

**GOVERNMENT OF INDIA
DEPARTMENT OF SPACE
LIQUID PROPULSION SYSTEMS CENTRE
VALIAMALA, TRIVANDRUM 695547, KERALA
PURCHASE & STORES**

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Date :01/11/2017

INVITATION TO TENDER

M/s

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Our Ref No : TP13 2017-030342-01

Tender Due: 16:00 Hrs ISTon 11/12/2017

Opening : 10:30 Hrs ISTon 12/12/2017

Dear Sirs,

Please submit your sealed quotation , in the Tender Form enclosed here along with the descriptive catalogues / pamphlets /literature ,superscribed with Our Ref.No. and Due Date for the supply of the following items as per the terms & conditions mentioned in Annexure(Form No: DOS:PM:20)

S.No.	Description of Items with Specifications	Unit	Quantity
1	Data Centre -Supply, Installation, Operations & Maintenance	lot	1

DELIVERY AT: VALIAMALA

MODE OF DESPATCH ON SITE

DUTY EXEMPTIONS EXEMPTED

SPECIAL INSTRUCTIONS NIL

SPECIFIC TERMS DOS:PM:20

INSTRUCTIONS TO TENDERERS:

1. Request For Proposal (RFP) as per Annexure- I.
2. General terms and conditions as per Annexure - II.
3. Instructions for Two Part tender as per Annexure - III.
4. Fax-e-mail offers will not be accepted.

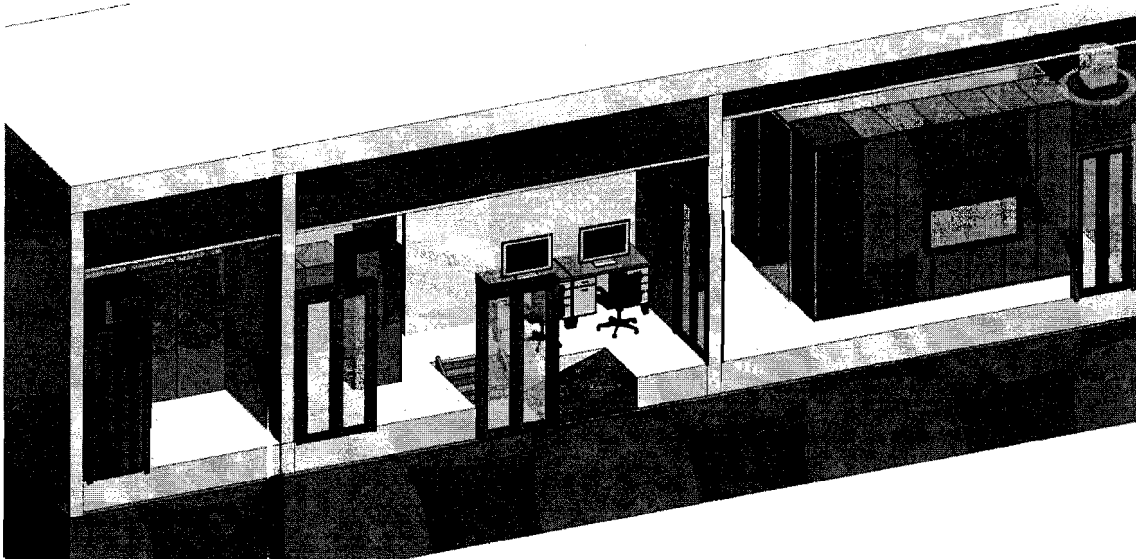
For and on behalf of the President of India
The Purchaser

Request for Proposal

Data Centre Construction for LPSC Valiamala

Abstract

LPSC proposes to construct a Data Centre at it's Head Quarters located at Valiamala, Nedumangadu, Thiruvananthapuram, Kerala. This RFP is intended to design and construct the physical infrastructure required for converting the existing space into a fully functional Data Centre(DC).



Liquid Propulsior Systems Centre (LPSC), Indian Space Research Organization (ISRO)

Department of Space (DOS),

Govt. of India

Valiamala, Thiruvananthapuram, Kerala, Pin - 695 547

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1. INTRODUCTION

Liquid Propulsion Systems Centre (LPSC) is the lead Centre for development and realization of earth-to-orbit advanced propulsion stages for Launch Vehicles and also the in-space propulsion systems for Spacecrafts. The LPSC activities and facilities are spread across its two campuses viz., Valiamala near Thiruvananthapuram, Kerala and Bangalore, Karnataka. Valiamala is the Head Quarters (HQ) of LPSC.

LPSC proposes to build, operate & maintain the Data Centre at its HQ located at Valiamala. The interested Suppliers are requested to submit their proposal for Supply, Installation, Commissioning, Operations & Maintenance of the Data Centre (DC) for a period of three years on turnkey basis in the existing space at the first floor of Cryo Building in Valiamala. The offer by the supplier shall meet all the functional, environmental, safety requirements and shall follow standard Data Centre guidelines as stated in this RFP.

For the entire scope of this RFP, LPSC is referred as **Purchaser** and the Prime bidder is referred as **Supplier**. The Supplier can be an OEM, Distributor, Service Provider or System Integrator.

2. BID QUALIFICATION CRITERIA

The Supplier must possess the adequate experience, expertise and capabilities in building the DC and maintaining DC services. In connection with this, the supplier should strictly adhere to the following Bid Qualification Criteria. Relevant documents like Contract Order, Contract Completion Certificate, Maintenance Certificate, Experience Certificate, Company Registration Certificate, Qualification Certificate, Confirmatory/Undertakings notes related to each of the Bid Qualification Criteria mentioned below shall be submitted as documentary proof along with **Technical Bid (Part - I)** of this tender.

1. Supplier should have experience in constructing physical infrastructure and in maintenance of at least two Data Centres on turnkey basis successfully for any Government/ PSUs/Private Sector institutions during the past 6 Years. One of such data centres should have minimum 8 Nos of Server Rack and the Server Room area of 25 m².
2. Supplier must be a registered company under Indian Company Act-1956
3. Audited financial statement for the last three financial years shall be furnished
4. The company must be registered with appropriate authorities for all applicable statutory duties/taxes
5. The Supplier shall provide the details of the company including technical strength, skill set, manpower details, organisation structure and shall have at least one CDCP (Certified Data Centre Professional) / CDCE (Certified Data Centre Expert) certified professional with minimum Two Years of experience.
6. Supplier shall submit latest Bank Solvency Certificate of Value for at least Fifty Lacs INR from nationalised/scheduled banks approved by RBI
7. Supplier shall not be blacklisted by any Govt./PSU Institutions, for their non-performance/inability to fulfil the contract terms and conditions of any of the previous orders for similar works for the past three years.
8. The Supplier should have a local office at Kerala, for ensuring timely support.

Supplier shall fill the Checklist provided for Bid Qualification Criteria in Annexure 7, 7a and 7b of Section 8.13, with relevant documentary proofs, without which their offer won't be considered for technical evaluation.

2.1. Technical Bid (Part – I of Tender)

The supplier should submit their technical bid with following details.

1. Detailed Technical Proposal with Project Implementation Plan for Supply, Installation & Commissioning & Maintenance of proposed DC shall be submitted. List of deliverables shall be submitted along with detailed specifications including Make & Model along with time lines for delivery & execution of the contract. All the drawings & layouts for the proposed setup shall be enclosed.
2. Supplier shall provide the details asked in the Annexure/Compliance Statements with supporting documents which are required against Bid-Qualification Criteria & Techno-Commercial specifications specified in this tender.
3. Company profile and financials with Balance sheet & Annual Turn Over for last three years (2014-15, 2015-16 & 2016-17).
4. OEM/Manufacturer's authorisation and Back-to-back support letters as per the format attached in the Annexure 3 of Section 8.9 & Annexure 4 of Section 8.10 respectively.
5. For establishing the facility, the supplier is responsible for supplying all items with required quantities which are mandatory for building & maintaining the DC. Supplier has to specify all of them even if they are not mentioned explicitly in the tender with required quantities. Data Sheets/ catalogues of all the offered products shall be submitted along with Technical-Bid.
6. Un-priced Bill of Materials (Items/Labour Components/Services) with Makes, Model No & Quantity requirements.
7. All documents submitted shall be duly signed by the authorised official of the supplier. Supplier are requested to ensure all required details for the technical evaluation of their bid are included in the Technical Bid (Part-I) itself, so that future clarifications requirements shall be reduced to the minimum.

2.2. Pre-Bid Visit

In case, Suppliers are interested in making an onsite visit to the proposed location in Valiamala, they will be allowed to visit the location, but such visits shall be made at least one week before the Tender Due

Date. For this purpose they shall contact/communicate with Senior Purchase & Stores Officer, LPSC, Valiamala (email Id: sps_purchase@lpsc.gov.in, Phone : 0471 – 2567727, Mob : 9447156735)

3. PROJECT OVERVIEW

The broad overview of the LPSC Data Centre project shall be as follows:

- Purchaser intends to establish the Data Centre in its existing space at Valiamala on turnkey basis. The schematic diagram of the existing space which is proposed to be converted as DC is given in Fig.1 of Section 8.1.
- The proposed DC contains Server Room, Network Operations Room (NOC), NOC/ Server Monitoring Room and Electrical Room (UPS and Battery) as given in Fig.2 of Section 8.2.
- The supplier will be responsible for carrying out the required civil, electrical, mechanical and environmental related works towards establishing the total DC. Supplier will be responsible for the supply of all essential items required to establish the DC, their installation and overall integration to meet the functionality requirements of the Data Centre along with environmental and safety requirements as per this RFP.
- Supplier is responsible for the up keeping of the DC on 24x7 basis and maintain the DC for a period of three years from the date of commissioning of the facility.
- Supplier also will be responsible for positioning onsite residential engineer/engineers during the contract period for the smooth operations of the DC.
- All items offered shall have Comprehensive Warranty Support for a period of three years from the date of commissioning of the DC. However, for all passive items lifetime warranty support as provided by the manufacturer/OEM shall be extended to LPSC. Supplier also has to submit their rates for subsequent three years Comprehensive Annual Maintenance Contract (AMC) of the DC.
- Offers made by suppliers who all are fulfilling the Bid Qualification Criteria mentioned in Section 2 only will be considered for Technical Evaluation.

4. SCOPE OF WORK (SOW)

Detailed Scope of Work is given below:

4.1. Civil Works

- Demolition of existing partitions/structures
- Removal of debris from the site
- Reconstruction of the existing structure with Raised Access Floor for Server room and Server/NOC Monitoring room, Regular Access Floor for NOC and Electrical room, Fire Resistant Walls, Fire Resistant Doors and View Windows and Related Civil and Interior as per the requirements mentioned in the proposed DC Layout (Fig. 2, Section 8.2) and as per the specifications mentioned in Section 6.1, 6.2, 6.3 & 6.4

4.2. Electrical Works

Establish fully redundant power supply to the DC as per the proposed electrical Schematic Layout Diagram (SLD) in Figure 6 Section 8.6

- All electrical activities shall be followed as per the specifications mentioned in Section 6.5
- Supply and installation of LT Switchgears, Control Panels, PMCCs, Distribution Boards, Medium Voltage (MV) Cables, Medium Voltage Distribution Systems, Cable Trays, Raceways & Accessories, Lighting Fixtures as per the specifications mentioned in Section 6.6, 6.7, 6.8, 6.9 & 6.10
- Separate earthing shall be done as per the specifications mentioned in Section 6.11
- Supply and installation of redundant UPS as per specifications mentioned in Section 6.12 and Surge Suppression System as per the specifications mentioned in Section 6.13

4.3. Data Centre Networking

Establishing network connectivity between NOC Room and Server room as per the Figure 3 Section 8.3

- Supply, Installation, Testing and commissioning of Redundant Single Mode fibre and CAT 6A network connectivity for the total DC as per the Network SLD mentioned in Figure 6
- Providing Cable trays, Guides and other accessories required for completing the structured cabling as per the specifications mentioned in Section 6.14 & 6.15

4.4. Equipment Racks

Supply and installation of server racks and network racks as per the specifications in Section 6.16 and Section 6.17

4.5. Precision Cooling & Comfort Air conditioning

Air conditioning for up keeping the servers at rack level and comfort AC for the DC facility with redundancy to ensure 24x7 hour services. Detailed requirements are mentioned in Section 6.18 & 6.19.

- Supply, installation and commissioning of Precision Air Conditioning (PAC) System for cooling the servers at rack level in the Server room
- Providing a containment solution to ensure proper and efficient cooling
- Providing and commissioning comfort cooling for areas other than Server Farm viz., Monitoring Room, NOC, UPS and Battery Room

4.6. Security and Safety

For protecting the DC and equipments from fire, pests, water leakage and enabling access only to authorised officials. Detailed requirements are mentioned in Section 6.20, 6.21, 6.22, 6.23, 6.24 & 6.25

- Supply, installation and commissioning of Fire Detection and Suppression System
- Providing Water Leakage Detection System and Rodent Repellent System
- Supply and implementing fire suppression system and with VESDA
- Supply and installation of finger print based Access Control System for the DC
- Video Surveillance System for monitoring the activities in the DC

4.7. Environmental Monitoring and Performance Monitoring System

Establish Data Centre Infrastructure Management (DCIM) System and Performance Monitoring System for the DC

- Design, supply, installation and commissioning of DC Infrastructure Monitoring System as per the specifications mentioned in Section 6.26
- Design, supply, installation, commissioning and integration of the components with DCIM
- Supply and implementation of KVM over IP for ensuring remote access to the authorised personal during service and emergency situations.
- Supply and implementation of 55" LED display system for DCIM dashboard viewing and monitoring.

4.8. General Conditions

The Supplier has to submit following layout/drawings/documents in the **Technical Bid (Part-I)**:

1. Schematic diagram of the proposed DC
 2. Electrical layout
 3. Computer Network layout
 4. Air flow plan with containment solution for the Precision Air Conditioning(PAC)
 5. Standard Operating Procedure(SOP) for the DC
 6. Preventive Maintenance Plan and actions required for up keeping the facility
 7. Service Level Agreement(SLA)
- The Supplier shall be responsible to design, construct and commission the DC in accordance with current industry standard/s and practices for establishing the DC with the redundancy criteria mentioned for the high availability in this RFP for various components of the DC and the total setup. The Supplier need to mention the standards they are following for the proposed DC explicitly in the Technical Compliance statement.
 - The Supplier shall be responsible for providing support and maintenance for all equipment and systems during the three years Warranty period.
 - The Supplier shall assist LPSC officials in shifting all the current servers and devices into the new DC with due care and in operationalizing the facility.

5. COMPONENTS OF DATA CENTRE

The basic components of the DC include Racks, Network Components, Electrical Components, Cooling Elements, Monitoring System, Safety & Security Components apart from Civil works. The DC shall be constructed in accordance existing industry practices.

6. DETAILED TECHNICAL SPECIFICATIONS

The activities/items required for building the infrastructure of the proposed DC, with detailed specifications are listed below. However, if the bidder finds any other item required mandatory for building the DC or if any of the specified items is not complete, they shall include the same in addition to the items/activities/specifications specified by the Purchaser. For all items the Make & Model shall be explicitly mentioned as per the format specified in Annexure 11 Section 8.15.

Civil Works	
6.1	Raised Access Floor
6.2	Fire Resistant Walls
6.3	Fire Resistant Doors and View Windows
6.4	Related Civil and Interior Works
Power	
6.5	Electrical General Conditions
6.6	LT Switchgears, Control Panels, PMCCs, Distribution Boards
6.7	Medium Voltage (MV) Cables
6.8	Medium Voltage Distribution Systems
6.9	Cable Trays, Raceways & Accessories
6.10	Earthing & Accessories
6.11	Lighting Fixtures
6.12	Parallel Redundant UPS
6.13	Surge Suppression System
Network	
6.14	Passive Networking and Structured Cabling
6.15	Cable Trays and Cable Guides
Racks	
6.16	Server Racks
6.17	Network Racks
Data Centre Cooling	
6.18	Precision Air Conditioning
6.19	Comfort Air Conditioning
Data Centre Safety	
6.20	Aspiration Smoke Detection System
6.21	Fire Suppression System
6.22	Water Leakage Detection System
6.23	Rodent Repellent System
Data Centre Security	

6.24	IP Based Surveillance system
6.25	Access Control System
Data Centre Monitoring	
6.26	Data Centre Environmental & Infrastructure Monitoring
6.27	KVM and Consoles

6.1. Raised Access Floor

Raised Access Floor is required for Server Room and Monitor Room as per Figure 1 Section 8.2. Providing and fixing Raised Access Floor systems as per specifications conforming to EN 12825 or equivalent standards for other areas regular access floor with vitrified tiles shall be laid.

6.1.1. Raised Access Floor System

Access floor system to be installed shall provide a maximum finished floor height of 450 mm from the existing floor level. The system shall provide with suitable pedestal and under-structure designed to withstand various static loads and rolling loads. The entire Access floor system shall be provided with adequate fire resistance, acoustic barrier and air leakage resistance

6.1.2. Panels

- 6.1.2.1 Panels shall be 600mm x 600mm with minimum 30 mm or better height fully interchangeable with each other within the range of a specified layout.
- 6.1.2.2 Panels shall rest on the grid formed by the stringers which are bolted on to the pedestals.
- 6.1.2.3 Panels shall be finished with melamine lined foil and thick plastic edge material as recommended by the manufacturer that is self-extinguishing and PVC free.
- 6.1.2.4 Panels shall be made up of Wood Core / Chip Board / Calcium Sulphate / equivalent
- 6.1.2.5 The bottom of the panel shall be covered with 0.05mm or better Aluminium foil to create a fire and humidity barrier and this should provide floor's electrical continuity.
- 6.1.2.6 The base surface of the panels shall be laminated using appropriate HPL laminated surface covering.
- 6.1.2.7 Panels shall remain flat through and stable unaffected by humidity or fluctuation in temperature throughout its normal working life.
- 6.1.2.8 The Panels shall be UL listed/ FM/DM approved. Panels shall provide for impact resistance top surfaces minimal deflection, corrosion resistance properties and shall not be combustible or aid surface spread of flame.
- 6.1.2.9 Panels shall be insulated against heat and noise transfer.
- 6.1.2.10 The air is to be distributed evenly inside the containment by providing grids with minimum 55% perforations and Volume Control Dampers in the floor tiles as per the cooling requirement.

6.1.3. Panel Loading

- 6.1.3.1 Concentrated point load at centre: up to 450 Kg
- 6.1.3.2 Max allowed load at centre is 1000 KG.

6.1.3.3 Uniformly Distributed Load (UDL): 1500 Kg/M2.

6.1.4. Fire Rating

The panels shall conform fire ratings tested as per EN13501 for minimum 30 Min.

6.1.5. Pedestal & Assembly Structure

- 6.1.5.1 Pedestal installed to support the panel shall be suitable to achieve a finished floor height of minimum 420mm but not exceeding 450mm.
- 6.1.5.2 Pedestals shall support an axial load of 1500 Kgs, without permanent deflection and an ultimate load of 3000 Kgs.
- 6.1.5.3 Pedestal design shall conform speedy assembly and removal for relocation and maintenance. Pedestal base to be permanently secured & position on the sub-floor. Pedestal assembly shall provide for easy adjustment of levelling and accurately align panels to ensure lateral restraint. Pedestal head shall be designed to avoid any rattle or squeaks.
- 6.1.5.4 Pedestal Assembly - The structure is made entirely of galvanized steel. Pedestal design shall conform speedy assembly and removal for relocation & maintenance. Pedestal assembly shall provide for easy adjustment of levelling and accurately align panels to ensure lateral restraint. The assembly shall provide a range of height adjustment up to 25mm, with the help of check nuts.
- 6.1.5.5 Understructure - Under structure system (US) consists of stringers that are locked into the pedestal head and run both ways. The US system shall provide adequate solid, rigid and quiet support for access floor panels. The US system shall provide a minimum clear, uninterrupted height of 450mm between the bottom of the floor and bottom of the access floor for electrical conducting and wiring.
- 6.1.5.6 Stringers - The stringer shall be hot dipped galvanized steel cold roll construction specially designed to stabilize lateral stability and to support the panels on all sides for alignment. The channels shall have a counter sunk holes at both ends to accommodate bolting of the same to the pedestal head assembly.
- 6.1.5.7 Accessories - Double cup tile pullers or lifters: Qty – 4 numbers shall be supplied.

6.2. Fire resistant Walls, Partitioning

6.2.1. Server Room

The existing room shall be made non-permissible airtight, thermally insulated and fire rated walls. Both the real ceiling and real flooring to be leak proof, air tight, thermally insulated with 2-hour fireproof rating.

6.2.2. UPS & Battery Room

Thermal insulation with 2-hour fire proof rating.

6.2.3. Internal partitions

Internal partitions shall be of minimum 135 mm thick 2 hrs fire rated gypsum partition with glass wool sound acoustics

6.2.4. Finishing /Painting

- **Inside Server Room, Monitoring Room & Electrical Room:** Internal surfaces of all walls and roof should be finished with one coat of primer and two coats of fire retardant paint of reputed brand.
- **In NOC Room and external surface of the total DC:** The walls should be finished with one coat of primer and two coats of plastic emulsion of approved make and shade.

The shade for inside and other areas will be decided by the Purchaser.

6.3. Fire resistant Doors and Windows

6.3.1. Fire Resistant doors

For the Data Centre three fire resistant doors are required with following dimensions:

Sl. No.	Type	**Door size in mm
1	Double Leaf Fire Rated Metal Door (Emergency Exit)	900 x 2100
2	Double leaf Fire rated metal door (to Server Room)	1200 x 2100
3	Double leaf Fire rated metal door (to UPS Room)	1000 x 2100
4	Double leaf Fire rated metal door (to NOC Room)	1000 x 2100
5	Single leaf Fire rated Sliding door(UPS Room to Battery Room)	1000 x 2000

** The dimensions specified for the doors are indicative and minor variations may arise during actual erection.

- Providing and fixing 2 hr fire rated double skin steel door constructed from minimum 1.2mm (18 SWG) thick galvanized steel sheet (conforming to IS 277) formed to provide minimum 46mm or better thick fully flush door shell with lock seam joints at stile edges.
- Internal construction of the door shall be a specially designed Honey Comb structure with reinforcements at top, bottom and stile surrounds.
- As per IS 3614 part-2 for stability & Insulation and Pressed Galvanized steel conforming to IS 277.
- Fire rated, thermally insulated View/Vision Glass panel with clear view shall be made available at the door.
- The door frames and door shutters are primed with Zinc-Phosphate Stoving Primer and finished with Polyurethane Aliphatic grade or epoxy paint
- All doors shall have provision to mount and operate with EMI Lock through which access to DC facility can be controlled by Biometric Access System

6.3.2. Glass Window:

For the Server Room two fire resistant glass windows with following dimensions having minimum 1 hour fire rating and thermal insulation are required:

Sl. No.	Type	Door size in mm
1	Glass window on Monitoring side	900 x 900
2	Glass window on Corridor side	1800 x 600

6.4. Other Civil and Interior Work

6.4.1. Demolishing

The demolition work should be done with utmost care while removing the existing brick wall and other supports fixed onto the wall. The existing partition brick wall, if any, shall be gently removed without disturbing the existing infrastructure and structure.

- All fixtures like windows on the outer wall, existing doors and internal partitions, etc in the existing layout mentioned in Figure 1 Section 8.1 shall be demolished without disturbing the other parts of the building
- All electrical accessories like light fixtures, power outlets, wiring etc and the existing fire fighting system are to be dismantled
- All dismantled items should remain the property of LPSC. The dismantled debris should be disposed to a location identified within the campus at a distance of 1km (approx) from the site.

6.4.2. Reconstruction work

The openings on the walls on account of the removal of existing windows, doors, glass partitions etc. are to be made good with brick work and surfaces plastered with 1:4 cement mortars to match with that of the existing walls. The flooring requirements other than the raised access floor, for server room & monitoring room, also shall be made with vitrified tiles suitably designed in aesthetic with the raised access floor.

Following doors have to be erected in addition to fire rated doors, mentioned in Section 6.3.1.

Sl. No.	Type	**Door size in mm
1	Aluminium and Glass door (to Monitoring Room)	1000 x 2100
2	Aluminium – 2 leaf door with glass partition (For Corridor)	1200 x 2100

** The dimensions specified for the doors are indicative and minor variations may arise during actual erection.

6.4.3. Thermal Insulation

The real flooring to be thermally insulated using 19mm nitrile rubber/ equivalent insulation with one side aluminium foil. The junctions between the insulator and fixtures shall be watertight and airtight.

6.4.4. Modular False ceiling

- False Ceiling is required for the entire DC. Grid type Mineral fibre false ceiling system with suitable support shall be made.
- The ceiling shall be provisioned with cut-outs for lighting, AC grills, Fire detectors, nozzles etc.
- The ceiling shall be easily accessible for cabling, maintenance work and emergency needs.

6.4.5. Furniture

- **Table:** Scratch resistant, easily polishable and sturdy Acrylic Solid Surface table top of size 600 mm (width) x 25 mm (thickness) should be provided along the side walls at 750 mm height for a length of 2m (approx.). A set of three drawers should be provided at four different locations underneath the table surface, provision for accommodation 2 CPUs shall be provided. The frames and legs should be of corrosion proof metal.
- **Chair:** Revolving type office chairs: Qty 2 nos. Acceptable make like Godrej Featherlite etc, with adjustable height with fabric cushion and arms are to be provided.

6.4.6. Illuminated Signage

Illuminated signs with proper naming convention should be installed in the Server Room, NOC, UPS Room, Battery room, Monitoring Room, Emergency Exit points etc. An emergency fire exit plan should be prepared and installed at the area designated by the Purchaser. At the entrance of the floor also one sign Board with 'LPSC Data Centre' shall be provided.

6.5. Electrical General Conditions

Ambient air temperature and altitude shall be taken as 50 deg. C, altitude less than 11m from Mean Sea Level (MSL) and relative humidity 95% for the purpose of designing of electrical equipment. The electrical work shall be carried out as per the following conditions in conjunction with the drawings and annexure(s).

- All equipment shall be capable of continuous operation satisfactorily under the following conditions:
 - Voltage variation : +/- 10%
 - Frequency variation : +/- 5%
 - Utilization: 415V, 3 Ph., 4 wire, 50 Hz with fault level of 20 kA.

6.5.1. Codes and Standards

- All equipment and materials specified herein or not, shall be designed, manufactured and tested with the latest applicable standards & bureau of Indian standards.
- All electrical equipment shall also conform to the latest electricity rules as regards safety and other essential provisions.
- All electrical installation work shall comply with the requirements of the following Act / rules / codes as amended up-to date:
 - Indian electricity act.
 - Indian electricity rules.

- National electric code published by BIS.
- All relevant BIS codes of practice.
- Regulations published by tariff advisory committee.

