

INDIAN BANK

**PROPOSED DATA CENTRE INTERIOR & RELATED
WORKS FOR INDIAN BANK, HEAD OFFICE,
2ND FLOOR,
#66, RAJAJI SALAI, CHENNAI**

TECHNICAL BID WITH SPECIFICATIONS

Architect:

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This document has 29 pages.

CIVIL AND INTERIOR WORKS – TECHNICAL SPECIFICATIONS

GENERAL SPECIFICATIONS

To be read in unison with particular specifications and bill of quantities

These specifications are for work to be done, item to be supplied and materials to be used in the works as shown and defined on the drawings and described herein, to the satisfaction of the Employer / Architect.

General:

- i. The workmanship is to be the best possible and of a high standard. The Tenderer shall take all steps immediately to make up deficiency if any noticed by the Employer/ Architect.
- ii. The materials to be provided by the Tenderer shall be in accordance with the samples already got approved from the Employer/ Architect by the Tenderer and in conformity with specification and approved list of manufactures and brand. The Tenderer shall produce all invoices, vouchers or receipts for any materials if called upon to do so by the Employer/ Architect.
- iii. Samples of materials are to be submitted to the Employer/ Architects for their approval before the Tenderer orders or deliver the materials to the site. Samples together with their packing are to be provided free of charge by the Tenderer and should any materials be rejected they will be removed from the site at the Tenderers expense. All samples will be retained by the Employer/ Architects for comparison with materials which will be delivered at site. Also the Tenderer will be required to submit specimen finishes of colors, fabrics, etc. for the approval of the Employer/ Architects before proceeding with the works.
- iv. The Tenderer shall be responsible for providing and maintaining temporary coverage required for the protection of finished work. He is also to clean out all wood shavings, cuts ends and other waste from all parts of the works before covering or in fillings is constructed.
- v. The Tenderer shall maintain uniform quality and consistency in workmanship throughout the execution of the work.

1. Thermal Insulation

The floor and ceiling slabs of server room on ceiling should be heat insulated with a heat insulating material to avoid condensation on floors below and above and to reduce the heat transfer in the Server rooms. The insulation shall be done with 19 mm thick self adhesive aluminum foil face Nitrile rubber.

2. Raised floor

The Server room should be equipped with raised floor with 600 mm (24 inch) height. Cavity floor shall have false flooring panels of 18 gauge steel 600 x 600 coated with 50 micron epoxy conductive paint. Floor shall be finished with 2mm thick antistatic high pressure laminate with 2mm thick PVC trim edge all-round. The interior of the panels shall be filled with noncombustible cementious compound.

3. False flooring panels

The floor should be designed for standard load confirming to BIS 875-1987.

Panels should be made up of 18-gauge steel of 600mm x 600mm size treated for corrosion and coated with epoxy conductive paint (minimum thickness 50 Micron). False flooring covering shall be antistatic high pressure laminate 2 mm. thick in approved shade and colour with PVC TRIM edge. Perforated floor

panels are to be provided on the designated floor for air delivery. The placement of perforated panels shall be decided as per the PAC layout. The perforated panels shall have dampers. The interior of the panels shall be filled with non-combustible cementitious compound.

The false floor should withstand the load of the racks with 50% safety margin.

No obstructions of pipes, conduits, detectors shall be permitted in space immediately under equipment line-ups. The under floor space under line-ups is required for equipment frame securing, cable management and power access.

Ramps and steps are to be provided for transitioning to elevated floor area at entrance of Data Center. Ramps are to be designed and installed to building code requirements.

Special tools and tackles required for operation of false flooring shall be supplied in two sets.

4. Under Structure

Pedestal Assembly: Pedestal assembly shall be of snap lock type consisting of base assembly 100 x 100 x 2 mm. with full bead weld to steel base plate with embossing and four numbers holes which shall be fixed to the floor with screws. Anti vibration rubber pad shall be provided below base plate. Steel pipe riveted to base plate shall engage the pedestal head assembly. Head shall be formed steel and full bead weld to stud, with four flange having shape and size as per standard approved manufacturers' specifications. Pedestal head flanges shall be provided with holes for screws for fastening the G.I. Stringers. No sharp edges or corners shall be exposed from pedestal head when floor panel is removed. G.I. rod, fully threaded shall be locked to pedestal head. The entire head assembly is engaged in the base assembly by means of nut and check nut.

5. Stringer

Stringer system is hot dipped galvanized sheet, construction having channel, with pre-punched counter and holes at both ends of the top face for securing the stringers on to the pedestal head to be fixed with screw ensuring maximum lateral stability in all directions. The grid formed by the pedestal and stringer assembly shall receive the floor panel. The stringer system would be earthed properly by using copper wire. This is required for some of the servers for transient grounding.

a. POP Punning & Painting

Plaster of Paris paste of thickness 5 - 8 mm punning over cement plaster/Partition shall be provided so as to ensure a level and smooth texture to the exposed walls and columns. The existing surfaces are to be cleaned and scratched and markers are kept before the application of punning material. After the material has dried upon application it is to be smoothened by means of rubbing it with sandpaper. Upon this smoothened surface one coat of primer and two coats of plastic emulsion paint of approved make & shade is to be applied. Server room shall additionally be applied with painting putty to level & plumb and painting with 2 coats of painting.

6. Fire Rated Doors.

Fire rating for 120 Minutes, Conforms to IS3614 (PART-2)1992, BS476 (PART 20 & 22) and ISO834.

Material: Door Frames and Leaves are made from Galvanized Steel

Door Leaves: Constructed from 1.0mm thick galvanized steel sheet formed to provide a 48mm thick fully flush, double skin door shell with seamless welding joint all around. The internal construction of the door shall be specially designed with infill to give 2 hours fire rating.

Infill: All the doors will have Honey Comb Crafted Paper or equivalent infill.

Door frame: Produced from 1.6mm galvanized steel sheet formed to single rebate profile of size 125mm x 57mm (+/- 0.3mm) with a maximum bending radius of 1.4mm. The necessary fixing arrangements should be provided to mount the doorframes to the gypsum partition.

Vision Glass: 2 hours Fire Rated Vision Glass with 6mm thick clear glass in rectangular shape dimensions of 200mm x 300mm to be fixed as per the given design.

Finish: The door frames and shutters are Zinc Phosphate with epoxy primer and finish with paint. All doors should have suitable locking mechanism with 3 keys each.

Automatic door closures, Seals for Air Tightness and Automatic Door Bottoms should be provided to four doors .

7. Ramp

Ramp is to be provided from true floor level to raised floor level at the entrance of Data Center. Maximum 14° Slope is to be maintained, constructed with MS framework with ms sheet cladding on top of sufficient gauge. MS sheet to be clad with 19mm ply on top, finished with laminate and provided with appropriate grips.

8. False Ceiling:

A modular and grid system, access False Ceiling at appropriate height should be installed which also supports the concealing all cables, electrical power and lighting wiring with suitable cabltray in all areas. It also serves as a plenum for lighting fixtures and PAC units. All the ceiling lights will be mounted on the false ceiling and suitably supported from the true ceiling.

9. **For Server room:** The **metal false ceiling** should be powder coated 0.5mm thick hot dipped galvanized steel tiles of size 595mm x 595mm with regular edge (5mm) suitable for 15mm grid supported on powder coated galvanized steel grid. The false ceiling would be inclusive of cutouts for lightings, for PAC return air grills, Fire detectors and any other sensors as specified in this tender.

