

Phase 3A Development at IGI Airport New Delhi

LEASED PREMISES DESIGN GUIDELINES

for

TENANCY AREAS of TERMINAL 1

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SECTION 0: GENERAL

1.0 INTRODUCTION

The purpose of this document is to provide information on the design basis of MEP Services and structural loads availability of the various permanent Tenancies (Retail/F&B/Offices/Ramp Accommodation) for the “**THE DEVELOPMENT OF PHASE 3A OF IGIA TERMINAL 1 (DELHI) WORKS**”. Separate Document shall be referred for Architectural Guidelines.

2.0 GENERAL GUIDELINES

- 2.01 The Concessionaire (Tenant) shall appoint a consultant architect/professional engineer to take charge of the renovation works.
- 2.02 The Concessionaire shall only appoint licensed and registered contractors of the relevant disciplines for the modification and alteration of the respective M & E systems. For list of registered contractors, refer subsequent respective sections.
- 2.03 The Concessionaire and his consultant architect/professional engineer/contractor shall comply with the DIAL requirements and guidelines on renovation works.
- 2.04 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 discrepancies in the drawings.
- 2.05 Before renovation works can commence, the Concessionaire shall:
- a. 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.
 - b. Submit 2 copies of the permit to start works issued by the relevant competent authorities to DIAL for record. He shall submit two copies of the letter written by his consultant architect / professional engineer to the relevant competent authorities if no Building Plan approval is required.
- 2.06 The Concessionaire shall ensure that the renovation work should not encroach into public and circulation areas.
- 2.07 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.
- 2.08 DIAL reserves the right to inspect the leased premise without notice from time to time.

- 2.09 All works carried out on site should be in strict accordance to the approved drawings.
- 2.10 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.
- 2.11 While these minor building works are exempted under Building Control Act, some of them may be subject to the control of other authorities. The Concessionaire shall be responsible to seek permission or clearance from other authorities or whether submission is required. The Consultant architect/professional engineer engaged by the Concessionaire shall submit in writing to the relevant authorities for a waiver in any submission. A copy of this letter is to be forwarded to DIAL.
- 2.12 DIAL reserves the right to inspect the Concessionaire's premise during renovations and thereafter during the leased period without notice from time to time.
- 2.13 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 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.
- 2.14 HACKING OF BEAMS, COLUMNS AND SLABS ARE NOT ALLOWED INCLUDING DRILLING OF INSERTS THROUGH BEAMS, COLUMNS AND SLABS WITHOUT PRIOR WRITTEN PERMISSION FROM DIAL.
- 2.15 **SPRINKLER/ AIRCON SYSTEM**
- Removal or modification of fire sprinkler/Air-conditioning system must be done by registered fire protection/air-conditioning company.
- 2.16 **USE OF LIFT**
- a) Only passenger will be allowed in the passenger lifts.
 - b) All materials for renovation should be transported through the DIAL designated Service Lift and the lift should be protected with suitable covering materials approved by DIAL.
- 2.17 **DEBRIS REMOVAL**
- All renovation debris must be removed out of the airport premises by the Concessionaire's contractor daily.
- 2.18 For all structural, M&E etc works in Concessionaire areas seismic forces as per IS: 1893 must be considered. Zone 5 has to be considered for design while considering relevant forces.

Before commencement of any addition/alteration/renovation works, a permit approved by the DIAL/Relevant Authority must be obtained and displayed behind the premise main entrance door. The Approval of this permit to be obtained from the DIAL/Relevant authority one week before the commencement of the work.

3.0 OTHER GUIDELINES ON WORKS

3.1 BEFORE COMMENCEMENT OF WORK

3.1.01 Incoming Concessionaires

3.1.01.1 Minimum requirements:

- a) Project title on the proposed shop to be displayed
- b) Expected completion date
- c) Interesting write-up and design on the hoarding to promote the shop to be submitted to officer in-charge for approval (A colour perspective on the proposed hoarding design shall be submitted).
- d) Compliance with details shall be provided.

All works carried out must be confined to the boundary of the premise or within the hoarding area. The surrounding area and the route used for the transportation of materials must be protected by means of plywood (at least 6mm thick and lay on a 4mm thick underlay) covered with 4mm thick grey felt carpet. All protection must be laid prior to the commencement of any work. If the protection is not laid in accordance with the specifications, the contractor is not allowed to commence work.

** For renovation work duration exceeding 4 weeks, all proposed hoarding shall be of gypsum board material of minimum 15mm thick complete with approved wall paper finishes. Otherwise, plywood of minimum 6mm thick with proper painting and decorative designs shall be applicable subject to DIAL approval.*

3.2 COMMENCEMENT OF WORK

3.2.1 The Concessionaire or his contractor shall not commence any site work until they have obtained a Renovation Work Permit issued by DIAL. The workers' security passes will be withdrawn if they are caught not complying to those requirements.

3.2.2 The Concessionaire may proceed with the installation work only after DIAL and other relevant authorities have approved every proposed plan. The Concessionaire's contractor shall also take note and comply with the conditions of approval (if any).

3.2.3 The Concessionaire shall inform DIAL on the commencement and completion dates of the

proposed renovation works.

- 3.2.4 Ensure all installation work carried out complied with all statutory requirements imposed by the relevant authorities.
- 3.2.5 No flammable object/material, such as thinner, kerosene, oxygen cylinder, is allowed to be stored in Airport. If it is required for the execution of renovation works, it shall be brought to site and removed from the Airport on the same day.
- 3.2.6 All addition and alteration works, renovations, construction or installation works shall in no way affect the functioning or efficiency of existing fire protection systems and means of escape, on DIAL's property.
- 3.2.7 Precautions shall be taken by Concessionaire to prevent damage to DIAL property in the course of the renovation works. Carpet in public areas affected by the renovation works shall be covered with clean nylon or plastic sheets and protected with plywood and grey felt carpet. Cargo lift shall also be protected with polythene lined plywood. Glass, aluminum panels, tiles, etc. shall be properly protected from welding sparks, corrosive fluid, sharp/abrasive objects, etc. When carrying out renovation works, Concessionaire shall ensure that his contractors do not block or impede any fire protection systems.
- 3.2.8 To seal off all air-conditioning grilles during the duration of renovation work.
- 3.2.9 Concessionaires shall not use any existing tray/trunking for their own installation.
- 3.2.10 Concessionaires and their renovation contractors shall not tamper illegally with DIAL's and government agency's services.
- 3.2.11 All tools, equipment and materials used for the renovation works should be stored within the hoarding area.
- 3.2.12 The Concessionaire shall not in any way hold DIAL responsible for any loss or damage to any equipment, plant or material brought to site for the execution of renovation works.
- 3.2.13 To keep the passage clear at all time.
- 3.2.14 No debris shall accumulate at the site but must be removed from the Airport daily in approved heavy-duty polythene bags.
- 3.2.15 The Concessionaire shall notify DIAL immediate of any site problem that is likely to affect the proper operation of the services in airport in the course of the renovation works.
- 3.2.16 In the false ceiling, all installation works must be coordinated on site and clearances of 300mm (all round) (or as approved by DIAL) between the services must be maintained. No fire protection systems are to be impeded or blocked.
- 3.2.17 All workers working in the Passenger Terminal Building are strictly not allowed to SMOKE even in the hoarded areas.

3.3 PEST CONTROL MEASURE

(Applicable only to F&B outlets with ceiling boards in the kitchen, food preparation areas and store)

- 3.3.1 A 2 feet wide wire mesh shall be secured along the perimeter of the kitchen, food preparation areas and store.
- 3.3.2 The wire mesh shall be made of rust-free material e.g. aluminum or stainless steel and secured properly (by brackets or adhesive) without leaving sharp edges exposed.
- 3.3.3 A sample of the proposed wire mesh shall be submitted to DIAL for approval prior to installation.

3.4 PRELIMINARY REQUIREMENTS FOR NEW FOOD SHOP/ FOOD STALL AT IGI AIRPORT

- 3.4.1 All the floor traps used within the premises must be of strong metal material, not easily breakable and must be screwed down (not easily opened by workers or pushed-up by rodents). The sample floor trap shall be approved by DIAL before installation.
- 3.4.2 Metal is the preferred material to be used for constructing the “false” ceiling for the whole foodshop/foodstall. If this is not possible and soft ceiling boards are used, then the perimeter of the ceiling’s edges must be covered with a thin one foot broad metal sheet (above the ceiling boards), especially around the kitchen, wash area, store, pantry and office. Strong metal grilles must be used to cover up all openings/gaps for the utility and other pipes that enter the premises from the ceiling area.
- 3.4.3 The foodshop/foodstall operator should engage a pest control operator (PCO) to carry out regular & effective rodent/pest control surveillance at the foodshop/foodstall. The PCO besides carrying out monthly pest control visit/treatment, has to submit a report on the pest status of the premises. This report shall be kept in the foodshop/foodstall and made available to the relevant agencies (e.g. DIAL, etc.) when requested to do so. The PCO’s services should be made available on a 24 hours basis.
- 3.4.4 All doors within the foodshop/foodstall should be made of rodent-proof material (especially the lower part of the door up to a height of 30cm).

3.5 AFTER COMPLETION OF WORK

- 3.5.1 The Concessionaire shall make good all works disturbed to DIAL’s satisfaction at his own cost.
- 3.5.2 To arrange for a joint site inspection with DIAL upon completion of the renovation works. All fire protection systems will be checked to ensure that they are not blocked or impeded.

