



Indian Institute of Integrative Medicine

(Formerly known as Regional Research Laboratory)

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TENDER NO :12(293)/2020-P Date 17.11.2020

TENDER DOCUMENT

FOR

Supply, installation, testing and commissioning of Fume hoods, laboratory furniture at IIIM Jammu.

(For Room no.215,216,217, Fermentation lab, Bio organic lab, 228, 229 & 231)

INVITATION FOR BIDS / NIT

1. Director, CSIR- Indian Institute of Integrative Medicine, Canal Road Jammu-180001, invites E-bids from manufacturers, their authorized distributors and Indian Agent of Foreign principals, if any, for purchase of items listed below. Bids are to be submitted electronically only on **NIC portal/ etenders.gov.in**

Sl..No.	Tender No.	Description of items	Quantity	Single/ Double bid	Bid Security (EMD) (in Indian Rupees)
1.	12(293)/19-P	<p style="text-align: center;">Lab. Furniture</p> <p style="text-align: center;">(Required Technical Specifications are mentioned at Chapter 4)</p> <ul style="list-style-type: none"> • Warranty: 1 year • AMC: 5 Years (Mentioning price for each year separately) 	As per BOQ	Double Bid	Rs. 6,06,000.00

2. Interested Bidders may obtain further information from the office of the Stores and Purchase Officer, Canal Road Jammu -180001

3. Each complete set of bidding document may be purchased by any interested bidder on submission of a written application to the above office and upon payment of a non-refundable and non-transferable fee of ₹500/- in the form of a Demand Draft in favour of The Director, CSIR- Indian Institute of Integrative Medicine, Canal Road Jammu-180001 payable at Jammu during office hours on all working days up to **08.12.2020** either in person or by post. Alternatively, the bidding documents can be downloaded directly from our website <http://www.iiim.res.in> free of cost. The bids must be uploaded on or before **08.12.2020 (Date)** up to 11:00.A.M hours (IST) and shall be opened on **09.12.2020 (Date) at 11:00 A.M** hours. (IST)

4. ~~A Pre-bid Conference will be held on _____ (Date) at _____ hours (IST) in CSIR- Indian Institute of Integrative Medicine, Canal Road Jammu-180001.~~ All prospective bidders are requested to kindly submit their queries, if any to the address indicated above so as to reach the office Stores and Purchase Officer, CSIR- Indian Institute of Integrative Medicine, Canal Road Jammu-180001 latest by **27.11.2020**.

05. Bid security in the form of Demand draft or Bank Guarantee only, as specified above and must be delivered to the above office at the date and time indicated above. Online Bids will be opened in the presence of Bidders' authorized representatives who choose to attend on the specified date and time. In the event of the date specified for bid receipt and opening being declared as a closed holiday for purchaser's office, the due date for submission of bids and opening of bids will be the following working day at the appointed time. Bids other than electronic mode will not be accepted.

6. As per Govt. of India procurement policies,

a. The purchaser intends to give purchase preference to local suppliers* in case the cost of procurement is up to Rs. 50.00 lakhs.

b. The eligibility of the supplier is restricted to

1. Indian Suppliers

or

2. **there is no restriction on the eligibility of the suppliers.**

✓

c. The procuring entity intends to give purchase preference to products /goods manufactured by micro, small and medium enterprises. *"Local supplier" means a supplier or service provider whose product or service offered for procurement meets the minimum local content of 50% as prescribed in DIPP Order No.P-45021/2/2017-PP (BE-II) dated 28th May, 2018 or by the competent Ministries/Departments in pursuance of this order 'Local content' means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the items procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.

7. The Director, CSIR- Indian Institute of Integrative Medicine, Canal Road Jammu-180001 reserves the right to accept or reject any bids or accept all tenders either in part or in full or to split the order, or to annul the bidding process without assigning any reason.

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2	Conditions of Contract
3	Schedule of Requirement
4	Specifications and Allied Technical Details
5	Price Schedule Forms
6	Qualification Requirements
7	Contract Form
8	Other Forms

CRITICAL DATE SHEET

Sl. No.	Stage	Date & Time
1.	Publish Date & Time	18.11.2020
2.	Sale/document Download Start Date & Time	18.11.2020
3.	Last Date & time for receipt of queries	27.11.2020
4.	Pre-bid Conference, if any	--- AM/PM
5.	Bid Submission Start Date & time	17.11.2020
6.	Bid Submission End Date & Time	08.12.2020 11:00AM
7.	Bid Opening Date & Time	09.12.2020 11:00AM

TENTATIVE TIME SCHEDULE OF PROCUREMENT PLANNING

Sl.No	Stage	Tentative Time Frame
1.	Date of Bid Opening	09.12.2020
2.	Date of Completion of Technical Bid Evaluation	15.12.2020
3.	Date of communication of Rejection of Bids	22.12.2020
4.	Date of Receipt of context, if any, from Bidders	29.12.2020
5.	Opening of Financial Bid	05.01.2021
6.	Notification of Award	12.01.2021

CHAPTER - 1

INSTRUCTIONS TO BIDDERS

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A **Introduction**

1.1. Eligible Bidders

- 1.1.1 This Invitation for Bids is open to all suppliers subject to para 06 of the invitation for bids/NIT. As per “MAKE IN INDIA” policy of GOI Only Class-I local supplier will be eligible to participate in tender if there is sufficient local capacity an local competition. Ministry of Finance, Department of Expenditure, Public Procurement Division Order No. F.No. 6/18/2019-PPD Dated 23rd July on “Restrictions under Rule 144(xi) of the General Financial Rules(GFRs) – Any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services (including consultancy services and non-consultancy services) of works(including turnkey projects) only if the bidder is registered with the Competent Authority specified in Annex I of the above said order.
- 1.1.2 A supplier or bidder shall be considered to be from a country if (i) the entity is incorporated in that country, or ii) a majority of its shareholding or effective control of the entity is exercised from that country; or (iii) more that 50% of the value of the item being supplied has been added in that country. Indian suppliers shall mean those entities which meet any of these tests with respect to India.
- 1.1.3 MSEs would be treated as owned by Scheduled Caste/Schedule Tribe enterprises as under:
- (a) In case of proprietary MSE, proprietor(s) shall be SC /ST.
 - (b) In case of partnership MSE, the SC/ST partners shall be holding at least 51% (fifty one percent) shares in the unit.
 - (c) In case of Private Limited Companies, at least 51% (fifty one percent) share shall be held by SC/ST promoters.
- 1.1.4 MSEs owned by women shall also be determined as per the above analogy/criteria.
- 1.1.5 Bidders should not be associated, or have been associated in the past, directly or indirectly, with a firm or any of its affiliates which have been engaged by the Purchaser to provide consulting services for the preparation of the design, specifications, and other documents to be used for the procurement of the goods to be purchased under this Invitation of Bids.
- 1.1.6 Bids from Joint Ventures, Consortium or Associations so long as they are formed and registered prior to the bid submission date.
- 1.1.7 The bidders who have been temporarily suspended or removed from the list of registered suppliers by the purchaser or banned from Ministry/country wide procurement shall be ineligible for participation in the bidding process.

1.2 Cost of Bidding

- 1.2.1 The Bidder shall bear all costs associated with the preparation and submission of its bid, and “the Purchaser”, will in no case be responsible or liable for these costs, regardless of the conduct or outcome of the bidding process.

