage shall be provided with JB type M to facilitate interconnection to lighting fixtures.
- 6.5.2 Permissible design parameters should be according to relevant standard. The deflection under the maximum wind pressure of 150 kg/sq.m shall not exceed 1 in 360. The Mast together with the fixtures shall be capable of withstanding the appropriate wind loads as per IS: 875 Part III.
- 6.5.3 The Mast shall be fabricated from special steel plates conforming to BS-EN10-025 and folded to form a polygonal section.
- 6.5.4 A suitable winch arrangement shall be provided to lower & raise the Lantern Carriage Assembly. Winch shall be of completely self-sustaining type without the need for brake shoe, springs or clutches. The min. working load shall not be less than 750 kg. The winch drum shall be grooved to ensure perfect seat for stable and tidy rope lay with no chances for slippage. Winch shall be operated by an internally mounted three phase motor/power tool with necessary reduction gear mechanism. A handle for manual operation of winch shall also be provided. An adequate door opening shall be provided at the base of the Mast.
- 6.5.5 All surfaces (inside & outside) of steel sections, members and hardware used shall be hot dip galvanised as per applicable standard.
- 6.5.6 Necessary mounting facilities for mounting of luminaires and control gear boxes shall be provided at top platform. This shall include provision of holes in the fixing bracket for movable fixing plate.



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Adequate number of movable plates affixed to the bracket shall also be provided. Size of movable plates and the position of holes shall match with the luminaire fixing arrangement.

6.5.7 Mast shall be provided with 1200mm long air termination for the lightning protection (at top of the mast as per IS-2309). Suitable arrangement for connection of down conductor (not in the scope of vendor) shall be provided. Provision of earth connection of GI strip shall also be kept at a height of one metre from the ground (conductor size shall be informed during detailed engineering).

6.5.8 Types of Lighting Masts

- a) LM20 - Lighting Mast with 20 m height
- b) LM25 - Lighting Mast with 25 m height
- c) LM30 - Lighting Mast with 30 m height

6.6 COMPONENTS OF MAST FEEDER PANEL

Lighting mast shall be complete in all respect and shall be provided with feeder panel complete with power/control circuit along with 63A TPN MCB, contactors, timers, photocell, MCB's, motor protections (O/L & single phase), start/stop PB with indication lamps. Feeder pillar shall have provision of receiving 4Cx16 sq mm. cable. All necessary cables between feeder panel & JB-M and between JB-M & fixtures are also included in the scope of mast and same shall be of proven design.

6.7 JUNCTION BOXES

6.7.1 Junction boxes with terminals shall be supplied for branching and terminating lighting wires/cables whenever required, as specified.

6.7.2 Construction Features

- i. The junction boxes shall be fabricated out of material & thickness as specified in Datasheet-A and shall be of rectangular shape. The cover shall be hinged or bolted with captive nuts and bolts and shall be provided with neoprene gasket lining all over.
- ii. The junction boxes shall be provided with suitable knock outs/ gland plates for conduit/ cable connection. The conduit connection shall be properly sealed. The junction boxes meant for cable connection shall be complete with removable gland plates, glands and cable lugs, as required. The junction boxes shall be provided with two earthing terminals suitable for GI earthing wires.
- iii. The junction boxes shall be weather proof type conforming to IP-55..
- iv. The boxes and cover shall be hot dip galvanised. Junction boxes for corrosive areas like DM Plant, water treatment plant etc. shall have additional epoxy/acrylic coating of thickness not less than 50microns on outer surface.



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- v. The junction boxes shall be suitable for mounting on wall, columns, etc. The brackets, bolts, nuts, screws and any other erection accessories required for erection shall be included.

6.7.3 Terminals

- (c) Multiway terminal blocks of approved type and make complete with galvanised screws, nuts, washers and marking strips shall be furnished for terminating the lighting wires.
- (d) All the terminals blocks shall be of 650V grade one piece construction with insulating barriers. These terminals shall be made of copper alloy and shall be stud type. Each terminal provided on junction box shall be suitable for terminating two numbers of aluminium conductors of the size as specified without any damage to the conductors or looseness.

6.7.4 The junction boxes shall be of following types:

Type	Description
JB-F	Provided with four (4) way stud type terminals for terminating upto 2 nos. 4 mm ² stranded copper conductors on each terminal, suitable for outdoor installations.
JB-FE	Same as above but with an additional epoxy coating of 50 micron thickness.
JB-S:	These are to be made of thermoplastic material with transparent cover, fitted with fuse base and fuse, also connecting terminals for low voltage cables to a maximum of three cables each 4 x 6 mm ² / two no. 4CX16 mm ² copper cables, including cable glands. Earthing screws with suitable bimetallic feature are to be provided for attaching the lead-coated copper conductor of the earthing system

6.8 RECEPTACLES

- 6.8.1 Receptacle unit shall consist of socket outlet with associated switch and plug. The socket outlet and switch shall be flush mounted on a box which shall be suitable for mounting on wall or steel structures.
- 6.8.2 Receptacle boxes shall be fabricated from material with thickness mentioned in Data Sheet A.
- 6.8.3 Steel boxes shall be hot dip galvanised/ painted as specified in Datasheet-A and as per the requirements of applicable standard corresponding to the sheet thickness.



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6.8.4 The boxes shall have conduit knock-outs and shall be suitable for cable entry of the size to be specified by purchaser during detailed engineering.

6.8.5 The boxes shall be provided with neoprene rubber gaskets to make them moisture and dust proof.

6.8.6 Suitable loop-in and loop-out terminals shall be provided inside the box. Terminals for incoming and outgoing shall be suitable for the size of conductor of cables.

6.8.7 The receptacle units shall be of the following types:

I. Type RA: It shall have the following:

- i. 20A, 240V, 1-phase, 2 pole, 3-pin (third pin scrapping earth) porcelain, metal clad socket with a metallic cover tied to it.
- ii. Rotary, heavy duty 20A switch conforming to applicable standard.
- iii. Shrouded, die-cast aluminium plug.
- iv. It shall be combined interlocked weather proof industrial unit.
- v. Mechanical interlock shall be provided as follows :
 - Switch can be put ON only when plug is fully engaged.
 - Plug can be withdrawn only when switch is in OFF position.
 - Cover can be opened only when switch is in OFF position.
- vi. The arrangement should ensure that water does not enter the plug when socket is ON.
- vii. Loop-in loop-out terminals shall be provided inside the box suitable for 10 mm² Al conductor.

II. Type RB: It shall have the following:

- i. Combination of 5A & 15A, 240V, 1-phase, 2 pole, 3-pin, third pin grounded socket with integral piano key type 15A switch, flush mounted on decorative bakelite (6 mm thick)/ perspex (3 mm thick) sheet as cover of the boxes.
- ii. Loop-in loop-out terminals similar to type RA shall be provided. These will be located in office areas.

III. Type RC: It shall have the following:

- i. 63A, 415V, 3-phase-neutral earth, metal clad socket with cover



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- ii. Rotary, heavy duty 63A switch conforming to applicable standard.
- iii. Shrouded, die-cast aluminium plug
- iv. It shall be combined, interlocked weather proof industrial unit.
- v. Mechanical interlock shall be same as that are applicable for RA type receptacles
- vi. The receptacle boxes shall be suitable for entry and exit of 3.5CX70 mm² Al conductor PVC cable and loop-in loop-out terminals for the same shall be provided such that not more than one core is terminated at one terminal. Removable, undrilled cable gland plate shall be provided. Tinned copper lugs and double compression cable glands shall also be supplied by the bidder.

IV. Type RD: It shall have the following:

- i. 125A, 415V, 3-phase-neutral earth, metal clad socket with cover.
- ii. Rotary, heavy duty 125A switch conforming to applicable standard.
- iii. Shrouded, die-cast aluminium plug
- iv. It shall be combined, interlocked weather proof industrial unit.
- v. Mechanical interlock shall be same as that are applicable for RC type receptacles
- vi. The receptacle boxes shall be suitable for entry and exit of 3.5CX95 mm² Al conductor PVC cable and loop-in loop-out terminals for the same shall be provided such that not more than one core is terminated at one terminal. Removable, undrilled cable gland plate shall be provided. Tinned copper lugs and double compression cable glands shall also be supplied by the bidder.

V. Type RE: It shall have the following:

- i. 5A, 240V, 1-phase, 2 pole, 3-pin, third pin grounded socket with integral piano key type 5A switch, flush mounted on decorative bakelite (6 mm thick)/ perspex (3 mm thick) sheet as cover of the boxes.
- ii. Loop-in loop-out terminals similar to type RA shall be provided. These will be located in office areas.

6.9 CEILING FAN & REGULATORS

- a) The bidder shall supply the following ceiling fans complete with suspension rod, canopy and accessories and regulators:
 - i. 1200 mm sweep



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ii. 1400 mm sweep

- b) The fan motor shall be totally enclosed. The motor winding shall be of copper wire provided with double or reinforced class-E insulation.
- c) The fan shall have three (3) well balanced blades. Precaution shall be taken in the manufacture of fan as well as regulators to ensure reasonable degree of silence at all speeds.
- d) The regulator shall be electronic type with stepped/smooth (stepless) control of approved make.

6.10 LIGHTING CONTROL SWITCH-BOXES

6.10.1 The switch-boxes shall be of bent steel construction, fabricated of 1.6 mm thick MS steel with 6 mm thick decorative bakelite or 3 mm thick perspex sheet cover. The boxes shall be hot dip galvanised.

6.10.2 The switch-boxes shall be suitable for surface mounting as well as flush mounting in brick walls. They shall be flush mounted in the walls in the office areas where false ceiling is provided.

6.10.3 Switch-boxes shall have conduit knock-out on two sides. Adequate provision shall be made for ventilation of these boxes. Conduit knock-out sizes shall be as per conduit layout drgs.

6.10.4 Switches shall be of piano-key type having quick-make, quick-break mechanism, provided with position marking, suitable for mounting on insulating plate. The switches shall be suitable for 1-phase, 240V, 50 Hz supply. They shall conform to relevant standards. The switches shall be supplied loose and shall be fixed at site according to requirement.

6.10.5 All components housed in the switch-boxes shall be wired to an outgoing junction box by 1.5 mm² Cu wire. The junction box shall have adequate nos. of terminals.

6.10.6 The size of switch-boxes shall be adequately chosen to accommodate the no. of switches and fan regulator boxes specified below. Fan regulators shall be supplied separately.

- i. Type SWB1 - Switch board with 1 no. 5A switch, JB type SW1.
- ii. Type SWB2 - 3 nos. 5A switches and 1 no. fan regulator, JB type SW2.
- iii. Type SWB2a - 4 nos. 5A switches, JB type SW2.
- iv. Type SWB3 - 7 nos. 5A switches, 3 nos. fan regulator, JB type SW3.
- v. Type SWB3a - 8 nos. 5A switches, JB type SW3.



