

# BOSE INSTITUTE

P-1/12, C.I.T. Scheme VII-M, Kolkata 700 054, West Bengal, India



बसु बिज्ञान मन्दिर

## BOSE INSTITUTE

P-1/12, C.I.T. Scheme VII-M, Kolkata 700 054

### BIDDING DOCUMENTS

For Tender Notice No.

**BI-K/E-TEND/13/2019-20**

To be addressed to:

Registrar (Officiating)

**Bose Institute, Centenary Building,  
P-1/12, CIT Scheme - VII -M  
Kolkata - 700054 (INDIA)**

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Ref : BI-K/E-TEND/13/2019-20

## INVITATION TO BIDS

Bose Institute, Kolkata invites online open tender for purchase of furniture and other items for the laboratories at the UAC from furniture manufacturer's with proven record of supplying laboratory furniture to renowned R&D Lab (Government of India Research laboratories and renowned Pharma companies).

Sl. No.	Name of the items	Bid security (EMD)
1.	Supply and Installation of laboratory infrastructure, namely laboratory benches, chemical storage cabinets, anti-vibration tables, fume hoods and other allied services	INR 25,00,000.00

- *Details of specifications are enclosed in Annexure - I*

Sl. No.	Particulars	Date & Time
1.	Date of uploading of NIT & other documents (Online) (Publishing date)	03.10.2019 at 16:00 hrs.
2.	Documents download start date (Online)	03.10.2019 at 16:10 hrs.
3.	<b>Clarification Start date</b> <b>Queries to be sent to the mail id <a href="mailto:bipurchase@jcbose.ac.in">bipurchase@jcbose.ac.in</a></b>	03.10.2019 at 16:30 hrs.
4.	<b>Clarification End date</b>	12.10.2019 at 13:00 hrs.
5.	<b>Prebid Conference</b>	15.10.2019 at 12:30 hrs.
6.	Amendment (if any) (On line)	24.10.2019 at 15:00 hrs.
7.	Bid submission start date (On line)	28.10.2019 at 17:00 hrs.
8.	Documents download end date (Online)	08.11.2019 at 17:00 hrs.
9.	Bid Submission closing (On line)	08.11.2019 at 17:00 hrs.
10.	Last Date of submission of Earnest Money Deposit Including the technical brochure, if any ( <b>Off line</b> )	11.11.2019 at 15:00 hrs.
11.	Bid opening date for Technical Proposals (Online)	13.11.2019 at 13:00 hrs.
12.	Date of uploading list for Technically Qualified Bidder (online)	To be notified later
13.	Date of uploading the final list of Technically Qualified Bidder (online) after disposal of appeals, if any.	To be notified later
14.	Date for opening of Financial Proposal (Online)	To be notified later

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<b>Name of Item/Item Description:</b>	:	Supply and Installation of laboratory infrastructure, namely laboratory benches, chemical storage cabinets, anti-vibration tables, fume hoods and other allied services
<b>Cost of Tender Document (Non-refundable)</b>	:	Rs. 2,500.00
<b>Bid security/ Earnest Money Deposit</b>	:	Rs. 25,00,000.00
<b>Mode of Payment for Earnest Money Deposit</b>	:	(To be paid through RTGS/NEFT/Demand Draft/Bank Guarantee)
	Name of the Bank A/C	_____
	SBI A/C No	_____
	Name of the Bank	_____
	IFSC Code	_____
	<b>This is mandatory that UTR Number is provided in the on-line quotation/bid for online transfer of EMD.</b>	
<b>Period of completion</b>	:	120 Days from the issue of Purchase order as per GFC drawing
<b>Bid Validity</b>	:	120 Days from the opening of Technical Bid

Interested bidders may download the Tender Documents from the <http://eprocure.gov.in/eprocure/app>. The Bid, complete in all respect, should be submitted online in the said CPP Portal till the last date and time of online bid submission as per the tender schedule along with scanned copy of transaction details (RTGS/NEFT/SWIFT/Demand Draft/Bank Guarantee) against the Earnest Money Deposit.

**Director, Bose Institute reserves the right to accept or reject any or all tenders either in part or in full. The reasons for rejecting the tender of a prospective bidder may be disclosed only when enquiries are made.**

*Sd /*  
**Registrar (Officiating)**  
**Bose Institute Kolkata**

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## BIDDER'S ELIGIBILITY CRITERIA:

1. **Company Profile:** The bidders should be registered as per company norms in India having a place of business in India. Clear supporting documents in this regard should be uploaded.

Bidder must upload the scanned copy of PAN Card, Trade License, Incorporation Certificate, Factory License, Income tax Return of the last Three Financial years (16-17, 17-18, and 18-19). Professional Tax Registration along with the updated challan, GST Registration Certificate and Certificate of Registration with EPF and ESI.

2. The company must also have ISO certification like ISO14001:2015 and ISO18001:2007.
3. The bidder should provide an undertaking that they have never been blacklisted by any Govt. Organization / PSUs/Autonomous Bodies / R&D laboratories etc.
4. **Work Experience:** The bidders should have work experience as following. Supporting documents like copy of Purchase Order, Completion Certificate should be uploaded in this regard.

- a) Three similar completed works (should have experience of having successfully completed works during the last seven years ending with the date of submission of tenders) each costing not less than Rs. 4.8 Crore for Govt. funded Technical/ Research Institutes (CFTI, which includes IITs, IISERs, IIMs, NITs, IIITs, NITTTRs, IISc and IEST), Central Universities and/or DAE Institutes (NISER, TIFR), or reputed Pharma/biotechnology R&D laboratories where they have completed similar works in **centrally air-conditioned Laboratories**;

Or

- b) Two similar completed works (should have experience of having successfully completed works during the last seven years ending with the date of submission of tenders) each costing not less than Rs. 7.2 Crore for Govt. Funded Technical/Research Institutes (CFTI, which includes IITs, IISERs, IIMs, NITs, IIITs, NITTTRs, IISc and IEST), Central Universities and/or DAE Institutes (NISER, TIFR), or reputed Pharma/biotechnology R&D laboratories where they have completed the similar in **centrally air-conditioned Laboratories**.

Or

- c) One similar completed work (should have experience of having successfully completed works during the last seven years ending with the date of submission of tenders) costing not less than Rs. 9.6 Crore for Govt. Funded Technical/Research Institutes (CFTI, which includes IITs, IISERs, IIMs, NITs, IIITs, NITTTRs,

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IISc and IEST), Central Universities and/or DAE Institutes (NISER, TIFR), or reputed Pharma/biotechnology R&D laboratories where they have completed the similar works in **centrally air-conditioned Laboratories**.

5. **Financial Turnover:** Should have had an average annual financial turnover of Rs.20 Crore in respect of fume hood, laboratory furniture during the last three years ending 31<sup>st</sup> March 2019. Latest audited financial statement with CA Certificate to this effect may be submitted.
6. **Infrastructure:** The bidder or its parent company should have a well-established (their own) in-house manufacturing unit and testing facility in India for the steel lab furniture and fume hood, quality management system as per International standards providing the products and services on the continuous basis at least for the last 10 years. The bidder or its parent company in India or abroad should possess the current/valid approval for such items manufacturing facility by a statutory certifying authority, like factory inspector etc.
7. The bidder / parent company should be an Official member with SEFA (Scientific Equipments & Furniture Association) on a continuous basis at least for the past 2 yrs. **“Laboratory Furniture Certificate of Performance” certified by SEFA** should be uploaded along with the bid.
8. The bidder / parent company should possess the key professional staff, at least one, in his organization on full or part time basis with good knowledge of codes and standards like ASHRAE and BS EN 14175. (Face Velocity and Inner- Plane containment testing of fume hoods and the use of the associated test equipment) Such professionals should have a valid membership of ASHRAE at least for the past 3 years (bidder should provide necessary documentary proof in this regard.).
9. The bidder should have the ability to do ASHRAE/BS EN 14175 testing at site by self or third party.

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10. The range of furniture offered by the bidder should have compliance certificate through SEFA authorized third party testing centers, for all the parameters of **SEFA 8M-2016 or higher grade for laboratory grade metal casework steel base cabinet, wall cabinet and 4 leg- table frame & SEFA-10-2016 Adaptable Laboratory Furniture Systems**. Detailed documentary evidence for the same (Certificate should be within last 3 years from the date of tender) must be included in the technical bid. The testing parameters should adhere as per the SEFA 8-M / SEFA-10 or higher standard Guideline. (The bidder should give a declaration that there has been no change in the product engineering design from the date of the Certificate). The bidder must also provide evidences, at least one, (purchase order(s) and completion certificate(s)) showing satisfactory supply and installation of both SEFA-8M and SEFA 10 certified furniture in the last three years and have in-house SEFA testing facility to test the product being supplied.
11. Considering the Size of the Project, the Bidder should have Solvency of minimum Rs. 10 Crore as on 30<sup>th</sup> September, 2019. The Bidder shall produce the Solvency Certificate for Rs. 10 Crore from the Bank, with the technical Bid.
12. **Details of work experience:** The bidder should provide names & addresses of only those organizations where they have completed the similar works including fume hoods, laboratory furniture & Exhaust System Work.

## CONTENT OF TENDER DOCUMENTS:

Online open tender has been invited from the reputed manufacturer of lab furniture through CPP Portal in **two-bid system** (technical & financial) for furnishing(Supply and Installation of lab furniture, fume hoods), at the Unified Academic Campus of BOSE INSTITUTE located in sector V, Salt Lake City, Kolkata-700091.

The tender document consists of two parts:

### PART-I: TECHNICAL BID:

- A. PRE-QUALIFICATION CRITERIA
- B. TERMS & CONDITIONS
- C. TECHNICAL BID

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## **PART-II: FINANCIAL BID:**

### **A. QUOTED MULTISHEET BOQ CONTAINING DETAILED BREAK-UP OF PRICES.**

Intending bidders are hereby requested to upload the technical bid and financial bid separately in two separate covers as mentioned in the tender detail through CPP Portal using digital signature certificate of the authorized signatory. Proof of document that indicate the price should not be uploaded in the technical cover. If such document is found in the technical cover, the entire bid shall be liable to be cancelled without any prior intimation to the bidder. Proper documentation with clear visibility of scanned documents are to be ensured before uploading the bid document. The interested **bidders are encouraged to visit the proposed site** before submitting the tender, if so desired, at their own cost. **Please see the BOQ filling instruction sheet to ensure proper bid submission in the financial cover.**

**The Institute may provide the following Documents to the Successful Bidder, if required:**

- 1) Custom Duty Exemption Certificate, as applicable
- 2) The institute would provide way bill as per requirement
- 3) GST Exemption Certificate, as applicable

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ANNEXURE-I

## COMPLIANCE CHECK LIST:

Serial No.	CRITERIA	*Whether complied or not (specify Yes/No)	Documentary Availability (Yes/No)
1	<p><b>Company Profile:</b> The bidders should be registered as per company norms in India having a place of business in India. Clear supporting documents in this regard should be uploaded.</p> <p>Bidder must upload the scanned copy of PAN Card, Trade License, Incorporation Certificate, Factory License, Income tax Return of the last Three Financial years (16-17, 17-18, and 18-19). Professional Tax Registration along with the updated challan, GST Registration Certificate and Certificate of Registration with EPF and ESI.</p> <p>The company must also have ISO certification like ISO14001:2015 and ISO18001:2007.</p>		
2	The company must also have ISO certification like ISO14001:2015 and ISO18001:2007.		
3.	The bidder should provide an undertaking that they have never been blacklisted by any Govt. Organization / PSUs/Autonomous Bodies / R&D laboratories etc.		
4.	<b>Work Experience:</b> The bidders should have work experience as following. Supporting documents like copy of Purchase Order, Completion Certificate should be uploaded in this regard.		
a).	Three similar completed works (should have experience of having successfully completed works during the last seven years ending with the date of submission of tenders) each costing not less than Rs. 4.8 Crore for Govt. funded Technical/ Research Institutes (CFTI, which includes IITs, IISERs, IIMs, NITs, IIITs, NITTTRs, IISc and IEST), Central Universities and/or DAE Institutes (NISER, TIFR), or reputed Pharma/biotechnology R&D laboratories where they have completed similar works in <b>centrally air-conditioned Laboratories;</b> (OR)		



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b).	Two similar completed works (should have experience of having successfully completed works during the last seven years ending with the date of submission of tenders) each costing not less than Rs. 7.2 Crore for Govt. Funded Technical/Research Institutes (CFTI, which includes IITs, IISERs, IIMs, NITs, IIITs, NITTTRs, IISc and IEST), Central Universities and/or DAE Institutes (NISER, TIFR), or reputed Pharma/biotechnology R&D laboratories where they have completed the similar in <b>centrally air-conditioned Laboratories</b> . (OR)		
c).	One similar completed work (should have experience of having successfully completed works during the last seven years ending with the date of submission of tenders) costing not less than Rs. 9.6 Crore for Govt. Funded Technical/Research Institutes (CFTI, which includes IITs, IISERs, IIMs, NITs, IIITs, NITTTRs, IISc and IEST), Central Universities and/or DAE Institutes (NISER, TIFR), or reputed Pharma/biotechnology R&D laboratories where they have completed similar works in <b>centrally air-conditioned Laboratories</b> .		
5.	<b>Financial Turnover:</b> Should have had an average annual financial turnover of Rs. 20 Crore in respect of fume hood, laboratory furniture during the last three years ending 31 <sup>st</sup> March 2019. Latest audited financial statement with CA Certificate to this effect may be submitted.		
6.	<b>Infrastructure:</b> The bidder or its parent company should have a well-established (their own) in-house manufacturing unit and testing facility in India for the steel lab furniture and fume hood, quality management system as per International standards providing the products and services on the continuous basis at least for the last 10 years. The bidder or its parent company in India or abroad should possess the current/valid approval for such items manufacturing facility by a statutory certifying authority, like factory inspector etc.		

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7.	The bidder / parent company should be an Official member with SEFA (Scientific Equipments & Furniture Association) on a continuous basis at least for the past 2 yrs. " <b>Laboratory Furniture Certificate of Performance</b> " certified by SEFA should be uploaded along with the bid.		
8.	The bidder / parent company should possess the key professional staff, at least one, in his organization on full or part time basis with good knowledge of codes and standards like ASHRAE and BS EN 14175. (Face Velocity and Inner- Plane containment testing of fume hoods and the use of the associated test equipment) Such professionals should have a valid membership of ASHRAE at least for the past 3 years (bidder should provide necessary documentary proof in this regard).		
9.	The bidder should have the ability to do ASHRAE/BS EN 14175 testing at site by self or third party.		
10.	The range of furniture offered by the bidder should have compliance certificate through SEFA authorized third party testing centers, for all the parameters of <b>SEFA 8M-2016 or higher grade for laboratory grade metal casework steel base cabinet, wall cabinet and 4 leg- table frame &amp; SEFA-10-2016 Adaptable Laboratory Furniture Systems</b> . Detailed documentary evidence for the same (Certificate should be within last 3 years from the date of tender) must be included in the technical bid. The testing parameters should adhere as per the SEFA 8-M / SEFA-10 or higher standard Guideline. (The bidder should give a declaration that there has been no change in the product engineering design from the date of the Certificate). The bidder must also provide evidences, at least one, (purchase order(s) and completion certificate(s)) showing satisfactory supply and installation of both SEFA-8M and SEFA 10 certified furniture in the last three years and have in-house SEFA testing facility to test the product being supplied.		

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11.	Considering the Size of the Project, the Bidder should have Solvency of minimum Rs. 10 Crore as on 30 <sup>th</sup> September, 2019. The Bidder shall produce the Solvency Certificate for Rs. 10 Crore from the Bank, with the technical Bid.		
12.	<b>Details of work experience:</b> The bidder should provide names & addresses of only those organizations where they have completed the similar works including fume hoods, laboratory furniture & Exhaust System Work.		

## SHORT LISTING CRITERIA:

For support & verification of above criteria necessary self-attested document must be attached in respect of each point.

## EVALUATION PROCESS

Initial technical qualification shall consist of evaluation of technical documents and samples as described in the technical document, following which the financial bids shall be opened. The L1 bidder shall then be issued a letter of intent (LOI) for setting up a mockup lab within three weeks from the date of LOI, for technical compliance as per the technical documents, and also the workmanship. If the overall/specific quality is found unsatisfactory, the bidder shall be given a written notice to rectify the same within two weeks from the date of notice issued to them. If the bidder fails to demonstrate a satisfactory product this time, Bose Institute reserves the right to reject the offer of the said bidder and issue the LOI to the L2 bidder, and so on.

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## GENERAL TERMS & CONDITIONS:

1. The procurement will be made by Bose Institute in compliance to the Govt. of India Rules framed for public procurement.
2. The Tender document can only be downloaded from the website: <https://eprocure.gov.in/eprocure/app> only after the time of "Document Download / Sale Start Date till Document Download / Sale End Date as shown in the schedule of tender.
3. The Institute reserves the right to reject any or all the bidders at any stage or accept them in part or reject the lowest tender without assigning any reason thereof. The Institute reserves the right to relax or tighten the Terms and Conditions given in the tender documents as per norms.
4. The Institute will initially issue Letter of Intent to the awarded vendor, who have actually participated in the tender, found eligible in all respects and have fully complied both in Technical as well as financial evaluation, and upon consequent acceptance and approval of the competent authority of the Institute. The purchase order(s) shall be subsequently issued after the receipt and due approval of GFC drawings and finalized BOQ.
5. **Preparation and Submission of Bid:**
  - a. Bid is to be submitted on-line through the website stated above. All the documents uploaded by the Tender Inviting Authority forms an integral part of the contract. The bidder is required to upload entire set of tender documents along with other related documents as asked for in the tender document through the above stated website within the stipulated date and time mentioned in the **schedule of the tender**.
  - b. Bid is to be submitted in two folders namely "Technical Cover' and "Financial Cover' (as mentioned in the **cover details**) within due date and time. The bidder shall carefully go through the documents and prepare to upload the scanned documents in Portable Document Format (PDF) files in the designated locations in the portal as Technical Bid. The bidder is required to fill up the rates of items in the provided BOQ in the designated cells (SOQ\_supply and SOQ-Installation) and upload the same in the designated location in the portal as Financial Bid. Please follow the INSTRUCTION FOR FILLING UP THE PRICE-BID (BOQ/SOQ) to ensure full compliance. If price is disclosed in the technical cover, the entire bid shall be rejected without any prior intimation to the respective bidder.
  - c. Documents uploaded are to be digitally signed using the Digital Signature Certificate (DSC).[Class –II or Class III with organization name]

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- d. Documents once uploaded can only be changed / replaced till the last date of submission of bid and after this date and time no changes are allowed.
- e. **Multiple bids on behalf of the same manufacturer is not allowed. In such a circumstance, bids shall be rejected.**
- f. The Institute is registered to the Department of Scientific & Industrial Research, Govt. of India and is thus exempted from customs duty vide notification no. 51/96 dated 23.7.1996 and GST exemption as per Govt. of India notification 45/2017 and 47/2017 dated 14.11.2017. The present details of registration are no. 11/106/1988-TU-V dt. 23.4.2018 valid upto 31.3.2021.

## 6. Cover Details:

### a) Technical Cover:

#### a. Statutory Cover:

**Fees:** Scanned copy of EMD and Tender Fees.

- b. **PQC / Technical:** Duly filled-up and signed Annexure-I-VI, NIT should be uploaded in this cover. A point-to-point technical compliance is to be ensured and such a document must also be prepared and uploaded. All the scanned documents in support of the eligibility criterion should also be uploaded in this cover. Bidders may upload any other relevant documents or their technical/financial credibility in this section as per the tender details.

### b) Financial Cover:

- a. Only the commercial/financial bid in the downloaded BOQ should be uploaded in this folder without tampering the BOQ Template.
- b. Any other information regarding the Price Bid should be uploaded (in **pdf format**) in the additional folder only in financial cover as mentioned in the tender details.
- c. Please refer to BOQ filling up instruction sheet for preparation and submission of the financial quote.
- d. The bids submitted by the vendors should be valid for a minimum period of 120 days from the date of the opening of the technical bid and the quoted price should be valid throughout the currency of contract and no price variation would be allowed under any circumstances.

7. **Two Bid Systems:** - The two bid systems should be followed for this tender. In this system the bidder must upload the technical and financial bid documents to the respective folder correctly. Scanned copy of bid documents with clear visibility to be uploaded by the bidders as per eligibility criteria.
8. Each page of the tender document submitted by the company must be digitally signed.
9. **Validity of Bid:** 120 days from the date of opening of Technical Bid.

