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GST No.32AAAJI0299R1ZS

12.04.2024

ADDENDUM TO TENDER NO  
IISER/PUR/2137/2143/VJ/BP/AS/SB/23-24

Sub: Supply installation and commissioning of Lab work benches & chairs in SoB and SEESS; reg

Ref: Tender Enquiry No. 2024\_IISRT\_802993\_1

The additional modifications are added as addendum to the above mentioned tender document at Annexure 1.

2. All other Terms and Conditions remain the same. Bidders may quote accordingly

Thanking You,

Yours Faithfully,

Deputy Registrar (Purchase & Stores)

## Annexure I

### Bidder Qualification Criteria

1. **Site Visit and Measurements:** The bidding party must visit the work site to take actual measurements after receiving the tender.
2. **Final Work Drawing:** A final work drawing must be prepared and approved by IISER before starting the work.
3. **Laboratory Standard Furniture:** All furniture should meet laboratory standards as per the provided specifications.
4. **Experience Requirement:** The bidding party should have at least 15 years of experience, especially in setting up facilities in national institutes like IITs, IISERs, NITs, and IIST. Proof of completion reports and other relevant documents must be provided. Customer satisfaction reports from institutions of national importance must be submitted if requested.
5. **Acceptance of Modifications:** The party should be willing to accept minor modifications during the work's progress without additional cost.
6. **Warranty:** All items must be warranted for 36 months from the date of acceptance by IISER.
7. **Certifications:** Certificates, such as acid resistance and corrosion resistance, should be provided for fume hoods and materials used for modular lab construction.
8. **Packing and Transportation:** The party is responsible for safely packing and loading materials to avoid damage during transportation. Scope of unloading and transportation should be defined.
9. **No-Deviation Compliance:** The party must submit a document confirming no deviation from the technical specifications. They should also certify the brand of the items offered.
10. **Item Information:** The make and brand of each item offered must be clearly mentioned in the offer.
11. **Single Source Responsibility:** The contractor shall provide complete assembly, work top, shelves, storage, service fixtures and accessories as a single responsibility.
12. **System Demonstration:** After installation, the party must demonstrate the entire system and submit an installation certificate.
13. **Mandatory site visit:** During the tendering process, the bidder should arrange a site-visit at their own expense. This should be done with prior appointment. The appointment can typically be taken on any working day between 9 am to 3 pm.
14. The bidder should also have a service center and service person in Kerala.

### Financial Requirements:

1. **Financial Documentation:** The bidding party must provide a scanned copy of the audited balance sheet or a certificate from a Chartered Accountant for the past three financial years, indicating annual sales turnover. No financial losses for more than one year are allowed during the last three years.
2. **Minimum Annual Average Turnover:** The bidder must have a minimum annual average turnover of Rs. 20 crores during the last three financial years. This turnover should exclusively be from the sales of laboratory furniture.

**Compliance standards:** Laboratory furniture must comply with SEFA-8M, SEFA 10 standards in SEFA approved labs with the latest 2016 Guidelines published by SEFA. In addition, fume hoods should comply with ASHRAE standards.

**Work Experience:** The bidding party should have relevant work experience, and supporting documents like purchase orders and completion certificates should be provided. These conditions and requirements ensure that the bidding party is qualified, experienced, and capable of meeting the standards and specifications required for the project.

12/07/2017

**1. GENERAL REQUIREMENTS:**

1.1. Furnishing and installation of laboratory cabinets and furniture for use in laboratory and research facilities including:

- a) Island tables, under table cabinets, reagent shelves, slotted reagent shelf supports, and standards in laboratories.
- b) Service fixtures and wall plates, sinks.
- c) Filler panels, knee space panels, and other items of trim and enclosure.
- d) Other miscellaneous items of laboratory cabinets/racks and furniture as listed in these specifications and as shown on drawings and as directed by IISER.
- e) All components should satisfy reference standards (below) and match the drawings/be installed in coordination with IISER.
- f) Delivery to the building, unpacking, setting in place, leveling and scribing to walls and floors as required.

1.2. Reference standards:

- a) IS 1161, Steel Tubes for Structural Purpose-Specification
- b) IS 7138, Specification for Steel Tubes for Furniture Purpose
- c) IS 13871, Powder Coating- Specification
- d) IS 822, Code of Procedure for Inspection of Welds
- e) IS 710, Plywood for General Purpose- Specification
- f) Scientific Equipment & Furniture Association (SEFA)
- g) SEFA 2.3 Scientific Laboratory Furniture and Equipment
- h) SEFA 3 Work surfaces
- i) SEFA 8W for wooden furniture as per 2016 guidelines
- j) SEFA 8M standards for metal works
- k) Chemical hood designed in accordance with the ASHRAE standards
- l) SEFA 10 guidelines for adaptable laboratory furniture

1.3. Submit plywood finish samples, countertop samples, etc. Submit shop drawings showing each assembly, identifying each item, details of construction, thickness of materials, and adjacent construction. Coordinate and confirm the make and colour of each component prior to construction. Clearly identify any deviations in dimension, material, detail, etc. from conditions shown on the contract documents. Any deviation not clearly identified will be considered disapproved, even if not specifically noted by IISER.

1.4. Contractor should verify field dimensions, and that products of this section will fit through entryways, corridors and door openings enabling a smooth flow of equipment to its proper location in the building.

1.5. Install filler panels as required for a continuous tight and accurate fit, without gaps or spaces between cabinets or counters and adjoining surfaces if any.

1.6. Adjust hardware so that doors and drawers operate smoothly without warp or binding. Lubricate operating hardware as recommended by the manufacturer.

1.7. Install work to plumb, level and true to line and plane as measured from established lines and levels.

1.8. The Contractor should furnish and deliver all utility service outlet accessory fittings, electrical sockets and switches identified on drawings as mounted on the laboratory furniture. Access to electrical junction boxes and plumbing valves should be provided and the locations should be coordinated with the client.

1.9. Adjusting, Cleaning and Protection:

- a) Repair or remove and replace defective or damaged work to the satisfaction of IISER at no change in contract amount.
- b) The work shall be handed over in a well-cleaned condition to the satisfaction of the client. Clean units, including wiping out of drawers and cabinet shelves. Clean countertops with diluted dishwashing liquid and water, leaving tops free of grease and streaks. Use no wax or oils.
- c) Installation at site shall be done without causing damage to the instruments and infrastructure. Any such damage shall be fixed by the agency at their own expense.

1.10. Provide holes and cut outs in countertops as required for service fittings and fixtures. Verify actual size of item to be used prior to making openings. After cutting, rout and file cutouts to ensure smooth, crack-free edges. Seal exposed edges/wherever required after cutting with a chemical resistant sealer. Electrical trunking should not have any gaps. Joints between granite slabs on the counter top should be filled and the workmanship should be of excellent quality. Cut/drill openings for fixtures, specialties, accessories, and other built-ins per template/instructions furnished by the manufacturer. Cut/drill openings necessary to accommodate conduit, cable, wiring, and wiring devices. Provide wire access grommets for wire holes in exposed surfaces.

1.11 Performance Test Results (Heat Resistance): Hot water (190° F - 205° F) shall be allowed to trickle (with a steady stream at a rate not less than 6 ounces per minute) on the finished surface, which shall be set at an angle of 45° from horizontal, for a period of

five minutes. After cooling and wiping dry, the finish shall show no visible effect from the hot water treatment.

**2. RAW MATERIALS:**

2.1 Plywood and metal finishes should be smooth, hard, chemically resistant, and specifically intended for use in the laboratory environment. Finishes should show no noticeable effect when subjected to brief exposure by common reagents such as acids, acetone and ethanol.

2.2 Materials used in the construction of laboratory cabinets/racks and equipment shall be the best of their respective kinds and shall be selected for their specific applications. Methods of construction shall be of proven designs and conform to the latest and best practices for production of durable laboratory cabinets/racks and equipment.

2.3 Steel sections shall be of high quality mild and degreased steel conforming to relevant IS Codes. The steel sections shall be epoxy powder coated (70-80 microns) (conforming to IS-13871) for chemical resistance, scratch resistance and to prevent rusting and having a minimum size as specified in the SOQ/drawings, having a minimum size of 60 X 40 X 3 mm and shall be joined by bead welds (conforming to IS: 822-1970) grinded smooth. In addition to SEFA-8M compliance, the coating quality and strength is ensured through a 1000-hours salt spray test and other physical tests conducted for each batch.

2.4 Where a stainless steel base unit is required, thickness should be at least 2 mm for the bendable parts and 2.6 mm for sheets.

2.5 The work top shall be 18 ( $\pm 1$ ) mm thick mirror polished jet-black granite with half round bull nosing on the top on the required sides and suitable connections shall be made to the already provided drains by means of SW PVC-U pipes schedule 40, totally leak free complete as shown in the drawings and as directed by IISER. Any defects/cracks/chipping of the granite are not acceptable. Countertop lengths shall be finished with beveled as specified and indicated on the drawings. The horizontal surface shall be smooth and level at the joints.

2.6 L.H. & R.H. side panel, bottom panel, top panel, back panel, front panel & drawer separator made out of IS 710 A-A grade 18 mm (minimum) thick boiling water proof (BWP) plywood, laminated on both sides with 0.8 mm thick melamine (conforming to IS: 5509-1980). Edges shall be provided with PVC lipping of minimum 3 mm thickness fixed using suitable adhesive.

2.7 Laboratory cabinets/racks shall have heavy-duty double extension drawer ball slides, stainless steel 304 grade concealed auto closing hinges of 105 degree openable, stainless steel 304 grade pulls.

2.8 Under table cabinet: Cabinets shall be located in designated positions, leveled, and plumbed.

2.9 Provide fillers wherever required, factory fabricate fillers of same material and finish as cabinets. Exposed edges shall be lipped/hemmed. Provide access space, cut-outs, and holes for pipes, conduits, and fittings in cabinet bodies to accommodate services and supports.

2.10 Use concealed fasteners wherever possible. Obtain prior approval for exposed fasteners. Provide concealed continuous stiffeners to the underside of any countertop spanning 1.0m or more.

2.11 Electrical fittings such as sockets and switches complete with internal wiring. Fittings shall be mounted on the electrical trunk. Electrical Trunking shall be in GI construction epoxy coated for excellent corrosion resistance.

2.12 Plumbing fixtures, except for drain fixtures and fittings, shall be with PP handles and brass with surface protected by epoxy powder coating, of approved colour and shall have a water flow capacity of around 30 lit/min at 3kg/sqcm pressure & working temperature range of 0-70°C with test pressure 9kg/sqcm & max working pressure of 10kg/sqcm.