1.3 Code of Integrity

- 1.3.1 The bidders/suppliers should sign a declaration about abiding by the Code of Integrity for Public Procurement in bid documents. In case of any transgression of this code, the bidder is not only liable to be removed from the list of registered suppliers, but it would be liable for other punitive actions such as cancellation of contracts, banning and blacklisting or action in Competition Commission of India, and so on.
- 1.3.2 **Code of integrity for Public Procurement:** The Purchaser as well as bidders, suppliers, contractors and consultants should observe the highest standard of ethics and should not indulge in the following prohibited

practices, either directly or indirectly, at any stage during the procurement process or during execution of resultant contracts:

- i) **“corrupt practice”**: making offers, solicitation or acceptance of bribe, rewards or gifts or any material benefit, in exchange for an unfair advantage in the procurement process or to otherwise influence the procurement process or contract execution;
- ii) **“Fraudulent practice”**: any omission or misrepresentation that may mislead or attempt to mislead so that financial or other benefits may be obtained or an obligation avoided. This includes making false declaration or providing false information for participation in a tender process or to secure a contract or in execution of the contract;
- iii) **“anti-competitive practice”**: any collusion, bid rigging or anti-competitive arrangement, or any other practice coming under the purview of the Competition Act, 2002, between two or more bidders, with or without the knowledge of the purchaser, that may impair the transparency, fairness and the progress of the procurement process or to establish bid prices at artificial, non-competitive levels;
- iv) **“coercive practice”**: harming or threatening to harm, persons or their property to influence their participation in the procurement process or affect the execution of a contract;
- v) **“conflict of interest”**: participation by a bidding firm or any of its affiliates that are either involved in the consultancy contract to which this procurement is linked; or if they are part of more than one bid in the procurement; or if the bidding firm or their personnel have relationships or financial or business transactions with any official of purchaser who are directly or indirectly related to tender or execution process of contract; or improper use of information obtained by the (prospective) bidder from the purchaser with an intent to gain unfair advantage in the procurement process or for personal gain; and
- vi) **“Obstructive practice”**: materially impede the purchaser’s investigation into allegations of one or more of the above mentioned prohibited practices either by deliberately destroying, falsifying, altering; or by concealing of evidence material to the investigation; or by making false statements to investigators and/or by threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or by impeding the purchaser’s Entity’s rights of audit or access to information;

1.3.3 Obligations for Proactive disclosures

- i) The Purchaser as well as bidders, suppliers, contractors and consultants, are obliged under Code of Integrity for Public Procurement to sue-moto proactively declare any conflicts of interest (coming under the definition mentioned above – pre-existing or as and as soon as these arise at any stage) in any procurement process or execution of contract. Failure to do so would amount to violation of this code of integrity; and
- ii) The bidder must declare, whether asked or not in a bid document, any previous transgressions of such a code of integrity with any entity in any country during the last three years or of being debarred by any other Procuring Entity. Failure to do so would amount to violation of this code of integrity;
- iii) To encourage voluntary disclosures, such declarations would not mean automatic disqualification for the bidder making such declarations. The declared conflict of interest would be evaluated and mitigation steps, if possible, taken by the purchaser.

1.3.4 Punitive Provisions

Without prejudice to and in addition to the rights of the Purchaser to other penal provisions as per the bid documents or contract, if the Purchaser comes to a conclusion that a (prospective) bidder/supplier, directly or through an agent, has violated this code of integrity in completing for the contract or in executing a contract, the purchaser may take appropriate measures including one or more of the following:

- i) **If his bids are under consideration in any procurement:**
 - a) Forfeiture or encashment of bid security;
 - b) Calling off of any pre-contract negotiations; and
 - c) Rejection and exclusion of the bidder from the procurement process.
- ii) **If a contract has already been awarded**
 - a) Cancellation of the relevant contract and recovery of compensation for loss incurred by the purchaser;
 - b) Forfeiture or encashment of any other security or bond relating to the procurement;
 - c) Recovery of payments including advance payments, if any, made by the purchaser along with interest thereon at the prevailing rate.
- iii) **Provisions in addition to above:**
 - a) Removal from the list of registered suppliers and banning/debarment of the bidder from participation in future procurements of the purchaser for a period not less than one year;
 - b) In case of anti-competitive practices, information for further processing may be filed under a signature of the Joint Secretary level officer, with the Competition Commission of India;
 - c) Initiation of suitable disciplinary or criminal proceedings against any individual or staff found responsible.

B. The Bidding Documents

1.4 Cost of Tender Documents

- 1.4.1 Interested eligible bidders may purchase the bidding documents on payment of the cost of bidding documents as indicated in the invitation forbids/NIT or alternatively, the bidding documents can be downloaded from our Website as indicated in the Invitation for Bids/NIT free of cost.

1.5 Content of Tender Documents

- 1.5.1 The goods required, bidding procedures and contract terms are prescribed in the bidding documents which should be read in conjunction. The bidding documents, apart from the invitation for bids and Critical Date Sheet have been divided into **8** Chapters as under:

- Chapter 1: Instructions to Bidder (ITB)
- Chapter 2: General Conditions of Contract (GCC) and Special Condition of Contract (SCC)
- Chapter 3: Schedule of Requirements
- Chapter 4: Specifications and Allied Technical Details
- Chapter 5: Price Schedule Forms
- Chapter 6: Qualification requirements
- Chapter 7: Contract Form
- Chapter 8: Other Standard Forms comprising:
 - (1) Bidder Information Form
 - (2) Manufacturer's Authorization Form (MAF);
 - (3) Bid Security Form
 - (4) Bid Securing declaration

- (5) Performance Statement form
- (6) Deviation Statement Form;
- (7) Service Support details;
- (8) Bid form
- (9) Performance Security Form;
- (10) Acceptance Certificate Form
- (11) Integrity pact
- (12) Format of letter of authority for participating in bid opening
- (13) Format for declaration by the bidder for code of integrity and Conflict of interest.
- (14) Certificate for sharing land of Border. **(Annexure 5P)**
- (15) Vendor Class. **(Annexure 5Q)**

1.5.2 The Bidder is expected to examine all instructions, forms, terms, and specifications in the bidding documents. Failure to furnish all information required by the bidding documents or submission of a bid not substantially responsive to the bidding documents in every respect will be at the Bidder's risk and may result in rejection of its bid.

1.6 Clarification of tender documents

1.6.1 A prospective Bidder requiring any clarification of the Bidding Documents shall contact the Purchaser in writing at the Purchaser's address specified in the Special Conditions of Contract (SCC), latest by the date specified in the critical date sheet. No request for clarification or query shall normally be entertained after the deadline/pre-bid conference if any. Should the Purchaser deem it necessary to amend the Tender Documents as a result of a clarification, it shall do so following the procedure under Clause relating to amendment of Tender Documents and Clause relating to Deadline for Submission of Bids.

The queries, clarifications and amendments issued would also be hosted on the website of the Purchaser for the benefit of the other prospective bidders and also shall be sent to all bidders who have purchased the tender documents.

1.7 Amendment of Tender Documents

- 1.7.1 At any time prior to the deadline for submission of bids, the Purchaser may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the tender documents by amendment. The same would also be hosted on the website of the Purchaser and all prospective bidders are expected to surf the website before submitting their bids to take cognizance of the amendments. However, the copies of the amendments would be sent by registered post/speed post/courier/e-mail to all the bidders who have purchased the tender documents.
- 1.7.2 In order to allow prospective bidders' reasonable time in which to take the amendment into account in preparing their bids, the Purchaser, at its discretion, may extend the deadline for the submission of bids and host the changes on the website of the Purchaser.

C. PREPARATION OF BIDS

1.8. Language of Bid

- 1.8.1 The bid prepared by the Bidder, as well as all correspondence and documents relating to the bid exchanged by the Bidder and the Purchaser shall be written in English language only.
- 1.8.2 The Supplier shall bear all costs of translation, if any, to the English language and bear all risks of the accuracy of such translation, for documents provided by the Supplier.