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- 3.5.3 The Concessionaire shall be responsible for the proper maintenance of the new and existing building works within the leased premise during the tenancy period.
- 3.5.4 All M & E systems, equipment and plants installed within the Concessionaire premises shall be maintained in good condition by the Concessionaire. Any lamp failure shall be replaced with new within 3 working days. There shall not be any increase in the electrical load without prior DIAL approval.
- 3.5.5 The Concessionaire shall submit three (3) complete sets for MEP Services installed and one Auto-CAD soft copy (DVD/Pen Drive) of the as-built drawings to DIAL within three weeks upon completion of works.
- 3.5.6 The Concessionaire shall reinstate the leased premise to its original state upon giving up his tenancy, if required by DIAL.
- 3.5.7 DIAL or its appointed maintenance contractor reserves the right to inspect the Concessionaire's premise without notice from time to time.
- 3.5.8 The consequence of illegal modification, extension or renovation of the electrical installation shall be the cutting-off of power supply to the Concessionaire's premise 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.

3.6 **PREPARATION OF RENOVATION PLANS**

- 3.6.1 The consultant Architect/Professional Engineer engaged by the Concessionaire is to ensure that the plans submitted comply with all statutory requirements imposed by relevant authorities.
- 3.6.2 The consultant/Professional Engineer engaged by the Concessionaire shall also request for and obtain a copy of the following relevant information before designing the propose renovation works from DIAL:
- a) FRS Fire Safety Strategy Report for Terminal 1 IGI Airport (which is accepted and approved by DFS (Delhi Fire Service));
 - b) DFS approved drawings (smoke reservoir and engineered smoke control system, fire alarm system, sprinklers system, fire escape route); and
 - c) All DFS approved waivers for the particular fire zone which the leased premise located in.

Unless otherwise a waiver is applied and obtained from DFS, the requirements stated in FRS (Fire Safety Strategy Report) for Terminal 1 IGI Airport are to be strictly complied with. Any waiver other than those obtained by DIAL if required by Concessionaire shall be the responsibility of the Concessionaire. The Concessionaire shall specifically seek approval from DIAL before approaching DFS.

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- 3.6.3 An Information Request Form (IRF) has to be completed by the Concessionaire when requesting for drawings and other information pertaining to the leased premise.
 - 3.6.4 All Concessionaires are required to submit a copy of coloured perspective drawings of the proposed works.
 - 3.6.5 All drawings shall be drawn to a scale of 1:100 with existing and proposed alteration/ new addition works clearly shown in standard colours and properly annotated/ defined.

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

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. CO₂, 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).

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.

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

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
1	Power Supply		
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
2	Earthing		
	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 4mm² and 2.5mm² 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.

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.

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 mm² unshielded wire.

25 mm dia conduit 6 x 1C x 2.5 mm² unshielded wire.

32 mm dia conduit 10 x 1C x 2.5 mm² 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

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 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.

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.

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

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.

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

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

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.

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. 1st tripping – Reset & switch on after taking verbal clearance from concessionaire concerned person
2. 2nd 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. 3rd 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.

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.

Form of Completion Certificate			
S. No.	Description	Status (Yes)	Status (No)
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.

SECTION 2: GENERAL SPECIFICATION FOR HVAC WORKS

2.1 SCOPE

This specification shall be applied to all the HVAC works being carried out/installed by concessionaire in DIAL premises. The HVAC works 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.

2.2 REGULATIONS AND STANDARDS

The HVAC system shall be governed by the requirements of ASHARE 62.1, ASHRAE 90, NBC 2016, 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 Building 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 called for.

2.3 APPROVAL & CLEARANCE

1. The Concessionaire shall submit 4 sets of HVAC layout drawings (minimum A2 size) showing the position of air-conditioning Equipment and its associated works for DIAL approval.

2.4 DRAWINGS

1. The Concessionaire shall submit 4 sets of HVAC layout drawings (minimum A2 size) showing the position of air-conditioning Equipment, diffusers, slot diffusers, grilles, VAV boxes, duct sizes, volume control dampers & Motorised Fire dampers, thermostats etc.
2. The HVAC layout drawing shall include the chilled water supply & return pipe and PIBCV & Balancing Valve arrangement from isolating valve provided at one point in each of the Concessionaire Areas by DIAL.

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3. The HVAC layout drawing shall also include the outdoor air as well as exhaust air duct connection form the provisions provided by DIAL at the Concessionaire space boundary.
 4. Power supply to run the AHU shall be provided by the Concessionaire from his distribution panel.
 5. All the drawings are to be endorsed by a Professional HVAC consultant having more than 15 years of experience. No alteration is to be done on the main duct without approval from DIAL. All HVAC layout drawings shall be coloured in the plan with section.
 6. The Concessionaire shall submit detailed heat load calculations for the concessionaire space and the calculations are to be endorsed by a Professional HVAC consultant having more than 15 years of experience.

2.5 GENERAL REQUIREMENTS FOR HVAC SYSTEM

1. The renovation work to be carried out must comply with the requirement of regulatory authority i.e. Delhi Fire Services and relevant building codes.
2. The Concessionaire should engage a Professional HVAC consultant for the design, supervision, certification, testing and commissioning of the HVAC installation work.
3. The type, make, model and rating of any fitting/equipment used are to be clearly indicated in the drawings & manufacturer catalogue/test certificate also to be submitted. All the samples component and make should be approved by DIAL before procurement.
4. All ducts to be installed shall be insulated internally or externally. Flexible ducts (insulated or uninsulated) installed must not exceed 1.5 metres in length.
5. Concessionaire to note the provisions for HVAC System for their tenancy as indicated in Annexure – A and B. In case of installation of excess lighting/computer/ equipment and erection of full height partitions will affect the space temperature and ventilation. Concessionaire is to take note that the supply air (if provided) “off-grille” temperature is around 16°C. If no modification works is done to the provided air conditioning supply, Concessionaire shall submit a letter from a HVAC consultant to ensure that the stipulated space temperature of 23±1°C can be achieved. Failing which the Concessionaire has to install additional air-conditioning units at their own cost and submit proposal drawings for DIAL approval before start of installation.
6. Concessionaire is required to provide and install additional VAV boxes, if required, with

local control thermostat with the necessary connecting ducts to DIAL design and specifications. Concessionaire to link the power supply cables for VAV boxes to their own DB and labelled. In addition, Concessionaires are required to provide “Access Panel” near each VAV boxes for maintenance purposes. The air-conditioning distributing system including VAV boxes and local control thermostat which the Concessionaire installed, shall be properly maintained by the Concessionaire themselves and shall be dismantled upon expiry of tenancy. DIAL has the rights to ensure that the VAV boxes and local control thermostat are properly and sufficiently maintained.

7. There shall be no illegal tapping of air conditioning at the main ducts before the VAV boxes or tampering with the approved installed VAV Boxes. Any illegal tapping or VAV box tampering will be removed by DIAL in-house Contractor and a penalty above the cost will be charged to the Concessionaire.
8. The stand alone air-conditioning unit(s) is subjected to the proposed equipment technical capabilities, the refrigerant piping distance and availability of space for mounting the Condensing Units. Concessionaires shall install standalone air-conditioning unit(s) at their own costs using VRV /DX refrigerant system or chilled water fan-coil (tapping from the nearest chilled water supply available) or any special air-conditioning system, whichever is applicable and feasible if air-conditioning is required for kitchen area or if the proposed heat loads exceeds the existing cooling capacity provided by DIAL. Concessionaires are advised to strictly adhere to the recommended lighting levels to prevent air conditioning overload.
9. The Concessionaire shall switch off or make arrangements for automatic switching-off of the air conditioning system when space is not in operation to avoid energy wastage.
10. The air conditioning distribution system, especially in the F&B area, shall be design and configured as such to avoid smell propagating to the adjacent spaces.
11. The Concessionaire shall provide double skin air handling units with piping, PIBCV, balancing valve & other valves, strainers, controls, thermometer, pressure gauges, flexible connection, electrical panel, power and control cable.
12. All condensate pipes shall be run in trunking and sleeves when penetrating walls and floors. Concessionaire shall provide these and make good the affected DIAL ceiling area and floor penetration at their own cost.
13. Condensate pipe must be provided with U-trap and shall drain to the nearest floor trap with Concessionaire insulating the floor trap if is not insulated. The proposed routing of all condensate pipes and penetrations details shall subjected to DIAL approval.
14. The Concessionaire shall ensure that provisions on the HVAC system are made available

to meet the requirements indicated in interface co-ordination section and /or anywhere else in this document.

15. All duct, pipe & refrigerant pipe insulating material shall be free from asbestos & dust. Materials shall not contain asbestos, lead, mercury and mercury compounds. Foam insulation materials shall not use CFC blowing agents in the manufacturing process. All thermal insulation shall be non - corrosive to the metal, free from chlorine, water repellent and fire retardant.

16. Duct/Pipe Insulation Material

- a. Nitrile Insulation (Closed cell Class –“O” Conforming to BS476 Part 6 & 7, FM approved) should be Factory Laminated for internal use and with UV coating for external use.
- b. Flexible Elastomeric Cellular Thermal Insulation consisting of Closed-cell, sponge- or expanded-rubber materials.
 1. Ultraviolet-Protective Coating shall be provided as recommended by insulation material manufacturer. Thermal Conductivity ≤ 0.035 W/m.K at 24 deg. C (75 deg. F).
 2. Nominal Density : 50-60 kg/m³
- c. Insulating materials shall be acceptable only if they are equal to or better than the rates or classes of fire resistance as follows:
 1. BS 476, Class O, for burning rate nil, and not producing melted droplets BS 476 Part 4, for non - combustible grade.
 2. BS 476 Part 6, for fire propagation index of a maximum of 12.6 (Class ‘O’) BS 476 Part 7, Class I, for surface spread of flame.
 3. BS 476 Part 9, for production of emitted smoke shall not give more than 35% obstruction of the light beam. BS 476 Part 12, non ignitable.
 4. All insulation finishes and coverings shall be classified as Class I surface spread when tested in accordance with BS 476, Part 7 & Class ‘O’ as per BS 476, part 6.
 5. Base insulation material and other layers of surface treatments going into the complete field assembly of thermal insulation shall be compliant, when tested as per ASTM E-84, to following:
 - a. Flame spread rating not exceeding 25, Smoke developed rating not exceeding 50 in accordance with NFPA 255, ASTM E 84, or UL723 fuel contributed - zero.