10. **For Auxiliary / Other areas:** Acoustical false ceiling of mineral fiber Board (600 x 600 x 15mm) of Armstrong or equivalent type laid on Grid system (Micro lock edge) with 15mm thick T section (White) having main runner 1200mm x 600mm, cross Tee at 295 HT. Mineral Fiber Board modular False Ceiling in Armstrong in Board edge Fissured ANF tiles of size 600mm x 600mm x15mm having Noise reduction Co-efficient 0.5, light reflection over 75%, Relative Humidity 99%, fire performance class0/class1 (BS 476) 24XL - Hot Dipped Galvanized Steel Suspension System having rotary stitching on main runner, 1200 mm & 600 mm cross tees with 15mm wide flanges of white color with standard perforation of 2.5mm dia. (16% open space) fleece with NRC of 0.70 & CAC 36, fixed to the structural soffit by Butterfly clip hangers, suspension wires & anchor fasteners as per the manufacturer's specification, Suspension wires to be provided at every 600mm c/c with two nos of ties on each anchor fastener, Perimeter trim of Trulok wall angle in white color secured to wall at 450mm maximum centers.

3 Miscellaneous

GLOW SIGNAGE:- Glow signage on both sides of the door shutters marking PUSH / PULL along with other signage marking different work areas and emergency signs.

SHOE RACK: At entry of Server Room to avoid entry of dust in server room.

Tile Puller: 2no. should be provided for maintenance purpose.

Unique Fire Doors & Specialized Metal Doors

We are glad to introduce **special and unique doors with unmatched technology and finish.** The product range covers three types of doors – **Fire rated Clean room and Burglar Proof.**

The **Fire Rated doors** are made out of galvanized steel and can be used a variety of applications including fire, emergency of smoke check. These type of doors have been successfully tested at international test houses such as **Warrington / GB** Fire Research Institute and **DEUTSCHES INSTITUT FUR BAUTECHNIK** certified to **BS (British Standard) 476 part 22 for 60 minutes to 240 minutes fire rating, and DIN (German) 4102** for 30 minutes to 120 minutes fire rating.

The **Clean Room doors** are either stainless steel or galvanized with powder coating, if required with antibacterial powders, which destroy, and stops growth of bacteria. The doors have polyurethane foam / honeycomb infill. Wide range of color options to suit application aesthetics / ambience is available.

The **Burglarproof door** requirements are met with the steel shell and tamper proof locks.

The doors are fitted with rated hardware from DORMA, Germany with a reputation for trouble free operations.

**TECHNICAL SPECIFICATIONS SHEET FIRE RATED DOORS (120 Minutes)
CONFORMS TO IS 3614(PART 2) 1992 BS476 (PART 20 & 22) AND ISO834**

FIRE DOORS (120 MINUTES)

MATERIAL:

Door Frames are made of CRCA and Leaves are made from spangle free Galvanized steel.

DOOR LEAVES:

Constructed from 1.0mm thick galvanized steel sheet formed to provide a 48mm thick fully flush, double skin door shall be with seamless welding joint all around. Internal reinforcements all around for fire rating. The internal construction of the door is specially designed honeycomb structure with reinforcement all around. The internal construction of the door varies with the degree of fire rating as tested. For doors having a overall height in the excess of 2300mm the shutters shall essentially have double latches. For Double doors, there shall not be any welded astragal and the interleaving portion shall be an integral part of the door leaves flush and in line with both the door leaves.

DOOR FRAME:

Produced from **1.6mm CRCA steel formed to single rebate of size 100mm x 57mm (+/- 0.3mm)** with a maximum bending radius of 1.4 mm

The doorframes may be built into the brick or block walls using corrugated "TEE" Anchors not welded to the frame (First Fix). Frames also be fixed on plastered openings with help of metallic expansion shield with butt joints for bolted assembly at site.

VISION GLASS:

Fire Rated vision glass with 6mm thick glass can be provided for a maximum of 2 hours fire rating. The Vision Glass can be providing in 200 x 300 mm. Rectangular in standard dimensions of 300mm x 300mm.

FINISH:

The doorframes and door shutters are primed with Zinc – Phosphate with epoxy primer and finish with PU paint as required up to a minimum of 70 microns.

IRONMONGERY

HINGES:

Stainless Steel Ball Bearing Butt Hinges 3mm Thick Are Fixed Flush To The frame & Shutter.

LOCK:

Mortise sash lock with Lever handles, Mortise dead bolt, Mortise latch and panic devices etc can be provide as required.

FLUSH BOLTS (DOUBLE DOOR)

Concealed extended lever action flush bolts provide on the top of the door to the leading stile edge.

DOOR CLOSERS:

Doors are made suitable to receive a large variety of Door Closers.

OPTIONS:

Exit, Electro Magnetic hold open device, Door Coordinator, Smoke seals for Air Tightness, Automatic door bottoms, access control etc., can be provided if required.

DURA STEEL DOOR

Technical Specification

GENERAL PURPOSE DOORS

SINGLE & DOUBLE SHUTTER.

MATERIAL: **GALVANIZED SHEET**

FRAME THICKNESS: **1.2MM**

SHUTTER THICKNESS: **0.8MM**

INSULATION: **HONEY COMB OF POLY URETHANE FOAM.**

FINISH: POWDER COATING OF PAINTING. **UP TO 80 MICRONS.**

FIRE DOORS – 2 HOURS FIRE RATING

SINGLE & DOUBLE SHUTTER:

MATERIAL: **GALVANIZED SHEET**

FRAME THICKNESS: **CRCA - 1.6MM**

SHUTTER THICKNESS: **GI-1MM**

INSULATION: **ROCK WOOL OR HONEY COMB**

FINISH: POWDER COATING OF PAINTING. **UP TO 70 MICRONS**

HARDWARE

SS BALL BEARING BUTT HINGE. **DORMA MAKE**

DORMA DEAD LOCK

DORMA "D" HANDLE

DORMA DOOR CLOSER – **DORMA MAKE**

DORMA PANIC LATCH

PAINTING PLASTIC EMULSION ETC.

Ready mixed oil paint, plastic emulsion paint, ready mixed synthetic enamel paint, Aluminum paint, etc., shall be brought in original containers and in sealed tins. If for any reason thinner is necessary the brand and quantity of thinner recommended by the manufacturer or as instructed by the Employer / Architects shall be used.

The surface shall be prepared as specified above and cost of approved primer shall be applied. After 24 hours, drying approved of specified quality paint shall be applied evenly and smoothly. If required a filler putty coating may be given to give smooth finish. Each coat shall be allowed to dry out thoroughly and then lightly rubbed down with sand paper and cleaned of dust before, the next coat is applied. Number of coats shall be as specified in the item and if however, the finish of the surface is not uniform additional coats as required shall be applied to get good and uniform finish at no extra cost. After completion no hair marks from the brush or clogging of paint puddles in the corners of panel angles of moldings shall be left on the work. The glass panes floor etc., shall be cleaned of stains.

When the final coat is applied, if directed, the surface shall be rolled with a roller or if directed it shall be stippled with a stippling brush.

ELECTRICAL WORK

Electrical Infrastructure Works:

The successful bidder should Supply, Installation, Test and commission the Electrical Distribution works as per the technical specifications mentioned & as per following rack configuration.

	kVA	No. of Rack
Present Load	10	2
	7.3	2
	7.6	1
	2	11
Future Load	5	22

Note - Bidder Shall Submit the Electrical Single Line Diagram with bid.

- 2no. Dedicated electrical panel shall be provided for Data center facility. Data center LT panel will feed power to UPS, Precision Air conditioning & lighting/raw power distribution.
- 2no. of 110 KVA UPS systems shall be provided by customer for present load and 1no. 110 KVA UPS systems will be added in future for future load without downtime of operation.
- Earth pits & Earth strips as required for the body & grid earthing system shall be considered.
- Required cable trays, raceways & conduits etc., shall also be part of the scope.
- Air Insulated BBT shall be used for rack power distribution from PDUs to Rack.