6.5.2. Supervision

The authorised focal point of the Purchaser will coordinate with the Supplier and the Supplier will be working under his/her guidance and direction/supervision. Such direction and supervision however shall not relieve the Supplier of his responsibility of correctness and quality of workmanship and of other obligation under the contract.

6.5.3. Responsibility

- The Supplier shall be fully responsible for proper erection, safe and satisfactory installation of electric devices and UPS.
- The work shall be executed in accordance with the directions, instructions, drawings and specifications in coordination with the Electrical Section of Purchaser.
- If, in the opinion of the Supplier, any work is insufficiently specified or require modification, the Supplier shall refer the same in writing to the authorised focal point of the Purchaser and obtain instruction/approval before proceeding with the work. If the Supplier fails to refer such instances, any excuse for the faulty erection, poor workmanship or delay in completion shall not be entertained.

6.5.4. Drawings

- Drawings and schedules enclosed with this specification are for general guidance of the Supplier to assess the type and volume of work involved.
- These drawings & schedules will be revised to suit the actual requirement in related systems. Final drawings & schedules need to be furnished by the Supplier as detailed designs as part of tender.
- The Supplier shall submit set of drawings as part of structural design carried out based on field survey and floor plan layout. After completion of work, the Supplier shall furnish a set of marked-up prints of "As Built" drawings to the Purchaser.

6.5.5. Methods and Workmanship

- All work shall be carried out in excellent workmanship by mechanics/electricians skilled in the trade involved.
- All details on installation shall be electrically and mechanically correct.

6.5.6. Protection of Work

- The Supplier shall effectively protect his work, equipment and materials under his custody from theft, damage or tampering.
- Finished work, where required, shall be suitably covered to keep it clean and free from defacement.
- Supplier shall be held responsible for any loss or damage to equipment and material issued to him until the same is taken over by the Purchaser according to the contract.

6.5.7. Consumables and Hardware

The Supplier shall furnish all erection materials, hardware and consumables required for the completion of installation. The materials shall include but not limited to the following:

- **Consumables:** Welding rods & gas, oil & grease, cleaning fluids, paints, electrical tape, soldering materials etc.
- **Hardware:** Bolts, nuts, washers, screws, brackets, supports, clamps, hangers, saddles, cleats, sills, shims, etc.
- **Materials:** Junction boxes, terminal blocks, connectors, ferrules, lugs, brass glands, rigid/flexible conduits, cables, ground wires, etc.
- Supply of cement, sand, stones, etc. required for the execution of the contract shall be the responsibility of the Supplier.
- The testing equipment, if required for testing is to be provided by the Supplier, during the testing/commissioning of the installed equipments at Data Centre building.

6.5.8. Installation – General

- Installation work shall be carried out in accordance with good engineering practices and also manufacturer's instructions/recommendations where the same are available.
- Equipment shall be installed in a neat workmanlike manner so that it is levelled, plumbed, squared and properly aligned and oriented.
- If the equipment is furnished in a dis-assembled condition as received at site, the Supplier shall assemble all these parts, mount and wire-up loose equipment, fittings and accessories and complete with all connections.
- Equipment shall generally be supplied with necessary floor/support steel, holding down bolts, nuts, anchors, etc., Supplier shall furnish and install all bolts, nuts, screws and anchors as required completing the installation.
- Any internal wiring of the equipment which has been left incomplete because of shipping split or which requires minor modifications shall be carried out by the Supplier.
- All erection work shall be carried out in strict compliance with manufacturer's instructions and shall include all necessary adjustments, checks and measurements.
- The Supplier shall record results of all erection tests and measurements. The Supplier shall submit copies of those test results to the LPSC's Engineer Incharge for their reference and record.

6.5.9. Design Criteria General

The equipment shall be used in medium voltage system having characteristics as listed in this specification.

- Energy Meters shall have data logging capability through network for DCIM.
- There shall be no radio interference when the equipments are operated at maximum service voltage.
- The maximum temperature in any part of the equipment at specified rating shall not exceed the permissible limits as stipulated in the relevant standards.

- The equipment shall be capable of withstanding the dynamic and thermal stresses of listed short circuit current without any damage or deterioration.
- All equipment, accessories and wiring shall have tropical protection, involving special treatment of metal and insulation against fungus, insects and corrosion.
- The safety clearances of all live parts of the equipment shall be as per relevant standards.
- Wherever single core cables are terminated in any equipment, gland plate shall be metallic and of 3-4 mm thick.
- There shall be no straight through joints in power & control cables.
- All cable terminations shall be with double compression cable gland with armour holding system for armoured cables.
- The lighting fixtures shall have loop in & loop out facility.

6.5.10. Extra / Additional Work

- The Supplier shall, when requested by the Purchaser, perform extra electrical work and furnish extra materials not covered under his scope of work.
- The Supplier shall be paid for all such work & material subject to the production of invoice & certifications by authorised officials of Purchaser.

6.6. LT Switchgears, Control Panels, PMCCs, Distribution Boards

The ratings/values mentioned in the attached SLD, is as per the initial assumptions. Supplier shall reconfirm these values before designing the solution. Necessary changes shall be incorporated to provide a trouble free operation of the entire solution.

6.6.1. Standards

LV switchgear / control gear shall be as per IS 13947. Switchboard assemblies shall conform to the requirements of IS 8623-1993

6.6.2. Construction

The construction should take care of following points:

- Safety
- Reliability
- Maintainability

The panel shall be metal enclosed, indoor / outdoor, floor / wall mounted freestanding cubicle type, as specified in three distinct zones namely

- Busbar zone
- Functional units zone
- Cabling zone

The requisite vertical sections when coupled together shall form continuous dead front/rear access switchboards, as required

- with dust, vermin and damp protection

- readily extendable as required by the addition of vertical sections after removal of the end covers
- with access to the feeders, busbars, cable terminations, cable alley etc., as required.

Each vertical section shall comprise:

- A front framed structure of rolled/ folded Cold Rolled Cold Annealed (CRCA) sheet / MS angle section of minimum of 3mm thick rigidly welded / bolted together. This structure shall house the components contributing to the major weight of the equipment such as circuit breaker cassettes, fuse switch units, main horizontal busbars, vertical risers, and other front mounted accessories.
- The structure shall be mounted on a rigid base frame of ISMC / folded CRCA sheet steel of minimum 6mm thickness and 75mm height. The design shall ensure that the weight of the components is adequately supported without deformation or loss of alignment during transit or during operation.
- A cable chamber housing the cable end connections and power/control cable termination. The design shall ensure generous availability of space for ease of installation and maintenance of cabling and adequate safety for working in one vertical/ horizontal section without coming in to accidental contact with live parts of the adjacent section.
- A cover plate at the top of the vertical section, provided with a ventilating hood where necessary. Any aperture for ventilation shall cover with perforated sheet having less than 1mm dia. Perforation to prevent entry of vermin.
- Front and rear doors fitted with dust excluding neoprene gaskets with fasteners designed to ensure proper compression of the gaskets. When covers are provided in place of doors generous overlap shall be ensured between sheet steel surfaces with closely spaced fasteners to preclude the entry of dust.
- The height of the panel shall not be more than 2300mm unless otherwise specified. However operating height of switch / Breaker should not exceed 1800mm from the floor level. Total depth of the panel shall be adequate locator for proper cable termination and spacing.
- Front doors shall be of minimum of 14G / 2mm sheet steel and other doors / partitions shall be of 16G / 1.6mm sheet steel. All sheet steel work forming the exterior of switchboards shall be smoothly finished, levelled and free from flaws. The corners should be rounded.
- The apparatus in the switch boards shall be so arranged as to facilitate ease of operation and maintenance and at the same time to ensure the necessary degree of safety.
- Apparatus forming part of the switch boards shall have the following minimum clearances:
 - Between phases - 25mm
 - Between phases & neutral - 25mm
 - Between phases & earth - 25mm
 - Between neutral & earth - 19mm
- When, for any reason, the clearances are not available, suitable insulation barrier shall be provided. Clearances shall be maintained during normal service conditions. Creepage distances shall comply with those specified in relevant standards.

- All insulating material used in the construction of the equipment shall be non-hygroscopic material treated to withstand the effects of high humidity, high temperature and tropical ambient service conditions.
- Functional units such as circuit breakers, fuse switches, MCCBs, etc., shall be arranged in multi-tier formation except that for more than two ACBs housed in a single vertical section.
- Metallic / insulated barriers shall be provided within vertical sections and between adjacent sections to reduce damage due to arcing fault and prevention of accidental contact with:
 - Main bus-bars and vertical risers during operation, inspection or maintenance of functional units and front mounted accessories.
 - Cable termination of one functional unit, when working on those of adjacent unit/ units.
- All covers providing access to live power equipment / circuit shall be provided with tool operated fasteners to prevent unauthorised access. One such tool shall be supplied along with each panel.
- Provision shall be made for permanently earthing the frames and other metal parts of the switchgear by independent connection. All the doors shall be provided with braided flexible copper earth connection.
- Doors with cut outs for instruments / relays shall be provided with stiffeners to avoid buckling
- Only CRCA steel sheet shall be used for fabricating the cubicle.
- Thickness tolerance for sheets shall be as applicable in the relevant IS

6.6.3. Bus Bar Zone

The zone comprised of horizontal bus bar, vertical bus bars, heat shrunk PVC sleeves, SMC Insulated supporting system. The busbars chambers shall be suitable for 500V, 3 Phase 4 wires, 50Hz, the short circuit level as per the industry standards

- Rated current, voltage and frequency
- Withstand capability during short circuit condition
- Protection against vermin, falling tools, hardware which tend to bridge and initiate arcing faults.
- Protection against and conducting deposits which accelerates tracking on supporting surface and consequently cause failure of the supporting system.
- Proper ventilation for heat dissipation.
- The orientation and spacing between the bus bars to withstand short circuit.
- Temperature rise and derating factor.
- Arcing faults.
- Insulation levels
- Proximity effects.
- The bus bar shall be either tinned copper or aluminum
- The conductivity of aluminium or copper bus bars should high and electrolytic grade copper of 99.9% IACS and aluminium of 55% IACS (International annealed copper standard) conforming to IS 5082 – 1981 , aluminium grade 63401 – WP .
- The bus bar shall be provided with black color heat shrunk PVC sleeves along the entire length, but the joints shall be shrouded.

- When bus bar / links are connected in parallel some gap should be maintained between the bus of same potential to improve heat dissipation. The gap should be equal to the thickness of the bus of 10mm or whichever is higher.
- Stiffeners shall be provided between bus of same potential to avoid bending stress on conductors and number of such stiffeners shall depend on the partial force.
- The total stress under short circuit condition should not exceed 0.1% proof stress of the bus bar material.
- The insulation material used for the supports should have following desirable properties.
 - High mechanical strength.
 - High Di-electric strength
 - High temperature withstands.
 - Non flammable properties.
 - Non hygroscopic properties.
 - High comparative tracking index.
- When marking busbar joints the safe minimum bending radius shall be T for copper busbars and 2T for aluminium busbars where the T is the thickness of the busbars.
- The busbar section shall be jointed either by the overlapping or by providing fish plates and bolt or clamping the sections together. Bolting and clamping methods should provide joints that have satisfactory service life.
- The main requirement for any busbar joints is that electrical efficiency should remain stable under all conditions of service. To achieve this, the following factors to be taken in to account when the joint is made. They are:
 - Proper contact pressure must be applied and maintained.
 - The surface of the aluminium must be cleaned before bolting up.
 - Air and moisture must be excluded from the joints.
 - The overlap should be at least equal to the width of the busbars.
- The busbars shall be suitably supported with DMC / SMC supports designed to provide a fault withstand capacity as specified.
- High tensile bolts and spring washers shall be provided at all bus bar joints.
- The busbar shall have uniform cross section throughout and shall be capable of carrying rated current at 500 volts continuously.
- The busbar shall be designed to withstand the temperature rise of 45 degree C. above the ambient.
- The current density of 1.2amps / sqmm shall not be exceeded for aluminium busbars and for Copper shall be 0.8 amps / sqmm, should comply with CEIG norms
- The neutral busbar shall have continuous ratings of at least 100% of the phase busbars as specified, for non linear loads.
- An earth bus of size of not less than 40 x 6 mm aluminium shall run throughout the length of the switch board at top or bottom as required.

6.6.4. Moulded Case Circuit Breaker (MCCB)

- The MCCB shall be 3 P / 4P AC and shall conform in all respect to IS 13947 – PART 1 & PART 2. They shall incorporate quick make, quick break, independent manual type with trip free feature.
- The handle position shall give positive indication whether the breaker is in ON, OFF or TRIP condition.
- The short circuit and the current rating of MCCB shall be as described under the SLD or as per the industry standards.
- MCCB shall be provided with AC shunt trip / UV release as per the requirement to meet the specifications.
- MCCBs shall be provided with rotary handle operating mechanism with door interlock & door interlock shall be defeat able when required.
- MCCB shall be micro procure type with communication port suitable for data acquisition.

6.6.5. Switch - Disconnecter - Fuse (SDF) Unit

- The SDF units shall be of the load break heavy duty, independent manual operating cubicle type conforming to the requirement of IS 13947 –1992 part 3 (AC 23 amperes duty)
- The SDF units shall be double break and shall have quick make and quick break mechanism designed to ensure positive operation.
- The unit shall be provided with the front operating handle. The ON and OFF positions of the switch handle shall be clearly and indelibly marked.
- Interlock shall be provided so as to prevent opening of the unit door when the SDF is in the ON position and also to prevent closing of the switch with the door not properly secured. It should, however, be possible for a competent examiner to operate the switch with door open by releasing interlock.
- The interior arrangement of the switch unit shall be such that live parts are shrouded.

6.6.6. Current Transformer (CT)

Wherever ammeters are called for C.T.s shall be provided for accurate current measuring.

- Each phase shall be provided with separate current transformer of accuracy Class I and suitable VA burden for operation of associated metering and controls.
- Current transformer shall be in accordance with IS: 2705 - 1964 as amended up to date.

6.6.7. Indicating / Integrating Meters

All indicating instruments shall be of flush mounting type. Instruments shall have clearly divided indelibly marked scales and shall be provided with adjusting devices in the front.

6.6.8. Cable Termination

- Cable entries and terminals shall be provided in the switch board to suit the number, type and size of aluminium conductor, power cables and copper conductors, control cables specified in the detailed specifications.

- Provision shall be made for top or bottom entry of cables as required. Generous size of cabling chamber shall be provided with the position of cable gland and terminals such that cables can be easily and safely terminated.
- Barriers or shrouds shall be provided to permit safe working at the terminals of one circuit without accidentally touching that of another live circuit.
- Cable risers shall be adequately supported to withstand the effect of rated short circuit current without damage and without causing secondary faults.
- Cable sockets shall be tinned copper, crimping type.

6.6.9. Control Wiring

- In motor control centre, control voltage for all controls, indications and metering shall be derived by providing a control transformer of adequate capacity.
- All control wiring shall be carried out with 1100 volts grade single core FRLS cable having stranded copper conductors with minimum cross section of 1.5sqmm for potential circuits and 2.5sqmm for current circuits.
- Wiring shall be neatly bunched, adequately supported and properly routed to allow for easy access and maintenance.
- Wires shall be identified by alpha numeric ferrules at each ends. The ferrules shall be of ring type and of non deteriorating material. They shall be firmly located on each wire so as to prevent free moment.
- All control circuit miniature circuit breakers (MCB) shall be mounted so as to be easily accessible.

6.6.10. Terminal Blocks

- Terminal blocks shall be of 500 volts grade and mechanically robust.
- Terminal blocks shall have minimum current rating of 10 amps and shall be shrouded. Provisions shall be made for label inscription.

6.6.11. Name Plates

The panel as well as feeders compartments shall be provided with name plates of anodised aluminium or Hylam switch plates with engraving. These shall be properly secured with fasteners / rivets. The panel / feeder description shall be as indicated in the drawings.

6.6.12. Tests

Routine tests shall be conducted on each Medium Voltage Power control centre and shall comprise:-

- Inspection of the switch boards including inspection of wiring and electrical operation tests where necessary.
- Di-electric tests:
 - Insulation resistance of the main circuit between each pole and the earth and that between the poles shall be measured.
 - Insulation resistance of all secondary wiring between phase and earth shall be measured.
 Insulation tests shall be carried out both before and after High voltage tests

- Checking of protective measure and electrical continuity of protective circuits.

6.6.13. High Voltage Tests

- A high voltage test with 2.5 KV for one minute shall be applied between each pole and earth and between poles. Test certificates shall be submitted along with panels.
- All instruments / Meters used for testing should carry a calibration stamp not earlier than 6 months.

6.6.14. Pre-Commissioning Tests

Panels shall be commissioned only after successful completion of the following tests. The test shall be carried in the presence of LPSC representative and copy of the test report submitted before commissioning.

- All main and auxiliary bus bar connection shall be checked and tightened.
- All wiring termination and bus bar joints shall be checked and tightened.
- Wiring shall be checked to ensure that it is according to drawing.
- All wiring shall be tested for insulation resistance by a 500 volt Megger.
- Phase rotation test shall be conducted.
- Suitable injection test shall be applied to all the measuring instruments to establish the correctness and accuracy of calibration of working order, as agreed mutually.
- All relays and protective devices shall be tested for correctness of setting and operation by introducing a current generator and ammeter in the circuit or by producing calibration / test certificate as required by the employer / inspectorate
- Rating of fuse, MCB shall be checked to ensure that it is according to the Electrical SLD mentioned in the Figure 5 Section 8.5

6.6.15. Distribution Boards (DB)

Distribution Boards (DBs) shall be suitable for AC supply, 415V, 3 phase (TPN DB) and / or 240V, 1 phase (SPN DB) as required. Distribution boards shall generally conform to IS: 2675 or BS: 214.

6.6.16.1. Type and Construction

- DBs shall be brand / ready-made of approved make. The sheet steel/ PVC MCB DB shall be flush mounting type unless otherwise specified and shall consist of MCB/ MCB isolator /ELCB / MCCB as incomer and MCBs as outgoing. At least 20% spare ways shall be provided.
- In case of HRC fuse DB, the incomer shall be a switch unit/ switch fuse unit with High Rupturing Capacity (HRC) fuse as outgoing.

6.6.16.2. Busbars

- Suitably derated bus bars made out of high conductivity copper strips only, color coded and mounted on non-hygroscopic insulating supports, shall be provided.
- In case of UPS power DBs, neutral bus/ terminal strip shall be twice the rating of phase busbars.

6.6.16.3. Circuit Breakers

MCB, Isolator, ELCB, MCCB shall be of approved rating and make with specified short circuit rating.

6.6.16.4. HRC Fuses

Rating of the fuses and carriers shall be as per drawings. Fuse carriers and bases shall conform to IS: 1300. They shall be non-inflammable and non-hygroscopic, with hard gloss finish.

6.6.16.5. Safety & Interlocks

- All the live parts shall be shrouded such that accidental contact with live parts is totally avoided.
- Distribution boards shall be provided with a frontcover and/or hinged door.
- Unused ways shall be closed with PVC blanks.
- Distribution boards interior assembly shall be dead front with the front cover removed.
- Main terminals shall be shrouded.
- Suitable insulating barriers made of arc resistant material shall be provided for phase separation.
- Ends of the bus structures shall also be shrouded.

6.6.16.6. Cabinet Design

- The Distribution Board cabinet shall be totally enclosed type with dust and vermin proof construction, with neoprene gaskets, to IP 54.
- The cabinet shall be made out of CRCA MS or PVC sheet and shall not deform during erection.
- The interior components shall be mounted on a separate steel sheet which is mounted and locked onto the studs provided inside the cabinet.
- Over this, a cover made of hylam or MS sheet shall be provided with slots for operating handle of breakers. If required, the cabinet shall be equipped with a hinged cover/ front door having a spring/magnetic latch and wherever asked for, with vault lock.
- Cabinets shall have knockouts for conduit / cable entry at both top and bottom.
- Finish shall be as per "Metal Treatment" meeting the industry approved standards.
- All visible, exterior surfaces shall be powder coated enamel paint.
- The interior surfaces shall be finished to an off-white shade.

6.6.16.7. Terminals

- Distribution Boards shall be provided with separate brass/ copper terminal strips of adequate size to receive neutral and earth wires of mains and outgoing circuits.
- For non-linear loads, Neutral strip size is critical. The location of the terminal strips shall be such that crowding of wires in the proximity of live parts is avoided.

6.6.16.8. Name Plate & Directory

DBs shall have an engraved name plate outside. A directory indicating the area and loads served by each circuit, rating of MCB, size of outgoing cables, etc. shall be affixed on the posterior of the DB cover.

6.7. Medium Voltage Cables

Supply, installation, storing, laying, fixing, jointing/ terminations, testing and commissioning of Medium Voltage (MV) cables in accordance with drawings, specifications, relevant standard specifications and manufacturer's guidelines. Cables shall be laid in built up trenches, directly buried underground, on cable trays, in pipes, clamped directly to wall or structure etc.

6.7.1. Details and Type

- MV cables shall be aluminium / Copper conductor, XLPE insulated, PVC sheathed and steel wire armoured or steel tape armoured construction.
- The conductors of cable shall be stranded and sector shaped.
- The cables shall conform to IS 7098, for XLPE IS: 1554 PVC cable in all respects.
- Cable storage, laying and testing shall conform to IS 7098 (Part –1): 88 latest editions.
- The cables shall be rated for a voltage of 1100 volts.

6.7.2. Laying of Cables

Cables shall be laid as per the specifications given below. Care shall be taken while laying cables to avoid formation of wrinkles or twists. Tags shall be provided at both ends and all change in directions, both sides of the wall and floor crossing. Cables crossing through walls and floor shall be through pipe and shall be sealed with fire retardant sealant and shall be painted with fire retardant paint upto 1 Mtr. on all joints, terminations and both sides of crossing.

6.7.2.1. Indoor

- MV cables laid indoor, above false ceiling wherever specified shall be laid on slotted angle steel cable trays/ supported on MS angle supports, on walls, on columns/beams as required.
- Suitable clamping with straps and saddles shall be used for keeping the cable in position.
- Spacing between the cables shall not be less than the overall diameter of the cable.
- Cables run on wall surface, upto 600mm above FFL, shall be protected by GI pipe of adequate size.
- Cables run inside concrete trenches shall be supported on cable trays / on MS angle supports and shall be neatly arranged and clamped.
- Cable entry from outdoors to indoors shall be via GI/ Stoneware/ RCC pipes and shall be sealed water tight with approved type of sealant to avoid water entering the building.
- Cable tags shall be affixed to all cables.

6.7.2.2. Cable Jointing

- Joints in cables shall NOT be allowed as a rule. Where joints are unavoidable, the location of such joints shall be got approved.
- Cable joint box / kit shall be of appropriate size, suitable for PVC insulated, armoured MV cables of particular voltage grade.
- All cable joints shall be made in suitable, approved cable joint box / kit. Jointing of cables in the joint boxes and filling in cf compound shall be done in accordance with manufacturer's instructions and in an approved manner.
- Joints that are directly buried such as Straight-through and T-joints shall be done in epoxy mould boxes with epoxy resin. End terminations shall be done using brass cable gland and heat-shrinkable cable jointing kits.
- All cables shall be jointed colour to colour and tested for continuity and insulation resistance both BEFORE and AFTER jointing.
- The sleeves of cables must not be removed until preparations for jointing are completed.

- Joints shall be finished on the same day as commenced and sufficient protection from the weather shall be arranged.
- Joints shall be made by means of proper size crimping type copper lugs for conductors.
- The conductors shall be firmly pushed into / butted into the lug/ferrule and crimped using correct crimping die /tool and anti-corrosive paste.
- The conductors /lugs shall then be efficiently insulated with insulating tape and by using spreaders of approved size and pattern. The joints shall be completely topped up with epoxy compound/ covered with stress relieving heat-shrink sleeve.

6.7.2.3. Bonding of Cables

Where a cable enters any piece of apparatus, it shall be connected to the casing by means of an approved type of copper clamp for the gland. The clamp must grip the armouring firmly to the gland or casing, so that no undue stress is passed on to the cable conductors due to vibrations. The gland shall be fixed to the lead sheath by means of either a plumbing joint or a cone of approved material, capable of being compressed onto the armouring. The gland or cone shall be capable of effecting a good electrical bond between both the armouring of the cable and the casing.

6.7.3. Testing of Cables

Tests shall be conducted for insulation between phases and between phase and earth for each length of cable on receipt, before and after jointing and on completion of cable laying work. The following tests shall be conducted in the presence of the Purchaser.

- Insulation Resistance Test (sectional and overall)
- Continuity Resistance Test.
- Armour Continuity Test.
- Sheathing Continuity Test.
- Hi-pot Test
- All tests shall be carried out in accordance with relevant standard code of practice and Electricity Rules.
- The Supplier shall provide necessary instruments, equipment and labour for conducting the above tests and shall bear all expenses in connection with such tests.
- All test equipment used for the tests shall bear a calibration seal not more than six months old.

6.8. Medium Voltage Distribution System

Medium voltage distribution system shall be applicable for wiring on 3 phase, 4 wire and earth conductor 415 volts, 50 Hz AC supply and single phase, 2 wire and earth 240 volts, 50 Hz, AC supply.

6.8.1. Rigid Steel / PVC Conduits and Accessories

- Conduits of rigid steel shall be of welded sheet steel, threaded type construction. Conduits shall be black stove enamelled outside.
- Conduits shall be of 1.6mm thickness (16G) and thickness tolerance limit: shall be as per IS conforming to IS 9537, Part II, 1981 or latest revision.

- PVC conduits shall be of black or other color as specified and 2mm thick conforming to relevant IS.
- Conduit accessories such as bends, collars, junction boxes for MS conduit work shall be of MS with threaded hubs;
- Junction boxes shall be provided with MS/ oversize PVC covers.
- All junction boxes, fan boxes, chandelier boxes used in slabs for recessed conduit system shall be of MS.

6.8.2. Open / Surface Conduit System Installation

- Wherever specifically called for, surface conduit system shall be adopted. Conduits shall be run in square and symmetrical lines.
- Conduits shall be fixed by heavy gauge GI saddles, on MS spacers secured by wood screws and raw plugs, at intervals not exceeding 600mm.
- Wherever couplers, bends, junction box or other fittings are used, saddles shall be provided on either side of the accessory.
- Exposed conduit laying above false ceilings shall be executed in similar manner described above.