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- d. The product shall be able to work effectively at ambient temperature of 105°C.
 - e. All adhesive, mastics, coatings, sealers and primers shall be classified as Class I surface spread when tested in accordance with BS 476, Part 6 & 7. They shall not in any way attack the insulation or the surface to which the insulation is being applied and shall be suitable for the working temperatures.

17. Duct Acoustic Lining Material

- a. Duct acoustic lining material shall be Nitrile Rubber open cell foam. Thermal conductivity of the insulation material shall not exceed 0.047 W/m²K at an average temperature of 20°C. Density of the nitrile rubber shall be 140 – 180 Kg/m³. The material should withstand maximum surface temperature of +85°C and minimum surface temperature of -20°C. The material should conform to Class 1 rating for surface spread of Flame in accordance to BS 476 Part 7 & HBF, HF 1 & HF 2 in accordance to UL 94, 1996.
- b. Insulation should have antimicrobial product protection, and should pass Fungi Resistance as per ASTM G 21 and Bacterial Resistance as per ASTM E 2180. The insulation should pass Air Erosion Resistance Test in accordance to ASTM Standard C 1071-05 (section 12.7).
- c. Thickness of the material shall be 15 mm thick specified for the individual application and with noise absorption properties as per IS: 8225 / ISO 354 / ASTM423C. The insulation should be installed as per manufacturer's recommendation.
- d. The extent of the duct acoustic lining shall be ascertained by the consultant to achieve noise levels as determined by the concessionaire (but not exceeding the values below) and to ensure no discomfort to the users and other concessionaires.
 - 1. Retail/F&B Public Area 50-55 dBA
 - 2. Retail/F&B Lounge Area 50-55 dBA

18. Pipe Installation

- a. During construction, the concessionaire shall ensure proper capping of all lines, so as to prevent the entrance of sand, dirt, etc. Each system of piping shall be flushed thoroughly after completion (for the purpose of removing dirt, grit, sand etc. from the piping and fittings) for as long a time as is required to thoroughly clean the system.
- b. Refrigerant pipes/pipe fittings shall be copper (hard/soft) shall be joined as per equipment manufacturer's recommendation and to be thoroughly cleaned before jointing. Refrigerant pipes shall be thoroughly blown out using nitrogen and pressure tested as below. The system shall be evacuated to levels as per equipment manufacturer recommendation.
- c. All CHW/refrigerant/condensate drain pipework to be pressure tested to 1.5 times the maximum design pressure of respective piping system for a period not less than 24 hours. All leaks and defects in joints revealed during testing shall be rectified, retested (in the same manner) and approval taken from DIAL.

2.6 ADDITIONAL REQUIREMENTS FOR CONCESSIONAIRE'S OWN SPLIT AIR-CONDITIONING UNITS

1. For split unit air-conditioning system, a detailed cross sectional plan showing the mounting, location of the condensing units for the air-conditioning should be reflected in the drawings. The split unit air-conditioning location should be approved by DIAL prior to installation.
2. All DX type indoor units shall be with CFC free refrigerant, minimum BIS 4 star energy rating and shall be installed as securely suspended with spring isolator from slab/steel substructure and the condensing units shall have neoprene pad installed on civil foundations. Concessionaire has to submit the loading details and suspension/installation arrangement to DIAL for seeking approval and shall start work only approval has been obtained in writing from DIAL.
3. All refrigerant pipes, condensate pipes and electrical wires shall be run in trunking and sleeves when penetrating walls and floors. Such wall/floor openings shall be fire sealed. Concessionaire shall provide these and make good the affected DIAL ceiling area and floor penetration at their own cost. Condensate pipe must be provided with U-trap and shall drain to the nearest floor trap with Concessionaire insulating the floor trap if is not insulated. The proposed routing of all refrigerant pipes and condensate pipes and penetrations details shall subjected to DIAL approval.
4. The air-conditioning works shall include the electrical single-line diagram showing the MCB rating, position of switch socket outlet, operating switch, isolator, catalogue etc. for the air-conditioning unit.
5. The Concessionaire is to ensure that the electrical load of the additional air-conditioning unit will not trip the electrical mains.
6. The Concessionaire shall seek approval in writing from DIAL for the location of the condensing unit installation. The loading of the condensing unit are to be endorsed by a certified structural engineer Concessionaire has to submit the loading details and suspension/ installation arrangement to DIAL for seeking approval and shall start work only approval has been obtained in writing from DIAL.
7. The Concessionaire shall properly label all condensing units, refrigerant and condensate pipe installed. In addition, Concessionaires are to submit the refrigerant pressure pipe test. Insulation for refrigerant and condensate pipe shall be class 'O' only.
8. The Concessionaire shall submit detailed heat load calculations for the outlet and all calculations are to be endorsed by a Professional HVAC Consultant. The HVAC distribution system, especially in the F&B area, shall be design and configured as such to minimize smell propagating to the adjacent space.

2.7 GENERAL REQUIREMENTS FOR MECHANICAL VENTILATION SYSTEM

1. The mechanical ventilation work to be carried out must comply with the regulations laid down by NFPA/Delhi Fire services and relevant codes.
2. The ventilation works drawings must be endorsed and supervised by a Professional HVAC consultant.
3. To show all existing/new ducting including demolition plan of ductwork/pipework in the proposed drawing.
4. The ducting layout of kitchen outdoor air and exhaust system from and to the kitchen area to be provided by Concessionaire.
5. Concessionaire is to provide the outdoor air grilles, kitchen hoods complete with grease filters, UV filters and automatic grease wash system similar to Gaylord GX2/CG3 UV Ultima or other approved equal by DIAL, volume control dampers, fresh and exhaust air distribution ductworks and connect to the provided main fresh air duct and exhaust air duct respectively. They are to maintain them and bear the cost of leaks and breakdowns.
6. The kitchen exhaust and fresh air fan shall be interlocked. Control wiring shall be installed by the Concessionaire if not provided. To conduct testing on the interlocking with the exhaust fan together with DIAL after all the installations have been completed. All electrical wiring should be FRLSZH/FRLSH cable to be used
7. Concessionaire shall indicate on their proposed drawing the design air flow (in L/s) on their respective exhaust cooker hoods and outdoor air grilles.
8. The Concessionaire shall submit detailed calculations of kitchen exhaust and hood sizing requirements for the Concessionaire area and the calculations are to be endorsed by a professional HVAC consultant). Concessionaire shall ensure that the design of kitchen exhaust does not permit cooking smell to propagate to other areas.
9. Concessionaire shall arrange for the kitchen exhaust duct to be chemical cleaned **at least once a year and submit a copy of the servicing report for DIAL record purposes.**
10. The Concessionaire shall maintain at least once every month the kitchen exhaust and fresh air fans and submit a copy of the servicing report for DIAL record purposes. Concessionaire shall attend and bear the cost of any breakdowns due to poor

maintenance fans.

11. The Concessionaire should maintain, attend and bear the cost of the breakdowns of the all control panels and electrical switchboard serving the Concessionaire kitchen ventilation system.
12. The Concessionaire shall to switch off the kitchen ventilation system when space is not in operation to avoid energy wastage.
13. Thermal Insulation on kitchen exhaust ducting shall be 80 mm thick Aluminum foil faced resin bonded fiber glass wool (asbestos free) of density not less than 48kg/m³ suitable to meet the Delhi Fire Services Approval.

2.7 EXISTING CONDITIONS

- e. In specific locations, DIAL has established certain fixed Base Building HVAC services that pass through the Leased Premises. Any connection changes or modifications to existing base building services, including structural items, within the Leased Premises shall be reviewed with the Development Coordinator and the DIAL's written approval must be obtained before any work is done.
- f. Except for redundant in-store ductwork associated with cooling an existing premise scheduled for renovation, the Concessionaire shall not remove, alter or relocate any other in-store ductwork without the prior consent of the DIAL.
- g. Any changes or modifications to existing base building services, including structural items, within the Leased Premises shall be reviewed and approved by DIAL before any work is done.
- h. DIAL must approve any work which may affect the base building warranties, before any work can commence.
- i. Where construction involves the modification of an existing control system, the Concessionaire's contractor shall co-ordinate the installation of all control components required to provide a fully operational system including the replacement of existing defective components, with DIAL.
- j. It is the responsibility of the Concessionaire's contractors and designers to check and verify actual on-site dimensions and conditions.
- k. All existing wall and floor penetrations within the Leased Premises must be fire stopped as required using only fire stop products.
- l. Ventilation to be provided by concessionaire as per site feasibility and design approval.

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- m. If Concessionaire's design calls for shifting of already installed units, ducting, piping and accessories, or additional need of air conditioning or ventilation then Concessionaire has to get prior approval from the DIAL and the Concessionaire at the Concessionaire's expense shall undertake any additions or relocations required.
 - n. If Concessionaire ducts are crossing 2 hr rated existing wall, it has to be provided with 2 hr rated fire damper as per NBC requirement.

2.8 Demolition of Existing HVAC Systems

- a. Any HVAC equipment which is no longer required by the Concessionaire or is to be abandoned must be removed.
- b. The Concessionaire is responsible for the repair or patching of all floors, walls, etc. damaged as the result of the removal of any equipment. New materials should be used to match the existing condition.
- c. Pipes and systems that are no longer required that are removed are to be noted as being removed on a set of record drawings. Such drawings shall be submitted to the DIAL.

2.8 Cutting & Patching

- a. Prior to undertaking any floor penetrations approved by the DIAL, the Concessionaire is required to X-ray the floor area in question to determine locations of any in-slab re-bar and/or conduit. Copies to be provided to the DIAL. X- raying of any floor area within the Leased Premises should be done after normal operating hours and all precautions should be made to procedures.
- b. Mechanical coring must be undertaken for slab penetrations greater than 25 mm (1") in diameter. Such work will be carried out by the DIAL's forces at the Concessionaire's expense.
- c. Provide sleeves for all wall and floor penetrations.
- d. All wall and floor penetrations must be sealed to the DIAL's satisfaction. All penetrations must be fire-proofed as required and all floor penetrations must have a watertight seal.

