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## **SECTION 1: GENERAL SPECIFICATION FOR ELECTRICAL WORKS**

### **1.1 SCOPE**

This specification shall be applied to all the electrical works being carried out by concessionaire in DIAL premises. The electrical specifications are for the assistance, guidance of the Concessionaire to design, fit out premises, maintain to a high standard in safe manner and in compliance with all necessary requirement. This also establishing the constraints/guidelines, within which the Concessionaire would need to design, install & maintain the space.

### **1.2 LICENSED ELECTRICAL WORKER**

The Concessionaire shall be deploying licensed supervisors and skilled workers having valid permits as per the regulation of Indian Electricity Rules and Local Electrical Inspector's requirements. The Concessionaire shall employ a competent, licensed qualified full-time electrical Foreman/Supervisor to direct the work for electrical installation in accordance with the drawings and specifications.

The grade of licensed electrical worker required to take charge of the electrical installation is based on the total approved capacity which is as follows:

- a) Electrician - 45 KVA and below
- b) Electrical Technician - 500 KVA and below
- c) Electrical Engineer - No limit
- d) Electrical Engineer - Installation with High Voltage possessing and should possess competency certificate from the electrical Inspector of the Local Government.

### **1.3 REGULATIONS AND STANDARDS**

The system shall be governed by the requirements of IS: 732, IE Rules, and IEE regulations.

The Installation shall conform in all respects to Indian Standard Code of Practice for Electrical wiring installation IS: 732-1989. It shall also be in conformity with the current Indian Electricity Rules, CEA Regulations and requirements of the Local Electric Supply Authority so far as these become applicable to the installation. In addition to above, the electrical installations must comply with the National Build Code 2016.

Wherever this specification calls for a higher standard of materials and/or workmanship than those required by any of the above regulations, this specification shall take precedence over the said regulations and standards. In general, the materials, equipment and workmanship not covered by the specification shall conform to the following Indian Standards, unless otherwise

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called for.

#### **1.4 APPROVAL & CLEARANCE**

- a. The Concessionaire shall prepare and submit to DIAL for their approval detailed the Electrical drawings, electrical layout and single line complete with power and lighting detail circuitries, proposed light fittings indicating the wattage/type of light fitting used.
- b. To indicate the maximum connected load on the electrical single line drawing with detail of lighting equipment, AC & Miscellaneous instruments.
- c. The load approval & its provisions shall be made based on the area occupied, requirement & availability of Infrastructure to provide the same on function.

#### **1.5 DRAWINGS**

- a. All electrical drawing submitted must bear the company's seal and must be endorsed by the Lead Engineer who undertake the design and installation work.
- b. Should indicate the following:
  - i. Emergency lights with battery pack of minimum 90 minutes so as to be able to operate during a power failure.
  - ii. Point of termination for conduit runs and broadly suggest the routes to be followed. However, any minor change, if found, essential to co-ordinate the installation of this work with other trades shall be made.
  - iii. The exact location, distances and levels etc. shall be governed by regulation and specification.
  - iv. Proper enclosure and trunking area for the cables from the isolators to the new Distribution Board.
  - v. Label the new distribution boards with circuit nos.
  - vi. Only LED light fixtures to be used.
  - vii. The LED lights used for the display shelves shall be replaced with lower wattage fittings if the premises found to be above 23 +/- 1C subsequently.
  - viii. All wires and cables shall be of 1100 V grade.
  - ix. Connected load does not exceed the supply capacity of the main distribution board. For loads provided for each tenancy. Refer Annexure – A & E.
  - x. Multi-plug and extension plug are not allowed to be used.
  - xi. Separate switch for Normal and Emergency (Red) lights.
  - xii. Room switches shall not be located behind an "opened" door.
  - xiii. Provide proper circuit labels/cable tags on the submain cables and all outgoing cables.
  - xiv. Provide new metal conduit/trunking for the laying of submain cables and outgoing cables.

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- xv. Labelling of the distribution board, light fittings, light switches, equipment and socket outlets with circuit nos.

The Concessionaire shall examine all Architectural, Structural, Air-conditioning and Electrical drawings before starting the work

## 1.6 OTHERS

1. The Concessionaire should inform DIAL immediately of any change of Licensed Electrical Worker during the course of the modification work.
2. Connection from meter to be taken through Isolator by concessionaire.
3. CBCT to be mandatory above 63Amp Connection
4. All electrical equipment used during the electrical installation work must obtain electricity supply through 30mA ELCB. For any other rating, approval from DIAL shall be taken by the Concessionaire.
5. Rubber mat to be provided near the electrical panel/DB. Anti-slippery Rubber mat (insulation purpose) should be minimum 3mm thick & 1.1KV insulated.
6. Electrical cabinet/Enclosure should be metallic.
7. CO<sub>2</sub>, FM-200/HFC-227ea gas based automatic tube detection & suppression system needs to be installed for Electrical Panel with Incomer rating equal to or more than 200Amps.
- 8.
9. Concessionaire shall apply 'Permit to Work' from DIAL before the commencement of work.
10. Duly complete and submit the meggar test report and other forms as required by DIAL after installation work.
11. At the completion of the work and before issuance of certificate of virtual completion, the Concessionaire shall submit to DIAL, layout drawings drawn at approved scale in six sets and a reproductive (original) copy clearly showing electrical layout and single line drawing including the circuit protection arrangement at the Concessionaire's distribution board.
12. As- Built Electrical Drawing(s) (Minimum 4 sets) to be submitted to DIAL and arrange an inspection upon completion of work.
  - a. Distribution scheme for the whole area.
  - b. Location of distribution and sub-distribution boards.
  - c. All types of cables (H.T/L.T/Control etc.) layout.
  - d. Layout of substation and switch gears and associated equipment.
  - e. External and internal lighting drawings complete with conduit layout etc.

*(Note: There will be a fortnightly testing of Generator Set. During the testing period a momentarily disruption of power supply of 10 to 15 seconds will occur. Concessionaires are advised to provide their own back-up power supply to cater for this disruption to back-up their critical equipment).*

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## **1.7 ADDITIONAL REQUIREMENTS FOR TAPPING OF NEW POWER SUPPLY FROM SWITCHROOM**

- 1.7.1 New power supply to be tapped from Switch or as advised by DIAL. New breakers to be installed in a compartment by DIAL. All breakers to be labelled with circuit no. and Concessionaire name with the purpose / area.
- 1.7.2 DIAL shall arrange to carryout the termination of all cables into the switchboards located within switch room.
- 1.7.3 DIAL shall install and label the Multifunction meter/MCCB compartments with the new circuit no. and Concessionaire name. The multifunction meter installed must be visibly accessible for the meter reading.
- 1.7.4 DIAL shall update the main single line drawing of the existing switchboard and label the sub-main cable with the new circuit no.
- 1.7.5 To label the incoming, outgoing sub-main cables, wall mounted compartment, MCCB, ELCB, MCB and the new distribution board with the new circuit no.
- 1.7.6 All costs for the works under 1.7.1 to 1.7.5 shall be paid by Concessionaire to DIAL.
- 1.7.7 The cables have to be sized adequately by Concessionaire to cater for the voltage drop (as advised by DIAL) from the Switch Room to the new distribution board within Concessionaire premises.
- 1.7.8 Arrangement to be made for the 'Turn-On' of the power supply at the Switch Room feeding the Concessionaire switchboard. The 'Turn-On' of Concessionaire DB should be by DIAL authorised personnel only.
- 1.7.9 Concessionaire to provide new trunking/containment for the laying of the sub-main cables from the Electrical Low Tension Room/Load centre to the new distribution board within Concessionaire premises. The trunking must be painted in yellow. Cable run from load centre to Concessionaire DB shall be coordinated and submitted for DIAL approval. Concessionaire's contractor must comply to approved method and support system for all services. All installed run must be inspected and accepted by DIAL.
- 1.7.10 All costs for works under 1.7.7 to 1.7.9 shall be paid by Concessionaire.

### **1.8 Quality:**

The DIAL decision with regard to the quality of the material and workmanship will be final and binding.

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## **1.9 Handover and Takeover (HOTO)**

In case of handover of premises to concessionaire and before switching on the power, a joint inspection (including DIAL Personnel) will be held to check & confirm that all Concessionaire provision are in good condition and as per requirement. Subsequently, meter reading shall be taken. This reading along with date & time shall be starting point for electricity billing.