6.8.3. Wiring Conductors

All wiring conductors shall be FRLS PVC insulated, stranded /flexible COPPER conductors. All lighting/power wiring shall be done using FRLS PVC insulated, stranded / flexible copper conductor wires of 1100V grade. Wiring conductors shall be supplied in Red, Black, Yellow, Blue, Green, Gray colours for easy identification of wires. The wiring conductors shall be of approved makes and shall bear manufacturer's trade mark, name, voltage grade, etc. Installation of Wiring Conductors / Cables the wiring conductors shall not be drawn into the conduits until all the works of any nature that may cause damage to the wires are completed. Proper care shall be taken in pulling the wires to see that no damage occurs to the insulation of the wires. The installation and termination of wires shall be carried out with due regard to the following:

- While drawing the wiring conductors, care shall be taken to avoid scratches and kinks which may cause breakage of strands. There shall be no sharp bends in the conduit system.
- Wire joints/splicing are permissible at switch boxes or light / power fixtures ONLY; wires shall otherwise be unbroken.
- Insulation shall be removed by means of a wire stripper tool; knife shall not be used.
- Strands of wires shall not be reduced / cut to suit the terminals or lugs. The terminals shall have adequate cross section to take all the strands.
- All the strands shall be fully pushed into the terminal hole and the screw tightened fully to avoid loose terminations.

6.9. Data Centre Lighting Fixtures

Light control switches shall be of a 5/15A rating for controlling light points. All sockets 5A and 15A ratings shall be of flush mounting type with control switches of modular type design of the same rating as that of the sockets. All sockets outlet shall be of 3 pin type with box.

- Supplier shall provide fully compatible electrical system, associated equipment, accessories and services for entire area under his scope.
- LED lighting fixtures shall be installed in the areas under scope to provide a lighting illumination level of 500 lux measured at 1.5 metre above the floor in the server farm area and min of 300 Lux in other area.
- Appropriate No (15%) of light fixtures to be fed from control supply of Service Load UPS System for data Centre and remaining shall be fed from the regular mains/ LT Distribution circuits.
- In Normal system when main power supply is healthy, the lighting shall be "ON".
- Emergency lighting shall also be provided at common areas.
- The luminaries shall be selected to suit architectural, functional and aesthetic requirement, for office areas Compact light Fixtures, in general for other areas energy saving high efficiency LED lights shall be used.
- Reflector shall be made out of high purity aluminium scientifically designed for high optical performance.
- The wiring shall be done with copper wires using 3 cores 1.5-sqmm cables for point wiring and looping and 2.5sqmm copper multi-strand FRLS for circuit mains wiring. MS conduits shall be used surface wiring. The lighting panels shall be 3-phase type with outgoing MCB circuits. Third core for earthing the lighting fittings, plug points, exhaust fans, etc. No PVC conduits shall be used in DC area.

6.10. Cable Trays and Raceways

This specification covers the design, material, construction features, manufacture, inspection and testing at the manufacture works and delivery to site of Cable Trays, Raceway, Marshalling boxes, Motor terminal adaptor boxes etc.

6.10.1. Codes And Standards

- The design, construction, manufacture and performance of the equipment/components shall conform to latest applicable standards as on date of submission of the bid and comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment/components will be installed. Nothing in this specification shall be construed to relieve the Supplier of this responsibility.
- Where no standards are available the supply items shall be backed by test results, shall be of good quality and workmanship and any supply items which are bought out by the Supplier shall be procured from approved manufacturers acceptable to the LPSC.
- In case of conflict between the standards and this specification, this specification shall govern.

6.10.2. Cable Trays And Accessories

- Cable trays shall be of Mild Steel with Aluminium Alkyd/Epoxy paint or of Galvanised Steel/Aluminium and of ladder/perforated type, complete with all necessary coupler plates, elbows, tees, bends, reducers, stiffeners and other accessories and hardware.
- All hardware (i.e. bolts, nuts, screws, washers, etc.) shall be hot dip galvanised.
- Each 2.5 metre section of all types of cable trays and all elbows, tees, crosses, etc. shall be provided with two side coupler plates and associated bolts, nuts and washers.

6.10.3. Race Way

- MS Trunking with screwed folded (min 10 mm) top cover or rectangular extruded aluminium sections with required dimensions with 25% open space for future expansion, shall be used for under floor raceways.
- The trunking shall be fabricated from 16 gauge (1.6 mm thick minimum) CRCA M.S. sheet & shall be duly epoxy powder coated where specifically mentioned, otherwise the trunking shall be pre-galvanised/hot dipped galvanised.
- Height of trunking shall not be less than 40 mm unless specified.
- The raceways shall terminate into under floor junction boxes only. However, if joint is unavoidable, proper overlapping coupler plates / end plates shall be used so as to completely prevent entry/seepage of moisture / foreign material in the raceway.
- Slotted metal sections shall be provided to secure wire bunches. PVC "U" gaskets shall be provided to protect wires from sharp edges.
- The top level of raceway shall be at least 15 mm below the finished floor level. Under-floor raceway & Junction box installation work shall include chasing & refilling the floor with cement plaster finish. The raceways shall be clamped & closed at every open end by suitable MS end-covers against possible entry of dust or any other foreign material.
- The under-floor Junction boxes shall have minimum 50 mm overall height unless specified.
- The junction boxes shall be fabricated out of 2.0 mm thick pre-galvanised M.S. sheet, duly hot dipped galvanized or powder coated 7 tank processes after fabrication. Junction box cover shall be flat/recessed (5 mm) hinged / screwed to junction box.
- The cover shall be M.S. hot dipped galvanized/ powder coated or fibre epoxy painted.
- The cover shall have a minimum thickness of 2.5 mm & suitable knockouts shall be provided for flexible conduit outlets on the cover.
- Removable screwed plates shall be provided on all four sides of the junction box. All the junction boxes shall be properly earth bonded with the raceway using 14 SWG bare copper wire

6.10.4. Terminal Blocks.

The Supplier shall supply terminal blocks wherever required for this project.

- Terminal blocks shall be complete with all accessories like mounting channels and plates, marking tags and clamps, protective covers, etc.
- All the terminal blocks shall be rated for 650V, 15A and shall be with disconnecting/shorting link.

6.10.5. Junction Boxes With Terminals

- Junction Boxes shall be hot dip galvanised, of outdoor/weather-proof construction (IP-55) and provided with gasketed front door hinged at one end and fixed with captive screws at the other end.
- The terminals shall be suitable for terminating 2 nos. 2.5 mm² stranded copper conductors on each side. At least two terminals in each box shall be suitable for terminating 4 mm² conductors.
- All terminals blocks shall be rated for 650V and 15A, unless otherwise specified in project drawings. These shall be of clip on type. All the terminals shall be complete with insulated barriers, terminal studs, washers, nuts, locknuts, identification strips, etc.

6.11. Earthing & Accessories

- All non-current carrying metal parts of the electrical installation shall be earthed as per IS: 3043.
- All equipment, metal conduits, rising main, cable armour, switch gear, distribution boards, meters, 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 be in conformity with the provisions of Rules 32, 61, 62, 67 and 68 of IER 1956.
- Complete earthing system comprising earth electrodes in conjunction with LP&C earth grid shall be provided for the proposed DC for achieving a safe step and touch potential.

6.11.1. Standards

- Code of Practice for earthing : IS 3043
- Indian Electricity Rules : 1956
- Indian Electricity Act : 1910
- CEIG Regulations

6.11.2. Details of Earthing System

Unless otherwise specified main earthing shall not be less than 50x10mm GI flat.

- Main Earth Grid - 50 x 10mm GI Flat
- Equipment to Main Grid - 25 x 6mm GI Flat
- DBs / Junction Boxes - 8SWG GI Wire

6.11.3. Plate Electrode

- Plate electrode shall be made of COPPER (Cu) plate of 3mm thick and 600 x 600 mm size.
- The plate shall be buried vertically in ground at a depth of not less than 2.5M to the top of the plate, the plate being encased in charcoal to a thickness of 300 mm all round. It is preferable to bury the electrode to a depth where subsoil water is present.
- A GI pipe of not less than 19mm dia shall be clamped with bolts vertically to the plate and terminated in a wire meshed funnel. Suitable funnel arrangements shall be made at the mouth of the pipe for watering.
- A suitable plate shall be fixed on to the rod for making necessary connections to the earth flat.
- The electrode shall be enclosed in a concrete earth pit with suitable cast iron / FCC covers.

- Each earth electrode shall have provision for individually testing the electrode.
- Coke / Charcoal / Salt shall be used to achieve the necessary earth resistance.
- Earth electrodes shall be erected 1.5 Mts. away from the building edge and minimum spacing between the electrodes shall be maintained as per IS: 3043.

6.11.4. INSPECTION AND TESTING

On completion of the entire installation, the following tests shall be conducted Check to ensure that the earthing system components meet the specified dimensions.

- Earth resistance of electrodes.
- Impedance of earth continuity conductors as per E-3 of IEE regulations.
- Effectiveness of earthing as per E-4 and E-5 of IEE regulations

6.12. Parallel Redundant UPS

The UPS shall consist of Rectifier / Charger, Battery, Inverter, Static Transfer Switch, Maintenance Bypass Switch, Protective Device and other Accessories. The UPS unit and accessories shall comply with the following requirement.

6.12.1. UPS unit

- The UPS units must be of the parallel UPS type
- The UPS units must have features supporting N+N level redundancy and parallel capable up to minimum 4 units.
- The UPS units proposed should be True Online Double conversion technology with pure sine wave output.
- The units shall have the capability of working independently to avoid a total maintenance outage.
- The Units must support equal load sharing between the parallel units. The paralleling control mechanism should be available with individual UPS.
- The Input Voltage and Frequency characteristics must be 440V ac, 3 phase, 50 Hertz.
- The Output Voltage and Frequency characteristics must be 400/415V ac, 3 phase, 50 Hertz.
- The UPS must support minimum 120kW usable load ready on delivery and shall have scalability to minimum 240 kW with N+N Redundancy.
- The UPS must be capable to handle input voltages in the range of 340-450V at rated load
- The UPS must be able to handle an input frequency in the range of 45-65Hz.
- UPS units must be connected in parallel that will enhance availability by allowing immediate, seamless recovery from isolated unit failures.
- The output of both the two UPS systems should be directly connected at the load distribution panel through individual circuit breakers (part of the distribution panel).
- There should not be any single point of failure which can lead to collapse of both the UPS systems.
- The unit must have features like LCD panel to offer real time fault diagnostic data.
- The UPS must be equipped with an Automatic Internal Bypass to allow for utility power to the connected loads in the event of a UPS power overload or fault.

- The maintenance bypass arrangement for seamless transfer of load from JPS to maintenance bypass and vice versa shall be available. The arrangement shall allow the UPS to be disconnected from input source, bypass source and output load while the load shall continue to be supplied through maintenance bypass breaker.
- The UPS shall have a Battery Circuit Breaker. This circuit breaker is to be mounted in the battery cabinet. When open, there shall be no battery voltage present in the UPS module cabinet.
- The UPS shall be automatically disconnected when the battery reaches the minimum discharge voltage level or when signaled by other control functions.
- Periodic battery self-tests must be done to ensure early detection of a battery that needs to be replaced.
- Battery life must be prolonged by regulating the voltage according to the battery temperature.
- Intelligent battery charging must be performed to maximize battery performance life and reliability.
- Cable entry must be bottom.
- The UPS must be manageable with network connectivity cards installed. UPS must have the required network connectivity to be fully managed as well as remotely monitored.
- The UPS units must be warranted for a period of three years, after the date of commissioning.
- The UPS unit provided must be able to charge the UPS batteries to the required charge level.
- The UPS unit must be supplied with all the required accessories including any consumables matching the electrical SLD provided as per Figure 5 Section 8.5
- Bidder should provide a technical acceptance of the proposed Electrical SLD mentioned in Figure 5 Section 8.5

6.12.2. Battery Bank

- The batteries units must be of the Valve Regulated Lead Acid, maintenance free battery type. Optional pricing for High efficiency Batteries shall be mentioned separately.
- Battery design float life must be minimum 4 years at 25 degrees Celsius.
- The battery units may be either 2V or 12V at nominal battery voltage.
- The battery units on offer must be compatible with the UPS unit on offer.
- The battery bank per UPS unit may comprise more than one battery string.
- The required under-voltage protection must be provided to each battery bank and each battery string, to ensure that the battery string voltage does not drop lower than 1.67V per 2V cell.
- The total battery bank capacity per UPS unit, must be rated at approximate 240kVA, and provide a battery backup time of 15 minutes at a load of 120kVA, and not discharge the battery units lower than 1.67V per 2V cell.
- The respective battery units must be interconnected with the required battery cable links or bus bar links.
- Each battery unit's terminals must be coated with a corrosion inhibitor material.
- The battery units must be warranted for a period of twenty four months, after the date of commissioning.
- Any additional warranty offered by the Battery Manufacturer should be transferred to LPSC.

6.12.3. Battery Cabinet

- The battery cabinet must be fit for purpose.
- The battery cabinet shelves must be designed in such a way to be able to support the full weight of the battery units that will be installed on each cabinet shelf.
- The battery cabinet height must not exceed the existing access door's height.

6.13. Surge Suppression System

Transient Suppression System as per the details given below should be provided in the UPS distribution panels. Test class according to IEC

- Max operating voltage : 3 x 480 V
- Max discharge current : 50 kA
- Response time : < 10 ns.
- Standards for compliance : IEEE 062.41, IEEE 062.45, IEEE 62.11, NEMALS -1, IEC 61643-1, IEC 61643-12, CE

6.14. Structured Cabling & Performance Evaluation

- UTP CAT 6A cable shall be laid in accordance with the approved cable route diagram and each of the terminations shall be labelled. All the cabling from NOC to Server/Network Racks shall be established through overhead cable trays/cable manager.
- Performance testing of the laid UTP cable (scanner report) for Channel Link as per EIA/TIA TSB-67 standard or higher in particular wire map (Short , open, transpose ,reverse ,split) , NEXT , PSNEXT, FEXT , PSFEXT, ACR, PSACR, Return Loss , length , propagation delay, delay skew shall be submitted.
- Performance testing of laid Fibre Optic cable by OTDR for continuity, length & db loss as per EIA/TIA-455-60 document for FO test procedures & Documentation of the results.
- Bidder should submit the performance certification with detailed cable route diagram, proper labelling & marking as per approved labelling plan & documentation "As Built".

6.14.1. Network Backbone Distribution Requirements

In the Network layout diagram (Section 8.6, Fig.6) the network backbone distribution requirements with MPO (Multi Push On) from MDA (Main Distribution Area) to HDA (Horizontal Distribution Area) are mentioned which include the following:

- 4 Runs of 12 core fibre MPO-MPO Cables from MDA Primary to HDA Primary in Primary path and 2 Run of 12 core fibre MPO-MPO from MDA Primary to HDA Secondary in Secondary path; and vice versa
- 2 Runs of 12 core fibre MPO-MPO Cables between HDA's (Primary & Secondary) in dual path.
- 2 Runs of 12 core fibre MPO-MPO cables between MDA's (Primary & Secondary) in dual path.
- 2 Runs of 12 core fibre MPO-MPO cables from each HDA (both Primary and Secondary) rack to two Server Racks identified during the project implementation

- 24 Runs of Cat6A Cable bunch from HDA Primary to each Server Racks in Primary path and 24 Runs of Cat6A Cable bunch from HDA Secondary to each Server Racks in Secondary path.

6.14.2. Cat6A FTP LSZH Cable

- Pair-shielded 100 Ohm installation cable with overall braided screen, suitable for transmission frequencies of up to 650 MHz, 4 x 2 (AWG 23).
- Compliant with standards ISO/IEC 11801 ed.2.2, EN 50173-1: May 2011 (DIN EN 50173-1), DIN 44332-5, IEC 61156-5 2nd Ed., EN 50288 x-1,
- 10GBASE-T in acc. with IEEE 802.3 Section Four.
- Low-smoke in acc. with IEC 61034, flame-retardant in acc. with IEC 60332-1 and halogen-free in acc. with IEC 60754-2.
- UL/ETL listed
- Should be certified by independent test lab for 10G Gigabit Ethernet Performance up to 100 mtrs
- 23 AWG solid bare copper

6.14.3. Cat6A Jack Panel - 24 Port - Unloaded

- 19 inch 1U Shielded Patch Panel for 24 x RJ45 connection module, should conform or exceed the EIA/TIA 568 C.2 (CAT 6A) standards
- Metallic / high strength or equivalent & 1U height, angular IO placement for better alien cross talk
- Transmission channels of Class EA with up to 4 plugged connections acc. to ISO/IEC 11801 ed. 2.2, June 2011, EN 50173-1 May 2011 (DIN EN 50173-1) and Class F on 2 pairs,
- Complies with Cat. 6A requirements of the standards ISO/IEC 11801 ed. 2.2, June 2011, EN 50173-1 May 2011, as well the U.S. standard
- Cat. 6A according to TIA 568-C.2

6.14.4. Cat 6A Information Outlets - Jack panel side

- RJ45 connection module of Cat. 6A, for the setting up of transmission channels of Class EA with up to 4 plugged connections acc. to ISO/IEC 11801 ed. 2.2, June 2011, EN 50173-1 May 2011 (DIN EN 50173-1) and Class F on 2 pairs,
- Complies with Cat. 6A requirements of the standards ISO/IEC 11801 ed. 2.2, June 2011, EN 50173-1 May 2011, as well the U.S. standard
- Cat. 6A according to TIA 568-C.2
- Suitable for 10GBASE-T applications in acc. with IEEE 802.3 Section Four up to 500 MHz and 100 m,
- Parallel pair termination without crossover in acc. with TIA 568-A/B,
- Gold-plated bronze contacts for >1000 mating cycles
- PoE and PoE+ compatible according to IEC 60512-99-001
- Material: halogen-free and heavy-metal free in acc. with EU directives RoHS 2
- Connection module Cat. 6A EL, die-cast, shielded, dust cover and snap-in frame.
- UL/ETL listed.
- Snap-in or equivalent Color coding should be used for identification as per the project requirement.

6.14.5. Cat6A Shielded patch cord

- Flexible cable, S/FTP³, 4 x 2 x AWG 26/7, LSZH
- Low-smoke in acc. with IEC 61034, flame-retardant in acc. with IEC 60332- 3C and halogen-free in acc. with IEC 60754-1.
- Halogen-free and heavy-metal free in acc. with EU directives RoHS 2.
- Mounted on both sides with RJ45 connector compliant with Cat. 6A ISO component standard: IEC 60603-7-51 RJ45 category 6A ISO (500 MHz), shielded.
- Strain-relief function in acc. with TIA 568-C.
- For the setting up of transmission channels of Class EA with up to 4 plugged connections acc. to ISO/IEC 11801 ed. 2.2, June 2011, EN 50173- 1, May 2011 (DIN EN 50173-1).
- Complies with Category 6A ISO requirements of the standards ISO/IEC 11801 ed. 2.2, June 2011, EN 50173-1 May 2011, as well as TIA 568-C.2,
- Interoperable and backwards compatible with Category 6 and Category 5e.
- Suitable for 10GBASE-T applications in acc. with IEEE 802.3 Section Four up to 500 MHz.
- Length – 3 ft & 7 ft or as per the project requirement

6.14.6. Optical Fiber Patch Cord, SM , LC-LC

- Both sides fitted with one LC-Duplex PC connector.
- Connector color: blue.
- Lever color: blue.
- Fiber: SM E9/125 G.652.D (OS2).
- Cable: F8 2.0x4.1 m n, yellow
- LC connector acc. to IEC 61754-20.

6.14.7. MPO Cassettes

- MPO cassettes shall single-mode 12-fiber break out assemblies.
- Cassettes should be pre terminated and shall have LC connectors on the front and two (24-fiber) MPO connections on the back.
- Cassette polarity shall be Pair Flipped / straight or as per the site requirement.
- MPO cassettes shall meet the most recent revision of TIA/EIA- 568-C.3 standard, and its published addenda.

6.14.8. MPO Trunk Cable

- 12 or 24 fibers OS2
- TIA/EIA-568-C.3 and ISO/IEC 11801 standards complied
- Trunk cable should be as per GR-409-CORE and UL/IEC rating for CMR or LSZH,
- Factory pre terminated assemblies with high density MPO connectors.
- Each trunk cable shall have protective devices to prevent damage
- Polarity of the assemblies should be available either pair flipped or Straight version.

- Return loss shall be ≥ 25 dB measured in mated condition against ref. connector at 850 nm.
- The fiber core shall be bend insensitive fiber.
- Length- 20 meter, 30 meter or bidder can propose as per the site requirement.

6.14.9. Unloaded LIU for MPO cassettes

- 1U, 19 Inch Drawer Style rack mountable
- High D Semi-ANGLED metallic distribution enclosure,
- Angled to provide additional cable management towards side area and can be placed in closed racks,
- Unloaded with 4 slots and allows easy moves, adds and changes,
- Can accommodate four MPO Cassettes with 12 or 24 fiber cores of 9/125 micrometers SM.

6.15. Cable Trays and Cable Guides

A structured approach to cabling is important for the reliability and the optimum performance of the data centre. Flexibility and accessibility are also essential when it comes to troubleshooting or expanding a data centre. The cable trays and cable guides should be loaded only for 50% of the capacity to ensure future scalability and bidder has to consider this while preparing the quantity.

6.15.1. Building Cable Management.

- Cable bridges shall be used for traversing hot or cold aisles. Cable bridges can be used for both narrow and wide cable trays and can also be used in combination with a Cold Corridor.
- Cable trays shall be used for routing cables between different cabinets where cables shall be guided via the top of the cabinet, over its roof, to the adjacent cabinet(s).
- Solid bottom system should be used for routing fibre and network cables to prevent microbends.

6.15.2. Horizontal Cable Management.

- Cable guides shall be used for routing cables through 19" sections.
- In case of cables routing from front to back or reverse cable trunks shall be used.
- Cable bushing brushes or bushing foams shall be included along with the racks in case of routing from front to rear in conjunction with cable guides.

6.15.3. Vertical Cable Management.

- Vertical cable management involves routing cables to the equipment from top to bottom (or in the opposite direction).
- Products like cable trays; fibre cable guides etc shall be used.
- Excess lengths of cable can be stored using a cable storage box and cable cleats.
- Velcro mounting material shall be used for mounting cables.

6.15.4. Fibre Cable Management.

- Fibre Raceway System with minimum 30 mm bending radius shall be used and solid bottom systems should be used to prevent micro bends

- Shall be made of environmentally friendly materials – halogen-free, flame-retardant and UV-resistant (UL94 V-0, UL2024).
- Fibre raceway system shall be modular and shall be able to extend further in case needed.
- The routing shall be done using horizontal and vertical joints, reducers, Elbows and Tees.
- Shall use Storage loops, Drop outlets and all the other required accessories meeting the practical and aesthetic nature of the data centre.
- The installation shall be done using the manufacturer recommended suspension kits and mounting accessories.

6.16. Server Racks

- Server Rack shall have the overall dimensions not exceeding of 600mm (W) x 1000mm (D) and it should have usable height of 42U.
- The rack should be provided with cable access roof and bottom cover for routing cables inside the cabinet.
- Rack Frame should be robust and made of Vertical Heavy grade Aluminium Profiles according to IS 1060 H2 standard and connected to CRCA Steel End Frames.
- Side Panel shall be covered with steel panels with IS 513 Gr D standard and it should be tool less installable.
- The side panels should be easily detachable with slam lock and it should have stiffener to provide stiffness.
- The rack should be able to carry load of minimum 1000Kgs with 3 pairs of depth channel support for equal load distribution. Accessibility should make easy installation and maintenance tasks simple.
- Front Doors should be single fully perforated (Hexagonal perforation) with minimum perforated area of 65% and cell opening ratio of 70% for better air flow and it should be hinged from inside and easily removable.
- Rear Doors should be Split Perforated (Hexagonal perforation) with minimum perforated area of 65% and cell opening ratio of 70% for better air flow and it should be hinged from inside and easily removable.
- The 19" mounting angles at front and rear should be fully recessible.
- The 19" mounting angles should be provided in pairs at front and rear as per the DIN 41494 / EIA 310-D standard.
- "U" marking should be done on the angle from bottom to top for easy management.
- Vertical Cable Channels with 19" Mounting Angle for cables can be routed in structured manner
- Horizontal Cable Manager 1U/19" Closed
- Castor wheel set of 4 with Feet Brake and levelling legs
- Rack shall be powder coated with Nano ceramic pre-treatment process using a zirconium coat. The Powder coating process shall be ROHS compliant.
- Powder coating thickness shall be 80 to 100 microns.
- The colour of the powder coat shall be Black.
- The rack shall be provided with common Lock & key for both front and rear door.
- The rack should be provided with minimum 25% blanking panels

- The rack should be provided with front panel captive hardware set in a pack of 20 and adjustable levelling feet for stability and security
- Required rack fixing kits shall be used to fix the racks securely to prevent tipping
- Metered PDU - 2 Nos of PDU in each Rack with min 24 Nos of IEC C13 and min 4 Nos of IEC C19 output sockets. Shall provide equivalent numbers of matching power cords for connecting the equipments with the Metered Rack PDU.
- Sufficient Fans with required CFM to be provided as per the cooling requirement for ensuring proper hot and cold air flow for the containment solution.
- Noise level in the Server Room shall not exceed the industry standards specified for the DC.

6.17. Network Racks

- Network Rack shall have the overall dimensions of 800mm (W) x 1000mm (D) and it should have usable height of 42U.
- The rack should be provided with cable access roof and bottom cover for routing cables inside the cabinet.
- Rack Frame should be robust and made of Vertical Heavy grade Aluminium Profiles according to IS 1060 H2 standard and connected to CRCA Steel End Frames.
- The rack should be able to carry load of minimum 1000Kgs with 3 pairs of depth channel support for equal load distribution. Accessibility should make easy installation and maintenance tasks simple.
- Front Doors should be single fully perforated (Hexagonal perforation) with minimum perforated area of 65% and cell opening ratio of 70% for better air flow and it should be hinged from inside and easy removable.
- Rear Doors shall have adequate perforations for better air flow and it should be hinged from inside and easy removable.
- The 19" mounting angles should be provided in pairs at front and rear as per the DIN 41494 / EIA 310-D standard.
- "U" marking should be done on the angle from bottom to top for easy management.
- Vertical Cable Channels with 19" Mounting Angle for cables can be routed in structured manner. Proper cut outs with cable bushing brushes or foams needed in the vertical cable channel for routing the cable from front to rear.
- Horizontal Cable Manager 1U/19" Closed
- Rack shall be powder coated with Nano ceramic pre-treatment process using a zirconium coat. The Powder coating process shall be ROHS compliant.
- The rack shall be provided with common Lock & key for both front and rear door.
- The rack should be provided with front panel captive hardware set in a pack of 20 which helps in directly mounting the 19" equipments.
- Required rack fixing kits shall be used to fix the racks securely to prevent tipping
- 12 Nos. of 5/15 Amp Octagonal Socket with 32 Amp MCB & Indicator with 3 Meter Input 3 core cable Indian Standard plug top with sufficient Ampere

- **Metered PDU** - 2 Nos of PDU in each Rack with min 24 Nos of IEC C13 and min 4 Nos of IEC C19 output sockets. Shall provide equivalent numbers of matching power cords for connecting the equipments with the Metered Rack PDU.
- **Sufficient Fans** with required CFM to be provided as per the cooling requirement ensuring proper hot and cold air flow for the containment solution.
- **Noise level** in the Server Room shall not exceed the industry standards specified for the DC.

