



21<sup>st</sup> April 2025

To Whom It May Concern

Open Tender for Supply and Installation of Cleanroom, HVAC & Electrical.

This is an RFQ (Request for Quote) for the Supply and installation of Cleanroom, HVAC & Electrical as part of an open tender for the Centre for Nano Science and Engineering (CeNSE) at IISc, Bangalore.

CeNSE is a multidisciplinary research department at IISc that houses a 14,000 sq. ft. cleanroom and characterization facility used by 50 faculty members from various disciplines at IISc. CeNSE also runs a program called the Indian Nanoelectronics Users Program (INUP) which has allowed 4200 participants from more than 700 universities and institutes all over India to use the facilities at CeNSE. Consequently, any tool in CeNSE receives significant exposure to the scientific community at IISc and beyond. The vendors are requested to factor in the value of this exposure in their quotes. Details of existing facilities and the INUP program can be gleaned from: <http://nnfc.cense.iisc.ac.in/>  
<http://www.mncf.cense.iisc.ac.in/>  
<https://www.inup.cense.iisc.ac.in/>

### Terms and Conditions

1. Vendors must submit a technical proposal and a commercial proposal in **two separate sealed envelopes**. Only vendors who meet the technical requirements will be considered for commercial negotiation. **PLEASE MAKE SURE THE SITE VISIT IS DONE BEFORE SUBMITTING THE BID. ONLY BIDS FROM VENDORS WHO VISITED THE SITE WILL BE ENTERTAINED.**
2. **The deadline for submission of proposals is the 12<sup>th</sup> of May 2025, 5:30 pm Indian Standard Time.** Proposals should arrive at the Main office, GF-15, Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore 560012, India, by the above deadline.
3. The decision of the purchase committee will be final.
4. The Bidder should belong to either class 1 or class 2 suppliers, distinguished by their “local content” as defined by recent edits to GFR. They should clearly mention which class they belong to in the cover letter and provide all the required supporting documents.
  - a) Class 1 supplier: Goods and services should have local content equal to or more than 50%.
  - b) Class 2 supplier: Goods and services should have local content equal to or more than 20 % and less than 50%.
5. Bidders offering imported products will fall under the category of non-local suppliers. They cannot claim themselves as Class-1 local suppliers/Class-2 local suppliers by



- claiming services such as transportation, insurance, installation, commissioning, training, and other sales service support like AMC/CMC, etc., as local value addition.
6. Quote should come only from the Indian Original Equipment Manufacturer (OEM) or their Indian authorized distributor.
  7. MSMEs can seek an exemption to some qualification criteria. IISc follows GFR2017 for such details.
  8. The quotations should be on FOR-IISc Bangalore basis in INR only.
  9. Bidders offering imported products must submit an authorized letter of OEM with the particular tender name and address.
  10. The bidder should have local vendor support for installation.
  11. Purchase preference as defined by the recent edits to GFR (within the “margin of purchase preference”) will be given to the Class-1 supplier.
  12. The technical proposal should contain a compliance table with 5 columns. The first column must list the technical requirements, in the order that they are given in the technical configuration below. The second column should describe your compliance in a “Yes” or “No” response. If “No” the third column should provide the extent of the deviation (please provide quantitative responses). The fourth column should state the reasons for the deviation, if any. The fourth column should also contain the make and model of the components/parts to be used in the installation.
  13. Any additional capabilities or technical details that you would like to bring to the attention of the purchase committee can be listed at the end of the technical table.
  14. In the commercial bid, please provide the itemized cost of the different subsystems, along with possible breakups.
  15. Provide itemized costs for required spares for 2 years of operation. Please note, the cleanroom is expected to be operational 24x7 and breakdowns should be minimal or nil.
  16. As an additional option, provide the cost of an annual maintenance contract (AMC) for 1-year, post-warranty. The AMC must cover 1 scheduled and 1 emergency visit per year. The AMC cost must also include an itemized list of spares that are essential for the scheduled visits.
  17. The RFQ must include references to 3 previous installations, preferably in India. Please provide the names and contact addresses of the referees, so that the committee can contact them independently.
  18. The shutdown of the facility will not be more than 15 days for the Installation and Upgrade. Vendors are allowed to work both day and night shifts. The entire project should be completed within 6 months of the release of the PO.
  19. The offer shall be valid at least 90 Days from the date of opening of the commercial bid.
  20. Any questions can be directed to Mr. Gajendra M, Centre for Nano Science and Engineering, Indian Institute of Science, Bangalore 560012, India. (gajendram@iisc.ac.in)

## Technical Specifications

Sl.NO	Description	Unit	Qty
<b>A</b>	<b>HVAC</b>		
<b>1</b>	<b>Air Handling Unit</b>	Nos	2
	<b>AIR HANDLING UNIT (AHU) (Quantity–2Nos)</b> Scope of work included design, supply, installation, and commissioning of dedicated AHUs for Micro and Nano Characterization facility with the following specifications, TEMPERATURE: $22 \pm 2^\circ \text{C}$ RELATIVE HUMIDITY: $50 \pm 5\%$ Noise levels in room: $55 \pm 2 \text{ dB}$		
	<b>AHU CASING</b> 1) AHU shall be of modular construction and of draw-through type comprising a pre-filter section, a fine filter section, a cooling coil section, and a fan section. The framework shall be of extruded aluminum sections joined by molded high tensile reinforced plastic and shall be assembled to provide a sturdy, strong, and self-supporting framework for various sections. Each section shall be complete with its own independent base and mounted on 14-G galvanized sheet steel and aluminum die-cast channels. Zinc deposition on the GI sheets shall be a minimum of 120 GSM. 2) AHU shall be of double skin, with 45+5 mm thick PUF insulation sandwiched panel, 0.8 mm thick percolated GSS outer skin and 0.8 mm thick plain GSS sheet inside. The density of PUF insulation shall be a minimum $38 \pm 1 \text{ Kg/m}^3$ . 3) The framework for each section shall be joined together with a soft rubber gasket in between to make the joints airtight. 4) Suitable air-tight access doors with Aluminum die-cast heavy-duty hinges and locks shall be provided for various sections. The casing shall incorporate a thermal break profile and all other necessary design Features to ensure condensation does not occur during all seasons. 5) The AHUs shall have Sound attenuators at Suction and delivery of AHUs to reduce the sound to $50 \pm 2 \text{ dB}$ at the point of Use		
	<b>CIRCULATION FAN</b> 1) Fan Type: Direct driven, plug-type high-efficiency centrifugal fan. 2) The desired noise level should be reduced to $70 \pm 5 \text{ dB}$ or less by suitable sound attenuators on the supply and return air path. 3) Required Total static pressure: $150 \pm 2 \text{ mmWG}$ .		

