

**SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF  
EMERGENCY LIGHTING ON EXISTING NURSE STATION  
WITHOUT AFFECTING PATIENT CARE AT OLD HOSPITAL  
IPD BLOCK AT JIPMER, PUDUCHERRY**

**Volume- III  
TECHNICAL SPECIFICATION**

**Tender No: HLL/IDD/CHN/20-21/048  
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## **TECHNICAL SPECIFICATION:**

### **Common Points:**

Contractor should submit the shop drawing for all the works within 10 days of receipt of work order / LOA to Engineer – in - charge and should get prior approvals before executing any type of works along with coordination layout. The contractor should not deviate from the approved drawing at any point of time, in case of deviation while executing proper authorization should be obtained before proceeding further. Decision of HLL stands final.

The contractor should follow the following procedures:

**1. MAR – Material Approval Request** (Before procurement of any materials the contractor should submit MAR request along with necessary supporting documents to HLL Engineers and the makes should be as per list of approved makes specified in the tender document. Any materials procured without approval will be rejected at any point of time)

**2. Sample Tag –** After obtaining MAR, the contractor should submit sample tag along with samples (detailed specification can be submitted instead of samples for materials with high procurement values)

**3. MIR – Material Inspection Request –** After supplying of materials at site, the contractor should submit MIR request for verification of materials (the materials should be as per approved MAR and sample tag). Items deviating against authorized MIR will be rejected at any point of time.

**4. IR – Inspection Request –** The contractor should submit Inspection request on day to day basis for inspecting the works carried out.

**5. Billing –** Billing should be as based on the actuals executed at site and the contractor should submit the bills based on HLL billing format along with supporting documents (Dc copy, bill invoice, MAR, Sample tag, MIR, test reports, etc) for the items claimed in the respective bill. 3 sets of original bill and 2 sets of copy should be submitted.

**6.** All document formats pertaining to the work should be of HLL formats and the same can be issued on request.

**7.** 3rd party testes through NABL aggregated labs should be carried out for the necessary items executed at site by the contractor as per the direction of HLL without any additional costs.

**8.** 5 sets of following documents should be submitted during completion/ handing over of the project

- a. As built drawings (Hard & Soft copy),
- b. Inventory list,
- c. Warranty certificates
- d. Statutory approvals, if any
- e. Manuals

**9.** Spares, keys or any other components related to the equipment/ materials installed should be handed over with a list along with separate tags.

**10.** Hindrance register should be maintained at site.

**11.** All the debris, remaining should be cleared from the same and disposed within campus lead not more than 4 KM. And the completion certificate will be issued only after clearing the site and making it good.

**12. Installation, Testing & Commissioning** report for all the works should be provided as per HLL formats.

**Hot work permit:**

Hot work permit must be obtained prior to the starting of work from concern department of JIPMER.

**Supervision:**

Contractor shall depute their team of engineer for the supervision of installation, testing, commissioning & handing over at site of work. List of Engineers along with their bio data should be submitted to project office before commencement of the works. And the team should maintain records of daily progress and report the same to HLL Engineers on regular basis. Prior permission for the works carried should be obtained from HLL. All the Engineers should be available at the site during execution of work until handing over without fail.

**Security & Storage:**

The contractor is responsible for storage & security of all the materials, equipments, piping, wiring and all related accessories till the time of handing over to the customer.

**Power & Water:**

The contractor should make his own arrangement for electricity & water.

**Working Hours & Damages of existing property:**

As the work is being executed in running institution building, at most care should be taken during execution of works. Damages caused to the existing property should be rectified at own risk and cost with war foot basis. Time Schedule for the works to be carried should be submitted prior to the work.

**Labour camp:**

Labour camp will not allow inside the campus and the contractor should take sole responsibility for workers stay outside the campus. Workers should not use any type of alcohol/smoking related items inside the campus.