1.9 Purchase Preference Policies

- 1.9.1 The purchaser intends to give product reservation/purchase preference/price preference in line with current Govt. of India procurement policies to help inclusive national economic growth by providing long term support to Small and Medium enterprises (SMEs) and disadvantaged sections of the society and to address environmental concerns along with preferential market access in govt. procurements.
- 1.9.2 For the above purpose, local supplier means a supplier or service provider whose product or service offered for procurement meets the minimum local content as prescribed in DIPP Order No.P-45021/2/2017-PP (BE-II) dated 28th May, 2018 or by the competent Ministries/Departments in pursuance of this order and local content means the amount of value added in India which shall, unless otherwise prescribed by the Nodal Ministry, be the total value of the items procured (excluding net domestic indirect taxes) minus the value of imported content in the item (including all customs duties) as a proportion of the total value, in percent.

1.10.1 Documents comprising the bid

The bid prepared by the Bidder shall include documents as under:

A. Technical bid

- (a) Bidder Information Form;
- (b) Declaration abiding by the Code of Integrity and no conflict of interest for public procurement;
- (c) Bid security as specified in the Invitation to Bids;
- (d) Service support details form;
- (e) Deviation Statement Form;
- (f) Performance Statement Form;
- (g) Manufacturer's Authorization Form along with a certified copy of the Agency Agreement between the bidders and the Indian Agent;
- (h) Documentary evidence establishing that the bidder is eligible to bid and is qualified to perform the contract if its bid is accepted;
- (i) Integrity Pact.
- (j) Documents establishing goods eligibility and conformity to bidding documents; indicating the Indian Customs Tariff Number (ICT & HSN No.) .
- (k) Schedule of requirements.
- (l) Self certification that the item offered meets the minimum local content of 50% giving details of the location(s) at which the local value addition is made in case the bidder wishes to avail the benefits under the make in India policy, if applicable.
- (m) In cases of procurement for a value in excess of ₹ 10 crores, the local supplier shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content to avail the benefits under the make in India policy, if applicable.
- (n) Documentary evidence about the status of the bidder i.e. whether MSE or not, owned by SC/ST or not and whether the MSE is owned by a women entrepreneur or not.
- (o) Certificate for sharing land of Border.(Annexure 5P)
- (p) Vendor Class. (Annexure 5Q)

B Price bid

- (i) Bid form;
- (ii) Applicable Price Schedule Form;

1.11. Bid form and price schedule

- 1.11.1 The bidder shall complete the Bid Form and the appropriate price schedule form furnished in the bidding documents. These forms must be completed without any alterations to its format and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested. The Bid Form and the appropriate Price Schedule form shall be submitted in accordance with Clause 1.18.3 of the bidding documents.

1.12. Bid Prices

- 1.12.1 The Bidder shall indicate on the appropriate price schedule form, the unit prices and total bid prices of the goods it proposes to supply under the contract.

- 1.12.2 Prices indicated on the price-schedule form shall be entered separately in the following manner:

(a) For Goods manufactured within India

- (i) The price of the goods quoted Ex-works including taxes already paid.
- (ii) GST and other taxes, if any which will be payable on the goods if the contract is awarded.
- (iii) The charges for inland transportation, insurance and other local services required for delivering the goods at the desired destination as specified in the price schedule form.
- (iii) Wherever applicable, the cost towards the installation, commissioning, spares, extended warranty, AMC/CMC, site preparation and training including any incidental services, if any.

RATES SHOULD BE QUOTED FOR IIIM JAMMU BASIS.

(b) For Goods manufactured abroad

- (i) The price of the goods, quoted on FCA (named place of delivery abroad) or FOB (named port of shipment), as specified in the price schedule form.
- (ii) The charges for insurance and transportation of the goods to the port / place of destination both by Air/Sea.
- (iii) The agency commission charges, if any.
- (iv) Wherever applicable, the cost towards the installation, commissioning, spares, extended warranty, AMC/CMC, site preparation and training including any incidental services, if any.

The terms FOB, FCA, CIF, CIP etc. shall be governed by the rules prescribed in the current edition of the Incoterms published by the International Chambers of Commerce, Paris.

- 1.12.4 **Where there is no mention of packing, forwarding, freight, insurance charges, taxes etc. such offer shall be rejected as incomplete.**

- 1.12.5 The price quoted shall remain fixed during the contract period and shall not vary on any account

- 1.12.6 All lots and items must be listed and priced separately in the Price Schedules. If a Price Schedule shows items listed but not priced, their prices shall be assumed to be included in the prices of other items. Lots or items not listed in the Price Schedule shall be assumed to be not included in the bid.

- 1.12.7 The Purchaser is registered with Dept. of Scientific & Industrial Research, Govt. of India and concessional customs duty and GST & IGST are leviable vide notification No. 54/2002-Customs on all imports covered under Notification No.51/96-Customs dated 23.07.1996, Notification No.47/2017-

Integrated Tax (Rate) and Notification No. 45/2017-Central Tax (Rate) both dated 14th November, 2017

- 1.12.8 Please state specifically in your offer whether the duties and taxes are extra over the prices quoted, failing which it will be presumed that the prices are inclusive of taxes and duties and no claim would be entertained for statutory variations at a later date.
- 1.12.9 Stipulations like "GST is presently not applicable but the same will be charged if it becomes leviable later on" is not acceptable unless in such cases it is clearly stated that GST will not be charged if the same becomes applicable later on due to increase in turn over etc. If a bidder fails to comply with this requirement, his quoted price shall be loaded with the quantum of duty which is normally applicable on the item in question for the purpose of comparison with the prices of other tenderers.

Note: All payments due under the contract shall be paid after deduction of statutory levies at source (like TDS etc.), wherever applicable.

1.13. Bid Currencies

- 1.13.1 Prices shall be quoted in Indian Rupees for offers received for supply within India and in freely convertible foreign currency in case of offers received for supply from foreign countries i.e. domestic tenderers are to quote and accept their payment in Indian currency; Indian agents of foreign suppliers are to receive their agency commission in Indian currency; cost of imported goods & services rendered in India, which are directly imported against the contract, may be quoted in foreign currency (currencies).

1.14. Documents Establishing Bidder's Eligibility and qualifications

- 1.14.1 The bidder shall furnish, as part of its bid, documents establishing the bidders' eligibility to bid and its qualification to perform the contract if its bid is accepted.
- 1.14.2 The documentary evidence of the bidder's qualification to perform the contract if the bid is accepted shall establish to the purchaser's satisfaction that;
- (a) The bidder meets the qualification criteria listed in bidding documents if any.
 - (b) Bidder who doesn't manufacture the goods it offers to supply shall submit Manufacturers' Authorization Form (MAF) using the form specified in the bidding document to demonstrate that it has been duly authorized by the manufacturer of the goods to quote and/or supply the goods.
 - (c) In case a bidder not doing business within India, it shall furnish the certificate to the effect that the bidder is or will be represented by an agent in India equipped and able to carry out the supply, maintenance, repair obligations etc. during the warranty and post warranty period or ensure a mechanism at place for carrying out the supply, maintenance, repair obligations etc. during the warranty and post-warranty period.

1.14.3 Conditional tenders shall not be accepted.

1.15 Documents Establishing Goods' Eligibility and Conformity to Bidding Documents

- 1.15.1 To establish the goods' eligibility, the documentary evidence of the goods and services eligibility shall consist of a statement on the country of origin of the goods and services offered which shall be confirmed by a certificate of origin at the time of shipment.
- 1.15.2 To establish the conformity of the goods and services to the specifications and schedule of requirements of the bidding document, the documentary evidence of conformity of the goods and

services to the bidding documents may be in the form of literature, drawings and data, and shall consist of:

A detailed description of the essential technical and performance characteristics of the goods;

- (a) A list giving full particulars, including available sources and current prices, of spare parts, special tools, etc., necessary for the proper and continuing functioning of the goods during the warranty period following commencement of the use of the goods by the Purchaser in the Priced-bid; and
- (c) An item-by-item commentary on the Purchaser's Technical Specifications demonstrating substantial responsiveness of the goods and services to those specifications or a statement of deviations and exceptions to the provisions of the Technical Specifications.

