

**BOSE INSTITUTE
KOLKATA**

Tender ID : 2017_BIK_241019_1

Tender Reference Number : BI-K/E-TEND/24/2017-18

Tender Title : Building of 10000 class clean room for gas
detector fabrication

ADDENDUM

**Addendum to the Technical Specification
to be considered for bidding.**

Existing specification may please be ignored.

Serial No.	Description of Items	Specification		
1.	Required Cleanliness Classification	Class 10,000 (Cleanliness, temperature, pressure and relative humidity must be regulated)		
		Class 100,000 (It should have filtered air shower to remove dust particle from clothes of users)		
		Dress change room (With air condition)		
2.	List of proposed equipment in the specified area	Class 10,000	<ol style="list-style-type: none"> 1. Gas line (N₂, Air and one more) 2. Vacuum cleaner 3. One cabinet 4. Granite table 5. One automatic temperature controlled box 6. Laminar flow table 	
		Class 100,000	<ol style="list-style-type: none"> 1. Gas lines (Ar, CO₂, 3 other gases) 2. One rotary pump (15A socket) 3. Ultrasonic bath cleaning system (15A socket) 4. Vacuum cleaner 	

			5. Electronics Rack (19 inch) 6. One cabinet	
		Dress change room	1. Water basin, soap stand 2. Cabinet for keeping cleanroom cloth 3. Cabinet for accessories of cleanroom cloth 4. Chair for shoe change Shoe rack	
3.	Control and monitor of ambient parameters in class 10,000 area	Temperature	23°C ±2°C	Pressure : 15-20 Pa RH : Details could be found in Section II-A (Specification of AHU)
		Pressure	10-15 mbar (positive pressure)	
		Relative humidity	50% ± 5% (non-condensing)	
4.	Lighting in class 10,000 and class 100,000 area	Standard light intensity inside the clean room. Clean room compatible white light must be fitted to the false ceiling.		
5.	Internet and telephone line	The vendor should install telephone and internet lines with wall sockets.		
6.	Electric power requirement for the equipment	10 kW		
7.	Power Distribution panel	A power distribution panel and control of HV AC is required. These should be placed in an easily accessible region.		
8.	Number of user working at a time	4 persons in class 100,000 area and 6 persons in class 10,000 area		
9.	Gas lines	As described in item 2.		
10.	Extra passage holes	Extra passage holes are required for future uses like chiller lines, vacuum line, used gas exhaust line etc.		
11.	Gas exhaust	A gas exhaust line is		Exhaust lines are completely

		needed from both class 100,000 and 10,000 room (All gas tubes and connectors must be of Swagelok)	isolated from room air circulation.
12.	Any hazardous or inflammable substances	Isobutane gas may be used for detector testing, Isopropyl alcohol, methanol will be used for material cleaning	
General room details			
1.	Room size	As per drawing	
2.	Room height	As per drawing	
3.	Glass window	As per drawing	
4.	Doors	As per drawing	
5.	Electrostatic flooring	Floor should be made of conductive PVC or equivalent placed on top of grounded copper grid	
6.	Grounding	Thick copper strip should be placed at the bottom of the wall for grounding – instrument isolated (Instrument ground has to be done by us)	
Site information and ambient condition			
1.	Location	Located on the ground floor.	
2.	Ambient Condition	As per location	

Please quote for the work specified below as separate .pdf file in Additional Folder in the BOQ. The price break up format is given in the additional folder including Item No. 7 (a) for Air Shower and 7 (b) for Static Pass Box

I. Room interiors (Clean room areas)		
1.	Wall Panel: Supply and installation of 100 mm thick Double skin wall panel. <ol style="list-style-type: none"> 1. Panel type – Non progressive type modular panel 2. Basic frame – Made out of aluminum extracted profile 3. Skin – 0.8mm powder coated galvanized 	