**Co-ordination with Other Agencies**

The contractor shall co-ordinate with all other agencies involved in the building work so that the building work is not hampered due to delay in his work.

**Structural Alterations to Buildings**

(i) No structural member in the building shall be damaged/altered, without prior approval from the competent authority through the Engineer-in-charge.

(ii) Structural provisions like openings, cutouts, if any, provided by the department for the work, shall be used. Where these require modifications, or where fresh provisions are required to be made, such contingent works shall be carried out by the contractor at his cost.

(iii) All such openings in floors provided by the Department shall be closed by the contractor after installing the cables/ conduits/ rising mains etc. as the case may be, by any suitable means as approved by the Engineer-in-charge without any extra payment.

(iv) All chases required in connection with the electrical works shall be provided and filled by the contractor at his own cost to the original architectural finish of the buildings.

### **Coordination Layout:**

Coordination layout must be submitted along with the shop drawings and approval must be obtained before execution of works.

## **MAINTENANCE DURING LIABILITY PERIOD**

### **Complaints**

The contractor shall receive calls for any and all problems experienced in the operation of the system under this contract, attend to these within 10 hours of receiving the complaints and shall take steps to immediately correct any deficiencies that may exist.

### **Repairs**

All equipment that requires repairing shall be immediately serviced and repaired. Since the period of Mechanical Maintenance runs concurrently with the defects liability period, all replacement parts and labour shall be supplied promptly free-of charge to the Owner.

## **NON-METALLIC CONDUIT WIRING SYSTEM**

### **Scope**

This chapter covers the detailed requirements for wiring work in non-metallic conduits. This chapter covers both surface and recessed types of wiring work.

### **Application**

1. Recessed conduit work is generally suitable for all applications. Surface conduit work may be adopted in places like workshops etc. and where recessed work may not be possible to be done. The type of work shall be as specified in individual works.
2. Flexible non-metallic conduits shall be used only at terminations, wherever specified.

### **Special Precautions-**

- i. If the pipes are liable to mechanical damages, they should be adequately protected.
- ii. Non-metallic conduit shall not be used for the following applications:-
- iii. In concealed/inaccessible places of combustible construction where ambient temperature exceeds 60 degrees C.
- iv. In places where ambient temperature is less than 5 degrees C.
- v. For suspension of fluorescent fittings and other fixtures.
- vi. In areas exposed to sunlight.

## **Materials**

### **a) Conduits**

- All non-metallic conduit pipes and accessories shall be of suitable material complying with IS 2509 : 1973 and IS 3419 : 1989 for rigid conduits and IS 9537 (Part 5) : 2000 for flexible conduits. The interior of the conduits shall be free from obstructions. The rigid conduit pipes shall be ISI marked.
- The conduits shall be circular in cross-section. The conduits shall be designated by their nominal outside diameter. The dimensional details of rigid non-metallic
- No non-metallic conduit less than 20 mm in diameter shall be used.

The maximum number of PVC insulated aluminium/copper conductor cables of 650/1100 V grade conforming to IS 694 : 1990 that can be drawn in one conduit of various sizes as per CPWD specification. Conduit sizes shall be selected accordingly.

### **b) Conduit Accessories**

- The conduit wiring system shall be complete in all respect including accessories.
- Rigid conduit accessories shall be normally of grip type.
- Flexible conduit accessories shall be of threaded type.
- Bends, couplers etc. shall be solid type in recessed type of works, and may be solid or inspection type as required, in surface type of works.
- Saddles for fixing conduits shall be heavy gauge non-metallic type with base.
- The minimum width and the thickness of the ordinary clips or girder clips shall be as per CPWD specification
- For all sizes of conduit, the size of clamping rod shall be 4.5 mm (7 SWG) diameter.