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10. The selected vendor will be initially issued a letter of intent for execution of the work. The bidder is then required to visit the Institute site and meet the end-users for finalizing the exact GFC drawing and requirement and submit the same to the Institute authority for issuance of the formal purchase order. The same must be completed within a maximum time span of 30 days from the date of issue of the letter of intent. The purchase order may be segregated for supply items, if required.
11. **Period of Completion:** 120 Days from the final Purchase order as per GFC drawing. The supply, installation & commissioning of the items in the tender should be executed within 4 months from the date of GFC (Good for Construction) drawing approved by the Institute.
12. **Liquidated damage:** If the installation of the all items are not made within stipulated period, a compensation will be payable for non- adherence to the committed installation schedules by the vendor to Bose Institute Kolkata as follows:  
**1% of the total order value per week or part thereof of delay in installation, subject to maximum of 10% of total order value or the difference in rate if Bose Institute Kolkata decides to purchase the items from open market whichever is higher.**
13. All the items to be supplied should be new, good quality, standard and conform to the technical specifications mentioned in technical bid document. Factory certification in this regard should be submitted. The Institute reserves the right to get any of the supplied products tested by the SEFA approved testing centers or any other agency decided by the Institute. Expenditures in this regard, if any, shall be borne by the vendor/supplier. Institute reserves the right to reject the supplies in case such tests fail to give satisfactory results.
14. **Force Majeure:** The Supplier shall not be liable for forfeiture of its performance security, liquidated damages or termination for default, if and to the extent that, its delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure. If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such conditions and the cause thereof. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event.
15. The installation of above items will be at the new laboratories in the Bose Institute, Unified Academic Campus, Kolkata, Salt Lake, Sector-V, Block-EN, Kolkata-700091.
16. The party has to make their own arrangements for boarding & lodging for their manpower deployed during installation. During installation party has to abide by all statutory requirements, safety norms and government rules applicable to them without creating any damage to the Institute premises and

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properties. For any such damage, the vendor shall be responsible for fixing the same at their own cost. Alternatively, they may be allowed to pay a compensation decided by the Institute authority.

## 17. PRICE:

- a. Unit price in foreign currency means delivered price up to Bose Institute, Kolkata including insurance, packing & forwarding, freight & transportation (up to Bose Institute, Unified Academic Campus, Salt Lake City, Sector-V, Kolkata-700054), loading, unloading & warranty charges on **DDP basis**.
- b. Unit price in INR means delivered price up to Bose Institute Kolkata, including insurance, packing & forwarding, transportation (up to Bose Institute, Unified Academic Campus, Salt Lake City, Sector-V, Kolkata-700054), loading, unloading & warranty charges.
- c. Though the BOQ uploaded is the multicurrency BOQ. However, the Institute prefers the prices to be quoted in INR.
- d. As per Govt. Notification # 45/2017 dt.14th November, 2017, Scientific Research Institute funded by the Govt. of India, GST will be applicable @5% for the items used for research purpose, for the bids where GST will be applicable, against Certificates to be provided by the Institute.
- e. *The committee designated by the Director, Bose Institute, (comprising maximum of five members) may inspect one customer site and bidder's manufacturing facility to assess the quality of work, infrastructure & obtain feedback from the users. The expenses for the visits to the factory, if required, will have to be borne by the bidder.*

## 18. PAYMENT TERMS:

Payment for the items to be supplied by the vendor against the purchase order shall be made by Bose Institute, Kolkata as follows -

- **For supply Items Quoted in INR:** 50% payment will be made by the Institute against delivery, receipt and inspection FOR destination/delivery at site. Remaining 50% will be paid after successful installation, commissioning and final acceptance of the furniture items at Bose Institute in good condition and to the entire satisfaction of the end-user along with submission of warranty certificate and as well as insurance certificate by the vendor. The Institute reserves the right to deduct any amount from the bill(s) as deemed fit if the supplier(s) fails to supply and install furniture as per this tender and satisfaction to the end-user.

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- **For supply items Quoted in Foreign Currency:** 100% L/C at site will be opened on DDP basis up to Unified Academic Campus of Bose Institute. 50% payment will be made against delivery, receipt and inspection at delivery site. Remaining 50% will be made upon successful installation, commissioning and acceptance of the furniture items at Bose Institute in good condition and to the entire satisfaction of the end-user along with submission of warranty certificate and as well as insurance certificate by the vendor.
- **Payment for installation charges** will be released only after complete supply of the items and satisfactory installation and commissioning of the items, and submission of the completion certificate approved by the Institute.

NOTE: The Institute reserves the right to increase or reduce the quantity of items as mentioned in the SOQ without any change in the rate per unit quoted by the bidder in its Financial Bid.

## 19. Performance Security:

The successful Bidder is required to furnish a Performance Security, within equal to 10% of Purchase Order (P.O.) in the form of an account payee Demand draft, Fixed deposit receipt, Bank Guarantee etc from any Commercial Bank in favor of "Bose Institute" payable at "Kolkata". Performance Security should remain valid for a period of sixty (60) days beyond the date of completion of all contractual obligations of the successful Bidder including warranty obligation/completion of comprehensive maintenance period. The performance security has to be submitted within 10 days of signing of the agreement, after issuance of formal purchase order.

## 20. Supplier Integrity

The Supplier is responsible for and obliged to conduct all contracted activities in accordance with the Contract using state of the art methods and economic principles and exercising all means available to achieve the performance specified in the contract.

a. As per directive of the CVC and/or DST, Bose Institute, Kolkata have to adopt an Integrity Pact (IP) to ensure transparency, equity and competitiveness in major Public procurement activities. The integrity pact envisages and agreement between the prospective bidders/vendors with the buyer committing the persons/officials of both the parties with the aim not to exercise any corrupt influence on any aspect of the contract. Only those bidders/vendors who have entered in to such an integrity pact with the buyer i.e. Bose Institute, Kolkata, would be competent to participate in the bidding. It is, therefore, mandatory to make it a condition for qualification in the bidding process in the tender document.



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b. IP envisages Panel of Independent External Monitors (IEMs) which shall be provided/recommended by Bose Institute Kolkata and approved by CVC and/or DST. The model format of Integrity Pact is attached in ANNEXURE-II.

21. **Warranty:** Onsite Warranty of 12 months period will start from the date of successful installation & commissioning of all the items. The vendor will be liable to clear any defects on regular basis during the warranty period. Also, the vendor will engage technician(s)/service personal(s) during this period. The vendor will solve any problem within 24 hrs, if any delay will occur the institute make good the defects noticed through any other vendor and the cost incurred in this regard will be adjusted from their performance security.
22. The tender must be submitted in the prescribed tender document issued by the Bose Institute, Kolkata. Any other technical details required to supplement the information quoted in the prescribed tender document may please be attached separately. The information asked in the tender document should be given at the place provided for it in the tender document. The tender in which information is not given at the place provided for it or not in the similar format given in the tender document may be rejected.
23. Conditional bid submitted by the bidders will not be accepted by Bose Institute, Kolkata.
24. The documents containing bids shall be free from cutting and erasures. However, alterations, if any, in the tender should be attested properly by the bidder, failing which the tender is liable to be rejected.
25. The tenders submitted by telex/fax/email or any other mode other online process through CPP Portal, will not be considered. No further correspondence will be entertained on this matter.
26. Tender will be rejected, if technical specifications offered by the firm in the technical bid differ from that of the financial bid.
27. Bose Institute, Kolkata requires that the bidders who wish to bid for this project have highest standards of ethics. Bose Institute, Kolkata will reject a bid if it determines that the Bidder recommended for award has engaged in corrupt or fraudulent practices while competing for this contract. Bose Institute, Kolkata may declare a vendor ineligible, either indefinitely or for a stated duration, to be awarded a contract if it at any time determines that the vendor has engaged in corrupt and fraudulent practices during the execution of contract.
28. Any conditional offer will lead to disqualification of tender.

**29. AWARD OF CONTRACT:**

Bose Institute, Kolkata shall award the Contract to the bidder whose evaluated bid has been determined to be technically suitable and financially lowest and is substantially responsive to the bidding document, provided further that the bidder is determined to be qualified to execute the contract satisfactorily.

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Purchaser's Right to Vary the Quantities: Bose Institute, Kolkata reserves the right at the time of award or during execution of Contract to increase or decrease the quantity of items specified in the Schedule of Quantities without any change in price or other terms and conditions.

The selected vendor has to give their acceptance on the letter of intent within 3 days of it's issue.

If formal purchase order is issued to the vendor, then they have to give their acceptance on the PO within 7 days of it's issue. They also have to enter into an agreement with the Institute within 10 days of issue of the formal PO, in applicable format to be provided by the Institute.

30. The decision of Director, Bose Institute, Kolkata is final and binding in case of any dispute arising out of this contract.
31. The committee designated by Director Bose Institute, Kolkata may inspect, if required, those organization to assess the quality of work, infrastructure & obtain feedback from the users only after technical evaluation.  
The committee will submit their report on the basis of their visit or otherwise, after due evaluation based on the documents and/or physical inspection of the site of the parties.
32. All the documents to be uploaded on CPP Portal should be digitally signed by the authorized representative of the bidder. Hardcopies of any technical brochure and leaflets, in support of the technical bids, may be submitted to Purchase Section, Bose Institute, P-1/12 CIT Scheme VIIM, Kolkata – 700054 along with the EMD and Tender fees.
33. **Applicable Law and arbitration:** All dispute arising out of this contract shall be referred to the sole arbitration of a person selected out of the panel of three persons nominated by the Director, Bose Institute, and his decision /award shall be final and binding on both parties. The Arbitration shall be governed under the Indian Arbitration Act 1996 or any statutory modifications or re-enactment thereof and rules made there under and for the time being in force shall apply to the arbitration proceeding under this contract. The Contract shall be interpreted in accordance with the laws of the Union of India and all disputes shall be subject to place of jurisdiction at Kolkata.

Registrar (Officiating)  
Bose Institute, Kolkata

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## SPECIAL CONDITIONS FOR THIS TENDER

### 1. DEFINITION:

In the Contract (as hereinafter defined) the following definitions words and expressions shall have the meaning hereby assigned to them except where the context otherwise required.

1.1 Institute shall mean the Bose Institute, Kolkata.

1.2 Government, Gol, or Govt. of India shall mean Government of India.

1.3 Accepting authority shall mean the Director, Bose Institute, Kolkata.

### 2. ASSIGNMENT & SUBLETTING:

The supplier shall not assign the contract or any part thereof or any benefit or interest therein or there under without the written consent of the Registrar, Bose Institute. The whole of the supply and installation works included in the contract shall be executed by the supplier except where otherwise provided in the contract. The supplier shall not sublet any part of the works without the written consent of the Registrar and such consent, if given, shall not relieve the supplier from any liability or obligation under the contract, and he shall be responsible for the acts, defaults and neglects of sub-supplier, his agents, servants or workmen, as if they were the acts, defaults or neglects of the supplier provided always that the provision of labour contracts on a piece work basis shall not be deemed to be a subletting under this clause.

### 3. SCOPE OF CONTRACT:

The contract comprises the supply, installation, commissioning of items and necessary civil modification work as per the site condition mentioned in the contract, and the provision of all labour, materials, constructional plant, equipment and transportation, temporary works and everything, whether of a temporary or permanent nature required in and for such installation & commissioning so far as the necessity for providing the same is specified in or reasonably to be inferred from the contract. The supplier shall make his own arrangements for the safe storage of materials; accommodation for his staff etc. and no claim for the temporary accommodation from the supplier shall be entertained.

After the tender process, the successful bidder needs to submit the lab wise drawing and updated BOQ for the issuance of the purchase order.

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## CONTRACT DOCUMENT:

- 3.1** The several documents, forming the contract, are to be taken as mutually explanatory of one another and in case of ambiguities or discrepancies the same shall be explained and adjusted by the Bose Institute, Kolkata who shall thereupon issue to the Supplier its interpretation directing in what manner the work is to be carried out. In case the Supplier feels aggrieved by the interpretation of the Registrar, Bose Institute, Kolkata then the matter shall be referred to the Director, Bose Institute, Kolkata and his decision shall be final, conclusive and binding on both parties to the contract.
- 3.2** The bidder shall be responsible for getting the drawings prepared from and approved by the institute. Delay in issue of drawings, if any shall not be considered for any purpose. The bidder alone shall be responsible for timely arrangement of required drawings and getting them approved from the Director, Bose Institute, Kolkata.
- 3.3** The approved drawing shall remain in the custody of the Institute. However, two complete sets of drawings, specification and schedule of quantities shall be furnished by Bose Institute, Kolkata to the vendor. One complete set shall be kept on the work site and the Director, Bose Institute, Kolkata and his representatives shall be, at all reasonable times, have access to the same. The vendor shall study the drawings thoroughly before the commencement of work. In case of any discrepancy, the supplier shall seek clarification before proceeding with the works. Figured dimensions are in all cases to be accepted in preference to the scaled sizes. Large-scale details shall take preference over small scale ones.
- The Director, Bose Institute, Kolkata shall have full powers and authority to supply to the vendor from time to time during the progress of the work such drawings and instructions as shall be necessary for proper execution and the vendor shall carry out and be bound by the same.
- 3.4** The successful bidder shall be required to enter into an agreement with the Institute within 10 days of issue of P.O. on non-judicial stamp paper of appropriate value. The Schedule of quantities & rates filled in by the successful bidder, the general terms & conditions of the tender, Specifications for Civil & Electrical Works, the Special conditions, additional specifications, and the award letter etc. shall form part of the agreement to be signed by the successful bidder. The cost of stamp paper required for the agreement shall be borne by the vendor and the same shall also be arranged by the vendor.

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4. The vendor(s) shall give to the Municipal Authority, police and other authorities all necessary notices etc. that may be required by law and obtain all requisite licenses to avoid any obstructions, enclosures etc. and pay all fee, taxes and charges which may be levied on account of these operations in executing the contract. He shall make good any damage to the adjoining property whether public or private and shall supply and maintain lights either for illumination or for cautioning the public at night.
5. The vendor shall take instructions from the Director, BOSE INSTITUTE regarding collection and stacking of materials at any place. No excavated earth or building rubbish or debris shall be stacked on areas/building premises and the same shall be disposed outside the premises of the Institute at vendor's expense within 15 days of successful completion. Upon non-compliance of the above-mentioned clause BOSE INSTITUTE would deduct the necessary disposal charges from any amount due to the vendor.
6. Vendor shall provide permanent bench marks, flag tops and other reference points for the proper execution of work and these shall be preserved till the completion of the work. All such reference points shall be in relation to the levels and locations, given in the Architectural and other related services drawings.
7. On completion of work, the Vendor shall submit at his own cost four prints of "as built" drawings to the Director, **BOSE INSTITUTE** within 6 weeks of completion of the work failing which a recovery of Rs. 25,000.00 for each item.
8. Water tanks, taps, sanitary, water supply and drainage pipes, fittings and accessories should conform to the ISI and tender specification and should conform to municipal body/corporation. The Vendor (s) should engage approved, licensed plumbers for the work.
9. The work shall be carried out in accordance with the Architectural drawings and structural drawings issued by Bose Institute, Kolkata. Before commencement of any item of work the Vendor shall correlate all the relevant drawings, nomenclature of items and specifications etc. issued for the work and satisfy himself that the information available there from is complete and unambiguous. The measurement by scale shall be superseding the figure/written dimension of the drawings. The discrepancy, if any, shall be brought to the notice of the Director, Bose Institute, Kolkata before execution of the work. The Vendor alone shall be responsible for any loss or damage occurring by the commencement of work on the basis of any erroneous and/ or incomplete information and no claim whatsoever shall be entertained on this account.

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10. The Vendor shall conduct his work, so as not to interfere with or hinder the progress or completion of the work being performed by other Vendor or by the Director, Bose Institute, Kolkata and shall as far as possible arrange his work and shall place and dispose off the materials being used or removed, so as not to interfere with the operations of other Vendor or he shall arrange his work with that of the others in an acceptable and coordinated manner and shall perform it in proper sequence to the complete satisfaction of others.
11. The Architectural drawings given in the tender other than those indicated in nomenclature of items are only indicative of the nature of the work and materials/fixing involved unless and otherwise specifically mentioned. However, the work shall be executed in accordance with the drawings duly approved by the Director, Bose Institute, Kolkata.
12. The Vendor shall render all help and assistance in documenting the total sequence of this project by way of photography, slides, audio-video recording including photographs, slides, audio-videography etc. and nothing extra shall be payable to the Vendor on this account.
13.
  - 13.1 The Vendor shall be fully responsible for the safe custody of materials brought by him at site / issued to him even though the materials may be under double lock and key system. The Vendor has to make his own arrangement like shed enclosure etc. for keeping the material, providing security etc. The Vendor shall be allowed to make temporary structures for stores, offices, sheds, huts etc. subject to the prior approval of Director, Bose Institute, Kolkata. The Vendor shall remove all the structures erected by him necessary for the execution of the work, after completion of the work and clean the site removing all structures and temporary hutments in all respect as per the direction of the Director, Bose Institute, Kolkata.
  - 13.2 If there is any conflict (in specifications, quantity, or any other technical specifications) between the Specifications and Bill of Quantities (BOQ), the bidder must clarify with the purchaser well in advance of the bid-closing date. The decision of the purchaser regarding any specification would be final and binding.
  - 13.3 For the product Make List, wherever it is written "Equivalent", the decision of Bose Institute, Kolkata will be final whether to accept any company as an "Equivalent" to the Makes mentioned in the Make List. For items not mentioned in the Make List, the vendor must submit a detailed

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- 13.4 technical specification, a point-wise compliance chart, technical details/brochure and requisite certificate(s), for approval and acceptance by Bose Institute.

The bidders have to submit a point to point compliance sheet for all the quoted items. For the components to be procured from the manufacturers in the make list, the names of the manufacturer and the country of origin of the said product(s) must be disclosed.

- 13.5 The quantities mentioned for all items in the SOQ (sheet-2 in the price-bid) are to the best of the knowledge of Bose Institute, Kolkata the time of uploading of the tender. However, the quantities are still tentative, and their numbers or measurements can change by any amount after the award of the job through letter of intent.

- 13.6 During Installation of the furniture and accessories, if any change has to be made in the existing layout of any room or building of Bose Institute, Kolkata, the bidder will be required to fix and restore the layout back to its original state at the end of completion of job of this particular Tender.

- 13.7 If minor modifications compared to the Service Drawings are to be made during installation, the bidder, with permission from Bose Institute, Kolkata, will be needed to carry out such activities without any additional cost.

- 13.8 The vendor, while pursuing the job, should not at any point, indulge in performing works which involve modifications from the service drawings without prior written consent from the competent authority of Bose Institute, Kolkata as appointed and communicated by Director, Bose Institute, Kolkata

## 14. SAFETY, HEALTH AND ENVIRONMENT:

- 14.1 The Vendor shall take all precautions to avoid accidents by exhibiting necessary caution boards during day and night, speed limit boards, red flags, red lights and providing barriers hoarding written in English, Hindi and Bangla. He shall be responsible for all damages and accidents caused to existing/new work due to negligence on his part. No hindrances shall be caused to traffic during the execution of the work. In case of any accident of labour / contractual staff the entire responsibility will rest on the part of the Vendor and any compensation under such circumstances if becomes payable the same shall be entirely born by the Vendor and institute

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- 14.2 shall have no role on this account.
- 14.3 The Vendor shall assign to his workmen, tasks commensurate with their qualification, experience and state of health for driving of vehicles, handling and erection of materials and equipments. All lifting equipments shall be tested certified for its capacity before use. Adequate and suitable lighting at every work place and approach there to, shall be provided by the Vendor before starting the actual operations at night.
- 14.4 Hazardous and / or toxic materials such as solvent coating or thinners shall be stored in appropriate containers.
- 14.5 All hazardous materials shall be labeled with the name of the materials, the hazards associated with its use and necessary precaution to be taken.
- 14.6 Vendor shall ensure that during the performance of the work, all hazard to the health of personnel, have been identified, assessed and eliminated.
- 14.7 Appropriate personal protective equipment such as helmets, gloves, goggles, aprons, safety belts etc. shall be provided to the workers employed at the work site as per the requirement and exposure to the hazardous materials or locations.
- 14.8 The Vendor has to follow the rules for the protection of the Health and sanitary arrangement for the workers.
- 14.9 The Vendor shall provide amenities to the workers in compliance with the model rules for the protection of Health and Sanitary arrangement for the workers.
- 14.10 The wages of the labour shall be paid as per the guidelines provided in the labour regulations applicable for site area.
- 14.11 The Vendor has to keep a record of all the workers employed at site, make daily attendance along with the location of the work and follow the applicable labour regulation. All the labour record shall be made available for inspection and verification to the Director, Bose Institute, Kolkata or his authorized representative as and when required.
- 14.12 The Institute, shall not be held responsible for any labor unrest or and health and safety hazards to the workmen during the execution of the work.
- 14.13 **WATER POLLUTION:**
- 14.13.1 The Vendor will take all precautionary measures to prevent the waste water during execution of work to accumulate anywhere.
- 14.13.2 The wastewater arising during execution of the job is to be disposed off in the manner that is acceptable to Bose Institute, Kolkata and conforming to Pollution Control norms.



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## 15. RISK FROM ELECTRICAL EQUIPMENT:

- 15.1 The Vendor will comply the relevant industrial electrical safety legislations.
- 15.2 The Vendor will take adequate precautions to prevent danger from electrical equipment i.e. no material will be so stacked or placed as to cause danger or inconvenience to person or the public.
- 15.3 All necessary fencing and lights will be provided by the vendor to protect the public.
- 15.4 All electric machines to be used in the construction will conform to the relevant Indian Standards (IS) codes, will be free from patent defect, will be kept in good working order, will be regularly inspected and properly maintained as per IS provision and to the satisfaction of Bose Institute, Kolkata.

