

FOR CULTURE ROOMS 1 & 2 with Class 10000 Cleanliness

TECHNICAL SPECIFICATIONS

Being labs where hazardous pathogens are handled, for designing the systems, the first priority should be to **prevent bacteria from escaping** the lab and then the safety of the workers. Prevention of environmental contaminants entering lab is the next priority. The pressure gradient of in the rooms will be maintained as required and all provisions for achieving the same have to be made in the system.

All the Bidders are requested to visit the site and inspect, to know the exact quantum of work, before quoting. Vague and ambiguous offers are liable to be rejected.

TUBERCULOSIS CULTURE ROOMS 1 AND 2 WITH ANTE ROOMS AS PER BSL 3 GUIDELINES

The available area is 35' X 20' and a height of 10'9", within this area 3 Labs are being proposed: The details are as given below and as per the enclosed drawing.

Two negative pressure labs and one Positive pressure lab have to be created within the area, viz. Entry and Exit areas, Instruments Room, Culture Room-1 & Culture Room-2. Culture-1 and Culture-2 are the rooms where hazardous Pathogens will be handled and manipulated, within the Biological Safety Cabinets. Though both the Rooms are critical, Culture-2 is for more critical application than Culture-1.

All the 3 labs have common entry, through Positive pressure Change Rooms and Airlocks. From the Entry Change Room, Lab personnel enter into Air Lock-1. From Air Lock-1 they enter the positive pressure Instruments Room. Exit from the Instruments Room will be through the same path as entry. Instruments Room will be a Class 10000 Clean Room at a positive pressure relative to Air Lock-1. A positive pressure gradient is maintained in the Entry rooms. For entering into Culture Rooms, from the Air Lock-1, personnel have to enter Air Lock-2, which has to be at a relative positive Pressure to Air Lock-1. Entry to Culture Room-1 & Culture Room-2 is from Air Lock-2. Culture Room-1 is at a negative pressure relative pressure to Air Lock-2 & Culture-2 is at a still lower pressure relative to Culture-1. Culture-2 personnel have to walk through Culture-1. Exit from Culture-1 is through Culture-2. Between Culture-1 & Culture-2, a Buffer Room has to be created which has to be kept at the **most** negative pressure and the doors will be interlocked in such a way that person entering into this room can only open the exit door after the entry door closes. This is to prevent entry of contaminants / infection directly from Culture-1 into Culture-2, as far as possible. Exit from the Culture Rooms will be through Wash Air Lock, Air Lock-3 and Exit Change Room. The exit path is at a Positive pressure gradient, Wash/Airlock at a higher pressure and the Exit change Room at a minimum positive pressure. All the rooms Positive pressure or Negative pressure, will have temperature control to maintain at $23\pm 2^{\circ}\text{C}$ & Max. RH of 60% and a Cleanliness level equivalent to Class 10000 as defined by US Federal Standard 209E.

As hazardous pathogens will be handled in both the Culture labs, AHUs for these Negative pressure areas will be once through. The Fresh Air AHUs for Culture-1 & Culture-2 may be independent or common. Room Air from both the Culture Labs are exhausted by the 3Nos. Biological Safety Cabinets in each room and an additional Exhaust AHU (with HEPA filter), which will work automatically, when the Biosafety Cabinet(s) are not exhausting sufficient air from the room and also when the room pressure increases from the preset limits. One separate Exhaust AHU for each of the Culture Rooms is required. For both the Exhaust AHUs, power back-up for 15 minutes, with inverter has to be included, this back-up is apart from the Generator power which we shall provide. When the system runs on back-up power, an audible alarm and flashing lights have to be activated to alert the personnel. The 15 minute back-up power provided is only sufficient for our Personnel to carryout the closing protocols and exit the Lab.

The positive pressure areas shall have a common AHU which is recirculation type with 15% fresh Air arrangement. All the AHUs have to be located in the Corridor in a corner or in a room opposite/ adjacent to the Lab or on the terrace. We prefer to have the AHUs on the same floor or on the ground floor, considering overall efficiency of the system, ease of working and aesthetics (building exterior).

Main incoming power as required will be provided with a Switch Fuse Unit on the same floor. From this switch, Cabling has to be done by the Contractor to his Control Panels, ACs, AHUs, Lights etc.