### **c) Outlets**

- The switch box shall be made of either rigid PVC molding, or mild steel, or cast iron on all sides except at the front. The regulator boxes shall however be made only of mild steel or cast iron.
- PVC boxes shall comply with the requirements laid down in IS 14772 : 2000. These boxes shall be free from burrs, fins and internal roughness.
- The thickness of the walls and base of PVC boxes shall not be less than 2 mm.
- The clear depth of PVC boxes shall not be less than 60 mm.
- 3 mm thick phenolic laminated sheet covers for all types of boxes shall be as per requirements.

## **Installation**

### **a) Common Aspects for Both Recessed and Surface Conduit Works**

- The erection of conduits of each circuit shall be completed before the cables are drawn in.

#### **Conduit Joints**

- All joints shall be sealed/cemented with approved cement. Damaged conduit pipes/fittings shall not be used in the work. Cut ends of conduit pipes shall have neither sharp edges nor any burrs left to avoid damage to the insulation of conductors while pulling them through such pipes.
- The Engineer-in-charge, with a view to ensuring that the above provision has been carried out, may require that the separate lengths of conduit etc.
- Conduit joints after preparation shall be submitted for inspection before being fixed.
- All bends in the system may be formed either by bending the pipes by an approved method of heating, or by inserting suitable accessories such as bends, elbows or similar fittings, or by fixing non-metallic inspection boxes, whichever is most suitable. Where necessary, solid type fittings shall be used.
- Radius of bends in conduit pipes shall not be less than 7.5 cm. No length of conduit shall have more than the equivalent of four quarter bends from outlet to outlet.
- Care shall be taken while bending the pipes to ensure that the conduit pipe is not injured, and that the internal diameter is not effectively reduced.
- Outlets
- All switches, plugs, fan regulators etc. shall be fitted in flush pattern.

### **b) Additional Requirements for Surface Conduit Work**

- Conduit pipes shall be fixed by heavy gauge non-metallic saddles with base, secured to suitable approved plugs with screws in an approved manner, at an interval of not more than 60 cm, but on either side of couplers or bends or similar fittings, saddles shall be fixed at a closer distance from the center of such fittings.
- Slotted PVC saddles may also be used where the PVC pipe can be pushed in through the slots.
- Where the conduit pipes are to be laid along the trusses, steel joists etc. the same shall be secured by means of saddles or girder clips as required by the Engineer in-charge. Where it is not possible to use these for fixing, suitable clamps with bolts and nuts shall be used.
- If the conduit pipes are liable to mechanical damage, they shall be adequately protected.

## **SWITCHES**

All 6 and 16 Amp switches shall be modular type of 240 volts A.C. grade. All switches shall be fixed on modular metal boxes. All 6 Amp socket shall be 3 pin type and 16 Amp socket shall be 5/6 pin type (unless otherwise specified) suitable for 16/6 Amp. All modular switches, sockets, telephone outlets, TV outlet etc. shall be in off white finish unless otherwise specified. The switches controlling the lights or fans shall be connected to the phase wire of the circuit. Switch boards shall be located at 1200 mm above finished floor level unless otherwise indicated on drawings or directed by Engineer-In-Charge.

In case of computer power points, Data points, telephone points etc. to be fixed on laminated partition board (furniture), same shall be fixed on laminated board (portion of laminated board meant for fixing power points) with base plate/cover plate as applicable, duly fixed with screws.

One modular switch may control maximum one, two or three light points as per requirement and as directed by Engineer-In-Charge. One light point controlled by 2 switches shall be provided in the staircases as directed by Engineer-In-Charge. Depending on area of rooms, halls etc. one or more than one switchboards shall be provided as directed by Engineer-In-Charge. At least one number 6A Socket with Switch shall be provided in each switchboard as directed by Engineer-In-Charge. Suitable power points and light points shall be provided for urinal sensors and hand dryers in the toilets as directed by Engineer-In-Charge. At least 10% Light fixtures shall be provided and operated with UPS supply with switches fed from UPS Distribution Boards.