## 16. PROGRAMME CHART:

- 16.1 The Vendor shall prepare an integrated programme chart for the execution of work, showing clearly all activities from the start of work to completion, with details of manpower, material, equipment and machinery required for the fulfillment of the programme within the stipulated period or earlier and submit the same for approval to Bose Institute, Kolkata within ten days of award of the contract failing which Rs. **1000/- per day shall be recovered** (non-refundable) from the Vendor till the date of actual submission.
- 16.2 The programme chart should include the following:
  - A. Descriptive note explaining sequence of the various activities.
  - B. Network (PERT / CPM / BARChart).
  - C. Programme for procurement of materials / equipments / labour by the Vendor.
- 16.3 If at any time, it appears to Bose Institute, Kolkata that the actual progress of work does not conform to the approved programme referred above, the Vendor shall produce a revised programme showing the modifications to the approved programme to ensure completion of the work. The modified schedule of programme shall be approved by the Director, Bose Institute, Kolkata.
- 16.4 The submission for approval by the Director, Bose Institute, Kolkata of such programme or the furnishing of such particulars shall not relieve the Vendor of any of the duties or responsibilities under the contract. This is without prejudice to the right of Director, Bose Institute, Kolkata to take action against the Vendor as per terms and conditions of the agreement.

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## 17. PROGRESS REPORT:

- 17.1 The Vendor shall submit monthly progress report of the work in computerized form. The progress report shall contain the following the information, apart from whatever else may be required as specified. Vendor shall give the Director, Bose Institute, Kolkata on 7<sup>th</sup> day of each months progress report of work done during previous month failing which Rs.750/- per day shall be recovered (non-refundable) from the Vendor till the date of its actual submission.
- 17.2 Project information, giving the broad features of the contract.
- 17.3 Introduction, giving a brief scope of the work under the contract and the broad structural or other details.
- 17.4 Construction schedule of the various works with a bar chart for the next quarter showing the mile stone, targeted tasks and up to date progress.
- 17.5 Progress chart of the various components of the work that are planned and achieved for the month as well as cumulative up to the month, with reasons for deviations, if any in a tabular format.
- 17.6 Plant and machinery statement, indicating those deployed on the work and their working status.
- 17.7 Man power statement indicating individually the names of all the staff deployed on the work along with their designations.
- 17.8 Existing drains, pipes, cables, over-head wires, sewer lines, water lines and similar services encountered in the course of the execution of work shall be protected against the damage by the Vendor at his own expense. In case the same are to be removed and diverted, the same shall be payable to the Institute. The Vendor shall work out the cost and the same shall be approved by Director, Bose Institute, Kolkata. The Vendor shall not store materials or otherwise occupy any part of the site in a manner likely to hinder the operation of such services as well as normal functioning of the Institute.
- 17.9 The Vendor shall be responsible for the watch and ward / guard of the building's safety, fittings and fixtures provided by him/ supplied to him against pilferage and breakage during the period of installations and thereafter till the entire work as per agreement is physically handed over to the institute. No extra payment shall be made on this account.

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## 18. QUALITY ASSURANCE:

- 18.1 The Vendor shall establish, document and maintain an effective quality assurance system as outlined in the specifications and various codes and standards.
- 18.2 The quality assurance system plans / procedures / method statement to be followed shall be furnished in the form of quality assurance manual. It should cover quality assurance, plan procedure, specifications, frequency of the inspection, testing, acceptance criteria, method of sampling, testing etc to be followed for quality and the details of the person responsible. It is obligatory on the bidder to obtain the approval of every quality assurance document with Director, Bose Institute, Kolkata before he starts using particular document for execution of work.
- 18.3 The approval of quality assurance by Bose Institute, Kolkata does not absolve the Vendor of the contractual obligations towards executing the work as per the laid down specification of the work.
- 18.4 The Vendor shall produce the quality control, records, on the formats approved by the Director, Bose Institute, Kolkata in the quality assurance plan.
- 18.5 The Vendor shall ensure towards the enforcement of quality assurance plan by all his specialized agencies as approved by the Director, Bose Institute, Kolkata.
- 18.6 The Director, Bose Institute, Kolkata reserve the right to inspect / witness, review any or stages of the work at shop / site as deemed necessary for quality assurance and / or timely completion of work.
- 18.7 The Vendor is required to review the quality assurance program at all appropriate stages to ensure the quality, completion of activities in time etc. and if required should deploy additional manpower and resources to ensure the quality and timely completion of the project.
- 18.8 The Vendor shall be fully responsible for the safe custody of materials brought by him even though the materials may be under double lock and key system.

## 19. TESTING OF MATERIALS:

- 19.1 All the required tests as per Technical Specification have to be got conducted at the risk & cost of the Vendor, unless specifically mentioned otherwise.

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19.2 All necessary tests as per the Contract, specifications shall be carried out on all the materials whether ISI marked or otherwise. Wherever Contract specifications do not specify the frequency of tests, the same shall be carried out as per the directions of the Director, Bose Institute, Kolkata. Nothing extra whatsoever shall be payable on this account.

## 20. TESTING AT MANUFACTURER'S PLACE:

20.1 All materials which are specified to be tested at the manufacturer's works shall satisfactorily pass the tests in presence of the authorized representative of Director, Bose Institute, Kolkata before being used in the work. In case all requisite testing facilities are not available at the manufacturer's premises, such testing shall be conducted at laboratory approved by the Director, Bose Institute, Kolkata. The charges for such testing shall be borne by the Vendor.

21. Any civil works if required for the installation of item is to be informed well in advance to the Director, Bose Institute, Kolkata with all details of drawing, location etc.

## 22. SPECIAL CONDITIONS FOR ELECTRICAL WORK

Requirement of power source or any electrical item beyond the scope of this contract but essential for the completion of the order must be informed in writing well in advance to the Director, Bose Institute, Kolkata with all details. The Vendor shall take care of the following points.

- a) The Vendor must study carefully all the specifications/schedule of work/drawings/additional specifications and site parameters and quote firm rates after accounting all works. No extra claim on any account shall be paid/entertained other than the agreement/quoted rates.
- b) The work shall be carried out in accordance with the drawings and specifications approved by the Director, Bose Institute, Kolkata. Before commencement of any item of work, the Vendor shall correlate all the relevant architectural and structural drawings issued for the work and satisfy himself that the information available is complete and unambiguous. The discrepancy, if any, shall be brought to the notice of Director, Bose Institute, Kolkata before execution of work. The Vendor himself shall be responsible for any loss or damage occurring by the commencement of work on the basis of any erroneous and or incomplete information.
- c) The Vendor shall take all safety precautions to avoid accidents by exhibiting caution boards, red flags, red lights and by providing necessary barriers and all other measures required from time to time. The Vendor shall be responsible for all damages and accidents due to negligence on his part.
- d) The Vendor shall give due notices to Municipality, Police and/or other authorities that may be required under the law/rules under force and obtain all requisite permissions/licenses for temporary obstructions/enclosures and pay all charges which may be levied on account of his execution of the

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- e) work under the agreement. Nothing extra shall be payable on this account.
- f) The work will be carried out in close coordination with all other works and other agencies. The Vendor will have to employ adequate labour for carrying out the work. No claim regarding the idle labour for any reason will be entertained by the Institute.
- g) No tools and plants including special T&P etc. shall be supplied by the Institute and the supplier will have to make his own arrangements at his expenses.
- h) All tools, plant and machinery provided by the Vendor shall, when brought at the site, be deemed to be exclusively intended for the installation and commissioning of this work and the Vendor shall not remove the same or any part there of (save for the purpose of moving it from one part of the site to another) without the consent of the Director, Bose Institute, Kolkata.
- i) All materials shall get checked by the Director, Bose Institute, Kolkata or his authorized representative on receipt of the same at site before use.
- j) No foreign exchange shall be made available by the institute for the purchase of equipments, plants, machinery, materials of any kind or any other items required to be carried out in execution of work.
- k) The Vendor shall carry out his work, so as not to interfere with or hinder the progress or completion of the work being performed by other supplier (s) or by the Director, Bose Institute, Kolkata and shall as far as possible arrange his work and shall place and dispose of the materials being used or removed, so as not to interfere with the operations of other suppliers, or he shall arrange his work with that of the others in an acceptable and coordinated manner and shall perform it in proper sequence to the entire satisfaction of the Director, Bose Institute, Kolkata.
- l) The main agency will be responsible for all acts of omission and commission of the associate suppliers including the changed one(s).
- m) The Vendor shall give the Director, Bose Institute, Kolkata on the 1<sup>st</sup> day of each month, a progress report of the work done during the previous month. The progress of work will be reviewed periodically by the Director, Bose Institute, Kolkata with the Vendor and shortfalls, if any, sorted out. The Vendor shall thereupon take such action as may be necessary to bring back his work to schedule without any additional cost to the Institute.
- n) Even ISI marked materials shall be subjected to quality test at the discretion of the Director, Bose Institute, Kolkata besides testing of other materials as per the specifications described for the item/material. Whenever ISI marked materials are brought to the site of work; the Vendor shall, if required by the Director, Bose Institute, Kolkata, furnish manufacturers test certificates to establish that the material procured by the Vendor for incorporation in the work satisfy the provisions of IS codes relevant to the material and/or the work done.

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- o) The Vendor shall have to engage well experienced skilled labour and deploy modern T&P and other equipments to execute the work.

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**ANNEXURE- II**

## **UNDERTAKING**

**(To be printed on the letter-head of Bidder)**

1. I/We undertake that I/we have carefully studied all the terms and conditions and understood the parameters of the proposed Work Order of laboratory furniture items and shall abide by them.
2. I/We also undertake that I/We have understood "All the terms and conditions and Annexure" mentioned in this Tender, and shall conduct the supply and installation of the furniture and equipment strictly as per the terms and conditions".
3. I/We further undertake that the information given in this Tender are true and correct in all respect and we hold the responsibility for the same.
4. I/we shall be responsible for rejection/cancellation of contract if the materials are not found up to the mark or for civil/criminal proceedings if the materials supplied is found substandard. We also undertake to incur the costs necessary for the tests or any other certification required by the Institute to confirm the compliance of the product with the specifications cited in the Notice for Tender.

Date

**Name of the Authorized Signatory**

Place

**Designation:**

**Contact No:**

**Signature with Seal**

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## PRE CONTRACT INTEGRITY PACT

## ANNEXURE- III

### General

This pre-bid pre-contract Agreement(hereinafter called the Integrity Pact) is made on \_\_\_\_\_ day of the month of \_\_\_\_\_ 2019, between, on one hand, the Director, Bose Institute acting through Shri....., Designation of the officer , Bose Institute (hereinafter called the "BUYER", which expression shall mean and include, unless the context otherwise requires, his successors in office and assigns) of the First Part and M/s \_\_\_\_\_ represented by Shri \_\_\_\_\_, Chief Executive Officer (hereinafter called the "BIDDER/Seller" which expression shall mean and include, unless the context otherwise requires, his successors and permitted assigns) of the Second Part.

WHEREAS the BUYER proposes to procure (Name of the Stores/Equipment/Item) and the BIDDER/Seller is willing to offer/has offered the stores and WHEREAS the BIDDER is a private company/public company/Government undertaking/partnership/registered export agency, constituted in accordance with the relevant law in the matter and the BUYER is an autonomous scientific research institute under the administrative control of department of science & technology under Ministry of Science & Technology .

NOW, THEREFORE, to avoid all forms of corruption by following a system that is fair, transparent and free from any influence/prejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to:-

Enabling the BUYER to obtain the desired said stores/equipment at a competitive price in conformity with the defined specifications by avoiding the high cost and the distortionary impact of corruption on public procurement, and enabling BIDDERS to abstain from bribing or indulging in any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also abstain from bribing and other corrupt practices and the BUYER will commit to prevent corruption, in any form, by its officials by following transparent procedures.

The parties hereto hereby agree to enter into this Integrity Pact and agree as follows:

### Commitments of the BUYER

1.1 The BUYER undertakes that no official of the BUYER, connected directly or indirectly with contract, will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage from the BIDDER, either for themselves or for any person, organization or their party related to the contract in exchange for an



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advantage in the bidding process, bid evaluation, contracting or implementation process related to the contract.

- 1.2 The BUYER will, during pre-contract stage, treat all BIDDERS alike, and will provide to all BIDDERS the same information and will not provide any such information to any particular BIDDER which could afford an advantage to that particular BIDDER in comparison to other BIDDERS.
- 1.3 All the officials of the BUYER will report to the appropriate Government office any attempted or completed breaches of the above commitments as well as any substantial suspicion of such a breach.
2. In case any such preceding misconduct on the part of such official(s) is reported by the BIDDER to the BUYER with full and verifiable facts and the same is prima facie found to be correct by the BUYER, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the BUYER and such a person shall be debarred from further dealings related to the contract process. In such a case while an enquiry is being conducted by the BUYER the proceedings under the contract would not be stalled.

## **Commitments of BIDDERS**

3. The BIDDER commits itself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of its bid or during any pre-contract or post-contract stage in order to secure the contract or in furtherance to secure it and in particular commit itself to the following:-
  - 3.1 The BIDDER will not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the BUYER, connected directly or indirectly with the bidding process, or to any person, organization or third party related to the contract in exchange for any advantage in the bidding, evaluation, contracting and implementation of the contract.
  - 3.2 The BIDDER further undertakes that it has not given, offered or promised to give, directly or indirectly any bribe, gift, consideration, reward, favour any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the BUYER or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the contract or any other contract with the Government for showing or forbearing to show favour or disfavour to any person in relation to the contract or any other contract with the Government.

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- 3.3 BIDDERS shall disclose the name and address of agents and representatives and Indian BIDDERS shall disclose their foreign principals or associates.
- 3.4 BIDDERS shall disclose the payments to be made by them to agents/brokers or any other intermediary, in connection with this bid/contract.
- 3.5 The BIDDER further confirms and declares to the BUYER that the BIDDER is the original manufacturer/integrator/authorized government sponsored export entity of the defense stores and has not engaged any individual or firm or company whether Indian or foreign to intercede, facilitate or in any way to recommend to the BUYER or any of its functionaries, whether officially or unofficially to the award of the contract to the BIDDER, nor has any amount been paid, promised or intended to be paid to any such individual, firm or company in respect of any such intercession, facilitation or recommendation.
- 3.6 The BIDDER, either while presenting the bid or during pre-contract negotiations or before signing the contract, shall disclose any payments he has made, is committed to or intends to make to officials of the BUYER or their family members, agents, brokers or any other intermediaries in connection with the contract and the details of services agreed upon for such payments.
- 3.7 The BIDDER will not collude with other parties interested in the contract to impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the contract.
- 3.8 The BIDDER will not accept any advantage in exchange for any corrupt practice, unfair means and illegal activities.
- 3.9 The BIDDER shall not use improperly, for purposes of competition or personal gain, or pass on to others, any information provided by the BUYER as part of the business relationship, regarding plans, technical proposals and business details, including information contained in any electronic data carrier. The BIDDER also undertakes to exercise due and adequate care lest any such information is divulged.
- 3.10 The BIDDER commits to refrain from giving any complaint directly or through any other manner without supporting it with full and verifiable facts.
- 3.11 The BIDDER shall not instigate or cause to instigate any third person to commit any of the actions mentioned above.
- 3.12 If the BIDDER or any employee of the BIDDER or any person acting on behalf of the BIDDER, either directly or indirectly, is a relative of any of the officers of the BUYER, or alternatively, if any relative of

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an officer of the BUYER has financial interest/stake in the BIDDER's firm, the same shall be disclosed by the BIDDER at the time of filing of tender.

The term 'relative' for this purpose would be as defined in Section 6 of the Companies Act 1956.

- 3.13 The BIDDER shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the BUYER.

#### **4. Previous Transgression**

- 4.1 The BIDDER declares that no previous transgression occurred in the last three years immediately before signing of this Integrity Pact, with any other company in any country in respect of any corrupt practices envisaged hereunder or with any Public Section Enterprise in India or any Government Department in India that could justify BIDDER's exclusion from the tender process.
- 4.2 The BIDDER agrees that if it makes incorrect statement on this subject, BIDDER can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

#### **5. Earnest Money (Security Deposit)**

- 5.1 While submitting commercial bid, the BIDDER shall deposit an amount of Rs.25,00,000.00 as Earnest Money/Security Deposit, with the BUYER through any of the following instruments:

- (i) Bank Draft or a Pay Order in favour of Bose Institute payable at Kolkata.
- (ii) A confirmed guarantee by an Indian commercial Bank, promising payment of the guaranteed sum to the BUYER on demand within three working days without any demur whatsoever and without seeking any reasons whatsoever. The demand for payment by the BUYER shall be treated as conclusive proof of payment.
- (iii) Any other mode or through any other instrument such as NEFT/RTGS.

- 5.2 The Earnest Money shall be valid upto a period of 165 days (including bid validity plus 45 days) from the date of opening of technical bid while the performance security deposit should be valid for a period covering the contractual obligations including warranty period plus 60days.

- 5.3 In case of the successful BIDDER a clause would also be incorporated in the Article pertaining to Performance Bond in the Purchase Contract that the provisions of Sanctions for Violation shall be applicable for forfeiture of Performance Bond in case of a decision by the BUYER to forfeit the same without assigning any reason for imposing sanction for violation of this Pact.

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5.4 No interest shall be payable by the BUYER to the BIDDER on Earnest Money /Security Deposit for the period of its currency.

## **6. Sanctions for Violations**

6.1 Any breach of the aforesaid provisions by the BIDDER or any one employed by it or acting on its behalf (whether with or without the knowledge of the BIDDER) shall entitle the BUYER to take all or any one of the following actions, wherever required:-

- (i) To immediately call off the pre contract negotiations without assigning any reason or giving any compensation to the BIDDER. However, the proceedings with the other BIDDER(s) would continue.
- (ii) The Earnest Money Deposit (in pre-contract stage) and/or Security Deposit/Performance Bond (after the contract is signed) shall stand forfeited either fully or partially, as decided by the BUYER and the BUYER shall not be required to assign any reason therefore.
- (iii) To immediately cancel the contract, if already signed, without giving any compensation to the BIDDER.
- (iv) To recover all sums already paid by the BUYER, and in case of an Indian BIDDER with interest thereon at 2% higher than the prevailing Prime Lending Rate of State Bank of India, while in case of a BIDDER from a country other than India with interest thereon at 2% higher than the LIBOR. If any outstanding payment is due to the BIDDER from the BUYER in connection with any other contract for any other stores, such outstanding payment could also be utilized to recover the aforesaid sum and interest.
- (v) To encash the advance bank guarantee and performance bond/warranty bond, if furnished by the BIDDER, in order to recover the payments, already made by the BUYER, along with interest.
- (vi) To cancel all or any other Contracts with the BIDDER. The BIDDER shall be liable to pay compensation for any loss or damage to the BUYER resulting from such cancellation/rescission and the BUYER shall be entitled to deduct the amount so payable from the money(s) due to the BIDDER.
- (vii) To debar the BIDDER from participating in future bidding processes of the Government of India for a minimum period of five years, which may be further extended at the discretion of the BUYER.
- (viii) To recover all sums paid in violation of this Pact by BIDDER(s) to any middleman or agent or broker with a view to securing the contract.
- (ix) In cases where irrevocable Letters of Credit have been received in respect of any contract signed by the BUYER with the BIDDER, the same shall not be opened.

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(x) Forfeiture of Performance Bond in case of a decision by the BUYER to forfeit the same without assigning any reason for imposing sanction for violation of this Pact.

6.2 The BUYER will be entitled to take all or any of the actions mentioned at Para 6.1(i) to (x) of this Pact also on the Commission by the BIDDER or any one employed by it or acting on its behalf (whether with or without the knowledge of the BIDDER), of an offence as defined in Chapter IX of the Indian Penal Code, 1860 or Prevention of Corruption Act, 1988, or any other statute enacted for prevention of corruption.

6.3 The decision of the BUYER to the effect that a breach of the provisions of this Pact has been committed by the BIDDER shall be final and conclusive on the BIDDER. However, the BIDDER can approach the independent Monitor(s) appointed for the purposes of this Pact.

## **7. Fall Clause**

7.1 The BIDDER undertakes that it has not supplied/is not supplying similar product/systems or subsystems at a price lower than that offered in the present bid in respect of any other Ministry/Department of the Government of India or PSU and if it is found at any stage that similar product/systems or sub systems was supplied by the BIDDER to any other Ministry/Department of the Government of India or a PSU at a lower price, then that very price, with due allowance for elapsed time, will be applicable to the present case and the difference in the cost would be refunded by the BIDDER to the BUYER, if the contract has already been concluded.

## **8. Independent Monitors**

8.1 The BUYER has appointed independent Monitors (hereinafter referred to as Monitors) for this Pact in consultation with the Central Vigilance Commission (Independent External Monitors appointed by CVC for the tender - Dr. Sanjay Kumar Panda, IAS (Retd.) & Shri Amol Prabhakar Joshi, CES (Retd.)

8.2 The task of the Monitors shall be to review independently and objectively, whether and to what extent the parties comply with the obligations under this Pact.

8.3 The Monitors shall not be subject to instructions by the representatives of the parties and perform their functions neutrally and independently.

8.4 Both the parties accept that the Monitors have the right to access all the documents relating to the project/procurement, including minutes of meetings.

8.5 As soon as the Monitor notices, or has reason to believe, a violation of this Pact, he will so inform the Authority designated by the BUYER.

8.6 The BIDDER(s) accepts that the Monitor has the right to access without restriction to all Project documentation of the BUYER including that provided by the BIDDER. The BIDDER will also grant the

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Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The Monitor shall be under contractual obligation to treat the information and documents of the BIDDER/Subcontractor(s) with confidentiality.