6.18. Precision Air Conditioning (PAC)

The Precision Air conditioner shall be High sensible cooling capacity and high SHR (i.e. the sensible to total cooling capacity ratio). Low running costs, achieved by means of sophisticated design and co-design methods, combined with an accurate selection of the components. The whole range of units shall be "environment friendly" using materials that can be recycled, particularly for the plastics and the thermal insulation. The bidder is expected to include all auxiliary works like ducting, inlet and drain piping, piping between indoor and outdoor, cabling, acoustic and thermal insulation (Duct and floor for server room), etc with related civil works etc as per the site requirements. The dimensions mentioned in the Figure 2 Section 8.2 for the PACs are indicative only and supplier may provide units with minor variations according to the manufactures dimensions, since this may vary between manufactures.

6.18.1. Direct expansion

- One/Multiple refrigeration circuit, incorporating a high efficiency, fully hermetic variable/Fixed/Tandem scroll compressor with crankcase heater, safety valve, filter drier, moisture indicating sight glass, liquid line solenoid valve and an externally equalized expansion valve.
- Each compressor is equipped with pre-set high and low pressure switches for protection against high condensing and low evaporating temperatures. The low pressure switch features an automatic reset (with an adjustable delay for winter start-up).
- The unit shall be provided with additional protection against high ambient temperature. When the temperature goes over the design conditions, the unit shall remain in operation with partial load (20% decrease against required). If such protection is not sufficient High Pressure switch shall generate a high pressure alarm and the unit shuts down - manual reset shall be required.
- The inclined evaporator coil shall be manufactured from copper tubes, mechanically bonded to hydrophilic painted aluminum fins, with a stainless steel condensate drain pan. The large face area/low velocity coil allows precise control of temperature and humidity during cooling and dehumidification, and is designed to optimize fluid velocity and minimize pressure drop.
- The moisture indicating sight glass, liquid line solenoid valve and expansion valve for each circuit shall be mounted in a service compartment, isolated from the air stream, to allow checking and adjustment while the unit is in operation.

6.18.2. Fan section

- Units shall be offered with required EC Direct Drive Fan, High efficiency, electronically commutated (EC) motor with Backward curved blades

- The unit shall be with directly-coupled EC electric motor offering the opportunity for speed adjustment by means of controller and complete with thermal protection inside the electric motor winding
- Maintenance free design and construction.
- Standard forward curved blower with traditional Belt driven motor arrangement not acceptable.

6.18.3. Cabinet and Frame

- The unit shall be powder painted panels with ½" (or 10mm) insulation. A hinged control access panel opens to a second front panel which is a protection enclosure for high voltage components.
- The frame shall be painted with a powder coat finish to protect against corrosion.
- The unit shall be totally front and rear accessible.

6.18.4. Air Filtration

- The filter cells shall be rated MERV8 following ASHRAE 52.2 or EU-4 with a filtration efficiency of 95% down to 10 microns or equivalent, replaceable from the front of the unit.
- Clogged filter alarm shall be available for standard and for optional filter. It sends a visual alarm to display.

6.18.5. Refrigerant

The system shall be designed for use with R410A refrigerant, which meets the EPA clean air act for phase out of HCFC refrigerants.

6.18.6. Microprocessor Controller

- Air conditioning models should be controlled by microprocessor based controller. It can be programmed to control the function of every device within the unit via I/O.
- The controller allows setting and monitoring of the room parameters. Unit utilizes multiple temperature sensors placed at the rack inlet, to ensure management and control of temperature by rack. Each unit should be connected up to 10 Sensors.
- The controller should allow setting and monitoring of the following space parameters:
 - Air inlet Temperature
 - Air supply Temperature (remote sensors at rack inlet)
 - Return Temperature set-point
 - Supply Temperature set-point
 - Return Temperature band
 - Supply Temperature band
 - Humidity (inlet)
 - Humidity set-point
 - Humidity band
 - Rack Min, Max and Average temperature
- The available warnings / alarms are :
 - High supply temperature

- Low supply temperature
- High return humidity
- Low return humidity
- Loss of airflow
- Compressor Low Pressure
- Compressor High Pressure
- Electrical heater high temperature (When applicable)
- Clogged filter
- Customer input (No 4 inputs)
- LP transducer fail
- Call service (customer input)
- High temperature (customer input)
- Unit hours exceeded
- Compressor hours exceed
- Humidifier hours exceed
- Supply sensor failure
- Network failure
- Humidifier problem
- Digital scroll high temperature
- Smoke detected
- Fire alarm
- Rack sensor failure etc
- Following features should be incorporated in the controller:
 - Status Report of the latest 100 event-messages of the unit.
 - Input for remote on-off and volt-free contacts for simple remote monitoring of low and high priority alarms: high/low temperature, high/low refrigerant pressure, fan/control failure, compressor/control failure and others shall be available
 - LAN management: functions provided as standard include stand-by (in case of failure of the unit in operation, the second one starts automatically), and automatic rotation. At least one unit in the LAN has to be equipped with ColdFire large display
 - Automatic restart is provided after a power failure.

6.18.7. Remote Monitoring

- The PAC unit shall support remote monitoring through Ethernet interface.
- Management through the network shall include the ability to change set points and view and clear alarms, low and high priority alarms: high/low temperature, high/low refrigerant pressure, fan/control failure, compressor/control failure and others are available

6.18.8. Condenser

- The condenser shall be with aluminum finned copper tubes, complete with low-speed axial-flow fans to reduce the sound pressure level and set for usages of R410A refrigerant.
- Fan speed controller should be provided for remote condenser to allow operation of unit under varying ambient conditions.
- The body must be powder coated with excellent weather-resistant characteristics.
- Condensers shall be suitable for 24x7 operations and be capable of providing vertical or horizontal discharge.

6.18.9. Humidifier

- The unit shall be fitted with a canister type steam humidifier suitable for use with water of varying degrees of hardness and to allow use of untreated water.
- The humidifier shall be complete with a water inlet valve, water outlet valve and a maximum water level sensor, disposable cylinder, steam distributor and electronic controls.

6.18.10. PAC Outdoor unit piping and other control systems

- Indoor to Outdoor Copper pipe lines of suitable sizes with nitrile rubber insulation of 19 mm thickness should be routed through nearby wall using suitable clamps and trays
- The outdoor Units must be installed maintaining the aesthetic of the building and with the concurrence of the concerned LPSC department

6.18.11. Containment Solution

- The proposed solution as per the layout refers to Cold Aisle Containment solution.
- The Entry and Exit doors of the aisle should be double leaf and have sliding type Mechanism
- Each door should have CRCA frame with fire rated glass of minimum 4 mm thickness.
- Doors must have a Steel structure Frame fabricated in minimum of 1.2mm thick CRCA sheet as per "IS 513 Grade D" standards.
- Top of the aisle shall be covered with either fire rated Glass or polycarbonate panels.
- Top panels shall be fixed in CRCA frame per "IS 513 Grade D" with thickness of 1.2 mm.
- Top panel must be tool less installation to offer quick access to area above the contained aisle during the maintenance activity.
- Shall have the facility of auto opening or drop ceiling in the event of a fire allowing access for the fire suppression system
- The containment system shall be provided with interior lighting having required luminous as per the standard.

6.19. Comfort Air Conditioning

Supply/ Installation/ testing and commissioning of split Type individual AC and duct type AC of suitable nominal cooling capacity fitted with Hermetically sealed compressors operating on R-22/Non CFC suitable for Ceiling/wall Mounting, comprising of 1-2 room units and one No. Condensing units suitable for operation on 230 V, 50 Hz, single phase, /three phase AC, supply complete with remote control, capable of Performing Cooling Dehumidifying Air Circulating Filtering.

6.19.1. Installation of split AC/Ceiling Mount AC

- Mounting / Fitting indoor & outdoor unit at their respective location.
- Laying Refrigerant Pipelines as required at site and connecting both the unit after drilling hole/ holes in the wall.
- Insulating the suction pipe with expanded polythene foam tubing.
- Supply & Installation of drain pipe, to drain out the condensate water being formed in the indoor unit.

6.19.2. Charging of Refrigerant gas in the unit

- Provision for PVC/ Plastic channel for concealing the channel and painting matching with interiors.
- Drain pipe: 4 / 6 size mm 3 / 4 core PVC insulated copper wire as per requirement to electrically connect both the units with each other.
- Required plumbing for drain pipe.

6.19.3. Split System Air Conditioners

- Split AC should be sleek, energy efficient, environment friendly and can be mounted in any place.
- The Split AC Indoor and Outdoor unit shall be supplied with suitable mounting fixture.
- The refrigerant piping, drain piping and cable between indoor and outdoor should be a considered while quoting.
- The installation and commissioning cost should include the mounting and erection of the outdoor and indoor unit with stand and suitable strengthening such as brick work, anchor fasteners, screws etc.

6.20. Aspirating Smoke Detection System

This specification covers the requirements of design, supply of materials, installation, testing and commissioning of Aspirating Smoke Detection System.

- The system shall include all equipments, appliances and labour necessary to install the system, complete with highly sensitive LASER-based Smoke Detectors with aspirators connected to network of sampling pipes.
- The Bidder shall also make provision in the Aspirating Smoke Detectors to trip Precision AC units through the relay contacts in the event of fire.
- The high airflow rates of the Rack Containment System shall be considered while designing the detection sampling levels.

6.20.1. Codes And Standards

The entire installation shall be installed to comply one or more of the following codes and standards:

- NFPA Standards,
- US British Standards,
- BS 5839 part: 1

6.20.2. Approvals

All the equipments shall be designed, tested, approved, and listed by one or more of the following:

- LPCB (Loss Prevention Certification Board), UK
- FM (Factory Mutual), US
- UL (Underwriters Laboratories Inc.), US
- ULC (Underwriters Laboratories Canada), Canada
- Vds (Verband der Sachversicherere.V), Germany

6.20.3. Design Requirements

- The System shall consist of LASER-based smoke detector, aspirator and filter.
- It shall have a display featuring LEDs and Reset/Isolate button. The system shall be configured by a programmer that is either integral to the system, portable or PC based.
- The system shall allow programming of:
 - Multiple Smoke Threshold Alarm Levels.
 - Time Delays.
 - Faults including airflow, detector, power, filter block and network as well as an indication of the urgency of the fault.
 - Configurable relay outputs for remote indication of alarm and fault Conditions.
 - It shall consist of an air sampling pipe network to transport air to the detection system, supported by calculations from an approved computer-based design modelling tool. Maximum transport time shall not exceed 90 seconds, and designed within the certification requirements of relevant approvals as per Section 6.20.2.

6.20.4. Performance Requirements

- Shall provide very early smoke detection and provide multiple output levels corresponding to Alert, Action, Fire 1 & 2. These levels shall be programmable and shall be able to set sensitivities ranging from 0.005 - 20% obscuration / meter.
- Shall report any fault on the unit by using configurable fault output relays or via the graphics Software.
- Shall monitor for filter contamination automatically.
- Shall incorporate a flow sensor in each pipe and provide staged airflow faults.
- Shall have a clean air supply to maintain Laser chamber clean all the time.

6.20.5. Materials And Equipment's

Both Light Scattering and Particle Counting shall be utilized in the device as follows:

- The Laser detection Chamber shall be of the mass Light Scattering type and capable of detecting a wide range of smoke particle types of varying size. A particle counting method shall be employed for the purposes of preventing large particles from affecting the true smoke reading.
- Monitoring contamination of the filter (dust & dirt etc.) to notify automatically when maintenance is required.
- The Laser Detection Chamber shall incorporate a separate secondary clean air feed from the filter; providing clean air barriers across critical detector optics to eliminate internal detector contamination.
- The detector shall not use adaptive algorithms to adjust the sensitivity from the set during commissioning. A learning tool shall be provided to ensure the best selection of appropriate alarm thresholds during the commissioning process.

6.20.6. Detector Assembly

- The Detector, Filter, Aspirator and Relay Outputs shall be housed in a mounting box and shall be arranged in such a way that air is drawn continuously from the fire risk area by the Aspirator and a sample passed through the Dual Stage Filter and then to the detector.
- The detector shall be LASER-based and shall have an obscuration sensitivity range of 0.005 - 20% obscuration per meter.
- The detector shall have four independent field programmable smoke alarm thresholds across its sensitivity range
- The Detector shall also incorporate facilities to transmit the following faults
 - Detector
 - Airflow
 - Filter
 - System
 - Zone
 - Network
 - Power
 - **Urgent and Minor faults:** Minor faults shall be considered as servicing or maintenance signals. Urgent fault shall indicate that the unit may not be able to function
- The detector shall have four pipe inlets which must contain a flow sensor. Both Minor and Urgent flow faults shall be reported.
- The filter must be a two-stage disposable filter cartridge. The first stage shall be capable of filtering particles in excess of 20 microns from the air sample. The second stage shall be ultrafine, removing more than 99% of contaminant particles of 0.3 microns or larger, to provide a clean air barrier around the detector's optics to prevent contamination and increase service life.
- The aspirator shall be a purpose-designed rotary vane air pump. It shall be capable of allowing/supporting for a single pipe run / multiple sampling pipe runs with a transport time of less than 90 seconds.
- The Assembly must contain relays for fire alarm and fault conditions. The relays shall be software programmable (latching or non-latching). The relays must be rated at 2 A at 30V DC. Remote relays

shall be offered as an option and either configured to replicate those on the detector or programmed differently.

- The Assembly shall have built-in event and smoke logging. It shall store smoke levels, alarm conditions, operator actions and faults. The date and time of each event shall be recorded. Each detector (Zone) shall be capable of storing up to minimum 18,000 events.

6.20.7. Displays On The Detector Assembly

The detector shall have a LED / LCD / Bar graph display for the multiple alarm threshold levels indicated and faults such as detector fault, airflow fault and indication for Isolate and Reset.

6.20.8. Programmers

- When required, a Programmer module may be located within the detector, a remote mounting box, or in a portable hand-held unit.
- Each Programmer at a minimum shall support the following features:
 - Programming of any device on the system.
 - Viewing of the status of any device in the system.
 - Adjustment of the alarm thresholds of a nominated detector.
 - Setting of Day/night, weekend and holiday sensitivity threshold settings.
 - Initiation of Auto Learn, to automatically configure the detectors alarm threshold settings to suit the current environment.
 - Multi-level password control.
 - To Program latching or non-latching relay operation.
 - To Program energizing or de-energizing relays.
 - To Program high and low flow settings for airflow supervision.
 - To Program aspirator speed control.
 - To Program maintenance intervals.
 - Facilities for referencing with time dilution compensation.
 - Testing of relays assigned to a specific zone to aid commissioning.

6.20.9. Network

- The devices in the smoke detection system shall be capable of communicating with each other via twisted pair RS485 cable. The network shall be able to support up to 250 devices (detectors, displays units and programmers), of which at least 100 detectors can be supported.
- The network shall be capable of being configured in a fault tolerant loop for both short-circuit and open circuit. Any communication faults shall be reported unambiguously and shall be clearly attributable to an individual device or wire link in the fault messages.
- PC based configuration tools shall be available to configure and manage the network of detectors.
- Digital Communication Port shall comply with EIA RS485 Protocol

6.20.10. Software Package

The software package shall centrally monitor and configure very early warning smoke detection and fire protection systems in multiple local or remote locations. The software package shall be compatible with smoke detection and fire protection systems that are approved by global approvals bodies and meet all local codes, standards and regulations. The software shall consist of monitoring and configuration components:

- The configuration component shall allow users to configure all detectors remotely by using a connected System. The bidder should include the minimum specifications of the hardware, preferably virtual instance, for installing the software package
- The monitoring component shall allow users to monitor individual detectors, multiple detectors connected via a HLI or multiple HLIs.

6.20.10.1 System Description:

- Access and Usability
- The software shall support local and remote password-based access control:
- Three local password-protected levels of software access: designer, user and administrator.
- Multiple user accounts with unique user-ID and password based access control.
- Remote password-management of remote fire networks
- The software shall have a user-friendly graphics user interface.
- The software shall support disk space monitoring.

6.20.10.2 Monitoring Functionality

- The software shall have the capacity to monitor multiple connections:
 1. The software shall enable one or more workstations to monitor and configure multiple detector systems in multiple buildings and multiple sites.
 2. The software shall provide an event list that provides a single integrated view of all events (faults/troubles and alarms) across multiple sites.
 3. The software shall prioritize all events presented in the event list according to logical precedence rules.
 4. The software shall allow management of all events from the event list including knowledge of events and resetting of devices.
 5. The software shall allow colors to be assigned to different event types.
 6. The software shall allow printing of event lists.
- The software shall be able to provide an all-in-one monitoring solution:
 1. Using standard RS232 ports (or Ethernet) on existing and future monitoring and control systems, PCs using the software shall connect to and interpret status change data transmitted from the ports and provide graphic annunciation, control, history logging and reporting as specified herein.
 2. Network systems that cannot interface to Network systems or systems requiring the use of a "dry contact" or "voltage monitoring" interfaces to connect to Network shall not be accepted.
 3. The software shall be able to connect to multiple remote sites via IP-based
 4. LAN or WAN using virtual serial port emulation.

5. The software shall communicate with one or more Network-compliant detectors via a high level interface (HLI) natively using the Network protocol without the necessity for using protocol translation or other communications equipment.
 6. The software shall be able to monitor up to 250 devices.
- The software shall be compatible with 4 alarm levels:
 1. Alert (Alarm Level 1) - may be used to activate a visual and audible alarm in the fire risk area.
 2. Action (Alarm Level 2) - may be used to activate the electrical/electronic equipment shutdown relay and activate visual and audible alarms in the Security Office or other appropriate location.
 3. Fire 1 (Alarm Level 3) - may be used to activate an alarm condition in the Fire Alarm Control Panel to call the Fire Brigade and activate all warning systems.
 4. Fire 2 (Alarm Level 4) - may be used to activate a suppression system and/or other suitable countermeasures (e.g. evacuation action or shutdown of systems).
 - The software shall allow importation of .wav files for event notification.
 - The software shall have a text-to-speech option to allow natural language announcement of all faults and alarms:
 1. The text-to-speech component of the software shall use Nuance's RealSpeak speech engine.
 2. The text-to-speech functionality shall be available in English.
 - The software shall support sophisticated floor plan development and management functionality:
 - The software shall enable floor plan drawings to be used in the software to graphically notify users where a smoke event is occurring in their monitored system.
 - The software shall allow development of multiple levels of interconnected floor plans.
 - The software shall allow importation of AutoCAD, jpg, bmp and other common image files.
 - The software shall include software to allow designers to create and manipulate CAD images for incorporation in meaningful context sensitive multi-level floor plans.
 - The software shall allow for multiple device smoke trending on a single graph.
 - The software shall support printing on a printer such as a line printer that supports Unicode.
 - The software shall support sophisticated event log management functionality:
 1. Event logs from all networked detectors shall be able to be retrieved a viewed event logs
 2. Event logs for each monitored site and/or combined event logs for multiple sites.
 3. Event logs shall be able to be archived and sorted
 4. Total event integration, consolidation and archiving across multiple networks shall be provided.
 5. All system, network and device events shall be stored in an ODBC-compliant database.
 - A remote notification facility shall enable the use of email (or SMS) to provide immediate and up-to-date information the system's operational status irrespective of location.
 - The software shall enable presentation of unique customised corporate response procedures upon occurrence of specific events in defined parts of the facility

6.20.10.3 Configuration Functionality

- The software shall allow configuration of all/multiple models of detectors:
 1. Full remote programming of all detector functions.

2. Saving of detector configurations for safe storage.

- The software shall allow creation of off-line configurations for all such detectors and allow a merge and compare of off-line configuration with online configurations.

6.20.11 Sampling Pipe

- The sampling pipe shall be smooth bore with an internal diameter between 15-25 mm. normally; pipe with an outside diameter of 25mm and internal diameter of 21mm should be used.
- The pipe material should be suitable for the environment in which it is installed, or should be the material as required by the specifying body.
- All joints in the sampling pipe must be air tight and made by using solvent cement, except at entry to the detector.
- The pipe shall be identified as Aspirating Smoke Detector Pipe along its entire length at regular intervals not exceeding the manufacturer's recommendation or that of local codes and standards.
- All pipes should be supported at not less than 1.5m centres, or that of the local codes or standards.
- The far end of each trunk or branch pipe shall be fitted an end cap and drilled with a hole appropriately sized to achieve the performance as specified and as calculated by the system design.

6.20.12 Sampling Holes

- Sampling Holes of 21mm, or otherwise appropriately sized holes, shall not be separated by more than the maximum distance allowable for conventional detectors as specified in the local codes & standards. Intervals may vary according to calculations.
- Each sampling point shall be identified in accordance with Codes or Standards. Consideration shall be given to the manufacturer's recommendations and standards in relation to the number of Sampling Points and the distance of the Sampling Points from the ceiling and roof structure and forced ventilation systems.

6.20.13 Installation

- Design of aspiration smoke detection system should be prepared as per the best industry practices and got approved by client before installation. The Supplier shall install the system in accordance with the manufacturer's recommendation.
- Where false ceilings are available, the sampling pipe shall be installed above the ceiling, and Capillary Sampling Points shall be installed on the ceiling and connected by means of a capillary tube.
- The minimum internal diameter of the Capillary tube shall be 5mm, the maximum length of the capillary tube shall be 2m unless the manufacturer in consultation with the Purchaser have specified otherwise.
- The Capillary tube shall terminate at a ceiling Sampling Point specifically approved by the Client. The performance characteristics of the sampling points shall be taken into account during the system design.

- Air Sampling Piping network shall be laid as per the approved pipe layout. Pipe work calculations shall be submitted with the proposed pipe layout design for approval.

6.20.14 Testing & Commissioning

- Commissioning of the entire installation shall be done in the presence of the Purchaser.
- All necessary instrumentation, equipment, materials and labour shall be provided by the Supplier.
- The Supplier shall record all tests and system calibrations and a copy of these results shall be retained on site in the system Log Book.

6.20.15 Functional Test

- Introduce Smoke into the Detector Assembly to provide a basic functional test.
- Introduce smoke to the least favourable Sampling Point in each Sampling Pipe.
- Transport time is not to exceed 90 Sec's.

6.20.16 Installation

- Design of aspiration smoke detection system should be prepared as per the best industry practices and got approved by client before installation. The Supplier shall install the system in accordance with the manufacturer's recommendation.
- Where false ceilings are available, the sampling pipe shall be installed above the ceiling, and Capillary Sampling Points shall be installed on the ceiling and connected by means of a capillary tube.
- The Capillary tube shall terminate at a ceiling Sampling Point specifically approved by the Purchaser. The performance characteristics of the sampling points shall be taken into account during the system design.
- Air Sampling Piping network shall be laid as per the approved pipe layout. Pipe work calculations shall be submitted with the proposed pipe layout design for approval.

6.20.17 Testing & Commissioning

- Commissioning of the entire installation shall be done in the presence of the Purchaser.
- All necessary instrumentation, equipments, materials and labour shall be provided by the Supplier.
- The Supplier shall record all tests and system calibrations and a copy of these results shall be retained on site in the system Log Book.

6.20.18 Functional Test

- Introduce Smoke into the Detector Assembly to provide a basic functional test.
- Introduce smoke to the least favourable Sampling Point in each Sampling Pipe.

This specification is for procurement of NOVEC 1230 Clean Agent Based Fire Suppression System. It shall be used as a standard for the system Equipment, System Installation and Acceptance testing. The design shall be done in such a way to suppress any such incident inside the proposed Data Centre (Server Room, UPS & Battery Room, NOC Room) including the Rack Containment System and the Containment should not act as a barrier for clean agent suppression nozzles. The problem of barrier shall be managed by adding extra clean agent nozzles within the contained aisle

- The Supplier shall give a Certificate stating that their NOVEC 1230 system is approved by UL / FM / VdS / LPC/CNPP for use with Seamless Steel Cylinders (Component as well as System Approval).
- The Storage Container offered shall be of Seamless type, meant for exclusive use in FM-200 systems, with VdS/FM/UL/LPC/CNPP component approval. Welded cylinders are not permitted.
- The Seamless storage cylinder shall be approved by Chief Controller of Explosives, Nagpur and shall have NOC from CCE, Nagpur for import of the same. Documentary evidence is to be provided for earlier imports done by the bidder.
- The NOVEC valve should be Differential Pressure Design and shall not require an Explosive / Detonation type Consumable Device to operate it.
- The NOVEC 1230 Valve operating actuators shall be of Electric (Solenoid) type, and it should be capable of resetting manually. The Valve should be capable of being functionally tested for periodic servicing requirements and without any need to replace consumable parts.
- The individual NOVEC 1230 Bank shall also be fitted with a manual mechanism operating facility that should provide actuation in case of electric failure.
- The system flow calculation to be carried out on certified software, suitable for the Seamless Steel Cylinder being offered for this project. Such system flow calculations shall be also approved by VdS / LPC/ UL / FM.
- The system shall utilize 42 Bar / High pressure (600 psi) technology that allows for a higher capacity to overcome frictional losses and allow for higher distances of the agent flow; and also allow for better agent penetration in enclosed electronic equipments such as Server Racks/ Electrical Panels/Network racks
- The designer shall consider and address possible Fire hazards within the protected volume at the design stage. The delivery of the NOVEC 1230 system shall provide for the highest degree of protection and minimum extinguishing time. The design shall be strictly as per NFPA standard NFPA 2001.
- The suppression system shall provide for high-speed release of NOVEC 1230 based on the concept of total Flooding protection for enclosed areas. A Uniform extinguishing concentration shall be 7% (v/v) of NOVEC 1230 for 21 degree Celsius or higher as recommended by the manufacturer.
- The system discharge time shall be 10 seconds or less, in accordance with NFPA standard 2001. Sub floor and the ceiling void to be included in the protected volume.
- The NOVEC 1230 systems to be supplied by the bidder must satisfy the various and all requirements of the Authority having Jurisdiction over the location of the protected area and must be in accordance with the OEM's product design criteria.