	<p>iron sheet on both sides</p> <ol style="list-style-type: none"> 4. Core – Rock wool of 110 kg/Cu.m density 5. Services – Inclusive of support systems / fittings / All cutouts for electrical, utilities services etc. everything complete 6. Joint filling – All joints to be filled with silicon sealant of Dove Corn. 	
2.	<p>Ceiling grid for class 10,000 area: Supply and installation of 70 mm thick Double skin walkable false ceiling system.</p> <ol style="list-style-type: none"> 1. Panel type – Non-progressive type modular panel designed for 150kg/sq.m live load. 2. Basic frame – Made out of aluminum extracted profile 3. Skin – 0.8mm powder coated galvanized iron sheet on both sides 4. Core – Rock wool of 110 kg/Cu.m density 5. Services – Inclusive of adjustable type suspension support systems / provision to accommodate service e.g. Hepa, light fittings, pendants etc. everything complete 6. Joint filling – All joints to be filled with silicon sealant of Dove Corn. 	
3.	<p>RA risers: Supply, installation, testing and commissioning of in-built return air raisers in wall panels. SS perforated grill with or without pre filter and the raiser shall be projected above the false ceiling by 150 mm for connection to the duct.</p>	
4.	<p>Coving: Supply, installation, testing and commissioning of aluminum clip on coving of 50 Radius @ all right angled joints e.g. floor to wall / wall to wall / ceiling to wall etc.</p>	
5.	<p>Flooring: Supply, installation, testing and commissioning of flooring as per specifications bellow</p> <ol style="list-style-type: none"> 1. 3 mm thick conductive PVC or equivalent with seamless joints placed on top of grounded copper grid. 2. Floor should have load-bearing surface that is resistant to chemicals. 3. Floor to false ceiling clear height must be 8 ft. 	
6.	<p>Windows:</p> <ol style="list-style-type: none"> 1. All existing windows must be matched with same size view panel in the clean room wall. 2. No crevices/ joints /sloped profiles to be 	

	used for fixing glass.	
7.	<p>Doors: Supply and installation of pre coated G.I.S. / Leaf doors</p> <ol style="list-style-type: none"> 1. Double doors air lock should have size nearly 5'x 7' 2. Door frame –To be of 1.6 mm aluminum extruded profile with in built gasket provision 3. Shutter – Shutters frame made of aluminum-extruded profiles. 4. Skin – 0.8 mm pre coated galvanized iron sheet on both sides. 5. Core – Rock wool of 110 kg/Cu.m density 6. Electrical interlocking systems for doors 7. Fittings and fixtures – <ol style="list-style-type: none"> a. Hermetically sealed double glazed view panel of 750 mm x 450 mm size b. Concealed auto drop door seal c. Door closer d. Handle – SS – 304 grades “D” type handle of 200 mm height. e. Push/Pull plate f. Lock – Door set make lock (wherever required) g. Door S.S Kick plate (300mm height) on both sides of door (1.2mm thick). 8. One door (5'x7') will be used for material entry in the beginning and should be sealed after that. The same should be used as 'emergency exit' later. 	<p>Doors: Supply and installation of powder coated G.I.S. / Leaf doors (same as wall panel mentioned in Point No. 1)</p> <ol style="list-style-type: none"> 1.a. Double panel entrance and emergency exit door of size 5 ft. (W) x 7ft. (H) x 2” (D) including frame 1.b. Double doors air lock should have size nearly 3 ½ ft. (W) x 7 ft. (H) 4. Skin – 0.8 mm powder coated galvanized iron sheet on both sides. <p><u>Point 8 should be omitted</u></p>

7.a.	Additional item	Air shower of 800 mm (W) x 900 mm (D)
7.b.	Additional item	Two way static Pass box of size 3 ft. (W) x 2 ft (H) x 2 ft (D)

8.	Clean room compatible electrical and gas line, table, chair and cabinets (to be supplied by the vendor): Supply, installation, testing and commissioning of electrical, water and gas lines as per specifications below:		
	<ol style="list-style-type: none"> 1. There will be gas supply lines for three SS and one Copper gas lines in class 10,000 and five SS gas lines in class 100,000 (All gas tubes and connectors must be of Swagelok) 2. Modular type electrical power sockets with wiring should be installed by the vendor. 		
	Class 10,000	<ol style="list-style-type: none"> 1. Gas line <ol style="list-style-type: none"> (i) Three (3) SS lines of ¼ inch OD (ii) One (1) Copper line of ½ inch OD (iii) Two conduits at the specified places (see drawing) containing regulators for all 4 lines <p>(All gas tubes, connectors and regulators must be of Swagelok make)</p> 2. One clean room compatible cabinet. (2m x 1.3m) depth – 0.5 m, 3 door 3. One granite table (2m x 1m); height – 1m 4. 8 no. cleanroom compatible chairs 	3. One granite table (2m x 1m); height – 1m; Top : 1 “ Granite with a support of 1 ½ “ black stone; Legs : 6 nos. 2” x 2” square SS
Class 100,000	<ol style="list-style-type: none"> 1. Gas lines <ol style="list-style-type: none"> (i) Five (5) SS lines of ¼ inch OD (ii) One conduit at specified place with 		