1.1 Specification for Electrical Panels:

- Supply, Installation, Testing and commissioning of 3-Phase, 4 wire, 415V, 50 Hz Panels, the fabrication shall be made with 14SWG cold rolled sheet with M/C pressing.
- The surface shall be painted with at least 2 coats of Powder coated paint. The panel shall be totally enclosed metal clad type with double gasket with rubber / resin lining.
- The panel shall be shall have cable entry provision from the top and bottom with suitable alley as the case may be.
- All components shall be from ISO-9001 companies and shall have relevant IS/IEC approvals without fail.
- The panel shall be with Copper Bus bar and Bus coupler with electro-mechanical interlocking facility as required. Interlocking shall be with Motorized Breakers & UV Coils, to operate automatically.
- The panel shall include base frame channel support.
- Transient Voltage Surge Suppressor (TVSS) shall be installed at input of main Electrical Panel.

1.2 Lighting Standards:

The luminaries and lamps shall comply with the requirements of relevant BIS/CIE standard and CIBSE guide lines with regard to safety and performance.

Lighting Fixtures & Accessories:

- The compact fluorescent/incandescent luminaries shall be of the various types.
- All the fixtures shall be suitable for single phase, 50 cycles, 230 Volts, AC supply system. They shall be suitable for surface/concealed mounting type.
- The wattage of lamps should be specified in the BOQ.
- Electronic ballasts with THDi less than 5% shall be considered.

1.3 LT Power Cables:

- The L.T power cables shall have Aluminum / copper conductor, XLPE insulation un-vulcanized rubber inner sheathing galvanised steel tape armouring and FRLS outer sheathing as per requirement.
- The cable shall be of the heavy duty type conforming to IS:1554.
- The design shall permit continuous operation of the cable at a conductor temperature up to 90°C under normal conditions and 250°C during faults without causing any permanent damage.
- The cables shall be designed to allow a bending radius of not less than 12 times the diameter or lower as per manufacturer's instructions.
- Power cables up to and including 16sq mm shall be with single strand Copper conductor and those of higher sections shall be of Aluminum / copper as per requirement

1.4 UPS Distribution Boards:

- The UPS DBs shall be of the factory assembled 3 phase / phase segregated type suitable for surface / flush mounting shall be of the totally enclosed type fabricated out of 1.6mm thick CRCA sheet.
- The DB enclosure shall undergo pretreatment followed by powder coated finish.
- The DB shall have glazed lockable door, which shall be reversible.
- Gland plates with knockouts shall be provided on the top and bottom. The sides shall have conduit knockouts.
- All 3Phase shall be housed in a common compartment.
- Insulated fork type bus bars rated of required rating & requisite length shall be supplied.
- Neutral bus and an earth bus of required rating shall be provided in the DB as per requirement.
- All bus bars shall be of copper.

1.5 Socket Outlets:

All socket outlets in the office areas shall be of decorative modular type suitable for flush / surface mounting and housed in passivity metal boxes wherever specified. All decorative sockets shall have safety shutters.

The mobile sockets in the Data center shall be industrial sockets with IP 44 enclosure. These shall be supplied with plug top.

1.6 Electrical Earthing

The DATA CENTER earthing system should be free from maintenance and the earth electrode size & enhancing compound should be as per IEEE recommendation. Instead of bolted joint exothermic joint is recommended to decrease contact resistance. The earth system value after bonding should be less than or equal to 2-ohm.

1.7 Cable Trays & Sleeves:

- Pre fabricated, factory assembled, bolted rung type Ladder trays made out of 2mm thick galvanized steel runners and slotted rungs. Tray shall be inclusive of sections like L, T, 90° inward & outward bends as required shall be supplied along with coupling accessories for following types of trays.
- All trays shall have coupler plates and galvanized hardware. Cable trays shall conform to enclosed specifications.
- Perforated type fabricated from 2mm thick pre-galvanized sheet and with 1.6mm thick non perforated covers.

1.8 Conduits & Accessories:

- All conduits for concealed / surface wiring shall be of 2mm thick rigid PVC grade with bends, collars & required accessories shall be used for office & data center wiring.
- The conduit accessories shall be of the same material as the conduit except for junction boxes, which may be of cast iron.
- The minimum size of conduit shall be 20mm, other sizes being 25mm, 32mm and 38mm.

- Junction boxes for PVC conduits shall be cast iron and shall be 65mm deep for concealed conducting.
- All accessories such as junction boxes, bends, ceiling rose, ball and socket attachment etc. shall be of the approved type.

1.9 Point Wiring:

- All points wiring, circuit wiring, sub mains wiring shall be done using rigid PVC conduits of minimum 1.6mm thickness and shall comply with IS 2509 of 1973 or amendments thereof and FIA approval.
- All switch boards under the point wiring shall be the standard boxes available and the same shall be suitable for concealed work. The boxes should be of Electro Plated as per the Manufactures standard practice and should be suitable to accommodate number of control switches fan regulators, sockets.
- The entire wiring shall have continuous 2.5 sq.mm. approved make FR Copper conductor earth wire for earth continuity having Green colour in 660/1100 volts grade.
- The point wiring shall comply to IS 732.
- The point wiring shall include wiring of light outlet of any length from distribution board via switch or to the point and including providing circuit wiring, in minimum 25 mm dia PVC Conduit of 1.8 mm and using wires as specified below of approved make.
- The installation cost shall include cost of anchor fastners, chain support for fixing recess mounted fluorescent luminaires wherever applicable.

2.0 Bus Bar Trunking

- Bus Bars Trunking from PDU to Racks shall be Air insulated 3P+200% Neutral Bus Bar & Earth Bus Bar running throughout the length of BBT.
- Provision shall be made available to fix Tap off Box (single phase & three phase) at regular intervals from BBT Header.
- Adaptor Box shall be provided in between PDU & BBT.
- End Cap shall be provided to BBT.
- BBT shall be supported by proper support from true ceiling.

1. Access Control System

An access control system consisting of a central PC/Server, door access terminals and card/biometric readers, power supplies, proximity cards, and all associated accessories as required to make a fully operational on line access control system. Access control shall be provided for doors as below:

- Biometric Systems on main entry side and smart card readers on exit side for DC main door.
- Smart Card System on entry & exit of present server room.
- Smart Card System on entry & exit of electrical room.

These doors shall be provided with electric locks, and shall operate on failsafe principle. The lock shall remain unlocked in the event of a fire alarm, or in the event of a power failure. The contractor shall make potential free contacts available for releasing the locks in a fire condition. The contractor should supply, install and configure the access control software on a PC/Server, running Windows operating system, to integrate all the biometric systems, terminals and readers. The contractor should supply all the necessary accessories for commissioning of Access control System.

1.1 Finger Print Reader:

The finger print reader (FPR) shall be capable of reading a fingerprint utilizing an optic capacitance sensor comparing the same with a stored template. The FPR shall store the fingerprint templates of each cardholder indexed against the card number issued to the person. When a card is presented at the smart card reader, the card number shall be passed on to the FPR, which would then read the finger print

(presented at the optic) and verify it against the templates stored against the same card number. If the fingerprint is matched the facility code & card number shall be passed on by the FPR to the door controller. In case the fingerprint is not matched, the card data shall be rejected & access denied. The size of the template shall be such that it shall use only one sector of the card. The reader shall have a capacity to store at least 1,000 templates (i.e.) 500 users with 2 templates for every user.

- The FPR shall have at least 5 security levels with password protection.
- The FPR shall be user friendly and shall have audio visual indicators.
- The False Acceptance Rate (FAR) and False Rejection Rate shall be better than 0.01%.
- The Enrolment time shall not be more than 15 seconds while the Verification time shall be 1 second.