	<p>4) The fan should have backward curved blades to improve efficiency.</p> <p>5) Fan blades should be made of Aluminum alloy for stability.</p> <p>6) The motor and fan assembly should be floor mounted and placed on extruded aluminum sections and vibration isolators to reduce amplitude to less than 25-50 microns.</p> <p>7) Motor Requirement: Adequately sized, TEFC Squirrel cage induction motor with VFD drive and suitable for 415V <math>\pm</math> 10%, 3-phase, 50 Hz <math>\pm</math> 5% AC power supply.</p> <p>8) The motor should be of high efficiency IE3 class as per IS12615–2011-NonFLP.</p> <p>9) The motor should be compatible for VFD operation.</p> <p>10) Flexible connection should be fabricated of neoprene coated flame proof fabric attached by screws or bolts at 6" interval should be provided. A flexible connection should be provided with sufficient material width to prevent interference with the free operation of the fan vibration system.</p> <p>11) Fan should be factory statically and dynamically balanced as required to achieve field balance levels.</p> <p>12) Epoxy-based coating shall be provided on all the surfaces of the ferrous fan housing.</p> <p>13) Vibration measurements should be made in three orthogonal areas at each bearing location. Where equipment configuration precludes measurement at the bearing, measurement should be made on the adjacent routine structure.</p> <p>14) Peak-to-peak displacement at the rotational frequency should be measured. Governing displacement should be at the rotational frequency of the fan. Controlling displacements at frequencies other than the rotational frequencies is not in compliance with the balance requirements.</p>		
	<p><b>COOLING COILS</b></p> <p>1) Cooling medium requirement: Chilled water at a temperature of 8<math>\pm</math>1 °C</p> <p>2) The velocity across the cooling coils should not exceed 2.25 m/s. Accordingly, the cooling coil area should be selected.</p> <p>3) Coils should be of seamless copper tubes with Al fins, eight rows deep, 12-13 fins/inch, copper header, flange connection, and SS 304 enclosure.</p> <p>4) Copper tubes should be 25<math>\pm</math>5% SWG and hydrostatically tested for 21kgpersq.cm.</p> <p>5) Cooling coil condensate tray should be of 14<math>\pm</math>5% SWG SS304 material.</p> <p>6) Vertically stacked Cooling coils should have SS 304 drip trays between</p>		

	<p>the SS pipe drain connection left at the drain tray and finally should be connected to the drain point with a suitable trap to check the ingress of outside air.</p> <p>7) Fouling factor requirement: 0.0002 hr.m<sup>2</sup> DegC/Kcal.</p> <p>8) Accessories requirement: Frame, support, inlet and outlet header, vent connection, and drain connection with valves, pressure gauges with valves at inlet and outlet, and their associated fittings.</p>		
	<p><b>HEATERS</b></p> <p>The AHUs should have an Electrical heater section to maintain the cleanroom temperature in the winter season.</p> <p>1) Strip/Tubular heaters of sufficient capacity should be selected in each AHU to maintain the area temperature.</p> <p>2) The heaters should be complete with a mounting frame, a Thermostat, a humidistat, and an air stat in a redundant arrangement, along with all control devices that will be controlled by thyristors.</p>		
	<p><b>FILTERS</b></p> <p>There should be three stages of filtration in the AHU. Specifications:</p> <ul style="list-style-type: none"> <li>• Filters face velocity should not exceed 2.25 m/sec.</li> <li>• The filter mounting frame should be made out of extruded aluminum material. The frame should be strong enough to withstand the weight of two people when climbing the frame during the filter replacement.</li> <li>• Between filter sections, a minimum spacing of 600 mm should be maintained.</li> <li>• Filters should have a quick release mechanism and a sealing gasket.</li> <li>• All the filters should have Al frame (flange type) with a module size of 600mm x 600mm (preferably):</li> </ul> <p>1) 1st Stage Pre-filters should be of G4 grade as per EN 779, non-woven synthetic material sandwiched between HDPE mesh on both sides with a minimum thickness of 150 mm, flange type with an initial pressure drop of 5 mm WG or less, suitable for cleaning with dry air or water jet.</p> <p>2) 2nd stage bag filters should be of F7 grade as per EN779, non-woven synthetic material sandwiched between HDPE mesh on both sides, and suitable for a minimum thickness of 300mm, initial pressure drop of 6-8 mm WG or less, suitable for cleaning with dry air or water jet.</p> <p>3) 3rd HEPA Filters should be of H14 grade, suitable for AHU capacity. Filter media should be microfiber glass. Efficiency required: 99.995% down to 0.3 micron. The filters should have an anodized aluminum frame with a module size of 600mm x 600mm (preferably). The filter</p>		

	media should be epoxy/PU bonded to the filter casing. Pressure drop < 15 mm of WG. Accessories Requirement: Frame, supports, sealing gasket (Neoprene gasket)		
i	1) AHU1 a. Total Supply air=8.796M3/sec b. Return air = 7.677 m3/sec c. Fresh air=1.119m3/sec d. Total fan Static=150mmWG e. 8 Row Cooling Coil Capacity = 30Tr f. Heater capacity=76.10Kw	Nos .	1
ii	1) AHU2 a. Total Supply air=5.349M3/sec b. Return air = 4.394 m3/sec c. Fresh air=0.955m3/sec d. Total fan Static=150mmWG e. 8 Row Cooling Coil Capacity=20Tr f. Heater capacity=46.28Kw	Nos .	1
	<b>Humidifier: Pan Type Humidifier</b> Construction: Tank made from 1.2mm or 2mm thick Stainless Steel 304 grade sheet, in welded construction with steam Inlet / Outlet / Drain / Overflow Nozzle, Top Cover Openable with S.S Bolts Heating Element: Electrical Resistance Immersion Type, S.S. tube, Nickel plated. Rating: 4KW x 3 Nos = 12KW. With 0.5 KW Additional Heater with Thermostat To maintain 75°C Temperature inside the tank Electrical Panel: Made from 18 Gauge CRC Sheet (Epoxy Painted), Main Incomer of suitable capacity (L&T make), Outgoing Contactor (L&T / ABB / Schneider make), Fault Indicating & R.Y.B phase Indicating lights (Esbee make), On / Off switch with light (Esbee make) Duly Factory wired. Controls: Level Switch – RC-61L for Low Level Cut out (with Nylon Ball), Float valve with SS Ball at Inlet connection. Thermostat for additional heaters (Range = 5 °C to 75 °C), Master Thermostat for total load (Range = 50 °C to 120 °C), Sight Glass provided to check water, Overflow valve. Insulation: 25mm thick fiberglass wool and clad with 22-gauge GI sheet.		
i	Humidifier 5.5Kg/Hr.	Nos .	1
ii	Humidifier 2.1Kg/Hr.	Nos .	1
<b>2</b>	<b>Chiller Unit</b>		