2.9 Coordination of Services

- a. The Concessionaire or his contractor must coordinate the locations of all existing services with the Development Coordinator and Mechanical Coordinator prior to the commencement of any work on site.
- b. The Concessionaire is required to complete a Building Services Shutdown Request Form to arrange for equipment to be isolated prior to work commencing.

2.10 Access Panels and Doors

- a. The Concessionaire shall prepare drawings showing the location and type of all access

doors for the existing equipment in co- ordination with other trades before proceeding with installation of False Ceiling of Concessionaire areas and hand these to the Contractor/DIAL to obtain approval.

2.11 LIST OF HVAC EQUIPMENT PREFERRED MAKES

S. No.	Description	Make
1	Floor Mounted AHUs	Waves /System Air/ Daikin/ Voltas/Caryaire/Blue Star
2	Ceiling Suspended AHUs	Waves /System Air/ Daikin/ Voltas/Caryaire/Blue Star
3	Fan Coil Units	Waves/System Air/
4	Air Washer	Waves, Voltas, System Air, Caryaire and Blue star
5	Scrubber	Rydair, Trion.
6	Fans	Kruger/Greenheck/System Air/Wolter/ Caryaire/ Nicotra
7	Factory Fabricated Duct	Zeco/Ductofab/Waves/Rolastar
8	Grilles/Diffusers/Nozzles/Louvers	System Air/Caryaire/Dynacraft /Airmaster
9	Fire/Smoke/Fire & Smoke Dampers	Greenheck/System Air/JCI/Caryaire
10	Fire Rated Ducts or GI with Fire Rated insulation	LAF/Promat/Morgan
11	MS/GI Pipes	Jindal (Hissar)/Tata Steel/SAIL
12	Copper Pipes	Rajco/Met Tube/Mex flow/Mandev/ As per OEM recommendation.
13	Butterfly Valves (above 50mm)	Audco/Honeywell/Advance (It should be PN 16.)
14	Balancing Valves	Audco/Honeywell/Advance
15	Ball Valves (Upto 50 mm dia)	Rapidcool/RB/Emerald/Sant/Zoloto (It should be PN 16.)
16	Y-Strainer	Emerald/Rapidcool
17	Pressure Gauge	H.Guru/Fiebig/Emerald
18	Thermometer	H.Guru/Fiebig/Emerald
19	Automatic Airvent	Rapidcool/Anergy
20	Closed cell Elastomeric Insulation	Armacell/K-Flex/A-Flex
21	2 way valve for FCUs/AHUs (PIBCV)	Danfoss/Siemens/Flowcon/Honeywell /Anergy/Belimo/Johnsons Control
22	Strip Heaters (Duct or AHU/FCU Mounted)	DASPASS/Omega/Green Hack

SECTION 3: GENERAL SPECIFICATION FOR FIRE PROTECTION SYSTEM (FPS) AND FIRE DETECTION & ALARM SYSTEM (FDAS) WORKS

3.1 SCOPE

This specification shall be applied to all the FPS/FDAS works being carried out by concessionaire in DIAL premises. The FPS/FDAS works 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 requirements. This also establishing the constraints/guidelines, within which the Concessionaire would need to design, install & maintain the space.

3.2 REGULATIONS AND STANDARDS

The FPS/FDAS system shall be governed by the requirements of NFPA, NBC 2016 & DFS Rules and requirement(s).

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 Building 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 called for.

3.3 APPROVAL & CLEARANCE

1. The fire sprinkler system has been provided in leased premise in Terminal 1. Refer Annexure – A and C for further details. Should there be any change to the location / position of fire sprinkler, the Concessionaire shall carry out the alteration works subject to the approval of Delhi Fire Services (DFS).
2. The Concessionaire should appoint registered Fire Protection Contractor to carry out the alteration work of the fire detection / protection system.
3. The Concessionaire should engage a Professional Engineers for the design, supervision, certification, testing and commissioning of the fire protection installation work.
4. The Concessionaire should ensure that the fire detection/protection installation carried out by their contactor comply with the requirements stipulated in NFPA, NBC and the approval of the DFS and the relevant local authorities having jurisdiction over the
- 5.

installation.

5. The Concessionaire shall forward a copy of the approval letter from DFS for the fire protection addition and alteration works to DIAL for record.
6. The Concessionaire should submit a copy of the DFS's approval letter and certificate of supervision for the fire detection/protection installation work to DIAL.
7. The Concessionaire shall ensure that all fire detection/protection system drawings to DFS are endorsed by their Qualified Person / Professional Engineer who undertakes the design and installation work.

3.4 DRAWINGS

1. The Concessionaire should appoint submit 4 sets of DFS approved drawings/layout to DIAL for approval.
2. The fire alarm and detection system shall be connected to the building's fire zone/s respectively. Upon completion, the Concessionaire shall submit two copies of the certificate of fitness to DIAL.
3. For provisions connections by DIAL for each concessionaire space, please refer Annexure A & C.

3.5 OTHER GUIDELINES

1. DIAL and the Airport Emergency Service shall be informed in writing (7 working days notice) of any fire sprinkler works to be carried out.
2. The allowable time for the fire protection system to be isolated or discharged shall be from 0900 hrs to 1700 hrs (Monday to Friday). The exact timings may vary from area to area. Concessionaire to seek DIAL confirmation of the same for his respective areas. The Concessionaire shall be responsible for ensuring that the entire sprinkler installation within his premises is charged up and in operation by 1630 hrs.
3. Upon completion of the installation work, the Concessionaire shall be responsible for the proper maintenance of the complete fire sprinkler and alarm system in their premises.
4. The Professional Engineers responsible for the fire protection installation shall submit in writing if a waiver for any statutory requirements or any building regulations is required.
5. The Concessionaire shall conduct regular servicing and maintenance of the fire protection

and/or detection system in their premises.

6. The fire alarm systems are to be wired to the existing zone as designed by DIAL. All wiring for fire alarm system is wired as Class A wiring. Servicing and maintenance shall be carried out in such a way that the overall healthiness of the entire system is not affected.
7. Concessionaires must adhere fully to the standards and regulations laid down in the NFPA and NBC codes.
8. The Concessionaire's qualified person (i.e. Professional Engineers) has to endorse on the drawings as whether the fire protection system has been affected by the renovation.
9. If the Fire Protection System is affected:
 - a) Concessionaires must submit the proposed sprinklers additions/alteration works for the premises with the Qualified Person's endorsement on the drawings to DFS for approval.
 - b) DIAL endorsement on the drawings for the above submission is required.
 - c) Concessionaires must also submit 4 sets of fire sprinkler drawing with endorsement and approval letter from DFS once they have receive the required approval from the authorities.
10. If the Fire Protection System is not affected, drawings must still be submitted to DFS for approval with the said status of the Fire Protection System endorsed onto the drawings by the Qualified Person.
11. Any proposed sprinklers that to be installed by Concessionaires shall be of Quick Response type (which is similar to existing installed for Terminal 1 building: Pendant or concealed as per approval from DIAL).
12. If there are any decorate false ceiling/canopy/display cabinets etc. installation below the existing false ceiling which has sprinkler installed, Concessionaire's Qualified Person shall ensure and certify that the sprinkler discharge pattern and engineered smoke extraction control is not affected.
13. The Concessionaire shall be responsible to provide the second layer of fire alarm smoke detectors for their installed false ceilings. The above fire smoke detectors shall be linked back to existing fire alarm system.
14. The proposed fire alarm detectors shall be designed and installed in accordance with the NFPA and NBC standards and in full compliances with the rules and regulation of the Delhi Fire Services (DFS) and other relevant authorities.

15. The Concessionaire shall submit the proposed fire alarm smoke detector plan clearly indicate the all existing, additional or alteration of the detectors and drawing must be endorsed by their own professional engineer.
16. Concessionaire must arrange at his own cost to engage T1 Fire Alarm system subcontractor for the software programming/ graphics upload to be integrated into existing fire alarm system and subsequently the network to be established with the Master NCS (Network Control station). If there is already existing detector on false ceiling, any alteration, addition or relocation to existing detector also required to submit to DIAL with endorsement for approval.
17. Concessionaire shall arrange inspection for all incoming material at site upon completion of works. During the execution of works, DIAL shall have the authority to accept/ reject the installation accounting to quality reasons.

18. ISOLATION AND DRAINING

1. Any isolation, draining and recharging to the affected sprinkler system must be done by DIAL's maintenance contractor and is chargeable to the Concessionaire. This works can only be performed provided the Concessionaire has obtained "Work Permit to Work" from DIAL and is supervised by the Concessionaire's Professional Engineer and will be done during normal office hours. The system must be promptly charged up by 1630 hrs.
2. The request to be submitted minimum 3 working days prior to the isolation and draining could only be made by supervisor of the work and he/she is required to be present during draining and charging of the requested zone. Notwithstanding this, DIAL reserves the right to schedule for the requested isolation works to be carried out together in a zone to safeguard the Terminal 1 building fire safety during the mass renovation works.
3. The sprinkler works contractor must carry out physical site checks with DIAL maintenance contractor to ensure that the requested zone is right one. The date of the site check must be indicated on the isolation form. No approval will be given at all if physical checks on site were not carried out, regardless of how urgent the work may be.
4. For new pipe work – pressure test report (certification) is required before it can be connected to the existing sprinkler system. Existing sprinkler layout is handed over to the Concessionaires who are required to upgrade or carry out any changes to the pipe size or distribution in accordance with the current code. All sprinkler works have to be done by experienced workers.