The reader should meet the following environmental specifications:

- Operating temperature: 10 to 50 degrees C
- Operating humidity: 5% to 95% relative humidity non-condensing.
- Weatherized design suitable to withstand harsh environments
- Finger print CUM SMART CARD reader
- Reading element False Acceptance Rate (FAR) less than 0.1%

1.2 Smart Card Readers:

The card reader shall be of Open type based Smart Card technology. The card readers shall be of high reliability, consistent read range characters, low power consumption and easy to install. Card readers should be "single-package" type, combining electronics and antenna in one package, in the following configurations:

- The reader should be of potted, polycarbonate material, sealed to a rating of IP54.
- The reader should be UL/C 294 listed, and should be FCC and CE certified,
- Should conform to ISO 14443/15693 (Read only) Standard.
- Transmit Frequency: 13.56 MHz
- Should have a read range of 2" to 3" when used with the compatible access card.
- The reader should require that a card once read, must be removed from the RF field before it will be read again, to prevent multiple reads from a single card presentation and anti-pass back errors.
- The reader should operate under internal control for read-only access control applications.
- The reader shall compare the biometric template stored on the card and the live sample supplied by the card holder. In the case of a positive match of these samples, the reader shall communicate the successful match of the biometric sample to the access control system of the host data centre.
- A minimum of 50 cards should be supplied initially.

The reader shall be capable of two way communication with the controller and have bi colored LED indication to indicate access granted / denied status. The readers shall support user defined reader keys offering higher security. The reader keys shall be stored in encrypted format in non-volatile memory.

1.3 Software Requirement:

- Should run on Windows/Unix/Linux operating system running on Intel platform.
- Should provide the accurate time and attendance solution.
- It should support 1:1 Authentication and 1:N identification.
- Should support local database management.
- Should support LAN and serial link connection.
- Should support integration with other solutions like BMS, CCTV camera system, etc.,
- All reports should get generated separately.
- Should be easy to use.

2. Gas Suppression system

2.1 General

The bidder shall supply, install, test and put in operation NOVEC 1230 (Fluro Ketone –FK-5-1-12) based fire suppression system. The fire suppression system shall include and not be limited to gas release control panel, seamless cylinders, discharge valve (with solenoid or pneumatic actuator) as the case may be, discharge pipe, check valve and all other accessories required to make a complete operation system meeting applicable requirements of NFPA 2001 standards and installed in compliance with all applicable requirements of the local codes and standards.

The system design should be based on the specifications contained herein, NFPA 2001 and in accordance with the requirements specified in the design manual of the agent. The bidder shall confirm compliance to the above along with their bid. The system shall be properly filled and supplied by an approved OEM (Original Equipment Manufacturer)

2.2 The NOVEC 1230 gas shall:

- (i) Comply with NFPA 2001 standard
- (ii) Have the approval from US EPA (Environmental Protection Agency) for use as a total flooding fire extinguishing for the protection of occupied space:
- (iii) Be given Underwriters' Laboratories Inc. (UL, USA) component listing for the NOVEC1230 gaseous agent.
- (iv) Must have zero ozone depletion potential (ODP)
- (v) Have a minimal life span in atmosphere, with atmospheric life time of less than 5 days
- (vi) be efficient, effective and does not require excessive space and high pressure for storage;
- (vii) commercially available

Key components are valves and its accessories, actuators, flexible discharge and connection hoses, check valves, pressure switch, and nozzles

The gas release panel to be available in redundant and be capable for integration to FAS

2.3 Design Condition

The Novec 1230 agent is stored in seamless steel cylinders and dry nitrogen is added to provide additional energy to give the required rapid discharge. At the normal operating pressure of 25 bar at 21o C, the agent is a liquid in the container.

- The designer shall consider simultaneous total flooding of all voids within the protected volume. The system shall be designed in accordance with the OEM's Design Manual.
- In order to extinguish a fire using clean agent, the concentration of agent delivered to each void shall be above the minimum design concentration. The following shall be considered while designing the system.
- The minimum design concentration shall be 4.2%. Class A Design concentration.
- If the protected volume has a floor and / or ceiling void the spaces shall be included in the protected volume, employing a minimum design concentration not below that of the main room compartment.
- The discharge nozzles shall be located within the protected volume in compliance to limitations and with regard to spacing, floor and ceiling coverage, etc. The nozzles shall be positioned such that they would cover the entire area up to the extreme corners of the area under protection and the design concentration will be established in all parts of the protected volumes.
- The final numbers of discharge nozzles shall be according to the OEM's product manual.
- The average pressure at each nozzle shall not be less than 6.034 Bar.
- The gas flow calculations shall be carried out on special software given by the OEM. The software should support usage of seamless cylinders which have a different design compared to the standard containers used worldwide. The system acceptance report shall show the resulting concentration in each independent void to be above 4.2% and the average pressure at each nozzle to be not less than 6.034 Bar.
- The agent discharge time shall not exceed 10 seconds and not less than 5 seconds.

The design concentration shall follow at minimum NFPA 2001 for under floor, room and ceiling space. Unless otherwise approved, room temperature for air-conditioned space shall be taken around 20_C. For non-air conditioned space, the temperature shall be taken around ambient temperature. The system shall be designed with minimum design concentration of 4.2 % as applicable to Class A & C fire.

The system engineering company should carry out the piping Isometric design and validate the same with a hydraulic flow calculation generated by using the agent's design software. Appropriate fill density to be arrived at based on the same. The system shall be so designed that a fire condition in any one protected area shall actuate automatically the total flooding of clean agent in that area independently. The entire system shall incorporate inter-alia detection, audible and visual alarms, actuation and extinguishing.

2.4 SYSTEM DESIGN

2.4.1 Cylinders

Each cylinder shall be seamless steel type manufactured from billets and tested in accordance with IS 7285 / BS 5045 standard.

The cylinder/valve assembly shall have suitable metallic protection for the valve enabling transportation of the filled cylinders safely.

The cylinders shall be super-pressurized with dry Nitrogen to 25 bar. The cylinder shall be capable of withstanding any temperature between -30 Deg C and 70 Deg C.

All cylinders shall be distinctly and permanently marked with the quantity of agent contained, the empty cylinder weight, the pressurization pressure and the zones they are protecting.

2.4.2 Cylinder Valve

The Valve assembly shall be mounted directly on the cylinder and should NOT have any adaptor provision between the cylinder and Valve as per requirements. Each cylinder valve shall have a provision for fixing a supervisory pressure switch and a safety burst disc to protect the cylinder from over pressure. The cylinder valve shall have a disabling plug to prevent accidental discharge of the valve during transportation and installation.

Each valve is to be fitted with a pressure gauge for monitoring loss of pressure.

The master cylinder valve is to be released electrically which is performed by means of a solenoid valve arrangement. Pilot cylinder actuation and pyrotechnic devices shall not be used.

2.4.3 Cylinder valve Actuators

In a single cylinder system the cylinder shall have a solenoid operated actuator and a manual actuator incorporating a strike knob mounted on top of the solenoid operated actuator. Multi cylinder systems shall have the same fitted on to the master cylinder and pressure operated actuators fitted on each slave cylinder. All actuators shall be original OEM make and locally manufactured actuators shall not be used.

2.4.4 Hoses

Each cylinder valve shall be provided with a plug in type flexible rubber discharge hose of minimum 40mm size with a test pressure of 52 Bar. Each hose shall be permanently marked with the test pressure and OEM's part number. Multi cylinder systems shall have an interconnect hose for each cylinder. All hoses shall be original OEM make and locally manufactured hoses shall not be used.

2.4.5 Manifold with Check valve

The manifold shall be fabricated from ASTM A106 Schedule 80 seamless pipe and shall have integral check valves provided for each cylinder. The Manifold shall preferably be supplied by the original equipment manufacturer instead of fabricating the same at site.

2.4.6 RE-FILLING AND MAINTENANCE

In case of any leakage or accidental discharge of the agent, it should be possible to re-fill the cylinders from a valid PESO approved OEM filling station in India itself. The contractor should indicate the source of re-filling and the time that will be taken for re-filling and replacement.

2.4.7 PIPING AND FITTINGS

All piping shall be ASTM A-106, Grade-B, Schedule 40 seamless pipes and all fitting shall be of ASTM A-105. The Novec is required for the panel rooms, DC, UPS, networking & staging rooms

3. ASPIRATING SMOKE DETECTION SYSTEM

3.1 SCOPE:

This specification covers the requirements of supply of materials, installation, testing and commissioning of Aspirating Smoke Detection System. The system shall include all equipment's, 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 AHU and to shut fire dampers if required in the event of fire through the relay contacts.