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JB details for lighting control switch boxes are as below :

JB-SW1 Provided with four (4) way stud type terminals, each terminal suitable for terminating upto two nos. of 10 mm² stranded aluminium conductor.

JB-SW2 Similar to the JB-SW1 but provided with ten (10) way terminals.

JB-SW3 Similar to the JB-SW1 but provided with eighteen (18) way terminals.

7.0 COMPONENTS OF MAIN EQUIPMENT (OTHER THAN LUMINAIRES)

7.1 MOULDED CASE CIRCUIT BREAKERS

7.1.1 Moulded case circuit breakers (MCCBs) shall be provided when called for in Data Sheet A for use in lieu of switch fuse. MCCB shall meet the requirements stipulated in Data Sheet A.

7.1.2 MCCBs in AC circuits shall be of single throw, air break, heavy duty type triple pole construction arranged for simultaneous three pole manual closing and opening and for automatic tripping at short circuit and overload. Neutral link shall be provided for LDB/ WDB without transformers.

7.1.3 Operating mechanism shall be quick make, quick break and trip free type.

7.1.4 The ON, OFF & TRIP positions of the MCCB shall be clearly indicated so as to be visible to the operator when mounted as in service. Operating handle shall be provided on front of the LDB/ WDB.

7.1.5 MCCBs shall be capable of withstanding the thermal stresses caused by overloads and short circuits. The maximum tripping time under short circuit shall not exceed 20 milli-seconds.

7.1.6 MCCB terminals shall be shrouded and designed to receive cable lugs for cable sizes relevant to circuit ratings.

7.1.7 Under voltage releases and other releases shall be provided as specified in data Sheet-A.

7.2 SWITCH-FUSE UNITS

7.2.1 These units shall preferably comprise of switches having integral fuses, called composite units. Alternatively, combination units of separate switch and fuse may also be acceptable.

7.2.2 These units shall be provided for general purpose i.e. incoming or outgoing units.

7.2.3 The units shall be of the air break air insulated type and designed to ensure safety to operating personnel.



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- 7.2.4 Composite units shall have integral fuses i.e. fuse carrier with fuse link (fuse link forming the moving contact). The design shall ensure that the moving contact is not live when switch is open i.e. in OFF position, so as to facilitate removal of fuse.
- 7.2.5 The switch shall be capable making and carrying the system prospective fault current, but limited in magnitude and duration by the cut off characteristics of the largest HRC fuse link that may be fitted to that unit.
- 7.2.6 The fixed contact shall be so shrouded that maintenance of the unit can be carried out in safety with the busbars live.
- 7.2.7 Where one isolating switch is used as the incoming device, the incoming side fixed contacts shall be shrouded to ensure that maintenance can be carried out with the remote fuse and switch closed.
- 7.2.8 Composite switch-fuse or the combination of switch and fuse shall meet the requirements of its components as follows:

Isolating Switch

- Switches shall be air-break, quick make, and quick break heavy duty type conforming to applicable standard.
- All switches shall have visible ON / OFF position indication and shall be padlockable in any (ON / OFF) position.
- Switches shall be door interlocked such that it shall not be possible to gain access to inside the unit unless the isolating switch is in OFF position.
- The switches shall be suitable for independent manual operation.
- The switch contacts shall be of silver alloy or silver plated copper and springs of non-corrosive material.
- Inter-phase barriers shall be provided to prevent possibilities of phase to phase fault in the switch. The switch shall also be shrouded from all sides to prevent access to live parts on the switch after opening the unit door. The barriers and shrouding shall extend upto the height of switch to fully enclose both side terminals of the device. The arrangement shall permit easy maintenance.

High Rupturing Capacity (HRC) Fuses

- The fuse serving as the short-circuit protective device in isolating fuse-switch units shall be of HRC cartridge, current limiting and plug-in non-deteriorating type.
- The fuse carriers shall be easily withdrawable for replacement of fuse. Insulated fuse pullers shall be provided where fuses are not mounted in insulating carriers to remove and replace fuses in live conditions.



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- iii. Fuses shall preferably be fitted with a device to indicate operation (i.e. when the fuse has blown).
- iv. Live terminals of fuse bases shall be shrouded to prevent contact with personnel where fuse links are not mounted in carriers and are directly plugged into the fuse base. Inter-phase barriers extending throughout the length of the fuse base shall be provided to prevent inter-phase short circuit. They shall be shrouded from all sides to prevent accidental contact.
- v. Fuse carriers and bases shall be of good quality moulded insulating material. Porcelain fuse bases and carriers will not be accepted.
- vi. The rating and characteristics of fuse links shall be chosen appropriately for short circuit protection of circuits downstream.

7.3 MINIATURE CIRCUIT BREAKERS

- 7.3.1 The use of miniature circuit breakers (MCBs) combining thermal overload and magnetic short circuit protection shall be application for the outgoing circuits of Lighting Panels.
- 7.3.2 MCBs shall have suitable rating as specified in Data Sheet A.
- 7.3.3 MCBs shall be suitable for housing in the lighting panel and for connection of copper link bus bar at the incoming and copper lugs at the outgoing ends.
- 7.3.4 The terminals of MCB and ON/OFF positions shall be clearly and indelibly marked.

7.4 CURRENT TRANSFORMERS

- 7.4.1 CTs shall be air insulated having insulation class E or better, cast resin type and shall be capable to withstand the thermal and mechanical stresses resulting from maximum short circuit.
- 7.4.2 The short time current duration for CTs shall be one second.
- 7.4.3 CT primary current shall not be less than the full load thermal rating of the associated circuit. CT secondary current shall be as specified in Data Sheet A. Polarity shall be marked in a suitable manner. The ratings shall be adequate to cater for the burden of connected instruments.
- 7.4.4 CTs shall be of bar primary / wound primary / ring type capable of carrying the rated primary current.

7.5 VOLTAGE TRANSFORMER

- 7.5.1 Voltage transformers (VT) shall be dry, cast resin type comprising of single phase or three phase units. They shall have their primary windings protected by current



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limiting fuses with interrupting capacity corresponding to that of the lighting board / panel.

7.5.2 VT secondary windings shall be earthed in LDB/ WDB / LP through link, which can be removed for insulation testing.

7.5.3 Three phase voltage transformers shall be as per Data Sheet A.

Single phase VTs shall have voltage rating of (Nominal System Voltage / $\sqrt{3}$) V / (110 / $\sqrt{3}$) V so that secondary voltage shall be 110 volts phase to phase when the secondary winding is star connected.

7.5.4 VTs shall have an output rating adequate to cater to the burden connected to them.

7.6 INDICATING METERS

7.6.1 Meters shall be panel mounted, flush type and suitable for rear terminal connection.

7.6.2 Meters and instruments shall be enclosed in dust proof, moisture resistant black finished cases and shall be suitable for tropical use. Instruments shall be suitable for operation from the secondary windings of CTs and VTs.

7.6.3 All instruments shall be calibrated to enable direct reading of primary quantities. Instruments shall be adjusted and calibrated at manufacturer's works and shall have means of calibration, checking and zero adjustment at site.

7.6.4 All the divisions and the quantity to be measured shall be clearly marked. Instruments shall conform to applicable standard having black numerals and lettering on white anti-parallax dial with knife edge pointer. Indicating instruments shall be of moving iron type for AC and moving coil type for DC circuits.

7.6.5 Instruments having metallic cases shall be fitted with earthing terminals.

7.7 CONTACTORS

7.7.1 Contactors shall be of the air break type, electromagnetic type fitted with arc shields.

7.7.2 The operating coil shall be suitable for satisfactory operation in the range of 85% - 110% of nominal voltage specified under the Data Sheet A. The coil shall be tropicalized having insulation not less than class 'E'.

7.7.3 Electrically independent auxiliary contacts not less than 2NO + 2NC for interlocking and indication shall be fitted to individual power contactor.

7.7.4 All springs shall be made out of a corrosion proof material.



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7.8 RELAYS

7.8.1 Relays shall be provided on the various circuits as per schemes. Relays shall be flush mounted on front of the board. Relay case shall be painted with dull black or egg shell black enamel and with back connected terminals. Metal cases and frames of relay shall be earthed.

7.8.2 All relays shall be of withdrawable type with built-in testing facilities, with provision for inspection, maintenance and replacement. Where built-in test facility is not provided for a particular relay, separate suitable test block shall be provided on the board for this purpose.

7.8.3 Relay performance shall not alter due to mechanical shock or vibration or external magnetic field which may be present at the place of mounting.

7.8.4 Each relay shall not have less than two independent pairs of contacts.

7.9 TIMERS

7.9.1 Time Switch

- a) Time switch shall be suitable for automatic switching ON and OFF of street lighting / flood lighting circuits.
- b) Time switch have 00 - 24 hrs clock base.
- c) Time switch shall indicate actual time and shall permit accurate time setting.
- d) Time switch shall be rugged, independent of normal fluctuations of voltage / frequency and free from maintenance.
- e) Contact rating, clock accuracy, rated voltage rating and frequency rating of timer shall be suitable to its application.
- f) Time switch shall be provided with Ni-Cd battery.
- g) Time switch shall be suitable for mounting inside the panel.

7.9.2 On/Off Delay Timer

- a) On delay timer shall be required for continuation of DC supply for a limited duration when the AC Emergency supply has been restored and DG set is under stabilisation.
- b) Timer shall be fully static and suitable for operation on normal frequency and system voltage.
- c) Timer shall have high setting accuracy, high repeat accuracy, low reset time and low power consumption.



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d) Timer shall have the time setting range as mentioned in Data Sheet A.

e) Timer shall be suitable for mounting inside the panel.

7.10 SELECTOR SWITCHES

7.10.1 The rating and other features of the switches shall be suitable for the application. The number of positions and the number of contacts required for each switch shall be as indicated in the schemes

7.10.2 Selector switches shall be stay put type, provided with properly designated escutcheon plates clearly marked to show operating position.

7.10.3 Terminals carrying potential above 120 Volts shall be shrouded to prevent accidental contact with personnel.

7.10.4 Ammeter selector switches shall have make before break contacts.

7.10.5 The switches shall be suitable for semi-flush mounting with the front plate and operating handle projecting out. All connection to the switches shall be from the back.

7.10.6 The arrangement for front mounting of these devices shall be such as to make them reasonably dust free so as not to interfere with normal operation.

7.11 PUSH BUTTONS

7.11.1 Push button shall be heavy duty, flush mounted suitable for the application.

7.11.2 Push button shall be provided with integral escutcheon plates marked with its function identified as per schemes.

7.11.3 Colour shall be appropriate to the function.

7.11.4 Minimum number of contacts shall be 2 NO + 2 NC or as per the requirements of control scheme.

7.12 INDICATION LAMPS

7.12.1 Indication lamps shall be complete with lens covers and holders.

7.12.2 Each lamp shall be fitted with a durable resistance integrally wired in series with the lamp. Alternatively, lamps with built in transformers are acceptable.