### **3. Technical Specifications for Furniture**

#### **3.1. Tables:**

Island tables and wall tables shall be of width & height as per SOQ with C-frame design of high quality mild and degreased steel conforming to relevant IS Codes. The C-frame/H-frame steel section shall be of epoxy coated (minimum 70-80 microns) (conforming to IS-13871) for chemical resistance, scratch resistance and to prevent rusting, having a minimum size of 60 X 40 X 3 mm and shall be joined by bead welds (conforming to IS: 822-1970) grinded smooth. Provisions shall be provided for inserting under table storage cabinets and drawers. The work top shall be 18 ( $\pm 1$ ) mm thick mirror polished jet-black granite (min 7 to 8 Kg per Sq. Ft) with half round bull nosing on the top. The counter top should project out of the frame by at least 3 cm. Suitable provisions for sink, cup sink, services, pipelines, etc. shall be provided wherever necessary. When specified, tables to be used for computational work should be of lower height (750 mm) and provided with a 300 mm wide/depth book rack attached to the frame at a height of 600 mm from the granite top. The whole work shall satisfy SEFA standards and all specifications must be confirmed before installation. The height of the wall benches is either 900 mm or 750 mm and is mentioned in the BOQ. In the case of a change in the depth of the table, the transition should be smooth and gradual.

#### **3.2. Under Table Cabinet and Drawer Combination:**

3.2.1 Under table cabinet and drawer combination shall be consisting of L.H. & R.H. side panel, bottom panel, top panel, back panel, front panel & drawer separator made out of A-A grade 18 mm (minimum) thick boiling water proof (BWP) plywood both side laminated with 0.8 mm thick melamine (conforming to IS: 5509-1980) and exposed edges shall be finished with PVC lipping of minimum 3 mm thickness fixed using suitable adhesive.

3.2.2 The hinges for the shutter shall be SS304 grade auto close hinges of 105 degree openable. Shutter/drawer shall be provided with epoxy powder coated steel channel so as to act as handles flushed with the face. There should be a minimum of two heavy duty, nickel plated, self-closing concealed alloy hinges for each cabinet door and will open 105 degrees and should be with 3 way adjustment for perfect finish and correct alignment.

3.2.3 For high strength and durability, permanent case work should be made using the latest technology such as biscuit joints with strong adhesives. The joinery construction with biscuit type joints should be clamped to obtain perfect alignment and permanent bonding. The cabinet body should be made of permanent casework without any screws and knockdown/mini-fix fittings (mini fix and dowel joints not accepted), without any gaps for dust accumulation Inside of the cabinet body. All joints should be sealed and it should be easily cleanable.

3.2.4 Standard drawer slides should be metabox type/telescopic rail, made of pressed metal, with profiling for added strength, epoxy coated and with nylon wheels to allow smooth and silent sliding.

3.2.5 Suitable and good quality locking arrangement shall be provided where specified (at least 2 keys per lock). The ball slide for the drawer shall be double extension ball bearing of chromate steel with a load capacity of 45 kg UDL per pair. Suitable locking arrangement of SS304 grade shall be provided.

3.2.6 The intermediate horizontal racks provided in the cabinets as per the drawing shall be provided with height adjustable mechanism.

3.2.7 The cabinets shall be fixed 100 mm above floor level.

3.2.8 The cabinets provided below the wall benches should be moveable, with 2 lockable and 2 non lockable heavy duty polyurethane castors where indicated.

3.2.9 Doors of all under bench cabinets & wall cabinets will have full length extruded anodized aluminium grab rail which are epoxy powder coated to 80-90 micron thickness. Doors of tall storages will have D handles and push open where specified.

3.2.10 The whole cabinet arrangement shall satisfy SEFA standards and all as per drawing and as directed by IISER.

3.2.11 Pedestal box, sleek, robust and small electrical pedestal boxes should be made of 1.2mm thick CRCA sheets to accommodate, single, double or quadruplet 6/16 Amp sockets and switches. The pedestal will take only very minimum space on the work table. The pedestal boxes should be epoxy powder coated to min 80 microns for good finish and aesthetic look.

3.2.12 The color combination for the lamination for the u/b drawer and cabinets should be decided only after the approval of IISER.

### **3.3. Reagent Racks**

Worktop mounted three-tier height adjustable reagent racks made out of 6 mm phenolic resin base supported on a framework of epoxy powder coated steel sections of SHS 30x30x2 mm as support. While the shelf height should be adjustable, the frame should be tall enough to accommodate three racks, where each rack is at least 450 mm in height. Electrical trunking shall be in GI construction, epoxy coated and corrosion resistant, provided for electrical cable management along with the frame. The whole cabinet arrangement shall satisfy SEFA standards. The reagent rack must be solid, stable and each level in each section of the rack should be able to withstand at least 100 kgs. The racks should be supplied with 2 removable stainless steel rods at different heights of 10 mm diameter to prevent accidental tumbling of storage containers.

### **3.4. Overhead storage cabinets**

Providing and fixing overhead cabinets consisting of L.H. & R.H. side panel, bottom panel, top panel & racks made out of 18 mm (minimum) thick boiling water proof plywood (conforming to IS:710) laminated with 0.8 mm thick melamine (conforming to IS: 5509-1980) and exposed edges shall be finished with PVC lipping of minimum 3mm thickness fixed using suitable adhesive. The hinges for the shutter shall be SS304 grade auto close hinges of 105 degree openable. Handles for shutter shall be D-Type projected handles of SS 304 grade. An adjustable rack shall be provided in all the cabinets. The whole arrangement shall be fixed and supported to the walls by means of same material as that of cabinet and epoxy powder coated steel angles of suitable size all along the periphery of cabinet using 75mm long SS/brass screws and fibre plugs. All arrangement shall be as per drawing and satisfying SEFA standards. Unless mentioned otherwise, the overhead storage cabinets should be supported by metal rods that connect the cabinets to the ceiling. The cabinets should be sturdy and each should be able to hold at least 150 kgs.

### **3.5. Polypropylene sink**



Providing and fixing countertop sink of polypropylene of approved make with /without drain boards of same material on to the space provided in workbench and making suitable connections to the already provided drains by means of SW PVC-U pipes schedule 40, totally leak free complete as shown in the drawings and as directed by IISER. The sink needs to be at least L600 X W450 X D315 (or unless mentioned otherwise). Acrylic splash guard needs to be installed on the side of the sink. The sink should have good sloping drain for easy drainage of waste water. It should be easy to maintain hygiene and will easily fit into work top with smooth edges and finish. The sink should not have any sharp corners inside. Anti siphon bottle trap in Polypropylene should be connected directly coupled to the threaded outlet at sink bottom. Sink colour should be black.

### **3.6. Emergency Eye washer**

Eye washer with SS braided flexible hose provided shall be angled double headed type having proper grip for holding and shall be placed near sink with suitable mount and making suitable connections to the already provided water mains as shown in drawing and as directed by IISER. Emergency eyewash will be manufactured according to CE - DIN 12 899 - UNI 9608 standards and they will be characterized by high water flow along with a very soft water spout (DIN EN 246 standard). Eye-washer spray heads will be made using a combination of plastic material associated with a brass body and valve with anti-corrosion epoxy coating. The jet has a flow regulator able to absorb any dangerous pressure overloads from the water mains. In accordance with the DIN EN 15154 standard, the lever will be activated with a single movement and has a catch to ensure the continuous delivery of water with total freedom of movement of the hands. Eye wash will be equipped with eye protecting rubber cups and anti-dust covers. Eye wash should be from TOF Italy/BROEN/WATER SEVER.

### **3.7. Peg Board**

Drying laboratory rack of size at least 550x700 mm(LxH) shall be of high-density polypropylene having at least 52 pegs each having a length of 125mm and diameter 10mm with load bearing capacity of minimum 4kg. Each peg board shall have a drip rack at the bottom with suitable arrangements for draining out. Drip rack should be manufactured in chemical resistant material such as polypropylene for drying glassware. Pegs should be manufactured from polypropylene material and should be inserted in polypropylene flat sheet. Drip racks will have a drip channel or a tray at the bottom which will drain the water through the rubber tube connected to the nozzle fitted to the drip channel. Wherever the back portion of the drip rack is exposed, it should be fully covered with 3mm thick compact laminate.

### **3.8. Swiveling gooseneck type 3-way water tap**

Pillar type 3-way water tap with swiveling GOOSENECK Spout shall be made up of PP Handle & Brass (UNI 5705 -65) with surface protected by Epoxy Powder Coating, of approved colour. Fittings will be manufactured as per modern technologies & comply to DIN 12920 standards for the best performance.

It should have the following features:

- Connection: G3/8, G1/2 and G3/4 UNI ISO 228/1.
- Nozzle:olive type hose screw coupling DIN 12898.
- Upper part: with normal regulation closing on/off.
- Maximum working pressure: 10 Bar.
- Sound - control during the flow of the water: DIN 4109. All taps and mixers used in multi-occupancy properties have to comply emitted noise > 30 dB(A).
- Water flow capacity of around 30 lit/min at 3kg/sqcm pressure & working temperature range of 0-70°C with test pressure 9kg/sqcm & max working pressure of 10kg/sqcm.

Suitable arrangements shall be provided to connect the tap to the existing water mains by means of CPVC pipes. Water standout fittings will be from TOF Italy/BROEN/WATER SEVER. All connector fitting used under bench also will be high quality and closely sealed against any leaks.

### **3.9. Electricals**

All the electrical switches and sockets shall be positioned just below the lower reagent rack or on the wall benches/island benches as per the BOQ. Each running meter of the island table shall necessarily possess two electrical sockets each (220-240V, 6/16A, 6 pin with 16A switch) on either side of the island table. All the sockets shall be wired with 4 sq. mm PVC Sheathed unarmored copper conductor stranded FRLS insulated cable. The switches and sockets shall be of one of the approved makes. All the sockets on each table shall be wired from separate MCB enclosure to be mounted on the appropriate position of table. Each power circuit shall be wired maximum for two switchboards.

### **3.10 Chairs**

#### *Laboratory workbench chairs*

Chairs should have pneumatic adjustment. The seat should be made of rugged polyurethane, and should be self-skinning, chemical- and puncture-resistant, easily cleaned and soil resistant. Minimum seat width should be 18 inches, depth 17 inches and thickness 1.5 inches. Minimum back width should be 16.5 inches, height should be 12 inches and at least 1 inch thick. Footring is essential. The feet of the chairs should have black dual-wheel, self-braking, non-marring casters. Should have an ergonomic 8 degree forward and 3 degree backward with seat tilt locks in place. Should be covered by 5 year warranty on

parts, lifetime on pneumatic lift and 5 years on upholstery. Base should be made of iron or any other metal. Base cannot be made of fibre or synthetic material.