In case of termination/end of lease/contract, the Concessionaire would hand over the premises in the same condition as was provided to them including any damages would be made good at their own cost prior to handing over back to DIAL. During take over, closing reading at that particular date & time shall be used for electricity billing.

## **1.10. Safety Standards and Other Requirements (For Concessionaire Compliance)**

1. The Concessionaire shall only appoint licensed and registered contractors of the relevant disciplines for the modification and alteration of the respective MEP systems.
2. The Concessionaire and his consultant architect/professional engineer/contractor shall comply with the DIAL requirements and guidelines on renovation works.
3. The Concessionaire shall ensure that a site inspection is conducted and to check and verify all drawings on the site before actual commencement of any work. The Concessionaire shall keep DIAL informed should there be any changes/addition/alteration/renovation in the drawings.

Before commencement of any addition/alteration/renovation works, the Concessionaire shall:

4. Complete and return the Letter of Indemnity (obtainable from DIAL) indemnifying DIAL in respect of any injury or death of person or damage to property as a result of renovation works carried out by his contractor.
5. A permit approved by the DIAL Authority must be obtained and shall be produce when demanded.
6. The Concessionaire shall ensure that the renovation work should not encroach into public and circulation areas.
7. The Concessionaire shall ensure that no person shall commence or carry out any building works except under the full time supervision of an appropriate qualified site supervisor. The particular of such person shall be made known to DIAL.
8. After the completion of the renovation works, it shall be the responsibility of the Concessionaire to maintain the new and assisting installation in a proper working condition and keep all drawings updated at all times.
9. DIAL reserves the right to inspect the Concessionaire's premise during renovations and thereafter during the leased period without notice from time to time.
10. The consequence of illegal alteration, modification, extension or renovation of the electrical installation shall be cutting off of power supply to the Concessionaire's premise

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or other penalties which shall be decided by DIAL. DIAL shall not be held responsible for any loss of business as a result of cutting off electricity supply.

11. HACKING OF BEAMS, COLUMNS AND SLABS INCLUDING DRILLING OF INSERTS THROUGH BEAMS, COLUMNS AND SLABS WITHOUT PRIOR WRITTEN PERMISSION FROM DIAL ARE NOT ALLOWED.
12. SPRINKLER/ AIRCON SYSTEM: Removal or modification of fire sprinkler system must be done by registered fire protection company and after approval by DIAL.
13. USE OF LIFT: Only passenger will be allowed in the passenger lifts. All materials for renovation should be transported through the Service Lift (nominated by DIAL) and the lift should be protected with suitable covering materials approved by DIAL.
14. DEBRIS REMOVAL: All renovation debris must be removed out of the airport by the Concessionaire's Contractor daily.
15. For all structural, MEP works in Concessionaire's Area, seismic forces for Zone V as per IS:1893 must be considered for design purposes.

## **1.11 ELECTRICAL DISTRIBUTION SYSTEM - DETAILS**

### **1. General**

Medium voltage distribution system shall be applicable for wiring 3 phase, 4 wire 415 ± 10% volts, 50 Hz ± 5%, AC supply and single phase, 2 wire 220 Volts±10%, 50 HZ ± 5 %, AC supply.

All concessionaire spaces are provided with single source power supply. Refer Annexure A & E for power provision for each concessionaire (Tenant).

Where supply from 2 sources is required to be provided, distribution should be such that even supply from one source fail/shutdown, operation should not be hampered.

Although stable grid power is being supplied, additional equipment like filters, surge protectors, UPS may be provided by Concessionaire as per his requirement to meet the requirement of no break power supply for computers/communications, security needs etc.

### **2. Location of Switchboards/Isolator Meter Box**

- a. Switchboards/Isolator Meter Box is to be located in dry location and well-ventilated space within concessionaire premises & should not be exposed to fumes etc.
- b. Shall not be erected above gas stove, sinks etc.
- c. Emergency Exit paths for evacuation.

New power supply to be tapped from Isolator or as advised by DIAL. Isolators with meters in the premises of concessionaires following provisioning shall be considered by DIAL for providing power.

S. No.	Description	Provided By	Remarks
<b>1</b>	<b>Power Supply</b>		
a.	Provision of raw power – Refer Annexure 1 for the details. Meter rent/Maintenance cost of meter shall borne by concessionaire.	DIAL	
b.	Appropriate Rating of Isolator with prepaid meter Box (shall be common for lighting and power) Switchgear and Cable of required size shall be provided as per Load requirement.	DIAL	
c.	Power and Lighting distribution (including Distribution Boards) inside Concessionaire Facilities.	Concessionaire	Refer below for Technical Guidelines
<b>2</b>	<b>Earthing</b>		
	Appropriates size of earth conductor shall be provided as Concessionaire per load requirement from nearest earth grid & distribution room. Tapping from shall be from this point.		

### 3. MCCB/MCB

- a. For the load Above 32 Amp rating TPN/SPN MCCB's should be provided and below 32 Amp TPN/SPN MCB.
- b. Earth leakage protection with should be provided at incomer of Concessionaire distribution panels along with over current and overload protection.
- c. It is recommended to provide double pole MCB in proper enclosure as power outlet for window A/c units, geysers etc.
- d. **Cabling and Wiring**
  - a. Cabling should be 2, 3.5 and 4 cores, XLPE insulated, FRLSZH/FRLS sheathed armored power cables. Cable up to 10 Sq.mm shall be copper and beyond that shall be aluminum.
  - b. Power circuits of 16A and above should be with 4 sqmm FRLSZH/FRLS Cu. Wire for power circuit of 6A and lighting circuits should be with 2.5 Sq.mm FRLSZH/FRLS Cu. Wire with suitable heavy duty GI conduit.
  - c. The GI conduits droppers on wall/column below the false ceiling should be concealed inside wall .
  - d. To provide new trunking for the laying of the sub main cables from the Electrical Isolator/Meter Panel/Switch Room/load center to the new distribution board at their premises. The trucking must be painted in yellow. Cable run from load center to Concessionaire DB must be coordinated and submitted for DIAL approval. Concessionaire Concessionaire must comply to approved method and support system for all services. All installed run must be inspected and accepted by DIAL.



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- e. Proper enclosure and trucking area to be provided for the cables from the isolators to the new Distribution Board to label the new distribution boards with circuit no's.
  - f. All electrical installations must comply with the National Building Code 2016.
    1. To provide proper circuit labels/cable tags on the sub main cables and all outgoing cables.
    2. Only GI Conduit to be used, in case of concealed in blockwork/brickwork wall- FRLS Heavy duty PVC conduit can be used.
    3. To label the distribution board, light fittings, light switches, equipments and socket outlets with circuit nos.
    4. All cables and trucking/conduits installed must be labelled accordingly at regular intervals.
    5. To install Uninterruptible Power Supply (UPS) with sufficient backup time to support any critical equipment during power failure.
    6. All electrical equipment used during the electrical installation work must obtain electricity supply through 30mA ELCB.
    7. To apply Permit to Work from DIAL before the commencement of work.
    8. To duly complete and submit the megger test report and other forms as required by DIAL after installation work.

#### 4. Wiring

The wiring system envisaged is generally to be shown on the layout drawings and line diagrams. However, a brief account of the general wiring system is given below:

- a. Submains wiring - Wiring from switchboards to the individual distribution boards.
- b. Circuit wiring - Wiring from DBs to the point control boxes for lighting, fans, sockets, call bells etc. and from DBs to the power sockets in the case of power wiring.
- c. Point Wiring- Point wiring shall commence from the first point control box/local control box for the points connected to the same circuit. Point wiring for lights, fans, 6 Amps sockets, call bells, etc. shall be carried out with multi stranded FRLSZH/FRLS, insulated copper wire of 2.5 sq.mm cross section. The point wiring shall be inclusive of 20mm/32mm galvanised steel conduits of standard and of approved make (as specified herein before) along with approved quality conduit accessories such as bends, inspection bends, reducers, junction boxes etc. together with wiring accessories such as ceiling roses, lamp holders, connectors, point control boxes (enclosure for electrical accessories), etc. Point wiring shall be provided with 1.5 sq.mm multi stranded FRLSZH/FRLS, insulated single core wire for earthing 3rd pin of sockets, luminaires and fan fixtures. Light control shall be either single, twin or multiple points controlled by a switch as specified.