7.12.3 The lamp cover (lens) shall be translucent of appropriate colour.

7.12.4 Bulbs and covers shall be interchangeable, easily replaceable from the front without the need for any special means.



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7.12.5 Terminals having potential above 120V shall be shrouded to prevent contact with personnel.

7.12.6 Terminals shall be suitable for ring type copper cable lugs of size depending upon the circuit rating.

7.13 CABLE GLANDS

7.13.1 Whether specifically mentioned or not, cable glands of suitable sizes shall be supplied along with each equipment for power and control cables.

7.13.2 Rubber components used in the gland shall be of neoprene.

7.13.3 Name / trade name of manufacturer, type no. and applicable range of outer diameter of cable shall be engraved / indelibly printed on the cable gland.

7.14 CABLE LUGS

7.14.1 All equipment shall be supplied with the power and control cable lugs of suitable size, whether specifically mentioned or not.

7.14.2 Name / trade name and size of lug shall be engraved/ indelibly printed on each cable lug.

7.15 TERMINALS

7.15.1 Terminals shall be stud type of copper material.

7.15.2 Terminals shall be provided with transparent cover(s).

7.15.3 Separate terminals shall be available for each termination of loop-in and loop-out power connections.

8 LABELING

8.1 Labels to identify all the Main assemblies, Sub-assemblies and components of the LDB/ WDB and LPs shall be provided.

8.2 Name and rating plate / marking shall be provided as required by relevant standard applicable to each component / assembly to be identified.

8.3 Labels shall be of two colour, three layer plastic material with matt or semi matt finish or of the anodised aluminium sheet.

8.4 All labels other than "Danger" or "Warning" labels shall have black lettering on a white background. Danger labels shall be as per applicable standard and shall not be affixed on to removable parts.



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- 8.5 All labels shall be securely fixed on to the equipment by means of self tapping screws or other approved means.
- 8.6 Stick-on type labels of good quality and permanent mounting shall be acceptable for internally mounted components only.
- 8.7 A list of all such items to be labeled and text and type of labels to be provided is given below:

a) BOARD DESIGNATION (MAIN EQUIPMENT LABEL)

- i. **Inscription :**
Designation & LDB/ WDB number for LDB/ WDB.
Designation and LP number for LPs.
- ii. **Location :**
Top centre in the front of the LDB/ WDB.
Top centre in the front of the LP.
- iii. **Material :**
3 Layer plastic material, fixation by self tapping, non-rusting screws, black inscription on white back ground.

b) OUTGOING - FEEDER DESIGNATION

- i. **Inscription :** Module number, LP number / purpose.
- ii. **Material :**
Black engraving on white anodised aluminium plate of thickness 1.6 mm or more. Plate to be secured with screws.

c) COMPONENT DESIGNATION

- i. **Inscription :** Letter symbol / Legend as assigned in schemes.
- ii. **Location :** Near or on the component
- iii. **Material :** Stick-on type

8.8 CIRCUIT DIAGRAM / DIRECTORY PLATE

- 8.8.1 A diagram is to be prepared for fixing to the inside cover of every lighting panel/mast feeder panel giving details of the points controlled by each circuit.
- 8.8.2 The circuit list shall be typed or printed stating the location of the equipment served, rating of the protective unit and the circuit loadings.



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8.8.3 The list shall be mounted on the inside of the cover door and shall be protected by an acrylic sheet cover to be easily removable to permit circuit modifications.

9 SURFACE TREATMENT

- 9.1 All metal parts and the surfaces (exterior & interior) of equipment, unless stated otherwise in case of reflectors, shall be degreased by dipping in hot alkaline solution and rubbed with wire brush to remove oil & scale from them & then rinsed in water. Alternatively, they may be shot / sand blasted.
- 9.2 Parts shall be pickled by dipping in hydrochloric acid tank to remove the rust from the surfaces formed during storage of sheets & then rinsed to remove traces of the acid. The cleaning and pretreatment of all metal parts shall be as per applicable standard.
- 9.3 The surfaces to be painted shall then be prepared by phosphatizing to protect them from further rusting & to create a good bond with the paint. The pretreatment shall conform to the applicable standard.
- 9.4 All parts shall then be subjected to a coat of red oxide primer paint.
- 9.5 All inside and outside surfaces of panel shall be spray painted with synthetic enamel of the shade and minimum thickness as per Data Sheet A.
- 9.6 Electrostatic or powder painting shall be acceptable subject to purchaser's approval.
- 9.7 Wherever possible, finished parts shall be coated with peelable compound by spraying method to protect the finished product from scratches, grease, dirty and oily spots during handling and transportation.

10.0 PACKING

- 10.1 Packing procedure shall conform to the General Technical Conditions (Volume IIC).
- 10.2 Packing of the material shall be sea worthy

11.0 GUARANTEED PERFORMANCE REQUIREMENTS

- 11.1 The vendor shall guarantee satisfactory performance of the equipment supplied under all conditions and requirement as laid down by this specification.
- 11.2 For the general requirements of performance guarantees refer to other parts of the specification.

12.0 INSPECTION & TESTING



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- 12.1 Inspection and testing of Lighting equipment shall be performed as per BHEL standard Quality Plans. Bidder shall sign and stamp the Quality Plans for conforming compliance. The equipment which are not covered in the Quality Plan shall be tested as per the QP to be submitted by bidder. Purchaser's comments shall be incorporated and final QPs shall be submitted for purchaser's approval during contract engineering stage. Modifications in the QP shall be incorporated without any cost implication to the purchaser.
- 12.2 All the components and completely assembled equipment shall be tested as per the latest edition of standards.
- 12.3 All the specified type and routine tests shall be carried out to verify the rating and performance of the equipment. Where valid type test certificates in evidence of equipment performance claimed are available & approved by purchaser, the requirements for conducting type tests may be waived. The general arrangement of object under test shall be to purchaser's approval.
- 12.4 Functional testing shall be carried out for Lighting Distribution Boards.
- 12.5 All manufacturing processes viz. machining, sheet forming, electroplating, wire routing, cleating & crimping, assembly, surface preparation shall conform to good manufacturing practices.
- 12.6 Inspection for dimensional & visual checks especially of the following, with respect to contract drawings, documents & standards shall be conducted:
- a) General sturdiness & rigidity of equipment.
 - b) Surface finishing.
 - c) Gasketing.
 - d) Inter-changeability.
 - e) Constructional features viz. location, accessibility & marking of components, segregation, accessibility to live parts (shrouding) etc.
 - f) Completeness of scope.
- 12.7 Safety interlocking verification shall be done.
- 12.8 Each lighting transformer shall be routine tested and one transformer of each rating shall be type tested in accordance with relevant standard in case type test certificates of similar transformers are not available / not acceptable to the purchaser.
- 12.9 Equipment shall be liable for rejection if tolerances on the values of dimensions, power consumption, impedances, temperature rise etc. exceed the specified values by purchaser and / or standards.
- 13.0 QUANTITY VARIATION



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- 13.1 Quantities of various items are indicated in BOQ as part of Section I, Volume IIB for the purpose of bidding.
- 13.2 Purchaser reserves the right to delete / add any of the equipment from the vendor's scope of supply. Unit prices quoted shall be considered for this purpose.
- 13.3 Unless stated otherwise in Data Sheet A, the unit rates quoted by the bidder for various equipment shall be firm for a variation as per NIT.
- 14.0 SPARES
- 14.1 A list of commissioning spares and O&M spares' quantities for a duration specified in Data Sheet A shall be filled up in the applicable schedule / format and submitted by bidder along with offer.
- 14.2 The bidder shall indicate any additional start-up and O&M spares and their recommended quantities, which may be required as per vendor's usual practice. However, the acceptance of the same shall not be binding on purchaser.
- 15.0 TOOLS AND TACKLE
- 15.1 Tools & tackle which are essential to facilitate assembly, adjustments, erection, maintenance & dismantling of equipment shall be provided as part of equipment supplied.
- 15.2 The above tools shall be supplied along with the initial consignment of equipment so as to be available prior to erection but may not be used for erection purposes.
- 15.3 Vendor shall also submit a list of recommended tools and tackle. Acceptance of these tools and tackle shall not be a binding on the purchaser.
- 15.4 Schedule of tools & tackle shall be filled up by bidder.
- 16.0 DOCUMENTATION
- 16.1 Purchaser's documents as part of tender
- Purchaser's single line diagrams, schematic drawings, documents etc. being enclosed in the specification are listed in Data Sheet A.
- 16.2 Documents to be submitted by the Bidder along with the bid.



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- a) Complete technical literature on luminaires, accessories and lamps.
- b) Quality Plans enclosed with the tender with bidder's seal and signature of acceptance on each sheet.
- c) Quality Plan for additional items.
- d) Catalogues / technical leaflets of all major components.
- e) Deviations from the technical specification, if any, brought out in the enclosed "Schedule of Deviations" (Volume III).
- f) Unpriced Price Schedules enclosed in Vol.III.
- g) Schedule of quantities of commissioning spares.
- h) Schedule of quantities of O&M spares.

16.3 Documents to be submitted by the vendor immediately after award of contract (Along with Data Sheet B).

- a) General arrangement drawings for all types of LDBs with following details :
 - i. Dimensions of each panel and overall dimensions.
 - ii. Arrangement of panels / modules.
 - iii. Floor mounting details and cutout details.
 - iv. Single Line Diagram.
 - v. Rating of components.
 - vi. Bill of quantities.
- b) General arrangement drawing of Lighting Transformer.
- c) Bar chart of activities of manufacture, testing, inspection and despatch.

16.4 Documents to be submitted during detailed engineering of contract

16.4.1 Engineering documents (refer clause 4.3) to be generated by the vendor, if applicable.

- a) Lighting calculations for indoor areas.
- b) Lighting calculations for outdoor areas.
- c) SLD of power distribution upto LPs.
- d) Control schemes for DC and street lighting
- e) Power load on each LP & LDB



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- f) Layout drawings for indoor areas
- g) Layout drawings for outdoor areas.
- h) Conduit layout drawings.
- i) Wiring and load distribution details for outdoor areas.
- j) Master Bill of Material.

16.4.2 Other documents :

- a) Final Quality Plans
- b) Polar curves, zonal flux diagram and CoU charts of luminaires.
- c) Complete design calculations for arriving at number of luminaires.
- d) Fixing / mounting details of luminaires and other items.
- e) General arrangement drawings of following :
 - i. Luminaires
 - ii. Controlgear boxes
 - iii. LPs
 - iv. Lighting Poles
 - v. Lighting Masts
 - vi. Street Lighting Pole JBs
 - vii. Fuse Boxes
 - viii. Receptacles
 - ix. 24 V Supply module
- f) Field Quality Plan as per General Technical Conditions.
- g) Rating and diagram plate drawing for lighting transformer.
- h) Structural design calculations for lighting tower.
- i) Foundation design calculations for lighting tower.
- j) Control Scheme for fluorescent, HPMV and HPSV luminaires.
- k) Schematic drawings for LDBs / LPs.