- The detection and control system that shall be used to trigger the NOVEC 1230 suppression shall employ cross zoning of photoelectric and ionization smoke detectors. A single detector in one zone activated, shall cause an alarm signal to be generated. Another detector in the second zone activated, shall generate a pre-discharge signal and start the pre-discharge condition.
- The discharge nozzles shall be located in the protected volume in compliance with the limitation with regard to the spacing, floor and ceiling covering etc. The nozzle locations shall be such that the uniform design concentration will be established in all parts of the protected volumes. The final number of the discharge nozzles shall be according to the OEM's certified software, which shall also be approved by third party inspection and certified such as UL / FM / VdS / LPC
- NOVEC 1230 shall be stored in seamless storage containers complying with the SMPV Rules set out by Chief Controller of Explosives, Nagpur, India. The Bidder shall be required to produce a NOC for the Chief Controller of Explosives, Nagpur for the storage containers against the cylinder identification numbers punched on them. Welded cylinders for agent storage will not be acceptable - NOR shall be such Seamless cylinders & Cylinder manufacturers, that do not already have the approval of Chief Controller of Explosives, Nagpur. The Cylinder shall be equipped with differential pressure valves and no replacement parts shall be necessary to recharge the NOVEC 1230 containers.
- NOVEC 1230 shall be discharged through the operation of an Electric (solenoid) operated device or pneumatically operated device, which releases the agent through a differential pressure valve. Systems that employ explosive or pyrotechnic devices for NOVEC 1230 discharge shall not be permitted.
- All system components shall be New and of Current manufacture and shall be installed in accordance with local codes. The suppression agent shall be UL component recognized 18. The bidder shall provide all documentation such as Cylinder Manufacturing Certificates, Test and Inspection Certificates and Fill Density Certificates.
- The extinguishing system shall include the following components:
 - Agent storage container with cylinder valve, pressure gauge, Low-pressure Switch
 - NOVEC 1230 agent
 - Discharge nozzle(s)
 - Solenoid valve(s) and Pneumatic Actuator(s)
 - Manual Actuator(s)
 - Mounting brackets
 - Discharge hoses
 - Check valves
 - Inter-connecting Actuation hoses
 - Manifolds and piping with fittings
 - Any other required for the completeness of the system
- The NOVEC 1230 discharge shall be activated by an output directly from the NOVEC 1230 Gas Release control panel, which will activate the solenoid valve. NOVEC 1230 agent is stored in the

container as a liquid. To aid release and more effective distribution, the container shall be super pressurized to 600 psi (g) at 21°C with dry Nitrogen.

6.22 Water Leakage Detection System

The Water leak detection cable shall be the sensor cable used to detect water leaks in the sub floor and data Centre area.

- The Cable shall be capable of water detection over its entire length. The construction of the cable shall be of PVC Twisted pair, with SS 316 elements, of diameter not exceeding 3.5 mm.
- The Cable shall draw excitation signal from a start of the line module. This module shall serve as the interface between the Water leak detection panel and the Sensor Cable.
- WLD sensor cables shall be of Digital Addressable Water leak detection cable sensor with Non-conductive polymers used in the leak detection cable's construction. This helps eliminate irritating nuisance alarms that could result from contact with metal, such as raised floor pedestals.
- The Start of Line Interface Module shall be locally placed in the False Flooring of the Server area(s), and shall be connected to the WLD Panel through standard 2 c x 1.5 mm² Cu-Ar Cable.
- The WLD Panel shall be capable of supplying power to the interface modules, and shall serve as the annunciator of alarms through facia mounted zonal LEDs. The panel shall activate sounders programmed Zone wise.
- Testing procedure shall involve physical application of a wet cloth to the cable, to test the relay operation. The Panel should sound the Alarms, and notify the DCIM system

6.23 Rodent Repellent System

The work includes Supply, Installation, testing and commissioning of Rodent Repellent System using Electronic transmitters of high frequency sound waves, which will emit sound at very high decibel levels painful to pests, as described in the specification given hereunder.

- The system shall consist of a Master Console VHFO, satellites and its cable circuits.
- These will be Electronic transmitters of high frequency sound waves (well above the 20 KHZ frequency which is the upper limit of the hearing range of the human ear.) emitting sound at high decibel levels (sound pressure) that is audible and painful to pests, but inaudible and harmless to humans. The VHFO system will consist of one Master Console and minimum twenty Satellites /Transducers OR to cover all data Centre area. The Console will be installed in the control room, or as directed and the satellites in the floor areas as required.
- The powerful sound waves generated by the satellites of VHFO shall be within the hearing range of many pests, and cause them pain and discomfort. VHFO's satellites should be quiet and inaudible to humans. The VHFO can be added in daisy protocol for interfacing 64 controllers with controller ID with 6 digit password protection. The controller data can be transferred to computer and can be subsequently viewed by installed software of the same OEM. LCD display with on board controls for changing the parameter.
- Each satellite will cover an open floor area of approximately 500 sq. ft for an average height of the ceiling at 10 to 12 ft. As regards area of false ceilings or false floorings, it should cover an approximate area of 500 sq. ft. The satellites should:

- Be able to mount in any angle to match the décor.
- Possible to install in sensitive areas.
- Should withstand high temperatures in false ceilings, and low temperatures in cold storages and air locks,
- Should not require a power connection,
- Should be able to test on an audible range with the help of a self-testing facility or any other suitable means.

Specification:

Operating Frequency	Above 20 KHz (variable)
Sound Output	80 dB to 110 dB with 360° transmission angle (at 1m)
Power Output	250 mW per transducer
Power Consumption	40 W approximately
Power Supply	230 V AC 50 Hz
Mounting	Wall / Table Mounting

6.24 IP Based Surveillance System

Supplier will be responsible for the installation and commissioning of the IP Based Surveillance System for the DC. IP Based CCTV cameras, storage device with Video Management Software shall be implemented. The activities by the Supplier with respect to this are the following:

- Cameras have to be mounted in Server Area, Monitoring Room, UPS Room, Battery Room, NOC Room and Corridor. Number of cameras – 10 nos.
- Bidder shall supply both hardware and software required for Surveillance System including display system.
- All cabling and interfacing shall be implemented.

Following are the indicative specifications:

6.24.1 Indoor Fixed Day and Night vision camera having IP connectivity

Image Sensor	-	1/2.7" Progressive/De-interlaced Scan CCD/CMOS or better
Lens	-	10x optical zoom or better
Resolution	-	D1 (720x576) or better
Frame rate	-	MPEG4, H.264 Up to 25 fps selectable or better
Horizontal AoV	-	minimum 60°
Minimum Illumination	-	Color 0.5 lux at 30 IRE, B/W: 0.05lux at 30 IRE.
Day / Night Functions	-	Day / Night automatic switch over
Network Interface	-	10/100 RJ 45, PoE
Shutter Time	-	1 – 1/10000s or better
Video Compression	-	H.264, MPEG-4
Video streaming	-	Multi-stream with variable/ configurable frame rate / bit rate

Motion Detection	-	Yes
Security	-	Password protection,
Users	-	4 or more simultaneous Users
Power	-	230 V AC / Suitable Power Adapter (Indian standard)
Mount	-	Ceiling / Wall mounts
Certifications	-	CE, FCC
Operating Temperature	-	5°C~50°C (40°F ~122°F)

Accessories : Power supply, other mounting accessories and connector kits, Installation Guide, CD with installation tools, recording software and User's Manual, installation and management tools,

6.24.2 Network Storage

RAID Controller	-	Single/software, Multiple Hard Drive Configurations: RAID 0/1/5/5+spare/6, JBOD, Standard
Controller Interface	-	2 x 1GbE or better
Connector Type	-	RJ45
USB	-	2 ports or more Drive Interface
SATA III/II Drive	-	3.5/ 2.5 inch
System Form Factor	-	Rack mountable (Preferred)
Capacity	-	Total 10 TB Raw space
JBOD Support	-	Yes
Networking	-	NFS, iSCSI for up to 16 targets, DFS support, DDNS, SNMP, Link aggregation, Fail-over/Fail-back, Virtual disks, Thin-provisioning, iSNS, CHAP, Snapshots, Print server Security VLAN Tag Support, AES Support, FTP/TLS/SSL
Backup	-	Remote , Local & External backup, Web File Manager.
Certifications	-	FCC, CE
Device management	-	IE7, Chrome, Firefox
Easy Search Utility	-	Shall be provided
Network Protocols	-	IEEE 802.3, IEEE 802.3ab, IEEE 802.3u, TCP/IP, CIFS/SMB, iSCSI, DDNS, NTP, FTP, NFS, DFS, HTTP/HTTPS, Jumbo Frames, SNMP, and SMTP

6.24.3 LED Display System - 55" Full HD

Display Technology	-	Back light LED Scanning : Progressive
TV System	-	PAL
Aspect Ratio	-	16:9 or 4: 3 selectable
Resolution	-	Full HD,
Viewing Angle (H/V)	-	178/178
Volume Leveler (AV -)	-	Auto Sound Output : 5W Dolby digital decoder : Built in

- Input Rear - S-Video, LAN (RJ 45), AV, component
- Input Side - PC analog (15 pin), HDMI (V 1.3), DVI
Composite AV, USB 2.0, Head phone out
- Remote - Full function Remote Controller
- Accessories - Wall mounting kit, cables and Indian standard power cord
- Power Supply : 230 V AC, 50 Hz/ Indian standard plug tops

6.25 Access Control System

Access to Server Room, Monitoring Room, UPS Room, NOC Room and Corridor should be enabled through fingerprint based biometric authentication.

- Doors should have provision to operate with Biometric card readers with EMI Lock. The network and electric connectivity for this purpose shall be established.
- The system should be integrated with DCIM for monitoring.

6.25.1 Biometric and smart card readers with built-in controller

SI No	Feature	Specification
1	Biometric type	Finger print
2	Sensor Type	Optical (Minimum 500 dpi)
3	Finger print sensor	Sagem/Suprema/Secugen
4	CPU	32 bit
5	Enrollment size	Maximum 512 bytes for native format and 512 bytes for ISO 19794 format for each finger template.
6	Operation mode	Shall support (Finger + Smart card), (Finger + Smart card + PIN), (Finger + PIN), (Smart Card + PIN), Finger only, Smart Card only for single/multiple user/s.
7	Keypad	Keypad for PIN entry and local operations with Numeric and functional keypad
8	Storage capacity	Minimum 10,000 finger print template storage capacity
9	Transaction capacity	Minimum 50,000 events
10	Verification time	Less than one second for 1:1 biometric verification
11	Actuators	To handle Turnstile & EM lock
12	Smart card reading capability	Mifare 13.56 MHz with sector reading (32 bit format in accordance with ISO 14443 series with dual key authentication (Both Key A and B of Mifare architecture)
13	Sensor sensing conditions	Should be capable for reading finger in dry, wet, mehendi and oily conditions
14	Smart card read range	5 cm minimum and to accommodate +/- 30 deg elevation error during presentation by the user.
15	Interfaces	Ethernet, RS232, Weigand better than 37 bit format (optional RS485)
16	Input / Output	Two input and two output

17	LCD display with backlit	To show day, date & time by default. To display the details of valid / invalid entry with name and employee ID at the time (24 Hrs. Format) of card flashing.16 Character or better display is preferable.
18	LED indication	To show power on, valid entry, invalid entry or any error.
19	Audible alarm	Distinguishable audio alarm for valid entry, invalid entry and any error
20	Real Time Clock (RTC)	RTC with battery backup. Reader RTC time shall be synchronized with server time.
21	Data & time retention	In case of power failure, the data retention to be provided using flash memory and the Real Time Clock of the unit should be retained with current date and time
22	Local & remote admin	The reader shall support local and remote administration and maintenance through network.
23	Anti-pass back	The reader shall have facility for global and local Anti-pass back.
24	Protection of transaction data	In case memory is full, the reader shall disable further transactions to protect over-writing of transactions data. Message shall be displayed on reader and admin alert shall be sent to administrator.
25	Event/ Alarm logger	Event logging in the onboard memory for the alarm observed at each location along with time shall be archived and retrieved.
26	Safety certification	The device shall be UL/CE certified
27	Operating conditions	Shall be weather proof (Polycarbonate enclosure) and capable for operation in outdoor condition under canopy without interference from day light illumination considering all the seasons.(IP54 or better)
28	Power requirement	230 VAC 50 Hz
29	Environmental	Shall operate at 0° to 50° C, RH 10% to 90%

6.25.2 Biometric and smart card daughter readers for OUT at second level access

Finger print based Biometric and smart card daughter reader shall work as OUT reader at second level access control. It shall be connected to IN reader controller for Authentication through Wiegand

SINo	Feature	Specification
1	Biometric type	Finger print
2	Sensor Type	Optical (Minimum 500 dpi)
3	Finger print sensor	Sagem/Suprema/Secugen
4	Smart card and Biometric reader	Reader shall read 13.56 MHz contactless smart cards - Mifare Card (ISO 14443 compliant) and to read the Biometric template in the native format for local Employee and ISO 19794 Format for authenticated employee of other centre/unit
5	Compatibility	Shall support Mifare 4K cards.

6	Smart card operating Range	Minimum 5 cm and to accommodate +/- 30 deg elevation error during presentation by the user.
7	Audio/Visual Indicators	Distinguishable audio alarm for valid entry, invalid entry and any error. LED indication to show power on, valid entry, invalid entry and any error. 16 Character or better display is preferable.
8	Operation Modes	Shall support (Finger + Smart card), Finger only, Smart Card only for single / multiple user/s.
9	Transaction time	Less than 1 second for 1:1 verification
10	Emergency function	The unit shall have by pass facility for exit in case of emergency over ride functions.
11	Anti-pass back	The unit shall have facility to set Anti-pass back
12	Certification	The device shall be UL/CE certified
13	Operating temperature & relative humidity	0° to 50° C, 10% to 90% non-condensing
14	Sensor sensing conditions	Should be capable for reading finger in dry, wet, mehandi and oily conditions

6.25.3 EMI lock for door with exit switch

SINo	Feature	Specification
1	Holding Force	1200 lbs. minimum
2	Protection level	Flame tamper proof, weather proof
3	Operating voltage	Dual voltage selectable (12 VDC or 24 VDC)
4	Mode	Automatic release by powering off
5	Monitoring	Feature to monitor door sensor for door Status
6	Features	Built-in Door Status sensor with voltage spike suppressor
7	Certification	UL Certified
8	Mounting Accessories	EM Lock shall be supplied with all required accessories for mounting on a single door
9	Material	Anodized aluminum casing with anti rust surface treatment & Anti-tamper jam nuts
10	LED indication	RED/GREEN LED indication for EM lock status
11	Emergency Exit switch	Exit switch with glass enclosure with mechanism to open the doors from inside in case of emergency situations and reader failure.
12	Temperature & Relative humidity	0° to 50° C, 10% to 90% non-condensing

6.25.4 ACS Software

Software for logging and monitoring the entry/exit details through biometric fingerprint system shall be available.

6.26 Data Centre Infrastructure Monitoring (DCIM)

A centralized, integrated physical infrastructure monitoring system is essential to monitor and record the performance of DC. DCIM shall be SNMP compatible & browser accessible which can monitor multiple

parameters of all the IP based equipments in DC infrastructure, like uninterrupted power supply units, PACs, power distribution units, rack level PDUs, Environment monitoring units, etc polled through standard Industrial protocols like SNMP, Modbus over TCP, SSH, IPMI, WMI. The proposed solution shall be capable of

- Web-based system that is accessed through a standard web browsing tool such as Internet Explorer, Chrome, or Firefox.
- Able to run on a physical or virtualized server.
- Monitor network equipment, including switches and routers, monitor power at the device, rack PDU, rack, and facility levels.
- Monitor cooling equipment in the DC. The DCIM must be able to monitor environmental conditions in the data center.
- Log of all changes within the DC, to create reports in PDF, Microsoft Word, or Excel spreadsheet formats.
- To create custom reports without requiring an external report creation tool.
- Display energy efficiency information such as PUE, DCiE, and CADE for a location, as well as showing capacity information for space, power, network, and cooling.
- The solution licensing should be perpetual in nature or license free and the license bought for polled devices shall not expire.
- Bidder shall supply both hardware and software required for DCIM monitoring solution. Details of the offered solution shall be submitted in the Technical Bid (PART -I).

6.26.10 Power Monitoring

- The DCIM tool shall display and report measured power load data for all infrastructure equipment, including, UPSs, PDUs, rack PDUs etc.
- The DCIM shall assist in fault detection and in alert/recommended action.

6.26.11 Cooling and Environmental Monitoring

- The DCIM tool shall display and report measured cooling load data for all infrastructure equipment.
- The DCIM shall be able to determine the capacity and impact of failed cooling systems. The DCIM tool shall be able to provide inlet and exhaust temperatures at the rack by monitoring server inlet temperatures, rack FDU sensors, wireless sensors, environmental monitoring equipment, and any other available sensors in the rack.
- The temperature data shall be displayed visually in the floor layout.

6.26.12 Alarm Notification

- The DCIM tool shall be capable of triggering alerts based on criticality (critical, warning, information, unreachable).
- The state of all current alarms shall be available in a dashboard in the DCIM tool.
- The user shall have the ability to select a device in an alarm state and display the specific nature of the alarm.

- The user shall have the ability to configure notification, including the severity of the alarm, the format of the information sent in the alert, the method of transmitting the alert, and the alert recipients. The DCIM tool shall be capable of sending alerts based on manual or automatically detected changes in the DC.
- The DCIM tool shall be capable of sending alerts and change messages to a valid email account or to a mobile device and send SNMP traps to a network management system.

6.26.13 Infrastructure Device Management

- The DCIM tool will collect sensor values from infrastructure equipment, including, but not limited to, temperature, power, load, and status.
- The DCIM tool shall support SNMP (v1 and v3), BACnet, and Modbus TCP protocols.
- The server area/rack shall be equipped with required sensors like temperature & humidity sensor, door sensor, smoke sensor, water leak detection sensor etc

6.26.14 Reporting

- All data collected over time must be stored for extracting and trending.
- The data collection poll cycle shall be configurable by the user, with a default of 5 minutes.
- Standard reports should be provided for individual devices, device type, and location. Standard report formats should include PDF, Microsoft Word, and Microsoft Excel.
- The user shall also have the ability to create custom reports through the DCIM tool.
- The user shall have the ability to create reports that display graphs for multiple data points. The user shall be able to select up to 8 sensor points to be graphed and have the ability to display any combination of minimum, maximum, and average data for the selected time period.
- All parameter shall be made available through a user interface on a 55" LED display, specification of the LED shall be same as that of Surveillance system display in Section 6.24

6.26.15 Security

- The DCIM shall be integrated with LDAP/Active Directory.
- The login to the web interface shall use SSL authentication.
- The web launch to devices shall occur through an HTTP or HTTPS connection.
- The HTTP or HTTPS port shall be user configurable.

6.27 KVM over IP

For service and maintenance access to the servers, rack based KVM solution is necessary. Since entry also needs to be restricted inside the server farm area, IP based KVM solution is identified as the most appropriate option. Bidder also has to provide a computer crash cart, to accommodate a laptop, keyboard, mouse and a portable UPS to meet any critical emergency situation.

The KVM over IP switch shall be proposed matching with the following minimum specifications.

- Should have 1 local and 4 remote access console connections.

- Should support minimum 16 computer connections.
- Should support FIPS 140-2 level 1 security standards.
- Console ports shall accept connection using USB, DVI-D, VGA HDB-15, RJ-45 and all ports should be of industry standards with support for servers from manufactures like HP, DELL, IBM, SUN, LENOVA and FUJITSJ.
- Shall support multiplatform server environments: Windows, Mac, Sun, Linux and VT100 based serial devices.
- Shall have minimum 16 x RJ-45 ports using CAT6, 3 x USB ports, and Serial port support.
- Support up to 1920 x 1200 @ 60Hz with 24-bit color depth at the switch's local console and on remote session displays.
- Cascade capability up to 256 computers
- IPv4, IPv6 capable
- Should include all the necessary accessories like CIM matching the port density and type. Any additional accessories identified during implementation are the responsibility of bidder.

7. OTHER TERMS AND CONDITIONS

The supplier shall comply to the below terms and conditions.

7.1. Submission of tender

Tender should be submitted in Two Parts. Technical Bid (Part -I) should contain all technical details, terms and conditions and documents as specified in the RFP. The Price Bid (Part-II, Price Bid) should contain only prices with breakup as per the format attached in Annexure 6 Section 8.12

7.2. Technical Evaluation

The Supplier should arrange a presentation on their proposal if called for by the Department during the technical evaluation. On submission of bids by the supplier, Purchaser will evaluate BQC criteria of the Technical Bid and the technical evaluation of the same will be made only against the suppliers who qualified the BQC Criteria. Suppliers whose offers are found techno-commercial discussion.

7.3. Submission of Drawings

On acceptance of offer the Supplier shall make site visits and submit the following drawings/layouts to the focal point identified by LFSC.

- Layout of proposed DC
- Detailed electrical diagram for DC
- Lighting scheme
- Earthing scheme
- PAC layout for the outdoor unit
- Detailed network layout

All the above drawings/layouts will be verified by the LPSC focal point and only after his approval of such documents the supplier shall undertake DC installation activities.

7.4. Pre-delivery Inspection

The Purchaser reserves the right to inspect and test the UPS and AC equipment like PAC's at the manufacturer's works, if warranted.

7.5. Schedule for completion

Detailed schedule of work shall be submitted major milestones to the Purchase. The work should be completed in all respects and handed over to the Department within Eight months from the date of acceptance of the purchase order.

7.6. Liquidated Damages (LD)

Liquidated Damages (LD) will be applicable in case of delay in delivery or completion of the work.

7.7. Warranty

- 7.7.1. Comprehensive warranty of three years will start from the day of completion of installation and acceptance by LPSC.
- 7.7.2. Supplier shall keep adequate spare parts & consumables required for up keeping the DC with high availability as mentioned in the RFP
- 7.7.3. Any failure reported during this period should be attended within a timeframe of 4 hours from the time of intimating the issue using any one of the communication channels mutually agreed upon.
- 7.7.4. In case the rectification of the fault may be delayed due to any unforeseen event including arranging spare parts, the bidder should make temporary arrangements to make the system up and running without affecting the operations of the LPSC Data Centre.
- 7.7.5. Performance bank guarantee (BG) for 10% of the order value should be furnished before effecting final payment.
- 7.7.6. The performance BG should be valid for a period of 60 months including a claim period of six months.
- 7.7.7. Preventive Maintenance shall be done as per the Annexure 9 of Section 8.12. The list is not exhaustive; the Supplier can add additional activity which ensures non-degraded performance of the DC.
- 7.7.8. Instruments/Devices required for up-keeping/maintenance of the DC shall be brought by the supplier and maintain their inventory.

7.8. Training

Training should be imparted to authorised officials related to each system, which includes the day-to-day regular operations and for monitoring the performance of the facility. Minimum two-day in-house training/familiarisation session shall be arranged to a team of LPSC officials.

7.9. Statement of Deviation

Bidder should submit a statement of deviation with detailed justifications as per the Annexure 5a.

Failure to do so may result in disqualification of the bid. The Deviations may or may not be

considered informalities in bidding. However, without any obligation to do so, LPSC may at its sole discretion accept the best and most qualified bid or reject the bid with deviations.

7.10. Annual Maintenance Contract (AMC)

Comprehensive AMC will start after the expiry of the warranty period of three years for which a separate PO will be placed later.

- 7.10.1. During this period, the Supplier should attend any number of breakdown calls within a time frame of 4 hours from the time of intimating the issue using any one of the communication channels mutually agreed upon
- 7.10.2. Preventive maintenance as per a schedule finalized on mutual agreement (preferably every month) with the department on completion of the work. The Supplier should ensure monthly visit of the service engineer of the OEM of all operating subsystems to ensure preventive maintenance
- 7.10.3. In case the rectification of the fault may be delayed due to any unforeseen event including arranging spare parts, the bidder should make temporary arrangements to make the system up and running without affecting the operations of the LPSC Data Centre.
- 7.10.4. The Comprehensive AMC charges for three years after the completion of initial three years Warranty period should be explicitly mentioned in the Price Bid, Part-II. The AMC charges also may be considered in finalisation during the commercial evaluation of the offers, which will be decided by the Purchaser.
- 7.10.5. In case the Supplier fails to undertake the AMC from the date of expiry of warranty, the department will have the right to claim the losses or additional expenses (incurred in availing maintenance services through alternate means) from the performance BG.
- 7.10.6. On completion of the warranty, BG equivalent to the extended warranty/AMC cost for three years, subject to a maximum of 10% of the value of this contract, should be submitted by the supplier as a proof of their commitment to undertake AMC for the extended warranty period. This BG should remain valid till the expiry of the period of AMC.
- 7.10.7. The performance BG will be released only on furnishing of BG as above. In case the Supplier fails to furnish the BG as given above, the department will be at liberty to realize the same from the performance BG.
- 7.10.8. Preventive maintenance shall be done as per the Annexure 9 of Section 8.14. A separate Maintenance log need to be maintained.

7.11. Payment

The Supplier should submit a cost break up as per the enclosed format in Section 8.12.

7.12. Acceptance Criteria

Complete documentation related to the installed DC with Operations Document with due signatures need to be submitted to the Purchaser. The final acceptance of the installation will be done by the Purchaser. Independent and integrated testing of the DC will be made by the Purchaser and only on its satisfactory

performance final payment will be made. Supplier need to conduct tests at their level and all their test results shall be submitted to the Purchaser. LPSC will verify them and carry in dependent tests which include the following.

7.12.1. Performance of the Electrical System

7.12.2. Performance of the Cooling, Environmental, Security & Safety System s

7.12.3. Performance of the Computer Network

7.12.4. Integrated testing of the DC facility

Note:

- Wherever Indian Standards does not apply, the relevant International Standards shall apply.
- Wherever there is a discrepancy in the specification detailed in this tender and those in the standards mentioned in this document the better specification will apply.
- The bidder shall refer to the Annexure and submit all the required details in accordance with the prescribed formats without fail.

7.13. Onsite Residential Engineer (RE) Support

- Residential Engineer Support : During the initial three years warranty period and subsequent three year AMC , the supplier shall position one certified Diploma engineer with experience in facility management (DC), to up keep the total DC. Rates applicable to that shall be quoted separately in the price bid.
- Role of Residential Engineer (RE): The RE shall report to the focal point for all DC related activities. He shall report to the office during all working days and on holidays as per the demand.
- The responsibility of the RE is trouble shooting , Monitoring of DC , Proper up keeping of all devices , keeping inventory of items etc.