1.15.3 For purposes of the commentary to be furnished pursuant to above, the Bidder shall note that standards for workmanship, material and equipment, designated by the Purchaser in its Technical Specifications are intended to be descriptive only and not restrictive. The Bidder may substitute these in its bid, provided that it demonstrates to the Purchaser's satisfaction that the substitutions ensure substantial equivalence to those designated in the Technical Specifications.

1.15.4 **Alternate offers/makes/models would not be considered.**

1.16. Bid Security

1.16.1 The Bidder shall furnish, as part of its bid, a bid security (BS) for an amount as specified in the Invitation for Bids. In the case of foreign bidders, the BS shall be submitted either by the principal or by the Indian agent and in the case of indigenous bidders; the BS shall be submitted by the manufacturer or their specifically authorized dealer/bidder.

1.16.2 The bid security is required to protect the Purchaser against the risk of Bidder's conduct, which would warrant the security's forfeiture.

1.16.3 The bid security shall be in Indian Rupees for offers received for supply within India and denominated in the currency of the bid or in any freely convertible foreign exchange in the case of offers received for supplies from foreign countries in equivalent Indian Rupees. The bid security shall be in one of the following forms at the bidders' option:

- (a) A bank guarantee issued/confirmed by a Scheduled Commercial Bank in India in the form provided in the bidding documents and valid for 45 days beyond the validity of the bid. In case a bidder desires to submit a BG issued from a foreign bank, then the same should be confirmed by a Scheduled commercial bank in India; or
- (b) Fixed Deposit receipt pledged in favour of the Lab. /Institute.
- (c) A demand draft in favour of the purchaser issued by any Scheduled commercial bank in India.
- (d) Bid Securing Declaration

1.16.4 The bid security shall be payable promptly upon written demand by the purchaser in case the conditions listed in the ITB clause 1.16.9 are invoked.

1.16.5 The bid security should be submitted in its original form. Copies shall not be accepted.

1.16.6 The bid security of unsuccessful bidder will be discharged /returned as promptly as possible positively within a period of 30 days after the expiration of the period of bid validity or placement of order whichever is later, without any interest.

1.16.7 The successful Bidder's bid security will be discharged upon the Bidder furnishing the performance security, without any interest.

1.16.8 Bidders that are currently registered with the purchaser or registered as MSEs will continue to remain registered during the tender validity period also and are exempted from payment of EMD. In case the tenderer falls in these categories, the bidder should furnish a certified copy of its valid registration

details. Except for MSEs, this exemption is valid for the trade group and monetary value of registration only. The MSEs are provided tender document free of cost and are exempted from the payment of Bid Security provided the goods are produced and the services are rendered by them and not for any trading activities undertaken by them. Further firms who are having Udyog Aadhar Memorandum are entitled to all benefits available for MSEs under the Public Procurement Policies for MSEs and can get registered with any of the following agencies:

- a) District Industries Centre
- b) Khadi and Village Industries Commission
- c) Khadi and Village Industries Board
- d) Coir Board
- e) National Small Industries Corporation
- f) Directorate of Handicraft and handloom and
- g) Any other body specified by the Ministry of MSME

1.16.9 Where any aggregator has been appointed by the Ministry of MSME, themselves quote on behalf of some MSE units, such offers will be considered as offer from MSE units and all such facilities would be extended to these aggregators also.

1.16.10 The bid security may be forfeited:

- (a) If a Bidder withdraws or amends or modifies or impairs or derogates its bid during the period of bid validity specified by the Bidder on the Bid Form; or
- (b) In case of a successful Bidder, if the Bidder fails to furnish order acceptance within 14 days of the order or fails to sign the contract and/or fails to furnish Performance Security within 21 days from the date of contract/ order.

1.16.11 Whenever the bidder chooses to submit the Bid Security in the form of Bank Guarantee, then he should advise the banker issuing the Bank Guarantee to immediately send by Registered Post (A.D.) an unstamped duplicate copy of the Guarantee directly to the Purchaser with a covering letter to compare with the original BG for the correctness, genuineness, etc.

1.17. Period of Validity of Bids

1.17.1 Bids shall remain valid for minimum of 90 days after the date of bid opening prescribed by the Purchaser. A bid valid for a shorter period shall be rejected by the Purchaser as non-responsive.

1.17.2 In exceptional circumstances, the Purchaser may solicit the Bidder's consent to an extension of the period of validity. The request and the responses thereto shall be made in writing (by post, fax or e-mail). The bid security provided shall also be suitably extended failing which the bid would be summarily ignored. A Bidder may refuse the request without forfeiting its bid security. A Bidder granting the request will not be required nor permitted to modify its bid.

1.17.3 Bid evaluation will be based on the bid prices without taking into consideration the above corrections.

1.18. Format and Signing of Bid

1.18.1 The bids may be submitted in single envelop or in two parts as specified in the Invitation for Bids.

1.18.2 In case the bids are invited on single envelop basis, then the Bidder shall prepare two copies of the bid, clearly marking each "Original Bid" and "Copy Bid", as appropriate. In the event of any discrepancy between them, the original shall govern.

- 1.18.3 In case the bids are invited on two-bid system, the Bidder shall submit the bids in two separate parts. One part shall contain Technical bid comprising all documents listed under clause relating to Documents Comprising the Bid excepting bid form and price schedules. The other part shall contain the priced-bid comprising bid form and price schedules. The Bidder shall prepare two copies of the bid, clearly marking each "Original Bid" and "Copy Bid", as appropriate.
- 1.18.4 The original and all copies of the bid shall be typed or written in indelible ink and shall be signed by the Bidder or a person or persons duly authorized to bind the Bidder to the Contract. All pages of the bid, except for un-amended printed literature, shall be initialed by the person or persons signing the bid detailing his/her name and contact details.
- 1.18.5 Any interlineations, erasures or overwriting shall be valid only if they are initialled by the persons or persons signing the bid.

D. Submission and sealing of Bids

1.19. Submission, Sealing and Marking of Bids

- 1.19.1 The bids may be submitted electronically only **(Bids received by Post/by hand/FAX/E-mail would not be considered for evaluation.)**
- 1.19.2 In the case of bids invited on single envelop basis, the Bidders shall seal the original and each copy of the bid in separate inner envelopes, duly marking the envelopes as "original" and "copy". The envelopes shall then be sealed in an outer envelope.
- 1.19.3 Bid may be submitted in two parts a) Technical & B) Financial
- 1.19.4 If the outer envelope is not sealed and marked as required above, the Purchaser will assume no responsibility for the bid's misplacement or premature opening. In such cases, bids received in open condition within the due date and time will be accepted at the risk of the bidder if the same is presented to the Controller of Stores & Purchase before expiry of the due date and time of opening of the bids.
- 1.19.6 Firms submitting bids in a single part against the requirement of two-bid system would be considered for further evaluation at the risk & responsibility of the bidder.

1.20. Deadline for Submission of Bids

- 1.20.1 Bids must be received by the Purchaser at the address specified at Clause 1.19.4 (a) not later than the time and date specified in invitation for bids. In the event of the specified date for the submission of Bids being declared a holiday for the Purchaser, the Bids will be received up to the appointed time on the next working day.
- 1.20.2 The Purchaser may, at its discretion, extend the deadline for submission of bids by amending the bid documents in accordance with Clause relating to Amendment of Bidding Documents in which case all rights and obligations of the Purchaser and Bidders previously subject to the deadline will thereafter be subject to the deadline as extended.

1.21. Late Bids

- 1.21.1 Any bid received by the Purchaser after the deadline for submission of bids prescribed by the Purchaser will be rejected.