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l) Type test certificates.

m) Catalogues / leaflets

16.4.3 Operation and maintenance (O&M) manual :

16.4.3.1 The document shall comprise of installation, operating and maintenance instructions for various items / components. The O&M manual shall include the following :

a) Write ups / instructions / procedures for

- i. Storage at site.
- ii. Unpacking.
- iii. Handling at site.
- iv. Erection.
- v. Pre-commissioning / commissioning tests.
- vi. Operating procedures.
- vii. Maintenance procedures.
- viii. Precautions to be taken during operation and maintenance work.
- ix. Trouble shooting charts covering problems, cause and solution.

b) Approved Technical Data Sheets.

c) Characteristic curves of HRC fuses, MCCBs, MCBs etc.

d) Technical leaflet of various items / components.

e) Copies of the type, acceptance and routine test certificates in bound volume.

f) Details of all components liable to be replaced during the life of the equipment.

g) List of maintenance tools required.

h) List of testing equipment required.

16.4.3.2 Draft O & M manual shall be submitted for approval

16.4.3.3 Final O&M shall be submitted in bound volume.

16.5 AS BUILT DRAWINGS

16.5.1 In case Engineering is the scope of vendor, the preparation of As Built Drawings shall be the scope of vendor.



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- 16.5.2 The As Built Drawings shall be prepared on the basis of marked up copies received from the erection contractor.
- 16.5.3 Entire work of As Built Drawings shall be to the satisfaction of purchaser. Requisite number of prints and RTFs shall be submitted by vendor.
- 16.6 Number of copies of documents to be submitted by vendor shall be as per section-C of specification.
- 17.0 24 V SYSTEM
- 17.1 Each 24V AC supply module will have one no. air-cooled two winding, 500VA, 1-phase, 50HZ, 240/24V transformer with 5A (240V side) and 15A (24V side) HRC fuse and necessary 240V and 24V terminals for incoming and outgoing connections. The 240V terminals of 24V AC supply module will be fed from respective lighting panels (LP). A group of 5A, 24V AC sockets identified with colour coding in order to distinguish them from the normal 240V sockets will be envisaged.



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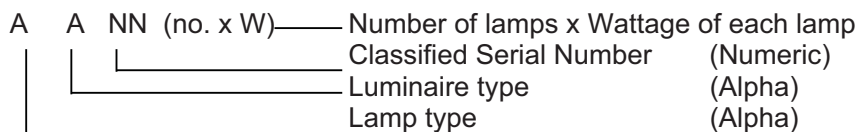
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ANNEXURE-I

LUMINAIRE DETAILS

LUMINAIRE CODING SCHEME

1.0 Code Structure



2.0 Lamp types

- a) F - Fluorescent
- b) M - Mercury Vapour
- c) S - Sodium Vapour
- d) T - Tungsten
- e) H - Halogen

3.0 Luminaire types

- a) C - Channel Mounted (Fluorescent)
- b) B - Bay Mounted
- c) W - Well Glass
- d) S - Street Lighting
- e) F - Flood Lighting
- f) H - Bulk Head
- g) P - Post Top Lantern
- h) E - Emergency Lighting
- i) X - Others

4.0 Serial Numbers

- a) 01 - 20 General Purpose (Industrial)
- b) 21 - 40 Decorative
- c) 41 - 50 Vapour Proof
- d) 51 - 60 Dust Proof
- e) 61 - 70 Drip Proof
- f) 81 - 90 Corrosion Proof
- g) 91 - 99 Flame Proof

NOTES :

1. Flood lighting luminaires to have non-integral control gearbox.
2. All other luminaires shall have integral control gearbox, unless specifically mentioned otherwise in enclosed sheets.
3. For more details of each luminaire, refer specification.

1.0 Fluorescent Lamp Luminaires



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1.1	FC01	1 x 28	Fluorescent, industrial box type base without any cover.
1.2	FC02	2 x 28	Fluorescent, industrial box type base without any cover.
1.3	FC03	1 x 28	Fluorescent, industrial box type base and stove enamelled side reflectors.
1.4	FC04	2 x 28	Fluorescent, industrial box type base and stove enamelled side reflectors.
1.5	FC05	1 x 28	Fluorescent, industrial box type base and vitreous enamelled side reflectors.
1.6	FC06	2 x 28	Fluorescent, industrial box type base and vitreous enamelled/ anodized glossy side reflectors.
1.7	FC07	1 x 18	Fluorescent, industrial box type base and vitreous enamelled side reflectors operating on 220V DC input supply.
1.8	FC21	1 x 28	Fluorescent, decorative with 3 side perspex acrylic diffuser.
1.9	FC22	2 x 28	Fluorescent, decorative with 3 side perspex acrylic diffuser.
1.10	FC23	1 x 28	Fluorescent, decorative, recessed type with perspex acrylic diffuser.
1.11	FC24	2 x 28	Fluorescent, decorative, recessed type with perspex acrylic diffuser.
1.12	FC25	1 x 28	Fluorescent, decorative, recessed type with mirror optic reflector.
1.13	FC26	2 x 28	Fluorescent, decorative, recessed type with mirror optic reflector.
1.14	FC27	2 x 28	Fluorescent, decorative with opal polystyrene louvers.
1.15	FC28	2 x 28	Fluorescent, decorative, recessed type with opal polystyrene louvers.
1.16	FC29	2 x 28	Fluorescent, decorative with vertical metallic louvers.
1.17	FC30	4 x 14	Fluorescent, decorative, recessed type, 600 x 600 size with perspex acrylic diffuser.
1.18	FC31	4 x 20	Fluorescent, decorative, recessed type, 600 x 600 size with opal polystyrene louvers.
1.19	FC32	2 x 20	Fluorescent, decorative, surface mounted with mirror optic reflector.



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- | | | | |
|------|------|--------|---|
| 1.20 | FC33 | 1 x 18 | Fluorescent, decorative, recessed type with mirror optic reflector operating on 220V DC input supply. |
| 1.21 | FC34 | 1 x 18 | Fluorescent, dust proof, totally enclosed type with sheet steel housing operating on 220V DC input supply |
| 1.22 | FC41 | 2 x 28 | Fluorescent, vapour proof with end boxes and controlgear box of cast Al. |
| 1.23 | FC51 | 2 x 28 | Fluorescent, dust proof, totally enclosed type with sheet steel housing. |
| 1.24 | FC61 | 1 x 28 | Fluorescent, street light with sheet aluminium canopy and ribbed acrylic cover. |
| 1.25 | FC62 | 2 x 28 | Fluorescent, street light with sheet aluminium canopy and ribbed acrylic cover. |
| 1.26 | FC81 | 2 x 28 | Fluorescent, corrosion proof, totally enclosed type with sheet aluminium/ polycarbonate housing. |

2.0 High Pressure Mercury Vapour (HPMV) Lamp Luminaire

- | | | | |
|------|------|----------|--|
| 2.1 | MB01 | 1 x 250 | Mercury, high bay, industrial type. |
| 2.2 | MB02 | 1 x 400 | Mercury, high bay, industrial type. |
| 2.3 | MB03 | 1 x 1000 | Mercury, high bay, industrial type. |
| 2.4 | MB04 | 1 x 250 | Mercury, high bay, totally enclosed industrial type. |
| 2.5 | MB05 | 1 x 400 | Mercury, high bay, totally enclosed industrial type. |
| 2.6 | MB06 | 1 x 250 | Mercury, high bay with non-integral controlgear box. |
| 2.7 | MB07 | 1 x 400 | Mercury, high bay with non-integral controlgear box. |
| 2.8 | MB11 | 1 x 250 | Mercury, medium bay, industrial type. |
| 2.9 | MB12 | 1 x 400 | Mercury, medium bay, industrial type. |
| 2.10 | MB13 | 1 x 250 | Mercury, medium bay, totally enclosed industrial type. |
| 2.11 | MB14 | 1 x 400 | Mercury, medium bay, totally enclosed industrial type. |
| 2.12 | MB17 | 1 x 80 | Mercury, low bay, industrial type. |



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2.13	MB18	1 x 125	Mercury, low bay, industrial type.
2.14	MB19	1 x 80	Mercury, low bay, totally enclosed industrial type.
2.15	MB20	1 x 125	Mercury, low bay, totally enclosed industrial type.
2.16	MW41	1 x 80	Mercury, well glass, vapour proof with vitreous enamelled reflector.
2.17	MW42	1 x 125	Mercury, well glass, vapour proof with vitreous enamelled reflector.
2.18	MW51	1 x 80	Mercury, well glass, dust proof with vitreous enamelled reflector.
2.19	MW52	1 x 125	Mercury, well glass, dust proof with vitreous enamelled reflector.
2.20	MW91	1 x 80	Mercury, well glass, flame proof with vitreous enamelled reflector and cast aluminium alloy LM6 housing.
2.21	MW92	1 x 125	Mercury, well glass, flame proof with vitreous enamelled reflector and cast aluminium alloy LM6 housing.
2.22	MW93	1 x 80	Mercury, well glass, flame proof with vitreous enamelled reflector and cast aluminium alloy LM6 housing
2.23	MW94	1 x 125	Mercury, well glass, flame proof with vitreous enamelled reflector and cast aluminium alloy LM6 housing.
2.24	MW95	1 x 80	Mercury, well glass, flame proof increased safety luminaire with vitreous enamelled reflector and cast aluminium alloy LM6 housing for Div.-2 areas.
2.25	MW96	1 x 125	Mercury, well glass, flame proof increased safety luminaire with vitreous enamelled reflector and cast aluminium alloy LM6 housing for Div. 2 areas.
2.26	MW98	1 x 125	Mercury, well glass, flame proof increased safety luminaire with vitreous enamelled reflector and cast aluminium alloy LM6 housing
2.27	MS61	1 x 125	Mercury, street light with one piece cast aluminium body.
2.28	MS62	1 x 250	Mercury, street light with two piece cast aluminium body.
2.29	MS63	1 x 400	Mercury, street light with two piece cast aluminium body.
2.30	MF61	1 x 250	Mercury, flood light, general purpose.
2.31	MF62	1 x 400	Mercury, flood light, heavy duty type.



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2.32 MF63 2 x 400 Mercury, flood light, heavy duty type.