8. ANNEXURES

8.1. Fig. 1- Schematic diagram of the Existing Space

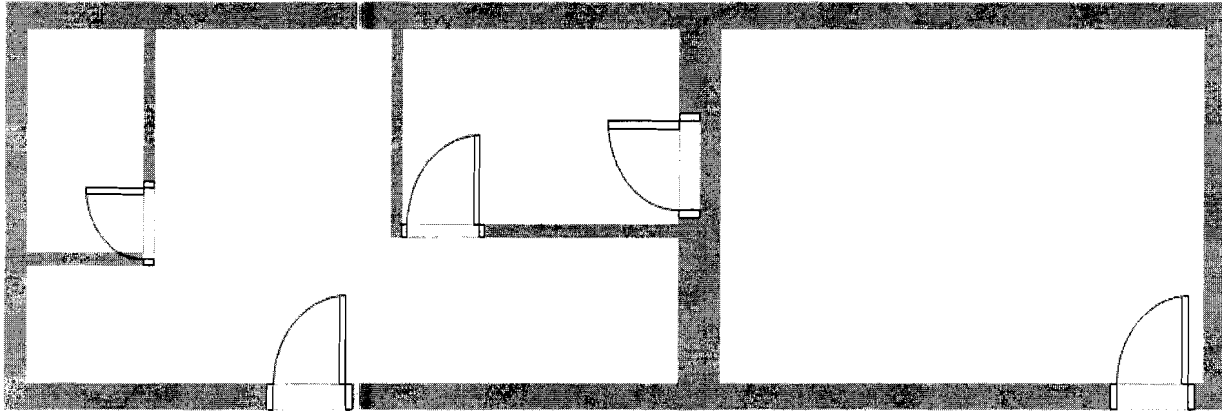
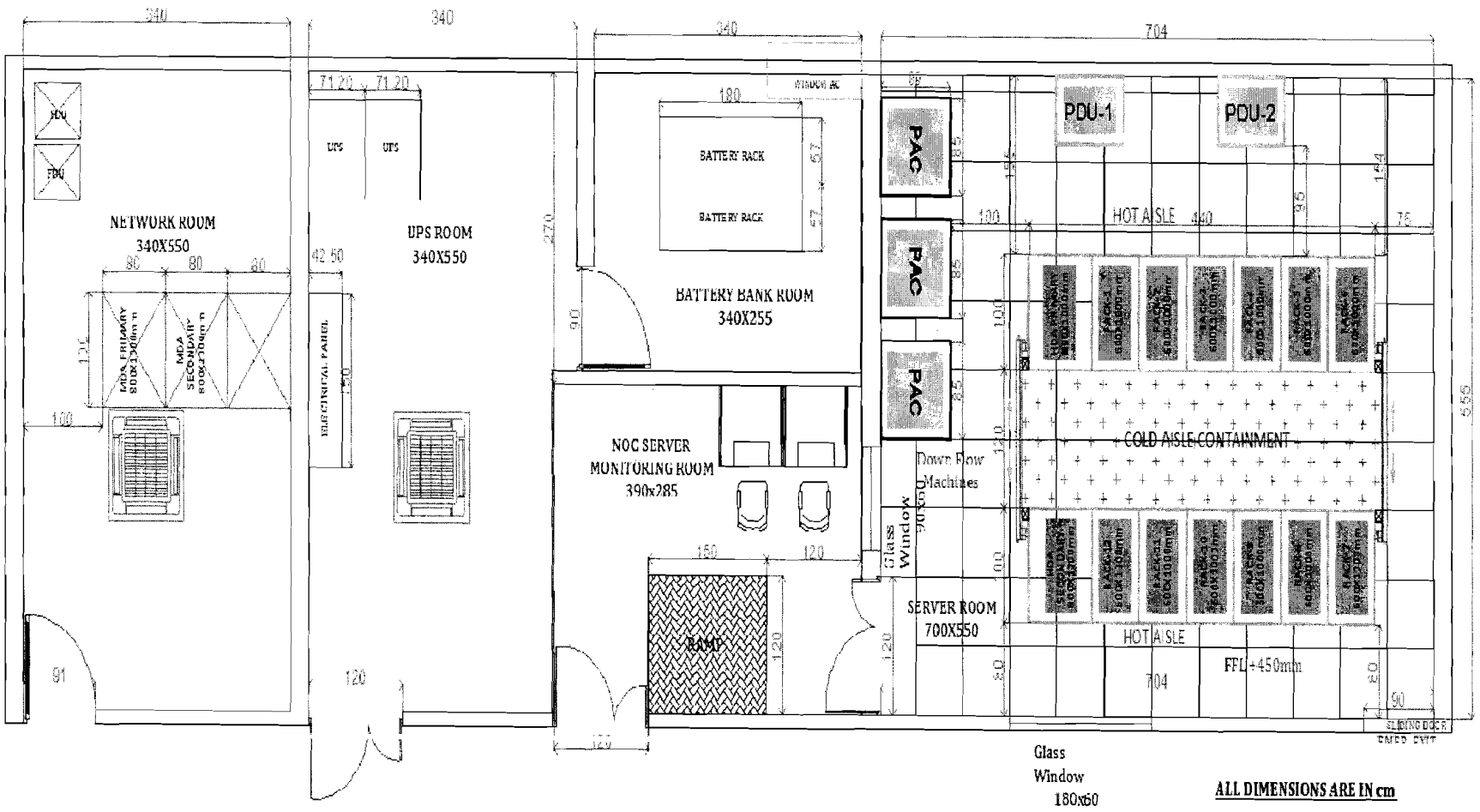
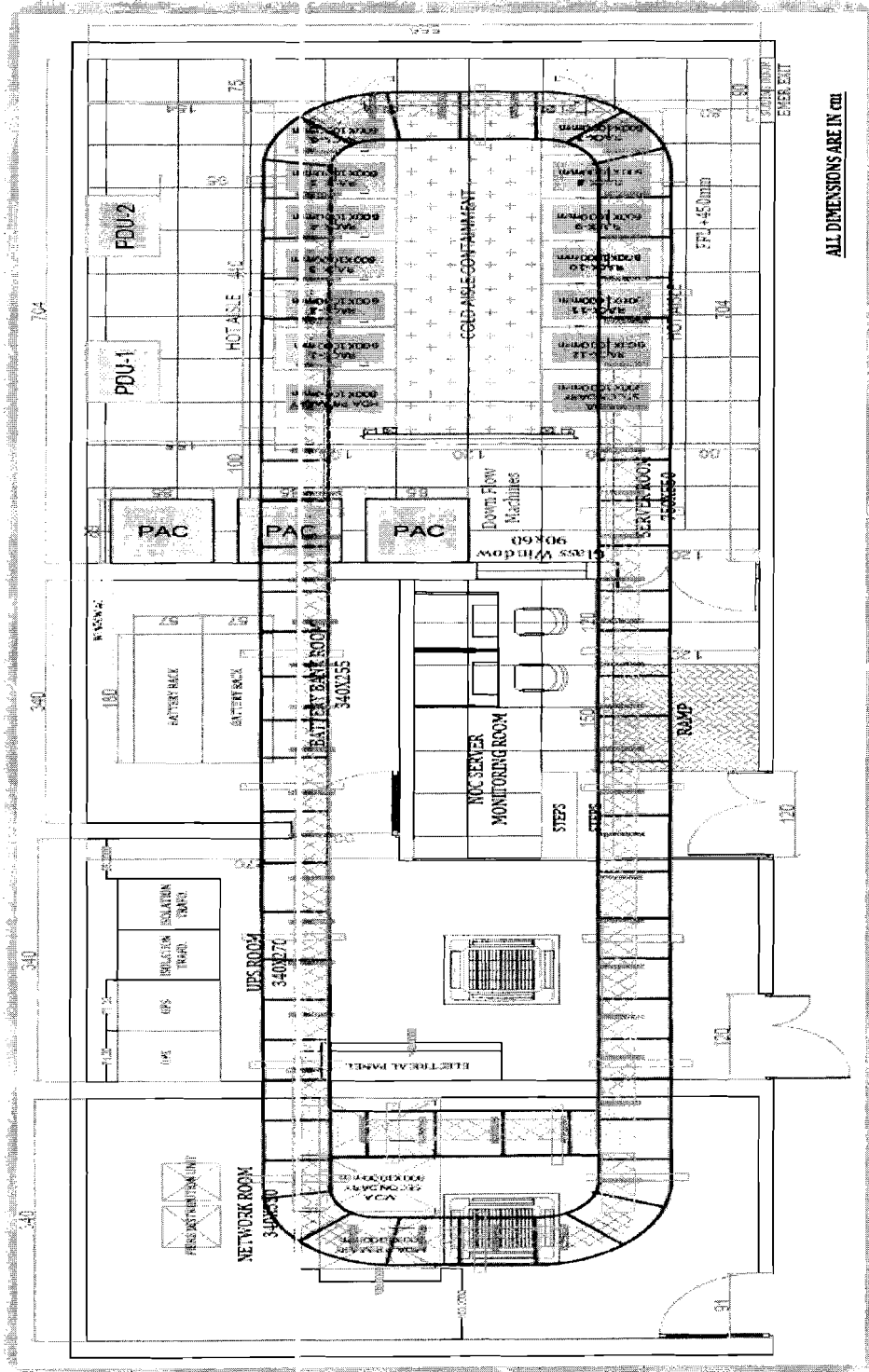


Figure 1 Schematic diagram of present layout

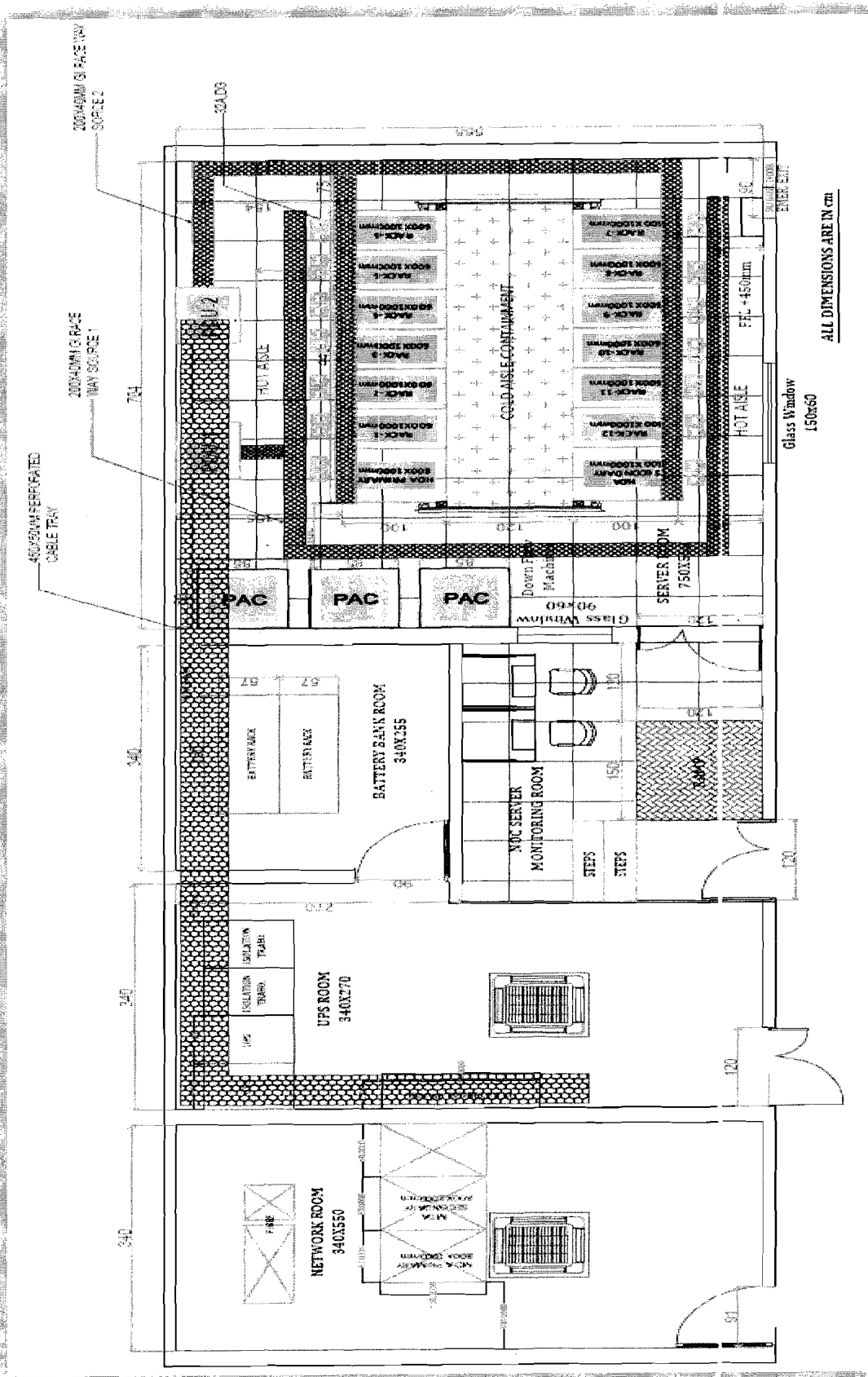


DATA CENTER LAYOUT

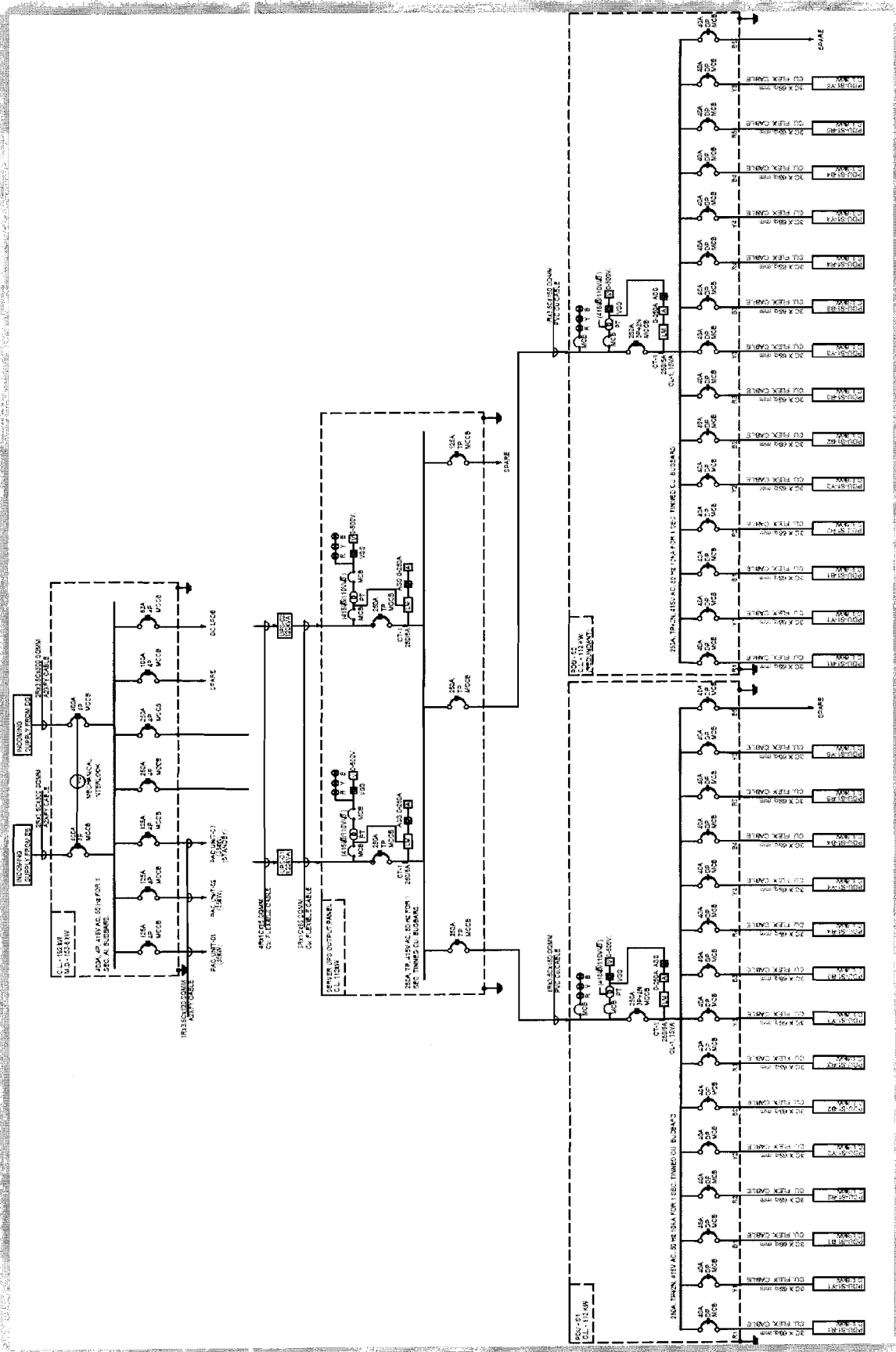
8.3. Figure3 - Proposed DC Network Cable Path



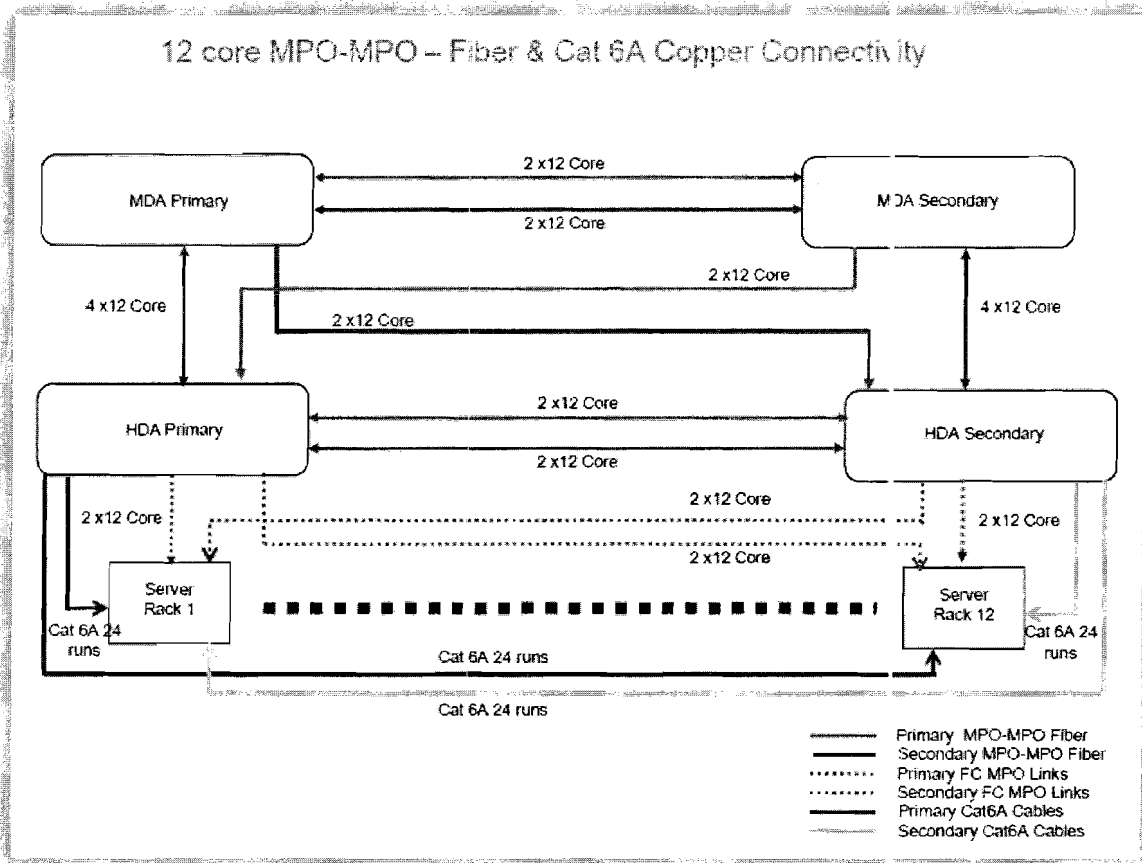
8.4. Figure4 - Proposed Electrical Cable Path (SLD)



8.5. Figure5 - Proposed Electrical SLD



Note: Primary and secondary MDA racks are not under the scope of this RFP



8.7. Indicative High Level Bill of Materials - Annexure 1

Physical Infrastructure		Quantity
1	Raised Access Floor – Includes Supply, Installation, Testing and Commissioning as per the detailed specifications of :	
a	Providing and fixing Access floor systems as per following specifications conforming to EN 12825 or equivalent standards for server farm area with for a maximum finished floor height of 450mm from the existing floor level, fire rated panels, galvanised steel pedestal assembly consisting of hexagonal shaped base plate, and height adjustment range of 25 mm, Under structure & Stringer system complete. Double cup tile pullers/lifters minimum four shall be supplied along with the Access floor	1 Lot
2	Fire Resistant Walls – Includes Supply, Installation, Testing and Commissioning of	
a	Fire resistant walls conforming the Data Centre standards, with 2 hrs fire rated internal partitions, fire retardant painting of approved make, plastics emulsion for all other areas complete (refer Section 6.2.4)	1 Lot
3	Fire Resistant Doors and View windows – Includes Supply, Installation, Testing and Commissioning of	
a	Providing and fixing 2 hr fire rated double-skin steel door constructed from minimum 1.25mm thick galvanized steel sheet formed to provide a 46mm or better thick fully flush door shell with lock seam joints at stile edges. Internal construction of the door is a specially designed Honey Comb structure with reinforcements at top, bottom and stile surrounds. Work includes providing all required hardware like SS fire rated hinges with necessary screws, heavy duty door closers, SS handles, door locks, SS door stoppers, DD door buffers etc.	1 Lot
b	Vision Glass panel should be 6mm thick clear glass provided in square on each door of standard dimensions of 300mm x300mm.	1 Lot
c	A vision panel of size 900 x 900 mm with fire rated glass and fire rated frames shall be provided on DC wall (Monitoring Room Side, Refer – Proposed Layout)	1 Lot
d	Double leaf Fire rated metal door (Refer Section 6.2.4)	1 Lot
	Double leaf glass with metal frame – Fire Rated Sliding Door (For Cold Aisle, Refer Section 6. 8.11)	1 Lot
	Single leaf Fire Rated Sliding Door (For Battery Room, Refer Section 6.2.4)	1 Lot
e	A vision panel of size 1800 x 600 mm with fire rated glass and fire rated frames shall be provided on DC wall (Corridor Side)	1 Lot
4	Related Civil and Interior – Includes Supply, Installation, Testing and Commissioning of:	
a	Demolition of all existing fixtures like windows on the outer wall, existing doors and internal partitions, etc as per the drawing. Dismantling of all electrical accessories like light fixtures, power outlets, wiring etc. The dismantled items and debris should be disposed to a location identified within the campus at a distance of 1km (approx) from the site.	1 Lot

b	Thermal insulation of the real flooring using 19mm nitrate rubber/ equivalent insulation with one side aluminium foil and fire retardant properties	1 Lot
c	Providing Mineral fibre false ceiling system with suitable supports as per the specification (Refer Section 6.4.4)	1 Lot
d	Providing Scratch resistant, easily polishable and sturdy Acrylic Solid Surface table top of size 600 mm (width) x 25 mm (thickness) should be provided with a set of three drawers and Cabins for 2 CPUs. (Refer Section 6.4.5)	1 Lot
d	Providing revolving type 2 office chairs with adjustable height with fabric cushion and arms	1 Lot
e	Providing Illuminated signs with proper naming conventions	1 Lot
Power Management		
5	Complete Dual Redundant Electrical System – Includes Supply, Installation, Testing and Commissioning as per the detailed specifications of :	
a	Data Centre Input LT panel fitted with redundant 3-Ph MCCB, Outgoing MCCB for UPS/PAC/Lights, Digital EDM meters & indicators, fed from independent power source feeders	1 Lot
b	FRLS grade Electrical cabling for LT Panel, UPS, PAC, PDU etc	1 Lot
c	Cable Trays & Ladders for movement of cables	1 Lot
d	Power distribution architecture with Copper Flexible cable feeders supporting 14 racks inside server farm area and other support areas.	1 Lot
e	Earthing system inside the Data Centre for server dedicated earth, common body ground as per Data Centre standards	1 Lot
f	Lighting Fixtures	1 Lot
g	Parallel Redundant UPS in N+N configuration with 15 min battery backup for 120KVA UPS output (Refer Section 6.12)	1 Lot
h	Surge Suppression System (Refer Section 6.13)	1 Lot
Network Management		
1	Passive Networking and Structured Cabling – Includes Supply, Installation, Testing and Commissioning as per the detailed specifications of :	
a	Laying of UTP CAT 6A cable with cable route survey & detailed cable route diagram, termination of cable with labels & marking as per approved labelling plan & documentation. Performance testing of the laid UTP cable for Channel Link as per EIA/TIA TSB-67. (Refer Section 6.14)	1 Lot
b	Laying of pre-terminated fibre cables with detailed cable route diagram, proper labelling & marking as per approved labelling plan & documentation Performance testing of laid Fibre Optic cable by OTDR for continuity, length & db loss as per EIA/TIA-455-60 document for FO test procedures. (Refer Section 6.14)	1 Lot
2	Cable Trays and Cable Guides – Includes Supply, Installation, Testing and Commissioning as per the detailed specifications of :	
a	Providing cable management system as per the layout provided in the Annexure using vertical, horizontal as well as fibre cable guides as per the specifications mentioned. (Refer Section 6.15)	1 Lot

Racks		
1	Server Racks – Includes Supply, Installation, Testing and Commissioning as per the detailed specifications of :	
a	42U-19" SERVER rack with rugged & light weight Aluminium body structure with perforated door for effective air flow having a load bearing as specified This has to be kept together and PAC system to be integrated along with all accessories required for the DC. (Refer Section 6.16)	12 set
2	Network Racks – Includes Supply, Installation, Testing and Commissioning as per the detailed specifications of :	
a	42U-19" network rack with rugged & light weight Aluminium body structure with perforated door for effective air flow having a load bearing as specified along with all accessories required for the DC. (Refer Section 6.17)	5 set
Data Centre Cooling		
1	Precision Air Conditioning System – Includes Supply, Installation, Testing and Commissioning as per the detailed specifications of :	
a	Precision Air Conditioners (PAC system - 3 Nos): 35KW room containment cooling Precision Units in N + 1 configuration should be Supplied with suitable compressor, energy efficient EC fan technology for higher savings compared to EC fans inside the PAC-cabinet, Controller with inbuilt team mode for synchronising the units to work as a single system , load sharing mode , cascade mode and sequencing etc. for further power savings, complete with Mod bus, SNMP, TCP/IP output for DCIM Compatibility, Heater, humidifier, condenser drain pump, Dust Filter etc. (Refer Section 6.18)	1 Lot
b	Precision AC copper pipes as required with pipe insulation, supply of other items including supply of outdoor unit stands required for 3 units of PAC, humidifier and drain line as required each, gas charging with R410A (Refer Section 6.18)	1 Lot
c	Cold Aisle Containment solution matching to the proposed rack to provide contained cooling for the data centre equipments (Refer Section 6.18)	1 Lot
d	Comfort Air Conditioning as per the required specifications and capable of providing sufficient cooling for the Network room, UPS room, Battery room and NOC room (Refer Section 6.19)	1 Lot
Data Centre Safety		
1	Aspiration Smoke Detection System – Includes Supply, Installation, Testing and Commissioning as per the detailed specifications of :	
a	Fire Alarm & Detection System complete with required multi criteria detectors, fault isolator module, monitor & control modules, manual call point & sounders (Refer Section 6.20)	1 Lot
2	Fire Suppression System – Includes Supply, Installation, Testing and Commissioning as per the detailed specifications of :	
a	NOVAC 1230 gas based Automatic Fire suppression system complete with required Kg of gas in specified cylinders, discharge nozzles, Gas release panel, Manual release & abort function (Refer Section 6.21)	1 Lot