*Student seating chairs*

The seat and backrest should be made of minimum of 1.2+/- 0.1 cm thick hot-pressed plywood and upholstered with fabric and moulded polyurethane foam with PVC lipping all around. PF foam density should be a minimum of 45+/- 2kg/m<sup>3</sup> and hardness load 16 + / - 2 kg as per IS: 7888 for 25% compression. The dimensions of the seat should be a minimum of 49 cm (W) X 44 cm (D) and of the backrest should be 49 cm (W) X 47 cm (D).

**3.11 Canopy hood**

Canopy hood should be made of 1.2 mm thick stainless steel. The top of the hood should be provided with flange made of the same material welded to the hood for connection to the exhaust system. The bottom portion should be open in order to give maximum surface area to contain fumes. The hood should be connected to an exhaust system with appropriate capacity blower. The blower housing should be of strong high density UV treated polypropylene for maximum corrosion resistance, the impeller should be made of polypropylene with noise level less than 62 dB.

**3.13. Bench Mounted Eye Wash**

Emergency eyewash will be manufactured according to CE - DIN 12 899 - UNI 9608 standards and they will be characterized by high water flow along with a very soft water spout (DIN EN 246 standard). Eye-washer spray heads will be made using a combination of plastic material associated with a brass body and valve with anti-corrosion epoxy coating. The jet has a flow regulator able to absorb any dangerous pressure overloads from the water mains. In accordance with the DIN EN 15154 standard, the lever will be activated with a single movement and has a catch to ensure the continuous delivery of water with total freedom of movement of the hands. Eye wash will be equipped with eye protecting rubber cups and anti-dust covers. Eye wash should be from TOF Italy/BROEN/WATER SEVER.

**3.14: Tall storage:**

TALL STORAGE CABINET WITH PANEL DOORS  
SIZE:1200X450X2000mm(H)

The tall storage cabinets should be made of Thickness 18mm (±1) mm Core Material (BWP Boiled Water Proof) plywood. Finish - High quality HPL (High pressure Melamine laminate) hot pressed on both the sides. The exposed edges of drawers front should be sealed with minimum 3(±1)mm thick high quality PVC edges. For strong bonding and durability, the

lamination and edging should be machine pressed at high temperature and pressure. Back wall is made of 18 mm thick BWP Melamine laminated plywood. For carcass, The exposed edges should be sealed with 0.5 mm thick high quality PVC edge tapes.

The tall storages should have 10 number of drawers of equal size as five rows and two columns with telescopic slides made of metal, zinc plated, running on ball bearing to allow smooth and silent sliding. The drawers should be provided with "D" shaped handle.

#### TALL STORAGE CABINET WITH GLASS INBUILT DOORS SIZE:1500X300X2200mm(H)

The tall storage cabinets should be made of Thickness 18mm ( $\pm 1$ ) mm Core Material (BWP Boiled Water Proof) plywood. Finish - High quality HPL (High pressure Melamine laminate) hot pressed on both the sides. The exposed edges of doors and drawers front should be sealed with minimum 3( $\pm 1$ )mm thick high quality PVC edges. For strong bonding and durability, the lamination and edging should be machine pressed at high temperature and pressure. Back wall is made of 18 mm thick BWP Melamine laminated plywood. For carcass, The exposed edges should be sealed with 0.5 mm thick high quality PVC edge tapes.

The tall storages should have lower section, at a height of 750mm, features two laminated plywood doors for built-in cupboards and in the center there are four drawers. Above this is the middle section provides an open space extending up to a height of 730mm and On the upper side, there is a three-door cubicle with glass doors and a middle shelf in each cubicle. All cupboards are equipped with a push-open system.

Nickel coated heavy duty; self-closing hinges should be provided which allows an opening up to 105 degree wide and adjustable in all three directions for perfect finish and corrections and the drawer should have telescopic slides made of metal, zinc plated, running on ball bearing to allow smooth and silent sliding.

#### **4. Specification for Furnishing Laboratory Fume Hood at LAB 2201 & BioCIAS at Chemical Science Block, IISER. Vithura. Trivandrum**

##### **PART 1 - GENERAL**

##### **4.1 SUMMARY**

A. This Section specifies requirements for the selection, installation, and testing of laboratory fume hoods. The scope of work includes, but is not limited to, the following:

1. The installation of all specified accessories such as monitor, cup sinks, petcocks, lighting, electrical, base cabinets, work surfaces, and filler panels.

2. Internal hoods plumbing and wiring.

B. The Contractor shall provide all miscellaneous parts and labor required to provide a complete and functioning fume hood.

**4.2 RELEVANT CODES AND STANDARDS:**

The following are the primary organizations and standards regarding fume hoods:

-OSHA Part 1910.1450. OSHA stands for Occupational Safety and Health Administration. The agency regulations regarding fume hood operation are listed in the Code of Federal Regulations Volume 29 Part 1910.1450. This code addresses several aspects of laboratory design and operation. Regarding hoods, it is primarily concerned with airflow at the face of the hood, monitoring, maintenance and exhaust.

-ANSI/ASHRAE 110-1995. Method of Testing Performance of Laboratory Fume Hoods. This standard is published by the American National Standards Institute and the American Society of heating, Refrigerating and Air Conditioning Engineers, Inc. It concerns itself primarily with methods of testing fume hoods to check their operation.

-ANSI/AIHA Z9.5. Titled "The American National Standard for Laboratory Ventilation" this standard is published by ANSI and the American Industrial Hygiene Association. It covers a variety of lab ventilation issues including hood monitoring, face velocities and exhaust.

-IS 4209, Indian Standard code for Chemical Laboratories- Code of Safety. It generally deals with the factors involving safety, laboratory design for safety, etc.

-NFPA 45. This standard is prepared by the National Fire Protection Association. It recommends hood construction, location, fire protection, specialty hoods, identification, inspection, testing and maintenance and exhaust.

-SEFA 1.2-1996. SEFA is the Scientific Equipment & Furniture Association. Its publication "Laboratory Fume Hoods Recommended Practices" covers design requirements of hoods, face velocities and testing.

**4.3 INSTALLER QUALIFICATIONS**

A. Fume hoods shall be installed by skilled electricians and mechanics, all of whom are properly trained and qualified for this work. As a minimum, the system must conform to all codes and manufacturers' instructions and recommendations.

**4.3.1. SUBMITTALS**

A. Prepare and submit CAD Shop Drawings and product data. Includes:

- 1. Plans, elevations, sections, and details illustrating shop fabrication, field assembly, and installation.
  - a. Show size and location of all cutouts.
- 2. Fume hood data including all components and accessories.

- a. Identify all manufacturer standard components with catalog numbers and identify all materials of custom-fabricated items.
3. Monitor manual with calibration instructions.
4. Manufacturer's test and certification data.
5. Manufacturer's installation manual.
- B. For Owner's Final Inspection, prepare and submit fume hood FPT documentation
- C. For Substantial Completion, submit O&M Manual information required.

## **PART 2 – SCOPE OF WORK**

- a) Supply and Installation of fume hoods (both superstructure and under structure cabinets) including worktops based on the specified Make List based on ASHRAE 110 (American Society of Heating, Refrigeration and Air Conditioning Engineers) - American Standards for Laboratory fume hood testing and European Standards for fume hood testing
- b) Supply and Installation of fume hood accessories like service outlets/fittings, electrical switches as per the specified make list. Fittings attached to the fume hood superstructure shall be mounted on the front fascia of the hood.
- c) Plumbing fixtures mounted on the fume hood super structures shall be pre-plumbed and electrical fixtures shall be pre-wired. All fume hoods to be fitted with electrical control box with motor starter and all the required electronic circuits.
- d) Removal of all debris, dirt and rubbish accumulated as a result of installation of the fume hoods leaving the premises clean and orderly.
- e) Manufactures should provide data indicating compliance with ASHRAE 110 or BS EN-14175 standards, at least one of the two.

### **Standard Fume Hood Performance Requirements**

Fume hoods shall be of complete airfoil design to ensure maximum operating efficiency. Foil sections at the front facials of the hood shall minimize eddying of air currents at the hood face and the rear baffle system shall minimize turbulence in the upper portion of the hood interior. All the fume hoods shall be designed for an approximate face velocity of 80 to 100 fpm.

## **PART 3 – SPECIFICATION**

**Type of Fume Hood:** Low Constant Volume (LCV) Type bench Fume hoods

**Dimensions of the fume hoods:** As per BOQ

### **(I) Outer Construction/ Super structure**

The super structure shall be double walled construction housing, frame members of size 45x45x2mm, attaching brackets and remote service fixture valves, constructed

using high quality, cold rolled, mild and degreased steel (conforming to IS: 513/ASTM A366).

**Fume hood superstructure consisting of -**

- Structure frame in 2.0 mm thick GI construction.
- Outer panels in 1.2 mm thick GI construction.
- The exterior of the structure shall be pre-treated with 8 tank chemical processes and powder coated with highly chemical resistant epoxy Colors having dry film thickness of 70 to 80 microns for chemical resistance, scratch resistance and to prevent rusting.

The rear part of the fume hood shall have service access for maintenance.

**Inner lining and worktop**

Internal side wall panels shall be fabricated using minimum 6 mm thick liner of high-pressure laminate made by compressing impregnated paper or wood fiber and epoxy, phenolic resin with an opening that provides access to the service piping and valves to facilitate installation and maintenance. The work top shall be made of 18 ± 1 mm thick **Black Natural Granite** with a PP cup drain flush with the recessed work surface.

**Sash**

The sash shall be made of 5 mm thick transparent toughened glass having a breaking stress value of 24,000 psi with a clear openable height of 750mm and heat resistant. Combination sashes shall be provided. The sash handle should be of type anodized Al construction and should not generate eddies in the plane of the sash opening. It should be thin enough in profile to minimize interference with the line of sight of the fume hood user. The counterbalance mechanism should use a single counterweight, stainless steel wires on ball bearing pulley assemblies. A cable-retaining device should be provided, assembled to prevent tilting of the sash during operation. Spring counterbalance mechanisms are not acceptable. The sash should move easily and quietly and remain in place wherever it is stopped. The sash should open and close against rubber bumper stops, installed so that the user can readily adjust the sash opening when moving the sash from either end. The design should ensure that, in the event of a failure of the counterbalance mechanism, the sash cannot fall within 50 mm of the bottom airfoil. This is in order to avoid the potential for serious injury to the fume hood user.

**Airfoil**

A streamlined "flip-on" type airfoil shall be integral at the bottom of the hood opening on bench hoods. The horizontal airfoil should be of 1.6 mm stainless steel, type 316 L with Teflon coated, typically installed approximately 25 mm above the raised portion of the work surface. It should be designed and installed for eddy-free entry of air into the fume hood. The air should sweep across the work surface, minimizing eddies and lessening the possibility of fumes generated near the front of the fume hood from

escaping. Airfoil width should project into the fume hood beyond the plane of the sash. The airfoil should be designed to eliminate reverse flow within 75 mm of the plane of the sash.