2.33 MP21 1 x 80 Mercury, post top lantern

2.34 MP22 1 x 125 Mercury, post top lantern

3.0 High Pressure Sodium Vapour (HPSV) Lamp Luminaire

3.1 SB01 1 x 150 Sodium, high bay, industrial type.

3.2 SB02 1 x 250 Sodium, high bay, industrial type.

3.3 SB03 1 x 400 Sodium, high bay, industrial type.

3.4 SB04 1 x 150 Sodium, high bay, totally enclosed industrial type.

3.5 SB05 1 x 250 Sodium, high bay, totally enclosed industrial type.

3.6 SB06 1 x 400 Sodium, high bay, totally enclosed industrial type.

3.7 SB07 1 x 150 Sodium, high bay with non-integral controlgear box.

3.8 SB08 1 x 250 Sodium, high bay with non-integral controlgear box.

3.9 SB09 1 x 400 Sodium, high bay with non-integral controlgear box.

3.10 SB11 1 x 150 Sodium, medium bay, industrial type.

3.11 SB12 1 x 250 Sodium, medium bay, industrial type.

3.12 SB13 1 x 150 Sodium, medium bay, totally enclosed industrial type.

3.13 SB14 1 x 250 Sodium, medium bay, totally enclosed industrial type.

3.14 SB17 1 x 70 Sodium, low bay, industrial type.

3.15 SB18 1 x 150 Sodium, low bay, industrial type.

3.16 SB19 1 x 70 Sodium, low bay, totally enclosed industrial type.

3.17 SB20 1 x 150 Sodium, low bay, totally enclosed industrial type.

3.18 SW41 1 x 70 Sodium, well glass, vapour proof with vitreous enamelled/ powder coated type reflector.



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3.19	SW42	1 x 150	Sodium, well glass, vapour proof with vitreous enamelled/ powder coated type reflector.
3.20	SW51	1 x 70	Sodium, well glass, dust proof with vitreous enamelled reflector.
3.21	SW52	1 x 150	Sodium, well glass, dust proof with vitreous enamelled reflector.
3.22	SW91	1 x 70	Sodium, well glass, flame proof with vitreous enamelled reflector and cast aluminium alloy LM6 housing.
3.23	SW92	1 x 150	Sodium, well glass, flame proof with vitreous enamelled reflector and cast aluminium alloy LM6 housing.
3.24	SW93	1 x 70	Sodium, well glass, flame proof with vitreous enamelled reflector and cast aluminium alloy LM6 housing.
3.26	SW95	1 x 70	Sodium, well glass, flame proof increased safety luminaire with vitreous enamelled reflector and cast aluminium alloy LM6 housing for Div. 2 areas.
3.27	SW96	1 x 150	Sodium, well glass, flame proof increased safety luminaire with vitreous enamelled reflector and cast aluminium alloy LM6 housing for Div. 2 areas.
3.28	SS61	1 x 70	Sodium, street light with one piece cast aluminium body.
3.29	SS62	1 x 150	Sodium, street light with one piece cast aluminium body.
3.30	SS63	1 x 250	Sodium, street light with two piece cast aluminium body.
3.31	SS64	1 x 400	Sodium, street light with two piece cast aluminium body.
3.32	SF61	1 x 250	Sodium, flood light, general purpose.
3.33	SF62	1 x 400	Sodium, flood light, general purpose.
3.34	SF63	1 x 250	Sodium, flood light, heavy duty type.
3.35	SF64	1 x 400	Sodium, flood light, heavy duty type.
3.36	SF65	2 x 250	Sodium, flood light, heavy duty type.
3.37	SF66	2 x 400	Sodium, flood light, heavy duty type.
3.38	SP21	1 x 70	Sodium, post top lantern.



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4.0 Tungsten Lamp Luminaires

- | | | | |
|------|------|---------|--|
| 4.1 | TW41 | 1 x 100 | Tungsten, well glass, vapour proof with vitreous enamelled reflector. |
| 4.2 | TW42 | 1 x 200 | Tungsten, well glass, vapour proof with vitreous enamelled reflector. |
| 4.3 | TW51 | 1 x 100 | Tungsten, well glass, dust proof with vitreous enamelled reflector. |
| 4.4 | TW52 | 1 x 200 | Tungsten, well glass, dust proof with vitreous enamelled reflector. |
| 4.5 | TW91 | 1 x 100 | Tungsten, well glass, flame proof with vitreous enamelled reflector. |
| 4.6 | TW92 | 1 x 200 | Tungsten, well glass, flame proof with vitreous enamelled reflector. |
| 4.7 | TW95 | 1 x 100 | Tungsten, well glass, increased safety (Div. 2) with vitreous enamelled reflector. |
| 4.8 | TW96 | 1 x 200 | Tungsten, well glass, increased safety (Div. 2) with vitreous enamelled reflector. |
| 4.9 | TB21 | 1 x 60 | Tungsten, bulk head, weather proof. |
| 4.10 | TB22 | 1 x 100 | Tungsten, bulk head, weather proof. |
| 4.11 | TB91 | 1 x 100 | Tungsten, bulk head, flame proof. |
| 4.12 | TB92 | 1 x 200 | Tungsten, bulk head, flame proof. |
| 4.13 | TP21 | 1 x 200 | Tungsten, post top lantern. |
| 4.14 | TE02 | 1 x 20 | Tungsten, portable emergency unit with rechargeable battery. |
| 4.15 | TE02 | 1 x 40 | Tungsten, portable emergency unit with rechargeable battery. |
| 4.16 | TX01 | 1 x 60 | Tungsten, dispersive vitreous enamelled reflector. |
| 4.17 | TX02 | 1 x 100 | Tungsten, dispersive vitreous enamelled reflector. |
| 4.18 | TX03 | 1 x 75 | Decorative recessed mounting luminaire suitable for comptalux lamp. |
| 4.19 | TX04 | 1 x 100 | Decorative recessed mounting luminaire suitable for comptalux lamp. |
| 4.20 | TX05 | 2 x 100 | Double obstruction aviation light of cast Al. alloy with red glass. |

5.0 Halogen



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5.1 HF61 1 x 300 Halogen, flood light, drip proof.

5.2 HF62 1 x 500 Halogen, flood light, drip proof.

5.3 HF63 1 x 750 Halogen, flood light, drip proof.

5.4 HF64 1 x 1000 Halogen, flood light, drip proof.

6.0 LED Luminaires With Fitting (Integrated/ retrofitted LED lamp to be provided as a part of Luminaire)

6.1 FC02(LED) Indoor LED batten suitable for conduit/surface/ suspended mounting, aesthetically designed CRCA housing and frosted diffuser and having an integral driver. The luminaire shall have nominal system output of 3600 $\pm 5\%$ lumens with nominal system power equal to 40W $\pm 10\%$. Fixtures suitable to meet the Utility Area aesthetic requirement, comparable to FC02.

6.2 FC06(LED) Indoor LED batten suitable for conduit/surface/ suspended mounting, aesthetically designed CRCA housing and frosted diffuser and having an integral driver. The luminaire shall have nominal system output of 3600 $\pm 5\%$ lumens with nominal system power equal to 40W $\pm 10\%$. Fixtures suitable to meet the Switchgear Room aesthetic requirement, comparable to FC06.

6.3 FC26(LED) Flat Panel (1200 mm X 300 mm) LED luminaire suitable for recess mounting in false ceiling, Aesthetically designed powder coated CRCA housing with high purity anodizes aluminium mirrors having an integral driver. The luminaire shall have nominal system output of 3600 $\pm 5\%$ lumens with system power equal to 40W $\pm 10\%$. Fixtures suitable to meet the Control Room aesthetic requirement, comparable to FC26.

6.4 FC30(LED) Flat Panel 600 mm X 600 mm LED luminaire suitable for recess mounting in false ceiling, aesthetically designed powder coated CRCA housing with high efficiency opal diffuser having an integral driver. The luminaire shall have nominal system output of 3600 $\pm 5\%$ lumens with system power equal to 40W $\pm 10\%$. Fixtures suitable to meet the Control Room aesthetic requirement, comparable to FC30.

6.5 FC81(LED) Corrosion proof, totally enclosed type with sheet aluminium/ polycarbonate housing having an integral driver. The luminaire shall



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have nominal system output of $3600 \pm 5\%$ lumens with system power equal to $40W \pm 10\%$. Fixture shall be suitable & comparable to FC81.

6.6 FC32(LED)

Decorative, surface mounted with mirror optic having an integral driver. The luminaire shall have nominal system output of $3600 \pm 5\%$ lumens with system power equal to $40W \pm 10\%$. Fixture shall be suitable & comparable to FC32.

6.7 SS62(LED)

Street light with one piece cast aluminium body having an integral driver. The luminaire shall have nominal system output of $9000 \pm 5\%$ lumens with system power equal to $90W \pm 10\%$. Fixture shall be suitable & comparable to SS62.

6.8 SS63(LED)

Street light with two piece cast aluminium body having an integral driver. The luminaire shall have nominal system output of $15000 \pm 5\%$ lumens with system power equal to $150W \pm 10\%$. Fixture shall be suitable & comparable to SS63.



**TECHNICAL SPECIFICATION FOR
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1.0	GENERAL
2.0	CODES & STANDARDS
3.0	TECHNICAL REQUIREMENTS
4.0	QUALITY ASSURANCE, TESTING & INSPECTION
5.0	PACKING
6.0	MARKING
7.0	DRAWING, DATA AND DOCUMENTS REQUIRED
8.0	TECHNICAL DETAILS OF CONDUITS



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1.0 GENERAL

- 1.1 This specification covers the manufacture, inspection & testing at vendor's works and delivery to site of conduits, pipes and their fittings for electrical installation.

2.0 CODES AND STANDARDS

2.1 The material shall comply with all currently applicable safety codes and statutory regulations of India as well as of the locality where the material is to be installed.

2.2 The material, construction, manufacture, inspection and testing of Rigid steel conduits shall conform to the latest revision of relevant standards as per Data Sheet-A.

2.3 In case of conflict between the applicable reference standard and this specification, the stringent **requirement of the two shall govern.**

3.0 TECHNICAL REQUIREMENTS

3.1 Rigid conduits shall generally conform to the requirements of relevant standard.

3.2 The diameter of conduits shall be uniform throughout the length. Each end of conduit length shall be threaded. The ends of conduits shall be sealed with protective caps to prevent damage to threaded portions and entrance of moisture and foreign material.

3.3 The inside surface of all conduits shall be smooth and suitable for pulling insulated cables and wires without damage.

3.4 Technical particulars of rigid conduits are specified in Data Sheet – A.

4.0 QUALITY ASSURANCE, TESTING & INSPECTION

4.1 Bidder shall confirm compliance with the BHEL's Standard Quality Plan (PE-QP-999-558-E001) as attached with the specification without any deviations. At contract stage, the successful bidder shall submit the Quality Plan for BHEL/ ultimate customer's approval. In case bidder has reference Quality Plan agreed with ultimate customer, same can be submitted for specific project after award of contract for BHEL/ ultimate customer's approval. There shall be no commercial implication to BHEL on account of Quality plan approval.

4.2 All materials shall be procured, manufactured, inspected and tested by vendor/ sub-vendor as per approved quality plan.

4.3 The supplier shall perform all tests necessary to ensure that the material and workmanship conform to the relevant standards and comply with the requirements of the specification. Charges for all these tests for all the equipment & components shall be deemed to be included in the bid price.

4.4 In case ordered quantities are manufactured and offered for inspection in more than one lot, BHEL reserves the right to witness testing on all lots without any commercial implication to BHEL.



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5.0 PACKING

5.1 The material shall be packed to ensure protection against damage during transit, storage for prolonged periods and handling.