3.2 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

3.3 DESIGN REQUIREMENTS

The System shall consist of a highly sensitive 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 a computer-based design modeling tool.

3.4 PERFORMANCE REQUIREMENTS

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

3.5 MATERIALS AND EQUIPMENT

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.

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.

3.6 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/ single 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 three/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 detect.

The detector shall have single / four pipe inlets which must contain a flow sensor. Both Minor and Urgent flow faults shall be reported. The filter must be a single/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 ultra-fine, 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 1000 events.

3.7 DISPLAYS ON 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.

3.8 INSTALLATION:

The Contractor 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 engineer have specified otherwise.

The Capillary tube shall terminate at a ceiling Sampling Point specifically approved by the SIA. 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.

3.9 COMISSIONING TEST

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

3.10 Functional Test

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

4. RODENT REPELLENT SYSTEM

4.1 SCOPE:

The Rodent Repellent System would consist of one master console & twelve satellites/transducers. The Master Console is installed in the server room and the satellites in the problem area. The successful bidder should make detailed working drawings and coordinate with agencies at site.

4.2 PRINCIPLE OF OPERATION

The powerful high frequency sound waves (well above the 20 KHz frequency which is the upper limit of the hearing range of human ear) generated by the satellites are within the hearing range of the many pests and cause them pain and discomfort and thereby, forcing them to abandon the protected area.

4.3 FEATURES

The Master Console Master Console would need a power connection and should be equipped with a 3-pin power supply cord of 2.5 meters. Satellites Each Satellite should cover an open area of 300sq. ft. when the average height of the ceiling is 10 ft. When installed in false ceiling / false flooring it should cover an approximate area of 150 sq. ft. Each satellite should occupy a maximum of space of 24cuin and could be mounted in any angle. They should be mono-polar and there should be no risk of sparking They should be able to withstand high temperatures in the false ceilings. They would not need a power connection.

4.4 TECHNICAL INFORMATION

4.4.1 SATELLITES

Crystal DM 44T 24V MAS Germany.

4.4.2 FREQUENCY

Peak frequency responses of the satellites should be,

- 21.6 KHz +/- 3 KHz
- 31.6 KHz +/- 3 KHz
- 50.4 KHz +/- 3 KHz
- 60 KHz +/- 3 KHz

4.4.3 NATURE OF SOUND WAVES

The sound waves propagated by the satellites should be linear sine waves with constantly varying frequencies.

4.4.4 OPERATING ENVIRONMENT

The satellites should operate in a temperature range of – 4 Deg. C to 60 Deg C, and can propagate sound waves in 100% humid conditions, and even when they are submerged under water.

4.4.5 EXCITORY CIRCUIT

Signal Generator should have full wave rectification, regulated 12 V DC power supply to withstand power fluctuations ranging from 170 VAC to 270 VAC. Amplifier should have a preamplifier stage coupled with signal generator for dual transistor amplification having a push – pull configuration.

4.4.6 PRESSURE

Uniform Pressure output of 80 dB to 110 dB with 360 Deg. C transmission angle. Linear Propagation of mixed / variable frequencies detectable at, or about 40 ft. distance from the source (transducer / satellite) Pressure should vary from 50 dB to 110 dB (with built – in control for steady output)

4.4.7 Power Supply

Provision for 230V AC and 24 VDC

5. WATER LEAK DETECTION SYSTEM

5.1 GENERAL

Water leak detection System shall be designed to protect the Air-conditioned premises and to alert the personnel about the leak in the AC systems. The system shall be capable of interfacing to Water leak detection sensors, condensation sensors & I/O modules. Events should be clearly reported on LCD/LED display with full English language description of the nature of the fault in the panel. The successful bidder shall make detailed working drawings.

5.2 EQUIPMENT

The Water leak detection system shall comprise of Tape Sensors, Water Leak detection modules, Condensation detectors, I/O modules and sounders all connected to a Control Panel.

5.3 CONTROL PANEL

The control panel shall be computerized 4/8/12 zone multiplex controller with a facility to add on dialer and speech processor. The system shall be programmed, armed or disarmed through a control key pad. The control key pad shall have a 16 character LCD display for viewing various events. The code to arm or disarm the system shall be changed only by entering a master code.

The system shall have 4/8/12 zones and all the detectors shall be connected through a 2 core cable.

Each area of the premises shall be divided into specific zones such that any zone shall be isolated by the user if required. The entire system shall be backed up by a maintenance free rechargeable battery to take care of system's power requirements whenever power fails.

The system shall be totally tamper proof and shall activate an alarm if the control panel is opened, the sensors tampered with or if the system cables are cut even in the disarmed state.

The system shall log 500 events and optionally printer shall be connected for generating reports. The Detectors, I/O Modules, Remote Keypads and other Devices shall be connected to a system on a single 2/4/6 Core Cable Bus to avoid individual cabling of zones. The system shall have a Buffer memory of minimum 250 events and log each event with exact date and time. The controller shall have a Serial Port for connecting to a computer.

The controller shall work on 220/240V AC power supply and it shall also have a built in battery backup. The memory inside the controller shall be backed up by a lithium battery. The controller shall work effectively over a temperature range of -10 Deg. C to + 55 Deg. C. and 0 to 90% of Humidity.

The system shall be totally tamperproof and shall activate an alarm if the control panel is opened, the sensors tampered with or if the system cables are cut even in the disarmed state.

5.4 WATER LEAK DETECTION SENSOR

Water Leak Detection sensors shall be able to mount in DIN rails, inside AHU's, power distribution units or other equipment where localized leak detection is required. The detectors shall be resistant to oxidation and erosion. The detector shall have relay output for connection to the controller. LED alarm indication shall also be provided. The detectors shall operate in AC or DC supply.

5.5 TAPE SENSORS

Tape sensors are used to detect water leaks usually under floors. Tape sensors for use with water leak detectors shall be covered with plastic netting to prevent short circuits when used in metal trays or conduits, and enables the tape to be folded at right angles to allow easy routing.

5.6 SOUNDER

The sounder shall give audible alarm when any sensor operates. It shall be complete with electronic oscillations, magnetic coil (sound coil) and accessories ready for mounting (fixing). The sound output from the Hooter should not be less than 85 decibels at the source point.

5.7 TECHNICAL SPECIFICATIONS:

5.7.1 Controller

No. of Zones: 4

Events: 500 event log

Control keypad: 20 button illuminated keypad

Display: 16 Character LCD on control keypad

5.7.2 Water leak Detector

Supply Voltage : 15-30V AC/DC

Output : 12A @240V AC relay contacts

Response Time : <1 Sec.

Max sensor tape length : 200 Mtr.

Ambient Temperature : 0° - 40°C

Relative Humidity : 0 - 80% RH

5.7.3 Condensation Detector

Supply Voltage : 24V AC/DC

Output : 10A @240V AC relay contacts

Response Time : <1 Sec.

Input resistance : 10 K ohm

FIRE DETECTION, ALARM AND CONTROL SYSTEM

All the areas of the Server Room and battery room shall have fire detection system which shall be designed and installed as per NFPA72 standard STD 2001. All the detectors shall be connected to an

Analog Addressable Fire Alarm Panel, which indicates the exact address of the Detector on Fire. In case of Fire the alarm needs to be generated at the local site as well as Systems Department.

(i) **Detector** The detection and control system shall employ multi-sensor detectors which are a combination of photoelectric and heat detectors. The detectors shall be located in the server room and UPS room. The detectors shall be strategically located in the false floor and above and below the false ceiling.

(ii) **Detecting System** Analogue addressable fire alarm system comprises of

(iii) Multi sensor Detectors.