## **COVER PLATE**

All modular switches, sockets, telephone outlets etc. shall be fixed on modular metal boxes with modular base plates and modular cover plates on top.

## **WALL SOCKET PLATE**

Each outlet shall have a switch located beside the socket preferably on the same cover plate/modular base. The earth terminal of the socket shall be connected to the earth wire.

## **WIRING**

All PVC insulated copper conductor wires shall conform to relevant IS Codes. All wires/ cables shall be stranded type irrespective of its size.

All internal wiring shall be carried out with PVC insulated FRLS, Copper wires of 650/1100 Volts grade. The circuit wiring for points shall be carried out in looping in system and no joint shall be allowed in the length of the conductors. Circuit wiring shall be laid in separate conduit originating from distribution board to switch board for light/fan. A light/fan switchboard may have more than one circuit but shall have to be of same phase. Looping circuit wiring shall be drawn in same conduit as for point wiring.

Each circuit shall have a separate neutral wire. Neutral looping shall be carried out from point to point or in light/fan switchboards. A separate earth wire shall be provided along with circuit wiring for each circuit. For point wiring red/yellow/blue colour wire shall be used for phase and black colour wire for neutral.

Circuit wiring shall be carried out with red, yellow or blue colour PVC insulated FRLS copper wire for RYB phase wire respectively and black colour PVC insulated FRLS Copper wire for the neutral wires. Green/Green-Yellow Colour copper wire shall be used as earth continuity conductor and shall be drawn along with other wires. No wire shall be drawn into any conduit until all work of any nature, that may cause injury to wire is completed. Care shall be taken in pulling the wires so that no damage occurs to the insulation of the wire.

Before the wires are drawn into the conduit, the conduits shall be thoroughly cleaned of moisture, dust and dirt. Drawing and jointing of copper conductor wires and cables shall be as per CPWD specifications for Electrical works (Part - I) 2013

Maximum number of PVC insulated 650/1100 V grade aluminium/copper conductor cable conforming to IS : 694 – 1990

## **JOINTS.**

All joints shall be made at main switches, distribution board socket and switch boxes only. No joint shall be made in conduits and junction boxes. Conductors shall be continuous from outlet to outlet.

## **LOAD BALANCING**

Balancing of circuits in three-phase installation shall be planned before the commencement of wiring and shall be strictly adhered to.

## **COLOUR CODE FOR CIRCUIT WIRING.**

Colour code for circuit and sub main wiring installation shall be Red, Yellow, and Blue for three phases. Black for neutral and yellow/green or green only for earth in case of insulated earth wire.

## **CLASSIFICATION OF POINTS.**

### **a. General**

b.

Classification of Point wiring shall be as per CPWD specification for Electrical Works (Part-I- Internal) 2013.

### **b. Point Wiring (Modular)**

#### **i. Definition of Point Wiring**

A point (other than socket outlet point) shall include all work necessary in complete wiring to the light points/fan/exhaust fan/call bell point from the controlling switch/MCB. The scope of wiring for a point shall, however, include the wiring work necessary in tapping from another point in the same distribution circuit i.e. from first switch board (wiring from distribution board to first switch box is covered in the circuit wiring and is not in the scope of point wiring) to subsequent switch board(s) in the same distribution circuit. The point wiring includes all materials specified below including chasing the wall (in case of recessed wiring in wall), fixing the conduit and making the wall good as it originally was. It also includes supply, drawing, testing and commissioning of wires.

#### **c. Scope of point wiring**

Following shall be deemed to be included in point wiring.