5.2 The ends of conduits shall be sealed with protective caps.

5.3 Each conduit shall be wrapped in plastic to prevent dust deposition.

5.4 The conduits should be aligned and stacked in bundles (a maximum of 25 pieces per bundle).

5.5 Each bundle shall be covered with jute fibre / thick plastic wrap for protection against extreme weather. Then, the bundle shall be tied with twin-strand mild steel wire, strong rope or steel strip.

6.0 MARKING

6.1 Rigid conduits shall be marked at least once on each manufacturing length, preferably 50 mm from one end, with the following:

- a) Manufacturer's name or trade mark, if any;
- b) Country of manufacture; and
- c) Nominal size of the conduits.
- d) ISI Certification Mark.

Marking may be applied by moulding, stamping, printing, adhesive label or water slide transfers.

6.2 Marking shall be durable and legible.

6.3 Marking shall be checked by inspection and by rubbing lightly the marking by hand for 15 seconds with a piece of cloth soaked with water and again for 15 seconds with a piece of cloth soaked with petroleum spirit.

7.0 DRAWING, DATA AND DOCUMENTS REQUIRED

7.1 The following information shall be furnished within two weeks of award of contract, for purchaser's approval.

- a) Data Sheet-B
- b) Final quality plan

8.0 TECHNICAL DETAILS OF CONDUITS

Refer Annexure-1 as "TECHNICAL DETAILS OF CONDUITS".



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ANNEXURE-1 TECHNICAL DETAILS OF CONDUITS

- 1.0 APPLICABLE STANDARDS : Relevant Standard
- 2.0 RIGID STEEL CONDUITS & STEEL PIPES
- a) Material : Hot rolled/Cold rolled mild steel as per relevant standard
 - b) Applicable standard
 - i) Upto 63mm OD : Relevant Standard
 - c) Surface treatment : Hot dip galvanizing inside & outside as per Relevant Standard
 - d) Min. Weight of zinc coating (gm/m²) : 340 upto 32 mm dia
460 above 32 mm & upto 50 mm dia
 - e) Duty : Heavy duty type
 - f) Fittings : Screw type as per relevant standard
- 2.1 Sheet thickness (minimum) : 1.6 mm upto 32 mm dia
2.0mm above 32 mm & upto 50 mm dia
- 2.2 Min. Thickness of zinc coating (microns) [By Elcometer] : 48 upto 32 mm dia
65 above 32 mm & upto 50 mm dia
- 2.3 Standard length approximate : 3 - 5 meters
- 3.0 FLEXIBLE CONDUITS:
- a) Material : Strip steel cold rolled and annealed
 - b) Standard applicable : relevant standard
 - c) Surface treatment : Electro galvanized as per relevant standard
 - d) Whether lead coated : YES
 - e) Minimum thickness : 25 microns of zinc coating
- 4.0 PVC CONDUITS



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- a) Material : PVC
- b) Applicable standard : Relevant Standard

5.0 SALIENT PARAMETERS OF CONDUIT ACCESSORIES

5.1 LOCKNUTS

Size of Conduit	Thickness	Width Across Flat (mm)
20 mm	5 mm	27
25 mm	5mm	33
32 mm	5 mm	41
40 mm	5 mm	50

5.2 SADDLES

Size of Conduit	A(mm)	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)	G(mm)
20mm	53	20	-	22	4	15.5	40
25mm	60	25	-	22	4	18	46
32mm	68	32	-	18	5	17.5	55
40mm	65	40	-	18	5	20	67

5.3 COUPLER (ELECTRO GALVANISED)

Nominal Size of Coupler	L(min).(mm)
20 mm	35
25mm	43
32mm	43
40mm	43

5.3 CIRCULAR BOXES (Refer Relevant Standard)



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DIMENSIONS OF SMALL CIRCULAR BOXES

Size of Conduit	B(mm)	C(mm)	D(mm)	E(mm)	F(mm)	G(mm)	H(mm)	I(Cixmm)
20mm	25	-	18	16.5	25	60	50	3mm
25mm	30	-	19	18	28	60	50	3mm
32mm	38	-	14	13	35	75	60	2.5
40mm	45	-	19	18	44	75	64	2.5

5.4 NORMAL BEND

Size of Conduit	Straight Length (mm)	Radius (mm)
20mm	30	60
25mm	50	69.5
32mm	60	90
40mm	60	130

5.5 INSPECTION BENDS

The main criteria is for the threaded portion which has to be taken same as that of a normal bend.

Conduit Size	Threaded Portion (mm)
20mm	15.0
25mm	19.0
32mm	19.0
40mm	19.0



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1.0 SCOPE OF WORK

The scope of installation work of the complete lighting and low voltage power services equipment shall be as follows:

- 1.1 Receipt at site, unloading, handling, unpacking, storing and preservation of all lighting equipment specified under technical specification (Supply) of Section-D and all other materials required for completion of this package
- 1.2 Erection, testing and commissioning of complete lighting and low voltage power services for the power station.
- 1.3 The contractor's scope shall also be deemed to include all such other equipment/materials and services required for the completeness of the job, but not listed above, as applicable and shall be quoted for accordingly.
- 1.4 Supply & erection of consumable like conduit accessories & fittings, conduit boxes, saddles, clamps, flexible conduit, junction boxes, fixing hardware, anchors, wedges, nuts & bolts, concrete inserts, materials required for mounting the fixtures, consumable and other incidental materials required to complete the installation testing & commissioning of complete lighting system for successful operation, & to the satisfaction of purchaser/ customer. Supply scope of these items shall form part of the installation rates quoted for the item.

Minor civil works Plumbing/Grouting/Foundation required to complete the lighting installation are covered under the scope of this contract and form part of the item installation cost and are not payable separately.
- 1.5 Power cables from lighting distribution boards LDBs to lighting panels (LPs), LDBs to street lighting panel, street lighting panels to poles and control cables from LDBs to remote street lighting control panel will be supplied by purchaser as free issue item to contractor, Laying & termination of these cables are to be done by the bidder.
- 1.6 Supply & Erection of supporting structural steel i.e. angles, channels etc. are to be quoted on tonnage basis. During contract stage contractors has to furnish total requirement for structural steel.
- 1.7 All tools & tackles, ladders, testing equipment etc. required for erection, testing & commissioning of complete lighting system are to be arranged by the contractors.
- 1.8 The entire work shall be carried out in accordance with specified installation instruction, manufacturer's recommendations, purchaser's approved drawings and/or as directed by the purchaser. Manufacturer' drawings and instructions shall be correctly followed in handling setting, testing and commissioning of all equipment and care shall be taken in handling to avoid distortion to structures, marring of finished surface, damage to delicate instruments etc. The equipment shall be installed in a neat work-manship like manner.
- 1.9 The erection work shall conform to latest applicable Indian standards, codes and practices, Electricity rules, fire insurance regulations and safety regulations of the locality where the equipment will be installed. All apparatus, wiring and connections shall be designed so as to minimise risk of fire or any damage which will be caused in the event of fire. Contractor to furnish the installation drawings of all equipment for purchaser's approval.



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2.0 CODES AND STANDARDS

The design, Manufacture and performance of equipment shall comply with all currently applicable regulations and safety codes in the locality where the equipment will be installed. Nothing in this specification shall be constructed to relieve the bidder of these responsibilities.

2.1 Unless otherwise specified, equipment offered shall conform to latest applicable standards

3.0 GUIDELINES FOR LIGHTING SYSTEM ERECTION WORK.

3.1 The contractor shall work in co-ordination with civil, air-conditioning, ventilation & switchgear vendors. Where holes or openings in walls and floors are required for routing the conduits, the contractor shall provide the same. Cut-outs in false ceiling shall be provided by false ceiling contractor.

3.2 The contractor shall be responsible if any parts of lighting fixtures, LDBs, LPs are lost or damaged and lamps are broken during installation. All damage and thefts shall be made good by the contractor till the installation is handed over to the customer.

3.3 The contractor shall note that for any change in the location of lighting panels, lighting fixtures, switch boxes/receptacles, no extra charges will be paid so long as the modifications are indicated to the contractor before commencement of the work on that particular equipment or circuit.

3.4 The contractor shall have a separate cleaning gang to clean all equipment under erection as well as the work area and the project site at regular intervals to the satisfaction of Engineer-in-charge. In case this is not done, the purchaser will have the right to carry out the cleaning operation and any expenditure incurred in this regard will be to the contractor account.

3.5 Except as specifically approved by the Engineer-in-Charge, installation of exposed conduits, mounting of lighting fixtures, etc. shall be taken up only after other services such as piping, air ducting, cable tray/bus duct hangers, structural bracing's etc. in a particular area have been installed

3.6 After installation of lighting fixtures/receptacles, panel number and circuit number shall be painted on them at a suitable place

3.7 Lighting Fixtures and Accessories.

3.7.1 Lighting fixtures of appropriate type as per the lighting layout drawings shall be installed by the contractor. The type of mounting, arrangement of fixtures shall be selected from the typical arrangements shown in enclosed fixture mounting details drawings in section-E. The type of mounting will generally be indicated on the layout drawings. The exact mounting will, however, be decided at site depending upon the actual space/other facilities available at site.



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- 3.7.2 The contractor shall submit for purchaser's approval the drawings showing the detailed mounting arrangements of various types of fixtures prior to installation.
- 3.7.3 Wooden plugs in walls and ceilings for fixing of lighting fixtures and accessories are not acceptable. A suitable fool-proof method (preferably using nylon rawl plug) of fixing these shall be offered and this be subject to the purchaser approval.
- 3.7.4 The bracket for mounting the lighting fixtures on boiler platforms shall be fabricated at site using 40 mm GI conduit with a reducing socket to suit the fixture and clamped to the hand rails. However, the clamping of these conduits at points of large vibrations should be avoided. The fixing shall be strong enough to withstand vibrations and wind velocity. If a roof (or other platform over the platform is available, the fixture will be pendant mounted (supported to the structural members of the platform above).
- 3.7.5 Flood lights shall be mounted on steel base facing the tentative direction shown on drawings. Bolts shall be tightened with spring washers. Terminals connection to the flood lights shall be through flexible conduits.
- 3.7.6 In the rooms where false ceilings are provided, the lighting fixtures shall be supported separately by false ceiling grid of roof over false ceiling if it is of steel structural or form ceiling and not by the false ceiling board. The arrangement shall be to the approval of purchaser. The erection rate of lighting fixtures shall include the supply of steel brackets, supporting, anchoring material, hardware and also steel brackets/hangers for bridging the gap above false ceilings, etc., required for installation of lighting fixtures as shown in the approved fixture mounting arrangement drawings.
- 3.7.7 A four (4) way terminal junction box type F shall be provided near each lighting fixture, for loop-in, loop-out and off connection of lighting wires or as required.
- 3.7.8 To distinguish emergency AC fixtures from normal AC fixtures, red painted circular mark of 1 cm dia. shall be provided on emergency fixtures.
- 3.7.9 The self contained emergency lighting fixtures shall be installed in required areas. Mounting brackets are to be provided by the contractor.
- 3.8 Lighting distribution board and Lighting Panels.
- 3.8.1 Lighting DB's consisting of lighting transformer etc, shall be mounted on floor and LP's shall be mounted on the walls/columns/steel structures at the locations indicated in the drawings.
- 3.8.2 Suitable Space provision for LDB mounting on floor would be made by the purchaser. The contractor will supply necessary foundation bolts and do the grouting to fix up the LDBs.
- 3.8.3 LPs shall be installed by fastening to studs of not less than 12 mm dia. which will be suitably grouted/welded to the wall/column by the contractor. All the required accessories including studs for the erection of the panel shall be supplied by the contractor. If Mounting channels are required for, LPs the same will be provided by contractor.
- 3.8.4 Unless specifically noted otherwise on the drawings the height of the centre line of lighting panels from the floor shall be 1200 mm.