(iv) Manual Call Points

(v) Isolator Modules

(vi) Relay Output Device (Control Modules)

(vii) Hooter: output 86-90dBA. Additional set hooter to be installed in the Systems Dept.

(viii) Battery Backup

CCTV System

Closed Circuit Television (CCTV) System shall be provided for surveillance and record for post event analysis.

- Products with UL listing and proven installation worldwide only shall be supplied.
- The video output from individual camera locations shall be available on high resolution monitor
- The System shall be capable for multiple camera displays for live viewing or play back while recording, continuous motion detection, alarm, pre alarm handling and schedule recording modes. Recording up to min. of 30 images per second, high speed searching shall be capable of backup management with external storage device. The recorder shall provide programmable motion detection. Each camera shall be customized for specific ‘_motion triggered’ recording with digital zoom.
- The CCTV cameras shall be located in Server room, entry passage and battery room.
- The external DVD writer shall be used to archive the video image. PC shall be used for the management of the system.
- Consider recording speed of 8-11 frames/sec and a storage space of 2TB

Building Management System

- The Building Management System should be implemented to monitor the various systems Installed.
- The BMS software should be installed which can communicate with all the equipments at site.
- The BMS should be monitored 24x7. e. The system should be integrated with all the other systems including fire alarm system and water leak detection systems.
- Building Management system (BMS) shall consist of microprocessor based controller and shall be designed to monitor all mechanical, electrical, and other facility equipment and system. The system shall be capable of local and remote monitoring and operation. Specifications for 24-hour monitoring shall be developed.
- BMS should be capable of monitoring each PAC, UPS, Electrical Panels and complete security system as Fire alarm system, fire suppression system, ACS, VESDA, WLD, etc.

Public Address System -

- The Public Address System shall be providing the datacenter area and ups room for serve to following function.

- A) Make general announcement
- B) Transmit fire tone under fire condition.

- All control consoles shall be placed in the IBMS room.
- Speaker should be output of 86-90 DB
- Amplifier as per speaker quantity

AIR CONDITIONING WORKS - TECHNICAL SPECIFICATIONS

SCOPE OF WORK

The Scope of Work covers the supply, installation, commissioning and warranty of Precision Air conditioner (herein referred to as “product”) and services provided for the same.

GENERAL

The AC Units should have high sensible heat ratios, to match the low latent loads of Server Rooms. A Microprocessor controlled package AC system with **R-407C refrigerant** shall have de-humidified air quantity of minimum 500 to 650 CFM/TR.

The Indoor unit complete with Variable Capacity Scroll compressor with individual circuit (Mandatory), Evaporator Infloor fan with EC motor & coil, Heater, Humidifier, Microprocessor controller, electrical switchgear components and Thermostatic expansion valve (TXV) and shall be housed in a single cabinet. The outdoor unit shall be comprised of Condenser fan, motor, fan speed controller (if applicable) & cooling coil.

THE AIR-COOLED PRECISION PACKAGE UNIT SHALL BE DESIGNED AS PER FOLLOWING CONDITIONS

- Inside Design condition : PAC Units shall be selected at return air of 24 deg.C/45% RH to maintain Cold Aisle at 22⁰C ±1 Deg C and 50% ± 5% RH.
- Ambient air design température : 40 Deg C (for PAC Selection)
- PAC Units Configuration : 34kW Actual Cooling Capacity – 4no.
- Flow Direction : Bottom discharge, top return; based on the requirement.
- Air inlet Temp & RH : Set point ± 1 °C (DB) & Set point ± 5% (Return Air)
- Air Quantity : 500 to 650 CFM / TR
- Filters : Filter to be provided on the Package unit, having 95% efficiency down to 5 Microns.
- No of Compressor : 1 or 2 with dedicated circuits
- Type of load : High sensible heat load (95% SHR and above)

- The Units shall be designed for sound levels of below 75 dBA at 1.5 meter from the unit outlet quiet operation with all moving parts mounted on anti-vibration mounting and carefully balanced to ensure minimum vibration.
- The unit shall be tested at site for performance rating before acceptance. Performance test shall be a heat load test using heater supplied by the Precision unit supplier.

TECHNICAL SPECIFICATION OF AIR-CONDITIONING SYSTEM

Customer is proposed to have High Performance Precision type DX air-cooled units, which is of Floor discharge type.

OTHER BASIS OF DESIGN ALONG WITH EQUIPMENT SCHEDULE WILL BE AS UNDER:

The capacity of Equipment, specified above, is actual sensible capacity at operating condition during peak summer. Bidder is requested to check and confirm the Capacity, before submission of the quotation. Bidder is requested to select the air-cooled condenser for 40 deg C ambient condition to avoid any de-rating during peak summer condition. The condenser shall be selected so that the condensing temperature does not exceed 53 to 54 Deg C.

SCHEME: The air-conditioning system consists of Precision Packaged air-conditioners as indicated in the Equipment schedule above. Precision AC units shall be of Variable capacity type. The cold & de-humidified air shall be pumped into the space between true floor and false floor and fed to the Equipments thru' floor grilles with Volume control damper.

SYSTEM DESCRIPTION:

Room shall be air-conditioned with Variable Capacity Precision Air-conditioning Unit each of 34kW actual total capacity & De-humidified air quantity of 5000 Cfm. The air-conditioning unit shall be designed specifically for high sensible heat ratio applications.

The system shall contain Variable capacity Hermetic Scroll compressor without frequency variation, Evaporator blower (Backward curved infloor Fan with EC Motor) & coil, Heater, Humidifier, Specific De-humidification cycle, Microprocessor & electrical and Expansion valve all of which shall be contained within the cabinet of the unit. The outdoor condenser unit shall be air-cooled type comprising of coil, fan, motor and fan speed controller (Variex).

THE TECHNICAL SPECIFICATIONS OF THE CONSTRUCTION OF UNIT ARE AS UNDER:

The Precision Environmental Control Systems shall be of self contained factory assembled unit with down flow air delivery. The Precision Air conditioner shall be High sensible cooling capacity and high Sensible Heat Ratio (i.e. the sensible to total cooling capacity ratio).

FRAME & CASING:

The frame shall be constructed of 2.5, 2.0 and 1.2 mm folded galvanized steel. The external panels shall be constructed of 1.2mm zinc coated sheet steel. Front, rear and end panels shall be fitted with 25 mm glass fiber insulation, fire rated to Australian Standard 1530 (indices 0,0,0,3). The cabinet shall powder coated with charcoal grey color and have a texture finish. The hinged front panels shall be removable and include captive ¼ turn fasteners. The cabinet shall be assembled with pop rivets providing ease of disassembly.

FILTER:

The filter chamber shall be an integral part of the system and withdraw able from the front of the unit. Filtration shall be provided by dry media disposable filters capable of filtering air to 95% down to 5 micron efficiency and shall be replaceable from the top of the unit. Filtration shall be provided by deep V form G4 performance dry disposable media to ASI324.

EVAPORATOR FAN:

Units should be offered with backward curve direct drive Fan, High efficiency, external rotor electronically commutated (EC) motor with integrated electronics, True soft start characteristics (inrush current lower than operating current), Backward curve, corrosion resistant aluminum fan wheel, Maintenance free design and construction. The fan section shall be designed for higher air flow. The unit shall be fitted with one (two, three) direct-driven, high efficiency, single inlet, backward curved; the fan motors shall be Electronically Commutated (EC), IP54, with internal protection and speed regulation via controller signal. They shall be statically and dynamically balanced.

In addition to the above, the units must feature an "in-floor" EC fan configuration to deliver the ultimate in energy efficiency. Fans are easily lowered into the floor after unit positioning on site. This Allows for a continuous negative pressure in the cabinet and Provides a more direct path for the air to travel through the cabinet. The fans operate more efficiently to save power.