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- d. Proper enclosure and trunking area to be provided for the cables from the isolators to the new Distribution Board. To label the new distribution boards with circuit nos.
  - e. To ensure that the connected load does not exceed the supply capacity of the main distribution board.
  - f. Circuit wiring shall generally be in single phase system. However, a maximum of 3 to 4 single phase circuit belonging to the same pole/phase could be installed in the same conduit or raceway. Each circuit wiring shall be provided with suitable GI earth continuity conductor as per standard specifications. Not more than 8 light points/fan points shall be grouped on one lighting circuit or the load per circuit shall not exceed 800-1000 watts. The minimum size of conductor for wiring of lighting circuit shall not be less than 2.5 sq. mm. All the wiring shall be carried out in loop in loop out system.
  - g. All circuit wiring shall be provided with printed PVC identification ferrules at either end bearing the circuit number and designation.
  - h. All electrical equipment used during the electrical installation work must obtain electricity supply through 30mA ELCB.
  - i. The sub main wiring shall be either in 3 phase, 4 wire or single phase, 3 wire system. Each sub main wiring circuit shall also have its own earth continuity wire. The number and size of earth continuity wire shall be as per the detailed drawings and standard specifications.

## 5. Wiring Conductors

All wiring conductors shall be multi stranded FRLSZH/FRLS insulated, single/stranded copper conductors of 1100 V grade as required Wiring conductors shall conform in all respects to IS 694 (Latest Edition).

The current rating for wiring conductors shall be based on the following

parameters: Ambient temperature 50 Deg C and Conductor temperature 70 Deg C

Wiring conductors shall be supplied in RED, BLACK, YELLOW, BLUE colours for easy identification of wires.

The cable used for power and lighting circuits shall be 4mm<sup>2</sup> and 2.5mm<sup>2</sup> in size respectively. Stranded copper conductors shall be used. All cables shall be with FRLSZH/FRLS insulation, FRLSZH/FRLS sheathed only. PVC shall not be used in cables.

The wiring used for lighting shall be standard products of reputed/approved manufacturers. The wires shall be of 1100 V grade, FRLSZH/FRLS insulated product of reputed manufacturers. The conductor sizes for wires used for point wiring beyond lighting panels shall be single core 2.5 sq.mm., 4 sq. mm. 6 Sq.mm and 10 Sq.mm stranded copper wire.

Power wiring shall be kept separate and distinct from light wiring. Wherever UPS is used, separate distribution system starting from DB to final wiring shall be provided.

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The wires used for connection of a lighting fixture from a nearest junction box or for loop-in loop-out connection between two fixtures shall be single core copper stranded conductor, 1100V grade flexible FRLSZH/FRLS insulated cords, unsheathed, conforming to IS:694 with nominal conductor cross sectional areas of 2.5 Sq. mm.

No joints in phase neutral or protective conductor in wires shall be permitted.

The wires shall be color coded as follows:

Red for R – Phase, Yellow for Y – Phase, Blue for B – Phase and Black for Neutral

Earthing - Green or Yellow green

Copper conductor of Min size of wiring should be as per below:-

Light wiring – 2.5 Sqmm/Power Wiring- 4 Sqmm

Power wiring more than 1 KW- size as per calculation

Conductor shall be flexible cable, Fire redundant low smoke (FRLSZH/FRLS). Only 3 core cable shall be used for connecting single phase appliances to the sockets. Unless cables are mechanically protected, these shall not be used in places on floor.

## **6. Installation of Wiring Conductors/Cables**

The wiring conductors shall not be drawn in to the conduits until all the works of any nature that may cause damage to the wires are completed. Before drawing the wires, the conduits shall be thoroughly cleaned, drained and ventilated. Proper care shall be taken in pulling the wires to see that no damage occurs to the insulation of the wires.

Wiring for power and lighting circuits shall be carried out in separate and distinct wiring system. Balancing of circuits in a three phase system shall be arranged before the installation is taken up.

Circuit of different phases shall be taken in a separate conduit. The earth wire should never be used as neutral. The earth and neutral should always be maintained separate.

Spacers and cleats shall be of suitable size to accommodate the cables. For isolated structures lighting cables may be taken in underground GI pipes.

Main runs of wiring from lighting panels and tapings to individual fixtures shall be as per design requirements in sizes specified on SLD. Wiring for all outlet sockets shall be done with 3 wires cores of equal sizes for phase, neutral and earth.

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### TABLE OF RECOMMENDED WIRING SYSTEM

Max, permissible number of 250V/650V Grade Single Core cables that can be drawn into Rigid Galvanized Steel Conduits

20 mm dia conduit    4 x 1C x 2.5 mm<sup>2</sup> unshielded wire.

25 mm dia conduit    6 x 1C x 2.5 mm<sup>2</sup> unshielded wire.

32 mm dia conduit    10 x 1C x 2.5 mm<sup>2</sup> unshielded wire.

#### **7. Conduit system**

Surface or concealed conduit system of wiring shall be adopted. Suitable pull boxes or inspection type fittings will be used to facilitate drawing of wires. No surface conduit shall be permitted in common/public area of terminal.

- a. Particularly in corridor areas where lot of service ducts, pipes, cable trays etc are present exposed conduits shall be laid on suitable supports. All surface conduits shall be heavy duty GI material and concealed conduit to be of FRLS heavy duty PVC material.
- b. In order to minimize condensation of sweating inside the conduit system, all outlets shall be properly drained and ventilated in such a manner so as to prevent entry of insects.
- c. The outer surface of the conduit pipes, including all accessories forming part of the conduit system, shall be adequately protected against rust, particularly when such system is exposed to weather. In all cases, bare threaded portion of the conduit shall not be allowed unless such bare threaded portion is treated with anti-corrosive preservative or covered with approved plastic compound.
- d. Where concealed wiring is to be adopted, conduits shall be laid in time before concreting of the slab/plastering of walls. The *Concessionaire* shall coordinate his work with other agencies involved in the civil works in such a way, that the work of these other agencies is not hampered or delayed because of any section on his part. Vertical conduit runs shall be made either through columns or chases prepared in the walls. *Concessionaire* shall fill these chases or any other openings made by him after completing the work and neatly finish the surface. If for low level receptacles, lighting etc. conduit may be concealed in the floor screed but care shall be taken for water penetration into it. No surface raceway or conduit is permitted.
- e. Wiring for exhaust fans shall be terminated in ceiling roses/receptacles and the connection from ceiling rose/receptacle to the exhaust fan shall be by means of a flexible cord equivalent in size to the main run of wires. The switch for control of the exhaust fan shall be mounted at an operable height and the receptacle shall be mounted near to the fan.
- f. After erection, the entire conduit system shall be tested throughout, for mechanical and electrical continuity and shall be permanently connected to earth by means of earthing clamps, in accordance with Indian Electricity Rules.
- g. Wiring above false ceilings shall not be left loose and shall be supported along the structures/ceiling. Wiring above false ceiling shall be on surface and below false ceiling it

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shall be concealed. To facilitate easy maintenance looping back system of wiring shall be followed throughout. Accordingly supply tapings and other interconnections are made only at fixture connector blocks or at switchboards. Intermediate junction boxes shall be used for wire pulling as inspection boxes.

- h. Building conduit lighting system of wiring generally consists of two parts. The first part includes the work necessary from panel upto lighting/power switch boards. The second part is point wiring which shall include the work necessary from tapping point in the switch board up to various fixture outlets / ceiling roses. The third part shall outlet to equipment. Third part shall not be more than 0.5 meter inside premises and 0.2 meter in common/public area.

In case of group control of light points, point to point distance shall be measured and classified for subsequent points.

The minimum size of conductor for wiring shall be  $2.5 \text{ mm}^2$ .

The wiring shall be colour coded so as to enable easy identifications of phase and neutral conductors and DC units.

The wiring shall be done in looping back system phase or line wires shall be looped at the switch board and the neutral shall be looped at the switch board or at the light or socket outlets. No joints shall be made at intermediate points in the run of wires unless the length of the final sub circuits or sub mains is more than the length of the standard coil as given by the manufacturer.