- (a) Supply & fixing conduit & conduit accessories for the same and wiring cables (including supplying and drawing wires) between the switch box and the point outlet.
- (b) All fixing accessories such as clips, nails, screws, phil plug, rawl plug etc. as required.
- (c) Modular switches, modular base plates and modular cover plates over the same. regulators, sockets with Metal boxes etc. in recessed or surface.
- (d) Outlet boxes, junction boxes, pull-through boxes etc. but excluding modular metal boxes if any, provided the switchboards for loose wires/conduit terminations.
- (e) In case of recessed wiring in wall the scope includes chasing of wall, fixing the conduit and making the wall good as it originally was.
- (f) Control modular switch (5/6A) as specified.
- (g) Ceiling rose or connector (in case of points for ceiling/exhaust fan point, prewired light fittings and call bells)
- (h) Connections to ceiling rose, connector, socket outlet, lamp holder, switch etc.



- (i) Interconnecting wiring between points on the same circuit, in the same switch box or from another. Interconnecting wiring from first switchboard to subsequent switch board(s).
- (j) Protective (loop earthing) conductor as required from one metallic switch box to another in the distribution circuits, and from switchboard to each point (light/fan/exhaust fan/call bell etc).
- (k) Bushed conduit where wiring cables pass through wall etc.
- (l) Ceiling rose (in the case of pendants except stiff pendants).
- (m) Lamp holder (in the case of goose neck type wall bracket, batten holder and fittings which are not pre-wired).
- (n) Back Plate (in the case of stiff pendants).

## **Circuit and Sub main Wiring**

### **a. Circuit Wiring**

Circuit wiring shall mean the wiring from the distribution board up to the tapping point for the nearest first point of that distribution circuit i.e. up to the nearest first switch box.

### **b. Sub main Wiring**

Sub main wiring shall mean the wiring from one main/distribution switchboard to another.

## **Power Plug Wiring**

### **a. 6A Plug Wiring**

Wiring for all 6 A Socket Outlets shall be done with 2 X 2.5 sqmm PVC insulated FRLS copper wire in suitable size MS Conduit (including supplying and fixing MS Conduit) along with the earth wire. Up to 3 points may be connected to one circuit.

### **b. 16A Power Plug Wiring**

Wiring for all 16 A Socket Outlets/Geyser point shall be done with 2X4 sq mm PVC insulated FRLS copper wire in suitable size MS Conduit (including supplying and fixing MS Conduit) along with the earth wire, directly from the MCB- Distribution Board or from one power socket outlet to another in case of computer power points. Looping shall not be done in general 16A power points (other than computer power points).

### **c. Wiring for 20A Metal Clad Socket Outlets**

Wiring for all 20A Metal Clad Socket Outlets shall be done with 2X6 sqmm PVC insulated FRLS copper wire in suitable size MS Conduit (including supplying and fixing MS Conduit) along with the earth wire directly from the MCB-Distribution Board. Wiring for 20A Metal Clad Socket outlet shall be done on linear basis i.e. complete wiring directly from MCB-Distribution Board to the socket outlet.

## **CONDUCTOR SIZE.**

**Wiring shall be carried out with following sizes of PVC insulated FRLS multiple stranded single core copper conductor wire/cable.**

- i. Light Point. - 1.5 sq.mm
- ii. Ceiling /Cabin/Exhaust Fan Point - 1.5 sq.mm
- iii. Call Bell Point - 1.5 sq.mm
- iv. 6A Plug Point/ UPS Computer outlets (up to 3 outlets on one ckt.) - 2.5 sq.mm
- v. Circuit Wiring - 2.5 sq.mm
- vi. General Power Point – 4 sq.mm
- vii 20A Industrial Socket Outlet – 6 Sqmm
- viii Special Power Point – 6 Sqmm
- ix A/C Box with 32A MCB- 6 Sqmm