**Baffle**

The baffles shall be fabricated using minimum 6 mm thick liner of high-pressure laminate and should have excellent chemical and heat resistant and fire retardant. At least three slots shall be provided for effective distribution of flow of air which shall be placed at a distance of approximately 5 cm from the back liner and shall be removable for cleaning.

**Scaffold/Lattice**

A 4x4 height and width adjustable scaffold made of Epoxy rods (minimum 12 mm diameter) shall be provided on to the internal liner clamped with the PP clamps to hold the test samples and rotors within the fume hood.

**Cup Sink**

Dimensions and material as per BOQ

**Electrical Services**

Lighting fixtures shall be of twin LED type light with fluorescent lamps which are sealed, vapor tight and protected by a transparent, scratch-resistant, shatter-resistant and flame-resistant material. All the electrical switches and sockets (GI construction) shall be positioned outside the fume hood just below the work top. Each fume hood shall necessarily possess minimum six 3-pin electrical sockets (220-240V, 6-16A) and a shunt tripper for the safety control of all the electrical points.

**Service Valves and Plumbing**

The shut-off valve or cock for the water supply shall be provided outside the fume hood. All the fittings shall be of approved makes. Utility services like Nitrogen, Compressed Air & Potable water shall consist of remote control valves as selected located within the end panels, controlled by in and out facility with flexible hose passing through the side panels of the hood, with color coded PP handles. All gas valves for regular lab gases to have standard needle valve and push and turn type arrangement for all gases to be supplied. All supplied valves to clear the following pressure test conditions: Gas Fittings - 7 bar, Water fittings - 10 bar. Interior fitting for gases and water shall be with polypropylene/epoxy coated forged brass construction 2.0 m long flexible tubing with end fittings for following services:

SERVICE	LETTER CODING	COLOUR CODING	Tube construction
Water	DIW	White	PU-4
Compressed Air	AIR	Orange	PU-4



Argon/Nitrogen	A/N	Blue	PU-4
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### **Digital Face Velocity Monitor**

Fume hoods shall be provided with an alarm system to detect low and high hood face velocities. The alarm system shall indicate the actual face velocity of the hood regardless of sash position. The system shall have an air velocity sensor mounted on the interior side liner of the hood. The velocity monitor shall have a digital display of the air velocity through the hood face in feet per minute. The alarm signals shall activate any time the face velocity falls below the low velocity alarm set point or rises above the high velocity alarm set point. There shall be both visual and audible alarm signals. The audible alarm shall have a mute provision.

- Provide fume hood manufacturer's recommended face velocity monitor with a local audible and visual alarm, capable of detecting a drop or rise in airflow (not static pressure) through the hood.
- The monitor shall be digital with a LCD screen.
- All parts of the system which are apt to be in contact with vapors or gases in the fume hood shall be chemically resistant, such as the controller, sensing device, and wiring.
- Provide a means to mute the audible alarm. The silence device shall not turn off the warning light.
- Provide a means for setting the alarm set point to the exhaust level desired. This adjustment shall be "internal" so that it is not readily adjustable by operating personnel.
- The low-level alarm point is 80 feet per minute (fpm) for conventional fume hoods and 56 fpm for low flow fume hoods.

### **Duct Collar**

A 8"-10" diameter polypropylene duct collar shall be located in the top of the hood plenum chamber.

### **Volume Control Dampers**

Damper sets in PP construction complete with pre drilled flanges on both sides, manual operation handle and extended spindle, suitable for motorized drive

### **Under Hood Cabinets (General Storage Purpose)**

Under hood cabinets of approved makes shall be of double wall construction having an air space of 1 1/2 inch throughout using 18-gauge GI sheet epoxy coated and FRP lining for chemical resistance, scratch resistance and to prevent rusting. The cabinets shall be provided with leak proof sills to prevent leakage in case of accidental spills. The doors shall be of self-latching mechanism for complete closure with flush mounted locking handles and secured on full length heavy duty piano hinges. Suitable air ducts ready for connection to main exhaust system of the fume hood shall be provided. Adjustable

leveling legs shall be provided to place the cabinet on uneven surface. Cabinets should be provided with large illuminating warning label to identify the type of material stored within the unit. Finally, no fumes leak point should be present when the fume hood is in closed condition. This is extremely important from safety point of view.

## **(II) Centrifugal Blower**

Silent high efficiency single piece molded PP blower consisting of continuous rating motor and chemical resistant impeller. The blower is designed to give a face velocity at safe working height as per the international safe velocity norms (ANSI/AIHA Z9.5). The blower body is polypropylene UV treated high density and chemical (corrosion) resistant and is mounted on a metallic stand. Centrifugal Blower shall be with specs: CFM 1500-1600, 40 mm WC, 1300-1500 RPM, B3 3-phase motor with IP55 protection, (TEFC class B insulation induction motor), in non-FLP construction. A suitable VFD to control the blower should also be provided. The wiring to connect the blower to the fume hood should also be provided. Cable should be 6 core, 4 square mm, PVC flexible copper cable. Cable length will be as per actual measurements which will be decided during the official site visit. A 25 Amp, 4 pole, C curve MCB Switchgear should also be provided.

### **General:**

The exhaust fans supplied and installed shall be of 'Centrifugal Corrosion Resistant' type and shall be capable of delivering the design flow rate against all duct losses. The fans shall be robust in construction and suitable for continuous duty operation. It shall be mounted with ease of maintenance and shall be installed with proper vibration isolators to minimize vibration transmission to ductwork and support structure. Fans selected shall be silent and vibration free when running and suitable for outdoor use.

### **Specifications:**

- Housings: PP- Single block strong high-density UV treated with no welded joint. Reversible and rotatable to any 8 standard discharge positions by 45-degree increments. All fan mounting hardware in stainless steel.
- Wheels: PP - Forward curved centrifugal type impeller made, of injection moulded PPH. Fan wheel supplied with hub cap constructed of PPH. Wheels electronically and dynamically balanced to ISO 1940.
- Motors - Direct drive, asynchronous, three phases, IP55. Single speed: three phase 230/400 V-50/60 Hz. Motor is outside the airstream. Three phase motors speed adjustable by variable frequency inverter drive.
- Motor Support - Several options: no stand, metal stand constructed of epoxy coated sheet metal, polypropylene motor pedestal or roof unit kit.
- Temperature Resistance - PPH casing and wheel recommended up to 80 °C.
- Performance - Fan performance based on tests conducted in accordance with AMCA 210-85 and ISO 5801.

- Warranty – Equipment to be free from defects in workmanship and material under normal use and service for one year after shipment.

### **Exhaust System**

Technical Specifications for PP/FRP Ducting:

- PP means PPGL: One side smooth & glossy finish and other end is matt finish.
- The smooth surface should be the inner surface of the duct.
- On mat side, FRP lining to be done.
- 25 mm x 25 mm Stitch welding is done on inner surface and continuous welding on outer surface with 5 mm welding thickness.
- FRP Lining to be done on the outer surface of PPGL i.e., on mat side.
- One-layer FRP is one mm.
- The final layer should be with fine mat to have smooth and good finish.
- While making the lining, there should not be any air pockets or any sort of uneven finish.

### **(III) Ducting**

(i). Rigid Ducting of PP (Polypropylene) + FRP (Fiber Reinforced Polyester) and flexible ducting with flanges, bends, damper transitions, clamps etc. Flexible joint is provided in the ducting in order to avoid transmitting the blower vibrations to the hood. A weather proof rain cowl is provided at the outlet of blower. All PP FRP to be 3+3 mm thick.

In addition, the following points should be also taken into account while fabrication of ducts.

- 1) All ducts of size larger than 450mm shall be cross broken.
- 2) All ducts shall be supported from the ceiling / slab by means of MS rods of dia 8mm with MS angle of size 40 x 40 x 5 mm at the bottom with neoprene pad in between the duct & MS angle. The ducts shall be suspended from the ceiling with the help of dash fasteners. Provision for necessary ancillary materials required for hanging the ducts shall be arranged by the contractor.
- 3) The vanes shall be provided wherever required and shall be securely fastened to prevent noise & vibration.
- 4) The rubber gasket shall be installed between duct flanges in all connections and joints.
- 5) All flanges and supports should be primer coated.
- 6) The ducting work can be modified if deemed necessary in consultation with the Engineer in Charge to suit actual site conditions in the building.

#### **4.3.1 Terms and conditions**

- A. Mechanical, electrical, and associated systems shall be safe, reliable, efficient, durable, easily, and safely operable, maintainable, and accessible.
- B. All equipment must be compatible with Indian electrical standards and codes.
- C. Standard Products: Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products for at least 3 years. Digital electronics devices, software, and systems such as controls, instruments, shall be the current generation of technology and basic design that has a proven satisfactory service record of at least three years.
- D. All items furnished shall be free from defects that would adversely affect the performance, maintainability and appearance of individual components and overall assembly.
- E. Vendor must provide a list of satisfied Indian users and their contact details for using offered items.
- F. Electrical Components and Devices: UL listed and labeled for intended use.

#### **4.3.2 Test and Submittals**

- A. Manufacturer's Literature and Data: Include the following:
  - 1. Illustrations and descriptions of laboratory fume hoods and factory-installed devices for fume hoods.
  - 2. Catalog or model numbers for each item incorporated into the work.
  - 3. Results of testing according to ASHRAE 110.
- B. Field Test Reports: Indicate dates and times of tests and certify test results.
- C. Factory Test Reports: Provide manufacturer's QC checklist or other reports that indicate comprehensive factory testing has been performed, and the results of these tests have been certified.

#### **4.3.3 TESTING EQUIPMENT**

- A. Testing equipment must be maintained and calibrated in accordance with manufacturer's specifications and have been calibrated within the past year. Indicate calibration dates and equipment type on test data form.

### **PART 5 INSTRUCTIONS FOR INSTALLATION**

#### **5.1 DELIVERY AND IDENTIFICATION**

- A. Deliver fume hoods to the jobsite, clearly identified in plain view by specifying fume hood manufacturer, size and type of fume hood, sash type and any special features included.

#### **5.2 INSTALLATION**

- A. Make all field measurements and verify all dimensions and that required utilities are roughed-in and ready for hook-up prior to installation.

- B. Install fume hood base cabinets plumb and level and parallel to walls and in accordance with manufacturer's instructions.
- C. Install monitors in accordance with manufacturer's instructions.  
Adjust sash, fixtures, accessories and other moving or operating parts to function smoothly. Fume hood Installation shall meet seismic support and anchorage requirements. Coordinate the installation of all supplementary framing and backing plates.
- D. Repair or remove defective work upon completion of installation. Touch up as required.
- E. Remove all packing materials, tags, tape, and shipping materials.

5.3 CLEANING AND PROTECTION

- A. Clean all exposed interior and exterior surfaces and protect from damage by work of other trades.