3	Water Leakage Detection System – Includes Supply, Installation, Testing and Commissioning as per the detailed specifications of :	
a	Water Leak Detection System complete with Water leakage sensor cables along with Intelligent zone monitoring panel and alarm system. (Refer Section 6.22)	1 Lot
4	Rodent Repellent System – Includes Supply, Installation, Testing and Commissioning as per the detailed specifications of :	
a	Rodent Repellent System complete with required transducers and accessories (Refer Section 6.23)	1 Lot
Data Centre Security		
1	IP Based Surveillance system – Includes Supply, Installation, Testing and Commissioning as per the detailed specifications of :	
a	Integration of the IP based surveillance system with the DCIM (Refer Section 6.24)	1 Lot
2	Access Control System – Includes Integration with the DCIM Solution	
a	Integration of the Access Control system with the DCIM(Refer Section 6.25)	1 Lot
Data Centre Monitoring (DCIM)		
1	Data centre Environmental & Infrastructure Monitoring System – Includes Supply, Installation, Testing and Commissioning as per the detailed specifications of :	
a	Data Centre monitoring system which, continuously collects critical information from network connected devices like PAC's, UPS, temperature, humidity, door sensors and other dry contact monitoring. (Refer Section 6.26)	1 Lot
b	Integration of the field devices using required gateway / convertor not limiting to Temperature & Humidity sensors, Door opening sensors, Water Leakage Sensors, Smoke detection sensors, other alarm monitoring, Metered PDU etc and configuring a single windows monitoring station (Refer Section 6.26)	1 Lot
c	Providing and configuring SNMP connectivity with all the manageable data centre infrastructure devices using standard protocols. (Refer Section 6.26)	1 Lot
d	Providing and configuring 55" or higher LED commercial display for displaying real time statistics, dashboard, alarms and other parameters (Refer Section 6.24)	2 Set
e	KVM over IP (Refer Section 6.27)	4 Set
f	Surveillance Camera (Refer Section 6.24)	10 Set
g	NVR & Monitoring S/w (Refer Section 6.24)	1 lot
Support Services		
1	Operational and Maintenance services	
a	Warranty Support for three years from the date of acceptance of all the DC equipments including the proper up keeping of the equipments and maintaining the log, to ensure proactive maintenance activities to avoid any outage, maintaining the systems and replacing the faulty components within the timeframe as per the SLA (Refer Section 7.7)	1 Lot

c	Resident Engineer (Diploma) per year x 3 (3 yr Warranty)	1 Lot
b	Providing AMC services: for three years after the completion of the warranty period for all the DC equipments (with Resident Engineer) as per the same conditions mentioned above (Refer Section 7.10).	1 Lot

8.8. Approved Makes & Brands - Annexure 2

Physical Infrastructure		Approved Makes
1	Raised Access Floor	UNITILE / UNIFLAIR / KEBAO / UNITED INSULATIONS
2	Modular False ceiling	AMRSTRONG / SAINTGOBAN / GYPBOARD
3	Fire Resistant Doors	GODREJ / SHAKTIMET/ OZONE
4	Paint	Asian paint, Nerolac , Berger
Power Management		
1	MCCB/ Auto Source Changer Over	SCHNEIDER / SIEMENS / L & T / ABB
2	MCB / ELCB/RCCB	SCHNEIDER / LEGRAND / ABB
3	Multi Function / Digital Meters	CONSERV / ENERCON / L&T
4	Volt Meter / Ammeter Meters	CONSERV / ENERCON / L&T
5	Selector Switches	VAISHNO / SALZER / L&T / SIEMENS / TECKNIC
6	ELR + CBCT	PROK DV'S / ALSTHOM / SIEMENS & KAPPA
7	LVM	MINILEC / L&T / AREVA
8	Contactors	TC / L&T / SIEMENS
9	Push Button / Ind.Lamps	VAISHNO / TECKNIC
10	DLM with RS 485	CONSERVE / L & T
11	PVC Insulated Flexible Cable	POLYCAB / KEI / RR KABEL
12	Panel Board Vendor	ELINS SWITCHGEARS / TECH7 AUTOMATIONS / POWERGEN SWITCHGEARS
13	Capacitors	EPCOS / SCHNEIDER / MEHER / L&T
14	Cable Tray	PROFAB / ELINS SHEET METALS / OBO
15	PVC Conduits & Accessories	PRECISION / VIP
16	Switches, Sockets& Accessories	LEGRAND / MK / HAWELLS
17	Luminaries/Lighting Fixtures	PHILIPS / WIPRO / BAJAJ / ASIAN
18	Floor Trunking / Raceways	ELINS / PROFAB / INDIANA / OBO / LEGRAND
19	UPS	EMERSON / RITTAL / APC / IBM / DELTA
20	SMF Batteries	GLOBAL YUASA / AMARARAJA / EXIDE / AMARON
21	Surge Suppression System	EMERSON / SCHNIEDER / OBO BETTERMANN / CAPE
Network Management		
1	Passive Networking	COMMSCOPE / R&M / PANDUIT / BELDEN
2	Cable Trays and Fibre Guides	COMMSCOPE / R&M / PANDUIT / BELDEN
Racks		
1	Server Racks and Accessories	EMERSON / RITTAL / APC / SCHNEIDER
2	Network Racks and Accessories	EMERSON / RITTAL / APC / SCHNEIDER
Data Centre Cooling		
1	Precision Air Conditioning	EMERSON / RITTAL / SCHNEIDER / STULZ
2	Comfort Air Conditioning	BLUESTAR / VOLTAS / LG / SAMSUNG / GODFREY
Data Centre Safety		
1	VESDA Fire detection System	XTRALIS / SIEMENS / KIDDE
2	Fire Suppression System	KIDDE / SIEMENS / HONEYWELL / TYCO / ANSUL
3	Water Leakage Detection System	SONTAY / SIEMENS / EUROPLEX / HONEYWELL
4	Rodent Repellent System	MASER INDIA / HONEYWELL
Data Centre Monitoring		

1	Data Centre Monitoring	EMERSON / APC / RITTAL/ HONEYWELL
2	KVM Over IP	ATEN, Austin Huges, EMERSON, HP, Dell, Schneider
3	55" LED Display	Sony / Samsung/LG/Panasonic
4	Surveillance Camera	Sony/Axix/Innfinova/Honeywell

CERTIFICATE OF UNDERTAKING FROM ORIGINAL EQUIPMENT MANUFACTURER/S

(This certificate should be submitted along with the technical bid, signed & sealed by respective Original Equipment Manufacturer/s. The individual signing the OEM undertaking shall have the power of attorney to sign the undertaking and has to be signed with direct contact details)

I/We, M/s the manufacturer of (Item Name, Make, Model No.), here by authorize M/s (Bidder Name) to participate in the tender (Tender No.) for supplying (name of Product/Items)..... (Tender No./ Tender Name). We guarantee that the equipments supplied are manufactured by us and are brand new and these items have not been used anywhere else before. Also, we hereby authorize M/s (name of Bidder) to provide support and service for the supplied equipments during three year warranty period and for the subsequent comprehensive operation & maintenance contract period (three years) after warranty as per the terms and conditions specified in the tender document,..... (Tender No.). In case M/s (name of Bidder) is not able to perform their duties including service support for our supplied equipments during installation, warranty, operation and maintenance period, we are ready to extend our support to LPSC for our supplied equipments, either directly or through our mutually agreed authorized service partner, under the same terms and conditions of this tender document, without any additional expenditure to LPSC. We further guarantee the availability of spares for the above said period for the equipments supplied.

Name

Designation of the Authorised Official

Signature of the Manufacturer (OEM)

Seal of the manufacturer (OEM)

(Note: Above undertaking is required from all of the concerned OEMs who are supplying their items for this tender including the manufacturers related to Raised Floor, PAC, Modular UPS, Electrical Panel Board, Passive Networking, Racks, Fire detection and Suppression Systems, and Data Centre Monitoring Software)

To
The Purchase & Stores Office,
LPSC, Valiamala,
Thiruvananthapuram

Sir,

Agreement with product vendors on Back to Back support

This is to certify that we M/s....., the manufacturer of (Item Name, Make, Model No.) has agreed to provide back to back support to M/s (Bidder Name & Address) for implementation, operations and maintenance phases of the items supplied for the tender (Tender No./ Tender Name). The spares and upgrades will be available to LPSC for a minimum period of 7 years from the date of commissioning of the system in conformance to the tender terms and conditions.

Yours faithfully,

(Signature of the Authorised Official)

Date: _____

With rubber stamp

(B2B Support acceptance is required for the following Equipments: PAC, Modular UPS, Fire detection and Suppression Systems, and Data Centre Monitoring Software)

8.11. Format for Technical Compliance Statement- Annexure 5

The bidder should submit a detailed compliance statement for each of the specifications mentioned in activities for items in Section 6 & A. The compliance statement should be signed and sealed by the authorized signatory of the bidder.

Sr. No	LPSC Tender Specifications	Offered Specifications	Complied (Yes/No)	Name of the documentary evidence attached & in which page of their offer tender this document is placed

- A. The Technical Compliance Statement shall be complete in every respect so that all the specifications mentioned in the tender for each item/activity are clearly addressed through the offered specifications. In case of any deviation, they shall be explicitly mentioned. Documentary evidence for each item shall be supplied and shall be related only to the offered products with specific make & model. For easy reference of such documentary evidence, supplier shall mention for each item – what documentary evidence is submitted in their offer along with reference page numbers.

Format for Statement of Deviation Annexure 5a

Sr. No	RFP Page NO	Section No	Original Spec	Deviation

8.12. Annexure 6 - Format for Price Bid (For Components related to Supply and Installation of DC)

Item. No	Sub. Item No	Item	Qty	UoM*	Unit Rate			Total Cost
					Supply/Installation	Tax	Unit rate incl. tax	
			A		B	C	D=(B+C)	(A*D)
1	1.1							
	1.2							
							
							
2	2.1							
	2.2							
							
							
3								
...								

* UoM stands for Unit of Measurement

Annexure 6a

Format for Resident Manpower Charges to maintain the DC (During Warranty and AMC Periods)

Sr. No	Manpower Charges for	Unit Rate	Tax	Total Manpower Charges
1	1 st Year during warranty			
2	2 nd Year during Warranty			
3	3 rd Year during warranty			
4	1 st year during AMC			
5	2 nd year during AMC			
6	3 rd year during AMC			

Annexure 6b

Comprehensive Annual Maintenance Charges

Sr. No	Item Description	AMC Rate	Tax	Total AMC Charges
1				
2				
...				
...				

8.13. Annexure 7 -Checklist for Bid Qualification Criteria (BQC)

Sr. No	Criteria	Documents to be provided	Submitted (Yes/No)
1	Experience in DC construction : Minimum two DCs in last Six years with at least one of them should have minimum 8 Nos. of Server Rack and 25 m ² of Server Room Area. Provide Name of the Client, details of the contact person.	Copy of two PO for their establishing and satisfactory maintenance of the DC & copy of documentary evidence of satisfactory completion of the DC project.	
2	Supplier must be a recognized company registered under Indian Company Act-1956	Certificate of Registration	
3	Financial Condition of the Supplier	Audited financial statement for the financial years 2014-15, 2015-16 & 2016-17.	
4a.	The company must be registered with appropriate authorities for all applicable statutory duties/taxes	GST Registration Number.	
		Income Tax registration - PAN number and TAN number	
		Income Tax returns for the financial years 2014-15, 2015-16 & 2016-17	
4b.	The Supplier/OEM should have at least one CDGP (Certified Data Centre Professional) / CDCE (Certified Data Centre Expert) certified professional with minimum Two Years of experience for monitoring both the Projects	Copies of the certificates duly signed by the authorized signatory of the organisation.	
5a.	Company expertise and manpower details with organizational structure in detail to be submitted. It should include type of activities carried out, skill set available, no. of officials working with their organization structure of the company in detail.		
6	Supplier shall submit latest Bank Solvency Certificate of Value for at-least Fifty Lakhs INR from nationalised/scheduled banks approved by RBI	Bank Solvency Certificate	
7	Supplier shall not be blacklisted by any Govt./PSU Institutions for their non – performance / inability to fulfil the contract terms & conditions of any of the previous orders for their	Declaration from the bidder in their letter head and duly signed by the Head/Authorized Official of the Organisation/Unit.	

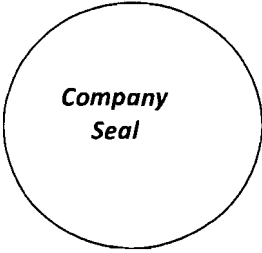
	work in the past three years.		
8	The Supplier should have a local office at Kerala, for ensuring timely support.	Relevant Documentary Evidence with address and contact details	
9	Completion and Experience Certificate from the client for the satisfactory execution of Data Centre projects	Undertaking as per the format mentioned in Annexure 10 Section 8.16	
10	Manufacturer Authorisation Form (MAF) from OEM	Certificates from Original Equipment Manufacturer (OEM) as per the format attached in the Annexure 3, Section 8.9	
11	The Supplier should have back to back support from the respective OEM during Warranty and Post Warranty period.	Undertaking as per the format mentioned in Annexure 4, Section 8.10 OEMs include: PAC, Modular UPS, Fire Detection & Suppression Systems, Data Centre Monitoring Software etc.	
13	Compliance to the detailed specifications / Terms & conditions.	Technical Compliance Statement as per the format mentioned in Annexure 5, Section 8.11 duly signed by the authorized signatory.	

Annexure 7a - Supplier Details

Supplier shall submit the following information with supporting documents along with the Techno-Commercial Bid (Part-I)

	Description	Bidder Response
1.	Name of the Company/ Business Establishment	
2.	Status of the Company (Govt./PSU/Proprietorship/Pvt. Ltd/Public Ltd/Joint Venture/Consortium)	
3.	Registered Office Address, Registration Certificate No. and Official Website details	
4.	Name & Address of the Office of the Chief Executive of the Company of the Supplier with contact No.	
5.	Contact person for this tender with Name, Designation and Contact details with Phone & email	
6.	Nature of business undertaken	

	Description	Bidder Response		
7.	Financial parameters			
	INR in Crores only	2014-15	2015-16	2016-17
	Turnover			
	Profit/Loss			
8.	Power of attorney, if applicable, in favour of authorized signatory of the bid / proposal documents			
9.	Any other relevant document, Bidder desires to submit.			



Signature of Authorized Person with Seal

Annexure 7b -- Experience in DC Projects

Details of last 5 years experience of Bidder in executing similar type of work which are currently operational (5 works maximum)

Sl. No	Full postal address of the client with details of Contact Person	Description of the work the Project with No. Of Racks and Server Room Area (in sqM)	Value of the work (Rs.)	PO Date	Installation Date	Project Duration		Reasons for delay
						Start Date	End Date	
1.								
2.								

* - Key Hardware components include PAC, Modular UPS, Electrical Panel Board, Passive Networking, Racks, Fire detection and Suppression Systems, and Data Centre Monitoring Software

Item	No. Of Min PM (Yearly)	Check list for PM
PAC	4	Cleaning the Unit, Check the refrigerant piping for signs of leak, Check machine' s Compressor and other drives for undue vibration, Clean Air filter, Ensure Condensate drain is not clogged, Ensure blower wheel fins are free from dirt, Record the Voltage – RY –YB –RB, Record Amps indoor motor- R-Y-B, Record condenser motor Amp, Record Suction pressure and discharge pressure, Check all Starters, Check operation of HP, LP Switches, Check electrical connection and fuses, Check operation of heater and humidifier, Record amps of the compressor – R-Y-B
Fire Detectors & Suppression System	4	Check each detector manually and run for the smoke sensing test, Ensure the Alarm sounds well as installed, check the voltage at the NOVEC Gas release module by pressing manual call points (Disconnect the cable from the cylinder before testing), Record Gas pressure status at the cylinder side, Clean each Nozzles of each Zone, Verify each detector response indicator status, clean each detector and ensure dust free.
Rodent Repellent	4	Run the System in test mode and see each transducers condition, Clean each transducers and see the cables, See if there is any new passage / Hole/ Duct made close to the DC and deploy additional transducers accordingly.
Electrical	4	Check at MCB and outlets of each rack and vacuum dust, Check the Incoming and outgoing panel board condition and vacuum dust, Record current and voltage of each phase Min 230 +/- 5%, Record the neutral value between each phase Min – 415 +/- 5%, Record Neutral to earth voltage Below 3 Volts. Record earth resistance at Pit side Below 2 Ohms
UPS	4	Battery leads clean and checking , opening UPS and cleaning cards, battery self test , input & output voltage calculation and checking
Networking	4	Ensure all unwanted cables are removed from the DC, Ensure all the new installed cables are labelled properly ,Reroute the patch cords according to the standards, Clean the spare Fiber connectors and ensure the installation of protection Cap, Make sure that no electrical cables are running close to the UTP Cables, Notables piece and cutting pieces are left inside the DC, Ensure the cables are not blocking the cold aisle reaching the server front, Ensure any new cable trays installed is not blocking the Air throw
Civil	4	Ensure tile alignment is in proper condition, check the air throw and return duct, clean the floor using antistatic floor cleaner.
DCIM	4	Check all the modules and test SMS and Email by setting the set points parameters.
VESDA	4	Check the pipe and chamber remove the dust.
WLDS	4	Check the sensor cable and run the test.

8.15. Particulars of Make & Model of equipments/System Compliance - Annexure 11

Sr. No	Equipment/ System*	Manufacturer, Make& Model No	Details/ Configuration Compliance
1.	Civil		
1.1	False Flooring – Panels and Pedestals		
1.2	Modular Ceiling Tile		
1.3	Partition Wall/ Structure		
1.4	Paints		
1.5	Fire Rated Door		
2.	Electrical		
2.1	Isolators		
2.2	MCCB		
2.3	MCB		
2.4	DB		
2.5	Armoured PVC Cable		
2.6	Multi-strand PVC		
2.7	Copper Cable		
2.8	Power Sockets and plugs		
2.9	Switches		
2.10	Indication Lamps		
2.11	PVC Conduits		
2.12	Meters		
2.13	Lighting Fixtures		
2.14	End Termination Materials		
3.	Fire Detection and Suppression		
3.1	Fire Alarm System		
3.2	Fire Suppression System		
4.	Air Conditioning		
4.1	Precision Air Conditioning		
4.2	Comfort A/C		
5.	Rodent Repellent		
6.	LED Panel		
7.	UPS System		
8.	LAN Components		
9.	DCIM		
10.	IP Based Surveillance system		
11.	Water leakage detection System		
12.	KVM Over IP		

The List is not exhaustive, please add any items which are essential for the successful completion of the DC

Signature and Seal of the Bidder

General Terms and Conditions:

1. Earnest Money Deposit :

Earnest Money Deposit amounting to **Rs.5,00,000/-** shall invariably be submitted by you along with your offer. Offer without EMD will be rejected. The EMD shall be submitted in the form of Demand Draft/Bankers Cheque/FD receipts or Bank Guarantee drawn in favour of Accounts Officer, LPSC and payable at Thiruvananthapuram. Submission of EMD is exempted in respect of Registered vendors, Foreign vendors, CPSU/CPSE, MSE, KVIC, NSIC. Vendors seeking exemption from payment of EMD shall submit necessary proof like registration number, copy of relevant valid certificates along with your offer, failing which the said offer will be rejected. The EMD of a vendor will be forfeited if the vendor withdraws or amends their tender or deviates from the tender in any respect within the validity period of the tender.

2. Purchase / Price Preference to MSEs

Purchase/Price preference will be applicable to the product reservation admissible to the Micro and Small Enterprises. Purchase/Price Preference shall be extended to the MSEs under the Public Procurement Policy for MSEs formulated under the Micro, Small and Medium Enterprises Development Act, 2006. The participating MSEs in a tender, quoting price within the band of L-1 + 15% may also be allowed to supply a portion of the requirement by bringing down their price to the L-1 price, in a situation where L-1 price is from someone other than an MSE. Such MSEs may be allowed to supply upto 20% of the total tendered value. In case of more than one such eligible MSE, the supply will be shared equally. .

3. Security Deposit

On acceptance of the order, you shall submit an interest free amount equivalent to 10% of the total contract/order value towards security deposit. This security deposit is collected towards the performance of the Contract. The said Security Deposit shall be submitted either in the form of Bank Guarantee/Demand Draft/PDR receipts duly endorsed in the name of the centre. The Security Deposit will be returned to you on successful completion of the Contractual obligations; failing which it shall be forfeited/adjusted.

4. PERFORMANCE BANK GUARANTEE:

A Bank Guarantee (as per the format enclosed) for 10% of the order value) shall be provided immediately within 10 days after supply or along with supply towards the performance of the system. The Bank Guarantee should be from a Nationalised / Scheduled Bank in Rs.200 non-judicial stamp paper valid till the successful completion of warranty period plus 60

days. This will not carry any interest and shall be returned to you after successful completion of warranty period against your request. In case of non performance/poor performance the Bank Guarantee shall be forfeited.

5. Offer Validity

Your offer shall be valid for 120 days from the date of tender opening. In case you offer validity less than 120 days, the said offer is liable for rejection which may please be noted.

6. Liquidated Damages:

If you fail to deliver the ordered items satisfactorily within the time specified or any extension thereof, Liquidated Damage @ 0.5%(zero point five percent) of the order value or part thereof the un-delivered items for each calendar weeks of delay shall be recovered from your bill. However total Liquidated Damage shall not exceed 10%(ten percent) of the order value.

7. Tender fee **Rs.590/- (Rupees Five Hundred and Ninety only)** shall be payable only in the form of Bank draft in favour of Accounts Officer, LPSC, Valiamala payable at Trivandrum and the same shall be enclosed along with your offer, **without which your offer will not be considered.**

8. **Payment terms:** 100% Payment would be made within 30 days on prorata basis after certification of the work by the LPSC Contract Manager.

9. The work shall be executed at LPSC Valiamala.

10. The work shall be carried out strictly to our satisfaction.

11. **Insurance:** You shall arrange personal insurance (All risk insurance coverage) for the labours being deployed for the work and produce certificates for verification before commencing the work at your cost.

12. You shall employ only qualified/experienced Indian Nationals. You shall follow the security guidelines of LPSC.

13. Other Terms and Conditions:

13.1 The Service Provider shall comply with all statutory rules *and regulations: in force in the country including labour and other laws/acts.*

13.2 The *character and other antecedents* in respect of the Personnel being engaged shall be got verified through record check by the Service Provider from the concerned Police authorities, *and a Police Clearance Certificate (PCC) obtained* and submit the Original PCC to LPSC within in one month from the date of execution of Contract.

13.3 LPSC, being a High Security area, the Service Provider, if selected, will be required to follow the security requirements, *and the personnel engaged shall be possessing a valid ID card issued by the Service Provider while entering the campus, maintaining high order of discipline while on duty and ensuring that only the Personnel whose character and antecedents are verified beforehand are employed.*

14. Liabilities, Control etc. of the Persons Deployed:

14.1 The Personnel engaged shall reach the work spot well in time and strictly follow the rules and regulations regarding safety and security of this office.

14.2 The Personnel engaged shall attend for duties by making their own transport arrangement. During Office hours, medical assistance on emergencies in LPSC campus can be provided by the Department from the First Aid centre, Valiamala and beyond that the Service Provider has to take care.

14.3 The Service Provider shall be solely responsible for any theft, pilferage or misbehavior committed by any of his Personnel engaged for carrying out the work.

14.4 In case, the Personnel engaged by the Service Provider commits any act of omission/commission that amounts to misconduct/indiscipline/incompetence, the Service Provider shall be able to take appropriate disciplinary action against such persons, including their removal from the duty. The Service Provider shall replace immediately any of his Personnel who is/are found unacceptable because of security risks, incompetence, conflict of interest improper conduct etc., upon receiving written notice from LPSC.

15 Terms and Conditions or Clauses not covered in this document:

Any other terms, conditions or clauses not covered in this document shall be in accordance with the concerned Labour and other statutory rules/acts.

16. Termination of contract

16.1 LPSC reserves the right to terminate the contract wholly or partly without assigning any reasons by giving a prior notice of 30 days.

16.2 LPSC reserves the right to terminate the contract wholly or partly owing to cessation of job requirement, sub-standard quality of Personnel engaged, breach of contract.

17. Jurisdiction

The Courts within Thiruvananthapuram will have the Jurisdiction to deal with and decide any matter arising out of this contract.

18. Applicable Law:

The contract shall be interpreted, construed and governed by the Laws of India.

19. Arbitration:

In the event of any dispute or difference relating to the interpretation and application of the contract, such dispute or difference shall be settled amicably by mutual consultations of the good offices of the respective parties. If such a resolution is not possible, then the unresolved dispute or difference shall be referred to the Sole Arbitrator appointed by Director, LPSC in accordance with the rules and procedures of Arbitration and Conciliation Act, 1996 or any modification thereof. The decision of the Arbitrator shall be final and binding on both the parties. The expenses for the Arbitration shall be paid as may be determined by the Arbitrator. The Arbitration shall be conducted in Thiruvananthapuram.

20. Compensation for Damages caused for Persons Goods, Property:

20.1 LPSC and/or any Officer, Employees or assignee thereof, shall be indemnified and held harmless, against any loss, damage or expense resulting from damage to property or personnel injury arising out of willful misconduct or gross negligence of the Service Provider or their personnel in the execution of the work under this Contract. You shall, at your expense defend any suit or proceedings brought against LPSC on account thereof, and shall satisfy all judgment and pay all expenses, which may be incurred by or rendered against them, or any of them in connection therewith.

20.2 LPSC shall not be responsible of any damages, loss, claims, finance and other injury for any Personnel in course of their performance of their duties or for payment towards any compensation.

21. LPSC will provide Canteen facility to the Personnel at the appropriate rate fixed by the Department, as applicable to such category of personnel.

(K.L. BABY)
Sr. Purchase and Stores Officer
For and on behalf of the President of India
(The Purchaser)

INSTRUCTIONS FOR TWO PART TENDERS.