## **LIGHTING FIXTURE AND FANS**

### **GENERAL**

- a. The Contractor shall supply and install all LED Lighting fixtures as per IS 4347 for Hospital Lighting.
- b. All fixtures shall be delivered to the building complete with suspension accessories, canopies, hanging devices, sockets, holders, reflectors, ballasts, diffusing material, louvers, plaster frames, recessing boxes, etc. all wired and assembled as indicated.
- c. Full size shop detail drawings of special fixture or lighting equipment, where called for in the fixtures, shall be submitted to the Engineer In Charge for approval.
- d. Fixtures, housing, frame or canopy, shall provide a suitable cover for fixture outlet box or fixture opening.
- e. Fixtures shall comply with all applicable requirements as herein outlined unless otherwise specified or shown on the Drawings.
- f. Manufacturer's name and catalogue number of light fixtures, fans, switchgears etc. shall be strictly adhered.
- g. Fixtures shall bear manufacturer's name and the factory inspection label.
- h. Fixtures shall be completely wired and constructed to comply with the IEE wiring regulations requirements for lighting fixtures, unless otherwise specified.
- i. Revamping the fixture shall be possible without having to remove the fixture from its place.
- j. Lamps of the proper type, wattage and voltage rating shall be furnished and installed in each fixture.

### **INSTALLATION**

Fixtures shall be installed at mounting heights as detailed on the Drawings or as instructed on site by the Engineer-In -charge.

Pendent fixtures within the same room or area shall be installed plumb and at a uniform height from the finished floor. Adjustment of height shall be made during installation.

Flush mounted recessed fixtures, shall be installed so as to completely eliminate leakage of light within the fixture and between the fixture and adjacent finish.

Fixtures mounted outlet boxes shall be rigidly secured to a fixture stud in the outlet box. Hickeys or extension pieces shall be installed where required to facilitate proper installation.

Fixtures located on the exterior of the building shall be installed with non-ferrous metal screws finished to match the fixtures.

### **LED Light Fixtures -GENERAL**

LED Lighting fixtures shall provide luminous efficacy of more than 100 Lumens/ Watt, including Driver & accessories. LED Light Fixtures shall have inbuilt harmonic mechanism to mitigate harmonics up to less than 10%.

### **BALLASTS/ Driver**

Ballasts/ Driver shall be electronic type and having high power factor type.

Ballasts shall have manufacturer's lowest sound level and case temperature rise rating.

### **TESTING**

After all lighting fixtures are installed and are connected their respective switches, test all fixtures to ensure operation on their correct switch in the presence of the engineer.

All non-operating fixtures or ones connected to the wrong or inconveniently located switch shall be correctly connected as directed by the Engineer In- charge. Stickers are to be placed on each light fixture w.r.t. controlling switch of respective light.

## **DISTRIBUTION BOARDS**

As a general practice MCB type double door DB shall be used. Provision of Vertical type MCB DBs is to be considered in areas where 3-phase outlets are also required:

Provisions in MCB DB:

- Recess/ surface type with integral loose wire box.
- Phase/neutral/ earth terminal blocks for termination of incoming & outgoing wires.
- DIN channel for mounting MCBs.
- Arrangement for mounting incomer MCB/RCCB/RCBO/MCCB as required.
- Copper Bus Bar.
- Earthing terminals.
- Interconnection between terminal block/ incoming switch/ bus bar/ neutral/ terminal block/ earth terminal connector with specified size of FRLS pre insulated copper conductor cable duly fitted with copper lugs/ thimbles.
- Termination block should be suitable for termination of conductor/ cable of required size but minimum rated cross section of the terminal blocks should be 6 sq. mm.
- Terminal block shall be made of flame retardant polyamide material.
- Coloured terminal blocks and FRLS wires for easy identification of RYB phases, Neutral and Earth.
- DB shall be provided with a detachable cassette for safe removal of MCBs, RCCBs. Terminal connectors from the DB without loosening the internal cable connections of phase and neutral circuits.
- The DB shall have peel able poly layer on the cover for protection from cement, plaster, paints etc during the construction period.
- Detachable plate with knock out holes shall be provided at the top/ bottom of board. Complete board shall be factory fabricated and pre-wired in factory, ready for installation at site. The box and cover shall be fabricated from 1.6 mm sheet steel, properly pretreated, phosphotized with powder coated finish.
- DB shall be of double door construction provided with hinged cover in the front.
- DB doors shall be suitably earthed.