**PART 6 - CONTRACTOR FUNCTIONAL PERFORMANCE TESTING (FPT)**

- A. Pre-test meeting: The Contractor shall coordinate its FPT activities of fume hoods, including test procedures and FPT documentation, with the Client's confirmation testing activities.
  - 1. This meeting shall include a face velocity test of at least one fume hood by third party with a representative of the department present.
- B. Contractor face velocity testing shall not start until the following is complete:
  - 1. Pre-test meeting
  - 2. Verification that all specified fume hood components and accessories are provided.
  - 3. Start-up and functional performance testing of all fume hood accessories and utilities is complete and in accordance with manufacturer's specifications
  - 4. Ceiling tiles are in place and laboratory doors are closed (the space is contained).
- C. For each fume hood, the Contractor shall perform and document the following FPT requirements:
  - 1. Face velocity
    - a. For conventional flow fume hoods, the target air velocity with the sash height at 18 inches is 100 feet per minute (fpm) +/- 10%.
    - b. Face velocity shall be tested using a VelGrid probe by Shortridge instruments or an anemometer.
  - 2. Sound level
    - a. Sound level must be at or below 50 dB measured with the sash height at 18" and the sound level meter located 3 feet from the sash and 5 feet above the floor.

- b. Sound level shall be tested using a Type 2 sound level meter manufactured to meet the American National Standards Institute (ANSI) S1.4 "Standard for Sound Level Meters" capable of measuring decibels in dBA.
- 3. Monitor functionality
  - a. The fume hood monitor is verified to be functioning and properly calibrated.
  - b. Verify that the face velocity is displayed.
  - c. Raise the sash to reduce the face velocity. Confirm that both the visible and audible alarm signal's function when the velocity drops below 80 fpm
  - d. Test the monitor's mute function and the reset button.
  - e. This test fails if the monitor does not alarm, is more than 10 fpm out of calibration, or if it fails any functional test or is damaged.
- D. Fume Hood FPT Documentation
  - 1. Record all test data on FPT data field forms for each fume hood.

#### 6.1 FINAL INSPECTION REQUIREMENTS

- A. The Contractor shall provide EIC ten (10) working days advance notice to schedule Client's fume hood confirmation testing.
  - 1. Include:
    - a. Complete fume hood FPT documentation.
    - b. For each fume hood type, the manufacturer's installation and operation manual.
    - c. For each monitor type, the manufacturer's manual with calibration instructions.
- B. The EIC, will review the Contractor's FPT documentation. If the documentation meets the performance requirements of these specifications, then the EIC will conduct confirmation testing of each fume hood in accordance with the Scientific Equipment and Furniture Association (SEFA) standard 1 for face velocity, sound level, and monitor functionality. Also, the under hood cabinetry shall be tested in accordance with SEFA 8 standards.
- C. The EIC will notify the Contractor if any fume hoods fail confirmation testing. Any fume hoods that do not meet the performance requirements shall be repaired and re-tested by the Contractor. The Contractor shall submit new FPT documentation for review and additional confirmation testing until each fume hood passes the Departments confirmation testing.
  - 1. Once the final testing is accepted and complete, the EIC will place appropriate labels on the fume hoods allowing use and this Work shall be substantially complete.

#### **General Standards to be followed for Fume hood:**

**Air Flow**

Proper air flow at the face of the hood is probably the most common cause of confusion regarding fume hood operation. Here are what the codes and standards say:

OSHA: "General air flow should not be turbulent and should be relatively uniform throughout the laboratory, with no high velocity or static areas; air flow into and within the hood should not be excessively turbulent; hood face velocity should be adequate. (Typically, 60-110 fpm.)"

ANSI/AIHA Z9.5: "Each hood shall maintain an average face velocity of 80-120 fpm with no face velocity measurement more than plus or minus 20% of average."

SEFA: "Face velocities of laboratory fume hoods may be established on the basis of the toxicity or hazard of the materials used or the operations conducted within the fume hood. Note: Governmental codes rules and regulation may require specific face velocities. A fume hood face velocity of 100 fpm is considered acceptable in standard practice. In certain situations, face velocity of up to 125 fpm or as low as 75 fpm may be acceptable to meet required capture velocities of the fume hood."

**Monitoring/Alarms**

OSHA: "each hood should have a continuous monitoring device to allow convenient confirmation of adequate hood performance before use. If this is not possible, work with substances of unknown toxicity should be avoided or other types of local ventilation devices should be provided."

ANSI/AIHA Z9.5: "New and remodeled hoods shall be equipped with a flow-measuring device."

NFPA 45: "New and remodeled hoods shall be equipped with a flow-measuring device."

**Maintenance/Inspection**

As with all equipment maintenance is important to proper operation.

OSHA: "Quality and quantity of ventilation should be evaluated on installation, regularly monitored (at least every 3 months), and re-evaluated whenever a change in local ventilation devices is made."

ANSI/AIHA Z9.5: "A routing performance test shall be conducted on every fume hood at least annually or whenever a significant change has been made to the operational characteristics of the system"

NFPA 45: "When installed or modified and as at least annually thereafter, laboratory hoods, laboratory hood exhaust systems, and laboratory special exhaust systems shall be inspected and tested."

NFPA 45: "Special use laboratory hoods and special use local exhaust systems shall be identified to indicate their intended use." "A sign shall be affixed to each hood containing the following information from the last inspection: Inspection interval, Last inspection date, Average face velocity, location of fan that serves

hood, Inspector's name. Exception: In lieu of a sign, a properly maintained log of all hoods giving the above information shall be deemed acceptable."

**Exhaust**

ANSI/AIHA Z9.5: "Discharged in manner and location to avoid re-entry into the laboratory building or adjacent buildings at concentrations above 20% of the allowable concentrations inside the laboratory under any wind or atmospheric conditions." Exhaust stack: "Be in a vertical up direction at a minimum of 10 feet above the adjacent roof line as so located with respect to opening and air intakes of the laboratory or adjacent buildings to avoid re-entry."

NFPA 45: "Air exhausted from laboratory hoods and other special local exhaust systems shall not be re-circulated." "Air from laboratory units and laboratory work areas in which chemicals are present shall be continuously discharged throughout systems maintained at a negative pressure relative to the pressure of normally occupied areas of the building.

**7. LIST OF APPROVED MAKES**

Below mentioned make are to be used unless/otherwise defined in technical specifications.

Item	Make*
1) STEEL SECTIONS	TATA, SAIL, JSW
2) LABORATORY FITTINGS	WATER SAVER, BROEN, TOF Italy
3) LABORATORY SINKS/DRIP CUPS	KLLAB, WATER SAVER, BROEN, FRIATEC, PREMIER
4) ELECTRICAL SOCKET	LEGRAND/SCHNEIDER/SIEMENS/NORTH-WEST
5) FRLS PVC ISOLATED SINGLE/MULTI CORE STRANDED COPPER CONDUCTOR WIRES/FLEXIBLE WIRES/ARMOURED AND UNARMOURED CABLES	GLOSTER/POLYCAB/FINOLEX/ RR KABEL



6) MODULAR (PLATE TYPE) SWITCHES, ELECTRONIC STEP TYPE FAN REGULATOR & POWER, TV, TELEPHONE, & EARTHNET SOCKET (WHITE COLOUR FOR NORMAL AND COLOURED FOR UPS POINTS)	LEGRAND, SIEMENS, MK
7) EYEWASH/SHOWER	WATER SAVER, BROEN, TOF Italy
8) HINGES	HETTICH, HAFFLE
9) LEGS	HETTICH, HAFFLE
10) LOCKS	HETTICH, HAFFLE
11) DOUBLE EXTENTION BALL SLIDE	HETTICH, HAFFLE
12) FLAMABLE/CORROSSIVE. CHEMICAL STORAGE CABINETS	JUSTRITE, DUPERTHAL, ASECOS
13) WORK TOP	18 ( $\pm 1$ ) mm thick mirror polished jet-black granite
14) A-A grade BWP marine PLYWOOD	GREEN PLY, CENTURYPLY, KIT PLY
15) GLASS	SAINT GOBAIN, MODI, ASAHI INDIA, GSC, ATUL
16) Chairs	Featherlite, Godrej or equivalent. Sample must be provided prior to installation

\* an equivalent to the makes mentioned in the table could be provided but only after providing sample and taking prior approval from the indentees/s

#### APPROVED MAKE OF MATERIALS FOR FUMEHOOD

Item	Make*
FUME HOOD SERVICE FIXTURES:	WATER SAVER, BROEN, TOF
ELECTRICAL SOCKETS:	Highly reputed brands such as LEGRAND, NORTHWEST, MK, NORISYS
FACE VELOCITY AND CONTROLS:	TEL, TROX, PHOENIX
CENTRIFUGAL BLOWERS	SEAT, COLASIT, PLASTIFER

WORK TOP:	BLACK GRANITE CONST.
TOUGHENED GLASS:	SAINT GOBAIN, MODI, ASAHI INDIA, GSC, ATUL
VFD	SIEMENS, DANFOSS
ELECTRICAL WIRING	POLYCAB
Inner lining (6 mm phenolic resin)	TRESPA, Fundermax
Air flow monitor	SEAT, TEL

\* an equivalent to the makes mentioned in the table could be provided but only after providing sample and taking prior approval from the indentee/s