#### Open/Surface conduit system

Necessary GI pull wires shall be inserted in to the conduit for drawing wires and proper size earth continuity wire shall be run throughout the length of the conduit with the earth wire being efficiently fastened to the conduit by means of special clamps.

No PVC conduits are allowed to be used in the installation works when surface conduit system is in use.

General conduits shall be of welded and screwed sheet steel construction.

The conduits shall conform to IS: 9537. Flexible conduits shall be provided wherever required but length shall not be more than 0.5 m.

Care shall be taken to see that all conduit ends have no burrs and ends are neatly reamed to avoid damage to wires. All metal conduit accessories shall be only of threaded type. Pin grip or clamp type accessories are not acceptable.

## **2. Enclosure for Electrical Accessories**

Enclosure for electrical accessories such as switches, sockets, fan regulators, etc. shall be of cast iron or galvanized steel conforming to IS: 5133-Part-I. Wherever specifically required, galvanized sheet steel boxes shall be provided. The enclosure boxes shall be provided with a minimum of four fixing lugs located at the corners for fixing the covers. All fixing lugs shall have tapped holes to take machined brass screws.

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Enclosures shall be sufficiently strong to resist mechanical damage under normal service conditions. Provision shall be made for bonding the enclosures to the earth. The enclosure shall be adequately protected against rust and corrosion with suitable air drying paint. Wherever different phase conductors are brought in to the same enclosure, phase barriers shall be provided.

#### Junction Boxes

The junction boxes shall be concealed type for indoor lighting and suitable for mounting on columns, lighting poles, structures etc., for outdoor lighting. Junction boxes shall be of square/rectangular type of 1.6 mm sheet steel with minimum 6 mm thick pressure die-cast aluminium material LM-6 and shall have bolted cover with good quality gasket lining.

The outdoor junction boxes shall be weather proof type with gaskets conforming to IP55 as per IS: 13947 (Part I). The conduit connections shall also be properly sealed to prevent entry of water.

#### Pull out Boxes

The pull out boxes shall be concealed type and suitable for mounting on column, structures etc. The supply of bolts, nuts and screws required for the erection shall be included in the installation rates.

The pull out boxes shall be circular of cast iron or 16 SWG sheet steel and shall have cover with good quality gasket lining. The pull out boxes and cover shall be hot dip galvanised. The pull out boxes shall be completed with conduit knock outs/threaded hubs and provided at approximately 3 meters intervals in a conduit run.

### **3. Switches, Sockets and Accessories**

Only modular type switch & socket outlet shall be provided for better quality & service. Piano key type shall not be used. Wherever specifically called for Industrial Socket shall be used for surface mounting.

#### **A. Rating of Outlets**

1. 6A & 16A sockets points shall be rated at 100W & 1000W respectively. No overload beyond this rating should be permitted.
2. Load more than 1KW shall be provided by industrial socket of required rating.
3. All sockets shall be provided with three pin to be connected to earth. 2 pin or 5 pin sockets shall not be permitted to be used.
4. Conductor connecting electrical appliances with sockets outlets shall be of flexible type with overall outer sheet, earthing conductor for connection to be earth terminal of plug & metallic body of the electrical appliance.
5. Socket for power outlet of rating above 1 KW shall be of industrial type with associated plug top & controlling MCB.

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6. For Socket to be installed 23 cm above floor level, above working platform & away from likely position of stove & sink, control switch for 6/16A socket outlet shall be kept along with sockets

**B. Lamp Holders, Ceiling Roses etc.**

Accessories for light outlets such as lamp holders, ceiling roses, etc. shall be in conformity with requirements of relevant IS specifications. Only approved make of accessories shall be supplied.

**C. Installation of switches, sockets and accessories**

All the switches shall be wired on phase. Connections shall be made only after testing the wires for continuity, cross phase, etc. with the help of a meggar. Switches, sockets, fan regulators etc. shall be housed in proper sheet steel enclosure. The arrangement of switches and sockets shall be neat and systematic. Outlets shall be terminated in to a ceiling rose for fan points and in to autoway porcelain or Bakelite connectors for ceiling light points. For wall plug sockets the conductors may be terminated directly in to the switches and sockets. The outlets in common/public area shall be set out as per approved drawings, Before fixing these, the Concessionaire shall obtain clearance from the Engineer/Architect of DIAL with regard to their proper locations installation. The enclosures of sockets /and 3rd pin of the socket shall be connected to the ground through a proper size earth continuity wires as mentioned in this specifications.

**4. EARTHING FOR ELECTRICAL WORKS**

**A. General**

All non-current carrying metal parts of the electrical installation shall be earthed as per IS 3043. All metal conduits, trucking, cable sheaths, switchgear, distribution boards, meters, light fixtures, fans and all other metal parts forming part of the work shall be bonded together and connected by two separate and distinct conductors to earth electrodes. Earthing shall also be in conformity with the provisions of Rule 32, 61, 62, 67 and 88 of IER 1956.

**B. Earthing Conductors**

All earthing conductors shall be of high conductivity Copper/ Aluminum/GI as required and shall be protected against mechanical damage and corrosion. The size of earth conductors shall not be less than half that of the largest current carrying conductor. The connection of earth continuity conductors of earth bus and earth electrodes shall be strong and sound and shall be rigidly fixed to the walls, cable trenches, cable trays or conduits and cable by using suitable clamps made of non ferrous metals. The following earthing conductors are required to be used for various sections of the installation.

- a. All fixtures - Lighting, fan and switch enclosures, lighting conduits shall be earthed with 16 SWG bare copper wires or 1.5 sq.mm FRLSZH/FRLS insulated copper conductor wires as required.

- b. All single phase switches and DBs up to 30 A. rating shall be earthed with one run of 12 SWG bare copper wires or 6.0 sq.mm FRLSZH/FRLS insulated copper conductor wires.
- c. All single phase switches and DBs above 30 A. and up to 63 A. rating shall be earthed with one run of 10 SWG bare copper wires or 6.0 sq.mm FRLSZH/FRLS insulated copper conductor wires as specified.
- d. All three phase switches/DBs up to 30 A. rating shall be earthed with 2 runs of 12 SWG copper wires or 4.0 sq.mm FRLSZH/FRLS insulated copper conductor wires as specified.
- e. All three phase switches/DBs above 30 A. and up to 63 A. shall be earthed with 2 runs of 10 SWG copper wires or 6.0 sq.mm FRLSZH/FRLS insulated copper conductor wires as specified.
- f. All three phase switches/DBs above 63 A. and up to 100 A. shall be earthed with 2 runs of 8 SWG copper wires.
- g. All cable glands should be earthed using 16 SWG copper bare wires.
- h. All conduits, cable armoring, raceways, rising mains, etc. shall be connected to the earth all along their run by earthing conductors of suitable cross-sectional area. The electrical resistance of earthing conductors shall be low enough to permit the passage of fault current necessary to operate a fuse/protective device/a circuit breaker and shall not exceed 1 ohms. As rough guide the following size of earth continuity conductors shall be used for circuit wiring.

	<b>Size of Circuit wires/cables</b>	<b>Size of copper earth wire</b>
a.	Up to 7/0.91 mm conductors	14 SWG
b.	10 mm <sup>2</sup> conductors	14 SWG
c.	16 mm <sup>2</sup> conductors	12 SWG
d.	25/35 mm <sup>2</sup> conductors	12 SWG
e.	50/70 mm <sup>2</sup> conductors	10 SWG

All single-phase wiring shall have one run of copper earth wire and three phase wiring shall be provided with two runs of copper earth wires.

For External location, concessionaire has to provide earth electrode. Main earth bus shall be taken from the main medium voltage panel to the earth electrodes. The number of electrodes required shall be arrived at taking into consideration the anticipated fault on the medium voltage network.

For internal location, concessionaire has to tap from nearest earth grid at two locations.

All the sub mains and sub circuits shall be provided with earth continuity conductors as specified and connected to the main earth bus. Earth conductors for equipment shall be run



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from the exposed metal surface of the equipment and connected to a suitable point on the sub main or main earthing bus. All switch boards, distribution boards and isolators, disconnect switches shall be connected to the earth bus. Earthing conductors shall be terminated at the equipment using suitable lugs, bolts, washers, and nuts.