Modular Wall and Ceiling Panels made for Clean Room application, with 0.5mm PCGI sheets with PUF insulation ($40\pm 2 \text{ Kg/m}^3$) has to be installed along the outer walls, partitions and false ceiling to create an impervious shell which is fully sealed. These panels must have pre-coated finish with guard film & good aesthetic appeal as well and have to be easily maintainable. Wall Panels are 100mm thick whereas Ceiling Panels are 50mm thick. As space is a constraint, we do not permit Exhaust ducts behind Wall Panels instead

of Embedded risers. Exhaust from the room is through the embedded Risers that are installed within the Wall Panels in such a way that pick up of air from the room is at 8” from floor level. The Ceiling panels must have minimum joints, a single panel along the width (shorter side) of the Lab is recommended. All 90° joints between Wall-Ceiling-floor have to be rounded off using extruded aluminium coving, in Panel colour to facilitate cleaning, with separate Corner Coving pieces. Clean Room Doors, View Panels, Clean Room Lighting, Epoxy flooring, Concealed wiring, plumbing, LPG line, Fire alarm, have to be arranged. Additional Modular type, power points 4Nos of 5A/15A will be provided at 3 locations on the wall in each of the 3 main rooms and 1 No. each in the other rooms for other Lab equipments. Clean Room Doors are suggested with flush double glazed view panels. Doors in AirLock-2, Wash/Airlock & Buffer Rooms will have electromagnetic interlocking arrangements. The door system has to be designed in such a way that once a person enters into the Culture Room-1, he cannot retract his path, he has to pass through the exit path to get out of the lab. This is to ensure that the entry protocols and safety of the labs are not compromised with. Epoxy flooring is suggested for the entire area. Air curtains have to be provided at the main entry & exit doors, in your Corridor.

Room pressure digital Gauges with alarm have to be installed at entry to each cubicle or in a common panel near the Lab.

In the Wash/Airlock a hands-free foot operated hand wash is provided and a 100L capacity water boiler with timer for heating the hand wash / bath effluent before discharging it to the outside drain, plumbing included.

The Contractor has to explain the working of the system he proposes to install. As an option a Virus Burn Out unit may be quoted to heat the exhaust air to 100°C. Civil work related to the above work have to be carried out by the Contractor.

Specifications for Modular Wall & Ceiling Panels

Modular Wall & Ceiling panels have to be Pre-engineered and Pre-fabricated sandwich panels with 0.5mm thick Pre-coated GI sheets on both sides and Poly Urethane Foam (PUF) insulation sandwich in between these sheets. The PUF density should be $40 \pm 2 \text{ Kg/m}^3$, and **MUST BE CFC & HCFC free**. The Blowing agent has to be Pentane/Eq., with **Zero Ozone Depleting Potential**. Relevant Test certificate from Central Govt. Lab for important parameters has to be produced with the Bid. To ensure this the entire production has to take place in a Continuous line which is automated with minimum human intervention to ensure minimum errors and impeccable finish. For proper and perfect adhesion of PUF to the GI sheet, Corona treatment has to be done to remove all dirt and dust from the surface. Width of each panel has to be 1000mm. For Ceiling panels, the length of the panel should be equal to the width of the room (smaller side) i.e. there should be joints only along the length of the room. Joints should be minimum. A guard film has to be provided which has to be peeled off after completion of Installation. To establish the superiority of the Panels, we might also visit the factory.

Certification

HEPA filter integrity, Negative pressure system, Temperature, RH, Room Cleanliness etc. will be checked and validated on completion of erection of the systems and once again after 12 months.

Available Data:

Total Area : 700 SqFt Culture room-1 & Culture Room-2 : each 150SqFt, Instrument Room : 200SqFt
 Ht. of False ceiling: 8ft. Room Temperature required: $24 \pm 2^\circ\text{C}$ & RH $60 \pm 5 \%$
 Cleanliness level: Class 10000 Filtration level: 5μ & 0.3μ filters

Approved Makes of Sub-components:

| | | | |
|------------------------------|-----------------------------|--------------------------|-----------------------------|
| Air Conditioner | : Voltas / Blue Star | Air Handling Unit | : Zeco / AMClean / Boopathy |
| Motor | : ABB / Crompton | Blowers | : Kruger / Nicotra |
| Filters | : EMW / Impec / Microstar | Electrical Cables | : Universal / Mardia / ISI |
| Insulation | : Superlon / | Duct sheets | : TATA / SAIL |
| Dampers & Grilles | : Dynamic Air / Air Breeze | Switchgears | : L&T / Siemens |
| VFD Drives | : Honeywell / Allen Bradley | Modular Panels | : Metecno / Lloyds / Rinac |
| Clean Room Doors | : Metaflex / Sakthimet/ MPP | Thermo/Humidistat | : Honeywell |
| Modular Switches | : Anchor Roma / MK | | |