- 8.7 The BUYER will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the parties. The parties will offer to the Monitor the option to participate in such meetings.
- 8.8 The Monitor will submit a written report to the designated Authority or BUYER/Secretary in the Department/within 8 to 10 weeks from the date of reference or intimation to him by the BUYER / BIDDER and should the occasion arise, submit proposals for correcting problematic situations.

## **9. Facilitation of Investigation**

In case of any allegation of violation of any provisions of this Pact or payment of commission, the BUYER or its agencies shall be entitled to examine all the documents including the Books of Accounts of the BIDDER and the BIDDER shall provide necessary information and documents in English and shall extend all possible help for the purpose of such examination.

## **10. Law and Place of Jurisdiction**

This Pact is subject to Indian Law. All disputes arising out of this Contract will be subjected to Kolkata jurisdiction.

## **11. Other Legal Actions**

The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

## **12. Validity**

- 12.1 The validity of this Integrity Pact shall be from date of its signing and extend up to 5 years or the complete execution of the contract to the satisfaction of both the BUYER and the BIDDER/Seller, including warranty period, whichever is later. In case BIDDER is unsuccessful, this Integrity Pact shall expire after six months from the date of the signing of the contract.
- 12.2 Should one or several provisions of this Pact turn out to be invalid; the remainder of this Pact shall remain valid. In this case, the parties will strive to come to an agreement to their original intentions.

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13. The parties hereby sign this Integrity Pact at \_\_\_\_\_ on \_\_\_\_\_

**BUYER**

**BIDDER**

**Name of the Officer:**

**CHIEF EXECUTIVE OFFICER**

**Designation**

**BOSE INSTITUTE**

Witness

Witness

1. \_\_\_\_\_ 1. \_\_\_\_\_

2. \_\_\_\_\_ 2. \_\_\_\_\_

\*Provisions of these clauses would need to be amended / deleted in line with the policy of the BUYER in regard to involvement of Indian agents of foreign suppliers.

**\*\* The bidders may note that they must upload the Integrity Pact signed by both the bidder as well as the buyer (Institute) and upload the same along with the bidding document.**

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**ANNEXURE- IV**

## **MANUFACTURERS' AUTHORIZATION FORM**

No. \_\_\_\_\_ Dated \_\_\_\_\_

The Director,  
**Bose Institute,**  
**P-1/12, CIT Scheme-VII/M,**  
**Kolkata – 700054 (W.B.) India**

Dear Sir,

I/We who are established and reputable manufacturers of having factories at -----  
- (*address of factory*) do hereby authorize M/s. (*Name and address of Agent*) to submit a bid, negotiate and receive the order from you against your tender enquiry.

No company or firm or individual other than M/s. is authorized to bid, and conclude the contract in regard to this business.

I/We hereby extend our full guarantee and warranty as per Clause 15 of the General Conditions of Contract and Clause of the Special Conditions of Contract for the goods and services offered by the above firm.

Yours faithfully,

(Name)

(Name of manufacturers)

**Note:** This letter of authority should be on the **letterhead of the manufacturer** and should be signed by a person competent and having the power of attorney to bind the manufacturer. It should be included by the Bidder in its techno-commercial un-priced bid.



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**ANNEXURE- V**

Quotation No.....

Date:

## **PROFORMA OF FALL CLAUSE CERTIFICATE**

If on any subsequent date after submission of quotation or placing of supply order, the manufacturer (the term manufacturer will also include his authorized distributor / agent) reduces the sale price of such stores or sells such stores to any party at a price lower than the price charged / chargeable against supply order placed by Bose Institute, Kolkata, the manufacturer (including his authorized distributor / agent) as aforesaid in case the quotation is submitted by them and supply / service is also effected by them) will forth-with notify such reduction in sale price to Bose Institute, Kolkata and price payable for the stores to be supplied against the Supply Order after the date of such reduction in sale price coming into force shall be reduced **correspondingly and will be reimbursed to the Institute.**

(Signature & Date of Bidders with Rubber Stamp)

*\*\* This certificate should be uploaded on the letter head of the company / firm / agency*

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ANNEXURE- VI

## BID SECURITY FORM

(To be executed by a scheduled Bank in India on non-judicial stamp paper)

To  
The Director,  
Bose Institute,  
P-1/12, CIT Scheme-VII/M,  
Kolkata – 700054 (W.B.) India

Dear Sir,

Whereas .....(Name and address of Bidder) (hereinafter called "the Bidder") in response  
To your Tender Notification No.-----dated-----is submitting its bid for the supply of  
..... (Name and/or description of the goods) (Hereinafter called "the Bid").

KNOW ALL PEOPLE by the represents that WE.....(Name of bank) of ..... (Name of  
country),having our registered office at ..... (Address of bank) (Hereinafter called "the Bank"),  
are bound unto **Director, Bose Institute, Kolkata, INDIA**(Hereinafter called "the Purchaser") for the sum of  
..... (Amount of the Guarantee in Words and Figures) for which payment well and truly  
to be made to the said Purchaser, the Bank binds itself, its successors, and assigns by these presents.  
Sealed with the Common Seal of the said Bank this day of \_\_\_\_\_20.

THE CONDITIONS of this obligation are:

1. If the Bidder withdraws its Bid during the period of bid validity specified by the Bidder on the Bid Form; or
2. If the Bidder, having been notified of the acceptance of its bid by the Purchaser during the period of bid validity:

contd.....

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3. Fails or refuses to execute the Contract Form if required; or
4. Fails or refuses to furnish the performance security, in accordance with the Instruction to Bidders.
5. This guarantee is valid upto ..... (six months from date).

We undertake to pay the Purchaser up to the above amount upon receipt of its first written demand, without the Purchaser having to substantiate its demand, provided that in its demand the Purchaser will note that the amount claimed by it is due to it, owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to and including forty-five (45) days after the period of the bid validity, and any demand in respect thereof should reach the Bank not later than the above date.

Date:

Signature.....

Place:

Seal of Bankers

(Complete Address/Contact Details with Tel./Fax/email etc)

Witness: 1.....

2.....

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## PERFORMANCE SECURITY FORM

(To be executed by a scheduled Bank in India on non-judicial stamp paper)

To  
The Director,  
Bose Institute,  
P-1/12, CIT Scheme-VII/M,  
Kolkata – 700054 (W.B.) India

Dear Sir,

Sub: Your Contract No.-----dated-----for

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1. You have entered into a contract with reference no as given above with \_\_\_\_\_(herein after referred to as the contractor) for the supply, installation, and commissioning of \_\_\_\_\_(herein after referred to as stores) for the price and on the terms and conditions contained in the said contract.
2. In accordance with the terms of said contract, the contractor has undertaken to produce a bank guarantee for Rs. (Rupees \_\_\_\_\_only) being 10 % of the total value of the said stores supplied to you, for the due fulfilment of its obligations to you for due performance as per the contract during warranty period.
3. In consideration thereof, we hereby expressly, irrevocably and unconditionally undertake and guarantee as principal obligator on behalf of the contractor that in the event you submit a written demand to us that the contractor has not performed according to the contractual obligations included in the said contract, we will pay you on written demand, without demur and without reference to the contractor any sum up to a maximum amount of Rs \_\_\_\_\_(Rupees \_\_\_\_\_only).Your demand shall be conclusive evidence to us that such payment is due under the terms of the said contract. Payment by us to you will be made within thirty (30) days from receipt of your request making reference to this guarantee and on demand.
4. This guarantee shall not be revoked without your express consent and shall not be affected by your granting any indulgence to the contractor, which shall include but not be limited to postponement from time to time of the exercise of any powers vested in you or any right which you may have against the contractor and to exercise the same in any manner at any time and either to forbear or to enforce any covenant contained or implied in the said contract or any other course or remedy or security available to you, and our Bank shall not be released from its obligations under this guarantee by your exercising any of your rights with reference to matters aforesaid or any of them or by reason of any other act or forbearance or other acts of omission or commission on your part or any other indulgence shown by you or by any other matter or

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thing whatsoever which under law would, but for this provision, have the effect of relieving our Bank from its obligation under this guarantee.

5. Notwithstanding anything herein contained, our liability under this guarantee is restricted to Rs. \_\_\_\_\_ (Rupees \_\_\_\_\_ only) and the guarantee shall remain in force up to and including the \_\_\_\_\_ day of being reported to us by you and returned to us duly discharged.
6. Unless a demand or claim under this guarantee is made on us in writing on or before the aforesaid expiry date as provided above or unless this guarantee is extended by us all your rights under this guarantee shall be proscribed and we shall be discharged from the liabilities hereunder.
7. This guarantee shall not be affected by any change in the constitution of our Bank or of the contractor or for any other reason whatsoever.

Date:

Signature.....

Place:

Seal of Bankers

(Complete Address/Contact Details with Tel./Fax/email etc)

Witness:

1.....

2.....

## INSTRUCTION FOR FILLING UP THE PRICE-BID (BOQ/SOQ)

(to be followed strictly)

### Step-wise Instructions

1. **Fill-up the "SOQ\_Supply" sheet first** following the points mentioned below.
  - a. Quote the prices of the individual items in column M (labelled "Basic rate").
  - b. Please **ignore the currency unit (INR) shown in SOQ\_supply sheet**, if quoted in foreign currency.
  - c. All the items **must be quoted in only one currency** in the "SOQ\_supply" sheet. Mixing of currencies is not allowed.
  - d. Fill up the Freight and Insurance charges (up to Bose Institute, Kolkata) row (#153) in "SOQ\_SUPPLY" **only if the prices are quoted in a currency other than INR.**
  
2. **Fill-up the "SOQ\_Installation sheet"**sheet
  - a. Quotes for **installation charges have to be in INR only.**
  - b. Fill the column M with the basic rates.
  
3. **Filling theBOQ1**
  - a. **Make sure that the total price from "SOQ\_supply" is matching** with the value indicated in column 13 ("TOTAL SUPPLYPRICE").
  - b. **Indicate the currency** of the supply in column12.
  - c. Select **"Full-conversion" only for INR** quotes and **"partial conversion"** for quotes in foreign currency.
  - d. Fill the "Other taxes" column (Column 15), only if required. Fill the total amount in the other taxes column and not(%).
  - e. Make sure that the Supply GST (Column 14) is 5% of the total supply price in the case of INR quotes. (INR Zero only for quotes in foreign currency). **This is calculated automatically.**
  - f. Make sure that the **"Installation / Commissioning charges" (Column 17) matches with the total price reflected in SOQ\_INSTALLATION.**
  - g. Make sure that the INSTALLATION GST (Column 14) is 18% of the total installation charges. This is also calculated automatically.

**VOLUME -II**  
**GENERAL SPECIFICATIONS**

**Name of the Work:**

**Supply and Installation of laboratory infrastructure, namely laboratory benches, chemical storage cabinets, anti-vibration tables, fume hoods, and other allied services in the Unified Academic Campus of Bose Institute, Kolkata in Block-EN, Sector V, Salt Lake City, Kolkata – 700091.**

## COMPREHENSIVE LIST OF ITEMS REQUIRED WITH NUMBERS AND COMPOSITION

\* ACTUAL DIMENSIONS MAY VARY DEPENDING ON THE FINAL GFC DRAWINGS

Serial No.	Name of the Units	Unit Composition	No. of Units Required	Detail Specs in
<b>A</b>	<p><b>Standing height column-based adaptive island bench</b> with reagent racks and gang dp switches and sockets with electrical connections.</p> <p><b>(Consult Drawing)</b></p>	<p>One unit refers to -</p> <p><b>a)</b> Island Bench of dimension ~ 16 ft (L) × 5 ft (W), with</p> <p><b>b)</b> 8 Nos Castor mounted Under-bench cabinets &amp;</p> <p><b>c)</b> 3-storey Glass/metal reagent racks</p>	50	<p><b>Chapter 1</b></p> <p><b>Part-B</b></p>
<b>B</b>	<p><b>Standing height floor-mounted wall bench</b> with under-bench cabinets, sink units with accessories, water faucets, and gang dp switches and sockets with electrical connections.</p> <p><b>(Consult Drawing)</b></p>	<p>One Unit refers to –</p> <p>A bench that spans a wall of ~ 20ft including,</p> <p><b>a)</b> ~ 8 Nos Floor Mounted Cabinets [≤ 3ft (L) × 2.5ft (W)] covering entire wall length,</p> <p><b>b)</b> Technical Ceramic Worktop of dimensions ~ 3-4ft (L) × 3 ft (W) to cover entire benchtop,</p> <p><b>c)</b> containing 2 Nos Sink Units and Water Faucets</p> <p><b>d)</b> 1 No. Eye Wash</p> <p><b>e)</b> Two PEG Boards</p>	50	<p><b>Chapter 1</b></p> <p><b>Part-A</b></p>
<b>C</b>	<p><b>Sitting height column-based adaptive wall bench</b> with column mounted over-head cabinets, RJ45 sockets, and gang dp switches and sockets with electrical connections.</p> <p><b>(Consult Drawing)</b></p>	<p>One Unit refers to –</p> <p><b>a)</b> 5 Nos suspended Under-bench cabinets,</p> <p><b>b)</b> 5 Nos glass door overhead cabinets, and</p> <p><b>c)</b> phenolic resin worktop of dimension ~ 16 ft (L) × 3 ft (W)</p>	50	<p><b>Chapter 1</b></p> <p><b>Part-C</b></p>



<b>D</b>	<b>Ventilated Reagent Storage</b>	One unit refers to – One Ventilated Reagent Storage (VRS) unit of ~ 7ft (H) × 1.90 ft (D) × 1.5 ft (L)	50	<b>Chapter 1 Part-D</b>
<b>E</b>	<b>Glazed tall storage cabinets</b>	One unit refers to - One Tall storage cabinet of dimensions ~ 7ft (H) × 1.90 ft (D) × 2.5 ft (L) with 2 doors and 5 shelves	50	<b>Chapter 1 Part-D</b>
<b>F</b>	<b>Anti-vibration tables (AVT) - Of Two different dimensions</b>	Each unit refers to - <b>a)</b> 2 ft (L) × 2 ft (W) working area, and <b>b)</b> 3 ft (L) × 2 ft (W) working area	10 10	<b>Chapter 1 Part-D</b>
<b>G</b>	<b>Solvent storage cabinets - of Four Different Dimensions</b>	Each unit refers to - <b>a)</b> One 22G, solvent storage cabinet with dimension ~ 5.5 ft (H) × 1.5 ft (D) × 1.90 ft (L) <b>b)</b> One 45G, solvent storage cabinet with dimension ~ 5.5 ft (H) × 1.5 ft (D) × 3.6 ft (L) <b>c)</b> One 60G, solvent storage cabinet with dimension ~ 5.5 ft (H) × 3 ft (D) × 3 ft (L) <b>d)</b> One 90G, solvent storage cabinet with dimension ~ 5.5 ft (H) × 3 ft (D) × 3.6 ft (L)	50 20 20 10	<b>Chapter 1 Part-D</b>
<b>H</b>	<b>Under-bench (FUMEHOOD) acid/corrosive solvents cabinets</b>	<b>Of Two dimensions</b> <b>a)</b> 35inH x 22inD x 14inL <b>b)</b> 36inHx22inDx48inL	45 6	<b>Chapter 1 Part-D</b>
<b>I</b>	<b>Laboratory Stools and Chairs</b>	Height adjustable lab Stool and lab chairs	Lab Chair - 500 Lab Stool - 20	<b>Chapter 1 Part-D</b>
<b>J</b>	<b>Wall-mounted racks - Of Two different dimensions</b>	Each unite refers to - <b>a)</b> Shelves of dimension ~ 12 in (D) × 36 in (L), and <b>b)</b> Shelves of dimension ~ 18 in (D) × 36 in (L) <b>c)</b> Height adjustable wall uprights and mounting channels	50	<b>Chapter 1 Part-D</b>

<b>K</b>	<b>Other miscellaneous items -</b> <b>a) Spot Extractors</b> <b>b) Gas Cabinets</b> <b>c) Electrical accessories</b>	Each unit refers to - <b>a) One ceiling mounted spot extractor of 15 inch diameter hood with ceiling brackets of dimension ~ 4ft x 4ft x 38ft</b> <b>b) One Fire Safety Gas cabinet of dimension ~ 6.6 ft (H) x 2 ft (D) x 3 ft (L) to accomodate 2 gas cylinders</b> <b>c) Electrical accessories include - MCCB (100A), MCB (62A &amp; 32A), and armored 3 x 4mm cables</b>	20  10  As mentioned in BOQ	<b>Part-D</b>
<b>L</b>	<b>4-ft Laboratory Fumehood</b>	Four feet laboratory benchtop fumehood with under bench cabinets	45	<b>1.00 Chapter 2</b>
<b>M</b>	<b>8-ft Laboratory Fumehood</b>	Eight feet laboratory bench top fumehood with under bench cabinets	6	<b>Chapter 2</b>

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## INTRODUCTION

**BOSE INSTITUTE wishes to set up functioning research laboratories in the unified academic campus building located in sector V, Salt lake City, Kolkata.**

The unified academic campus consists of a 16 storied building out of which first 8 floors have been completed with HVAC system, GI exhaust ducts, false ceilings, electrical connections, and fresh air units. Out of these eight floors the proposed laboratories are distributed across 2<sup>nd</sup> to 8<sup>th</sup> floors. Each floor contains multiple laboratories with two predominant layouts,

- A. Laboratories with two entry doors
- B. Laboratories with single entry doors

**The Scope of works** shall include preparation of the final layouts, supply, installation. Commissioning and handing over of the laboratories with laboratory benches and other miscellaneous items including bench mounted electrical & other services (as described in Chapter 1), Fume Hoods and connecting them to the existing GI exhaust system with dampers and flexible tubing (as described in Chapter 2).

# CHAPTER-01

## LAB FURNITURE SPECIFICATION

### 1. SUMMARY AND SCOPE

- A. Supply, install, and commission laboratory furniture listed below as per the specification outlined in PART-A (floor-mounted as defined in SEFA 8 or SEFA 10 class 1) or PART-B/C (Column-based/free standing adaptive furniture as defined in SEFA 10 class 7/8) along with worktop, other components, and specialized units specified in PART-D.
- B. The steel furniture shall be of modern design and shall be constructed in accordance with the best practices of the Scientific Laboratory Equipment Industry. First class quality casework shall be insured by the use of proper machinery, tools, dies, fixtures and skilled workmanship to meet the intended quality and quantity for the project.
- C. Necessary civil modifications required for installation as per the approved GFC drawing.
- D. Removal of all debris, dirt and rubbish accumulated as a result of the installation of the laboratory furniture to an onsite container provided by others, leaving the premises broom clean and orderly.

### 2. THE FURNITURE REQUIREMENT IN BRIEF

- A. **Standing height column-based adaptive island bench** with reagent racks as per drawing and described in part-B.
- B. **Standing height floor-mounted wall bench** with under-bench cabinets, sink units with accessories, water faucets as per the drawing and described in Part-A
- C. **Sitting height column-based adaptive wall bench with column mounted over-head cabinets as per** drawing and described in part-C.
- D. **Ventilated Reagent Storage** – described in part D.
- E. **Glazed tall storage cabinets**– described in part D.
- F. **Anti-vibration tables**– described in part D.
- G. **Factory Mutual (FM)-approved Solvent storage cabinets**– described in part D.
- H. **Under-bench acid/corrosive solvents cabinets**– described in part D.
- I. **Laboratory Stools and Chairs**– described in part D.
- J. **Wall-mounted racks**– described in part D.
- K. **Other miscellaneous items** as defined and specified in section D.

### 3. DESIGN CRITERIA

- A. **PURPOSE:** It is the Intent of the work to provide high quality CRCA Steel (obtained from TATA STEEL, JINDAL STEEL or SAIL) Cabinets Powder Coated with epoxy powder coats (obtained from reputed manufacturers such as KANSAI NEROLAC, BERGER PAINTS, ASIAN PAINTS, SHALIMAR) Phenolic Resin/Technical Ceramic Work Tops specifically designed for Laboratory Environment. The details of the powder coating and performance criteria are given in part-E of this document.

### 4. RELEVANT DOCUMENTS AND STANDARDS

- A. All components shall conform to relevant Indian Standard Specifications, wherever existing, irrespective of whether explicitly mentioned or not.
- B. All electrical work shall be carried out in accordance with the provision of Indian Electricity Act 2003 and Indian

Electricity Rules 1956, amended to date.

- C. All furniture lab fixtures shall conform to relevant international standards or guidelines and the vendor should provide documentary evidence for the same. These include the following
1. SEFA (Scientific Equipment and Furniture Association) Desk reference 5<sup>th</sup> edition.
  2. SEFA 3 (Worktops)
  3. SEFA 7 (Laboratory fixtures)
  4. SEFA 8M / SEFA 10 Class 1 (for Floor-mounted wall bench)
  5. SEFA 10 Class 7/8 (For free-standing column-based adaptive wall and island benches)
  6. NFPA 30 - National Fire Protection Association
  7. NFPA-45 - National Fire Protection Association
  8. UL - Underwriters Laboratories
  9. Factory Mutual (FM) certification
  10. ASTM D552 – Bending Test

## 5. SUBMITTALS

- A. **Manufacturer's/Bidder's Data:** Submit manufacturer's data for each type of system and casework.
- B. **Disclosure of the Component manufacturer's Information and Certification:** Name for all the manufacturers of various components other than those from the bidder must be disclosed along with their relevant technical documents, certifications, and testimonials as mentioned in the specification. Bidder must provide a checklist along with the tender for all third party items containing the following information, as given in the proforma / sample checklist given at the end of the document.
- C. **Shop Drawings:** Submit shop drawings for furniture assemblies showing plans, elevations, ends, cross-sections, service run spaces, location and type of service fittings. Provide roughing-in drawings for mechanical and electrical services when required.
- D. **Samples:** Bidder, upon pre-qualification and preliminary evaluation of the technical documents, maybe asked to provide samples for final technical evaluation at no cost to the Institute. The samples may include -
1. One sample of all top materials, of sufficient size to perform finish requirement tests.
  2. Sample of all necessary service fittings, locks, door pulls, hinges, and interior hardware.