19. FOR F&B/COOKING AREAS/REHEATING AREAS REQUIRING HOODS ONLY

- Concessionaires should install their own cooker hood complete with a Fire-Suppression System suitable for deep fry cooking and open flames and connected with Fire Alarm system within its premises. Concessionaires should include this item in the submission for DIAL approval.
20. The FDP system (Sprinklers & Detectors) has been provided in tenancy area by DIAL with a provision of extension of FDP system. Any change, alteration required due to additional works in tenancy areas, shall be done by *Concessionaire* in compliance with standards and codes mentioned hereafter and technical specifications.
 21. The existing sprinkler system in Terminal/Node and Piers has been designed as per classifications of Ordinary Hazard group-I (For passenger handling areas) and Ordinary Hazard Group-II (For baggage, package and mail handling areas.) The addition and alteration shall be carried out to meet the classification, as described.
 22. The scope of work for Concessionaire includes integration of fire alarm system of tenancy areas with fire alarm system of PTB and provides additional costs for up-gradation in configuration of panel(s), graphics, software etc, if required, in accordance with system operation and specification requirements. The proposed system and equipment shall be same or compatible with fire alarm system of PTB.
 23. All the plant and material required for extension of FDP services, in tenancy areas shall be compatible with existing systems and as per list of manufacturers approved by DIAL.
 24. The sizes of sprinkler piping shall be as per NFPA-13 Piping schedule (Ordinary hazard).
 25. Fire Extinguishers inside the Concessionaire areas shall be provided and distributed in compliance with NFPA-10 and DFS requirements by Concessionaires. The type of fire extinguishers shall be as per approval of DIAL.
 26. Kitchen Hood- Wet chemical based and mechanically operated (Mechanical Actuation Mechanism), Automatic Liquid fire suppression, UL Listed, to be installed for each and every Hood to the approval of DIAL.
 27. The fire sprinkler system has been provided in leased premise in Terminal 1. Should there be any change to the location / position of fire sprinkler, the Concessionaire shall carry out the alteration works subject to the approval of Delhi Fire Services (DFS).
 28. All materials required for the modification and networking of the fire system shall be in the scope of Concessionaire.

29. Before start of renovation works, DIAL concerned system maintenance contractor will carry out a pre-test with Concessionaire. This is to verify that the building fire detection and prevention system is in working condition before handing over the fire system to the Concessionaires.
30. A post test will be carried out after the Concessionaire has completed renovation work. If the post test fails, the Concessionaire/ project contractor shall rectify the fault (fault of the entire system, not limited to the Concessionaire area) at his own cost to the satisfaction of DIAL.
31. All required interface with the existing system and the costs thereof shall be in the scope of Concessionaire.

3.6 FIRE SAFETY REQUIREMENTS (FOR CONCESSIONAIRES COMPLIANCE)

1. No Hot Works are allowed for FPS/FDAS works within the Terminal.
2. No Hot work is allowed within 75 metre of any aircraft unless the aircraft parking bay is/are closed. Permit for the aircraft bay closure is obtainable from DIAL.
3. A fire engine is required to be on site whenever hot work is conducted at the airside and is chargeable to the Concessionaire /contractor at the prevailing rate. Concessionaire to seek confirmation from DIAL for the rates at time of application for permit for hotworks.
4. All hot work activities at the airside shall cease during the airport peak hours from 1600 hrs to 2300 hrs.
5. The use of jubilee clip for hose connection is not allowed, only hose clamp is allowed.
6. The hot work permit shall be prominently display in the premises and shall be made available upon request by authorized representative of DIAL. Hot work in concessionaire area, are allowed post DIAL approval only.

3.7 FIRE PATROLLER (DIAL TRAINED)

1. A qualified fire patroller (FP) must be present at the worksite whenever welding/hot works are in progress.
2. FP is to inform DIAL before works commence and upon completion of hot work.
3. FP is to provide own fire extinguisher(s) at work site (6kg ABC with valid documents & test certificate).

FP shall ensure that the area is free from combustible or flammable material / substances before the hot work commence.

3.8 REQUIREMENT FOR ISOLATION OF FIRE ALARM AND DRAINING OF FIRE SPRINKLER SYSTEM

1. Fire alarm isolation and/or draining of fire sprinkler application form shall be submitted at least 3 working days before work commence.
2. Allowable working time: Mon – Fri, 0830 hrs to 1630 hrs. Isolation / discharging of the protection system is not allowed on Saturday, Sunday and Public Holiday. The actual timing may vary depending on the needs of the Airport Operations. A joint physical site inspection shall be carried out with DIAL to ensure the requested zone is correct.
3. A copy of the fire sprinkler drawing / floor plan shall be submitted together. No hot work is allowed when the building's fire protection /detection systems are not in service or vice-versa.
4. Concessionaire's project officer shall be present during draining and charging of fire protection system.
5. Any fire alarm activation due to the negligence of the worker/s, a Service Charge will be levied to the Concessionaire or contractor for the fire engine turnout.
6. Concessionaires shall ensure that the 2nd layer fire sprinklers are charged-up before installing the false ceiling.
7. Concessionaire's Professional Engineer shall ensure that pipe pressure tests is carried out (In accordance to the Code of Practice) on all newly installed sprinkler pipes before connecting to the building's fire protection system and a copy of the report / certificate to be forwarded to DIAL.
8. A physical sprinkler burst test will be conducted on all newly installed sprinkler pipes and it shall be witness by DIAL.

3.9 FIRE SUPPRESSION SYSTEM (FOR KITCHEN AND F&B OUTLET)

1. Concessionaires shall install an approved kitchen's fire suppression system for all "Open flame" cooking facilities and deep frying activities in their premises. This is in addition to the premises fire protection system. The system shall be linked to the building's fire alarm system.

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2. A copy of the fire suppression system manual and the layout plan shall be submitted to DIAL for reference. A copy of the layout plan shall be posted in the kitchen/preparation area.
 3. Concessionaire is to ensure that the suppression system is included in the submission Drawings for DFS approval.

3.10 OTHER FIRE SAFETY REQUIREMENTS

1. Concessionaires are hereby informed that provision of one-way locking electromagnetic devices linked to the building's fire alarm system will not be allowed unless otherwise permitted via waiver applications by the Relevant Authority.
2. Use of and/or storage of portable LPG cylinder gas is not allowed in the Terminal Buildings and other DIAL owned buildings.
3. A Letter of Approval or a Fire Safety Certificate (FSC) must be obtained by the owner/occupier of the Concessionaire premises for the fire safety works from Delhi Fire Services before it is allowed to be used or occupied. Concessionaires shall forward a copy of the FSC to DIAL –P&E, ARFF, Safety for reference.
4. Concessionaires are to forward a copy of the Certificate / test report on flame propagation and smoke toxicity tests on carpet used in the premises to DIAL –P&E, ARFF, Safety.

3.11 CONTACT NUMBERS:

- | | |
|--|---------------|
| a) Fire Call | To Be Advised |
| b) Booking of fire engine standby (Advance Notice) | To Be Advised |
| c) Hot work application | To Be Advised |
| d) Isolation of fire alarm system | To Be Advised |
| e) Draining of fire sprinkler system | To Be Advised |

3.12 REFERENCE MATERIALS

- | | |
|-------------|--|
| ASME B31.3. | (Process piping code –cutting, welding & Other Hot work) |
| NFPA 51B | Standard for Fire Prevention during Welding, Cutting, & other Hot Work |

3.13 DETAILED REQUIREMENT FOR FPS/FDAS SYSTEM PLANS

1. FIRE ALARM SYSTEM LAYOUT PLAN

1. All existing detector(s) are to be indicated.
2. Proposed addition or deletion of detectors are to be stated.
3. Any detector to be dismantled owing to the change of ceiling board etc. shall be clearly indicated.
4. Full or half partition of the room which may affect the effectiveness of the detector shall be indicated.
5. The type, make, model and rating of the fittings/equipment used are to be clearly indicated in drawings.
6. The Concessionaire shall reinstate to the original design upon giving up tenancy. All relevant approval must be obtained.

2. FIRE PROTECTION LAYOUT PLAN

1. The plan submitted shall show the existing portions of all existing sprinkles/hosereels, fire extinguishers, automatic sprinkles alarm valves, etc.
2. Proposed addition or deletion of the detectors/fittings etc. are to be stated, particularly the sprinklers at the cooker hoods, if applicable. A plan indicating the cooker hood's sprinkler layout, duly endorsed by their Professional Engineer shall be submitted to DIAL Engineering.
3. Any sprinkler/fittings etc. to be dismantled owing to the change of ceiling board etc. shall be clearly indicated.
4. All false/decorative ceiling, wall panels and full or half partition of the room shall not impede the effectiveness of the fire protection system. For all leased premises with engineered smoke control, all ceiling design shall have minimum 25% free area for smoke extraction.

3.14 GAS SYSTEM PLAN

1. There is no provision of the gas supply in the Terminal Building(s).
2. Use of gas cylinders is prohibited within the Terminal Building(s).

3.15 SPECIFICATION OF FPS/FDAS SYSTEM ELEMENTS

A. SPRINKLER SYSTEM

1. Sprinklers spacing shall be as per the NFPA code/approved layout only.
2. Sprinkler System shall be designed as per the existing architectural layout, if partition walls are introduced it should not go up to the false ceiling.
3. If occupant changes the sprinkler layout as per the interior layout, the sprinkler quantity of one riser tapping should not be more than 275. If it is more than 275, occupant shall provide the separate header with butterfly valve with supervisory switch, check valve, flow switch, pressure gauge & other accessories from the nearby riser to meet the requirement.
4. The layout shall be such that a minimum pressure of 0.5 bar shall be maintained at all sprinkler points.
5. Upright Sprinklers & Detector to be retained and subjected to design approval.
6. The Pendent Sprinklers, Rosette Plates & Flexible Sprinkler drops shall be in the scope of Concessionaire.
7. The false ceiling & all the construction materials used shall be of non-combustible class A construction, as per NFPA 101.
8. There is no requirement of sprinkler above the false ceiling, if all construction materials are of non-combustible class A construction.
9. Minimum gap of 280mm shall be maintained between bottom of pipe and top of false ceiling throughout the building, in order to use the flexible sprinkler drops for fixing sprinklers in the false ceiling.
10. Occupant shall provide the necessary fire suppression system (i.e. Extinguishers), if they are using the cooking gas inside the area.
11. The As built drawings on AUTO CAD to be submitted for DIAL records.
12. Standard sprinklers:

Standard (Quick Response) Sprinklers shall be as per following specifications.