## **5. DISTRIBUTION BOARDS FOR POWER AND LIGHTING DISTRIBUTION**

### **A. General**

All electrical equipment's accessories shall be suitable for voltage and frequency of supply. Distribution board shall be suitable for 415 volts, 3 phase AC supply or 230 volts single phase AC supply as required. Distribution boards shall generally conform to IS 2675. However, the specifications hereinafter described shall take precedence over the above wherever this specification calls for a higher standard for material or workmanship.

### **B. Type and construction**

Distribution boards shall be of totally enclosed dead front safety type. The enclosure shall be made of best quality sheet steel of not less than 16 gauge. The sheet steel shall be treated with a rigorous rust inhibited process before fabrication.

In case of plate type or modular type accessories, the enclosures used shall be of the same make as that of the accessories.

The electric power will be received by concessionaire at main isolator/metering box and distributed through DB & then to wiring. The location of DB will be properly worked out.

Each main distribution board & sub distribution board shall be controlled by an incoming circuit breaker. Each outgoing circuit shall be controlled by a circuit breaker. Only MCCB/MCB type DB shall be used.

No switchboard should have more than one source of incoming supply. Where more than one incoming supply will be allowed, proper safety & interlock is provided so that only one source can be switched ON. Isolation shall be for neutral also.

Gasket at all points and opening including hinged doors with suitable locking facility shall be provided. The DB shall be of flush wall mounted type.

Protect insulated cover plate shall be provided inside the panel to shroud all the live parts. Only the operating handle of the Switch/MCB shall be projecting outside the cover plate. The incoming switch terminals shall be suitably shrouded to avoid accidental contact. Each phase or way shall also be suitably shrouded with hylam plate. The incoming and outgoing terminals shall be suitable for terminating cables.

All the low voltage internal wiring of the distribution boards shall be of 1100V grade stranded copper conductor of core size 2.5 Sq.mm minimum suitable for fault withstand capacity of the board.

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All the device wires and terminal blocks with in the board shall be clearly identified by durable and legible tags corresponding to those in applicable drawings. All wiring shall be easily identifiable by ferrules (interlocking type) accessible for maintenance checks.

The DB shall have nameplate with its designation inscribed on it. Suitable nameplate shall be provided for each piece of equipment for easy identification.

Suitable removable gland plates shall be provided for top/bottom cable entry, as specified.

An earth bus of bare copper/Al strip of adequate section shall be provided all along the length of the panel with two bolted type earthing terminals. All metallic non-current carrying parts including doors, switch base, handles etc shall be securely connected to the main earth bus by stranded PVC insulated copper wire of adequate size.

Proper danger plate shall be provided on each board as per relevant Standards.

#### Marking of Switch Board

Board shall be marked of each incoming/outgoing the details of load/area it feeds.

### **C. Bus bars**

Suitable bus bars made of high conductivity copper strips and mounted on non-hygroscopic insulating supports shall be provided.

The busbar shall be amply sized to carry the rated continuous current under the specified ambient temperature without exceeding the total temperature of 85°C. The busbar and their connections shall be capable of withstanding without damage the thermal and mechanical effects of through fault currents.

The following color coding shall be used for identification of busbars and wiring, as per Standards:

R Phase	Red
Y Phase	Yellow
B Phase	Blue
N Neutral	Black
E Earthing	Green or Yellow-Green
C Control	Grey

### **D. Circuit Breakers**

Molded case circuit breakers and miniature circuit breakers shall be of approved design and make. Circuit breakers shall be equipped with individually insulated, traced and protected connectors. The front face of all the breakers shall be flush with each other. Each breaker shall be provided with card holder and neatly printed card identifying the

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circuit. The position of handle of the breaker shall clearly indicate the condition of breakers such as 'ON/OFF/TRIPPED'.

#### **E. Miniature Circuit Breaker**

Miniature Circuit Breaker shall comply with IS-8828-1996 / IEC 898-1995. Miniature circuit breakers shall be quick make and break type for 230/415V AC, 50 Hz application with magnetic thermal release for over current and short circuit protection. The breaking capacity shall not be less than 10 KA at 415 V AC.

MCBs shall be DIN mounted. The MCB shall be Current Limiting be type (Class-3). MCBs shall be classified (B,C, D ref IS standard) as per their Tripping Characteristic curves defined by the manufacturer. The MCB shall have the minimum power loss (Watts) per pole defined as per the IS/IEC and the manufacturer shall publish the values.

The housing shall be heat resistant and having a high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection. All DP, TP and TPN miniature circuit breakers shall have a common trip bar.

#### **F. EARTH LEAKAGE CIRCUIT BREAKER (ELCB)**

Earth Leakage Circuit Breaker (ELCB) shall work on the principle of core balance transformer. The incoming shall pass through the torroidal core transformer. As long as the currents in the phase and neutral shall be the same, no electro motive force shall be generated in the secondary winding of the transformer.

In the event of a leakage to earth, an unbalance shall be created which shall cause a current to be generated in the secondary winding, this current shall be fed to a highly sensitive miniature relay, which shall trip the circuit if the earth leakage current exceeds a predetermined critical value. ELCB/RCCB shall be current operated independent of the line voltage, current sensitivity of a minimum of 30 mA and a maximum of 300 mA at 240/415 volts AC and shall have a minimum of 20,000 electrical operations.

The moving contacts of the phases shall be mounted on a common bridge, actuated by a rugged toggle mechanism. Hence, the closing /opening of all the three phases shall occur simultaneously. This also shall ensure simultaneous opening of all the contacts under automatic tripping conditions.

#### **G. Safety & interlocks**

All the live parts shall be shrouded such that accidental contacts with live parts are totally avoided. Distribution board shall be provided with a front hinged door. Distribution board interior assembly shall be dead front with the front cover removed. Main lugs shall be shrouded on five sides. Suitable insulating barrier made of arc resistant material shall be provided for phase separation. Ends of the bus structures shall also be shrouded

#### **H. Cabinet design**

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The distribution board cabinet shall be totally enclosed type with dust and vermin proof construction. The cabinet shall be stove enameled to Grey shade finish. The interior surface shall be finished to an off-white shade. The interior components shall be mounted on separate sheet steel which is mounted and locked on to the studs provided inside the cabinet. Over this, a cover made of hylam sheet or stove enameled sheet steel shall be provided with slots for operating handles of breakers. The cabinet shall be equipped with a front door having a spring latch and a vault lock. Cabinets shall have detachable gland plates at both top and bottom.

#### **I. Terminals**

Distribution boards shall be provided with a terminal block of adequate size to receive mains and outgoing circuits. The location of the terminal block shall be so located that crowding of wires in the proximity of live parts is avoided. A neutral link having rating equal to that of phase bus shall be provided

#### **J. Installation**

Distribution boards shall be surface mounted or recessed mounted as required by the Architects and at the locations shown on the drawings. The boards shall be fixed with suitable angle iron clamps and bolts. All the cables/conduits shall be properly terminated using glands/grips / check nuts etc. Wiring shall be terminated properly using crimping lugs/sockets and PVC identification ferrules. No bare conductor shall be allowed inside the board. Distribution boards shall be bonded to the earth at least at two points using brass bolts and lugs. Suitable name plate, danger plate, indicating the voltage shall be fixed to the front cover.

The *Concessionaire* shall determine the exact location of each equipment in order to avoid interference with piping, mechanical equipment or other services and also illumination shall be such installed with a view to obtain as uniform illumination as practicable, and to avoid objectionable shadow / patches.

Lighting and power DB shall be mounted such that top of the panel is not more than 2000 mm above finished grade.

Fixtures shall be firmly supported from the structures, Support clamps, safety chains etc. may be bolted or welded to the existing steel work or metal inserts. In case of concrete structures, where metal inserts are not available, fixtures will be fixed to or supported from concrete surfaces with the help of anchor fastener. In such cases special care shall be taken to see that anchoring is firm. For smaller weight equipment, nylon (or metallic) sleeve anchors shall be used. All lights used must be warm white in color. All room switches shall not be located behind an opened door.

#### **K. Testing**

Distribution boards shall be tested at factory as per IS 2675. The test(s) report(s) shall include insulation test, high voltage tests etc. Certificate to be submitted at the time of DIAL inspection and alongwith As-Built drawings.

Distribution boards shall be tested for insulation resistance after the erection.