**Specific requirements for lab space 2201 and annexure in the School of Biology, IISER Thiruvananthapuram:**

LAB-1 (1201E)			
	Description	Quantity	Unit
1)	<b>WALL BENCH - 4350 mm (900 mm height from FFL)</b>	1 no ✓	
	18 (±1)mm thick granite worktop 750 mm wide with backsplash	4.35	rm
	Movable u/b storage cabinet with 2 drawer (side by side), 1 adjustable shelf & 2 doors 900mm wide with lock and castor wheels	2	no
	Movaleble u/b cabinet with 1 adj. shelf and 2 doors 900mm wide with lock and castor wheels	1	no
	front + back frame	4.27	rm
	Filler panel	0.34	rm
	middle frame	4	no
	side frame	2	no
	knee space panel	1.97	rm
	16 Amp/220 Volt double electrical pedestal box	4	no
2)	<b>WALL BENCH - 5700 mm (900 mm height from FFL)</b>	1 no ✓	
	18 (±1)mm thick granite worktop 750 mm wide with backsplash	5.7	rm
	Movable u/b cabinet with 1 drawer, 1 adjustable shelf & 2 door 600mm wide with lock	3	no
	u/b sink cabinet 900mm wide	1	no
	polypropylene drip rack with 52 pegs Size:550x700 mm(LxH)	1	no
	front + back frame	5.62	rm
	Filler panel	0.17	rm
	middle frame	6	no
	side frame	2	no
	knee space panel	3.51	rm
	cold water standout with triple outlets	1	no
	polypropylene sink 600x450 mm	1	no
3)	<b>WALL CABINET</b>	1 no ✓	
	lockable wall mounted storage cabinet with panel doors	6	no

	size:900x300x600mm(h)		
4)	<b>LABORATORY SEATING</b>		
	pu seated height adjustable laboratory chair	4 ✓	no
<b>LAB-2 (2201)</b>			
5)	<b>ISLAND BENCH - 3000 mm (900 mm height from FFL)</b>	2 nos ✓	
	18 (±1)mm thick granite worktop 1500 mm wide	3	rm
	u/b cabinet with 1 drawer, 1 adjustable shelf & 1 door 450mm wide with lock	4	no
	front+back frame	5.8	rm
	Filler panel	0.66	rm
	side frames	12	no
	knee space panel	3.75	rm
	16 Amp/220 Volt double electrical outlet	6	no
	Three tier reagent rack 300 mm wide 2800 mmlong with service box	2.8	rm
6)	<b>C-SHAPE BENCH - 1500+1024+1250+1075+1250+1024+900 mm (750mm HEIGHT FROM F.F.L)</b>	1 no ✓	
	24 mm thick melamine laminated plywood worktop 600mm wide with back splash	3.48	rm
	24mm thick melamine corner worktop with back splash	2	no
	u/b cabinet with 2 drawer, 1 adj. shelf and 2 doors 800mm wide with lock	1	no
	cable gromet	5	no
	corner support	4	no
	Filler panel	4.61	rm
	knee space panel	6.39	rm
	16 Amp/220 Volt double electrical outlet	5	no
	lockable wall mounted storage cabinet with panel doors size:1200x300x600mm(h)	2	no
7)	<b>L SHAPE BENCH - 3714+2000 mm (900 mm height from FFL)</b>	1 no ✓	
	18 (±1) mm thick Granite worktop 900mm wide with back splash	5.71	rm
	Movable u/b storage cabinet with 1 drawer, 1 adjustable shelf & 1 door 450mm wide with lock with castor wheels	2	no
	Movable u/b storage cabinet with 2 drawer (side by side), 1 adjustable shelf & 2 doors 900mm wide with lock with castor wheels	1	no

	Movable u/b cabinet with 2 drawer (side by side), 1 adj. shelf and 2 doors 1000 mm wide with lock	1	no
	corner support	2	no
	u/b sink cabinet 900mm wide	1	no
	polypropylene drip rack with 52 pegs Size:550x700 mm(LxH)	1	no
	front + back frame	4.63	rm
	Filler panel	0.64	rm
	middle frame	4	no
	side frame	4	no
	knee space panel	2.83	rm
	bench mounted eye wash	1	no
	cold water stand out with triple outlets	1	no
	16 Amp/220 Volt double electrical pedestal box	4	no
	polypropylene sink 600x450 mm	1	no
	lockable wall mounted storage cabinet with panel doors size:900x300x600mm(h)	3	no
<b>8)</b>	<b>WALL BENCH - 3700 mm (900 mm height from FFL)</b>	<b>1 no</b> ✓	
	18 (±1)mm thick granite worktop 750 mm wide with backsplash	3.7	rm
	Movable u/b cabinet with 1 drawer, 1 adjustable shelf & 1 door 450mm wide with lock and castor wheels	3	no
	front + back frame	3.62	rm
	Filler panel	0.34	rm
	middle frame	3	no
	side frame	2	no
	knee space panel	2.79	rm
	16 Amp/220 Volt double electrical pedestal box	3	no
<b>9)</b>	<b>WALL CABINET</b>	<b>1 no</b> ✓	
	lockable wall mounted storage cabinet with panel door size:500x300x600mm(h)	2	no
	lockable wall mounted storage cabinet with panel doors size:900x300x600mm(h)	4	no
	lockable wall mounted storage cabinet with panel doors size:1000x300x600mm(h)	4	no

10)	<b>LABORATORY SEATING</b>	1 no ✓	
	executive office chair with armrest, back rest & castors	5	no
	pu seated height adjustable laboratory chair	15	no
11)	<b>FUME CUPBOARD</b> <b>Type of Hood: Low Constant Volume (LCV) type Bench Fume Hood</b> <b>Overall Dimension: Width 1200 x Depth 915 x Height 2300mm</b> <b>Inner Dimension: Width 1000 x Depth 645 x Height 1200mm</b>	1 no ✓	
	<ul style="list-style-type: none"> <li>Structure frame in 2.0mm thick GI construction</li> <li>Inner lining, rear baffles and top baffles in 6mm thick. Phenolic resin construction</li> <li>Outer panels in 1.2mm thick GI construction.</li> <li>Streamlined shaped exhaust duct collar in PP const.</li> <li>Aerodynamic Shape front posts, in GI construction</li> <li>Flip-on type Airfoil in 1.6 mm thick SS construction</li> <li>Combination type, frameless design sash in toughened glass const. with full length sash handle in anodized Al const.</li> <li>Sash movement mechanism with counter weight.</li> <li>Twin LED tube type light with fittings</li> </ul>	1	no
	<b>Fumehood worktop</b> <ul style="list-style-type: none"> <li>Black natural granite construction, having raised rails on all four sides, in PP construction., on the left rear side</li> <li>There shall be provision for water supply with a single valve tap in each fume hood with a high density polypropylene (approx. dimension 80×160 mm) oval shaped cup sink directly below the tap and shall be connected to the existing water inlet as well as drain outlet respectively..</li> <li>Polypropylene sink L 560 mm x W 355 x D 245 mm protected with splashguard</li> </ul>	1	
	<b>Service valves</b> <ul style="list-style-type: none"> <li>Having body in forged brass const., extended spindle in Aluminum construction, color coded knobs in plastic const. angular shaped serrated nozzles, in epoxy coated forged brass const. 1.5mt. long flexible tubing with end fittings for following services:</li> </ul>	1	
	<b>Service tube construction</b> <ul style="list-style-type: none"> <li>Vacuum - SS braided Teflon Hose</li> <li>Nitrogen - PU-4</li> <li>Potable Water - Nylon braided PVC Hose</li> <li>Minor-B fume cupboard 1525mm wide services are water , electrical &amp; gas(Nitrogen) with vsb 25</li> </ul>	1 1 4	
	<b>Exhaust Fan (PP-35)</b> - one fan for 1 Nos. 1200 mm wide Fume Hood and 1 Nos. Chemical Storage Cabinet (CSC)	1	
	<b>Electrical Services with internal wiring (all in non-FLP const.)</b> - Controller for Blower & light (Touch Pad) - 16A, 2 Pole MCB - Legrand or eq. Make - necessarily possess minimum <b>six 3-pin electrical sockets</b> (220-240V, 6-16A) and a shunt tripper for the safety control of all the electrical points. Legrand or equivalent make	1 1 1	
	<b>Controls</b> Air velocity Monitor with low air alarm		
	<b>Fume Hood Understructure</b> Fabricated out of heavy gauge rectangular shape hollow pipes in MS construction, duly finished with corrosion resistant specialty coatings		
	<b>Fume Hood Under-Cabinet (Chemical Storage Purpose)</b>		

	<p>Detachable design general purpose twin cabinets fabricated out of GI sheet, consisting of, - Special arrangement for air ventilation inside the cabinet</p> <ul style="list-style-type: none"> <li>● Twin doors in double wall const.</li> <li>● Flushed type recessed handle.</li> <li>● Heavy duty knuckle-barrel special design door hinges.</li> <li>● 1 No. removable shelf.</li> <li>● Recessed base frame in heavy duty GI const.</li> <li>● <b>FRP Lining inside the chemical storage cabinet</b></li> <li>● <b>PP Tray for chemical storage</b></li> <li>● Twin castors for easy removal of the cabinet.</li> </ul> <p><b>Accessories</b></p> <ul style="list-style-type: none"> <li>● 200 mm dia. Duct damper in PP const. complete with pre drilled flanges on both sides, manual operation handle and extended spindle, suitable for motorized drive.</li> <li>● Scaffold Grill (1330 x 750mm) in Vertical rod design, fabricated out of 12.0mm dia., Epoxy rods, having 150mm pitch between two rods.</li> <li>● Ceiling Enclosure Panels in GI const; duly powder coated</li> </ul> <p><b>Exhaust Fan (315 mm Dia) - one fan for 1 Nos. 1200 mm wide Fume Hood</b>          - Single piece molded UV treated chemical resistant SISW direct driven centrifugal fan in PP constuction with suitable stand in MS powder coated construction, CFM 400 to 500          - Corrosive resistant PP Impeller with extra strength,high efficiency, properties which produces lower noise and power consumption. - Drive - 2 HP, 1400 RPM, 415V, 50Hz., TEFC Class B insulation induction motor with IP55 enclosure, in Non- FLP const.          - 16A, 3Ph MCB for Fan - Legrand or eq. Make          - VFD Panel with necessary internals</p> <p><b>Exhaust ducting in PP + FRP (Round Shape) construction (3mm + 2mm)</b>          complete with necessary bends, reducers, T-connections, supports, flanges, gaskets, nutbolts etc.          Note: Amount for ducting work and wiring shall be payable as per actuals which will be evaluated after the official site visit.</p>	<p>1 1 1</p>	
12)	<b>TALL STORAGE</b>	<b>1 no</b> ✓	
	lockable tall storage cabinet with doors & drawers size:1500x300x2200mm(h)	1	no
	lockable tall storage cabinet with panel drawers size:1200x450x2000mm(h)	1	no
13)	<b>MOVABLE CABINET</b>	<b>1 no</b> ✓	
	movable u/b cabinet with 1 drawer, 1 adjustable shelf & 1 door 450mm wide with lock	6	no





**Laboratory furniture for BioCIAS lab, SEESS, IISER TVM**

No:	Description	Quantity	Unit
1	<b>ISLAND BENCH -L 2000 x W 1000x H 900 mm</b>	1 ✓	No's
	18 (±1) mm thick granite worktop 1050 mm wide	1	No's
	u/b cabinet with 1 drawer, 1 adjustable shelf & 1 door 500mm wide with lock	1	Nos
	Front + back frame	1.9	rm
	Filler panel	2.65	rm
	Side frames	1	No's
	Side frames, special	1	No's
	Knee space panel	1.17	rm
	16 Amp/220 Volt double electrical pedestal box	1	No's
	Stainless steel base unit	1	No's
2	<b>WALL BENCH – L 1200 mm x W 700mm x H 900mm</b>	1 ✓	No's
	18 (±1) mm thick granite worktop 750 mm wide with backsplash	1.2	rm
	u/b cabinet with 1 drawer, 1 adjustable shelf & 1 door 450mm wide with lock	1	No's
	Filler panel	0.7	rm
	Knee space panel	0.69	rm
	16 Amp/220 Volt double electrical pedestal box	1	No
	Supporting strip	1.38	rm
3	<b>WALL BENCH - L 1600 mm x W 700 mm x H 900 mm</b>	1 ✓	No's
	18 (±1) mm thick granite worktop 1650 mm wide with backsplash	1.6	rm
	u/b cabinet with 1 drawer, 1 adjustable shelf & 1 door 350 mm wide with lock	1	No's
	Filler panel	1.07	rm