- Model: Recessed pendent & Concealed pendent
- Approval: UL Listed & FM Approved
- Frame: Bronze
- Deflector: Copper / bronze
- Rosette Plate/Sprinkler head-Escutcheon and it should not be painted
- K-Factor: As per Terminal Design
- Rated working Pressure: 12.1 bar
- Minimum Effective Pressure: 0.5 bar
- End Connection: As per K Factor
- Temperature: 79 Deg C for heat effected Zone and for rest area 68 Deg C.

For Pipe supports: (If Pipe routing is changed by the Occupant at a later stage)

- The above ground pipes, running above the false ceiling shall be suspended from the ceiling by means of a threaded hanger rod, which is fixed in to the ceiling, by means of Anchor fasteners. Pipes below 50mm are rested on Universal clamp whereas 50mm & above rested on the Clevis Hangers, fitted to the threaded rods. These supports shall be placed at equal intervals.
- Hangers shall be provided to support five times the weight of the water-filled pipe plus 114 kg at each point of piping support. They shall be provided to provide the required supporting effects and allow pipelines movements as necessary. Anchoring fasteners shall be rated to take minimum 2 tons load and shall be of approved make.
- The unsupported length between the end sprinkler and the last hanger on the line shall not be greater than 0.9 m for 25mm pipe, 1.2 m for 32mm pipe, and 1.5 m for 40mm or larger pipe. Where any of these limits are exceeded, the pipe shall be extended beyond the end sprinkler and shall be supported by an additional hanger.
- The maximum Hanger spacing and the Hanger rod sizes for sprinkler pipes, suspended from ceiling, shall be as per MSS-SP-58 & ASPE.

Pipe dia (mm)	Hanger Rod Dia (mm)	Maximum Spacing between supports (m)
Up to 100	10	3.0
125 to 150	12	3.0

Following methods of piping joints shall be used:

- Pipe to pipe joints: (For aboveground)
 - 50mm & below – Only Threaded
 - 65mm & above - Grooved (Butt welding).

- Pipe to Fitting joints: (For aboveground)
 - 50mm & below – Threaded Joint
 - 65mm & above - Grooved Joint (Butt welding)

Flexible Drops:

- Braided flexible.
- Length should be 1.5 meter,
- UL Listed & FM approved,

Fire Extinguishers:

- Extinguisher locations shall be based on Maximum travel distance to Extinguisher of 75 ft (22.8 m), whereas in enclosed rooms, it shall be provided as per area of coverage of particular type of Extinguisher.
- ABC type fire extinguishers shall be provided throughout the business centre areas.
- The capacity of extinguishers used shall be 2 Kgs. for all types of extinguishers.

Code	Extinguisher code- BIS 15683.
Capacity/Rating/Type	2.0 Kg (Stored Pressure type)/2A/Portable
Body Material	MS sheet, MIG Weld Minimum Thickness-2mm,
Valve Brass Forging	IS: 6912, Threads conf: IS: 2643, Handle-MS, Epoxy Polyester Powder coated upper & lower lever for squeezing.
Pressure Gauge	Brass Shell, Nickel plated water proof
O' Ring Washer Rubber	IS: 5382
Spindle/Spring	Brass-IS: 319/Carbon Steel-IS: 4454
Siphon Tube	Outer dia (nominal) 16mm, Inner dia (nominal) 12 mm Length – 350 mm
Discharge Type	Nozzle Charge Mono-ammonium phosphate base Chemical powder (IS 14609) Weight-2Kg +/- 2%, Propellant gas-Nitrogen
Working Pressure	15Kg/cm ²
Performance Discharge	Duration :8-10 Seconds
Jet throw	Minimum 2mtrs
Effective discharge(min.)	85%
Painting	Fire Red
Accessories	Wall Bracket, 3 mm thick, powder coated

Carbon-Di-Oxide Fire Extinguishers

Code	IS: 2878, 2004 edition.
Capacity	2 Kg. (Stored Pressure type)
Rating	4B
Type	Portable
Body	Material-Manganese, seamless tube, confirming IS:7285
Overall length (mm) x dia(mm) (nominal)	620mm x 140 mm dia
Wall Thickness (Nominal)	4.5mm
Base Thickness	12-16mm
Mass Empty (Nominal)	11.3Kg
Full Weight	18.4Kg
Testing Pressure	250 Kg/cm ²
Working Pressure	150 Kg.cm ² at 15 deg C
Neck Ring Threads	as per IS: 3224
Type	Wheel Type
Valve	As per IS:3224:2002
Working pressure	158Kg/cm ²
Hose	Internal dia-10mm
Length	1mtr
Working Pressure	140Kg/cm ²
Bursting Pressure	275Kg/cm ²
Discharge Tube	MS, Swivel joint type with rubber cover Rotation-360 deg
Discharge Horn	Property-Non Conductive
Material	Fiber Glass/Polythene
Length	250mm internal dia at discharge-62mm
Charge	Carbon Dioxide confirming to IS: 15222
Filling Ratio	0.667
Washer	Outer dia-19mm
Inner dia	9mm
Thickness	3mm
Painting	Fire Red
Maintenance	As per IS:2190
Siphon Tube	Brass-IS:407
Performance	Discharge Duration-8-16 Seconds
Effective discharge(min.)	90%

Wet Chemical Stored Pressure Type Fire Extinguisher (For Class K fires in Kitchens):

Capacity	6 litres
Type	Stored Pressure
Approval	BS EN3:1996 or equivalent
Charged Weight	11 - 12 Kgs.
Agent	Wet Chemical
Working Pressure	7 bars
Test Pressure	20 bars
Discharge Time	40-80 Seconds
Jet Range	3-4 meter
Construction	Cylinder -Stainless Steel Valve-Brass Handle-Stainless Steel
Finish	Cylinder-Powder Coated Valve-Nickel Plated Handle-Natural

B. FDAS SYSTEM

1. CURRENTLY INSTALLED FDAS SYSTEM EDWARDS
2. All detectors, strobes/hooters. Interface module(s), control/monitor module(s) shall be of same make as currently installed Fire Alarm System Panels.

2.11 LIST OF FIRE PROTECTION & DETECTION SYSTEM PREFERRED MAKES

S. No.	Description	Make
1.	MS/GI Pipes	Jindal (Hissar)/Tata Steel/SAIL
2.	Pipe Fittings	George Fischer/VS (Vijay Sales)
3.	Gun Metal Gate Valve (Upto 50 mm dia)	Leader/Zoloto/Sant
4.	Forged Brass Ball Valve (Upto 50 mm dia)	Leader/Zoloto/Sant
5.	Butterfly Valves (UL Listed, FM Approved)	Tyco/Viking/Victualic/ HD fire/Newage
6.	Check Valves (UL Listed, FM Approved)	Tyco/Viking/Victualic/ HD fire/Newage
7.	Double/Single Headed Fire Hydrant	Minimax/New Age/Safeguard
8.	Fire Hosereel Drum	Minimax/New Age/Safeguard/FireMatics
9.	Rubber Pipe for Hosereel	Maruti/Padmini/Jyoti
10.	Gun Metal Shut-off Nozzle	Minimax/New Age/Safeguard
11.	Fire Hose	Minimax/New Age/Safeguard/FireMatics
12.	Gun Metal Branch Pipe	Minimax/New Age/Safeguard/FireMatics
13.	Fire Hose Cabinet	Minimax/New Age/Safeguard/FireMatics

14.	Sprinklers/Nozzles (UL Listed/FM Approved)	Tyco/Viking/Victaulic H. Guru/Fiebig/Wika/Forbes Marshall/ Waaree
15.	Pressure Guage	
16.	Air Release Valve	Leader/Sant/Newage/FireMatics
17.	Flow Switch (UL Listed & FM Approved)	Potter/ System Sensor
18.	Inspection & Drain Assembly	Tyco/Viking/Victaulic Tyco/Viking/Victaulic/ Newage,/HD
19.	Flexible Sprinkler Drops (UL Listed, FM Approved)	Fire, Easy flex
20.	Fire Extinguishers	Minimax/New Age/Safeguard/FireMatics
21.	Fire Survival Cables	AEI/Tyco/Prysmian/Pirelli Asian/Shalimar/Berger/Nerolac/Indigo/ Hilti
22.	Primer/Paint	
23.	Drilling Fixing Inserts/Concrete From Inserts	Hilti/Fischer

2.12 ADDITIONAL- REQUIREMENT

Fire exit signage, PAVA, Evacuation route, Traps doors requirement and other fire norms to be checked with ARFF team.

SECTION 4: GENERAL SPECIFICATION FOR PUBLIC HEALTH ENGINEERING (PHE) WORKS

4.1 SCOPE

This specification shall be applied to all the PHE works being carried out by concessionaire in DIAL premises. The PHE works 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.

4.2 REGULATIONS AND STANDARDS

The PHE works shall be governed by the requirements of NFPA, NBC 2016 & SP 35 Rules and requirement(s).

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 Building 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 called for.

4.3 APPROVAL & CLEARANCE

1. The water c/w water meter, isolation valve and drainage pipes have been provided at one location within the Concessionaire space.
2. The Concessionaire should appoint a professional plumber/engineer to carry out the alteration work of the PHE system.
3. The Concessionaire should ensure that the PHE installation carried out by their contractor comply with the requirements stipulated in NFPA, NBC 2016, SP 35 and the relevant local authorities having jurisdiction over the installation.