## 6. Lighting

Concessionaires shall use energy efficient luminaries – LED only. The overall LPD shall be in compliance with LEED India NC 1.0 requirement.

In case of false ceilings, fixtures shall be supported from true ceiling. Exact location of fixtures shall be finalized in consultation with other agencies such as HVAC, plumbing, firefighting etc.

Concessionaire to provide emergency lights with battery pack of minimum 90 minimum so as to be able to operate during a power failure.

Suggested Emergency lights with battery backup shall be provided as depicted below. Type and size shall be based on area & function requirement.



Model : PEL LED LBL / NM  
 Lamp Type : LED  
 Accumulator : SLA  
 Battery Backup : 12 Hrs.



Model : PEL LED LTBL / NM  
 Lamp Type : LED  
 Accumulator : SLA  
 Battery Backup



Model : PEL LED LTBL (RM)/NM  
 Lamp Type : LED  
 Accumulator : NA  
 Battery Backup



Model : PEL LED LML / NM  
 Lamp Type : LED  
 Accumulator : SLA  
 Battery Backup

## 7. Testing and Inspection

The work shall be carried out in the best workman like manner in conformity with this specification, the relevant specifications / codes of practice of the Indian Standards Institution, approved drawings and the instructions of the *Concessionaire* (or) his authorized representative from time to time.

In addition to the standards, all work shall also conform to the requirement of the following

- Indian Electricity Act and rules framed there under
- Fire insurance regulations
- Regulations laid down by the Chief Electrical Inspector of the State electricity board.
- Regulations laid down by the factory inspector of the state.
- Any other regulations laid down by the local authorities.

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### **Testing and Commissioning**

Testing of installation shall be as per IS 732 - 1989 (Third revision).

- a) The insulation resistance shall be measured by applying between earth and the whole system of conductors or any section thereof with all fuses in places and all switches closed and except in earthed concentric wiring shall be all lamps in position or both poles of the installation otherwise electrically connected together.
- b) The insulation resistance measured as above shall not be less than 50 divided by the number of points on the circuits provided that the whole installation shall be required to have an insulation resistance greater than one megohm.
- c) Control rheostats, heating and power appliances and electric signs may, if required, be disconnected from the circuit during the test, but in the event, the insulation resistance between the case or frame work and all live parts of each rheostat appliance and sign shall not be less than that specified in the relevant Indian Standard specification or where there is no such specification shall not be less than half a megohm.
- d) The insulation resistance shall also be measured between all conductors connected to one pole or phase conductors of the supply and all the conductors connected to the middle wire or the neutral or to the other pole or phase conductors of the supply and its value shall not be less than specified.
- e) On completion of an electric installation (or an extension to an installation) a certificate shall be furnished by the Concessionaire countersigned by the qualified supervisor under whose direct supervision the installation was carried out. The certificate shall be in the prescribed form as required by the Local Electric Supply authorities.

#### **Testing of earth continuity path**

The earth continuity conductor including metal conduits and metallic envelopes in all cases shall be tested for electric continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance or leakage circuit breaker measured from the connection with the earth electrodes to any point in the earth continuity conductor in the completed installation shall not exceed one mega ohm.

#### **Testing of polarity of non-linked single pole switches**

- a) In a two wire installation a test shall be made to verify that all non linked single pole switches have been fitted in the same conductor throughout and such conductor shall be labeled or marked for connection to an outer or phase conductor or to the non-earthed conductor of the supply.
- b) In a three wire or a four wire installation, a test shall be made to verify that every non-linked single switch is fitted in a conductor which is labeled marked for connection to one of the outer phase conductors of the supply.

Lighting installation shall be tested as per the instructions below but not be limited to the following:

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- a. Measure the insulation resistance of each circuit without the lamps (load) being in place and it should not be less than 500,000 ohms to earth.
  - b. Current and voltage of all the phases shall be measured at the lighting panel bus bars with all the circuits switched on with lamps. If required, load shall be balanced on the three phases.
  - c. Check the earth continuity for all sockets outlets. A fixed relative position of the phase and neutral connections inside the socket shall be established for all sockets.
  - d. After inserting all the lamps and switching on all the circuits, minimum and maximum illumination level should be measured in the area.
  - e. Ensure switch On/Off (light/fan/socket) is only on live side.

The whole lighting control system, with lighting controllers, group controllers, occupancy sensors, photocells, etc., involved in the lighting system shall be tested.

LT panel to be commissioned after:

- a) Tightening of all nuts & bolts.
- b) Closing any left out holes & ensure that entire panel is insect proof.
- c) Megger Test
- d) Earth Test

## **8. MAINTENANCE**

1. Proper Maintenance for reliable, safe installation with emphasis on Preventive maintenances is to be carried out. It shall be the responsibility of the concessionaire to maintain its installation to them in a proper working condition.
2. The Concessionaire shall employ competent, licensed qualified person to direct the work of electrical installations in accordance with the drawings and specifications and should possess competency certificate from the Electrical Inspectorate of the Local Government.
3. The concessionaire shall ensure that the following guidelines have been executed during preventive maintenance.
  - All switchboards are clean and preventive maintenance is done every six months so as to ensure adequacy, safety & efficiency.
  - Safety Procedures are followed.
  - No overloading is being done and loads are balanced.
  - Log of PM and BM is maintained and all instruments, meters and indicative instruments are in working condition.
  - No loose wires are available.
  - Replacement of old/outdated equipment.



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- Insulation Resistance (IR) values shall be taken for the individual circuits as well as for the complete installation and the test reports verified by DIAL T3 Engineering Electrical Department before energizing the panel.
  - No overload each switch socket outlet with multiple connections at any one time.
  - All electrical equipment shall be properly earthed and connected to main earthing with suitably sized earthing conductor.
  - Repairing of all patchy circuits which may leads to short circuit.
  - Check all the illumination fittings including the emergency lights are clean & in proper working condition.
  - Following checks shall be carried out regularly as mentioned below:
    - Earth Testing – Once a year
    - Insulation Testing – Once a year

#### **4. Charging of New Connection**

- A. Charging of new connection shall be done after receipt of New Connection form duly filled by the concessionaire approved by commercial department & finance department. There will be a joint visit & verification on termination of connection.
- B. Completion of Installation to be submitted by concessionaire.
- C. Satisfactory report of joint verification of installation.

#### **5. Recharging Procedure of Prepaid Meters (Terminal)**

Concessionaires to deposit the payment through RTGS/Cheque/DD a least 5 working days before the exhaust of previous balance but not less than one month for recharging their prepaid meters with duly filled format to DIAL Finance Team on any working day (Mon-Fri)

After recharge is done P&E Team shall send all the details of meter recharged on day after recharging day through mail.

#### **6. Penalties / Fines**

##### **A. Repeated Tripping**

Concessionaire shall ensure & install effective protection at their end so that if fault occurs, I does not travel to the other end & equipment's are not affected. In case if tripping occurs at DIAL side following actions shall take place.

1. 1<sup>st</sup> tripping – Reset & switch on after taking verbal clearance from concessionaire concerned person
2. 2<sup>nd</sup> tripping (within 24 hrs) – Reset & switch on after submission of written request from the concessionaire concerned person depicting the cause of tripping.

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3. 3<sup>rd</sup> tripping (within 24 hrs) – Reset & switch on after submission of written request from the concessionaire concerned person depicting the cause of tripping along with a penalty of INR 1000.

**B. Theft of Electricity**

Concessionaire if found,

- i. Taps, makes or cause to be made any connection with cables/wires of DIAL property (other than concessionaire installation)
- ii. Uses electricity through a tampered meter.

DIAL shall disconnect power and levy penalty of INR10000/- along power charges of for entire connected load since connection.

**C. Theft of Material**

Cut or removes or take away or possess DIAL material without DIAL consent, whether or not the act is done for profit or gain.

DIAL shall disconnect power and levy penalty of INR10000/- alongwith cost of material.

**D. Disconnection of supply in default of payment**

Where any concessionaire neglects to pay any charge for electricity, the supply shall be cut off until all required charges together with any expenses incurred in cutting off reconnecting supply are paid. Supply of electricity shall not be cut off if such person deposits under protest the amount equal to the sum claimed from him.