	Knee space panel	1.17	rm
	16 Amp/220 Volt double electrical pedestal box	1	Nos
	Supporting strip	2.34	rm
<b>4</b>	<b>WALL BENCH - 2700 mm x 750 mm x 900 mm</b>	<b>1</b> ✓	<b>No's</b>
	18 (±1)mm thick granite worktop 800 mm wide with backsplash	2.7	rm
	u/b cabinet with 1 drawer, 1 adjustable shelf & 1 door 500mm wide with lock	1	No's
	u/b sink cabinet 600mm wide	1	No's
	Filler panel	0.92	rm
	Knee space panel	1.54	rm
	Single cold water stand out	1	No's
	16 Amp/220 Volt double electrical pedestal box	2	No's
	Polypropylene sink 600x450 mm protected with splashguard	1	No's
	Coldwater stand out with triple outlets	1	No's
	Lockable wall mounted storage cabinet with panel doors size: 1000x300x600mm(h)	1	No's
	Lockable wall mounted storage cabinet with panel doors size: 1200x300x600mm(h)	1	No's
	Supporting strip	3.08	rm
	bench mounted eye wash	1	No's
<b>5</b>	<b>WALL BENCH - L 2050 mm x W 1000mm x 900 mm</b>	<b>1</b> ✓	<b>No's</b>
	18 (±1)mm thick granite worktop 1050 mm wide with backsplash	2.05	rm
	u/b cabinet with 1 drawer, 1 adjustable shelf & 1 door 400mm wide with lock	2	No's
	Filler panel	1.22	rm
	knee space panel	1.2	rm

	16 Amp/220 Volt double electrical pedestal box	3	No's
	supporting strip	2.4	Rm
<b>6</b>	<b>WALL BENCH - 1550 mm x W 600 x 900 mm</b>	<b>1 ✓</b>	<b>No's</b>
	18GRT60BS 1.55 m 18 (±1)mm thick granite worktop 650 mm wide with backsplash		
	CB045PHXL 2 no u/b cabinet with 1 drawer, 1 adjustable shelf & 1 door 450mm wide with lock		
	FP-H 0.13 m Filler panel		
	KS1000-H 0.61 m knee space panel		
	LE2WP-IN 1 no 16 Amp/220 Volt double electrical pedestal box		
	STRIP 1.22 m supporting strip		
<b>7</b>	<b>WALL BENCH - L 5440 mm x W 450 mm x (750mm HEIGHT FROM F.F.L)</b>	<b>1 ✓</b>	<b>No's</b>
	18mm thick melamine laminated plywood worktop 700mm wide with back splash	5.44	rm
	Acrylic separation panel (H 400mm x W 700 mm). Thickness 7 mm. Light blue shade	6	No's
	Front frame, L 5440 mm x 400 mm. [white writing board]	5.44	rm
	Legs should be made of Powder-coated MS structure with heavy duty weight bearing capacity.		
	Specially designed powder-coated M.S. brackets fixed to the partition frame support the table tops and gable ends u/b cabinet with 1 drawer, 1 adjustable shelf & 1 door 400mm wide with lock	5	No's
	Cable gromet	5	No's
	Single computer data outlet	5	No's
	Filler panel	0.58	rm
	Knee space panel	3.38	rm

8	Student sitting chair-height adjustable	5 ✓	No's
9	Lockable plywood 3 drawer pedestal unit (H 700 mm x W 400 mm x L 450mm). The handles should be of stainless steel.	8 ✓	No's
10	Student sitting chair-height adjustable	5 ✓	No's
11	<b>Low constant volume (LCV) type Bench Fume Hood) L 1500 x D 915 x H 2300 mm) (For Non-AC labs)</b>	1 ✓	No's
	<p><b>Fume Hood Superstructure</b></p> <p>Consisting of following :</p> <ul style="list-style-type: none"> <li>Structure frame in 2.0mm thick GI construction</li> <li>Inner lining, rear baffles and top baffles in 6mm thk. Phenolic resin construction</li> <li>Outer panels in 1.2mm thick GI construction.</li> <li>Aerodynamic Shape front posts, in GI construction</li> <li>Flip-on type Airfoil in 1.6 mm thick SS construction</li> <li>Streamlined shaped exhaust duct collar in PP const.</li> <li>Combination type, frameless design sash in toughened glass const. with full length sash handle in anodized Al const.</li> <li>Sash movement mechanism with counter weight.</li> <li>Twin LED tube type light with fittings</li> </ul> <p><b>Fume Hood Worktop</b></p> <p>In telephone black natural granite construction, having raised rails on all four sides, with 1 No. 560x450x300 mm sink, in Polypropylene construction., on left rear side.</p> <p><b>Service Valves</b></p> <p>Having body in forged brass const., extended spindle in Aluminum construction, color coded knobs in plastic const. angular shaped serrated nozzles, in epoxy coated forged brass const. 1.5mt. long flexible tubing with end fittings for following services:</p> <ul style="list-style-type: none"> <li>Services Tube Construction</li> <li>Vacuum - SS braided Teflon Hose</li> <li>Nitrogen - PU-4</li> <li>Potable Water - Nylon braided PVC Hose</li> </ul> <p><b>Electrical Fittings</b></p> <ul style="list-style-type: none"> <li>with internal wiring (all in non-FLP const.)</li> <li>Controller for Blower &amp; light (Touch Pad)</li> <li>16A, 2 Pole MCB - Legrand or eq. Make</li> <li>5/15A 3-pin Socket with switch/ MCB - Legrand or eq. Make</li> </ul>		

	<p><b>Controls</b> Air velocity Monitor with low air alarm, Model AFA/1000 TEL - UK Make</p> <p><b>Fume Hood Understructure</b> Fabricated out of heavy gauge rectangular shape hollow pipes in MS construction, duly finished with corrosion resistant specialty coatings.</p> <p><b>Fume Hood Under-Cabinet (Chemical Storage Purpose) Accessories</b></p> <p>Detachable design general purpose twin cabinets fabricated out of GI sheet, consisting of,          Special arrangement for air ventilation inside the cabinet          Twin doors in double wall construction          Flushed type recessed handle.          Heavy duty knuckle-barrier special design door hinges.          1 No. removable shelf.          Recessed base frame in heavy duty GI construction          FRP Lining inside the chemical storage cabinet          PP Tray for chemical storage          Twin castors for easy removal of the cabinet.</p> <p><b>Accessories</b>          200 mm dia. Duct damper in PP const. complete with pre drilled flanges on both sides, manual operation handle and extended spindle, suitable for motorized drive.</p> <p>Scaffold Grill (1330 x 750mm) in Vertical rod design, fabricated out of 12.0mm diameter.          Epoxy rods, having 150mm pitch between two rods.          Ceiling Enclosure Panels in GI const; duly powder coated.</p>		
	<p><b>Exhaust Fan (PP-35) - one fan for 1 Nos. 1500 mm wide Fume Hood and 1 Nos. Chemical Storage Cabinet (CSC)</b></p>	<p>1</p>	<p>No's</p>
	<p>Single piece molded UV treated chemical resistant SISW direct driven centrifugal fan in PP construction with suitable stand in MS powder coated construction, CFM 1500-1600</p> <p>Note: Amount for ducting work and wiring shall be payable as per actuals which will be evaluated after the official site visit.</p>		

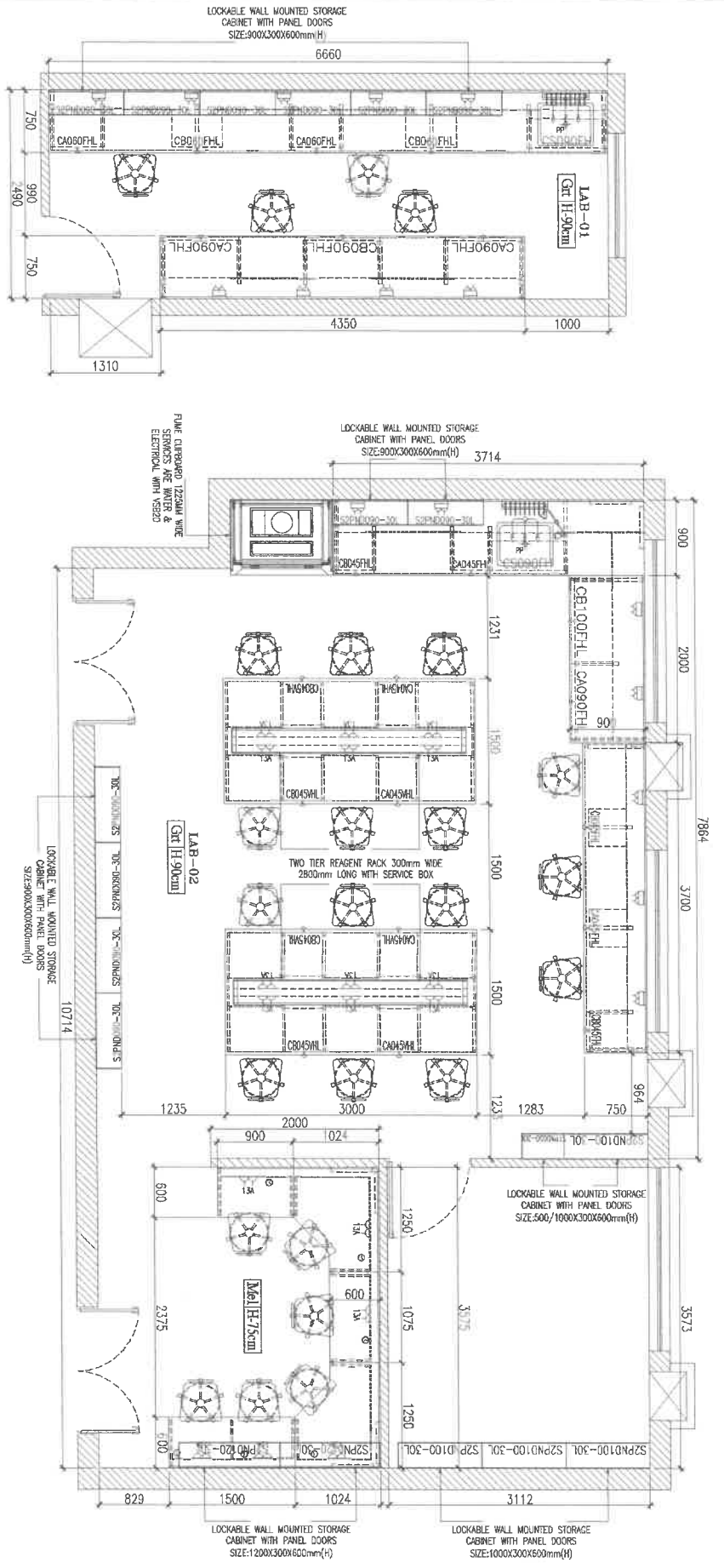
<b>12</b>	<b>CHEMICAL STORAGE</b>	<b>1</b> ✓	<b>No's</b>
	Chemical storage cabinet size: L 800x W400x H1500mm	1	No's
	Racks	4	No's
<b>13</b>	<b>WALL CABINET</b>	<b>1</b> ✓	<b>No's</b>
	Lockable wall mounted storage cabinet with panel doors size: L1000 x300x H 600mm	2	No's
	Lockable wall-mounted storage cabinet with panel doors size: L 2000x 300x H 600mm	1	No's
<b>14</b>	PU seated height adjustable laboratory chair	12 ✓	No's
<b>15</b>	<b>BALANCE BENCH 1 No 900 x600 x 900mm (H)</b>	<b>1</b> ✓	<b>No's</b>
	18 (±1)mm thick granite worktop 950 mm wide		
	Filler panel	0.92	rm
	Knee space panel	1	rm
	16 Amp/220 Volt double electrical pedestal box	1	Nos
<b>16</b>	<b>Lockable wall mounted storage cabinet panel door</b> size:600x300x600mm(h) Plywood with stainless steel locks and handles	<b>1</b> ✓	<b>No's</b>
<b>17</b>	<b>Lockable wall mounted storage cabinet with panel doors</b> size:1200x300x600mm(h) Plywood with stainless steel locks and handles	<b>4</b> ✓	<b>No's</b>