COMPRESSOR:

One/Two refrigeration circuit, incorporating a high efficiency, fully hermetic Variable Capacity Scroll Compressor with crankcase heater. The compressor shall be charged with R407C/R410a. The compressor solenoid valve shall unload the compressor & allow the variable capacity operation, i.e. the Scroll compressor shall modulate its capacity from 20% to 100% without any frequency variation. Each compressor is equipped with pre-set high and low pressure switches for protection against high condensing and low evaporating temperatures. Each compressor shall have internal motor protection and be mounted on vibration isolators.

REFRIGERATION CIRCUIT:

The refrigeration system shall be of the direct expansion type and incorporate one compressor, complete with crankcase heaters. The system shall include a manual reset high pressure control, auto reset low pressure switch, externally equalized expansion valve, high sensitivity refrigerant sight glass, large capacity filter drier and charging/access ports in each circuit. Each refrigeration circuit shall include rigidly mounted isolation valves in the discharge and liquid lines to aid servicing and installation.

EVAPORATOR COOLING COIL:

The evaporator coil shall be A-coil (for down flow) incorporating draw-through air design for uniform air distribution. The coil shall be constructed of rifled bore copper tubes and louvered aluminum fins, with the frame and drip tray fabricated from heavy gauge aluminum. All metal parts in contact with condensate shall be the same material to prevent electrolytic corrosion. The drip trays shall ensure the collection of condensate and be accessible for cleaning. The cooling coil shall be maximum of 4 rows and minimum 11 fins per inch and the face velocity shall not be more than 2.5 m/s.

REMOTE AIR-COOLED CONDENSER:

The Air-cooled condenser shall be the low profile, weatherproof type incorporating high efficiency, direct drive, external rotor motors with axial blade fans & fan speed controller. The condenser shall be constructed from heavy duty aluminum and corrosion resistant through special anti corrosive epoxy coatings for any specific polluted areas. Heavy duty mounting legs and all assembly hardware shall be included. Condensers shall be suitable for 24 hours operation and be capable of providing vertical or horizontal discharge. The condenser shall be fully factory wired and require a 230 volt, single phase, 50 Hz electrical service. The high performance heat exchanger shall include mechanically expanded cross-hatched copper tubes and louvered aluminum fins for maximum heat transfer.

HUMIDIFIER:

The humidifier shall be of the infrared type consisting of high intensity quartz lamps mounted above and out of the water supply. The humidifier pan shall be stainless steel and arranged to be removable without disconnecting high voltage electrical connections. The complete humidifier section shall be pre-piped, ready for field connection to water supply. The humidifier shall be equipped with an automatic water supply system and shall have an adjustable water-overfeed to prevent mineral precipitation. A high-water detector shall shut down the humidifier to prevent overflowing.

ELECTRICAL HEATING:

The electrical heating elements shall not operate at a level exceeding 60 W/Sq. m. The low watt density elements shall be of finned tubular construction. The heating circuit shall include dual safety protection through loss of air and high temperature controls. Electric heating shall be provided in a single stage. The elements shall be low watt density, 304/304 stainless steel fin tubular construction, protected by thermal safety switches. The heating system shall include dual safety protection through loss of air and manual reset high temperature controls.

UNIT SIZE:

Precision AC Indoor units shall be placed inside the Equipment room only. Hence the Footprint area of the Unit is extremely important to accommodate the same inside the existing Equipment Room. The unit shall require front access only for routine service and installation work.

MICROPROCESSOR CONTROLLER:

The unit control shall be factory-set for Intelligent Control which uses "fuzzy logic" and "expert systems" methods. Proportional and Tunable PID shall also be user selectable options. Internal unit component control shall include the following:

SYSTEM AUTO RESTART

The auto restart feature will automatically restart the system after a power failure. Time delay is programmable.

SEQUENTIAL LOAD ACTIVATION

On initial startup or restart after power failure, each operational load is sequenced with a minimum of one second delay to minimize total inrush current

PREDICTIVE HUMIDITY CONTROL

Calculates the moisture content in the room and prevents unnecessary humidification and dehumidification cycles by responding to changes in dew point temperature. The control shall be

compatible with all remote monitoring and control devices. Options are Available for BMS interface via Modbus, BACNet and SNMP. The control processor shall be microprocessor based with a 128x64 dot matrix graphic front monitor display and control keys for user inputs mounted in an ergonomic, aesthetically pleasing housing. The controls shall be menu driven. The display & housing shall be viewable while the unit panels are open or closed. The display shall be organized into three main sections: User Menus, Service Menus and Advanced Menus. The system shall display user menus for: active alarms, event log, graphic data, unit view/status overview (including the monitoring of room conditions, operational status in % of each function, date and time), total run hours, various sensors and display setup and service contacts. A password shall be required to make system changes within the service menus. Service menus shall include: set points, standby settings (lead/lag), timers/ sleep mode, alarm setup, sensor calibration, maintenance/wellness settings, options setup, system/network setup, auxiliary boards and diagnostics/service mode. A password shall be required to access the advanced menus.

USER MENUS SHALL BE DEFINED AS FOLLOWS:

ACTIVE ALARMS

Unit memory shall hold the 200 most recent alarms with time and date stamp for each alarm

EVENT LOG

Unit memory shall hold the 400 most recent events with id number, time and date stamp for each event

GRAPHIC DATA VIEW

Two graphic records shall be available: return air temperature and return air humidity

UNIT VIEW - STATUS OVERVIEW

Simple or Graphical. Unit View summary displays shall include temperature and humidity values, active functions (and percent of operation) and any alarms of the host unit.

TOTAL RUN HOURS

Menu shall display accumulative component operating hours for major components including compressors, fan motor, humidifier and reheat.

MICROPROCESSORS SHOULD BE INTELLIGENT ENOUGH TO DO THE FOLLOWING TASK:

- Save Energy using Predictive Humidity Control
- Built-in Lead/Lag Functions for enhanced system reliability
- Wellness Calculation alerts service personnel before problems occur
- Unit to Unit (U2U) Communications allows Lead/Lag and optional teamwork settings for maximum flexibility and control
- Optional IntelliSlot cards offer external monitoring through Modbus RTU and HTTP/SNMP protocols

STANDBY SETTINGS/LEAD-LAG

Menu shall allow planned rotation or emergency rotation of operating and standby units.

TIMERS/SLEEP MODE

Menu shall allow various customer settings for turning on/off unit.

TEAMWORK MODES OF OPERATION

It saves energy by preventing operation of units in opposite modes multiple units.

AUXILIARY BOARDS

Menu shall allow setup of optional expansion boards.

DIAGNOSTICS/SERVICE MODE

Control input and output values and status shall be displayed to aid in unit diagnostics and troubleshooting.

Control inputs shall be indicated as on or off at the front display. Control outputs shall be able to be turned on or off from the front display without using jumpers or a service terminal. Each control output shall be indicated by an LED on a circuit board.

The unit shall also incorporate the following protections:

- Single phasing preventers.
- Reverse phasing
- Phase unbalancing
- Phase failure
- Overload tripping (MPCB) of all components

SAFETY INTERLOCKS:

Operation of heaters & humidifiers shall be possible only when blower fan is in operation.

Fire detection signal from fire detector system shall be able to switch off the package unit operation in event of fire in conditioned space.

REFRIGERANT PIPING:

Each refrigerant circuit shall be suitable for operation on R-407C/R410a and shall include the following items:

- a) Expansion valve with pressure equalization;
- b) Removable liquid line drier / filter.
- c) Liquid line sight glass with moisture indicator.
- d) Hand shut off valves.

SEQUENCING OF OPERATION OF UNIT: The Precision AC units for the room shall be clubbed in individual group, so that Stand-by unit should start on after specific time of operation of working unit, as well as during break down of working unit. This sequencing operation feature should be integral part

ELECTRICAL WORK: Each Precision AC unit should be provided with in-built electrical panel. Necessary 415 Volts +/- 10%, 3 Phase, 4 Wire (With Neutral), 50 Hz +/- 5% Power shall be provided by Customer at each unit's electrical panel. Balance distribution of Power is in the Scope of Bidder. All Electrical cabling should be of armored Copper.