## 6. QUALITY ASSURANCE AND TESTING

- A. The supplier shall have a history of successful projects of similar size and complexity.
- B. **Single Source Responsibility:** The supplier shall provide complete package including laboratory benches including worktops and reagent racks, other items, fumehoods as a single responsibility.
- C. The supplier shall submit test results for SEFA-3, SEFA 7, SEFA 8/8M, SEFA 10 compliance as indicated in performance criteria of the respective codes for a minimum of any 2nos Cabinets/frame structures of different sizes as listed in the BOQ. The supplier shall at his own expense and at no cost to the purchaser carry out all such tests and inspections of goods and related services as specified in Tender.
- D. Supplier is expected to provide the purchaser with a reasonably advance notice to permit the purchaser or its designated representative to attend the test and/or inspection procedure for the batch to be supplied.

## 7. INSTALLATION PROCEDURE

- A. Furnish and deliver all utility service outlet accessory fittings, electrical receptacles and switches identified on drawings as mounted on the laboratory furniture. Pre-plumbing and pre-wiring Workstations, where called for in these specifications or equipment schedules, services shall be plumbed using flexible hoses and shall terminate at a single point connection above the top of the vertical support member as specified. Pre-wired power service shall terminate at a power cord at the top of the vertical support member as specified. All plumbing and electrical fittings, not preinstalled in equipment, shall be furnished with supply tank nipples and lock nuts, loose in boxes, and properly marked. These plumbing and electrical fittings shall be packaged separately and marked appropriately.
- B. Furnishing and delivering, packed in boxes for installation by the vendor, all laboratory sinks, cup sinks or drains, drain troughs, overflows and sink outlets with integral tailpieces, which occur above the floor, and where these items are part of the equipment or listed in the specifications or equipment schedules. Integral tailpieces when required shall be in accordance with the manufacturer's standards. All tailpieces shall be furnished less the couplings required to connect them to the drain piping system.
- C. Furnish service strip supports where specified, and setting in place service tunnels, service turrets, supporting structures and reagent racks of the specified type.

## PART-A

### STANDING HEIGHT (900 ±20 MM) FLOOR-MOUNTED LABORATORY WORKBENCH SPECIFICATIONS

#### 1. DESCRIPTION

- a. **The standing height floor-mounted laboratory workbench** (as shown in the drawing), that meets the performance requirements described in SEFA 8M/SEFA 10 class 1, shall comprise
  - i. Individual units, having complete welded construction complying with SEFA 8M Standards, placed side by side to form the entire table.
  - ii. The cabinet bodies, drawer bodies, shelves, drawer heads and door assemblies, steel frames, panels, and shutters should be made from Prime Quality CRCA (Cold Rolled Cold Annealed) Steel of specified thickness as described below.
  - iii. The finished cabinets must meet or exceed the SEFA performance test requirements given in part-E of this document.
  - iv. The bench will be completed with technical ceramic worktop, sink units, and eye wash as per specification given below.
  - v. The completed bench shall also have all the necessary electrical and plumbing with faucets and drainage up to the nearest drain header.
  - vi. PEG boards shall also be mounted on the wall/worktop near the sink units.
- b. **Related Publications:**
  - i. SEFA 3 – Scientific Equipment and Furniture Association
  - ii. SEFA 8 – Scientific Equipment and Furniture Association
  - iii. SEFA 10 – Scientific Equipment and Furniture Association
  - iv. NFPA 30 – National Fire Protection Association
  - v. NFPA-45 – National Fire Protection Association
  - vi. UL – Underwriters Laboratories
  - vii. ASTM D522 – Bending Test

## 2. MATERIALS AND CONSTRUCTION

- a. **Cold Rolled Steel:** Cold rolled sheet steel shall be prime grade 12, 14, 16, 18 and 20 gauge (as per the requirement described below) U.S. Standard; roller leveled, and shall be treated at the mill to be free of scale, ragged edges, deep scratches or other injurious effects.
- b. **DRAWER, DOOR STYLE, AND CABINETS:** The outer drawer and door head shall have a channel formation on all four sides to eliminate sharp raw edges of steel and the top front corners shall be welded and ground smooth. Drawer and door, when closed, shall be recessed to create an overall flush face, and with optional pull. All cabinet bodies shall be flush front construction with intersection of vertical and horizontal case members, such as end panels, top rails, bottoms and vertical posts in same plane without overlap. Exterior corners shall be spot welded with heavy back up reinforcement at exterior corners. All face joints shall be welded and ground smooth to provide a continuous flat plane.
- c. **Drawer and Door Pulls:** Pull shall be of modern design, offering a comfortable handgrip, and be securely fastened to doors and drawers with screws. All pulls shall be satin finish aluminum, with a clear, lacquer finish. Two pulls shall be required on all drawers over 24" long. Use of plastic pulls (molded or extruded), or a design not compatible for usage by the handicapped will not be acceptable.
- d. **Hinges:** Hinges shall be made of Type 304 stainless steel 0.089-inch-thick, 2-1/2" high, with brushed satin finish, and shall be the institutional type with a five-knuckle bullet-type barrel. Hinges shall be attached to both door and case with two screws through each leaf. Welding of hinges to door or case will not be accepted. Doors under 36" in height shall be hung on one pair of hinges, and doors over 36" high shall be hung on 3 hinges.
- e. **Positive Catch:** A two-piece heavy-duty cam action positive catch shall be provided on all base cupboard doors and shall be positioned near the pivoting edge of door to provide a clean unobstructed opening. Main body of the catch shall be confined within an integral cabinet divider rail, while latching post shall be mounted on the hinge side of door. Nylon roller type catches are not acceptable.
- f. **Elbow Catches:** Elbow catches and strike plates shall be used on left hand doors of double door cases where locks are used, and are to be burnished cast aluminum, with bright brass finish.
- g. **Shelf Adjustment Clips:** Shelf adjustment clips shall be nickel-plated steel.
- h. **Base Molding:** Base Molding shall be provided on all table legs, unless otherwise specified, to conceal leveling device. Shoes shall be a pliable, black vinyl material. Corner clip should be provided to hold the base molding firmly. Use of a leg shoe, which does not conceal leveling device, will not be acceptable.
- i. **Sink Supports:** Sink supports shall be the hanger type, suspended from top front and top rear horizontal rails of sink cabinet by four 1/4" dia. rods, threaded at bottom end and offset at top to hang from two full length reinforcements welded to the front and rear top rails. Two 3/4" x 1-2/2" x 12-gauge channels shall be hung on the threaded rods to provide an adjustable sink cradle for supporting sinks. When sink capacity exceeds 3,750 cu. in., the sink supports shall be suspended from full-length reinforcements welded to the two end rails. Two 1" x 2" x 10 gauge full-length channels shall be hung from the four 1/4" dia. rods to provide an alternate sink cradle.
- j. **Worktop, sink units, & fixtures:**
  - i. Technical ceramic worktop and sinks, along with necessary faucets, fixtures, and drainpipe (HDPE 3mm drainpipe for chemical disposal) required to complete the bench are specified in part-D. The



worktop must have a minimum length of three ft to ensure minimum number of joints. Smaller sized worktops, if found necessary, while preparing the GFC drawings as per the actual site condition, needs prior approval from the buyer.

- ii. All power plugs are to be wired internally with un-armored 3x4 mm<sup>2</sup> fire-resistant low Smoke (FRLS) PVC insulated copper wire (from KEI, HAVELLS, LAPP, or FINOLEX) in surface recessed steel conduits and connected to the supply line via DB's and MCB's from either Shneider, Legrand, Hager, Simens, or Havells.
  - iii. All sockets must be 6/13A 2 Gang DP universal Switch Socket Outlet (230V)
- k. Knee space panels, where shown or specified, shall be 20 gauge, finished same as casework cabinets, and easily removable for access to mechanical service areas.

## **PART-B**

### **STANDING HEIGHT (900 ±20 MM) COLUMN-BASED ADAPTIVE ISLAND BENCH SPECIFICATIONS**

#### **1. DESCRIPTION**

- A. The standing height column-based island work bench** (double-sided cantilever structure as shown in the drawing) that meets the performance requirements described in the latest SEFA 10 class 7/8 guideline for the most adaptive range of furniture. Provide certification from the competent SEFA approved test lab that the quoted furniture meets the performance requirements described in SEFA 10 class 7/8.
- B.** The island bench shall incorporate either adjustable height or fixed height work surfaces with mobile base cabinets as shown in drawing. The work surfaces, shelving, service utility distribution, and ancillary items are suspended from the frame structure. The island bench shall have the above-counter structures that are pre-plumbed and pre-wired, and the services can be taken from the ceiling. The workbench shall also incorporate adjustment slots for vertical height adjustability of work surfaces, shelving and ancillary items.
- C.** The under-bench cabinets shall be movable having lockable caster wheels.
- D.** Furnish all mobile cabinets, supporting frame structures for the free-standing workbench including worktops, reagent shelves, and necessary electrical connections as listed in these specifications, or equipment schedules.
- E. Related Publications:**
  - i. SEFA 3 – Scientific Equipment and Furniture Association
  - ii. SEFA 8 – Scientific Equipment and Furniture Association
  - iii. SEFA 10 – Scientific Equipment and Furniture Association
  - iv. NFPA 30 – National Fire Protection Association
  - v. NFPA-45 – National Fire Protection Association
  - vi. UL – Underwriters Laboratories
  - vii. ASTM D522 – Bending Test

#### **2. MATERIALS AND CONSTRUCTION**

- A. Cold Rolled Steel:** Gauges of steel used in construction of workbench shall be as follows:
  - i. Corner gussets for leveling bolts and apron corner braces, 12 gauge.
  - ii. Case and drawer suspension channels, 14 gauge.

- iii. Top and intermediate front horizontal rails, table aprons, hinge reinforcements, and reinforcement gussets, 16 gauge.
  - iv. Drawer assemblies, door assemblies, bottom, bottom back rail, toe space rail, and adjustable shelves, 20 gauge.
  - v. Steel tubular foot supporting the column, 11 gauge.
  - vi. Work surface support system and shelf brackets, 12 gauge
  - vii. Shelves, 14 gauge
- B.** Back construction shall consist of a top and bottom rail, channel formed for maximum strength and welded to back and top flange of end uprights, open for access to services.
- C.** Die formed gussets, with multiple ends for strength, shall be furnished in each bottom corner of base units to ensure rigidity, and a 3/8"-16 leveling bolt, 3" long, and shall engage a clinch nut in each gusset. Access to the leveling bolts shall be through plug buttons in the bottom pan. Each leveling bolt and gusset shall be capable of supporting 500 lbs. Access to leveling bolts through toe space or leveling bolts requiring special tools to adjust are not acceptable.
- D.** Adjustable shelves shall be formed down 3/4", returned back 7/8" and up 1/4" into a channel formation front and rear; formed down 3/4" at each end, shelves over 42" long shall be further reinforced with a channel formation welded to underside of shelf.
- E. MOBILE CABINETS:**
- i. Each cabinet shall be complete and provided with lockable caster wheels to allow easy movement and relocation. Case openings shall be rabbeted on all four sides for both hinged and sliding doors to provide a dust resistant case. All cabinets shall have a cleanable smooth interior. Bottom edges shall be formed down on sides and back to create easily cleanable corners with no burrs or sharp edges, and front edge shall be offset to create a seamless drawer and door recess rabbet for dust stop.
  - ii. **Drawer, door style, door pulls, hinges, catches, and shelf adjustment clips:** As described in the relevant section in part A.
  - iii. Drawer bodies shall be made in one-piece construction including the bottom, two sides, back and front. They shall be fully covered at interior bottom on all four sides for easy cleaning. The top front of the inner drawer body shall be offset to interlock with the channel formation in drawer head providing a 3/4" thick drawer head.
  - iv. Drawer slides are Heavy duty, full extension, soft-close, self-closing, zinc plated, ball bearing slides, rated for 100 pound loads.
  - v. Steel Door assembly (two-piece) for solid pan swinging doors shall consist of an inner and outer door pan. Outer door pan shall be formed at all four sides. The corners on the pull side of the outer door pan shall be welded and ground smooth to prevent exposure of sharp edges of steel at these critical points. Inner door pan shall be flanged at all four sides with hinge reinforcements welded in place. The door assembly shall be 3/4" thick and contains sound deadening material.
  - vi. Steel Drawer/door assemblies shall be painted prior to assembly. Both shall be punched for attaching drawer pulls. Likewise, inner pan formation of door and drawer body shall be indented for in-field installation of locks when required.
  - vii. Doors shall be readily removable and hinges easily replaceable. Hinges shall be applied to the cabinet and door with screws. Welding of hinges to either cabinet or door will not be acceptable

## F. Reagent Racks:

- i. **Metal-frame supported Glass:** Glass thickness – 6mm, surface – non-frosted rough surface, metal support – powder-coated 18 gauge cold-rolled steel.
- ii. **Metal Reagent Rack:** powder-coated 18-gauge cold-rolled steel of size described in schedule of quantities.

## G. Worktop, Electrical Raceway, Sockets and switches

- i. The bench is completed with the technical ceramic worktop of minimum as specified in part-D. Each worktop shall be of a minimum length of 4 ft to ensure minimum joints. Smaller sized worktops, if found necessary, while preparing the GFC drawings as per the actual site condition, needs prior approval from the buyer.
- ii. All power plugs are to be wired internally with un-armored 3x4 mm<sup>2</sup> fire-resistant low Smoke (FRLS) PVC insulated copper wire (from KEI, HAVELLS, LAPP, or FINOLEX ) in surface recessed steel conduits connected to the supply line via DB's and MCB's from either Shneider, Legrand, Hager, Seimens, or Havells.
- iii. All sockets must be 6/13A 2 Gang DP universal Switch Socket Outlet (230V)

# PART-C

## SITTING HEIGHT (750±20 MM) COLUMN-BASED ADAPTIVE WALL BENCH SPECIFICATIONS

### 1. DESCRIPTION

- A. **The sitting height column-based island work bench** (single-sided cantilever structure as shown in the drawing) that meets the performance requirements described in the latest SEFA 10 class 7/8 guideline for the most adaptive range of furniture. Provide certification from the competent SEFA approved lab that the quoted furniture meets the performance requirements described in SEFA 10 class 7/8.
- B. The wall bench shall incorporate adjustable height work surfaces with suspended base cabinets as shown in drawing. The upper cabinets, work surfaces, shelving, service utility distribution, and ancillary items are suspended from the frame structure. The bench shall have the above-counter structures that are pre-wired, and the services can be taken from the ceiling. The workbench shall also incorporate adjustment slots for vertical height adjustability of work surfaces, shelving and ancillary items.
- C. The under-bench suspended cabinets shall be mounted on the frame and not from the worktop while the overhead cabinets shall also be mounted on the frame and not bolted on the building structure as outlined in the SEFA 10 guideline.
- D. Furnish all cabinets and casework, supporting structures for the free-standing sitting bench including worktops, overhead cabinets, and necessary electrical connections as listed in these specifications, or equipment schedules.
- E. **Related Publications:** Same as described in part B.

### 2. MATERIALS AND CONSTRUCTION

- A. **Cold Rolled Steel:** Same as described in part B.

- B.** Intermediate vertical uprights of workbench shall be raised to sandwich the over-head cabinet sin between with front face of cabinet in match to upright front. The wall cabinets shall rest on metal support frame which is fastened at either ends with the uprights.
- C.** The vertical uprights structure shall have provision for pre-piping & pre-wiring up with removable service access for any maintenance in future.
- D.** Die formed gussets, with multiple ends for strength, shall be furnished in each bottom corner of base units to ensure rigidity, and a 3/8"-16 leveling bolt, 3" long, and shall engage a clinch nut in each gusset. Access to the leveling bolts shall be through plug buttons in the bottom pan. Each leveling bolt and gusset shall be capable of supporting 500 lbs. Access to leveling bolts through toe space or leveling bolts requiring special tools to adjust are not acceptable.
- E. UNDER-BENCH CABINETS:** Each under-bench cabinet shall be complete and mounted onto the frame. Case openings shall be rabbeted on all four sides for both hinged and sliding doors to provide a dust resistant case. All cabinets shall have a cleanable smooth interior. Bottom edges shall be formed down on sides and back to create easily cleanable corners with no burrs or sharp edges, and front edge shall be offset to create a seamless drawer and door recess rabbet for dust stop.
- F. OVER-HEAD CABINETS:** Over-head cabinets shall of similar construction as the under-bench conforming to SEFA standards and shall have steel-framed transparent toughened glass doors of thickness between 4-6 mm.
- G. CABINET CONSTRUCTION DETAILS:**
- i. Drawer, door style, door pulls, hinges, catches, and shelf adjustment clips:** As described in the relevant section in part A.
  - ii.** Drawer bodies shall be made in one-piece construction including the bottom, two sides, back and front. They shall be fully coved at interior bottom on all four sides for easy cleaning. The top front of the inner drawer body shall be offset to interlock with the channel formation in drawer head providing a 3/4" thick drawer head.
  - iii.** Drawer slides are Heavy duty, full extension, soft-close, self-closing, zinc plated, ball bearing slides, rated for 100 pound loads.
  - iv.** Steel Door assembly (two-piece) for solid pan swinging doors shall consist of an inner and outer door pan. Outer door pan shall be formed at all four sides. The corners on the pull side of the outer door pan shall be welded and ground smooth to prevent exposure of sharp edges of steel at these critical points. Inner door pan shall be flanged at all four sides with hinge reinforcements welded in place. The door assembly shall be 3/4" thick and contains sound deadening material.
  - v.** Adjustable shelves shall be formed down 3/4", returned back 7/8" and up 1/4" into a channel formation front and rear; formed down 3/4" at each end, shelves over 42" long shall be further reinforced with a channel formation welded to underside of shelf.
  - vi.** Steel Drawer/door assemblies shall be painted prior to assembly. Both shall be punched for attaching drawer pulls. Likewise, inner pan formation of door and drawer body shall be indented for in-field installation of locks when required.
  - vii.** Doors shall be readily removable and hinges easily replaceable. Hinges shall be applied to the cabinet and door with screws. Welding of hinges to either cabinet or door will not be acceptable.

## H. Worktop, Electrical Raceway, Sockets and switches

- i. The bench is completed with the phenolic resin worktop of 20 mm thickness as specified in part-D. Each worktop shall be of a minimum length of 4 ft to ensure minimum joints. Smaller sized worktops, if found necessary, while preparing the GFC drawings as per the actual site condition, needs prior approval from the buyer.
- iv. All power plugs are to be wired internally with un-armored 3x4 mm<sup>2</sup> fire-resistant low Smoke (FRLS) PVC insulated copper wire (from KEI, HAVELLS, LAPP, or FINOLEX) in surface recessed steel conduits and connected to the supply line via DB's and MCB's from either Shneider, Legrand, Hager, Seimens, or Havells.
- v. All sockets must be 6/13A 2 Gang DP universal Switch Socket Outlet (230V)
- vi. RJ45 sockets are to be provided.

## **PART-D** **WORKTOP, ACCESSORIES, AND OTHER ITEMS SPECIFICATIONS**

### 1. Worktops

Worktops for all the workbenches as well as that of the fumehood should be of the following specification as outlined in the BOQ.

#### A. Technical Ceramic Worktop/sinks/cup sink:

1. The light-colored technical ceramic must be **SEFA- 3.0** certified by a SEFA approved agency (certificate from the authorized agency must be enclosed).
2. The ceramic is manufactured from a mixture of natural earth resources as clay, kaolin, feldspar and quartz by single firing at high temperature (1230-1250°C). The single-firing technique at high temperature allows the ceramic body to combine firmly with the glaze to give the enameled surface an excellent resistance in time.
3. Worktops are to be supplied with factory-finished and glazed edges. Special shaped worktops that contains holes for cup-sinks and other fittings must be produced with dedicated molds in the factory.
4. No modification of the worktop (such as cutting, buffing, edge-bending, polishing, making of holes) will be allowed during installation at-site.
5. The manufacturer of the technical ceramic must have at least three years of proven testimonials in reputed global or Indian research laboratories in worktop volume of similar or higher size of this project.
6. For the wall-bench a 4" inch skirting must be included.

#### B. Phenolic Resin worktop:

1. 20 mm Solid Grade laminate made of composite wood fibres with a surface which is free of melamine resins and resistance to Bacteria and various chemical/Biological spillage as well as chemical fumes.
2. Work top must be SEFA 3.0 Certified from authorized SEFA approved agency with 10 years written Product Guarantee for chemical resistance. (Certificate must be enclosed).
3. Ten years of proven testimonials in reputed global and/or Indian research laboratories in worktop volume of similar size of this project.