1.22. Withdrawal, substitution and Modification of Bids.

- 1.22.1 A Bidder may withdraw, substitute, or modify its Bid after it has been submitted in accordance with ITB Clause 1.19 duly signed by an authorized representative, and shall include a copy of the authorization in accordance with ITB Sub-Clause 1.18.4 (except that no copies of the withdrawal notice are required). The corresponding substitution or modification of the bid must accompany the respective written notice. All notices must be:
- (a) Submitted in accordance with ITB Clauses 1.18 and 1.19 (except that withdrawal notices do not require copies), and in addition, the respective envelopes shall be clearly marked "WITHDRAWAL," "SUBSTITUTION," or "MODIFICATION"; and
 - (b) Received by the Purchaser prior to the deadline prescribed for submission of bids, in accordance with ITB Clause 1.20.
- 1.22.2 Bids requested to be withdrawn in accordance with ITB Sub-Clause 1.22.1 shall be returned unopened to the Bidders. No bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the Bidder on the Bid Form or any extension thereof.

E. Opening and Evaluation of Bids

1.23 Opening of Bids by the Purchaser

- 1.23.1 The Purchaser will open all bids one at a time in the presence of bidders' authorized representatives who choose to attend, as per the schedule given in invitation for bids. The Bidders' representatives who are present shall sign the quotation opening sheet evidencing their attendance. In the event of the specified date of Bid opening being declared a holiday for the Purchaser, the Bids shall be opened at the appointed time and location on the next working day. In two-part bidding, the financial bid shall be opened only after technical evaluation.
- 1.23.2 First, envelopes marked "WITHDRAWAL" shall be opened and read out and the envelope with the corresponding bid shall not be opened, but returned to the Bidder. No bid withdrawal shall be permitted unless the corresponding withdrawal notice contains a valid authorization to request the withdrawal and is read out at bid opening. Next, envelopes marked "SUBSTITUTION" shall be opened and read out and exchanged with the corresponding Bid being substituted, and the substituted Bid shall not be opened, but returned to the Bidder. No Bid substitution shall be permitted unless the corresponding substitution notice contains a valid authorization to request the substitution and is read out at bid opening. Envelopes marked "MODIFICATION" shall be opened and read out with the corresponding Bid. No Bid modification shall be permitted unless the corresponding modification notice contains a valid authorization to request the modification and is read out at Bid opening. Only envelopes that are opened and read out at Bid opening shall be considered further.
- 1.23.3 The bidders' names, bid modifications or withdrawals, bid prices, discounts, and the presence or absence of requisite bid security and such other details as the Purchaser, at its discretion, may consider appropriate, will be announced at the opening. No bid shall be rejected at bid opening, except for late bid(s). The contents of the bid forms and price schedules would however be announced only at the time of opening of Priced-bids in the case of two-bid system.
- 1.23.4 Bids that are received late shall not be considered further for evaluation, irrespective of the circumstances.

- 1.23.5 **Bidders interested in participating in the bid opening process, should depute their representatives along with an authority letter to be submitted to the purchaser at the time of bid opening as per form Annexed at Chapter-9.**

1.24. Confidentiality

- 1.24.1 Information relating to the examination, evaluation, comparison, and post qualification of bids, and recommendation of contract award, shall not be disclosed to bidders or any other persons not officially concerned with such process until publication of the Contract Award.
- 1.24.2 Any effort by a Bidder to influence the Purchaser in the examination, evaluation, comparison, and post qualification of the bids or contract award decisions may result in the rejection of its Bid.

1.25. Clarification of Bids

- 1.25.1 To assist in the examination, evaluation, comparison and post qualification of the bids, the Purchaser may, at its discretion, ask the Bidder for a clarification of its bid. The request for clarification and the response shall be in writing and no change in prices or substance of the bid shall be sought, offered or permitted. However, no negotiation shall be held except with the lowest bidder, at the discretion of the purchaser. Any clarification submitted by a bidder in respect to its bid which is not in response to a request by the purchaser shall not be considered.

1.26. Preliminary Examination

- 1.26.1 The Purchaser shall examine the bids to confirm that all documents and technical documentation requested in ITB Clause 1.10 have been provided, and to determine the completeness of each document submitted.
- 1.26.2 The Purchaser shall confirm that the following documents and information have been provided in the Bid. If any of these documents or information is missing, the offer shall be rejected.

(a) Bid Form and Price Schedule, in accordance with ITB Clause 1.10;

(b) All the tenders received will first be scrutinized to see whether the tenders meet the basic requirements as incorporated in the tender enquiry document. The tenders, who do not meet the basic requirements, are to be treated as unresponsive and ignored. The following are some of the important points, for which a tender may be declared as unresponsive and to be ignored, during the initial scrutiny:

- (i) The Bid is unsigned.
- (ii) The Bidder is not eligible.
- (iii) The Bid validity is shorter than the required period.
- (iv) The Bidder has quoted for goods manufactured by a different firm without the required authority letter from the proposed manufacturer.
- (v) Bidder has not agreed to give the required performance security or has not furnished the bid security.
- (vi) The goods quoted are sub-standard, not meeting the required specification, etc.
- (vii) Against the schedule of Requirement (incorporated in the tender enquiry), the bidder has not quoted for the entire requirement as specified in that schedule.
- (viii) The bidder has not agreed to some essential condition(s) incorporated in the tender enquiry.

1.27 Bidder's right to question rejection.

- 1.27.1 A Bidder shall have the right to be heard in case he feels that a proper procurement process is not being followed and/or his tender has been rejected wrongly. Only a directly affected bidder can represent in this regard as under:
- i) Only a bidder who has participated in the concerned procurement process i.e. pre-qualification, bidder registration or bidding, as the case may be, can make such representation;
 - ii) In case pre-qualification bid has been evaluated before the bidding of Technical bids, an application for review in relation to the technical bid may be filed only by a bidder who has qualified in pre-qualification bid;
 - iii) In case technical bid has been evaluated before the opening of the financial bid, an application for review in relation to the financial bid may be filed only by a bidder whose technical bid is found to be acceptable.
 - iv) Following decisions of the purchaser in accordance with the provision of internal guidelines shall not be subject to review:
 - a) Determination of the need for procurement;
 - b) Selection of the mode of procurement or bidding system;
 - c) Choice of selection procedure;
 - d) Provisions limiting participation of bidders in the procurement process;
 - e) The decision to enter into negotiations with the L1 bidder;
 - f) Cancellation of the procurement process except where it is intended to subsequently re-tender the same requirements;
 - g) Issues related to ambiguity in contract terms may not be taken up after a contract has been signed, all such issues should be highlighted before consummation of the contract by the vendor/contractor; and
 - h) Complaints against specifications except under the premise that they are either vague or too specific so as to limit competition may be permissible.
- 1.27.2 In case a Bidder feels aggrieved by the decision of the purchaser, he may then send his representation in writing to the Purchaser's address as indicated in special conditions of contract (SCC) within 05 working days from the date of communication of the purchaser intimating the rejection for reconsideration of the decision by the purchaser.

1.28 Responsiveness of Bids

- 1.28.1 Prior to the detailed evaluation, the purchaser will determine the substantial responsiveness of each bid to the bidding documents. For purposes of this clause, a substantive responsive bid is one, which conforms to all terms and condition of the bidding documents without material deviations, reservations or omissions. A material deviation, reservation or omission is one that:
- (a) Affects in any substantial way the scope, quality, or performance of the Goods and Related Services specified in the Contract; or
 - (b) Limits in any substantial way, inconsistent with the Bidding Documents, the Purchaser's rights or the Bidder's obligations under the Contract; or
 - (c) If rectified, would unfairly affect the competitive position of other bidders presenting substantially responsive bids.
- 1.28.2 The purchasers' determination of a bid's responsiveness is to be based on the contents of the bid itself without recourse to extrinsic evidence.
- 1.28.3 If a bid is not substantially responsive, it will be rejected by the Purchaser and may not subsequently be made responsive by the Bidder by correction of the material deviation, reservation or omission.