| Sl No | System Description | Rate Rs. | Qty | Amount Rs. |
|-------|---|----------|---|------------|
| 1 | Modular , Pre-engineered, rigid sandwich Panels with GI sandwich panels with PUF insulation 38-40kg/m ³ a) Wall Panels 100mm thick b) Wall Panels 100mm thick with embedded Return Air Risers | | 800 SqFt 650 SqFt | |
| 2 | Modular , Pre-engineered, rigid sandwich Panels with GI sandwich panels with PUF insulation 38-40 kg/m ³ Ceiling panels 50mm thick, strong enough to take the load of 2 persons. | | 700 SqFt. | |
| 3 | Covings to round-off 90° joints between wall-wall, wall –floor, wall-ceiling with specially fabricated corner coving pieces where wall-wall-ceiling / wall-wall-floor meet. | | 300 m | |
| 4 | Epoxy flooring with 2mm thick Epoxy substrate which minimizes entry of moisture from floor (especially in Ground Floor) & 0.5mm thick top rigid colouring layer of epoxy to render seamless & smooth finish. | | 700 SqFt. | |
| 5 | Clean Room, metal doors with double glazed view panels and SS handles, SS push plate, SS hinges, Door closer etc. Single Door Size:1000 X 2100mm Double Door Size:1450 X 2100mm | | 9 Nos. 2 Nos. | |
| 6 | Lighting: Clean Room Light Fitting with fluorescent / CFL lamps including wiring & switches | | 13 Nos | |
| 7 | Air Handling Unit a) AHU1 & AHU2 for Culture Room-1 & Culture-2 100% Fresh Air with Air conditioning designed for Class 10000(ISO-7) Clean Room Double skin Air Handling Units of capacity 1300cfm each & 100mm wG Static Pressure with Blower & Motor, cooling coil, Heater section, filter sections (2-stage) b) AHU3 & AHU4 Exhaust Module from Culture-1& Culture-2 Double skin Exhaust AHU for Culture-II and Exit Cubicle Capacity 1500cfm (provision for HEPA & 20µ filter) including pressure sensors for rooms and On/Off control c) AHU5 for Entry areas & Instruments Lab Double skin Air Handling Unit of capacity 3000cfm & 100mm wG static pressure with suitable blower & Motor, cooling coil, prefilter sections | | 2 Sets 2 Sets 1 Set | |
| 8. | a) Condensing Unit for AHU1 & AHU2 Capacity 14TR (1 No each of 8.5TR and 5TR) with copper piping and commissioning Condensing Unit for AHU5 Capacity 8.5TR with copper piping and commissioning | | 2 Sets 1 Set | |
| 9. | Ducting: flange jointed GI duct 24G for Supply & Exhaust/Return Air | | 1300Sqft | |
| 10 | Insulation of ducts with nitrile foam / cross linked Polyethylene (aluminium foil fused material in the exposed (to sun) areas) for supply Air 13mm for return/exhaust air 9mm | | 800sq.ft 650sq.ft | |
| 11 | Volume Control Dampers -made of GI | | 24 Sq.ft | |
| 12 | Extruded Aluminium Grille duly powder coated | | 12 Sq.ft | |
| 13 | HEPA Filters with Plenum for fixing Including test port and special fixing clamps AHU1&2 36"X24"X3" AHU3 & 4 36"X24"X12" AHU5 12" X 12" X 3" 18X 12X 3" 24X 12X 3" 36"X24"X3" | | 4 Nos 4 Nos 2 Nos 2 Nos. 2 Nos. 3 Nos. | |
| 14 | Pre-filters – 2 stage 20µ & 5µ for AHU1 & 2 For AHU3 & 4(only 20 µ) For AHU5 | | 2 sets 2 Sets 1 Set | |
| 15 | Electrical Panel with Cabling, MCBs, earthing, wiring for lights etc. | | 1 Set | |
| 16 | Back-up power for the Exhaust Modules (AHU3 & 4) for 15 minutes to ensure negative pressure when power fails | | 2 Sets | |
| 17 | Installation & Commissioning of the above system | | Lot | |
| 18 | Velocity & Pressure Balancing and Validation of Clean Room | | Lot | |
| 19 | Double Glazed View Panel of size 800mm X 1000mm on the wall panel with 5mm thick toughened glass on both sides installed on a frame in such as way the glasses are flush with the outer walls of the panel | | 2 Nos. | |
| 20 | Air Curtains for door width of 1000mm to prevent flies, insects and other visible dust entering the Labs through air from Corridor. Air curtain will switch On when door is opened, limit switch provided | | 2 Nos. | |
| 21 | Civil work Pedestals or brackets for AHUs/ Condensing units, making cutouts for ducts, cables in walls and plastering them after completion, removal of existing partitions/doors and plastering etc, Plumbing within | | Lot | |

Special Notes: In all our systems standard execution for Air Conditioning & AHU systems include Thermostatic control, HP/LP cutouts, Overload protection, Single Phasing prevention, provision to run the blower alone when the system runs on a generator etc. are included.

Arrangements have to be made in the systems for Fumigation and De-fumigation.

Power back-up for 15minutes for the Exhaust AHUs has to be provided.

Unequivocal undertaking has to be given that with the system quoted by you, Pressure gradient, Temperature, RH and Cleanliness will be attained and maintained in the Negative pressure and Positive pressure areas, all necessary provisions have to be made in the system for this.

Onsite Validation of the Clean Room: the following tests will be carried out as part of Validation once before handover and once at the end of one year from Handover.

1. HEPA filter Integrity test, if HEPA filter is installed
2. Particle Count test to ascertain the Cleanliness level, if HEPA filter is installed
3. Air Velocity measurement and System capacity checking
4. Room Pressure reading using the installed Magnehelic gauge