## 2. Sinks

- A. **Molded Ceramic Sinks:** Technical ceramic sink units must not be separate from the worktop but pre-formed using specialized molds to ensure optimal performance.
- B. **Ceramic cup sinks:** Molded Cup-sinks are to be of technical ceramic mixture as the worktop. Sinks must be provided from the same manufacturer of the worktop. Otherwise, all the documentation mentioned for the worktop such as SEFA-3 certification, customer satisfaction and installation reports must be enclosed.

## 3. PEG Boards:

- A. Single faced acrylic pegboard (of 10 mm thickness) having a stainless steel (SS304) tray with a hole for water drainage. The pegboard must contain at least 30 PEGs made up of epoxy resin (L x H is 750 mm x 750 mm).

## 4. Laboratory Service fixtures

### A. General

1. The laboratory fitting manufacturer shall be certified to ISO 9001 / EN 29001 / BS 5750 Part 1, or equivalent. The manufacturer should guarantee the availability of spare parts and replacement products for a period of minimum 10 years.
2. The fittings should be delivered with color and media indication in accordance with **EN 13792:2002**.
3. Every fitting should be leak-tested before leaving the factory. Certificate of leak testing of each fitting to be provided.
4. All laboratory service fixtures shall have the construction and shall meet the performance requirements set forth in this specification. Fixture types shall be as indicated in the fixture schedule or fixture details included in these specifications.
5. All service fixtures shall be factory assembled (including the assembly of valves and shanks to turrets, flanges and other mounting accessories), and each fixture shall be individually factory tested. Fixtures shall be tested in the manner and at the pressures set forth below.
6. Except as otherwise indicated, faucet and valve handles shall be forged brass Nylon type and shall have a color-coded screw-on index disc. Color code requirements for indexing service fixtures shall follow DIN Standard 12920:1995.

### B. Finish

1. Laboratory service fixtures and safety equipment shall be furnished with a powder coated finish to enhance the appearance of the fitting and to protect against corrosion. Coating material shall be a blend of epoxy and polyurethane. The hybrid blend shall ensure a finish coating with an optimum combination of chemical resistance, mar and abrasion resistance and resistance to fading under ultraviolet (UV) light.
2. Fittings inside fume hoods shall have an epoxy finish color-coded to match the fixture service index color. Coating material shall be free flowing epoxy powder with a particle size of 35-70 microns.
3. **Mar and Abrasion Resistance:** Finishes shall have a pencil hardness of 2H-4H with adhesion substantial enough to withstand both direct and reverse impacts of 160 inch pounds. Finish shall have excellent mar resistance and be capable of withstanding scuffing, marring and other ordinary wear.
4. **Reparability:** Finish shall be capable of surface repair in the event that a fixture is scratched or a surface rupture occurs. The service fixture manufacturer shall have available an air-drying aerosol coating, specially formulated to match the existing epoxy coating color, which may be applied in the field to repair coated surfaces.

### C. Water Faucets and Valves

1. All faucets and valves for water service shall have a renewable unit containing all working components subject to wear, including a stainless steel replaceable seat and an integral adjustable volume control (designated by the suffix "AC"). The renewable unit shall be interchangeable among all faucets and valves for water service. The renewable unit shall be broached for position locking in the valve body. The unit shall have a high durometer thermoplastic valve disc and a molded TFE stem packing. The unit shall be

capable of being readily converted from compression to self-closing, and vice versa, without disturbing the faucet body.

2. Goosenecks shall either have a separate outlet coupling with a 3/8" IPS female thread securely brazed to the gooseneck for attachment of serrated hose ends, aspirators and other outlet fittings. Rigid goosenecks shall have a 3/8" IPS male inlet thread and be threaded directly into the faucet body so as to be absolutely rigid. Swing goosenecks shall utilize a TFE packing with an externally adjustable packing nut. Alternatively, the gooseneck fittings must have click-on swivel spouts which can easily be replaced.
3. Water faucets and valves shall be fully assembled and individually tested at 80 pounds per square inch (PSI) water pressure.
4. All fixtures must be SEFA 7 compliant; the manufacturer must be enlisted in the SEFA approved brands as provided in SEFA website.

#### **D. Twin cup eye wash/Drench Hose Units**

1. Deck mounted eye wash/drench hose units shall be capable of use as a fixed eye wash with hands-free operation or as a drench hose.
2. All water-bearing parts made of brass or Plastics: PA, POM, TPE, Metals: SS, AISI 316 and Rubber:EPDM
3. handle with integrated, adjusting activation made of plastics, valve not self-closing.
4. high-performance spray heads made of brass, for large-scale dispersion of water, chemical resistant powder coated, largely scale-free, with rubber sleeves and sealed dust caps.
5. integrated flow regulation 14 litre / minute and integrated backflow preventer,
6. Stainless steel covered hose, with water inlet 12.5mm dia. female, DIN-DVGW tested and certificated
7. table mounting accessories M28x1,5x80mm made of brass, incl. fastening-parts kit with nut M28x1,5mm and 2 screws M5 for mounting difficult to access, chrome-plated rosette, sealing to table surface with O-Ring
8. sign for eye shower according to DIN 4844-2-D and BGV A8, self-adhesive PVC-film, 100 x 100 mm
9. Twin cup eye wash shall conform to the following codes; DIN 1988 und DIN EN 1717, DIN EN 15154-2:2006 and ANSI Z358.1-2004.
10. Units shall be furnished with a deck flange with locator guide to hold the unit facing forward and an 8 ft. reinforced PVC hose.
11. Manufacturers: BROEN / WATER SAVER/ BROWNALL

#### **5. FM-approved solvent storage cabinets (under bench and stand-alone types)**

FM-approved storage cabinets for the storage of flammable and combustible liquids of size specified in the schedule of quantities (SOQ) should be designed in accordance with NFPA (National Fire Protection Association), OSHA (Occupational Safety and Health Administration) and FM (Factory Mutual International) regulations.

- A. Satisfies SEFA 8 chemical requirement
- B. Construction 18-gauge double-walled fully-welded steel, 38mm air space between wall
- C. Paint: solvent, acid, alkali protective powder coated
- D. Vents: opposite Side
- E. Rack capacity: Internal individual racks must be able to hold a minimum of 500 kg load.
- F. Door: Full-door piano-hinge mounted self-closing (above 75°C) doors.
- G. Interlocking shelf hangers and minimum of two grounding attachment points
- H. Non sparking lock
- I. Must have a minimum fire-rating of 10 min.

#### **6. Gas Cabinets**

Gas cylinder cabinets should be supplied with the following nominal specifications

- A. Satisfies SEFA 8
- B. Construction: 18-gauge double walled steel, 38mm air space between wall

- C. Paint: solvent, acid, alkali protective powder coated
- D. Capacity: 2 cylinders
- E. Inbuilt checkers base plate and rest chain system for 2 cylinders
- F. Gas manifold should be inside the gas cabinet, regulator, Automatic changeover & accessories
- G. Self-closing doors with full door continuous piano hinges of 1.6 mm thick.
- H. Folding ramp for Cylinder change
- I. Non-sparking locks
- j. for a third-party gas cabinet, the name of the OEM and technical brochure must be submitted.

## 7. Laboratory Stools and Chairs

### A. Lab chair specification

1. Lab chair constructed with wet-laboratory compatible foam or Leather seat & back rest with polyurethane armrest.
2. Have chrome-plated metallic hydraulic Height adjustability between 350mm to 900mm to allow use with both sitting as well as standing height benches.
3. have chrome-plated footrest ring of diameter 18 inch.
4. With chrome base, castors wheels. (lock & without lock)

### B. Lab Stools specification

1. Lab stool constructed with foam or Leather upholstery seat.
2. having chrome plated hydraulic Height adjustable
3. height adjustable from 460mm to 680mm.
4. Having chrome plated 16" dia foot rest Ring
5. with lock & without lock castors Wheels.

## 8. Anti-Vibration tables

- A. **Geometric profile:** Rectangular dimension of specified dimension and with a height of 2.5 ft/ 3 ft.
- B. **Granite Geometry:** Granite geometry shall be as per IS Standards IS 7327: 1991, Granite will have thickness of 80 mm.
- C. **Surface roughness:** Surface Roughness of the Granite shall be maintained between 7-10 Microns as per IS Standards IS 7327: 1991.
- D. **Rigidity:** The Granite loaded area shall not deflect below the remaining area by more than 1 micron/200N.
- E. **Physical Properties:**
  1. Density,  $\rho$ : 2500 kg/ m<sup>3</sup> - 3000 kg m<sup>-3</sup>
  2. Tensile Breaking Stress: 7 – 35 N/mm<sup>2</sup>
  3. Compression Breaking Stress: 100 – 300N/mm<sup>2</sup>
  4. Porosity Coefficient: 1 – 1.5%
  5. Imbibition Coefficient: 1 – 3%
  6. Coeff. Of linear thermal expansion,  $\alpha$ : 2 to 5 X 10<sup>-6</sup> K.
- F. **Table Legs:** Legs for the table are made of Square tube of 80 x 80mm & 3mm as per IS Standards IS: 4270: 1992 and 60 X 40 mm x 2.5mm thick Rectangular Tube (Tie bars) for Reinforcement.
- G. **Base Plate for Legs:** Base Plate shall be made of 80 x 80 x 10mm M.S. Plate with a hole of 12.5mm and to be surface finished, to be welded to the legs and grinded.
- H. **Anti-vibration Leveling Bolts:** AVM for the table as per IS Standard be of circular type having a diameter with in the limit of 80mm and a Height of 35 mm. Anti-Vibration leveling Bolts with Elastomer pads absorb vibration from the ground and also protect the ground surface from scratches and stray marks. Helps prevent skidding, retards creeping.
- I. **Physical Characteristics of AVM:**
  1. Color : Black
  2. Binder Type: Nitrilic Rubber
  3. Compression at 400PSI (%) 25-35



4. Recovery (%) 80
  5. Tensile (Kg/cm<sup>2</sup>) 23.5.
- J. Intermediate Plate:** Intermediate Plate shall be made of 6mm M.S. Plate with a surface finished/machined surface, to place AVMs at locations.
- K. Fabrication and Welding:** Fabrication of all structure shall be in accordance with IS: 800 (latest) unless otherwise specified, and in conformity with various clauses of this specification. Welding of the structure shall be as per IS: 800 and IS: 816.

## 9. Spot Extractor Specification

- A.** Spot extractor shall be made of white color poly Propylene or anodized aluminum surface with joints and tube in recyclable PP. Extraction Arms shall be of modern design with 3 sections suitable for ceiling mounting with a working radius of 1500mm.
- B.** All vertical drops from slab shall be made up of corrosion resistance SS 316. Extraction arm shall be  $\Phi 75$ , Lengths A=750 & B=450 with 360° rotation. SS pipe length upto 1500mm, which shall be mounted from ceiling with ms brackets with chemical resistance epoxy powder coating. Arms are provided with dampers, tight down to under pressure of 3500pa & air temperature of -10° to 70°C.
- C.** Flow rate of arms shall be between 80cmh to 180cmh for dia.75mm arms.
- D.** All extraction arms shall be designed to have a large friction diameter joint and the "One-Hand-Operation" of the adjustment knob to provide a very flexible function with a stable joint that stays in position without sagging. No great force needed to be applied and no tools are required.
- E.** The joint shall have a reinforced indentation which prevents deformation. A design that use "O-Ring" which may cause slip or the joint to crack shall not be permitted.
- F.** The adjustment knob joint shall have ball bearings insulate the set frictions, which facilitates the arms movements without jamming the joint or losing stability and function.
- G.** The arms shall come with a integral air tight throttle damper clearly indicating the flow for open or shut off positions.
- H.** The arms shall come with suitable connection to tubes (suction nozzles), round high impact Plexi glass (PPMA) hoods.
- I.** Manufacturer: Fumex, Alsident, Nederman or approved equivalent.

## 10. Glazed Tall storage

- A. Material and Construction:** CRC construction with spot-welded corners and epoxy powder-coating similar to the base cabinets described in section A following SEFA-8Mguidelines.
- B. Doors:** Front doors should have metal framed transparent toughened glass of thickness to 6-8 mm.

## 11. Wall-mounted Racks

- A.** wall hanging racks are with adjustable modular shelves constructed with 16 gauge CRCA material with Epoxy powder coated. these single racks of specified dimensions should be capable to take the load of ~90KG.

## 12. Ventilated Reagent Storage

- A.** Cabinets designed for storage of chemicals of size mentioned in the SOQ made up of epoxy powder coated CRCA steel of thickness 1.2 mm.
- B.** Interior should also be epoxy powder coated and may also contain phenolic resin based sheets for additional protection against chemicals.
- C. Doors:** Inset style pull out door with louvers with heavy-duty channels capable of 100kg or more load.
- D. Shelves:** At least four and each capable of holding a minimum of 25 kg.
- E.** Vendor need to connect the exhaust duct from the VRS cabinet to the existing main exhaust duct.

## 13. Acids/corrosive solvent storage under-bench cabinets

- A. The cabinet construction must satisfy SEFA 11/ Equivalent FM Approval norms.
- B. The outer structure must be constructed of 1.2 mm metallic phosphate treated CRCA with powder-coating of thickness between 60-80 micron.
- C. The inner structure should be made of a moulded one-piece low-density polyethylene (LDPE) with coved corners and a minimum of 25 mm lip at the bottom front.
- D. The cabinet doors are lined with polyethylene sheet of minimum thickness of 3 mm and the doors are latched using a nylon roller catch.
- E. Each cabinet is to be furnished with a PVC vent pipe for venting to the fume hood above
- F. The hole in the hood work-surface (not more than 50 mm dia), if necessary, must be pre-designed in the ceramic worktop.

## **PART-E**

### **PERFORMANCE CRITERIA AND TESTS**

#### **1. PERFORMANCE REQUIREMENTS**

All furniture specified above must meet the following performance and quality criteria.

##### **A. Steel Casework Construction Performance**

1. Base cabinets shall be constructed to support at least a uniformly distributed load 200 lbs. per square foot of cabinet top area, including working surface without objectionable distortion or interference with door and drawer operation.
2. Base cabinet corner gussets with leveling bolts shall support 500 lbs. per corner, at 1-1/2" projection of the leveling bolt below the gusset.
3. Each adjustable and fixed shelf 4 ft. or shorter in length shall support an evenly distributed load of 40 lbs. per square ft. up to a maximum of 200 lbs., with nominal temporary deflection, but without permanent set.
4. Drawer construction and performance shall allow 13-5/8" clear when in an extended position and suspension system shall prevent friction contact with any other drawer or door during opening or closing. All drawers shall operate smoothly, a minimum of number of cycles as declared in SEFA 8M norms with an evenly distributed load of 150 lbs.
5. Swinging doors on all caseworks shall support 200 lbs. suspended at a point 12" from hinged side, with door swung through an arc of 160 degrees. Weight load test shall allow only a temporary deflection, without permanent distortion or twist. Door shall operate freely after test and assume a flat plane in a closed position.

##### **B. Steel Paint System Finish**

1. After Cold Rolled Steel and Textured Steel component parts have been completely welded together and before finishing, they shall be given a pre-paint treatment to provide excellent adhesion of the finish system to the steel and to aid in the prevention of corrosion. Physical and chemical cleaning of the steel shall be accomplished by washing with an alkaline cleaner, followed by a spray treatment with a complex metallic phosphate solution to provide a uniform fine-grained crystalline phosphate surface that shall provide both an excellent bond for the finish and enhance the protection provided by the finish against humidity and corrosive chemicals.

2. After the phosphate treatment, the steel shall be dried and all steel surfaces shall be coated with a chemical and corrosion-resistant, environmentally friendly, electro statically applied powder coat finish. All components shall be individually painted, ensuring that no area be vulnerable to corrosion due to lack of paint coverage. The coating shall then be cured by baking at elevated temperatures to provide maximum properties of corrosion and wear resistance.
3. The completed finish system in standard colors shall meet the performance test requirements specified under PERFORMANCE TEST RESULTS outlined below.

### C. Performance Test Results (Chemical Spot Tests)

1. **Testing Procedure:** Chemical spot tests for non-volatile chemicals shall be made by applying 5 drops of each reagent to the surface to be tested and covering with a 1-1/4" dia. watch glass, convex side down to confine the reagent. Spot tests of volatile chemicals shall be tested by placing a cotton ball saturated with reagent on the surface to be tested and covering with an inverted 2-ounce wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire test period, and at a temperature of 25±3°C. For both methods, leave the reagents on the panel for a period of one hour. At the end of the test period, the reagents shall be flushed from the surface with water, and the surface scrubbed with a soft bristle brush under running water, rinsed and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Immediately prior to evaluation, 16 to 24 hours after the reagents are removed, the test surface shall be scrubbed with a damp paper towel and dried with paper towels.
2. **Test Evaluation:** Evaluation shall be based on the following rating system. After testing, panel shall show no more than three (3) Level 3 conditions.

Level 0	-	No detectable change.
Level 1	-	Slight change in color or gloss.
Level 2	-	Slight surface etching or severe staining.
Level 3-		Pitting, cratering, swelling, or erosion of coating, showing obvious and significant deterioration.

### 3. Test Reagents

<u>Test No.</u>	<u>Chemical Reagent</u>	<u>Test Method</u>
1.	Acetate, Amyl	Cotton ball & bottle
2.	Acetate, Ethyl	Cotton ball & bottle
3.	Acetic Acid, 98%	Watch glass
4.	Acetone	Cotton ball & bottle
5.	Acid Dichromate, 5%	Watch glass
6.	Alcohol, Butyl	Cotton ball & bottle
7.	Alcohol, Ethyl	Cotton ball & bottle
8.	Alcohol, Methyl	Cotton ball & bottle
9.	Ammonium Hydroxide, 28%	Watch glass
10.	Benzene	Cotton ball & bottle
11.	Carbon Tetrachloride	Cotton ball & bottle
12.	Chloroform	Cotton ball & bottle
13.	Chromic Acid, 60%	Watch glass
14.	Cresol	Cotton ball & bottle
15.	Dichlor Acetic Acid	Cotton ball & bottle
16.	Dimethylformamide	Cotton ball & bottle
17.	Dioxane	Cotton ball & bottle

18.	Ethyl Ether	Cotton ball & bottle
19.	Formaldehyde, 37%	Cotton ball & bottle
20.	Formic Acid, 90%	Watch glass
21.	Furfural	Cotton ball & bottle
22.	Gasoline	Cotton ball & bottle
23.	Hydrochloric Acid, 37%	Watch glass
24.	Hydrofluoric Acid, 48%	Watch glass
25.	Hydrogen Peroxide, 3%	Watch glass
26.	Tincture of Iodine,	Watch glass
27.	Methyl Ethyl Ketone	Cotton ball & bottle
28.	Methylene Chloride	Cotton ball & bottle
29.	Mono Chlorobenzene	Cotton ball & bottle
30.	Naphthalene	Cotton ball & bottle
31.	Nitric Acid, 20%	Watch glass
32.	Nitric Acid, 30%	Watch glass
33.	Nitric Acid, 70%	Watch glass
34.	Phenol, 90%	Cotton ball & bottle
35.	Phosphoric Acid, 85%	Watch glass
36.	Silver Nitrate, Saturated	Watch glass
37.	Sodium Hydroxide, 10%	Watch glass
38.	Sodium Hydroxide, 20%	Watch glass
39.	Sodium Hydroxide, 40%	Watch glass
40.	Sodium Hydroxide, Flake	Watch glass
41.	Sodium Sulfide, Saturated	Watch glass
42.	Sulfuric Acid, 33%	Watch glass
43.	Sulfuric Acid, 77%	Watch glass
44.	Sulfuric Acid, 96%	Watch glass
45.	Sulfuric Acid, 77% and Nitric Acid, 70%, equal parts	Watch glass
46.	Toluene	Cotton ball & bottle
47.	Trichloroethylene	Cotton ball & bottle
48.	Xylene	Cotton ball & bottle
49.	Zinc Chloride, Saturated	Watch glass

\* Where concentrations are indicated, percentages are by weight.

- D. Performance Test Results (Heat Resistance):** Hot water ( $90\pm 5^{\circ}$  C) 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  $45^{\circ}$  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.
- E. Performance Test Results (Impact Resistance):** A one-pound ball (approximately 2" diameter) shall be dropped from a distance of 12 inches onto the finished surface of steel panel supported underneath by a solid surface. There shall be no evidence of cracks or checks in the finish due to impact upon close eye-ball examination.
- F. Performance Test Results (Bending Test):** An 18-gauge steel strip, finished as specified, when bent  $180^{\circ}$  over a 1/2" diameter mandrel, shall show no peeling or flaking off of the finish.
- G. Performance Test Results (Adhesion):** Ninety or more squares of the test sample shall remain coated after the scratch adhesion test. Two sets of eleven parallel lines 1/16" apart shall be cut with a razor blade to intersect at right angle thus forming a grid of 100 squares. The cuts shall be made just deep enough to go through the coating, but not into the substrate. They shall then be brushed lightly with a soft brush. Examine under 100

foot-candles of illumination. Note: This test is based on ASTM D2197-68, "Standard Method of Test for Adhesion of Organic Coatings".