- 1.28.4 If a bidder quotes Nil Charges/consideration, the bid shall be treated as unresponsive and will not be considered.

1.29 Non-Conformity, Error and Omission

- 1.29.1 Provided that a Bid is substantially responsive, the Purchaser may waive any nonconformities or omissions in the Bid that do not constitute a material deviation.
- 1.29.2 Provided that a bid is substantially responsive, the Purchaser may request that the Bidder submit the necessary information or documentation, within a reasonable period of time, to rectify nonmaterial nonconformities or omissions in the bid related to documentation requirements. Such omission shall not be related to any aspect of the price of the Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid.
- 1.29.3 Provided that the Bid is substantially responsive, the Purchaser shall correct arithmetical errors on the following basis:
- (b) if there is a discrepancy between the unit price and the line item total that is obtained by multiplying the unit price by the quantity, the unit price shall prevail and the line item total shall be corrected, unless in the opinion of the Purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the line item total as quoted shall govern and the unit price shall be corrected;
 - (c) if there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
 - (c) if there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above.
- 1.29.4 Provided that a bid is substantially responsive, the purchaser may request that a bidder may confirm the correctness of arithmetic errors as done by the purchaser within a target date. In case, no reply is received then the bid submitted shall be ignored and its Bid Security may be forfeited.

1.30 Examination of Terms & Conditions, Technical Evaluation

- 1.30.1 The Purchaser shall examine the Bid to confirm that all terms and conditions specified in the GCC and the SCC have been accepted by the Bidder without any material deviation or reservation.
- 1.30.2 The Purchaser shall evaluate the technical aspects of the Bid submitted in accordance with ITB Clause 1.15, to confirm that all requirements specified in Schedule of Requirements of the Bidding Documents have been met without any material deviation or reservation.
- 1.30.3 If, after the examination of the terms and conditions and the technical evaluation, the Purchaser determines that the Bid is not substantially responsive in accordance with ITB Clause 1.28, it shall reject the Bid.

1.31 Conversion to Single Currency

- 1.31.1 To facilitate evaluation and comparison, the Purchaser will convert all quoted prices expressed in various currencies to Indian Rupees at the selling exchange rate established by any bank in India as notified in the Newspapers on the date of bid opening (techno-commercial bid in the case of two-part bidding) For this purpose, exchange rate notified in www.xe.com or www.rbi.org or any other website could also be used by the purchaser.

1.32 Evaluation and comparison of bids

- 1.32.1 The Purchaser shall evaluate each bid that has been determined, up to this stage of the evaluation, to be substantially responsive.
- 1.32.2 To evaluate a Bid, the Purchaser shall only use all the factors, methodologies and criteria defined below. No other criteria or methodology shall be permitted.
- 1.32.3 Purchase preference shall be given to all local suppliers in all procurements undertaken by the purchaser in the following manner:
- (a)** Where the purchaser has restricted the eligibility of suppliers to Indian suppliers only, as per para 06 of the invitation to bid/NIT. This is applicable only for those items for which the Nodal Ministry has communicated that there is sufficient local capacity and local competition for the cost of procurement up to Rs. 50.00 lakhs.
- (b)** If the tendered items are not listed by the Nodal Ministry indicating the local capacity and local competition, the following procedure of evaluation shall be followed, irrespective of value:
- (i) Among all qualified bids, the lowest bid will be termed as L1. If L1 is from a local supplier, the contract for full quantity will be awarded to L1.
- (ii) If L1 bid is not from a local supplier, 50% of the order quantity shall be awarded to L1. Thereafter, the lowest bidder among the local suppliers, will be invited to match the L1 price for the remaining 50% quantity, subject to the local supplier 's quoted price which should fall within the margin of purchase preference of 20%. The contract for that quantity shall be awarded to such local supplier, who matches the L1 price. In case such lowest eligible local supplier fails to match the L1 price or accepts less than the offered quantity, the next higher local supplier within the margin of purchase preference shall be invited to match the L1 price for the remaining quantity and so on. The contract shall be awarded accordingly. In case some quantity is still left uncovered on the part of local suppliers, the balance quantity may also be ordered to the L1 bidder.
- (c)** If the tendered item is not divisible, the following procedure of evaluation shall be followed:
- i. Among all qualified bids, the lowest bid will be termed as L1. If L1 is from a local supplier, the contract will be awarded to L1.
- ii. If L1 is not from a local supplier, the lowest bidder among the local suppliers will be invited to match the L1 price, subject to local supplier's quoted price falling within the margin of purchase preference of 20%. Accordingly, the contract shall be awarded to the local supplier matching the L1 price.
- iii. In case such lowest eligible local supplier fails to match the L1 price, the local supplier with the next higher bid within the margin of purchase preference shall be invited to match the L1 price. This may be repeated until all the local suppliers are given an opportunity to match the L1 price. The contract shall be awarded accordingly. In case none of the local suppliers within the margin of purchase preference match the L1 price, the contract may be awarded to the L1 bidder.
- 1.32.4 Further, In tender, where the items are divisible, the participating Micro and Small Enterprises (MSE) quoting price within price band of L1+15 (fifteen) per cent shall also be allowed to supply a portion of requirement by bringing down their price to L1 price in a situation where L1 price is from someone other than a MSE and such MSE shall be allowed to supply up to 25 (twenty five) per cent of total tendered value. The 25 (twenty five) per cent quantity is to be distributed proportionately among these bidders, in case there are more than one MSMEs within such price band.
- 1.32.5 Within this 25% (Twenty five Percent) quantity, a purchase preference of 25 (twenty five) per cent out of 25 (twenty five) per cent is reserved for MSEs owned by Scheduled Caste (SC)/Scheduled Tribe

(ST) entrepreneurs (if they participate in the tender process and match the L1 price). Further, out of the total annual procurement from the MSEs, (3%) three percent from within the 25% target shall be earmarked for procurement from MSEs owned by women. Provided that, in the event of failure of such SC/ST MSE to participate in tender process or meet tender requirements and L1 price, four per cent sub-target shall be met from other MSE.

- 1.32.6 In case the items are not divisible, then the MSE quoting price within price band L1 + 15% may be awarded for full/complete supply of total tendered quantity to MSE, considering the spirit of the policy for enhancing the Government procurement from MSEs.
- 1.32.7 The bids shall be evaluated on the basis of final landing cost which shall be arrived as under:

(FOR CSIR IIIM, JAMMU SITE)

For goods manufactured in India

- (i) The price of the goods quoted ex-works including all taxes already paid.
- (ii) GST and other taxes, if any which will be payable on the goods if the contract is awarded.
- (iii) Charges for inland transportation, insurance and other local services required for delivering the goods at the desired destination.
- (iv) Wherever applicable, the cost towards the installation, commissioning, spares, extended warranty, AMC/CMC, site preparation and training including any incidental services, if any.

For goods manufactured abroad

- (i) The price of the goods, quoted on FCA (named place of delivery abroad) or FOB (named port of shipment), as specified in the bidding document.
 - (ii) The charges for insurance and transportation of the goods to the port/place of destination.
 - (iii) The agency commission etc., if any.
 - (iv) Wherever applicable, the cost towards the installation, commissioning, spares, extended warranty, AMC/CMC, site preparation and training including any incidental services, if any.
- 1.32.8 The comparison between the indigenous and the foreign offers shall be made on FOR destination basis and CIF/CIP basis respectively. However, the CIF/CIP prices quoted by any foreign bidder shall be loaded further as under:
- (a) Towards customs duty and other statutory levies—as per applicable rates.
 - (b) Towards custom clearance, inland transportation etc. - 2% of the CIF/CIP value.

The bidder should give a clear cut breakup of EXW, FOB/FCA, CIF/CIP prices to facilitate proper comparison with the purchaser reserving the right to order on either basis, failing which the bid would be summarily ignored.