Distribution Board shall be standard type. Distribution boards shall contain miniature circuit breakers. Miniature circuit breakers shall be quick make and quick break type with trip free mechanism. MCB shall have thermal and magnetic short circuit protection. All miniature circuit breakers shall be of minimum 10 kA, 'C' curve rated rupturing capacity unless otherwise specified.

Neutral busbars shall be provided with the same number of terminals, as there are single ways on the board, in addition to the terminals for incoming mains. An earth bar of similar size as the neutral bar shall also be provided. All live parts shall be screened from the front. Ample clearance shall be provided between all live metal and the earth case and adequate space for all incoming and outgoing cables. A circuit identification card in clear plastic cover shall be provided for each distribution board.

MCB's shall be provided on the phase of each circuit. No isolator shall be used in distribution board & panels unless stated otherwise. The individual banks of MCB's shall be detachable. There shall be ample space behind the banks of MCB's to accommodate all the wiring. All the distribution boards shall be completely factory wired, ready for connections. All the terminals shall have adequate current rating and

size to suit individual feeder requirements. Each circuit shall be clearly numbered from left to right to correspond with wiring diagram. All the switches and circuits shall be distinctly marked with a small description of the service installed.

Earth Leakage Circuit Breaker/Residual Current Circuit Breaker shall be provided in each Distribution Board as required. Earth Leakage Circuit Breaker shall be current operated type and of 30 mA sensitivity unless otherwise specified. It shall also provide over-current and short circuit protection i.e. it shall be MCB-cum-RCCB (Residual Current Circuit Breaker). In case ELCB doesn't have inbuilt short circuit protection, same rating MCB have to be provided for short circuit protection along with ELCB. Cost of this MCB is deemed to be included in the cost of ELCB. ELCB shall be housed within the Distribution Board.

Distribution Boards shall be ready for connections and shall be inspected in the factory by Electrical Engineer- In charge before dispatch.

Before procurement of Distribution Boards, MCB's, ELCB's (incomer and outgoings) etc., the contractor has to take approval of the DB Schedule/Drawings of each DB from the Electrical Engineer In Charge. The whole unit i.e. Distribution Board, MCB's, ELCB's etc. shall come from the manufactures premises/workshop. After inspection and clearance from the HITES Electrical Engineer the same may be dispatched to site for installation. However if a single component (such as ELCB or MCB or DB) is required for any reason such as replacement, increase in no. of circuits in the DB, change in the load of existing circuit, change in the total load on a particular DB etc., the same may be ordered separately.

#### **UPS:**

CPWD specifications shall be followed along with the direction of Engineer – in – charge.

#### **LIST OF APPROVED MAKES:**

<b>List of Approved makes</b>		
<b>S.No</b>	<b>Details of Materials/Equipments</b>	<b>Manufacturer name</b>
<b>ELECTRICAL</b>		
1	LT Panels / Synchronizing Panels/ Capacitor Panels	L&T/ ABB / Schneider/ Siemens or their authorized Channel Partner
2	HT & LT Cables (Power & Control Cables, Solar Cables)	Gloster/ Havells/ Nicco/ Finolex/ KEI/Polycab
3	Wiring Cables FRLS	Polycab, Finolex, RR Cables, Havells
4	Modular Switches/ Socket outlets and wiring accessories with moulded cover plate	Siemens (Delta)/ Legrand (myrius)/ L&T (Entice)/ Havells (Crab tree-Athena)/ Anchor (Roma)/ Schnieder (Opale)
5	MCB/ MCCB / RCCB/Isolaters / RCBO	Hager/ Havells/ Legrand/ L&T/ Schneider/ ABB/ Siemens
6	Ceiling /Exhaust/Wall fans	Crompton/ Usha/ Orient/ Bajaj/ Havells
7	Cable Gland & Lugs	Comet, Dowels, Hex, Gripwell
8	Cable Jointing Kit / HT termination Kit	Reychem/ Xicon/ 3M
9	Terminal connector	Connectwell, Elmex
10	Outdoor Type Box	Sintex, Legrand, Hensel, Rittal
11	MS & GI pipes	TATA, Jindal, SAIL
12	Cable Tray/ Race ways / Floor trunking / wall channels	MEM/ BEC/ MK/ OBO Bettermann/ Indiana/ Legrand/Sai Metal Craft