**E. Non-Compliance to safety procedure**

A penalty of INR 500 would be charged to concessionaire in case of any incident resulting from Non-compliance to safety procedures as specified by DIAL. In case the concessionaire bypass protection system, DIAL shall charge the penalty of INR 1000 from the concessionaire.

**7. Storage of Materials:**

Concessionaires are to note that any materials stored outside their demise will be removed off site disposed off and all associated costs will be borne by the offending Concessionaires. All materials and deliveries must go straight to Concessionaire's space and must be stored inside their own units. Materials will not be stored on the concourse floors. Just in time delivery must be introduced and the retailers will not be allowed to store an abundance of materials in their units due to congestion, rework and fire loading.

**8. Waste Management:**

DIAL will provide a centralized waste management system on commercially agreed condition for all Concessionaires. This will involve the segregation of waste at source by each Concessionaire and deposited in specific bins.

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The Concessionaire shall remove all waste or unwanted material from site immediately. Waste is not allowed to be piled up and kept overnight as this is a fire hazard. Waste is to be removed every day. Any inflammable material shall need to be removed from site immediately as per fire safety plan and rules and regulations.

- Should waste accumulate to an extent that it is deemed hazardous from a health, safety, fire or environmental point of view; DIAL will immediately notify the Concessionaire to immediately remove same. Should this not be addressed within a period of 4 hours, DIAL reserve the right to appoint an external agency to conduct all necessary works to address the issue to their satisfaction. All associated costs will be offset against the offending Concessionaire.
- Concessionaires must maintain on site copies of all cradles to grave certification of the material and waste disposal for audit as required by DIAL.

## **9. Construction Power**

- The Concessionaire is to make an application to DIAL to make a connection to the electrical panel.
- Limited temporary lighting has been installed in the building to illuminate the areas for safety reasons. This concessioner shall supply, installation, connection, maintenance, relocation as required and decommissioning electrical equipment at the end of the works. As noted above, all electrical supply costs will be payable directly to DIAL as per the unit rates or fixed on connected load as mutually agreed.

## **10. Safety Procedures**

Inspection of electrical installation is intended primarily from fire safety consideration. Following points to be observed as a part of inspection & corrective actions.

- a) Keep Premises clean & dry. Front user vicinity of DB should not be used to store broken furniture, dismantled & waste material, packing boxes etc.
- b) DB shall be operated & maintained by authorized personnel only.
- c) Electrical wiring & control systems should be periodically inspected & if found defective wiring & broken parts to be replaced.
- d) While working on live mains follow permit-to-work system.
- e) Only competent, experienced & authorized person shall work on live mains & apparatus.
- f) No Overload of DB & wiring.
- g) Tools with proper insulation to be used.
- h) One socket outlet is to feed one appliance only & do not use multiple outlet.

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- i) DIAL staff will do a quality inspection & list out the deficiencies & reported deficiencies need to be corrected in definite time otherwise power may be disconnected.
  - j) Only properly prequalified & skilled Concessionaire to be deployed.
  - k) Keep appliances in OFF state when retail or office is not in use of during OFF hours.
  - l) Check that there is no sign of heating up or burn smell. These may occur due to overload or loose contacts. Highly unbalanced loading may cause heavy neutral current & consequently heating of neutral conductor & in turn produce spark or flash.
  - m) Concessionaire shall not use any existing DIAL equipment for their own installation.
  - n) Electrical distribution boards will be inspected weekly by a competent inspector
  - o) ELCB testing of electrical circuits will be conducted monthly by a competent inspector
  - p) No work shall be carried out on any live cable, or so near to cause danger
  - q) The electrical installation shall to the regulation of IE rule 1956/existing electrical regulations.
  - r) MCB shall be provided in the main distribution board and sub distribution board for overload protection.
  - s) Earth leakage protective devices to be used.
  - t) Use ISI marked cables/wires/equipment.
  - u) Outlets should be of capacity to handle the load connected to it.
  - v) Cables/wires/switchgears should be as per the connected load.
  - w) Joint in wiring should not be done. In case unavoidable, use terminal box or isolator.
  - x) Replace loose cords or wires which might get damaged/cracks.
  - y) Keep away electrical installation/equipment like panels, distribution boards, fuse box etc. away from combustible materials.
  - z) Use RCCB in distribution circuit to detect leakage current.
  - aa) Handle construction power supply or temporary electrical installation as per same rule as per permanent installation.
  - bb) Proper ventilation needs to be provided for panels, distribution boards, cable chambers etc.
  - cc) Meter box or panel room should be adequately ventilated and must be as per standard design.

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- dd) Electrical equipment's should be away from water and must be in a dust free environment.
  - ee) Place oily rags in a covered metal container. This waste must be properly disposed of on a regular basis.
  - ff) Educate engineers & electricians regularly & update the knowledge.
  - gg) Get installation done through licensed electrical contractor.
  - hh) Insist on testing through licensed electrical supervisor.
  - ii) Ask contractor to carry out installation as per Indian Electrical rules & National Building code & relevant standards.
  - jj) Periodic maintenance of installation must be done.
  - kk) Periodic testing of installation to be carried out.
  - ll) Protecting the public including person engaged from dangers arising from use of electricity installation & maintenance.
  - mm) RCCB SHALL BE PROVIDED IN THE SUB DISTRIBUTION BOARD and a register shall be maintained for its weekly testing.
  - nn) All the power supply to portable tools and task lighting must be routed through RCCB only.
  - oo) RCCB sensitivity shall be 30mA and tripping time 30mS
  - pp) Only metal clad and interlocked type combined switch plug socket units shall be used and no loose wire shall be inserted in sockets without plugs.
  - qq) Jointing of power cables is forbidden – all cables must be one continuous conductor.
  - rr) Double earthing shall be provided for all electrical installations like DB's and SDB's.
  - ss) All hand tools shall have earthing, 3 point metal clad plug or double insulated case
  - tt) All portable tools, task lighting must be routed through RCCB only
  - uu) Electrical machineries/equipment must be guarded properly
  - vv) Lock/ Tag Out/ in procedure shall be followed.

## 11. Periodic Inspection and Testing

Concessionaire shall employ a full time PERSON/AGENCY to look after the following activities for maintaining the electrical equipment.

Concessionaire shall maintain at site the following tools and instruments, but not limited to the list below in working conditions.

- a) Clip-on Ammeter and voltmeter

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- b) 1000 V Meggar and 5 KV Meggar
  - c) Insulation Tapes
  - d) Earth Testing Meggar
  - e) Cable jointing kit

DIAL or its appointed maintenance contractor reserves the right to inspect the Concessionaire's premises without notice from time to time.

The consequence of illegal modification, extension or renovation of the electrical installation shall be cutting off the power supply to concessionaire premises or other penalties which shall be decided by DIAL. DIAL shall not be held liable for any loss of business as a result of cutting off the electricity supply.

## **12. CERTIFICATE OF FITNESS**

The main prerequisite for fire hazard to ensure free & safe building is periodic inspection by qualified engineers. This ensures requirement of a particular building & other instructions for avoidance of possible fire hazard are completed & shortcomings are observed. These shortcomings need to be eliminated immediately by taking corrective actions as necessary & subsequently submitting the Action Taken Report (ATR).

The installation is to be inspected and tested at regular intervals, preferably not more than 6 months. The DIAL or their representative shall at all reasonable times have free access to the works and/or to the premises and the Concessionaire shall give every facility necessary for inspection and examinations and test of the equipment for fitness & safety requirements.

In case of any NON-Compliance, concessionaire shall make the required correction within 10 working days and subsequently submit compliance report to DIAL. In case of failure to do so DIAL shall send the reminder to the concerned person. Even if the compliance is not received within other 6 working days, power shall be disconnected.

## **13. GUIDELINES FOR PUBLIC AND CIRCULATION AREA IN DIAL PREMISES**

The Concessioner and his consultant architect/professional engineer/agency shall comply with following DIAL requirements and guidelines for works for Public and circulation area.

1. Before commencement of any addition/alteration/renovation works, a permit approved by the DIAL Authority must be obtained and shall be produced when demanded.
2. Any agencies who are to carry out any work shall be submitting an "Intimation letter". This shall be submitted at least 07 working days before starting work (except for emergencies) to DIAL by the Requisitioning Authority along with duly filled Work permit.