**Specific requirements for lab space B108 in the School of Biology, IISER Thiruvananthapuram:**

	Description	Quantity	Unit
1	<b>ISLAND BENCH-L 3500 mm X W1500 mm (900 mm height from FFL)</b>	2 ✓	Nos
	18 (±1)mm thick granite worktop 1500 mm wide	3.5	rm
	u/b cabinet with 1 drawer,1 adjustable shelf & 1 door 500mm wide with lock	6	no
	Filler panel	1.38	rm
	Knee space panel	4.18	rm
	16 Amp/220 Volt quadruplet electrical pedestal box	3	no
	Three tier reagent rack 300mm wide and 3400mm long	3.4	rm
	Supporting strip	8.36	rm
2	<b>WALL BENCH - L5100mm X W750mm (900 mm height from FFL)</b>	1 ✓	No
	18 (±1)mm thick granite worktop 750 mm wide with backsplash	5.1	rm
	u/b movable cabinet and 1 drawer,1 adjustable shelf & 1 door 500mm wide with lock	2	no
	u/b movable cabinet and 1 drawer,1 adjustable shelf & 2 doors 750mm wide with lock	2	no
	ceiling mounted canopy hood 900x600 with vsb 20	1	no
	corner support	2	no
	u/b sink cabinet 900mm wide	1	no
	polypropylene drip rack with >46 pegs	1	no
	front frame	9.28	rm
	front + back frame	0.9	rm
	middle frame	10	no
	side frame	6	no
	knee space panel	10.59	rm
	bench mounted eye wash	1	no
	cold water stand out with triple outlets	1	no
	polypropylene sink 600x450 mm protected with splashguard	1	no
	lockable wall mounted storage cabinet with panel doors size:900x300x600mm(h)	3	no
3	<b>WALL BENCH - L6270mm X W750mm (750 mm height from FFL)</b>	1 ✓	No
	18 (±1)mm thick granite worktop 750 mm wide with backsplash	6.25	rm
	Book rack 300 mm wide 6000 mm long	1	no









	u/b movable cabinet and 1 drawer, 1 adjustable shelf and 1 door 500 mm wide with lock	3	no
	Front frame	6.27	rm
	Filler panel	0.17	rm
	Middle frame	4	no
	Side frame	2	no
	Knee space panel	6.21	rm
4	<b>L-SHAPE BENCH- L2100+1150+700mm X W750mm (900 mm height from FFL)</b>	1 ✓	<b>no</b>
	18 (±1)mm thick granite worktop 750 mm wide with backsplash	2.8	rm
	18 (±1)mm thick 750mm wide granite corner worktop with backsplash	1	no
	u/b storage cabinet with 1 drawer, 1 adjustable shelf & 1 door 500mm wide with lock	2	no
	u/b movable cabinet and 1 drawer, 1 adjustable shelf & 1 door 500mm wide with lock	1	no
	u/b movable cabinet and 1 drawer, 1 adjustable shelf & 2 doors 750mm wide with lock	2	no
	corner support	2	no
	front + back frame	3.09	rm
	Filler panel	0.34	rm
	middle frame	1	no
	side frame	6	no
	knee space panel	3.63	rm
5	<b>WALL CABINET</b>		
	lockable wall mounted storage cabinet panel door size:450x300x600mm(h)	2 ✓	<b>no</b>
	lockable wall mounted storage cabinet with panel doors size:900x300x600mm(h)	16 ✓	<b>no</b>
6	<b>LABORATORY SEATING</b>		
	Laboratory workbench chairs	14 ✓	no
	Student seating chairs	8 ✓	no





**WORKTOP:-** Grt 16(±1)mm THICK GRANITE TOP WITH BACK SPLASH  
Mel 24mm THICK MELAMINE LAMINATED PLYWOOD WITH BACK SPLASH

**LEGEND:-**

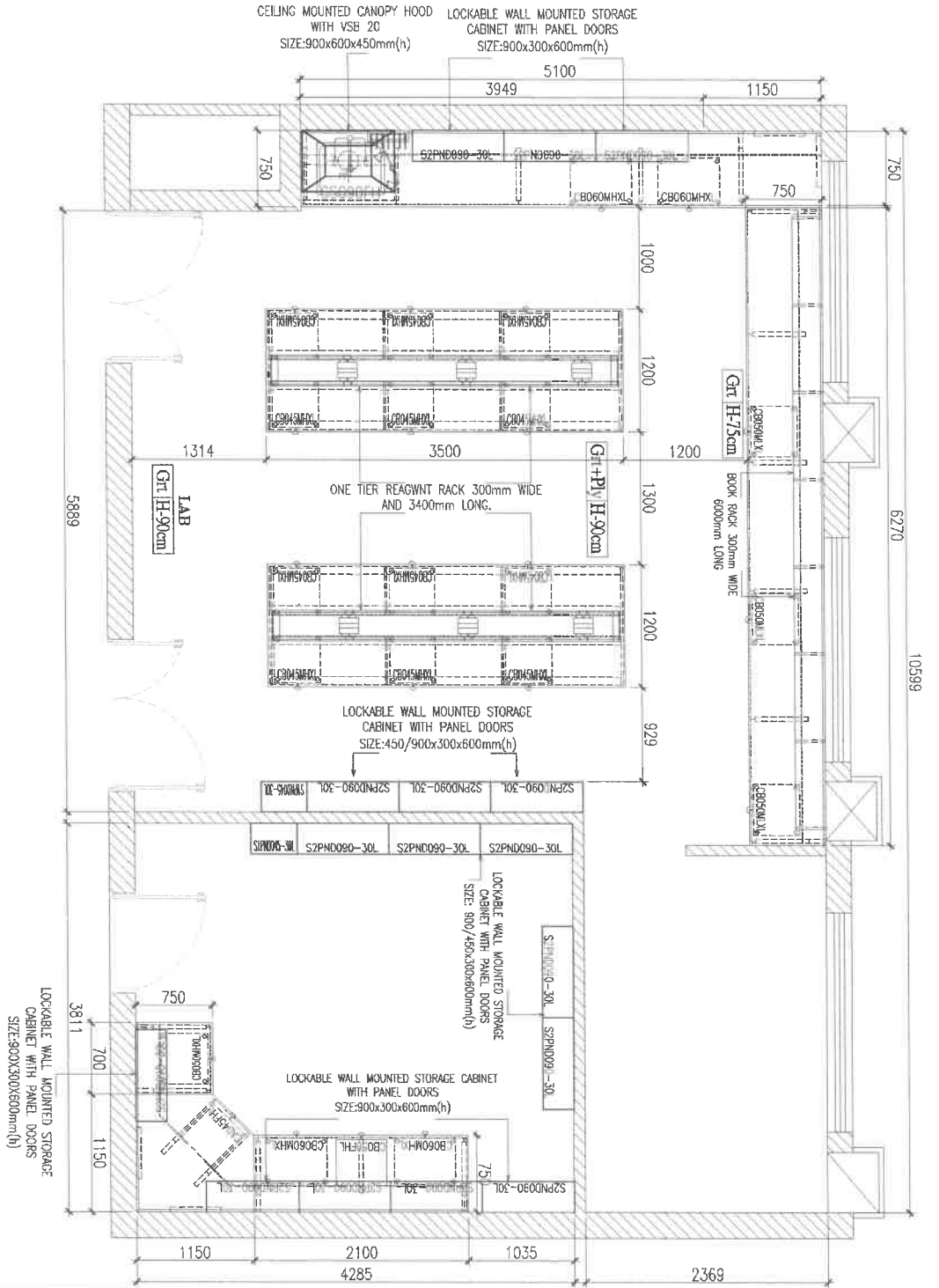
 POLYPROPYLENE SINK, SIZE: 600x450mm  
 COLD WATER STANDOUT WITH TRIPLE OUTLETS  
 DRIP RACK, SIZE 550x700mm(LxH)  
 13amp/220volt DOUBLE ELECTRIC PEDestal BOX  
 13amp/220volt DOUBLE ELECTRIC OUTLET.  
 BENCH MOUNTED EYE WASH  
 CABLE GROMMET  
 PU-SEATED LABORATORY CHAIR

MOVABLE U/B CABINET WITH LOCK QUANTITY-06 NOS





IISER BIOLOGY LAB



**LEGEND:-**

- POLYPROPYLENE SINK, SIZE: 600x450mm
- 16amp/220volt QUADRUPLET ELECTRIC PEDESTAL BOX
- COLD WATER STANDOUT WITH TRIPLE OUTLETS
- DRIP RACK, SIZE 400x550mm(LxH)
- BENCH MOUNTED EYE WASH
- PU-SEATED LABORATORY CHAIR
- OFFICE CHAIR

**WORKTOP:-** Grt 18(±1)mm THICK GRANITE TOP WITH BACK SPLASH

**GrtPly** 18(±1)mm THICK GRANITE TOP WITH BACK SPLASH WITH PLYBACKING

PU-SEATED LABORATORY CHAIR  
QUANTITY : 12 NOS

OFFICE CHAIR  
QUANTITY : 08 NOS

ALL DIMENSIONS ARE IN MM