Note: Where there is no mention of packing, forwarding, freight, insurance charges, taxes etc. such offers shall be rejected as incomplete.

- 1.32.9 Orders for imported stores need not necessarily be on FOB/FCA basis rather it can be on the basis of any of the incoterm specified in ICC Incoterms 2010 as may be amended from time to time by the ICC or any other designated authority and favorable to the purchaser.
- 1.32.10 Wherever the price quoted on FOB/FCA and CIF/CIP basis are the same, the Contract would be made on CIF / CIP basis only.
- 1.32.11 The GCC and the SCC shall specify the mode of transport i.e., whether by air/ocean/road/rail.

- 1.32.12 There is no provision to purchase optional items. The specifications embodied in the tender documents would be the basis of evaluating the responsiveness of bids received.
- 1.32.13 The Purchaser shall compare all substantially responsive bids to determine the lowest valued bid, in accordance with ITB Clause 1.32.

1.33 Contacting the Purchaser

- 1.33.1 Subject to ITB Clause 1.25, no Bidder shall contact the Purchaser on any matter relating to its bid, from the time of the bid opening to the time the Contract is awarded.
- 1.33.2 Any effort by a Bidder to influence the Purchaser in its decisions on bid evaluation, bid comparison or contract award may result in rejection of the Bidder's bid.

1.34 Post qualification

- 1.34.1 In the absence of pre-qualification, the Purchaser will determine to its satisfaction whether the Bidder that is selected as having submitted the lowest evaluated responsive bid is qualified to perform the contract satisfactorily, in accordance with the criteria listed in ITB Clause 1.14.
- 1.34.2 The determination will take into account the eligibility criteria listed in the bidding documents and will be based upon an examination of the documentary evidence of the Bidder's qualifications submitted by the Bidder, as well as such other information as the Purchaser deems necessary and appropriate.
- 1.34.3 An affirmative determination will be a prerequisite for award of the contract to the Bidder. A negative determination will result in rejection of the Bidder's bid.

F. AWARD OF CONTRACT

1.35 Negotiations

- 1.35.1 Normally, there shall not be any negotiation. Negotiations, if at all, shall be an exception and only in the case of items with limited source of supply. Negotiations shall be held with the lowest evaluated responsive bidder. Counter offers tantamount to negotiations and shall be treated at par with negotiations in the case of one time purchases.

1.36 Award Criteria

- 1.36.1 Subject to ITB Clause 1.39, the Purchaser will award the contract to the successful Bidder whose bid has been determined to be substantially responsive and has been determined to be the lowest evaluated bid, provided further that the Bidder is determined to be qualified to perform the contract satisfactorily. The details of the award would be hosted on the website of the Purchaser.

1.37 Purchaser's right to vary Quantities at Time of Award

- 1.37.1 The Purchaser reserves the right at the time of Contract award to increase or decrease the quantity of goods and services originally specified in the Schedule of Requirements to the extent of 25% without any change in unit price or other terms and conditions.

1.38 Option Clause

- 1.38.1 The Purchaser reserves the right to increase or decrease the quantity of the required goods up to 25% (Twenty-Five) per cent at any time, till final delivery date (or the extended delivery date of the contract), by giving reasonable notice even though the quantity ordered initially has been supplied in full before the last date of the delivery period (or the extended delivery period)

1.39 Purchaser's right to accept Any Bid and to reject any or All Bids

- 1.39.1 The Purchaser reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to award of Contract, without thereby incurring any liability to the affected Bidder or Bidders.

1.40 Notification of Award

- 1.40.1 Prior to the expiration of the period of bid validity, the Purchaser will notify the successful bidder in writing by registered letter or by cable or telex or fax or e mail that the bid has been accepted and a separate purchase order shall follow through post.
- 1.40.2 Until a formal contract is prepared and executed, the notification of award should constitute a binding contract.
- 1.40.3 Upon the successful Bidder's furnishing of the signed Contract Form and performance security pursuant to ITB Clause 1.43, the Purchaser will promptly notify each unsuccessful Bidder and will discharge its bid security.

1.41 Signing of Contract

- 1.41.1 Promptly after notification, the Purchaser shall send the successful Bidder the Agreement/Purchase Order.
- 1.41.2 Within twenty-one (21) days of date of the Purchase Order, the successful Bidder shall sign, date, and return it to the Purchaser.

1.42 Order Acceptance

- 1.42.1 The successful bidder should submit Order acceptance within 14 days from the date of issue of order/signing of contract, failing which it shall be presumed that the vendor is not interested and his bid security is liable to be forfeited pursuant to clause 1.16.9 of ITB.
- 1.42.2 The order confirmation must be received within 14 days. However, the Purchaser has the powers to extend the time frame for submission of order confirmation beyond the original date. Even after extension of time, if the order confirmation is not received, the contract is liable to be cancelled provided that the purchaser, on being satisfied that it is not a case of cartelization and the integrity of the procurement process has been maintained, may, for cogent reasons, offer the next successful bidder an opportunity to match the financial bid of the first successful bidder, and if the offer is accepted, award the contract to the next successful bidder at the price bid of the first successful bidder.

1.43 Performance Security

- 1.43.1 Within 21 days of receipt of the notification of award/PO, the Supplier shall furnish performance security (PS) in the amount specified in SCC, valid till 60 days after the warranty period.
- 1.43.2 The proceeds of the performance security shall be payable to the Purchaser as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.
- 1.43.3 The Performance Security shall be denominated in Indian Rupees for the offers received for supplies within India and denominated in the currency of the contract in the case of offers received for supply from foreign countries or in equivalent Indian rupees in case the performance security is submitted by the Indian Agent.

- 1.43.4 In the case of imports, the PS may be submitted either by the principal or by the Indian agent and, in the case of purchases from indigenous sources, the PS may be submitted by either the manufacturer or their authorized dealer/bidder.
- 1.43.5 The Performance security shall be in one of the following forms:
- (a) A Bank guarantee or stand-by Letter of Credit issued by a Nationalized/ Scheduled bank located in India or a Foreign bank with preferably its operating branch in India in the form provided in the bidding documents. Or
 - (b) A demand draft in favour of the purchaser.
- Or,
- (c) A Fixed Deposit Receipt pledged in favour of the Purchaser.
- 1.43.6 The performance security will be discharged by the Purchaser and returned to the Supplier not later than 60 days following the date of completion of the Supplier's performance obligations, including any warranty obligations, unless specified otherwise in SCC, without levy of any interest.
- 1.43.7 In the event of any contract amendment, the supplier shall, within 21 days of receipt of such amendment, furnish the amendment to the performance security, rendering the same valid for the duration of the contract, as amended for further period of 60 days thereafter.
- 1.43.8 The performance security must be received within 21 days. However, the Purchaser has the powers to extend the time frame for submission of Performance Security (PS). Even after extension of time, if the PS is not received, the contract is liable to be cancelled provided that the purchaser, on being satisfied that it is not a case of cartelization and the integrity of the procurement process has been maintained, may, for cogent reasons, offer the next successful bidder an opportunity to match the financial bid of the first successful bidder, and if the offer is accepted, award the contract to the next successful bidder at the price bid of the first successful bidder.
- 1.43.9 Whenever, the bidder chooses to submit the Performance Security in the form of Bank Guarantee, then he should advise the banker issuing the Bank Guarantee to immediately send by Registered Post (A.D.) an unstamped duplicate copy of the Guarantee directly to the Purchaser with a covering letter to compare with the original BG for the correctness, genuineness, etc.**

1.44. Pre-bid Conference (PBC)

- 1.44.1 A Pre-bid Conference shall be held as indicated in invitation to bid, if any. All prospective bidders are requested to kindly attend the Pre-bid Conference. In order to facilitate the purchaser the proper conduct of the Pre-bid Conference, all prospective bidders are requested to kindly submit their queries (with envelope bearing Tender No. and Date on top and marked "Queries for Pre-bid Conference") so as to reach the purchaser as indicated in invitation to bid. The purchaser shall answer the queries during the pre-bid conference, which would become a part of the proceedings of the Pre-bid Conference. The proceeding of the Pre Bid Conference would be hosted on the website of the purchaser. Before formulating and submitting their bids, all prospective bidders are advised to surf through the purchaser's website after the Pre-bid Conference, in order to enable them take cognizance of the revised tender conditions.