		<p>regulators for all 5 lines. (All gas tubes, connectors and regulators must be of Swagelok make)</p> <ol style="list-style-type: none"> 2. One cleanroom compatible cabinet(2m x 1.3m) depth – 0.5 m, 3 door 3. One cleanroom compatible working table (1.5m x 1m) height – 1m 4. 6 no. cleanroom compatible chairs 	
	Dress change room	<ol style="list-style-type: none"> 1. Water basin, soap stand 2. Cabinet for keeping cleanroom cloth (2m x 1.3m) depth – 0.5 m, 3 door 3. Cabinet for accessories of cleanroom cloth(2m x 0.8m) depth – 0.5 m, 2 door 	
9.	<p>Illumination and acceptable noise level:</p> <ol style="list-style-type: none"> 1. The illumination at working height, like tabletops etc. should not fall below 400 lux. 2. The noise level in the clean room, arising from the air handling system should not exceed 50db on the average. 		
10.	Power socket	<p>Class 10,000 area</p> <ol style="list-style-type: none"> 1. 15 A / 6 pin wall socket: 15 no. 2. 5 A / 5 pin wall socket: 15 no. 3. 15 A / 3 phase wall socket: 1 no. <p>All the wiring should be put by the vendor</p>	
		<p>Class 100,000 area</p> <ol style="list-style-type: none"> 1. 15 A / 6 pin wall socket: 5 no. 2. 5 A / 5 pin wall socket: 10 no. 3. 15 A / 3 phase wall socket: 1 no. <p>All the wiring should be put by the vendor</p>	
		<p>Dress change room</p> <ol style="list-style-type: none"> 1. 15 A / 6 pin wall socket: 2 no. 2. 5 A / 5 pin wall socket: 4 no. <p>All the wiring should be put by the vendor</p>	

II: HV AC and Air filtration

Supply, Installation, Testing and commissioning of DX based units to maintain laminar flow (without using perforated false flooring) as per specifications below

Temperature: $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$; **Relative Humidity:** $(50 \pm 5)\%$

Relative Pressure: Positive

1. Supply, Installation of ducts, manifolds, outlets for AC units
2. Supply, Installation of HEPA filters of appropriate grade to ensure Class 10,000. It is estimated that 40-50 air changes per hour would be required.
3. Supply, Installation of Electrical panels and similar accessories and controls for the HVAC units.
4. Supply, Installation of Digital Humidistat, Digital Thermostat with appropriate setting points.
5. Testing of clean room class and air quality.

A. Specification of AHU:

Design, Supply, Installation, Testing and Commissioning of double skin A.H.U. consisting of Aluminum frame work, 3 way corners with double skin panels having outer walls of 0.67 mm thick pre coated sheet insulated with 38 kg/Cu.m. Injected PUF and complete with extruded frame with thermal break for motor and blower duly mounted with DIDW centrifugal BACKWARD curved blower along with its electrical driver motor. Pre-filter section 10 micron and fine filter section 5 micron, Dx coil section with 6 RD coil and view window on the service door and Light in the AHU unit for servicing purpose. Limit switch automatic system on each AHU door etc. complete as required for following area to be maintained as indicated in the layout diagram.

Static pressure: 150 MM WG with Heater Bank for controlling RH.

Option for fine tuning of RH by water spray should be provided.

B. Refrigeration system:

Green refrigerant such as R134A/R404A/R407C should be used.

C. Specification of Ducting Insulation:

- a. Ducting insulation to have low chemical emissions of both Total Volatile Organic compounds (TVOCs) and Formaldehyde. Preferably, materials should hold GREENGUARD Indoor Air Quality (IAQ) Certification.
- b. Manufactured without the use of CFCs, HFCs or HCFCs. They should be fiber-free and dust free, and resist mold and mildew.
- c. Made of a closed-cell structure to prevent moisture from wicking, since moisture accumulation will reduce insulation performance.

D. Specification for Outdoor Units:

Each refrigerating unit will comprise of semi-hermetic / screw compressor suitable for R-22, one cross flow air cooled condenser with cooling air fans, and temperature and relative humidity controller, pipe work and control panel.

E. Control Panel for AHU:

Automatic AHU control panel for AHU ON/OFF incorporating with input MCB TP, CONTACTOR, SPP, OVERLOAD RELAY, HONEYWELL THERMOSTAT with interlock and remote option. Although the Dehumidifier is an optional item, the control panel should have the provision to control parameters of HEATER and HUMIDISTAT.

F. Cost of ducting

The vendors are requested to include the cost of a minimum length of ducting. Tubing, piping etc. in the quotation, along with per unit length cost mentioned. In case additional lengths are required at the time of installation for some reason, the per unit length cost should be used to calculate the additional expense.

G. Entry of ducting in the room:

Should be as close as possible to the AHU.