	<p>Supplying, installing, testing and commissioning of AHRI Certified Air-Cooled SCROLL WATER CHILLING UNITS of 40 TR capacity(actual) complete with twin screw design compressor with star-delta, squirrel cage induction motor, starter panel machine mounted, water. cooled condenser, insulated chiller, flow switch at chiller and condenser, neoprene pads, integral refrigerant piping and wiring, BMS interface unit Mod bus, counter flanges along with flanged connection for condenser and cooler water in/out connections, complete charge of refrigerant and oil, accessories as required and called for, automatic and safety controls mounted in central micro-processor based console panel and all mounted on a steel frame complete as per specifications. Motor shall be suitable for 415±10% 50 cycles. 3-phase AC supply and motor cable terminal box shall be suitable to connect copper Cabling. Refrigerant used shall be ozone-friendly HFC 134a/R410a as detailed in specifications. The first chiller shall be factory tested at design conditions at 100%, 75%, 50%, and 25% load.</p>	Nos	2
<b>3</b>	<b>Chilled water circulation Pumps</b>		
	<p>Chiller Water Pumps</p> <ol style="list-style-type: none"> <li>1) Quantity–2Nos.(1W+1S)</li> <li>2) Pump flow rate:600LPM@3Kg/cm<sup>2</sup>.</li> <li>3) Pump type: Horizontal centrifugal pumps.</li> <li>4) Heavy duty for continuous operation</li> <li>5) MOC: SS304</li> <li>6) Impellor: SS304</li> <li>7) Motor: Adequately sized TEFC, squirrel cage induction motor having a high efficiency rating IE3 Class and suitable for 415V + 10%, 3 Phase, 50 Hz + 5%.</li> <li>8) Pumps shall be horizontal, closed-coupled, single-stage, centrifugal, end suction with back pull-out design. Hence, the rotating unit can be removed and serviced without disconnecting the suction and discharge pipe.</li> <li>9) The noise level shall not exceed 75 dB at 1m from the source.</li> <li>10) Accessories: Pressure gauges at suction and discharge, isolating butterfly valves at suction and discharge, check valve, strainer, integral piping, base frame, foundation bolts, nuts, vibration isolator/rubber pads, etc. Pumps should be Horizontal end-suction Type.</li> </ol>	Nos	2
<b>4</b>	<b>Chilled water pipeline</b>		
	<p><b>Piping</b></p> <ol style="list-style-type: none"> <li>1) All the pipes shall be SS304 SCH10, PN10rated, all pipelines should be joined with TIG welded.</li> </ol>		

	<p>2) Square cut plain ends should be welded for pipes up to and including 100 mm Dia.</p> <p>3) All pipes 100 mm in diameter or larger should be beveled by 35 ° before welding. Pipe</p> <p><b>Supports/hangers.</b></p> <p>1) Pipe support should be provided and installed for all piping wherever indicated, required, or otherwise specified. Additional hangers and support shall be provided wherever necessary to prevent vibration or excessive deflection of piping and tubing.</p> <p>2) All vertical pipe supports should be made of 12mm M.S. rods, and the horizontal support should be of M.S. angles of 50x50x4 mm thick.</p> <p>3) Pipe supports should be adjustable for height and primed with rust preventive paint &amp; finished with black paint using the approved grade of paint.</p> <p><b>Joining</b></p> <p>1) All pipelines should be joined with TIG welded.</p> <p>2) All pipes 125 MM Dia. or larger should be beveled by 35 °. Before welding.</p> <p>1) The body of the check valves should be made from SS304 PN16 rated, single-piece casting in cylindrical shape.</p> <p>2) There should be two plates, which should be hinged in the center of the circle.</p> <p>3) Both plates should have springs attached to them to assist in the closing action of the valve.</p> <p>4) There should be a properly/designed metal-to-metal seal between the plates and the outer body, to ensure nonleaking sealing.</p> <p>5) The valve design should conform to API 594 or equivalent specifications.</p> <p><b>Strainers</b></p> <p>1) Strainers should either be pot-type or 'Y' type SS304 body PN 16 rated, tested up to the pressure applicable for the valves as per design.</p> <p>2) The strainers should have a perforated bronze sheet screen with 3 mm perforation and with a permanent magnet, to catch iron filings.</p> <p><b>Al Cladding Insulation</b></p> <p>All the chilled water lines shall be insulated with Puff 50mm thick insulation and clad with Aluminum sheet.</p>	Lot	1
	<p><b>TESTING</b></p> <p>1) In general, tests should be applied to piping before the connection of equipment and appliances. In no case should the piping, equipment, or</p>		



	<p>appliances be subjected to pressures exceeding their test ratings.</p> <p>2) The tests should be completed and approved before any insulation is applied. Testing of segments of pipe work should be permitted, provided all open ends are first closed by blank offs or flanges.</p> <p>3) After tests have been completed, the system should be drained and flushed 3 to 4 times and cleaned of all dust and foreign matter. All strainers, valves, and fittings should be cleaned of all dirt, fillings, and debris.</p> <p>4) All piping should be tested to a hydraulic test pressure of at least one and a half times the maximum operating pressure, but not less than 10 kg/cm<sup>2</sup>, for a period of not less than 12 hours. All leaks and defects in the joints revealed during the testing should be rectified to the satisfaction.</p>		
<b>5</b>	<b>Instrumentation &amp; Control</b>		
	1. Three-way flow control valve, complete with all the accessories and with a manual bypass line with an isolation valve.	Nos .	2
	2. All three areas/partitions shall have temperature sensors with an accuracy of $\pm 0.2$ °C or better and humidity sensors RH sensors with an accuracy of $\pm 1\%$ or better.	Nos .	3
	3. The cooling coil water-inlet and water-outlet shall have temperature sensors cum transmitters.	Nos .	2
	4. Pressure gauges with isolation ball valves at the inlet and outlet of the coils. In order to ensure protection, a temperature gauge should come with a thermowell.	Nos .	4
	5. Pressure gauges with isolation ball valves at the inlet and outlet of all the pumps	Nos .	4
	6. Differential pressure sensor across pre-filters and fine filters.	Nos .	6
	7. VFDs for AHU fans. HMI control panel is used to monitor temperature, T, humidity, and RH of all partitions/rooms. AHU supply air volume shall be varied based on the room exhaust flow rates.	Nos .	1
<b>6</b>	<b>AIR DISTRIBUTION SYSTEM: DUCTS, GRILLS &amp; DIFFUSERS DUCTS AND INSULATION</b>		
	<b>HVAC Ducting Distribution</b>		
	<p>Duct Specifications:</p> <p>Complete supply air ducting, including the flexible ducting connecting the solid duct work with filters collar and return air ducting, is covered under the scope of work.</p> <ul style="list-style-type: none"> <li>• Dust shall be made from GI sheet of lock forming quality having Zinc Coating as per ASTM A-525 G90.</li> <li>• The ducts shall be constructed as per the SMACNA standard.</li> <li>• The ducts shall be designed for 100 mm of WC pressure.</li> <li>• The ducts will be used for clean room class 100 environments. To</li> </ul>		