4.4 DRAWINGS

1. The Concessionaire should appoint submit 4 sets of drawings/layout to DIAL for approval.

2. The plan submitted shall show both existing water supply pipe location and the proposed hot/cold water supply and return line.
3. Proposed addition or deletion of water meters/fittings etc. are to be stated.
4. All the drawings are to be endorsed by the professional engineer/licensed plumber who undertake the design and installation work.
5. The Concessionaire shall engage their own professional engineer/licensed plumber to submit the installation drawings and arrange for inspection.
6. All fitting/material must be of the approved type.

4.5 OTHER GUIDELINES

1. Coordination of Services

The Concessionaire to coordinate the locations of all existing services prior to the commencement of any work on site.

2. Performance Tests

The Concessionaire is required to undertake performance tests for all mechanical and electrical equipment and systems installed within the Leased Premises to ensure proper operation and that all requirements have been met. Written documentation of the performance tests must be submitted to the DIAL prior to acceptance of the work. Operation philosophy ad SOPs are to be shared for DIAL approval.

3. Fire sealant

The Concessionaire must provide fire sealant around all pipes, wherever pipes passes through the fire rated walls.

4. As Built drawings

Concessionaire to submit all internal pipe layout drawings for approval to DIAL before carrying out the work and submit as built drawings on the Auto CAD to DIAL for record.

5. LEED Requirements:

All fitting fixture to be used in PHE system shall low flow and LEED certified fittings and pipes

4.6 MATERIALS FOR PHE WORKS

1. GALVANISED IRON PIPES AND FITTINGS

The pipes shall be galvanized steel seamless conforming to the requirements of IS:1239

(Part-1) and IS:3589. e Galvanising shall conform to IS: 4736, the zinc coating shall be uniform, adherent reasonably smooth and free from such imperfections as flux, ash and drop inclusions, bare patches, black spots, rust strains, bulky white deposits and blisters.

Pipe sizes of 65 mm NB and above shall be screwed joints. The fittings shall be malleable iron and comply with all the requirements of the pipes. The sizes of pipes and fitting to be as per system design.

a. Laying and Jointing of GI Pipes

The galvanized pipes and fittings shall run in wall chase or ceiling or as specified. The fixing shall be done by means of standard pattern holder bat clamps keeping the pipes about 15mm clears of the wall where to be laid on surface.

Where it is indicated do submitted drawings to conceal the pipes, chasing may be adopted. For pipes fixed in the shafts, ducts etc. there should be sufficient space to work on the pipes with the usual tools.

As far as possible, pipes may be buried for short distances provided adequate protection is given against damage and where so required special care to be taken at joints. Where directed by the DIAL, pipe sleeves shall be fixed at a place the pipe is crossing through a wall or floor for reception of the pipe and allow freedom for expansion and contraction and other movements.

In case of pipe is embedded in walls or floors it shall be painted with anticorrosive bitumastic paints of approved quality. Below the grade slab, if required, the pipes shall be laid in layer of sand filling.

Galvanized iron pipes shall be jointed with threaded and socket joints, using threaded fittings. Care shall be taken to remove any burr from the end of the pipes after threading. Teflon tape, White lead or an equivalent jointing compound of proprietary make shall be used, according to the manufacturer's recommendation.

b. Piping installation and support

Shop drawings for the routing of pipes shall be prepared generally on the basis of layout drawings issued. The shop drawings shall reflect the site conditions, structural beams and columns, obstructions by way of any construction elements or any other service pipes, ducts etc.

The drawings shall clearly indicate openings required in brick or concrete walls, drain valves at low points, air valves at high points, isolating valves, if any, and invert levels at every 15m intervals.

The drawings shall also indicate typical details of hangers, supports, brackets etc. After approval of the drawings, pipe routes shall be marked with a distinct colour of paint on the site and got it approved by the DIAL and endorsed by the Contractor. The entire piping work shall be organized in consultation with other services work,

so that area can be carried out in one stretch.

All openings and chases in brick walls core cuttings shall be made neatly and refilled to a reasonable finish.

Pipe sleeves, larger diameter than pipes, shall be provided wherever pipes pass through walls and slab and annular space filled with fiberglass and finished with retainer rings.

If the Pipe penetration is through Fire compartment, the hole shall be sealed with an approved fire resistant sealant. Good workmanship and neat pipe layout are the prerequisites of these specifications.

Horizontal pipes shall be truly horizontal with necessary slopes and hangers or supports as specified. Vertical pipes shall be truly vertical and shall be laid away from the walls at least by 10mm or as required by the DIAL.

All pipe runs shall be parallel to the ceiling or walls for presenting a neat appearance. Pipes buried in wall shall be laid in machine-made chases with galvanized steel anchors. All pipes before and after testing shall be protected with wooden or brass plugs to prevent ingress of dust, sand or any extraneous matter. All high points in the piping shall have air vents with shut off valves.

Piping shall be properly supported on, or suspended from, on stands, clamps, hangers as specified and as required. The Subcontractor shall adequately design all the brackets, saddles, anchor, clamps and hangers, and be responsible for their structural stability. Pipe work and fittings shall be supported by hangers or brackets so as to permit free expansion and contraction. All accessories and ancillaries of support system such as bracket, saddles, clamps, hanger etc. shall be hot dip galvanized after fabrication. Pipe hangers shall be generally provided as per ASPE Vol. No 4 Table 6-4 for Hanger rod and Table 6-3 for Support spacing:

Pipe dia (mm)	Hanger Rod Dia (mm)	Spacing between supports (m)
Up to 25	10	2.0
32 to 50	10	2.7
80 to 100	16	2.7
125 to 150	20	3.6
200 to 300	20	5.3

Concessionaire shall make sure that the clamps, brackets, saddles and hangers provided for pipe supports are adequate. Piping layout shall take due care for expansion and contraction in pipes and include expansion joints where required.

All pipes shall be accurately cut to the required sizes in accordance with relevant IS codes and burrs removed before laying. Open ends of the piping shall be closed as the pipe is installed to avoid entrance of foreign matter. Automatic air valves shall

be provided at all high points in the piping system for venting. All valves shall be of 15mm pipe size and shall be associated with an equal size isolation ball valve. Pressure gauges shall be provided as per the operational and maintenance requirement. Care shall be taken to protect pressure gauges during pressure testing.

2. CAST IRON PIPES

All Sanitary and vent pipes of size above 100 mm dia shall be spun cast iron pipes per IS: 3989. All pipes shall be straight and smooth and the inside free from irregular bore, blowholes, cracks and other manufacturing defect. Spun cast iron Pipes shall confirm to I.S: 3989/1729. Standard weights and dimensions shall be as follows:

Diameter (mm)	Thickness (mm)	Overall Weight (1.83M length) (Kg)	Internal dia of socket (mm)
50	5	11.41	76
75	5	16.52	101
100	5	21.67	129
150	5	31.91	181

M.S. clamps shall be of standard design and fabricated from M.S. flat 40mm x 3mm thick and they shall be painted with two coats of epoxy paint before fixing.

Jointing

Jointing of CI pipes and fittings shall be done using Pipe joint sealant (drip seal). The surface should be dry and free from any loose material, dust, dirt, cement, oil, grease or any other foreign material. The surface may be wire brushed to remove the foreign material.

- Insert the spigot end into the hub and insert the yearning material (spun yarn) around the spigot end and place the centre of spigot end in the socket.
- Drive the strand of spun yarn to the bottom of the joint by using suitable yearning tool.
- Mix the pipe joint sealant homogeneously as per the ratio given below.

White Compound- 200 Gms

Black Compound - 300 Gms

- Apply the mixed sealant with suitable tool up to minimum depth of 25mm and press properly with damp finger and bewel it off at an angle of 45°, with outside of the pipe and allow it to dry till it is hard. It should be ensured that mixed sealant should be used within 30 minutes.

Cast Iron Fittings

Fittings shall conform to the corresponding Indian Standard for pipes. Contractor shall use pipes and fittings of matching specifications. Access door shall be secured air and water tight with 3mm thick insertion rubber gasket and white lead. The bolts shall be lubricated with grease or white lead for easy removal.

3. PIPES WITHIN TENANCY AREAS

Waste line within the tenancy boundary for line below 50mm shall be HDPE PN4 and shall be uPVC confirming IS 13592:1992 (Type A) for line from 50 mm to 100 mm dia nominal.

Pipe Hangers, Support and Clamps

All vertical pipes shall be fixed by galvanized clamps and galvanized angle brackets truly vertical. Branch pipes shall be connected to the stack at the same angle as that of the fittings. No collars shall be used on vertical stacks. Each stack shall be terminated at top with a cowl (terminal guard). Horizontal pipes running along ceiling shall be fixed on galvanized structural adjustable clamps of special design shown on the drawings or as directed by the DIAL. Horizontal pipes shall be laid to uniform slope and the clamps adjusted to the proper levels so that the pipes fully rest on them.

The Concessionaire shall provide all sleeves, openings, hangers as required. during the construction. He shall provide all necessary information to the building Subcontractor and the Contractor for making such provisions in the structure as necessary. All damages shall be made good to restore the surfaces. All pipes clamps, supports and hangers shall be galvanized. Factory made prefabricated clamps shall be preferred.

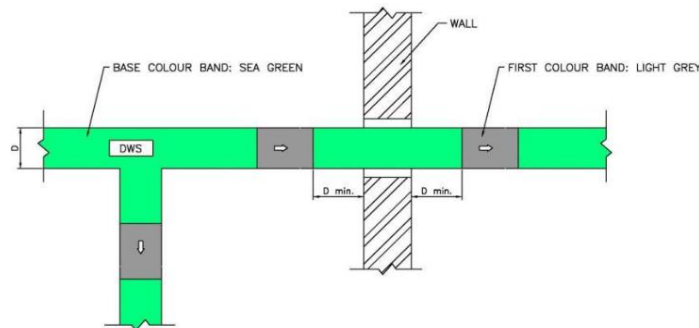
The Concessionaire may fabricate the clamps of special nature and galvanize them after fabrication but before installation. All nuts, bolts, washers and other fasteners shall be factory galvanized. Clamps shall be of approved design and fabricated from MS flats (which shall be hot dipped galvanized after fabrication) of thickness and sizes as per drawings. Clamps shall be fixed in accordance to manufacturer's details / shop drawings to be submitted.