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3.9 Lighting control Switch Boxes & Receptacle Boxes.

3.9.1 The locations of switch/receptacle boxes will be approximately as shown in the drawings. The exact location shall be finalised by the contractor in consultation with the engineer-in-Chief.

3.9.2 All switch/receptacle boxes in offices and control room shall be flush mounted in the wall. In other areas they shall be mounted on wall or column.

3.9.3 Unless Otherwise noted on the drawings the mounting height of switch/receptacle boxes shall be as follows.

- i. Lighting Control switch boxes - 1500 mm.
- ii. Receptacle boxes 500 mm for indoor and 900 mm for outdoor locations.

3.10 Conduits and Accessories

3.10.1 All lighting wires shall be run inside the conduit. Size of conduit shall be selected as per the table given below.

Size of Wire	Max. number of wires in	
	20mm conduit	25mm conduit
1.5 sq. mm.	4	
2.5 sq. mm.	4	6

3.10.2 Conduit shall run along wall, floor, ceiling, on steel structures, embedded in wall, floor, for ceiling, in accordance with relevant layout drawings. The contractor shall closely co-ordinate his work with the civil contractor. Exposed conduits shall be run in straight lines parallel to building columns, beams and walls. Unnecessary bends and crossings shall be avoided to present a neat appearance. In the office area as specified conduits shall be embedded along the entire run. It is the responsibility of the lighting contractor to co-ordinate with the civil contractor of these buildings. Conduits supports shall be provided at an interval of 750 mm for horizontal runs and 1000 mm vertical runs

3.10.3 Conduit shall be clamped on to approved type spacer plates or brackets by saddles or U-bolts. The spacer plates or brackets in turn, shall be securely fixed to the building steel by welding and to concrete or brick work by grouting or by nylon rawl plugs.

3.10.4 Embedded conduits shall be securely fixed in position to preclude any movement. In fixing embedded conduit, if welding or brazing is used, extreme care should be taken to avoid any injury to the inner surface of the conduit.

3.10.5 Spacing of embedded conduits shall be such as to permit flow of concrete between them and in no case shall be less than 40mm.

3.10.6 Where conduits are along cable trays provided by purchaser, they shall be clamped to supporting steel at an interval of 600 mm.



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- 3.10.7 For direct embedding in soil, the conduits shall be coated with an asphaltbase compound. Concrete pier or anchor shall be provided where necessary to support the conduit rigidly and to hold it in place.
- 3.10.8 Conduits shall be installed in such a way as to ensure against trouble from trapped condensation.
- 3.10.9 The contractor shall made available at site, dies for threading various conduits. Running threads shall be avoided as far as practicable. Where it is unavoidable, check nut shall be used. All field thread ends shall be reamed after threading and anti-corrosive paint applied.
- 3.10.10 Conduits shall be kept, wherever possible, at least 300 mm away from hot pipes, heating devices etc.
- 3.10.11 Slip joints shall be provided when conduits cross structural expansion joints or where long run of exposed conduits are installed, so that temperature change will cause no distortion due to expansion or contraction of conduit run
- 3.10.12 For long conduit runs junction/pull boxes shall be provided at suitable intervals (not exceeding 10 m) to facilitate wiring.
- 3.10.13 Conduits shall be securely terminated at LPs/junction boxes or lighting fixtures by proper fastening with a lock put on inside and outside. The number of conduits terminating at LP's shall not exceed the permissible number considering the glanding area of lighting panel. Conduit termination's shall be made water & vermin proof.
- 3.10.14 Conduits lengths shall be jointed by acrowed couplers. Conduit shall be cleanly cut. The cut ends shall be within three (3) degrees of square with the conduit axis. Cut ends shall be reamed and all burrs and sharp edges removed.
- 3.10.15 Conduits lengths shall be jointed connection and shall be made thoroughly water-tight and rust-proof by application of a thread compound which will not insulate the joints. White lead will be uses for embedded conduit and red lead for exposed conduit.
- 3.10.16 Water treatment plant chlorination plant lighting installations shall be made with epoxy coated steel conduits and accessories.
- 3.10.17 Field bends shall have a minimum radius of four (4) times the conduit diameter. All bends shall be free of kinks, indentations or flattened surfaces. Heat shall not be applied in making any conduct bend. Separate bends may be sued for this purpose.
- 3.10.18 The entire metallic conduit system, whether embedded or exposed, shall be electrically continuous and thoroughly grounded where slip joints used, suitable bending shall be provided around the joint to ensure a continuous ground circuit.
- 3.10.19 Conduits and fittings shall be properly protected during construction period against mechanical injury. Conduit ends shall be plugged or capped to prevent entry of foreign material.
- 3.10.20 After installation, the conduits shall be thoroughly cleaned by compressed air before pulling in the wire.



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- 3.10.21 Lighting fixtures shall not be suspended directly from the junction box in the main conduit run.
- 3.11 Lighting wires
- 3.11.1 Lighting wires from lighting panels to junction boxes and junction boxes to lighting fixtures, switch boxes and receptacle boxes shall run in conduits (Rigid/flexible).
- 3.11.2 All wires in a conduit shall be drawn simultaneously. No subsequent drawing is permissible.
- 3.11.3 Wires shall not be pulled through more than two equivalent 90 deg. bends in a single conduit run. Wherever required, suitable conduit junction boxes/pull boxes shall be provide. All types of wiring, concealed or unconcealed shall be capable of easy inspection.
- 3.11.4 Receptacles and lighting circuits shall be fed from different circuits. The switch controlling these circuits shall be on the live side (phase wire) of the circuits.
- 3.11.5 A.C. normal, A.C. emergency and D.C. emergency system wiring shall run throughout in separate conduits.
- 3.11.6 Wiring shall be spliced only at junction boxes. Maximum two wires shall be connected at each terminal.
- 3.11.7 In vertical run of wires in conduit the wires shall be suitably supported by means of wooden/hard rubber plugs at each pull/junction box.
- 3.11.8 All lighting wires shall be crimped using suitable type of solderless, crimping, tinned fork type copper lugs. Cost of the lugs shall be included in the erection price of wire.
- 3.12 Junction Boxes
- 3.12.1 Junction boxes having volume upto 1600 cubic centimetre may be installed without any support other than that resulting from connecting conduits where two or more rigid metallic conduits enter and accurately position the box. Boxes shall be installed so that they are levelled, properly aligned and present a pleasing appearance. Boxes with volumes greater that 1600 cubic cm. or for other reasons not rigidly held, shall be adequately supported. The contractor shall perform all drilling, cutting, welding, shimming and bolting required for attachment to supports.
- 3.12.2 Necessary holes for conduit/cable entry shall be done during installation depending on the requirement. The holes shall be drilled/punched neatly and shall be dust/vermin proof after installation of the conduit.
- 3.12.3 All welds, bolts holes, conduit entry holes etc., made during installation as mentioned above shall be wire brushed and touched up with metal primer (lead oxide and zinc chromate in synthetic medium
- 3.13 Street Lighting/Flood Lighting Poles
- 3.13.1. The lighting poles and lighting Tower shall be erected by the contractor at locations shown in the street lighting layout to be prepared by contractor and shall be got approved from the purchaser. The erection work shall include making of foundations (with supply of all materials).



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Installation of necessary wiring/ cabling, junction/ switch box and mounting of assembled fittings. The cable from junction box at the bottom of pole upto the lighting fixture shall be supplied by the contractor. All the above erection work shall be done by contractor for lighting masks including making of foundations. 50mm GI pipe shall be provided for cable protection from trench to junction box by the contractor for loop-in-loop-out cables.

3.13.2 The lighting poles shall be painted with two coats of aluminium paint after completion of installation or as specified by purchaser.

3.13.3 The flood light fixtures shall be mounted on galvanised M.S. base making use of shop drilled holes or by suitable clamps. No cutting or drilling of galvanised structure is permitted.

3.13.4 Each lighting poles and lighting/lightning mast junction box shall be earthed by 16 Sq.mm Stranded tinned Cu. Conductor bonded to one (1) 18 mm dia Cu clad/ Bonded steel rod, 3 meter length driven vertically in the ground. The conductor and rod shall be supplied by BHEL and erection of these shall be done by the vendor. 14 SWG Cu wire shall be taken from fixture to JB.

The bidder shall submit the foundation drgs of poles/masts for purchaser's approval.

3.14 Earthing of Lighting system

3.14.1 All junction boxes, receptacles, switch boxes, lighting fixtures, conduit etc. shall be earthed in compliance with the provision of I.E. rules and applicable Indian Standard amended upto date.

3.14.2 A continuous earth conductor of 14 SWG Cu wire shall be run all along each conduit run and bonded at every 600 mm by not less than two turns of the same size of wires. This conductor shall be connected to the earth bus of lighting panel from which the conduits originate. All junction boxes, receptacles, lighting fixtures etc. shall be connected to this 14 SWG GI earth conductor. All lighting panels and LDBs shall be earthed by GI flats to the purchasers earthing bus. The supply of GI flat and erection shall be in contractor's scope and rates of the same shall be included in the erection rates of the respective LDB/LP.

3.15 Ceiling Fans and Regulators (If Applicable)

3.15.1 The contractor shall install the ceiling fans and regulators at the locations shown in the relevant drawings. The exact location will however, be decided at site in consultation with engineer-in-charge.

3.15.2 The fan regulators shall be flush mounted on the lighting control switch boxes provided in that area.

3.15.3 Hook alongwith rubber bush shall be supplied and grouted by contractor in ceiling for mounting the fan. All necessary material and hard wares for installation shall be supplied by contractor.

3.16 Foundation & Civil Works

3.16.1 Equipment foundations, for street lighting Poles/Flood Lighting Poles, lighting mast, street lighting panel and other panels mounting foundation and other civil work including supply of cement, steel and other materials as per relevant drawings and specification clauses shall be



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provided by the contractor. Cost of foundation works , including supply of necessary material is to be quoted as part of E & C rates for these items.