	<p>meet this requirement, the GI sheet for manufacturing the ducts shall be totally oil-free.</p> <ul style="list-style-type: none"> <li>• Velocity for Supply Air shall not exceed 1500 fpm and return air shall not exceed 1000 fpm. Ducting shall be complete with dampers, vanes, anchor fasteners, supports, access doors, neoprene rubber gaskets, etc.</li> <li>• All the ducts shall be supported with the building structure with GI threaded rods of 10mm diameter and spring isolators of GI or coated, suitable for clean rooms.</li> <li>• Ducting shall include dampers, supports, Isolators etc.</li> <li>• All duct supports and reinforcement shall be galvanized.</li> <li>• All the dampers shall be aluminum anodized.</li> <li>• The duct sections shall be joined with Angle iron flange joints.</li> <li>• All the edges with min or leaks should be sealed with silicone sealant.</li> <li>• A duct inspection window is to be provided in the main ducts and plenum boxes. The inspection windows should be leak-proof and easy to open/close.</li> <li>• The duct fabrication work shall be carried out in a dust-free environment. Sheet Specifications: Unless otherwise directed, all duct work, sheet metal thickness, and fabrication shall strictly meet requirements, as described in IS: 655-1963 with amendment-I (1971 edition).</li> </ul>		
	22G Ducting	Sqm	130 0
	<p>Flexible Duct Work</p> <ul style="list-style-type: none"> <li>• Insulated, flexible duct work shall be installed from the AI supply duct work to each HEPA filter ceiling module.</li> <li>• The flexible duct work shall be sealed and secured at each filter module and sheet metal collar utilizing stainless steel flexible duct bands and duct band locks.</li> <li>• The diameter of the flexible duct shall be 12" (approx.) matching the air inlet collar size.</li> <li>• Flexible ducting shall be heavy duty suitable for +2500 Pa of air pressure and 30m/s air velocity.</li> <li>• Material of duct: Multiple layers of Al-polyester laminated with spring steel wire helix.</li> </ul>		
	Flexible duct dia 250mm	Rmt	120
	<p><b>Volume Control Damper</b></p> <ul style="list-style-type: none"> <li>• At the junction of each branch duct with main duct and split of main</li> </ul>		

	<p>duct, volume dampers must be provided. Dampers shall be two gauges heavier than the gauge of the large duct and shall be rigid in construction.</p> <ul style="list-style-type: none"> <li>• The volume dampers shall be of an approved type, lever operated, and completed with locking devices that will permit the dampers to be adjusted and locked in any position and clearly indicate the damper position.</li> <li>• The dampers shall be of splitter, butterfly or louver type. The damper blade shall not be less than 1.25 mm (18) Gauge, reinforced with 25 mm angles 3 mm thick along any unsupported side longer than 250 mm. Angles shall not interfere with the operation of the dampers, nor cause any turbulence.</li> </ul>	Nos.	55
	<p><b>Fire Dampers</b></p> <ul style="list-style-type: none"> <li>• Automatic fire dampers to be provided wherever required as per the safety standards. The damper shall be a multi-blade louver type. The blades should remain in the air stream in the open position and should be constructed with a minimum of 1.8 mm-thick galvanized sheets. The frame should be 1.6 mm thick. Other materials shall include a locking device, a motorized actuator, a control panel to trip the AHU motor, etc.</li> <li>• The fire dampers shall be capable of operating automatically on receiving signal from a fire alarm panel. All control wiring shall be provided between fire damper and electric panel.</li> <li>• A hinged and gasket access panel measuring at least 450mmx450 mm shall be provided on duct work.</li> </ul> <p>Before each reheat coil and at each control device that may be located inside the ductwork.</p>	Nos.	4
7	<b>Thermal Insulation</b>		
	<p>Duct Insulation</p> <ul style="list-style-type: none"> <li>• Supply &amp; Return Air Duct Thermal Insulation with Aluminum foil-faced self-adhesive, closed-cell, Nitrile Rubber Insulation, with proper sealing of joints filled with silicon sealant. Insulation of duct exposed to atmospheric/ambient conditions using aluminum-faced closed-cell Nitrile rubber, Class 'O' fire rating, density not less than 50 Kg/m<sup>3</sup>. All joints shall be sealed with 75 mm-thick aluminum tape.</li> </ul> <p>Supply Air Duct: 19 mm thick. Return Air Duct: 19mm thick.</p> <ul style="list-style-type: none"> <li>• Al-Cladding: HVAC ducts exposed to UV light shall be cladded with Aluminum Sheets of suitable gauge.</li> </ul>		
I	• 19mm thick for Supply air ducting	Sqm	700

II	• 19mm thick for Return air ducting	Sqm	700
8	• <b>Supply and Return Air Grills with Plenum Boxes</b>		
	<b>• Standard Grills</b> • The supply and return air grills shall be fabricated from extruded aluminum sections. The air grills shall have single/double louvers. The front horizontal louvers shall be of an extruded fixed/adjustable type section. There is a vertical louver where required, which shall be of aluminum extruded sections and an adjustable type. The return air grill shall have a single horizontal extruded section with fixed louvers. The grills may or may not have an outer frame. • The damper blades shall also be of extruded aluminum sections. The grill flange shall be fabricated out of the aluminum extruded section. Grills longer than 450 mm shall have intermediate support for the horizontal louvers.		
I	<b>Supply Air grill</b> The linear diffusers/grilles shall be fabricated from Aluminum extruded sections. The diffusion blades shall be extruded, flush-mounted type with single or double direction air flow. The frame shall have an aluminum extruded section and shall hold the louvers tightly in a fixed position. The dampers as described under grilles shall be provided wherever specified. Includes GI Plenum Box	Nos	55
ii	<b>Return Air Grill</b> The linear diffusers/grilles shall be fabricated from Aluminum extruded sections. The diffusion blades shall be extruded, flush-mounted type with single or double direction air flow. The frame shall have an aluminum extruded section and shall hold the louvers tightly in a fixed position. The dampers as described under grilles shall be provided wherever specified.	Nos	55
9	<b>Electrical</b>		
	<b>HVAC Electrical Panels</b>		
	1) HVAC Electrical Panel: General Design Considerations a) System configuration i Voltage Supply: 415V± 10% ii.Frequency:50Hz±5% iii. Number of Phase and grounding: 3Phase & Solidly grounded earth iv. Power Distribution: A.C., 3 Phase 4 wire for 3 Phase system, 1 Phase 3 wire system b) Code & Standards: All electrical equipment and accessories to be furnished, installed, and commissioned shall be designed,		