When required to be fixed on RCC columns, walls or beam they shall be fixed with approved type of galvanized expansion anchor fasteners (Dash fasteners) of approved design and size according to load. Structural clamps e.g. Trapeze or cluster hangers shall be fabricated by electro-welding from MS structural members e.g. rods, angles, channels flats as per tenderers shop drawings shall be galvanized after fabrication. All nuts, bolts and washers shall be galvanized. Galvanized slotted angle / channel of approved sizes supports on walls shall be provided wherever shown on shop drawings. Angles / channels shall be fixed to brick walls with bolts embedded in cement concrete blocks and to RCC walls with anchor fasteners mentioned above. The spacing of support bolts on support members fixed horizontally shall not exceed 1m.

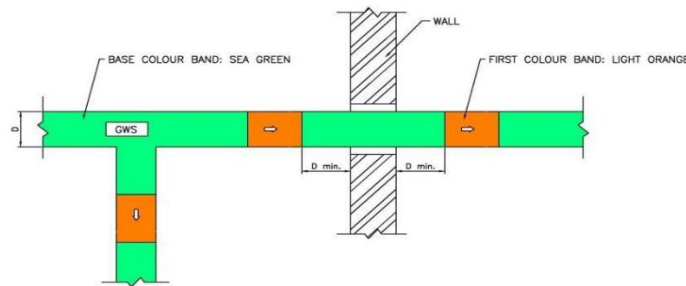
Installation of pipes

Soil, waste and vent pipes in shafts shall consist of cast iron pipes as described earlier. All Horizontal pipes running below the slab and along the ceiling shall be fixed on structural adjustable clamps, sturdy hangers of the design as per the requirement of the Contractor / DIAL. The pipes shall be laid in uniform slope and proper levels. All vertical pipes shall be truly vertical fixed by means of stout clamps in two sections, bolted together, built into the walls, wedged and neatly jointed. The branch pipes shall be connected to the stack at the same angle as that of fittings. All connections between soil, waste and ventilating pipes and branch pipes shall be made by using pipe fittings with inspection doors for cleaning. Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts. Where the horizontal run off the pipe is long or where the pipes cross over building expansion joints etc. suitable allowance shall be provided for any movements in the pipes by means of expansion joint etc. such that any such movement does not damage the installation in any way.

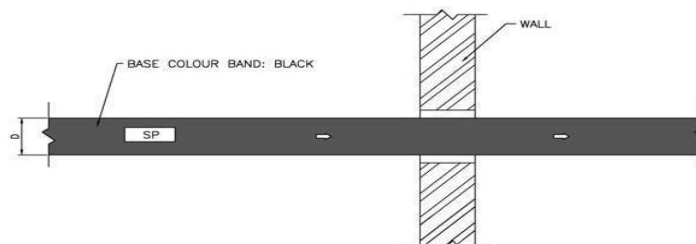
Domestic Water Supply (DWS)



Grey Water Supply (GWS)



Sanitary Pipe (SP)



Grease Trap/ Separator

- For all F&B outlets & outlets with requirement of disposal of waste products into sewage network, a under table grease trap of approved sizing has to be installed by the Concessionaire.
- Sizing to be done on basis of prevalent code and NBC, approval from DIAL has to be taken prior to installation of grease trap.
- Inspection chamber between grease trap and main connection or before the connection into the DIAL sewer line to be made in the network with bar screen/ perforated plate to protect the drainage from any solid particles or foreign material.
- In case any concessionaire is found disposing off waste into sewage network without grease trap a penalty decided by DIAL management would be imposed on the concessionaire.
- Approval for installation of grease trap including location need to be taken from DIAL.
- Maintenance of grease trap will be the responsibility of the concessionaire.
- DIAL reserves the right to inspect/order cleaning of same at any time.

Concessionaire has to maintain records proving regular maintenance of grease trap. Same can be inspected by DIAL representative at any

4.7 A WATER PROOFING METHODOLOGY FOR WET AREA

- Surface preparation - Cleaning of slab free of dust, cracks to be filled with PU sealer (Dr. Fixit) & filling holes. Making of corners by cement mortar (of 1:4 mix) to be mixed with LW+ chemical (Dr. Fixit).
- Providing and laying of Dr. Fixit URP admixed with cement and let it dry. Repeat second layer next day and let it dry.
- Day 3 - Apply Davco Primer/Dr. Fixit Primer Coat and let it dry.
- Day 4 - Apply a layer of Davco K10 Polyurethane plus/Dr. Fixit Flexi PU 270-I and let it dry. Repeat second layer next day and let it dry for next three days.
- Day 8 - Fill the treated area with water (ponding) for next 48 hours for testing of water proofing.
- Covering the treated area with 20-25mm (1:4) Mortar protection plaster and let it dry.
- Apply one coat of Dr. Fixit URP admixed with cement on top of protection plaster and let it dry.
- Next day lay block filling as per the procedure below:(150mm thk after laying pipe)
- Area needs to be dust free before starting the laying process of AAC block.
- Block panels are then laid on area to be raised and secured by means of binding wire (3mm thick). The panel to panel joints area secured by overlapping jointing mesh to defeat any possibility of cracks at the joints.
- If any corner or curve is to be created in the panels, corner meshes are used to secure the joints.
- Once all the concealed services are in place, floor to be finished with PCC (35mm thick) of (M20 1:1.5:3 concrete) mixed with LW+ chemical.
- Davco K10 to be applied on the PCC.
- For laying of bedding for tiles, use either Litecrete 100 chemical or cement sand mortar with LW+ chemical.

4.7 B WATER PROOFING METHODOLOGY FOR DRY AREA

- 2 coats of water proofing (Minimum 2mm Thick) equivalent to MYK 9273 conforming to elongation of 400% with tensile strength of more than 3MPA. To be done by concessionaire over the entire raw surface provided by DIAL. Water proofing to be as per ASTM D751-89 16.1.

4.8 GENERAL REQUIREMENT FOR PHE PROVISIONING

- For services provided to each tenancy, Refer Annexure – A and D.

4.9 APPROVED MAKE LIST & APPROVED SPECIFICATION

All the PHE System works shall only be carried out by one of the following approved Subcontractors or any other Govt, approved with necessary and respective work licence:

Water Supply-

- Specification for Water meter- Magnetic drive multijet Class ‘B’ PN 16 Conforming IS 779 & ISO:4064. With valid calibration certificate indicating sr. No of meter.
Make- Kranti, Sant, Honeywell
- Specification for Supply pipe- cPVC ASTM D-2846 SDR-11 Class-1, cPVC solvent ASTM F493 for normal water & for hot water Copper pipe EN 1057, Fittings BN-1254-1, all valves shall be brass & PN-16 rating minimum. cPVC ball valve not allowed.

Water Drainage-

- Specification for Drain Pipe- uPVC IS:4985 Class 5 & IS:7834 Class 5 for fittings, uPVC solvent- ASTM D-2564,
Makes – Astral/Supreme for Pipe and Fittings.
- Grease trap- Make- Nugreen, Kessel and Concessionaire can propose another make in SS material.
- Ball Valve- Forged Brass Valve PN-16 with brass adaptor.

SECTION 5: INTERFACE COORDINATION

1. For HVAC Systems provisions for a tenancy - Refer attached sheets. Where indicated in attached Annexures or unless agreed with DIAL, the Concessionaire shall be responsible for any extension of the pipes and the installation of AHU/FCUs and any other associated equipment including outdoor air, exhaust air, make up air and smoke exhaust fans within the leased area. The power requirement of these equipment and or any other related equipment shall be powered through the Tenancy electrical board which will be provided by the Concessionaire in his leased area. The AHU provided by Concessionaire shall have facilities (Provision of I/O points complete with controllers) to interface with DIAL's CMS. Minimum I/Os from Tenancy controller shall be as follows:

- a. AHU supply fan start/ stop
- b. Chilled water temperature in / out
- c. PIBCV modulation signal

All these points complete with suitable transducers shall be wired upto junction box (by Concessionaire) complete with terminals blocks for further extension of connection by DIAL.

2. As part of the existing scope, DIAL provides top level (ceiling mounted) sprinkler and fire detection systems. If a Concessionaire installs a false ceiling, the Concessionaire must carry out further distribution of the fire protection and detection system.
3. DIAL shall terminate drain lines and water supply lines in the tenancy at one point. Water supply lines shall be provided with water meter. Concessionaire shall draw the connections for their use. The Concessionaire shall indicate such connections in appropriately prepared layout drawings showing all the details, cross sections, make of various component and piping, valves and meters, etc.
4. DIAL shall terminate at one point inside the premises of the retails area suitably rated supply(ies) point with isolator(s) (Refer Annexure – E for further details of these provisions). These points shall be metered and the metering shall be installed by DIAL at his electrical panel.
5. The concessionaire under no circumstances shall draw power more than his allotted connections. The concessionaire shall provide all the detailed calculations, layout and SLD and other equipment drawing for the approval of DIAL.
6. DIAL shall provide necessary outdoor air supply and exhaust duct connection (Refer Annexure - B) at one point from where the Concessionaire has to connect his duct work in consultation with DIAL engineer. Concessionaire shall coordinate the exact location of such points with the DIAL engineer.

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7. No installation will be allowed unless and until the design and the construction methodology is fully approved by DIAL.
 8. Electrical distribution within the Concessionaire area shall be carried out by Concessionaire.
 9. All electrical installations shall conform to Indian Electricity rules and other relevant standards. Any violation of any of the statutory regulation, the concessionaire shall be liable.
 10. All electrical raceway from DIAL electrical distribution network shall be extended by the concessionaire for his distribution.