BIDDER'S QUALIFICATION CRITERIA:

- Manufacturer should have experience in manufacturing & installation of Precision AC units in India for last 10 (Ten) years;
- Manufacturer should have ISO 9001, ISO 14001 Certification;
- Manufacturer should have installation base in the respective location for such Units and fully equipped Service center (For Precision AC units) to give prompt & efficient service;
- Bidder to furnish Partial list of Installations of Precision AC units in India.

MAKE OF MATERIALS FOR INTERIOR

<u>S.No.</u>	<u>Material</u>	<u>Approved Make</u>
1	Door Closers / Floor spring	Dorma / Ozone
2	Metal Ceiling	Armstrong / Daiken / USG
3	Paints	Asian / ICI / Dulux / Nerolac
4	Screws (Oxidized)	GKW
5	Furniture Hardware	Efficient Gadgets / Ebco / Ozone / 4C
6	Adhesive	Fevicol SH, Araldite, Vamicol
7	Mortise Locks	Dorma / Godrej / Ozone / Golden
8	Cement	Coromandel / L& T/ Zuar / Penna super
9	Frosted film	3M / Garwar / metamark
10	Vinyl	3M / LG / Armstrong
11	Toughen glass	Saint Gobain / Asahi / Modi
12	Hardware Fittings such as Hinges, Handle, Tower Bolts Castors etc.	SS: Garg / Dorma / Ingersoll / Rand / knob ozone

Make of Materials for Electrical

(As Listed Alphabetically)

S.No.	Details of Materials / Equipment	Manufacturer's Name
1.	Final Distribution Board	ABB MDS Legrand Siemens Schneider Electric (MG)
2.	Moulded Case Circuit Breaker (MCCB)	ABB (Isomax) Larsen & Toubro (D-Sine) MDS Legrand Schneider Electric (Compact MS) Siemens (3WL)
3.	Miniature Circuit Breakers (MCB)	ABB Hager (L&T) MDS Legrand Schneider Electric (MG) – Multi - 9 Siemens
4.	Power/Aux. Contactor	ABB Larsen & Toubro Schneider Electric (Telemecanique) Siemens
5	Protection Relay a. Numeric Type	ABB Areva Larsen & Toubro Prok Devices Pvt. Ltd. Siemens
	b. Electromagnetic Type	ABB Areva Larsen & Toubro
6.	Indicating Lamps LED type and Push Button	Larsen & Toubro (ESBEE) Schneider Electric (MG) Siemens Teknik Vaishno Electrical
7.	Overload relays with built in Single Phase preventer	ABB Larsen & Toubro

		Schneider Electric(Telemechanique) Siemens
8.	a. Electronic Digital Meters (A/V/PF/Hz/KW/KWH) with LED Display	ABB L & T Schneider Electric
	b. Dual Energy Meter with centralized metering & billing system	ABB Schneider Electric L&T
9.	Static Power Meter & Logger (SPML) With RS 485 port	Ducati IME Larsen & Toubro Schneider Electric
10.	PVC insulated XLPE aluminium/copper conductor armoured MV Cables upto 1100 V grade	Finolex Polycab Rallison Cables
11.	LT Jointing Kit / Termination	Raychem Safe Kit
12.	Cable Glands Double Compression with earthing links	Baliga Lighting Comet Cosmos
13.	Bimettalic Cable Lug	Comet Cosmos Dowell's (Biller India) Hax Brass (Copper Alloy India)
14.	PVC insulated copper conductor stranded flexible wires (FRLS) -	Finolex Polycab Rallison
15.	Mettalic / GI Conduit (ISI approved)	AKG BEC GUPTA NIC Vimco
16.	Accessories for Mettalic /GI Conduit (ISI approved)	Prakash Engineering Works Sharma Sales Corporation Super Sales Corporation
17	PVC Conduit & Accessories (ISI approved)	AKG BEC D Plast Duraline Polypack Precision
18.	Switch & Socket	Anchor(Viola) Italy MDS Legrand (Mosaic) MK(Blenze) Crabtree (Athena)
19.	Industrial Socket a. Splash Proof	Clipsal Gewiss MDS Legrand Neptune Balls RR-PCE Schneider Electric
	b. Metal Clad	BCH MDS
20.	Selector Switch, Toggle switch	Kaycee

		Salzer (Larsen & Toubro)
21	Invertor	Autopro (Professional Lighting) Emerson Sukam
22.	Cable Trays	Profab Engineer pushbak
23.	Fire Sealant & Fire Retardant Paint	BTHM Engineering Birla 3 M HILTI Promat
24.	Coaxial Cable	Beldon Comm-Scope (US Imported)
S.No.	Items	<u>Makes</u>
	<u>FIRE ALARM SYSTEM</u>	
1.	Fire Sensors & module	Honeywell - Esser Johnson Notifier Siemens
2.	Main Control Panel (Including the emergency voice evacuation, Repeater panel Graphic Display software)	Bosch Honeywell - Esser Johnson Notifier Siemens
3.	Manual call stations/ Hooters/ Strobes Multi tap speaker	Honeywell - Esser Johnson Notifier Siemens
4.	Public Address System and All Accessories	Bosch GE Honeywell – Notifier
5.	Sealed maintenance free batteries	Exide Global yuasa Amaraja
6.	Communication Cable - Indegenous	Batra Henlay Finolex Lappkabel Neolex Polycab RR Kabel Technoflex Caliplast
7.	Auto Dialer	Securico
8.	Response Indicator	Honeywell Siemens System Sensor
S.No.	Items	<u>Makes</u>
	<u>CCTV SYSTEM- IP</u>	
1.	NVR & Accessories including software	Honeywell Siemens
2.	CCTV- Cameras	Axis Sony Pelco Samsung Honeywell

3.	Monitor	Samsung, sony, LG
4.	Lenses	American Dynamics Axis Sony Pelco Samsung Honeywell
5.	L2 & L3 Switches	D-Link Cisco Lanbit
6.	Communication Cable/ Signal Cables /Control / power Cables- Indegenous	Finolex Fusion Polymers Lapp kabel Neolex Rajnigandha RR kabel Technoflex Caliplast
7	Metallic Conduits (MS/GI)	AKG BEC NIC Wimco
8.	Personal Computer	Dell Hewlet Packard IBM Wipro
9.	Color Monitor	LG Philips Samtron Samsung
10.	Printer	Hewlet Packard Cannon
11.	Mouse	Dell Logitech Microtek
S.No.	Details of Materials / Equipment	Manufacturer's Name
	<u>ACCESS CONTROL SYSTEM</u>	
1.	Door Controller & Software	Siemens, JCI, UTC, Honeywell
2.	Electric Door Strikes	Kaba Lock netics Miwa Lock Rutherford Trimec
3.	Cards and Card Readers	Siemens, JCI, UTC, Honeywell
4.	L2 & L3 Switches	D-Link Cisco Lanbit
5.	Communication Cable/ Signal Cables /Control / power Cables- Indegenous	Finolex Fusion Polymers Lapp kabel Neolex Rajnigandha RR kabel Technoflex
6.	Communication Cable/ Signal Cables /Control / power Cables- Imported	Belden Comscope- USA Southwest wire & Cable Volex

7.	Metallic Conduits (MS/GI)	AKG BEC NIC Wimco
8.	Personal Computer	Dell Hewlet Packard IBM Wipro
9.	Color Monitor	LG Philips Samtron Samsung
10.	Printer	Hewlet Packard Cannon
11.	Mouse	Dell Logitech Microtek

NOTE;PREFERENCE OF MAKES ,SUPPLY OF ITEMS SHOULD BE CONSULTED WITH CLIENT/CONSULTANT BEFORE EFECTING OF SUPPLY