H. Power consumption:

Total power consumption of the AHU including

D. Specification for Outdoor Units:

Each refrigerating unit will comprise of semi-hermetic / screw compressor suitable for green refrigerants as mentioned in B earlier with cooling air fans, and temperature and relative humidity controller, pipe work and control panel.

	refrigeration units should be quoted.	
III. Safety system, monitoring and validation		
1.	<p>Fire Detection, Fire Alarm, Fire fighting system:</p> <ol style="list-style-type: none"> 1. Vendor to suggest, supply, install and commission fire detection, fire alarm and fire fighting system. 2. The entire area should have optical type detectors below false ceiling. 3. Single loop fire panel provided for all the smoke and heat detectors. Fire panel shall be stand-alone type. 4. A provision for an EMERGENCY EXIT (break glass type) should be provided. The location and design of this is to finalize after discussion with the customer. 	
2.	<p>Monitoring Systems: Temperature and relative humidity indicators should be supplied, installed, tested and commissioned. An easily visible pressure gauge should indicate pressure.</p>	
3.	<p>Validation: Vendor has to perform, witness customer and provide validation certificate for the following tests as per International Clean Room standard. – Federal 209E OR ISO14644-1.</p> <ol style="list-style-type: none"> 1. Air velocity test/ CFM balancing by Digital hot wire Anemometer. 2. Filter Integrity Test by computer aided DOP photometer and DOP generator. 3. Particle Count Test by LASER Particle Counting Machine with on line printing facility 4. Recovery Test by LASER Particle Counting Machine and DOP generator. 5. Air Flow Pattern Test by DI Water Fogger. 6. Light Intensity Test by Digital Lux Meter. 7. Sound Level Measurement by Digital Noise Meter. 8. Temperature and RH mapping by Digital Thermometer and Digital Hygrometer. 9. Differential Pressure checking/Balancing by Differential Pressure Gauge. 10. Air Temperature by Digital IR Thermometer. 11. Swept Test by LASER Particle Counting Machine and DOP generator. 12. Vibration test by Digital Vibration meter. 	

	<p>13. Third party validation.</p> <p>All instruments should be calibrated from NABL accredited lab.</p>	
<p>IV. Warranty, Annual maintenance and servicing</p>		
	<p>A. Warranty:</p> <p>One-year warranty on components and workmanship of this advanced laboratory should be provided.</p> <p>B. Annual Maintenance Contract (AMC) - Optional</p> <p>Three year AMC for the laboratory without spares should be quoted. AMC will start after the expiry of one-year warranty.</p> <p>C. Servicing:</p> <p>The vendor should have a service center located in Kolkata for speedy execution of service work under AMC. Details of the technical set up of the service center have to be submitted. The vendor must quote the attending time to resolve any problem after complaint registration under AMC.</p>	<p>C. Servicing:</p> <p>The vendor should have a service center located in Kolkata for speedy execution of service work <u>during warranty period as well as under AMC</u>. Details of the technical set up of the service center have to be submitted. The vendor must quote the attending time to resolve any problem after complaint registration under AMC</p>
<p>V. Optional items and supporting documents</p>		
	<p>A. Optional items</p> <p>Please quote optional items separately to enhance the performance of the laboratory.</p> <p>B. Supporting documents:</p> <ol style="list-style-type: none"> 1. Vendor should furnish detailed specification of each equipment and all electrical, gas, water line drawing should be provided with quotation. (All gas tubes and connectors must be of Swagelok) 2. Vendor should furnish detailed DQ, IQ, OQ, PQ with equipment along with supply. 3. User manual of small equipment, layout drawing of the laboratory with all electrical, gas, water line etc. should be provided at the time of installation (soft copy as well as hard copy). 	<p>2. Vendor should furnish detailed DQ along with the technical bid. IQ, OQ, PQ should be supplied after installation.</p>
<p>VI. Execution of work</p>		
	<p>The work should be completed within 120 days after receiving the purchase order.</p>	
<p>VII. Other customers</p>		

	List of customers who built similar laboratory in India (up to 5), with email address and telephone number.	
VIII. Execution of work		
	Compliance table: Detailed point-by-point compliance of the features with serial number and pricing as mentioned in this tender document has to be provided.	
<p style="text-align: center;">IX. Site visit</p> Site visit is mandatory before submission of quotation. Drawing of the room will be provided after site visit. Site visit is mandatory before submission of quotation. Drawing of the room will be provided after site visit. Site Address :: Shyamnagar Campus :: Shaheb Bagan, Shyamnagar 24 Paraganas (North), Pin 743 127 Ph # 91 033 2586 4440 / 41 / 42 033 2569 3113		

Sr. Prof. & Incharge, Registrar's Office