1. We invite your offer duly signed, in **TWO** parts as follows:-

(a) **PART- I : TECHNICAL & COMMERCIAL** (Other than Price)

(b) **PART -II : PRICE BID**

1.1 PART-I : TECHNICAL & COMMERCIAL

1.1.1 **TECHNICAL:** The detailed Scope of work and other technical details for the proposed Outsourcing for assisting in Cryo Engine & Stage Realization activities as detailed in RFP as per Annexure I, and Commercial Terms as per Annexure II shall be covered in this part. Please enclose a copy of the details indicated in price quotation (**WITHOUT PRICES OR BY MASKING THE PRICE**) mainly to know the items/ services for which you have indicated prices in price bid. **This part should not contain prices.** The Technical and commercial part of the offer should be kept in a sealed envelope superscribing the following details.

<p style="text-align: center;">QUOTATION AGAINST TENDER No. <u>TP13 2017030342</u> DUE ON 11.12.2017 at 16.00 hrs IST OPENING ON 12.12.2017 at 10.30 hrs IST SUPPLY, INSTALLATION AND COMMISSIONING OF LPSC DATA CENTRE AT LPSC, VALIAMALA PART I - TECHNICAL & COMMERCIAL</p>

The cover should indicate " **SENDER'S**" address.

1.2. PART -II : PRICE BID

1.2.1. This part shall contain **PRICE** details only.

1.2.2. The price for the item should be indicated item wise in this part as per the price format. All the items/ services mentioned in the Technical Part should come here and prices indicated against each. The break-up for each item or services should be indicated.

1.2.3. Whenever options are quoted, the same should also be indicated with quantity and unit rate separately. The prices are to be mentioned both in figures and in words. This part should also be kept in a sealed cover superscribing as follows:-

QUOTATION AGAINST TENDER NO TP13 2017030330

DUE ON 11.12.2017 at 16.00 hrs IST

OPENING ON 12.12.2017 at 10.30 hrs IST

**SUPPLY, INSTALLATION AND COMMISSIONING OF LPSC DATA CENTRE AT LPSC, VALIAMALA
PART II - PRICE BID**

THE TWO SEALED COVERS PREPARED AS ABOVE SHOULD BE KEPT IN ANOTHER ENVELOPE, SEALED AND SUPERSCRIBED AS UNDER:-

Quotation against Tender No. TP13 2017030342 Due on 11.12.2017 at 16.00 hrs IST for **SUPPLY, INSTALLATION AND COMMISSIONING OF LPSC DATA CENTRE AT LPSC, VALIAMALA** containing **TWO SEPARATE COVERS PART-1 & PART -II** and addressed to:

**SR.PURCHASE & STORES OFFICER
Liquid Propulsion Systems Centre
Valiamala (PO)
Thriuvananthapuram- 695 547.**

The cover should indicate " **SENDER'S** " address

For any clarification you may contact us at following phone/Fax Nos.

Telephone : 0471 2567726/0471 2567727

Fax : 0472 2800712/0471 2567305

Your offer should reach us on or before the due date and time i.e. **11.12.2017 at 16.00 hrs IST. Offers received after the due date and time will not be considered.**

Offers received through fax or email will not be considered.

Note:

Tender fee **Rs.590/- (Rupees Five Hundred and Ninety only)**(Including GST) shall be payable only in the form of Bank draft in favour of Accounts Officer, LPSC, Valiamala payable at Trivandrum and the same shall be enclosed along with Part-I, Techno-Commercial Bid, **without which your offer will not be considered.**

COMPLIANCE STATEMENT FOR COMMERCIAL TERMS

Sl. No. (1)	Description (Commercial terms & conditions) (2)	Compliance to Col. (2) [YES/NO] (3)	Remarks (4)
1.	P & F charges, if any, (If mentioned as EXTRA OR INCLUDED in your quote, please mention the percentage in Remarks Column)..		
2.	Whether applicable GST percentage mentioned in offer (If mentioned as EXTRA OR INCLUDED in your quote, please mention the percentage in Remarks Column).		
3.	Please specify whether you are a registered vendor (If NO, please mention the same in remarks column)		
4.	ISRO is exempted from payment of Customs Duty vide Notification No.12/2012-Customs dated 17.03.2012. [We will provide Customs Duty Exemption Certificate for bought out items being imported for manufacturing the ordered items (List of items to be imported with quantities to be enclosed along with offer) OR for Orders placed on Foreign Vendors OR for High Sea Sale orders.]		
5.	Installation Charges, if any, (If mentioned as EXTRA OR INCLUDED in your quote, please mention the percentage in Remarks Column).		
6.	Delivery Term :- <ul style="list-style-type: none"> • FOR : LPSC, VALAIAMALA • In case of Foreign orders, FOB or FCA 		
7.	Freight charges, if any. (If mentioned as EXTRA OR INCLUDED in your quote, please mention the percentage in Remarks Column).		
8.	Delivery Period (If any specific delivery period is mentioned in the tender, please comply the same. If not agreed, please mention your delivery period in remarks column OR if already mentioned in your quote please mention as "already furnished in the quote")		
10.	Payment Term :- (a) 100% payment shall be made through RTGS within 30 days of receipt and acceptance of the item at our site. (b) In case of Foreign orders, Payment term shall be SIGHT DRAFT / 80% BY IRREVOCABLE LETTER OF CREDIT AND BALANCE 20% BY WIRE TRANSFER AFTER RECEIPT & ACCEPTANCE OF THE ORDERED ITEM.		
11.	Liquidated Damages (LD) :- If the ordered items are not supplied within the delivery schedule, LD shall be levied from your bill @ 0.5% per week for the undelivered items subject to a maximum of 10% of the order value for the delayed period. (Note : This is a mandatory clause)		

Sl. No. (1)	Description (Commercial terms & conditions) (2)	Compliance to Col. (2) [YES/NO] (3)	Remarks (4)
12.	Warranty :- Warranty for the offered item shall be from the date of installation/acceptance of the item at our site for a minimum period of one year or as specified in the tender document.		
13.	<p>Security Deposit (SD) :-</p> <p>You have to furnish a Bank Guarantee for 10% of the order value within 10 days of receipt of Order towards the faithful execution of the order valid till the completion of the scope of work as per order plus sixty days. (This will be returned to you immediately on execution of the order satisfactorily as per order terms. In case of non-performance / poor performance, the amount will be forfeited).</p> <p><u>SECURITY DEPOSIT NOT REQUIRED FOR LANDED COST BELOW RS.5 LAKHS.</u></p> <p><i>(NB : If the quoted price is below Rs.5L, please mention NOT APPLICABLE in the Remarks Column. Also, Micro & Small Enterprises registered under NSIC is eligible for exemption from submission of BG. Instead they have to submit Indemnity Bond for 10% of order value. The exemption shall be allowed against production of Documentary Proof upto the monetary limit indicated in the NSIC Certificate. Please mention the same in the Remarks column.)</i></p>		
14	<p>Performance Bank Guarantee (PBG) :-</p> <p>You have to submit a PBG from a Nationalised / Scheduled Bank for 10% of the order value towards the performance of the system at the time of supply valid till the completion of warranty period plus 60 days as per the format provided by the Department.</p> <p>OR</p> <p>10% OF THE ORDER VALUE SHALL BE WITH HELD TILL THE COMPLETION OF WARRANTY PERIOD PLUS 60 DAYS.</p>		
15..	In case, if parties are unable to provide two separate BGs, i.e., one for SD and one for PBG, they can submit a combined BG for SD & PBG within 10 days of receipt of order for 10% of order value valid till the completion of total contractual obligation (i.e., supply period + warranty period + 60 days) as per the format provided by the Department.		
16.	<p>Insurance :-</p> <p>Being a Govt. Of India Dept., Insurance is not required at our cost. Please ensure the safe delivery of the ordered item with proper AIR / SEA / ROAD worthy packing.</p>		

Sl. No. (1)	Description (Commercial terms & conditions) (2)	Compliance to Col. (2) [YES/NO] (3)	Remarks (4)
17.	<p>Validity of Offer :-</p> <p>(a) The validity of the offers should be 90 days (in case of single part tender) from the date of opening of the tenders.</p> <p>(b) The validity of the offers should be 120 days (in case two part tender) from the date of opening of the tenders.</p> <p>Note :- Tenders shorter than offer validity mentioned above will not be considered for evaluation.</p>		
18.	<p>In case of foreign orders.</p> <p>(a) Please specify whether any Export clearance is required. If it is required please provide End User Certificate format along with offer.</p> <p>(b) Please specify whether any Agency Commission is involved or not. If 'YES' mention the percentage of Agency Commission. [Agency Commission shall be claimed by the Indian Agent through an Invoice. The Agency Commission shall be paid to the Indian Agent in Indian Rupees worked out on the basis of Telegraphic Transfer buying rate of exchange prevailing on the date of placement of the Purchase order/Contract and within 30 days from the date of satisfactory acceptance of the item at our site. Distributors are not eligible for Agency Commission]</p>		
19.	<p>Special conditions against Indian Agents submitting quotations in Foreign Currency.</p> <p>(a) Foreign Principal's proforma invoice indicating the commission payable to the Indian Agent and nature of after sales service to be rendered by the Indian Agent.</p> <p>(b) Copy of Agency agreement with the Foreign Principal, precise relationship between them and their mutual interest in the business.</p> <p>(c) The enlistment of the Indian Agent with Director-General of Supplies & Disposals under the Compulsory Registration Scheme of Ministry of Finance.</p>		

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE
LIQUID PROPULSION SYSTEM CENTRE
PURCHASE DIVISION
VALIAMALA P.O. THIRUVANANTHAPURAM

Tender No : TP13 2017030342 01
Due on : 11.12.2017
Ref. No :
Date :

TENDER FORM

From :

.....
.....
.....

To: The Purchase & Stores Officer,
Liquid Propulsion Systems Centre
Valiamala P.O.
Thiruvananthapuram – 695 547

Dear Sir,

I/We hereby offer to supply the stores detailed below at the price hereunder quoted and agree to hold this offer open till.....I/We shall be bound to supply the stores hereby offered upon the issue of the Purchase Order communicating the acceptance there of on or before the expiry of the last mentioned date. You are at liberty to accept any one or more of the items of stores tendered for or any portion of any one or more of the items of such stores. I/We notwithstanding that the offer in this tender has not been accepted in whole, shall be bound to supply to you such items and such portion or portions of one or more of the items as may be specified in the said Purchase Order communicating the acceptance:

Sl. No.	Description	Quantity	Unit	Rate Rs.	Delivery Date
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.....
.....

NOTE: All the rates should be given both in figures and words.

Place at which delivery will be made:
Date by which the ordered items will be supplied:.....

2.I/We have understood the items of the tender annexed to the invitation to tender and have thoroughly examined the specification/drawing and / or pattern quoted or referred to herein and /are fully aware of the nature of the stores required and my/our offer is to supply the stores strictly in accordance with the requirements subject to the terms and conditions stipulated in the enquiry and contained in the purchase order communicating the acceptance of this tender either in whole or in part.

Signature of Tenderer
Date.....
(Seal)

GOVERNMENT OF INDIA
DEPARTMENT OF SPACE
LIQUID PROPULSIONS SYSTEMS CENTRE
PURCHASE AND STORES DIVISION

Form No. DOS:PM:20

TERMS AND CONDITIONS OF TENDER

1. Tenders should be sent in sealed envelopes superscribing the relevant tender No, and the due date of opening. Only one tender should be sent in each envelope.
2. Late tenders and delayed tenders will not be considered.
3. Taxes, legally leviable and intended to be claimed should be distinctly shown separately in the tender.
4. a) Your quotation should be valid for 120 days from the date of opening of the tender or any other period as specified in the tender enquiry. Offer with validity lesser than that specified is liable for exclusion from the procurement process.
 - b) Prices are required to be quoted according to the units indicated in the annexed tender form. When quotations are given in terms of units other than those specified in the tender form, relationship between the two sets of units must be furnished.
5. (a) All available technical literature, catalogues and other data in support of the specifications and details of the items should be furnished along with the offer.
 - (b) Samples, if called for, should be submitted free of all charges by the tenderer and the Purchaser shall not be responsible for any loss or damage thereof due to any reason whatsoever. In the event of non-acceptance of tender, the tenderer will have to remove the samples at his own expense.
 - (c) Approximate net and gross weight of the items offered shall be indicated in your offer. If dimensional details are available the same should also be indicated in your offer.
 - (d) **Specifications:** Stores offered should strictly confirm to our specifications. Deviations, if any, should be clearly indicated by the tenderer in his quotation. The tenderer should also indicate the Make/Type number of the stores offered and provide catalogues, technical literature and samples, wherever necessary, along with the quotations. Test Certificates, wherever necessary, should be forwarded along with supplies. Wherever options have been called for in our specifications, the tenderer should address all

such options. Wherever specifically mentioned by us, the tenderer could suggest changes to specifications with appropriate response for the same.

6. The purchaser shall be under no obligation to accept the lowest or any tender and reserves the right of acceptance of the whole or any part of the tender or portions of the quantity offered and the tenderers shall supply the same at the rates quoted.
7. Corrections, if any, must be attested. All amounts shall be indicated both in words as well as in figures. Where there is difference between amount quoted in words and figures, amount quoted in words shall prevail.
8. The tenderer should supply along with his tender, the name of his bankers as well as the latest Income-Tax clearance certificate duly countersigned by the Income-Tax Officer of the Circle concerned under the seal of his office if required by the Purchaser.
9. The Purchaser reserves the right to place order on the successful tenderer for additional quantity up to 25% of the quantity offered by them at the rates quoted.
10. The authority of the person signing the tender, if called for, should be produced.

TERMS & CONDITIONS OF TENDER

1. DEFINITIONS:

- (b) The term 'Purchaser' shall mean the President of India or his successors or assigns.
- (c) The term 'Contractor' shall mean, the person, firm or company with whom or with which the order for the supply of stores is placed and shall be deemed to include the Contractor's successors, representative, heirs, executors and administrators unless excluded by the Contract.
- (c) The term 'Stores' shall mean what the Contractor agrees to supply under the Contract as specified in the Purchase Order including erection of plants & machinery and subsequent testing, should such a condition is included in the Purchase Order.
- (d) The term 'Purchase Order' shall mean the communication signed on behalf of the Purchaser by an Officer duly authorised intimating the acceptance on behalf of the Purchaser on the terms and conditions mentioned or referred to in the said communication accepting the tender or offer of the Contractor for supply of stores or plant, machinery or equipment or part thereof.

2. PRICES:

Tender offering firm prices will be preferred. Where a price variation clause is insisted upon by a tenderer, quotation with a reasonable ceiling should be submitted. Such offers should invariably be supported by the base price taken into account at the time of tendering and also the formula for any such variation/s.

3. SECURITY DEPOSIT:

On acceptance of the tender, the Contractor shall, at the option of the Purchaser and within the period specified by him, deposit with him, in cash or in any other form as the Purchaser may determine, security deposit not exceeding ten percent of the value of the Contract as the Purchaser shall specify. If the Contractor is called upon by the Purchaser to deposit, 'Security' and the Contractor fails to provide the security within the period specified, such failure shall constitute a breach of the Contract, and the Purchaser shall be entitled to make other arrangements for the re-purchase of the stores Contracted at the risk of the Contractor in terms of Sub-Clause (ii) and (iii) of clause 10(b) hereof and/or to recover from the Contractor, damages arising from such cancellation.

4. GUARANTEE & REPLACEMENT:

- (a) The Contractor shall guarantee that the stores supplied shall comply fully with the specifications laid down, for material, workmanship and performance.
- (b) For a period of twelve months after the acceptance of the stores, if any defects are discovered therein or any defects therein found to have developed under proper use, arising from faulty stores design or workmanship, the Contractor shall remedy such defects at his own cost provided he is called upon to do so within a period of 14 months from the date of acceptance thereof by the purchaser who shall state in writing in what respect the stores or any part thereof are faulty.
- (c) If, in the opinion of the purchaser, it becomes necessary to replace or renew any defective stores such replacement or renewal shall be made by the Contractor free of all costs to the purchaser, provided the notice informing the Contractor of the defect is given by the purchaser in this regard within the said period of 14 months from the date of acceptance thereof.
- (d) Should the Contractor fail to rectify the defects, the purchaser shall have the right to reject or repair or replace at the cost of the Contractor the whole or any portion of the defective stores.
- (e) The decision of the purchaser notwithstanding any prior approval or acceptance or inspection thereof on behalf of the purchaser, as to whether or not the stores supplied by the Contractor are defective or any defect has developed within the said period of 12 months or as to whether the nature of the defects requires renewal or replacement, shall be final, conclusive and binding on the Contractor.
- (f) **Performance Bank Guarantee:** To fulfil guarantee conditions outlined in clause 4 (a) to (e) above, the Contractor shall, at the option of the purchaser, furnish a Bank Guarantee (as prescribed by the purchaser) from a Bank approved by the purchaser for an amount equivalent to 10% of the value of the Contract along with first shipment documents. On the performance and completion of the Contract in all respects, the Bank Guarantee will be returned to the Contractor without any interest.

- (g) All the replacement stores shall also be guaranteed for a period of 12 months from the date of arrival of the stores at purchaser's site.
- (h) Even while the 12 months guarantee applies to all stores, in case where a greater period is called for by our specifications then such a specification shall apply in such cases the period of 14 months referred to in para 4 (b) & (c) shall be the 'asked for' guarantee period plus two months.

5. **PACKING FORWARDING & INSURANCE:**

The Contractor will be held responsible for the stores being sufficiently and properly packed for transport by rail, road, sea or air to withstand transit hazards and ensure safe arrival at the destination. The packing and marking of packages shall be done by and at the expense of the Contractor. The purchaser will not pay separately for transit insurance, all risks in transit being exclusively of the Contractor and the Purchaser shall pay only for such stores as are actually received in good condition in accordance with the Contract.

6. **DESPATCH:**

The Contractor is responsible for obtaining a clear receipt from the Transport Authorities specifying the goods despatched. The consignment should be despatched with clear Railway Receipt/Lorry Receipt. If sent in any other mode, it shall be at the risk of the Contractor. Purchaser will take no responsibility for short deliveries or wrong supply of goods when the same are booked on 'said to contain' basis. Purchaser shall pay for only such stores as are actually received by them in accordance with the Contract.

7. **TEST CERTIFICATE:**

Wherever required, test certificates should be sent along with the despatch documents.

8. **ACCEPTANCE OF STORES:**

- (a) The stores shall be tendered by the Contractor for inspection at such places as may be specified by the purchaser at the Contractor's own risk, expense and cost.
- (b) It is expressly agreed that the acceptance of the stores Contracted for, is subject to final approval by the purchaser, whose decision shall be final.
- (c) If, in the opinion of the purchaser, all or any of the stores that do not meet the performance or quality requirements specified in the Purchase Order, they may be either rejected or accepted at a price to be fixed by the purchaser and his decision as to rejection and the prices to be fixed shall be final and binding on the Contractor.
- (d) If the whole or any part of the stores supplied are rejected in accordance with Clause No. 8 (c) above, the purchaser shall be at liberty, with or without notice to the Contractor, to purchase in the open market at the expense of the Contractor stores

meeting the necessary performance and quality Contracted for in place of those rejected, provided that either the purchase, or the agreement to purchase, from another supplier is made within six months from the date of rejection of the stores as aforesaid.

9. REJECTED STORES:

Rejected stores will remain at destination at the Contractor's risk and responsibility. If instructions for their disposal are not received from the Contractor within a period of 14 days from the date of receipt of the advice of rejection, the purchaser or his representative has, at his discretion, the right to scrap or sell or consign the rejected stores to Contractor's address at the Contractor's entire risk and expense, freight being payable by the Contractor at actuals.

10. DELIVERY AND LIQUIDATED DAMAGES:

(a) The time for and the date of delivery of the stores stipulated in the Purchase Order shall be deemed to be the essence of the Contract and delivery must be completed on or before the specified dates.

(b) Should the Contractor fail to deliver the stores or any consignment thereof within the period prescribed for such delivery, the purchaser shall be entitled at his option either.

(i) to recover from the Contractor as agreed liquidated damages and not by way of penalty, a sum of 0.5% per week of the price of any stores which the Contractor has failed to deliver as aforesaid or during which the delivery of such store may be in arrears subject to a minimum of 10%, or

(ii) to purchase from elsewhere, without notice to the Contractor on the account and at the risk of the Contractor, the stores not delivered or others of a similar description (where others exactly complying with the particulars, are not, in the opinion of the purchaser, readily procurable, such opinion being final) without cancelling the Contract in respect of the consignment (s) not yet due for delivery, or

(iii) to cancel the Contract or a portion thereof and if so desired to purchase or authorise the purchase of stores not so delivered or others of a similar description (where others exactly if complying with the particulars are not, in the opinion of the purchaser, readily procurable, such opinion final) at the risk and cost of the Contractor.

In the event of action being taken under sub-clause (ii) & (iii) of clause 10 (b) above, the Contractor shall be liable for any loss which the purchaser may sustain on that account, provided that the re-purchase or if there is an agreement to re-purchase then such agreement is made within six months from the date of such failure. But the Contractor shall not be entitled to any gain on such re-purchase made against default. The manner and

method of such re-purchase shall be at the discretion of the purchaser, whose decision shall be final. It shall not be necessary for the purchaser to serve a notice of such re-purchase on the defaulting Contractor. This right shall be without prejudice to the right of the purchaser to recover damages for breach of Contract by the Contractor.

11. EXTENSION OF TIME:

As soon as it is apparent that the Contract dates cannot be adhered to, an application shall be sent by the Contractor to the purchaser. If failure, on the part of the Contractor, to deliver the stores in proper time shall have arisen from any cause which the purchaser may admit as reasonable ground for an extension of the time (and his decision shall be final) he may allow such additional time as he considers it to be justified by circumstances, of the case without prejudice to the purchaser's right to recover liquidated damages under clause 10 thereof.

12. ERECTION OF PLANT & MACHINERY:

Wherever erection of a plant or machinery is the responsibility of the Contractor as per the terms of the Contract and in case the Contractor fails to carry out the erection as and when called upon to do so within the period specified by the purchaser, the purchaser shall have the right to get the erection done through any source of his choice. In such an event, the Contractor shall be liable to bear any additional expenditure that the purchaser is liable to incur towards erection. The Contractor shall, however, not be entitled to any gain due to such an action by the purchaser.

13. PAYMENT:

Contractor's bill will be passed for payment only after the stores have been received, inspected and accepted by the Purchaser.

14. MODE OF PAYMENT:

Normally payment will be made for the accepted stores within 30 days from the date of receipt of the materials.

15. RECOVERY OF SUM DUE:

Whenever any claim for the payment of, whether liquidated or not, money arising out of or under this Contract against the Contractor, the purchaser shall be entitled to recover such sum by appropriating in part or whole, the security deposited by the Contractor, if a security is taken against the Contract. In the event of the security being insufficient or if no security has been taken from the Contractor, then the balance or the total sum recoverable as the case may be, shall be deducted from any sum then due or which at any time thereafter may become due to the Contractor under this or any other Contract with the purchaser. Should this sum be not sufficient to cover the full amount recoverable, the Contractor shall pay to the purchaser on demand the remaining balance

due. Similarly, if the purchaser has or makes any claim, whether liquidated or not, against the Contractor under any other Contract with the purchaser, the payment of all moneys payable under the Contract to the Contractor including the security deposit shall be withheld till such claims of the purchaser are finally adjudicated upon and paid by the Contractor.

16. INDEMNITY:

The Contractor shall warrant and be deemed to have warranted that all stores supplied against this Contract are free and clean of infringement of any Patent, Copyright or Trademark, and shall at all times indemnify the purchaser against all claims which may be made in respect of the stores for infringement of any right protected by Patent Registration of design or Trade mark and shall take all risk of accidents or damage which may cause a failure of the supply from whatever cause arising and the entire responsibility for sufficiency of all means used by him for the fulfilment of the contract.

17. ARBITRATION:

In the event of any question, dispute or difference arising under these conditions or any conditions contained in the Purchase Order or in connection with this Contract (except as to any matter the decision of which is specially provided for by these conditions), the same shall be referred to the sole arbitration of the Head of the Purchase office or some other person appointed by him. It will be no objection that the arbitrator is a Government servant, that he had to deal with matter to which the Contract relates or that in the course of his duties as Government servant he has expressed views on all or any other matters in dispute or difference. The award of the arbitrator shall be final and binding on the parties of this Contract.

If the arbitrator be the Head of the Centre/Unit –

- (i) In the event of his being transferred or vacating his office by resignation or otherwise it shall be lawful for his successor-in-office either to proceed with reference himself, or to appoint another person as arbitrator, or
- (ii) In the event of his being unwilling or unable to act for any reason, it shall be lawful for the Head of the Centre/Unit to appoint another person as arbitrator.

If the arbitrator be a person appointed by the Head of the Purchase Office – In the event of his dying, neglecting or refusing to act or resigning or being unable to act, for any reason, it shall be lawful for the Head of the Centre/Unit either to proceed with the reference himself or appoint another person as arbitrator in place of the outgoing arbitrator.

Subject as aforesaid the Arbitration & Conciliation Act 1996 and the rules thereunder and any statutory modifications thereof for the time being in force shall be deemed to apply

to the arbitration proceedings under this Clause. The Arbitrator shall have the power to extend with the consent of the purchaser and the Contractor the time for making and publishing the award. The venue of arbitration shall be the place as purchaser in his absolute discretion may determine. Work under the Contract shall, if reasonably possible, continue during arbitration proceedings.

In the event of any dispute or difference relating to the interpretation and application for the provisions of the Contracts, such dispute or difference shall be referred by either party to Arbitration of one of the Arbitrations in the Department of Public Enterprises. The Arbitration Act 1996 shall not be applicable to arbitration under this clause. The award of the Arbitrator shall be binding upon the parties to the dispute provided however any party aggrieved by such award may make a further reference for setting aside or revision of the award to the Law Secretary, Department of Legal Affairs, Ministry of Law & Justice, Govt. of India. Upon such reference, the dispute shall be decided by the Law Secretary or the Special Secretary / Additional Secretary when so authorized by the Law Secretary, whose decision shall bind the parties finally and conclusively. The parties to the dispute will share equally, the cost of arbitration as intimated by Arbitrator.

18. COUNTER TERMS AND CONDITION OF SUPPLIERS:

Where counter terms and conditions printed or cyclostyled conditions have been offered by the supplier, the same shall not be deemed to have been accepted by the Purchaser, unless specific written acceptance thereof is obtained.

19. SECURITY FOR PURCHASE OF MATERIALS:

Successful tenderer will have to furnish in the form of a bank guarantee or any other form as called for by the purchaser towards adequate security for the materials and properties provided by the Purchaser for the due execution of the Contract.