**H. Performance Test Results (Hardness):** The test sample shall have a hardness of 4-H using the pencil hardness test. Pencils, regardless of their brand are valued in this way: 8-H is the hardest, and next in order of diminishing hardness are 7-H, 6-H, 5-H, 4-H, 3-H, 2-H, F, HB, B (soft), 2-B, 3-B, 4-B, 5-B (which is the softest). The pencils shall be sharpened on emery paper to a wide sharp edge. Pencils of increasing hardness shall be pushed across the paint film in a chisel-like manner until one is found that will cut or scratch the film. The pencil used before that one—that is, the hardest pencil that will not rupture the film—is then used to express or designate the hardness.

# CHAPTER-02

## FUMEHOOD SPECIFICATION

### 1. SUMMARY AND SCOPE

- A. **Section Includes:** Supply and install fume hoods, work tops, and understructures as per the minimum specification outlined below.
- B. **Accessorization:** Furnishing and delivering all service outlets, accessory fittings, electrical receptacles and switches as listed in these specifications or equipment schedules. Fittings attached to the fume hood superstructure shall be mounted at the factory.
- C. **Exhaust system Connection:** Connect fumehoods to the existing GI exhaust system using either GI or PP-FRP ducts.
- D. Removal of all debris, dirt and rubbish accumulated as a result of the installation of the fume hoods to an on-site container provided by others, leaving the premises clean and orderly.

### 2. STANDARD FUME HOOD PERFORMANCE REQUIREMENTS

- A. Fume hoods shall be of complete airfoil design to insure maximum operating efficiency. Foil sections at the front facias 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.
- B. **Standard Fume Hood Type:** The fume hoods shall be of the constant air volume type.

### 3. MATERIALS AND CONSTRUCTION

- A. **Fume Hood Superstructure Frame:** A free-standing rigid frame structure of steel angle shall be provided to support exterior panels and interior liner and baffle panels. To allow for maintenance and replacements, the interior liner panels shall be removable without disassembly of the frame structure and outer steel panels. Likewise, the exterior steel panels shall be removable without disassembly of the frame structure and inner liner panels. Fume hoods that require disassembly of the superstructure for liner replacement are not acceptable.
- B. **Fume Hood Interior Walls:** Double wall ends, not more than 4" wide, shall be provided to maximize interior working area. The area between the double wall ends shall be closed to house the remote-control valves. The front vertical facia section shall have a full 135 degree 1" radius at the front leading edge to provide a streamlined section and insure smooth even flow of air into the hood. The vertical facias shall contain the required service controls, electrical switches and receptacles. The hood interior end panels and sash track shall be flush with the facia to prevent eddy currents and back flow of air.
- C. **Fume Hood Airfoil:** A streamlined airfoil shall be integral at the bottom of the hood opening on bench and distillation hoods. This foil shall provide a nominal 1" open space between the foil and the top front edge of the work surface to direct an air stream across the work surface to prevent back flow of air. The airfoil shall extend back under the sash, so that the sash does not close the 1" opening. The foil shall be removable to allow large equipment into the hood. The foil shall be of 12-gauge steel/SS304 to resist denting and flexing. Black Color PVC cover is used as additional protective cover on the metal defector vane.
- D. **Fume Hood Top Panel:** Standard Grille Bypass Configuration: The top front panel shall be of the same material as the exterior facia. It shall have an integral grille stamped into the upper portion.
- E. **Fume Hood Baffles:** A stable, non-adjustable baffle with three fixed horizontal slots shall be provided to aid in distributing the flow of air into and through the hood. The baffle shall be spaced out 2-1/4" from the back liner. The baffle shall be removable for cleaning.
- F. **Fume Hood Duct Collar:** A 12" diameter polyethylene bell-mouthed duct collar shall be located in the top of the hood plenum chamber. Coated common steel duct collars are not acceptable.
- G. **Fume Hood Lighting:** Energy-efficient, LED light with light fixture of the size given below shall be provided in the hood roof. Illumination at 13" above the work surface shall be at least 500 lux. The light fixtures shall be isolated from the hood interior by a 1/4" thick tempered glass panel sealed from the hood cavity. Fixture shall be UL labeled. For Hood length more than 6ft will have 2 Nos 2ft Length Light fixture.

- H. Fume Hood Sash:** A combination sash shall be provided. The sash shall have horizontal sliding glass panels in a vertical rising steel frame. The bottom of the sash frame shall have a full-length metal handle. The sash track shall be a neutral colored polyvinyl chloride set flush with the interior liner panels to minimize turbulence. The sash shall be counterbalanced with a single weight to prevent tilting and binding during operation. The glass panels shall be 1/4" laminated safety float glass mounted on metal rollers in an aluminum track.
- I. Fume Hood Plumbing Service:** Utility services shall consist of remote-control valves as selected located within the end panels, controlled by extension rods projecting through the control panels of the hood, with color coded plastic handles. Interior fitting for gases and water shall be nylon panel flanges and angle serrated hose connectors, color coded. Interior fittings for distilled water shall consist of a bronze tin lined, white color-coded, panel flange and angle serrated hose connector. Interior fittings for steam shall consist of a cast bronze flange and angle serrated hose connector with a chemical resistant metallic bronze finish. Water goosenecks shall be cast bronze with a chemical resistant metallic bronze finish. All plumbing fittings shall be factory installed and piped between the valve and the outlet. Inlet piping will be of 3/8" OD SS304 shall have a single-point connection for each valve provided and carried to a point 150 mm above the fume hood roof. Points of final service connection by other trades shall be at the stub provided by the fume hood manufacturer.
- J. Fume Hood Electrical Service:** The hood superstructure shall be pre-wired and contain wire gauge, connections, fixtures and wire color coding. Wiring electrical services shall consist of two duplex receptacles and a light switch. Sockets of 230 Volt AC, and 3-wire polarized grounded with ground fault interruption. The receptacles shall be of specification grade, side wired only, to insure a positive connection. Wiring shall terminate in one 6" x 6" x 4" service junction box located on the fume hood roof. Electrical contractor will provide single phase power supply to the junction box.
- K. Lattice Rod Assemblies:** 1/2" dia Epoxy rods shall be clamped with the Epoxy clamps to form a lattice arrangement to hold the test samples and rotors within the fume hood.
- L. Hood Work Surface: Ceramic Worktop:** Hood work surface shall be 20 mm thick SEFA 3.0 certified technical ceramic made in the form of a watertight pan, not less than 3/8" deep to contain spillage with a 6" wide safety ledge across the front edge. A cup sink flush with the recessed work surface shall be provided. For detailed specification of the technical ceramic please refer to the Chapter 1, part D, worktop specification.
- M. Cup Sinks:** Should be moulded one-piece acid resistant technical ceramic cup. They shall have an integral mounting flange and an integral tailpiece with a 1-1/2" I.P.S. male straight thread outlet.
- N. Access Opening:** The interior end liner panels shall be furnished with an opening that provides access to the service piping and valves to facilitate installation and maintenance. The openings shall be covered with a removable panel with rounded corners. Panels that require tools to remove are not acceptable. The panel shall provide an overlapping seal on all edges.
- O. Fume Hood Finish:** After the component parts have been completely welded together and before finishing, they shall be given a pre-paint treatment to provide excellent adhesion of the finish system to the steel and to aid in the prevention of corrosion. Physical and chemical cleaning of the steel shall be accomplished by washing with an alkaline cleaner, followed by a spray treatment with a complex metallic phosphate solution to provide a uniform fine-grained crystalline phosphate surface that shall provide both an excellent bond for the finish and enhance the protection provided by the finish against humidity and corrosive chemicals. After the phosphate treatment, the steel shall be dried and all steel surfaces shall be coated with a chemical and corrosion-resistant, environmentally friendly, electrostatically applied powder coat finish. All components shall be individually painted, ensuring that no area be vulnerable to corrosion due to lack of paint coverage. The coating shall then be cured by baking at elevated temperatures to provide maximum properties of corrosion and wear resistance.
- P. Performance Test Results (Chemical Spot Tests):** The completed finish system in standard colors shall meet the performance test requirements specified below.
- a. Testing Procedure:** Chemical spot tests for non-volatile chemicals shall be made by applying 5 drops of each reagent to the surface to be tested and covering with a 1-1/4" dia. watch glass, convex side down to

confine the reagent. Spot tests of volatile chemicals shall be tested by placing a cotton ball saturated with reagent on the surface to be tested and covering with an inverted 2-ounce wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire test period, and at a temperature of 77° ±3° F. For both methods, leave the reagents on the panel for a period of one hour. At the end of the test period, the reagents shall be flushed from the surface with water, and the surface scrubbed with a soft bristle brush under running water, rinsed and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Immediately prior to evaluation, 16 to 24 hours after the reagents are removed, the test surface shall be scrubbed with a damp paper towel and dried with paper towels.

**b. Test Evaluation:** Evaluation shall be based on the following rating system.

Level 0 – No detectable change.

Level 1 – Slight change in color or gloss.

Level 2 – Slight surface etching or severe staining.

Level 3 – Pitting, cratering, swelling, or erosion of coating. Obvious and significant deterioration.

**c. After testing, panel shall show no more than three (3) Level 3 conditions.**

**d. Test Reagents**

Test No.	Chemical Reagent	Test Method
1.	Acetate, Amyl	Cotton ball & bottle
2.	Acetate, Ethyl	Cotton ball & bottle
3.	Acetic Acid, 98%	Watch glass
4.	Acetone	Cotton ball & bottle
5.	Acid Dichromate, 5%	Watch glass
6.	Alcohol, Butyl	Cotton ball & bottle
7.	Alcohol, Ethyl	Cotton ball & bottle
8.	Alcohol, Methyl	Cotton ball & bottle
9.	Ammonium Hydroxide, 28%	Watch glass
10.	Benzene	Cotton ball & bottle
11.	Carbon Tetrachloride	Cotton ball & bottle
12.	Chloroform	Cotton ball & bottle
13.	Chromic Acid, 60%	Watch glass
14.	Cresol	Cotton ball & bottle
15.	Dichlor Acetic Acid	Cotton ball & bottle
16.	Dimethylformamide	Cotton ball & bottle
17.	Dioxane	Cotton ball & bottle
18.	Ethyl Ether	Cotton ball & bottle
19.	Formaldehyde, 37%	Cotton ball & bottle
20.	Formic Acid, 90%	Watch glass
21.	Furfural	Cotton ball & bottle
22.	Gasoline	Cotton ball & bottle
23.	Hydrochloric Acid, 37%	Watch glass
24.	Hydrofluoric Acid, 48%	Watch glass
25.	Hydrogen Peroxide, 3%	Watch glass
26.	Iodine, Tincture of	Watch glass
27.	Methyl Ethyl Ketone	Cotton ball & bottle
28.	Methylene Chloride	Cotton ball & bottle
29.	Mono Chlorobenzene	Cotton ball & bottle
30.	Naphthalene	Cotton ball & bottle
31.	Nitric Acid, 20%	Watch glass



32.	Nitric Acid, 30%	Watch glass
33.	Nitric Acid, 70%	Watch glass
34.	Phenol, 90%	Cotton ball & bottle
35.	Phosphoric Acid, 85%	Watch glass
36.	Silver Nitrate, Saturated	Watch glass
37.	Sodium Hydroxide, 10%	Watch glass
38.	Sodium Hydroxide, 20%	Watch glass
39.	Sodium Hydroxide, 40%	Watch glass
40.	Sodium Hydroxide, Flake	Watch glass
41.	Sodium Sulfide, Saturated	Watch glass
42.	Sulfuric Acid, 33%	Watch glass
43.	Sulfuric Acid, 77%	Watch glass
44.	Sulfuric Acid, 96%	Watch glass
45.	Sulfuric Acid, 77% and Nitric Acid, 70%, equal parts	Watch glass
46.	Toluene	Cotton ball & bottle
47.	Trichloroethylene	Cotton ball & bottle
48.	Xylene	Cotton ball & bottle
49.	Zinc Chloride, Saturated	Watch glass

\* Where concentrations are indicated, percentages are by weight.

- Q. 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.
- R. Performance Test Results (Impact Resistance):** A one-pound ball (approximately 2" diameter) shall be dropped from a distance of 12 inches onto the finished surface of steel panel supported underneath by a solid surface. There shall be no evidence of cracks or checks in the finish due to impact upon close eye-ball examination.
- S. Performance Test Results (Bending Test):** An 18-gauge steel strip, finished as specified, when bent 180° over a 1/2" diameter mandrel, shall show no peeling or flaking off of the finish.
- T. Performance Test Results (Adhesion):** Ninety or more squares of the test sample shall remain coated after the scratch adhesion test. Two sets of eleven parallel lines 1/16" apart shall be cut with a razor blade to intersect at right angle thus forming a grid of 100 squares. The cuts shall be made just deep enough to go through the coating, but not into the substrate. They shall then be brushed lightly with a soft brush. Examine under 100 foot-candles of illumination. Note: This test is based on ASTM D2197-68, "Standard Method of Test for Adhesion of Organic Coatings".
- U. Performance Test Results (Hardness):** The test sample shall have a hardness of 4-H using the pencil hardness test. Pencils, regardless of their brand are valued in this way: 8-H is the hardest, and next in order of diminishing hardness are 7-H, 6-H, 5-H, 4-H, 3-H, 2-H, F, HB, B (soft), 2-B, 3-B, 4-B, 5-B (which is the softest). The pencils shall be sharpened on emery paper to a wide sharp edge. Pencils of increasing hardness shall be pushed across the paint film in a chisel-like manner until one is found that will cut or scratch the film. The pencil used before that one—that is, the hardest pencil that will not rupture the film—is then used to express or designate the hardness.
- V. Fume Hood Liners:** Interior liner panels shall be 1/4" thick fiberglass reinforced polyester sheet **OR** shall be 1/4" thick made from a compression molded cellulose fiber reinforced phenolic resin core with integrally

cured white melamine surfaces. Interior liner panels shall be fastened using stainless steel screws with plastic covered heads.

**W. Liner Tests – Chemical Spot Tests – 24 Hours:**

a. Testing procedure: Chemical spot test shall be made by applying 10 drops (approximately 1/2 milliliter) of each reagent to the surface to be tested. Each reagent (except those marked \*\*) shall be covered with a 1-1/2" diameter watch glass, convex side down to confine the reagent. Spot tests of volatile solvents marked \*\* shall be tested as follows: A 1" or larger ball of cotton shall be saturated with the solvent and placed on the surfaces to be tested. The cotton ball shall then be covered by an inverted 2-ounce, wide mouth bottle to retard evaporation. All spot tests shall be conducted in such a manner that the test surface is kept wet throughout the entire 24-hour test period and at a temperature of 25± 3°C.

b. Evaluation: At the end of the test period, the reagents shall be flushed from the surfaces with water and the surface scrubbed with a soft bristle brush under running water, rinsed, and dried. Volatile solvent test areas shall be cleaned with a cotton swab soaked in the solvent used on the test area. Spots where dyes have dried shall be cleaned with a cotton swab soaked in alcohol to remove the surface dye. The test panel shall then be evaluated immediately after drying.

c. Ratings/Legend:

- |                                |  |
|--------------------------------|--|
| 1 –Epoxy Resin;                | A = No effect or slight change in gloss  |
| 2 – Glass Reinforced Polyester | B = Slight change in gloss or color      |
| 3 – Stainless Steel 304        | C= Slight etching or severe staining     |
| 4 – Stainless Steel 316        | D = Swelling, pitting, or severe etching |
| 5 – Reinforced Phenolic Resin  |  |

d. RESULTS:

	1	2	3	4	5
1. Acetic Acid -98%	A	B	B	B	A
2. Acetone **	A	D	A	A	A
3. Acid Dichromate	A	A	A	A	A
4. Ammonium Hydroxide ** 28%	A	A	B	B	A
5. Amyl Acetate **	A	A	A	A	A
6. Benzene **	A	A	A	A	A
7. Butyl Alcohol **	A	A	A	A	A
8. Carbon Tetrachloride **	A	A	A	A	A
9. Chloroform **	A	D	A	A	A
10. Chromic Acid 60%	B	B	C	C	A
11. Cresol	A	A	A	A	A
12. Dichloroacetic Acid	A	D	B	A	A
13. Dimethylformamide	A	A	A	A	A
14. Dioxane **	A	A	A	A	A
15. Ethyl Acetate **	A	A	A	A	A
16. Ethyl Ether **	A	A	A	A	A
17. Ethyl Alcohol **	A	A	A	A	A
18. Formaldehyde	A	A	A	A	A
19. Formic Acid 90%	A	A	A	A	A
20. Furfural **	B	B	A	A	C
21. Gasoline **	A	A	A	A	A
22. Hydrochloric Acid -37%	A	A	B	B	A
23. Hydrofluoric Acid- 48%	B	D	D	D	A
24. Hydrogen Peroxide- 30%	A	A	A	A	A

25. Methyl Ethyl Ketone **	A	A	A	A	A
26. Methyl Alcohol **	A	A	A	A	A
27. Methylene Chloride **	A	D	A	A	A
28. Monochloro benzene **	A	A	A	A	A
29. Naphthalene **	A	A	A	A	A
30. Nitric Acid 20%	B	A	B	A	A
31. Nitric Acid 30%	B	A	B	A	A
32. Nitric Acid 70%	B	D	B	A	A
33. Phenol ** 85%	A	C	A	A	A
34. Phosphoric Acid 85%	A	A	B	A	A
35. Silver Nitrate	B	C	A	A	C
36. Sodium Hydroxide 40%	A	D	A	A	A
37. Sodium Hydroxide 20%	A	D	A	A	A
38. Sodium Hydroxide 10%	A	D	A	A	A
39. Sodium Hydroxide Flake	A	B	A	A	A
40. Sodium Sulfide	A	B	A	A	A
41. Sulfuric Acid 77%	A	A	C	A	A
42. Sulfuric Acid 96%	C	D	C	A	C
43. Sulfuric Acid 33%	A	A	C	A	A
44. Tincture of Iodine	A	C	B	B	A
45. Toluene **	A	A	A	A	A
46. Trichlorethylene **	A	A	A	A	A
47. Xylene **	A	A	A	A	A
48. Zinc Chloride	A	A	B	A	A
49. Nitric 70%/Sulfuric Acid 77%*	B	B	B	A	A

\* Equal parts of Nitric Acid 70% and Sulfuric Acid 77%.

\*\* Indicates these solvents tested with cotton and jar method

**X. Fume Hood normal Base cabinets:** Base units under hoods shall be fabricated of Cold rolled prime grade roller leveled furniture steel. Gauges of steel used in construction shall be 18 gauges except as follows: Corner gussets for leveling bolts and apron corner braces, 12 gauges. Hinge reinforcements, 14 gauges. Top and intermediate front horizontal rails, apron rails and reinforcement Gussets, 16 gauge. Door assemblies and adjustable shelves, 20 gauge. Performance of the painted surfaces shall match that of the fume hood outer panels.