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3. Such requisition should be accompanied by proper alignment maps drawn to scale or with reference from landmark, clearly marked therein:
    - a. This should also mention method statement, the process for reinstatement of the work.
    - b. Detailed schedule specifying the date of commencement and date of completion and restoration works shall be included dated of completion.
  4. Based on above, the DIAL will issue the required permission for the said works or refuse permission indicating the reason thereof within 10 days of receipt of formal request.
  5. Agency shall not make any alterations or improvements to the premises or building without the prior written consent from DIAL. DIAL must approve all improvements in writing prior to the commencement of installation and/or construction of any improvement
  6. At any stage for the purpose of improvement/new expansion and for other purposes, the requisitioning Agency shall shift/relocate this installed equipment in case it is so within 40 days from the issue of the notice by DIAL.
  7. Works should be carried out causing minimum hindrance to inconvenience or inconvenience to the normal functioning. Necessary precautions should be taken to avoid dust nuisance to public and others.
  8. Proper lighting, fencing, caution boards and other precautionary measure as per Guidelines on safety and good engineering practice should be ensured by the requisitioning Agency in order to avoid any kind of accidents. The requisitioning Agency will be solely responsible for any accident or damage caused during the execution of the works. Signs and barriers are to be secured with sand bags if necessary.
  9. The works shall be carried out by the agency on the prescribed location as per the plan approved by the DIAL.
  10. DIAL will direct the agency as to where and how wires or any equipment are to be introduced and placed. no wires shall be introduced or placed except as directed by DIAL the owners.
  11. The DIAL shall stop the works for not providing adequate safety measures by agency.
  12. Agency will not be permitted to leave any articles such as carpeting, pads or equipment in the public corridors. Further, Agency shall not use existing corridor outlets to pull power. No extension cords laying in existing corridors are allowed.
  13. All interior floor or surfaces of the building must be protected by plywood. All exterior door butts and interior door butts, plus door butts of freight elevators must be protected by plywood.



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14. Agency and its sub-agency's will act in a professional manner at all times.
  15. Under no circumstances, DIAL will allow coring of the beam or structure.
  16. Any coax, signal and/or phone cable run throughout the buildings must be hung independently and attached to the building properly.
  17. The agency will take all necessary precautions for carrying out the work to avoid any damage to the buildings and existing installations. If any damage is occurred during the execution of the work, the same shall have to be rectified by the agency at their own cost. If any damage is caused to the equipment or services of other agencies during works, the complete cost for rectifying the damages are to be borne by the requisitioning agency and will have to get the same repaired or replaced at his cost. Agency shall restore the area to its original condition at his own cost without claiming any charges DIAL. In case of failure the DIAL shall be at the liberty to get the rectification done at the risk & cost of the agency.
  18. Agency shall furnish adequate protection against personal injury to employees and public while work is in progress.
  19. Agency wishing to install a satellite dish on the Building roof must obtain prior approval from the DIAL. Upon termination of the contract, the agency shall be required to remove the satellite dish and all associated wiring and restore the building to its original condition
  20. Letter for Restoration with the relevant details and signed by the concern shall be submitted to the DIAL office along with Return of Permit.
  21. The guarantee period for the rectification work will be six months and the Requisitioning Authority will be responsible for rectifying damages on the during the guarantee period. If there is any failure on the part of requisitioning agency, DIAL will arrange the work at the cost of the Requisitioning agency.

<b>Form of Completion Certificate</b>			
<b>S. No.</b>	<b>Description</b>	<b>Status (Yes)</b>	<b>Status (No)</b>
1	The Protection device has been installed at the allocated place.		
2	Cable routing is as per the route advised.		
3	The workmanship of installation and cable lying commensurate to DIAL standards and electrical regulations.		
4	Cables shall not be laid on the false ceiling or on the partition walls. Cables wherever required are to be laid on cable trays.		
5	Cable trays shall not be suspended on services on the ceiling.		
6	Circuit breakers and metal clad distribution boards are to be used for electrical installation and distribution.		
7	Main switch board, electricity meter, distribution board etc. are not to be fixed on combustible material or in combustible panels.		
8	No temporary connections shall be made in the premises and no flexible wire shall be used for the main supply cable from the main switch room to the allotted premises. Armored cables etc. shall be used for this purpose.		
9	No combustive materials are to be stores under/close to the electrical switch board/distribution board/meter etc.		
10	The applicant shall install one suitably rated fire extinguisher next to each electrical panel.		
11	No PVC conduits shall be laid.		
12	Shutter type switch socket outlet on suitable MS Box shall be used with proper earthing.		
13	No wooden distribution boards shall be installed. Only metal distribution board with MCB shall be provided.		
14	All wires used in electrical wiring shall be LSHZS/FRLS.		
15	All computer/other communication cables shall be drawn in separate conduits and not with the electrical wiring.		
16	All electrical works are to be carried out by a licensed contractor.		

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- 17 All electrical equipment like geysers, voltage stabilizers etc. shall be installed with ELCB's
- 18 All electrical equipment shall be properly earthed and connected to main earthing with suitably sized earthing conductor.
- 19 Insulation Resistance (IR) values shall be taken for the individual circuits as well as for the complete installation and the test reports verified by DIAL Engineering Electrical Department before energizing the panel.
- 20 Single line diagram sealed in a plastic folder shall be provided inside each electrical panel.
- 21 No overload each switch socket outlet with multiple connections at any one time.
- 22 Load Balancing has been done
- 23 Earthing (In case external premises)
- a) Description of earthing electrodes
- b) No. of earth electrodes
- c) size of main earth used
- 24 Test Results:-
- Insulation Resistance:
- a) Insulation Resistance of whole system of conductor to earth. Mega Ohm.
- b) Insulation between phase conductor & neutral.
- Between R phase & neutral \_\_\_ Mega Ohm
- Between Y phase & neutral \_\_\_ Mega Ohm
- Between B phase & neutral \_\_\_ Mega Ohm
- c) Insulation between phase conductors.
- Between R phase & Y phase \_\_\_ Mega Ohm
- Between Y phase & B phase \_\_\_ Mega Ohm
- Between B phase & R phase \_\_\_ Mega Ohm
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## **1.8 EXPLANATORY NOTES**

### **1.8.1 APPLICATION FOR A NEW LICENCE OR ITS RENEWAL**

YOU ARE REQUIRED TO SUBMIT YOUR APPLICATION FOR THE RENEWAL OF THE LICENCE AT LEAST ONE MONTH BEFORE THE EXPIRY DATE. For a new installation, please apply 1 week before the date of turn-on of the electricity supply.

When there is a change of management, an application has to be made for a new license.

### **1.8.2 VERIFICATION BY CONCESSIONAIRE/APPLICANT**

Where an application for a licence or a renewal is made by:

- a) a firm, the application form shall be signed by a partner or manager of the firm;
- b) a company, the application form shall be signed by a director, company secretary or general manager of the company.

### **1.8.3 CERTIFICATE OF FITNESS**

The installation is to be inspected and tested at regular intervals, preferably not more than 6 months.

- a) Approved Load: Load approved by DIAL.
- b) Installed Load: Total connected load of the electrical installation in KVA (based on a power factor of 0.8)
- c) Standby Generator (if any): or UPS  
State the number of standby generators or UPS as applicable and the rating of each in KVA.
- d) Single-Line & Layout Drawings

THE RELEVANT DRAWINGS OF THE INSTALLATION SHOULD BE SUBMITTED TOGETHER WITH THE APPLICATION.

- e) In addition to other information, the following have to be provided on each of the drawings (minimum size A1).
  - i) Signature of the licensed electrical worker;
  - ii) Licence No. of the licensed electrical worker;
  - iii) Date
  - iv) Name and Address of the installation;

- v) Proper Title Block with Legend;
- vi) Installation load in KVA.

#### **1.8.4 APPROVED MAKE LIST-**

- a) Switches, MCB, MCCB, RCBO, ELCB, RCCB, ACB, HT, LT: Legrand, ABB, Schneider, Siemens
- b) Wire and Cable- Polycab, KEI, RR, Havells, Gemco
- c) LED-Philips, Wipro, Havells
- d) Conduits- AKG, BEC (ISI marked)
- e) Cable tray- MEM, Profab (ISI marked)
- f) Earthing Cable- should be in Copper and min 3mm and could be higher as per design approval.