- 3.16.2 All foundation drawings shall be subject to the purchaser's approval. However, it shall be the responsibility of the contractor to check these foundations before commencement of erection to ensure their suitability.
- 3.16.3 At final adjustment of foundation levels, chipping and dressing of foundation surfaces, setting and grouting of anchor bolts, sills, inserts and fastening devices shall be carried out by the contractor including minor modification of civil work as may be required for erection.
- 3.16.4 Any cutting of masonry/concrete work, which is necessary, shall be done by the contractor at his own cost and shall be made good to match the original work. The contractor shall obtain approval of the purchaser before proceeding with any cutting of masonry/concrete work.
- 3.16.5 The contractor shall perform all excavation and backfilling as required for ground connections and casting foundations.
- 3.16.6 Excavation shall be performed upto the required depth. Such measures shall be taken as may be necessary for protection of the wall.
- 3.16.7 The contractor shall make use of his own arrangements for pumping out any water that may be accumulated in the excavation.
- 3.16.8 All excavation shall be backfilled to the original level with good consolidation.
- 3.17 Cabling work:
- 3.17.1 The owner will supply necessary cables required for the system as per the specification & the bidder shall have to lay & terminate the same. This shall include all clamping, fixing, drilling, cutting, glanding, lugging, connecting to terminal blocks, grounding etc. as required to complete the job. Cost of all consumable materials required for cable laying & cable termination shall be included in the erection rate to be quoted by the bidder.
- 3.17.2 Bidder shall supply all necessary glands & lugs required for cable termination carried out by him. Size of glands & lugs shall be as per the size of the cables selected during detailed engg.
- 3.17.3 Cable glands shall be double compression type & made of tin plated heavy duty brass casting and machine finished. Glands shall be of robust construction capable of clamping cable & cable armour firmly without injury to the cable. Thickness of tin coating shall not be less than 10 microns. All washers and hardware shall be made of brass & tinned. Rubber components used in the glands shall be made of neoprene of tested quality.
- 3.17.4 Cable lugs shall be tinned copper, solderless crimping type, conforming to IS:8309 suitable for Al or Cu conductors. Crimping of terminals shall be done by using corrosion inhibitory compound.
- 3.17.5 All cable entry points shall be sealed & made vermin & dust proof. Unused opening shall be effectively closed.



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- 3.17.6 Cables shall be laid in owner's trays wherever available. In areas, where owners trays are not available, cable shall be clamped to the structures or laid in conduit or buried depending on the area.
- 3.17.7 Each cable shall be tagged with the cable no. as per cable schedule. The tag shall be of rectangular shape & attached to the cable by not less than two turns of 20 SWG GI wire. Cable tag shall be provided at each end of the cable before entering the equipment enclosure, on both sides of wall or floor crossing and every 30 meter of cable runs.
- 3.17.8 Minimum bending radius for the cables shall not be less than 12D, where D is the overall dia of the cable.
- 3.18 Steel Fabrication
- 3.18.1 The steel structures supplied and fabricated by the contractor shall be made from standard quality steel sections/flats/plates. The steel fabricated structures shall be free from defects, cleaned of rust, grease, oil etc., and sharp edges shall be removed.
- 3.18.2 The welds shall be wire brushed or cleaned otherwise. The holes shall be touched up with metal primer.
- 3.18.3 All steel fabrications shall be painted with two coats of metal primer (lead oxide and zinc chromate in synthetic medium) followed by two coats of aluminium paint. The welds to galvanised steel shall be touched up with galvanised weld rod applied in accordance with manufacturer's instruction.
- 3.19 Cutting & wastage allowances:
- 3.19.1 Contractor shall carefully plan cutting schedule of each cable drum, conduit, lighting wires, GI wires such that wastage's are minimised and any resultant short length can be used where appropriate route length are available. The following wastage's allowances are permissible for various materials.
- 3.19.2 Power cables, and control cables, Cutting & wastage's allowance shall be computed on the length actually measured, used & accepted. Break up of above 3% wastage allowances are given below :
- a) 1% unaccountable wastage.
 - b) 2% accountable wastage.
- Note: Usable length to be returned to purchaser. Minimum wastage length is to be decided in consultant with site engineers.
- 3.19.3 The contractor shall take-back the unused installation materials which has not been entered in the measurement records by the purchaser after completion of job.
- 3.20 Quantity measurement:
- 3.20.1 For all payment purpose, measurement shall be made on physical measurements. Physical measurements shall be made by the contractor in the presence of the site engineer/purchaser.



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- 3.20.2 The measurement of cable laying shall be made on the basis of length actually laid from lug to lug including that of loops provided.
- 3.20.3 In the measurement of conduits, the accessories will not be include Cu wire.
- 3.20.4 The accountable wastage to be returned to purchaser's store in good condition and as directed by site engineer.
- 3.20.5 Any wastage granted by the vendor in excess of the allowable percentage shall be charged at the panel rates decided by the site engineer whose decision shall be final and binding on the vendor.
- 3.21 Contractor to make a protocol in consultation with site engineer and customer's representative for erection, testing & commissioning of all lighting equipment.
- 4.0 TESTING & INSPECTION AT CONTRACTOR'S WORKS
- 4.1 Standard quality plan (QP) for lighting equipment is enclosed. Bidder to confirm compliance to this QP by signing every page of it.
- 4.2 All accessories shall be subject to routine and type tests in accordance with requirement of appropriate IS in the presence of purchaser's representative.
- 4.3 Samples selected by the purchaser of all galvanising material shall be subjected to galvanising tests. All fittings, fabrications, hardwares etc. as specified shall be inspected & tested in accordance with IS recommendation. Type test certificates from National Test House or from reputed agency shall be considered.
- 4.4 Field quality plan for quality checks to be observed at site during erection, testing & commissioning shall also be furnished by contractor alongwith offers as per standard format.
- 4.5 Testing and commissioning
- 4.5.1 On completion of erection work, the contractor shall request the site engineer for inspection and test.
- 4.5.2 The site engineer shall arrange for joint inspection of the installation by purchaser's and customers representative for completeness and correctness of the work. Any defect pointed out during such inspection shall be promptly rectified by the contractor.
- 4.5.3 The installation shall be then tested and commissioned in presence of the site Engineer & customer's representative
- 4.5.4 The contractor shall provide all men, material and equipment required to carry out the tests.
- 4.5.5 All rectification's, repairs or adjustment work found necessary during inspection, testing and commissioning shall be carried out by the contractor without nay extra cost. The handing over of the lighting installation shall be effected only after the receipt of written instruction from the site engineers/ customer.



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- 4.5.6 The testing shall be done in accordance with the applicable Indian standards and codes of practice. The following tests shall be specifically carried out for all lighting installation.
- Insulation resistance
 - Testing of earth continuity path
 - Polarity test of single phase switches.
- 4.5.7 The lighting circuits shall be tested in the following manner.
- All switches ON and consuming devices in circuit, both poles connected together, to obtain resistance to earth.
 - Insulation resistance between poles with lamps and other consuming devices removed and switches ON
- 5.0 DRAWINGS/ DOCUMENTS
- REFER VARIOUS CLAUSES OF ELSEWHERE
- 6.0 PRICES
- 6.1 The contractor shall quote his prices for supply, erection, testing & commissioning of complete lighting system as per format attached with the specification.
- 6.2 Unit price quoted for erection, testing & commissioning of items listed under B O M shall be deemed to have been included the prices for Supply material as described in clause 1.4 of this specification and other relevant clauses of this specification for various lighting equipment.
- 6.3 The unit rates of supply & installation (E & C) for all equipment and service quoted by the bidder shall be firm for a variation of quantities as per NIT.
- 6.4 Purchaser reserves the right to right to delete/add any equipment or services from the bidders scope, and for price adjustment in such cases, unit prices quoted by the bidder will be considered.
- 6.5 The bidder shall furnish unpriced price schedule of all equipment and services inclusive of E & C and recommended spares alongwith the technical bid.

Format of Memorandum of Agreement (MOU) between bidder (who is not an approved lighting vendor) and bidders associate's(who is an approved Lighting vendor) for Station Lighting System Package on turnkey basis.
To be executed on non judicial paper of Rs.100/- between the bidder and his associate.

MEMORANDUM OF UNDERSTANDING

This Memorandum of Understanding is made in.....on.....of..... 2009.

BETWEEN

(Bidder Name) having its registered Office at.....(hereinafter referred as 'Contractor which expression shall unless excluded by or repugnant to the context, means and include its successors-in-interest and assigns)

AND

(name of associate) having its registered Office at.....(hereinafter referred as 'Contractor which expression shall unless excluded by or repugnant to the context, means and include its successors-in-interest and assigns)

Whereas Project Engineering Management, Bharat Heavy Electricals Ltd. (PEM-BHEL) Noida (hereinafter referred to as 'Employer') has issued invitation for bids bearing No..... dated..... for Station Lighting System package and requires that bidders who are not approved for this package are required to associate with approved vendors of lighting system.

Now this MOU witnesseth and it is hereby agreed by the Contractor and Associate hereto as follows:

Whereas the Contractor and Associate hereto and interested to share their capabilities, strength and resources and co-operate for Station Lighting System package involving design, procurement, supply, erection, testing and commissioning of complete indoor and outdoor illumination system.

Balance engineering documents / drawings for the illumination system such as conduit layout etc. may be done by Contractor. Associate agrees to review these drawings on need base and where specifically desired by the Employer.

Detailed BOQ for the luminaries & lamps shall be worked out by Associate who will also be responsible to obtain approval for the same from the Employer and their customer. For this purpose Associates agrees to depute technical experts to Employer's and Employer's Customer's offices as and when required. Further Associate undertake coordination with inspection authority for supplies under his scope. Contractor is responsible for preparation of Detailed BOQ, Data Sheets etc. for all other items. Inputs whereas required for the same will be provided by the Associate who agrees to review the documents/data prepared by the contractor on a need base and where specifically desired by the Employer.

Contractor will be responsible for contract planning, site mobilization, storage, erection, commissioning and performance testing as per contract specification and project schedule. Associate shall provide engineering site supply when found essential by Contractor and / or by Employer.

Contractor & Associate undertake to keep secret and confidential all information exchanged between themselves in connection with the agreement herein contemplated and not disclose any such information to any third party or person, except as required by the Employer for the successful execution of the project.

In the event of the contractor ordering the above agreed part on the Associate, we, the aforesaid Contractor and Associate do hereby undertake that we shall be jointly and severally responsible to the Employer for the successful completion and performance of the station Lighting System package. This is without the prejudice to any rights of the Employer against the contractor under the contract and / or guarantee.

This agreement shall be effective from the date of its execution by the contractor and Associate and shall terminate by mutual agreement only after obtaining prior written permission from the Employer who will have the sole discretion to reject such permission in the interest of the project.

VERIFICATION

The Contractor and his Associate fully endorse to the above statements made on this date, the 2009 and verify to the true to the best of their knowledge and belief.

Signature & official Seal of

(Contractor)

(Associate)

Witnessed by (name, address and signature)

- 1.
- 2.