#### 4. MATERIAL OF CONSTRUCTION

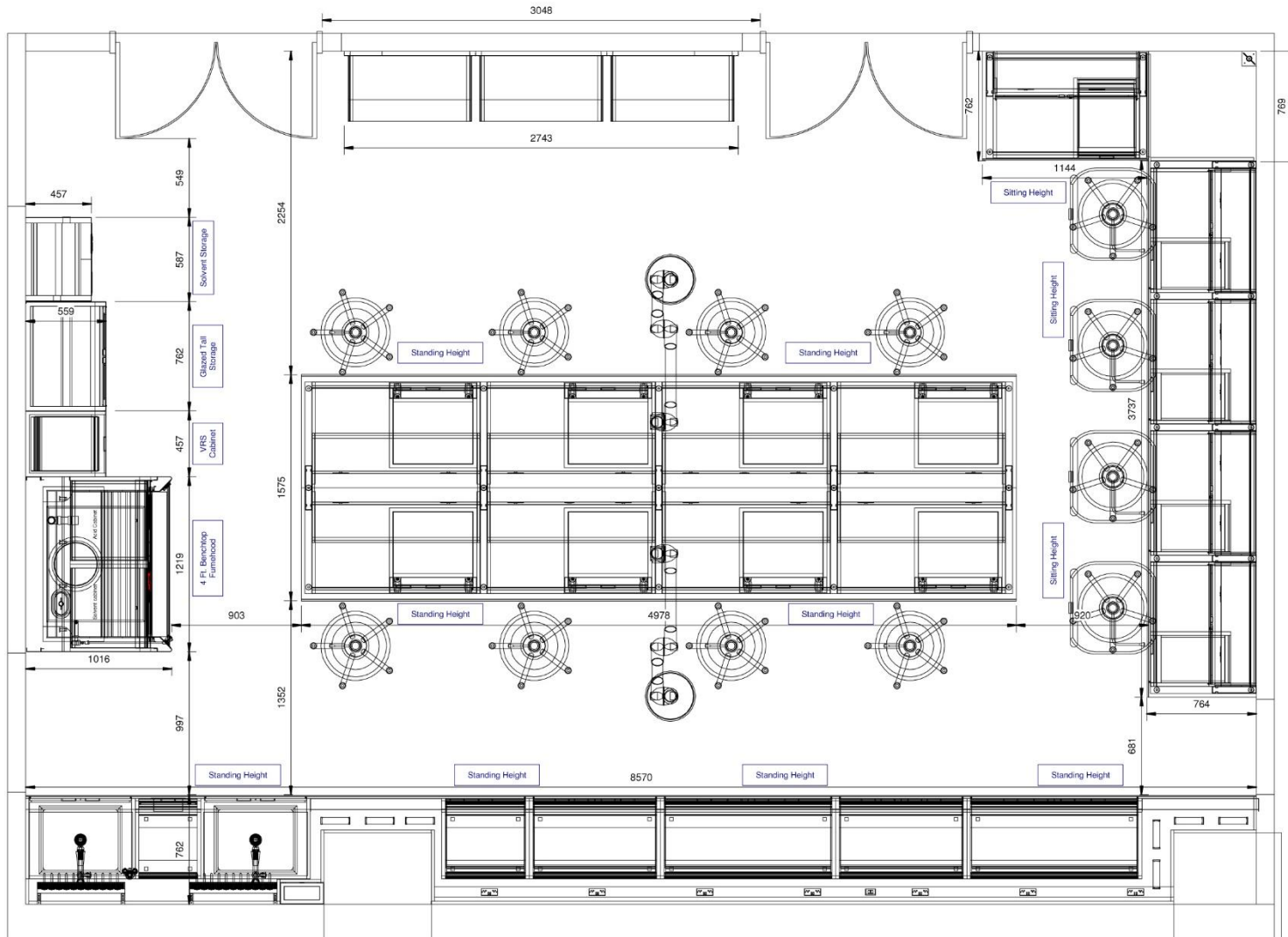
Fume Hood superstructure:	: 18 gauge CRC Sheets, Electrode position Powder coated 60-80 micron
Table top	: 33 mm Ceramic Table top
Electrical sockets	: PVC
Gas fixtures	: Brass Lacquer Coated
Gas piping	: SS304
Vacuum Fixtures	: Brass Lacquer Coated
Vacuum Piping	: Copper/SS/PP
Water fixtures	: Brass Lacquer Coated
Water Piping	: Brass Lacquer Coated
Electrical cables	: Copper wire with PVC Sheath

#### 5. APPLICABLE CODES & STANDARDS:

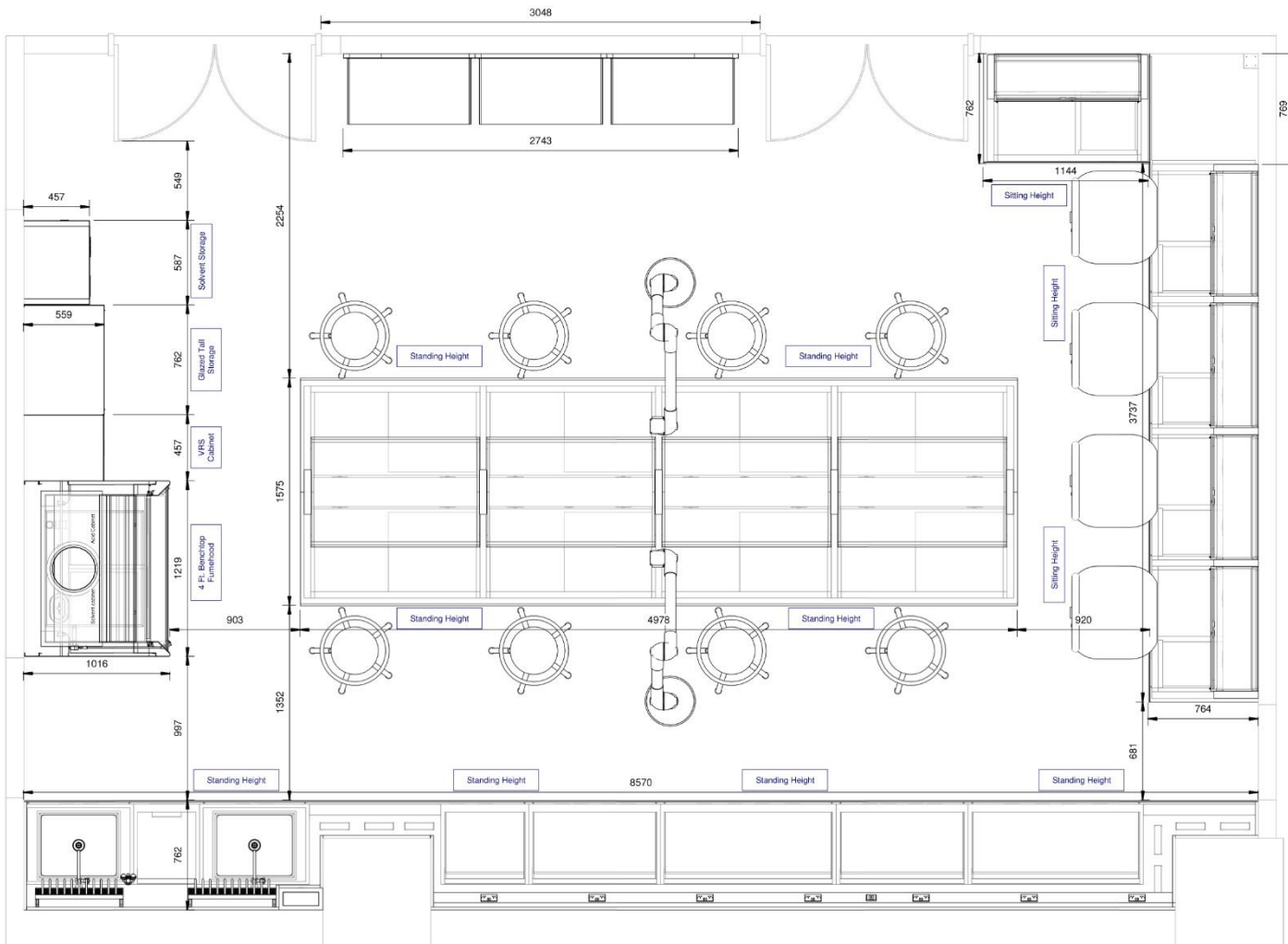
ASHRAE Standard 110.1995 - Method of Testing Performance of Laboratory Fume Hoods



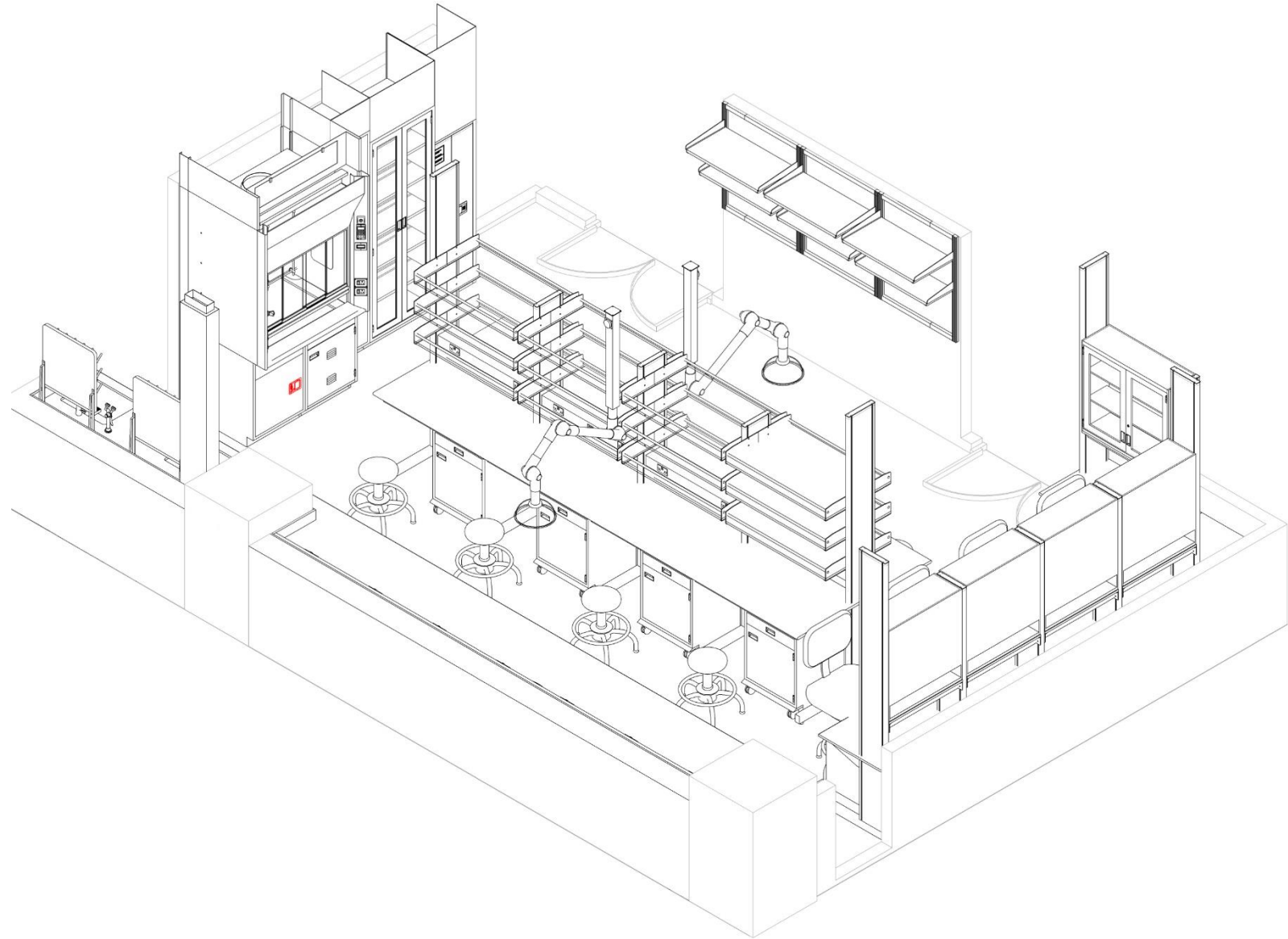
# Typical Layouts and Representative drawings



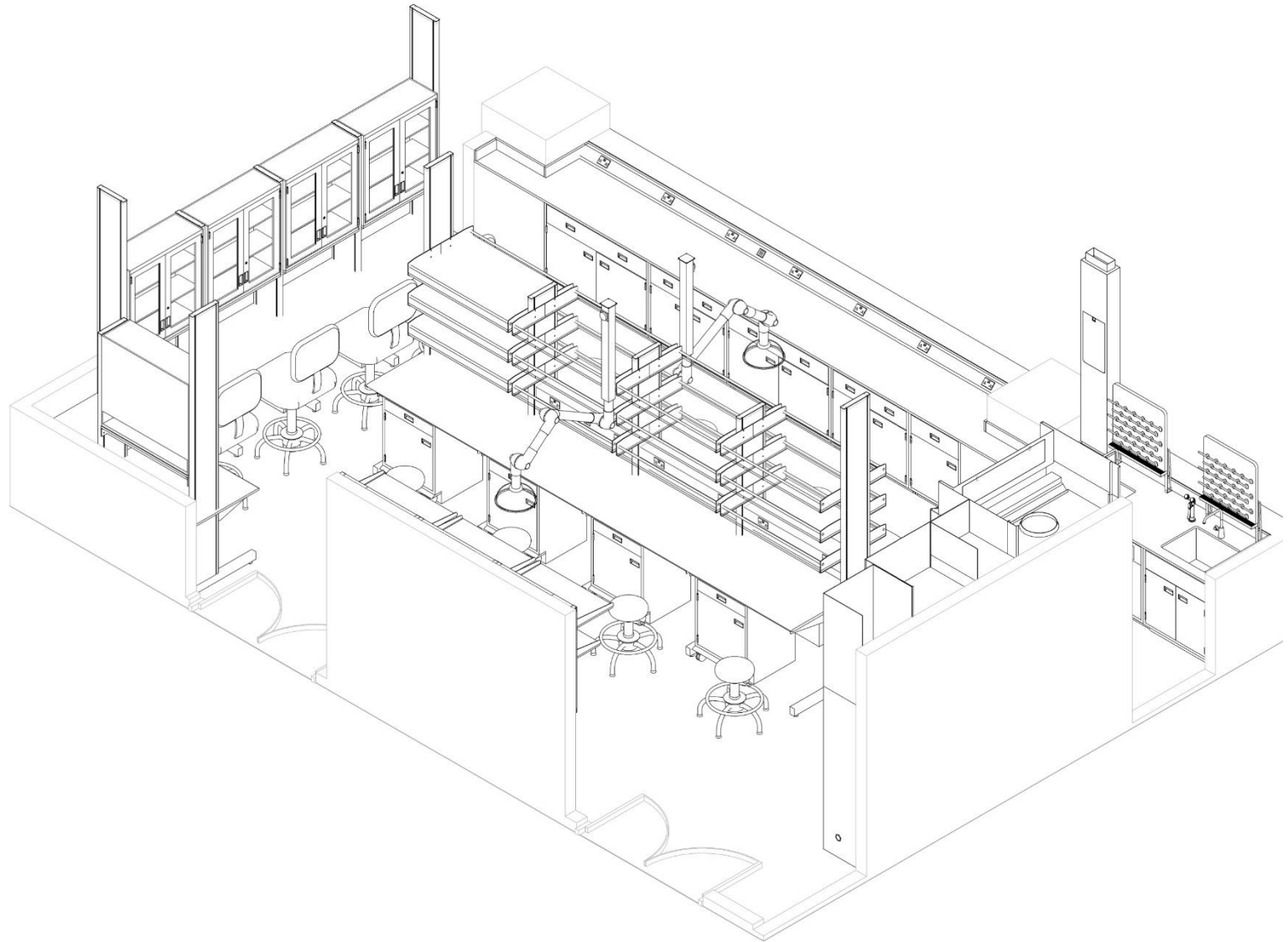
3 Plan View  
1 : 20



2 Plan View  
1 : 20



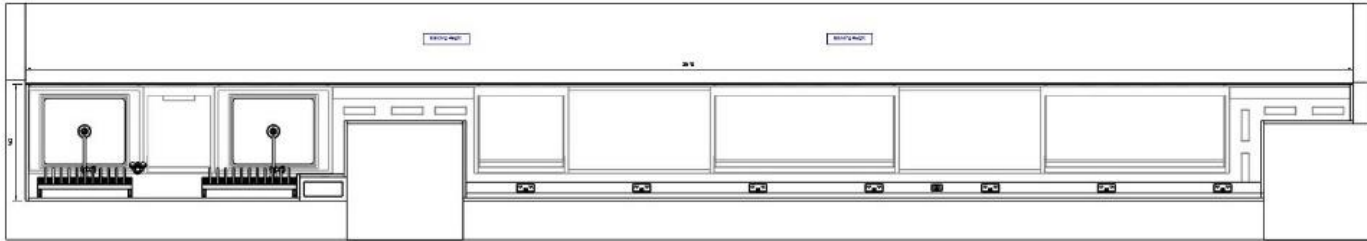
1 Isometric View-I



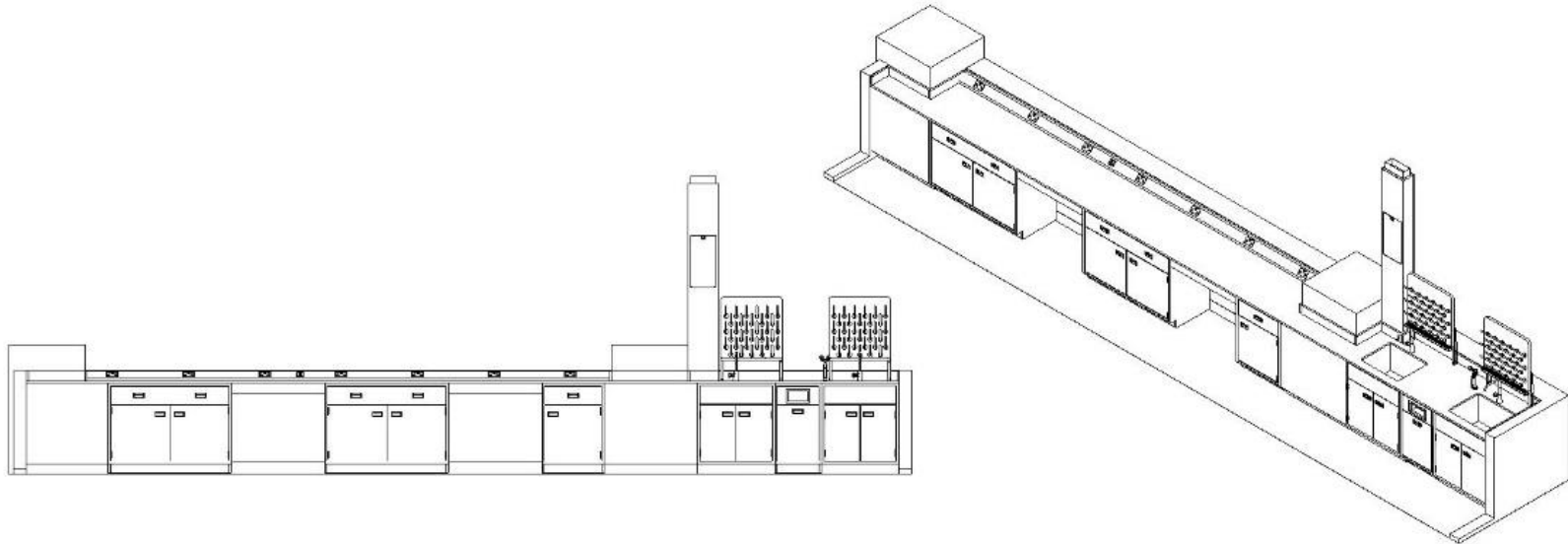
2 Isometric View-II



# Floor-mounted Wall-bench layout (SEFA 8M/SEFA 10 class-1 certified)



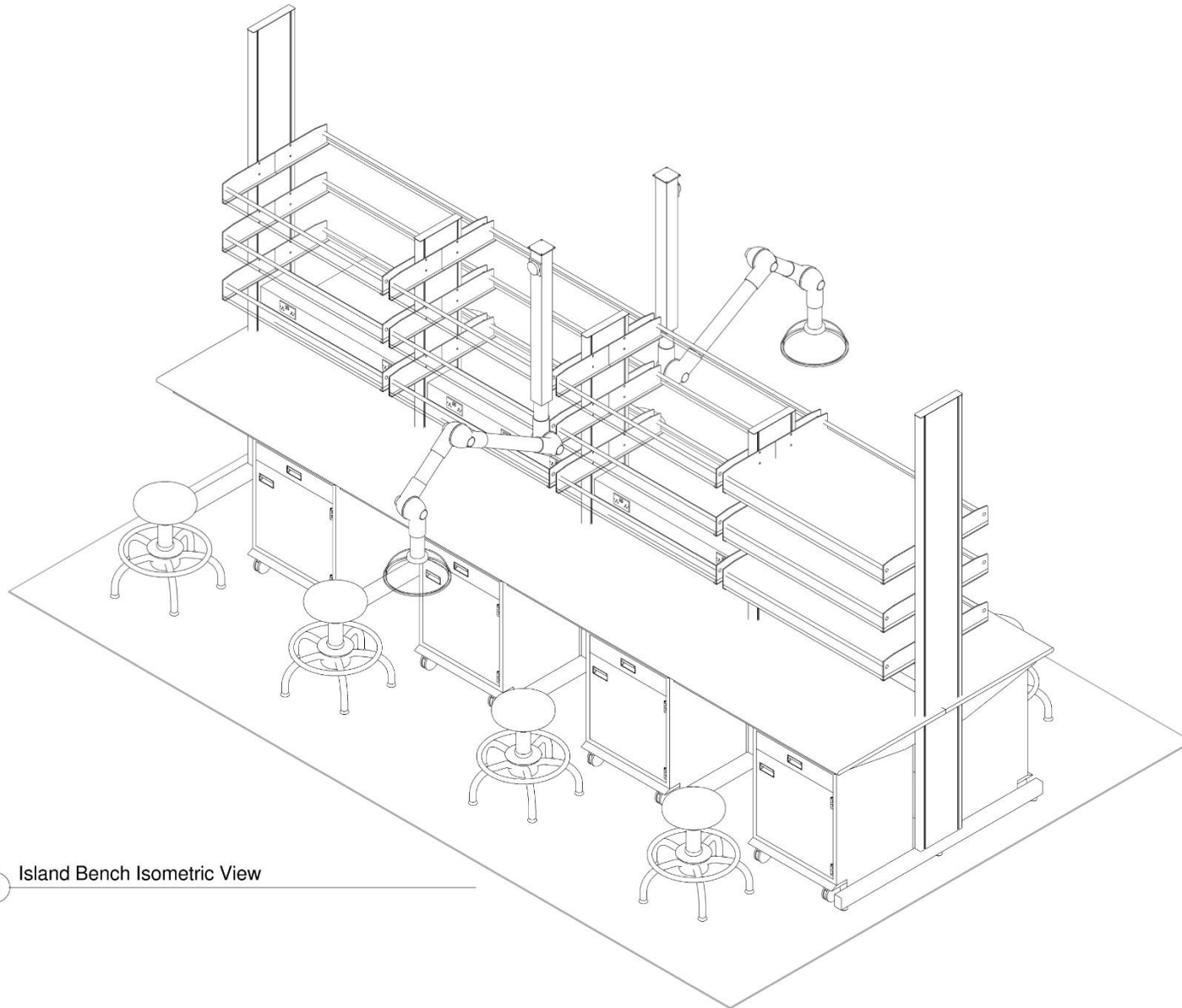
1 Research Plan View  
1 : 10



5 Research Elevation View

4 Research Isometric View

## A typical column-mounted lab island bench layout (SEFA 10 certified)



3 Island Bench Isometric View

## A typical column-mounted lab wall bench layout (SEFA 10 certified)