13	Data/Telephone/TV Outlets	Systemax/ Belden/ Simone/ MK/ Legrand/ Havells/ Anchor
14	DB's / Pre-wired DB's	Hager/ Havells/ Legrand/ L&T/ Schneider/ ABB/ Siemens
15	Optical Fiber Cable	Sterlite Technologies/ Finolex/ Belden/ Delton/ Skytone
16	PVC insulated FRLS - Aluminum / Copper 1.1 KV grade flexible wires	L&T/ Gloster/ Havells/ Polycab / Finolex/ RR Kable/ KEI/ Batra henlay
17	Indicating Lamps	AE/ Kaycee/ Vaishnav/ L&T/ Siemens/Schnieder/ Teknik/ ABB
18	Industrial Socket	ABB/ L&T/ Legrand/ Siemens/ Hager
19	Insulated Rubber Ma	Premier Polyfilm Ltd/ Polyelectrosafe/ Challenger/ Electro Mat/ Safe Hold
20	LED Light Fixtures and Lamps	Philips/ Wipro/ Trilux /Havells
21	Measuring Instruments (Analog Meter)	L&T/ AE/ MECO/ Rishabh/ Schnieder
22	Measuring Instruments (Digital Type)/ MFM/KWH meter	L&T/ Ducati/ Conzerv/ Secure/ Siemens/ Schnieder/ ABB
23	MS Conduit & accessories	BEC/ AKG/ Steel Kraft
24	Multi-function Meter	L&T/ ABB / Siemens/ Schneider
25	Panel Accessories	L&T/ Teknik/ Rishabh/ Siemens/ Schnieder
26	Push Buttons	Siemens/ L&T/ ABB/ Schneider/ C&S/ Teknik
27	PVC Conduit & Accessories	Clipsal/ Polypack/ BEC/ AKG/ Avon Plast/ Precision
28	Relay / Contractors/ Timers / Starters and Control Panel	Siemens/ L&T/ Schneider/ ABB
29	Selector Switch	Siemens/ L&T/ Teknik/ Salzer/ Schnieder/ ABB
30	Tap-off/ Splitter box	Zinwell/ Novatron/ Catvision
31	Telephone Tag Block/Jack Panel/ Face Plate	Krone/ Phoenix/ Wago/ Beldon/ Panduit/ Huwaei/ HP
32	Network Switch & Accessories	Cisco/HP
33	CAT 6A Wire/ Patch Cord	Amp/Belden/ Simone/Panduit/Legrand/ CISCO
34	Equipment Rack	Rittal/ Netrack/ Cisco/MTS/APW
35	UPS	Emerson (Vertiv)/ Schnieder (APC)/ Eaton/ Socomec/ Luminous/ Microtek

Note: All the materials used in the project must be as per IS standards and in case any materials left in the list of approved makes, the same should be used only after obtaining proper approval from HLL Engineer – in – charge before procurement.

#### CIVIL

1	Paints - Other Paints / Primer	ICI Dulux/ Asian/ Berger/ Nerolac
2	Steel	TATA, JSW, SAIL

Note: All the materials used in the project must be as per IS standards and in case any materials left in the list of approved makes, the same should be used only after obtaining proper approval from HLL Engineer – in – charge before procurement.

**END OF VOLUME - III**