	<p>manufactured, tested, and installed in accordance with relevant Indian Standard Specifications (ISS), Indian electricity rules, and any other applicable regulations.</p> <p>2) Cabling for electrical supply from the wall-mounted electrical panel to the respective AHUs/Chillers/Pumps/humidifiers shall be armored copper cables.</p> <p>3) Copper lugs should be used for cable termination.</p> <p>4) The bus bar for the incoming should be of Copper.</p> <p>5) Cabling for all the equipment shall be laid through a GI ladder or conduit</p> <p>6) AHU blower should operate on VFDs</p> <p>7) Heater control should be through Thyristors</p> <p>8) Star-delta starter for chilled water pumps</p> <p>9) Electrical Panel with bypass arrangement, DOL/SD type electrical control panel, and provision of a Microprocessor controller with display for Temperature, RH controlling, monitoring with status (AHU) interlocking with 3 3-way modulating valve &amp; Strip heater system, and SCR for Heater controllers. Provision for: a) AHU (Heaters, Blower, Humidifier) b) Pumps c) Chillers d) Compressor e) Process Cooling Water system</p> <p>10) AHU panel Interlocks:</p> <p>a. Flow Switch-1nos</p> <p>b. AHU Door interlock-1nos</p> <p>c. Smoke and Fire interlock-1nos</p> <p>d. Thermal Interlock-1nos</p> <p>e. Access control Emergency interlock-1nos.</p>		
	<p><b>HVAC Electrical DB:</b> Supply, Installation, Testing, and commissioning of a floor-mounted type 14swg CRCA powder-coated electrical control panel with main incomer MCCB and provision for a Microprocessor controller with HMI (refer to the I/O points mentioned in the Technical Specifications, PLC panel with HMI). HVAC electrical DB will have the following provisions.</p> <p>1) AHU Blower-VFD-3Ph-2nos.</p> <p>2) Chiller unit-41Kw, 3Ph-Contactor-2nos.</p> <p>3) Heater-SSR-90, 50Kw 3Ph-2nos.</p> <p>4) Pumps-7.5Kw, 3Ph-Contactor with Star Delta Starter-2nos.-</p>		
	<p><b>PLC Panel With HMI</b></p> <p>Dedicated HVAC BMS system with HMI panel shall be with the following I/O's.</p>	Nos.	1

	<b>Interlocks</b> 1) AirFlow Switch-2nos 2) Room Air temp. and RH 3) Chiller interlocks (Provision only) 3) AHU Door interlock-2nos 4) Chiller-Pump Interlock-2nos 5) Smoke and Fire-2nos 6) Thermal Interlock-2nos 7) Access control Emergency interlock-2nos.		
10	<b>Electrical Cabling and Accessories (Cables, wire, conduit, Earthing, Switch boards, Switches/Sockets, etc.)</b>		
	<b>Cables</b> The scope includes the Supply and installation of ISI-marked PVC/XLPE-insulated, extruded PVC inner sheath, GI strip-armed overall FRLS PVC outer sheathed, on wall/surface/existing cable tray as required, as per the detailed specification and quantity in the BOQ. Control cables shall be copper conductor, PVC insulated, and power cables shall be XLPE insulated. The necessary hardware for the installation of cable, such as cable ties, clamps, tags, etc. It will be in the scope of the vendor. Make of power/control cable shall be Polycab/ Havells/ KEI/NICCO/CCI/National/gloster/Ecko. Instrumentation cables shall conform to BS 5308, type II, 300/500 Grade with stranded 0.75sq mm copper conductor, PVC insulated, color-coded, twisted to form a pair/pairs, twisted to form a unit, units laid up, mylar taped binding, overall screened with aluminum mylar tape with tinned copper drain wire, extruded inner sheathed, galvanized steel round wire/strip armored, overall FRLS PVC sheathed.		
	<b>Wire</b> The scope includes the supply and installation of stranded copper conductor wire, 1100-volt grade, and FR PVC insulated single core conforming to IS 694 as per the detailed specification and quantity in the BOQ. Conduit: The scope includes the Supply and installation of ISI-make rigid steel, hot-dip galvanized conduits of different sizes, quantities, and specifications as per the BOQ. The conduit shall be installed on the wall/surface/ metal truss/existing cable tray, as required. Flexible conduit shall be made with bright, cold-rolled, annealed, and electro-galvanized mild steel. Installation of conduits shall include all necessary hardware, metal strip, welding, Clamps etc.		



i	Cabling for AHU Blower Interlock and Emergency Light-2nos.- 2.5mm <sup>2</sup> , 3Core Cable	Rmt	60
ii	Cabling for <b>modulating</b> valve-2nos.-1.5mm <sup>2</sup> shielded 3Core Cable	Rmt	60
iii	Cabling for <b>Pumps</b> -7.5KW-2nos.-4mm <sup>2</sup> , 4core Cable-2nos	Rmt	100
iv	Cabling for <b>Duct Temp Sensor</b> -2nos 1.5 mm <sup>2</sup> shielded 3Core Cable-2sets	Rmt	60
v	Cabling for Differential pressure sensor 1.5mm <sup>2</sup> shielded 3Core Cable-9sets	Rmt	270
vi	Cabling for-Flow sensor-3Nos. 1.5mm <sup>2</sup> shielded 3Core Cable-2nos	Rmt	60
vii	Cabling for-Room Temp and Rh-3Nos. 1.5mm <sup>2</sup> shielded 3Core Cable-3sets	Rmt	150
viii	Cabling for-Water Thermal Sensor-2Nos.-1.5mm <sup>2</sup> shielded 3Core Cable	Rmt	100
ix	Cabling for Chillers 16mm <sup>2</sup> cable 4Core cable-2sets	Rmt	120
x	Cabling for AHU Blower 18Kw-2nos-4core 6mm <sup>2</sup> cable-2sets	Rmt	60
xi	Cabling for Heaters-3Ph, 75Kw-25mm <sup>2</sup> , 3Core cable-3sets	Rmt	30
xii	Cabling for Heaters-3Ph, 50Kw-16mm <sup>2</sup> , 3Core cable-3sets	Rmt	30
xiii	Cabling for HMI Panels 1.5mm <sup>2</sup> shielded 3Core Cable	Rmt	70
xiv	GI Perforated Trunking with supporting System	Rmt	90
G	<b>Misc</b>		
1	Scaffolding Charges for duct erection	Nos	1
2	Duct Supporting System	Kgs	300
3	Wall Openings for Duct Entry	Lot	1
4	Engineering, Design, and drawings	Lot	1
5	Documentation	Lot	1
6	Commissioning and validation	Lot	1
7	Packing, forwarding, and Transportation	Lot	1
8	Housekeeping	Lot	1
	<b>Optional items, but mandatory to submit the technical and commercial bid</b>		
1.1	<b>Cleanroom Solid Wall Panel for Class 10000</b>		
	Supplying & Fixing of Progressive type Solid Double skin modular 100mm thick Solid wall panel for partitions and wall panelling, made of 0.8 mm thick Powder coated sheets on both sides with PUF as infill of density 40 ± 2 kg /m <sup>3</sup> , GI Profiles for reinforcement along the periphery with bottom track, and necessary arrangements, All Joints shall be sealed with cleanroom compatible Neutral Grade Silicon Sealant.	Lot	1
1.2	<b>Cleanroom Return Air Riser Wall Panel for Class 10000</b>	Lot	1

	Cleanroom Return Air Riser wall panel with inbuilt Return Air Risers of not less than 0.8 mm thick Powder coated GI sheet (hot dipped with zinc coating of 120 gsm), Return air risers shall be minimum 800x70mm to be provided with a minimum of 15mm puff insulation on both side of riser, within the wall panel. Risers with adjacent ceiling heights to extend a minimum of 200mm high above the top of the false ceiling with a minimum 25mm flange.		
1.3	<b>Cleanroom Ceiling Panel for Class 10000</b>		
	Cleanroom Ceiling panels shall be Progressive type Double skin modular 75 mm thick Ceiling wall panel made of 0.8 mm thick Powder coated sheets on both sides with PUF as infill of density $40 \pm 2 \text{ kg/m}^3$ , GI Profiles for reinforcement along the periphery with bottom Aluminium track, and necessary arrangements, All Joints shall be sealed with cleanroom compatible Neutral Grade Silicon Sealant.		
	Ceiling panels are suspended by threaded tension bars with adjustable turnbuckles fastened to the overhead support at fixed intervals to withstand 150-200 Kg per sq. meter		
1.4	<b>Cutout in Wall &amp; Ceiling Panels</b>		
	Suitable factory-made cut-outs wherever required shall be provided in the wall panel and ceiling panel as applicable for fixing HEPA filters with Modules, light fixture, return air grills, power sockets, communication outlets, LAN outlets, cables, pipes, exhaust ducts, Magnehelic gauge, smoke sensors, pendants, utilities etc., are also to be included in the quotation after conducting an inspection to the proposed clean room and utility.		
	Factory-made wall cut-outs for switches and sockets and includes one conduit per cut-out. Quantity and size as per requirement. The quantity will be as per the electrical design and will be finalized upon drawing approval.		
	Factory-made ceiling cut-out for HEPA Modules (with lip as per HVAC design). Quantity and size as per requirement. The quantity will be as per the HVAC design and will be finalized upon drawing approval. Each 0.74 SQM (1200 mm X 600 mm).		
	Factory-made ceiling cut-out for Light Fixtures (with lip as per electrical design). Quantity and size as per requirement. The quantity will be as per the electrical design and will be finalized upon drawing approval. Each 0.36 SQM (600 mm X 600 mm)		
1.5	<b>Clean room Window Modules</b>		
	Windows and door vision panels should be formed from double-glazed toughened glass composite modules. View panels of size 900 x 900 mm shall be provided in wall panels - View panels glass shall be at least 5		

	mm thick, toughened Glass with a Ceramic border of 20mm width. View panels shall be fixed flush to both faces of the wall panels. - No crevices/joints/sloped profiles should be used to fix the glass to avoid particle contamination and dust accumulation.		
1.6	<b>Clean room Doors</b>		
	Clean room Doors shall be 44 mm thick doors flush on one side, made of static-dissipative type powder-coated door frames 1.2mm thick, totally flush with the wall panels - Concealed hardware for fixing the door frames. - In place of PUF/ Honeycomb is used to give effective acoustic and thermal insulation.		
	Stainless steel double bearing butt hinges as per BS 7352 CLASS 9 - Mortise dead locks with all ancillaries like door closer, lock & key, hinges, d-handle, push plate, drop seal & tower bolt with view glass of size 0.4m x 0.6m. Door sets should match the partition modules.		
1.7	<b>Coving</b>		
	All the Covings (Inner and Outer Coving) are Extruded Aluminium Powder Coated /Anodized clip-on type covings of R-50mm. Coving shall be used at wall-wall and wall-ceiling joints and wall-to-floor.		
	Coving Corner Pieces: All the Inner and Outer 3D & 2D corner pieces are Aluminium powder-coated finish.		
1.8	<b>ESD Flooring</b>		
	The electrostatic dissipative flooring should be provided for Cleanroom Class 100 & 1000 areas with the specification below: -		
	· The anti-static floor material shall have a Resistance level of $1 \times 10^9$ ohms		
	· Load carrying capacity of the material shall be 750PSI (min.) conforming to BS 2050.		
	· The joints shall be welded by thermo-chord weld.		
	· The flooring shall include providing and laying (P/L) a suitable copper strip (foil) grid of size 3' x 3' (approx.) as recommended by the manufacturer and connecting to the dedicated earthing		
	Work includes preparation of the existing surface with suitable (compatible for clean room application) floor levelling material so as to make the surface free from any undulations.		
1.9	<b>Dedicated Earthing for ESD Flooring</b>		
	ESD Flooring includes dedicated earth pit accessories and an Interconnecting Copper strip 30x5 mm thick.		
	The vendor has to ensure that a 0.1-ohm resistance can be achieved at		

	the cleanroom point.		
1.10	<b>Cleanroom lights</b>		
	<b>Class 10000 Lights</b>		
	Cleanroom-compatible LED lights. The envisaged Lighting level in clean rooms is 500 Lux, at 90 cm above the floor. Lights must be openable towards the inside of the room. Dimensions: 600 x 600 mm Power: 42 W		
1.11	<b>HEPA filter</b>		
	<b>HEPA filter module</b>		
	The Clean Room ceiling system shall include HEPA filter ceiling modules as indicated on the drawing.		
	<ul style="list-style-type: none"> <li>The filters will be used as a terminal air distribution device. The air supply plenum shall be connected directly to a connecting collar on the filter top with an individual damper in the plenum and flexible ducts.</li> </ul>		
	<ul style="list-style-type: none"> <li>The filters shall H13 class filters as per EN1822 with an efficiency of 99.95%.</li> </ul>		
	<ul style="list-style-type: none"> <li>The design Air velocity through filter shall be 0.45m/s with IPD of 100±5% Pa or better.</li> </ul>		
	<ul style="list-style-type: none"> <li>The frame of the filter shall be of Extruded Anodized Aluminium construction.</li> </ul>		
	<ul style="list-style-type: none"> <li>The filter media shall be Glass Fibre with hot melt separator.</li> </ul>		
	<ul style="list-style-type: none"> <li>The filter shall have expanded sheet metal face guard. The face guard shall be powder coated in off-white colour.</li> </ul>		
	<ul style="list-style-type: none"> <li>The filter shall be having endless polyurethane D-profile, Liquid pour to solid in extrusion profile seal at the outlet.</li> </ul>		
	<ul style="list-style-type: none"> <li>All the filters shall be individually tested according to EN1822 and computerized scan test report should accompany each filter.</li> </ul>		
	<ul style="list-style-type: none"> <li>The filter shall be held in place utilizing 'hold down' devices with the Ceiling grid using channel on the filter top and T-bolts in the ceiling grid pressing the filter against ceiling grid.</li> </ul>		
	<ul style="list-style-type: none"> <li>All filter modules shall be complete with air inlet collar of 12" diameter (approx.).</li> </ul>		
	<ul style="list-style-type: none"> <li>Top sheet should be of G.I./Aluminium single piece drawn with seamless neck. In case, neck is not seamless, neck joint to the top sheet be a proper leak proof joint and with the capability of supporting a person standing on the top surface.</li> </ul>		
	<ul style="list-style-type: none"> <li>Filter media shall be bonded to extruded aluminium cell sides. Dimensions :1210 L x 600 D x 60 mm H</li> </ul>		
	<b>Fan Filter Units</b> Fan Filter module with HEPA filters. These FFM's are self-		

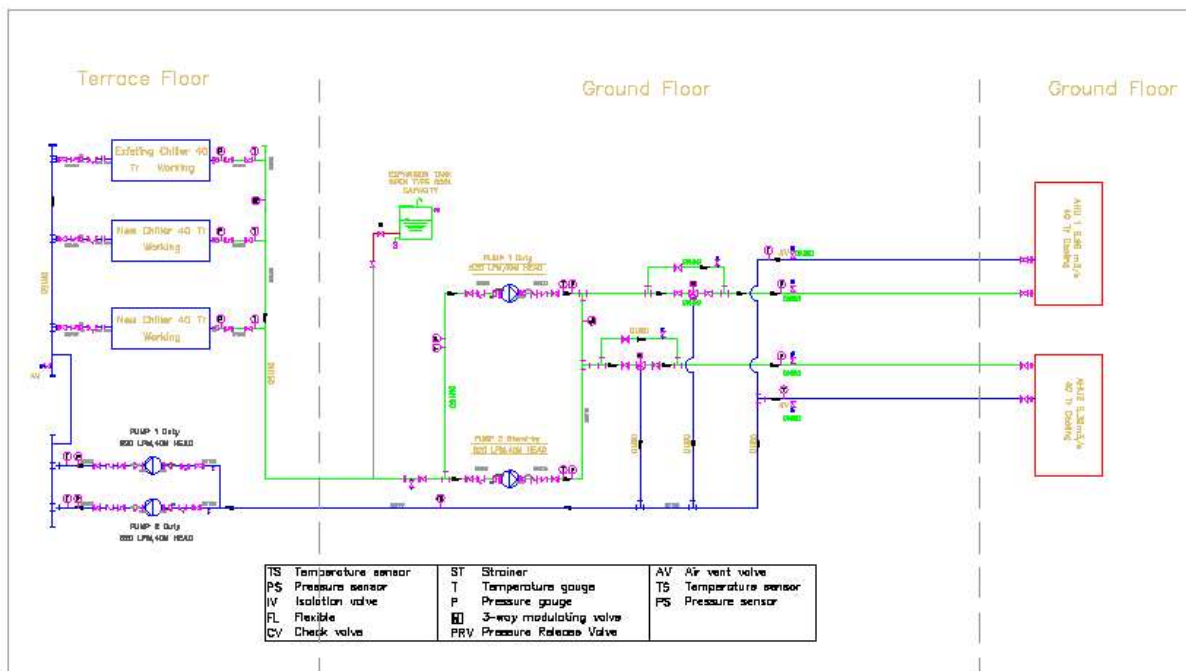
	<p>powered grid module with modular design, to fitting in standard T grid ceiling. Total height is 320mm. The Fan Filter Module is U.L listed and CE certified. FFU speed can vary from 0.2 to 0.5m/s and air flow rate vary from 460-760 CFM. The sound level will be 55dB's when measured from 760mm below from filter face. The vibration level is 0.9mils.The Fan motor drive will be direct drive, forward curve centrifugal type with sealed bearing. The motor will have permanent split capacitor type, rated for continuous operation with thermal overload protection with two speed switches. The power requirement is 230V, 50Hz single phasewith maximum current of 1.9A with 280watts power input. The fan/motor assembly is capable of delivering air at filter pressure of 9mm to 23mm final state. These FFM will have a speed controller for increasing the speed of the motor/blower from low, medium and high. Dimensions :1215 Lx 600 D x 350 mm HFFU Material of construction: Al Zinc AlloyULPA filter: Ulpafilters U15 are rated 99.9995% efficiency in removing 0.3<math>\mu</math> or larger particles. IPD of 120<math>\pm</math>5% Pa or better. Leak free in accordance with latest I.E.S recommended particle. The filter media is micro glass fibre with a poly-string separator, sealed to the casing. The filter guard is provided with a diamond-pattern expanded sheet for protection. Dimensions :1210 L x 600 D x 60 mm Pre-filters are rated 90% efficiency in removing 10-to-15-micron particles. Pre-filters are made from non-woven materials.Dimensions :550 L x 600 D x 50 mm H</p> <p><b>ROOM CONDITIONS REQUIRED</b>  ROOM CLASIFFICATION: Class100000  TEMPERATURE: 22<math>\pm</math>2<math>^{\circ}</math> C  RELATIVE HUMIDITY: 50<math>\pm</math>5%  DIFFRENTIAL PRESSURE: 20Pa</p>		
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A. Recommended makes for the HVAC system:

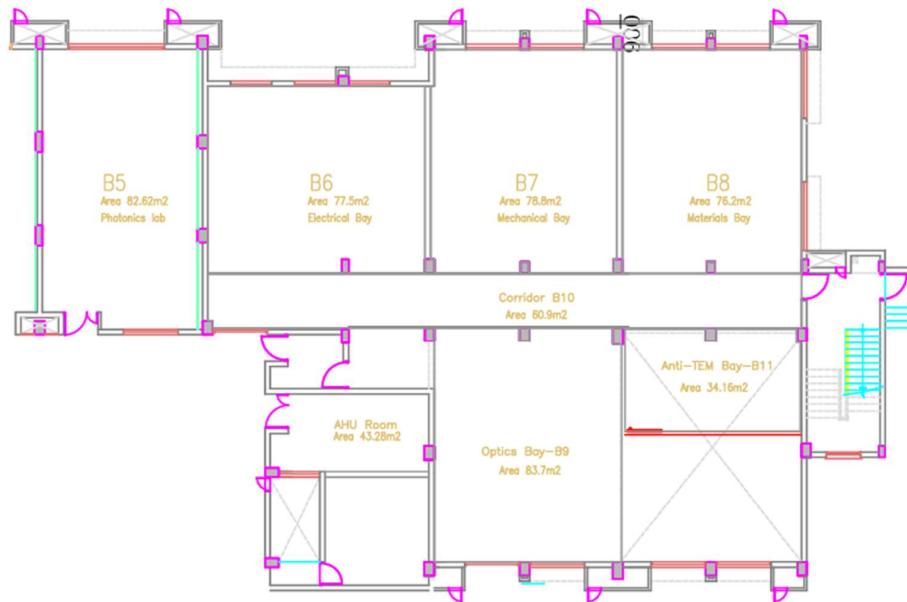
Sr. No.	Description	Makes
1	Air handling unit (AHU)	VTS/trane/Zeco
2	Motors for AHU	Crompton/ Greaves/ ABB/ Siemens/ Schnider
3	Chillers	Daikin, Trane, Mcquay, Carrier.
4	Starter	Siemens/ ABB/ L&T/ Schneider
5	Fire dampers	Air Master/ Caryaire/ Ajanta/ System Air/ Cosmos
6	Pan type humidifier	Rapid cool/ nordamann/ walter meier/ appidi
7	Ducting – GI Sheets	SAIL/TATA/Jindal
8	Duct insulation	Armaflex/k flex/supreme/aeroflex/ trocellene
9	Butterfly & ball valves	Regin/Siemens/ L&T/GEC/BDK/ZOLOTO
10	3-way, mixingvalve	Honeywell/Siemens/Johnson/Belimo/Regin
11	Balancing valve	L&T/Advance/Bell & Gossett/Tour & Anderson
12	Y-Strainer	Sant /DS Engg/Lehry/ASIAN/ZOLOTO
13	Pumps	Johnson/ Grundfos /Armstrong/ wilo, Blue Star
14	Pipe SS	TATA/Jindal
15	Pressure and Temperature gauges	WIKA/FORBE MARSHALL/HGURU/WAREE/BAUMER



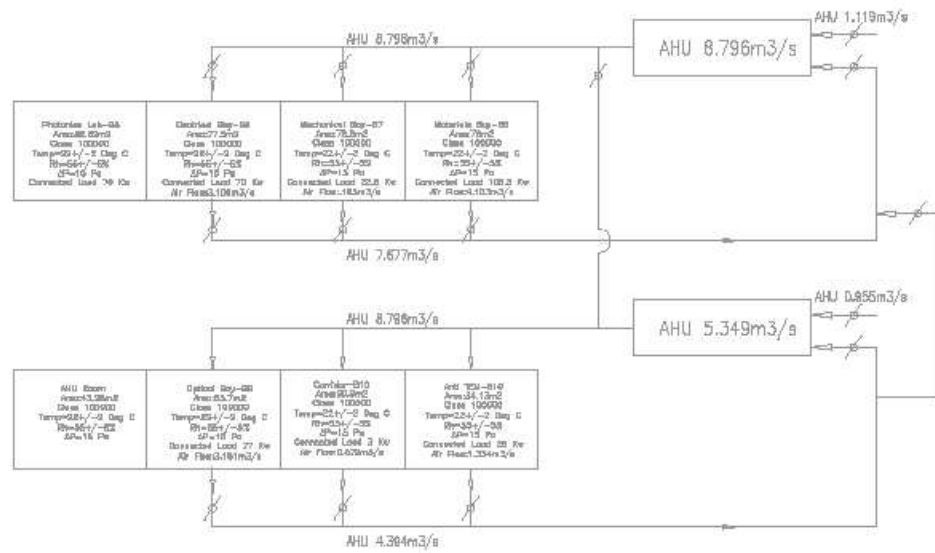
## Annexure 1



## Layout Drawing



## HVAC Flow Drawing



\*(To be submitted In the company letter head by supplier)

## **Declaration of Local Content by Local supplier**

**Subject:** Public Procurement (Preference to Make In India)

**References:**

Preference to Make in India including counter offering will be as per the Public Procurement (Preference to Make in India), Order 2017 available in the following links <https://dipp.gov.in/public-procurements>

[http://dipp.nic.in/sites/default/files/publicProcurement\\_MakeinIndia\\_15June2017.pdf](http://dipp.nic.in/sites/default/files/publicProcurement_MakeinIndia_15June2017.pdf)

[http://dipp.nic.in/sites/default/files/Revised-PPP-MII-Order-2017\\_28052018.pdf](http://dipp.nic.in/sites/default/files/Revised-PPP-MII-Order-2017_28052018.pdf)

[https://dipp.gov.in/sites/default/files/PPP-MII%20Order%20dt%2029th%20May%2019\\_0.pdf](https://dipp.gov.in/sites/default/files/PPP-MII%20Order%20dt%2029th%20May%2019_0.pdf)

<https://dipp.gov.in/sites/default/files/PPP%20MII%20Order%20dated%204th%20June%202020.pdf>

We hereby declare with reference to above subject and references that

M/s ----- (Tick whichever is applicable as below)

"Class-I local supplier" meeting the requirement of minimum local content equal to 50% (fifty percent) or more defined in the above government notification for the goods and services

(or)

"Class-II local Supplier" meeting the requirement of local content 20% to less than 50% (fifty percent) defined in the above government notification for the goods and services

(or)

Non Local supplier (If not belonging to Class-I & Class-II)

Please mention the details against the following:

Enquiry no:----- dated. -----

Type of Supplier (Class-I/Class-II) .....

Product:-----

Project:.....

Details of location at which local value addition will be made is as follows:

We also understand that the false declarations will be in breach of the code of Integrity under rule 175(1)(i)(h) of the General financial rules for which a bidder or its successors can be debarred for up to two years as per Rule 151(iii) of the General Financial Rules along with such other actions as may be permissible under law.

Authorized Signature M/s-----

(Signature and seal)

Place:.....

Date:.....