1.45 Integrity Pact

- 1.45.1 Integrity Pact binds both buyers and sellers to ethical conduct and transparency in all activities from pre-selection of bidders, bidding and contracting, implementation, completion and operation related to the contract.

- 1.45.2 The Integrity pact essentially envisages an agreement between the prospective vendors/bidders and the buyer, committing the persons/officials of both sides, not to resort to any corrupt practices in any aspect/stage of the contract. Only those vendors/bidders, who commit themselves to such a Pact with the buyer, would be considered competent to participate in the bidding process. In other words, entering into this Pact would be a preliminary qualification. The essential ingredients of the Pact include:
- i) Promise on the part of the Purchaser to treat all bidders with equity and reason and not to seek or accept any benefit, which is not legally available;
 - ii) Promise on the part of bidders not to offer any benefit to the employees of the Purchaser not available legally and also not to commit any offence under Prevention of Corruption Act, 1988 or Indian Penal Code 1860;
 - iii) Promise on the part of bidders not to enter into any undisclosed agreement or understanding with other bidders with respect to prices, specifications, certifications, subsidiary contracts; etc.
 - iv) Undertaking (as part of Fall Clause) by the bidders that they have not and will not sell the same material/equipment at prices lower than the bid price;
 - iv) Foreign bidders to disclose the name and address of agents and representatives in India and Indian Bidders to disclose their foreign principals or associates;
 - v) Bidders to disclose the payments to be made by them to agents/brokers or any other intermediary;
 - vi) Bidders to disclose any past transgressions committed over the specified period with any other company in India or Abroad that may impinge on the anti-corruption principle;
 - vii) Integrity Pact lays down the punitive actions for any violation.
- 1.45.3 Each page of such Integrity pact proforma would be duly signed by Purchaser's competent signatory. All pages of the Integrity Pact are to be returned by the bidder (along with the technical bid) duly signed by the same signatory who signed the bid, i.e. who is duly authorized to sign the bid and to make binding commitments on behalf of his company. Any bid not accompanied by Integrity Pact duly signed by the bidder shall be considered to be a non-responsive bid and shall be rejected straightway.
- 1.45.4 The SCC shall specify whether there is a need to enter into a separate Integrity pact or not.
- 1.45.5 The Integrity Pact would be effective from the date of invitation of bids till complete execution of the contract.
- 1.45.6 The names and contact details of the Independent External Monitors (IEM) on the event of the need of IP is as detailed in the SCC.
- 1.45.7 The modal format of IP is at Chapter-8.

CHAPTER 2

CONDITIONS OF CONTRACT

A GENERAL CONDITIONS OF CONTRACT (GCC)

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GENERAL CONDITIONS OF CONTRACT (GCC)

2.1 Definitions

2.1.1 The following words and expressions shall have the meanings hereby assigned to them:

(a) “Contract” means the Contract Agreement entered into between the Purchaser and the Supplier, together with the Contract Documents referred to therein, including all attachments, appendices, and all documents incorporated by reference therein.

(b) “Contract Documents” means the documents listed in the Contract Agreement, including any amendments thereto.

(c) “Contract Price” means the price payable to the Supplier as specified in the Contract Agreement, subject to such additions and adjustments thereto or deductions there from, as may be made pursuant to the Contract.

(d) “Day” means calendar day.

(e) “Completion” means the fulfilment of the Goods and related Services by the Supplier in accordance with the terms and conditions set forth in the Contract.

“GCC” means the General Conditions of Contract.

(f) “Goods” means all of the commodities, raw material, machinery and equipment, and/or other materials that the Supplier is required to supply to the Purchaser under the Contract.

(g) “Related Services” means the services incidental to the supply of the goods, such as transportation, insurance, installation, training and initial maintenance and other such obligations of the Supplier under the Contract.

(h) “SCC” means the Special Conditions of Contract.

- (i) "Subcontractor" means any natural person, private or government entity, or a combination of the above, to whom any part of the Goods to be supplied or execution of any part of the Related Services is subcontracted by the Supplier.
- (j) "Supplier" means the natural person, private or government entity, or a combination of the above, whose bid to perform the Contract has been accepted by the Purchaser and is named as such in the Contract Agreement.
- (l) The "Council" means the Council of Scientific & Industrial Research (CSIR), registered under the Societies Registration Act, 1860 of the Govt. of India having its registered office at 2, Rafi Marg, New Delhi-110001, India.
- (m) The "Purchaser" means any of the constituent Laboratory/Institute of the Council situated at any designated place in India as specified in SCC.
- (n) "The final destination," where applicable, means the place named in the SCC.

2.2 Contract Documents

- 2.2.1 Subject to the order of precedence set forth in the Contract Agreement, all documents forming the Contract (and all parts thereof) are intended to be correlative, complementary, and mutually explanatory. The Contract Agreement shall be read as a whole.

2.3 Code of Integrity

- 2.3.1 Without prejudice to and in addition to the rights of the Purchaser to other penal provisions as per the bid documents or contract, if the Purchaser comes to a conclusion that a (prospective) bidder/supplier, directly or through an agent, has violated this code of integrity in competing for the contract or in executing a contract, the Purchaser may take appropriate measures including one or more of the following:
 - a) Cancellation of the relevant contract and recovery of compensation for loss incurred by the purchaser;
 - b) Forfeiture or encashment of any other security or bond relating to the procurement;
 - c) Recovery of payments including advance payments, if any, made by the Purchaser along with interest thereon at the prevailing rate.
 - d) Provisions in addition to above:
 - 1) Removal from the list of registered suppliers and banning/debarment of the bidder from participation in future procurements of the purchaser for a period not less than one year;
 - 2) In case of anti-competitive practices, information for further processing may be filed under a signature of the Joint Secretary level officer, with the Competition Commission of India;
 - 3) Initiation of suitable disciplinary or criminal proceedings against any individual or staff found responsible.

2.4 Joint Venture, Consortium or Association

- 2.4.1 If the Supplier is a joint venture, consortium, or association, all of the parties shall be jointly and severally liable to the Purchaser for the fulfilment of the provisions of the Contract and shall designate one party to act as a leader with authority to bind the joint venture, consortium, or association. The composition or the constitution of the joint venture, consortium, or association shall not be altered without the prior consent of the Purchaser.

2.5 Scope of Supply

- 2.5.1 The Goods and Related Services to be supplied shall be as specified in Chapter 4 i.e. Specifications and allied technical details.

2.6 Suppliers' Responsibilities

- 2.6.1 The Supplier shall supply all the Goods and Related Services included in the Scope of Supply in accordance with Scope of Supply Clause of the GCC, and the Delivery and Completion Schedule, as per GCC Clause relating to delivery and document.

2.7 Contract price

- 2.7.1 Prices charged by the Supplier for the Goods supplied and the Related Services performed under the Contract shall not vary from the prices quoted by the Supplier in its bid.

2.8 Copy Right

- 2.8.1 The copyright in all drawings, documents, and other materials containing data and information furnished to the Purchaser by the Supplier herein shall remain vested in the Supplier, or, if they are furnished to the Purchaser directly or through the Supplier by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party.

2.9 Application

- 2.9.1 These General Conditions shall apply to the extent that they are not superseded by provisions in other parts of the Contract.

2.10 Standards

- 2.10.1 The Goods supplied and services rendered under this Contract shall conform to the standards mentioned in the Technical Specifications, and, when no applicable standard is mentioned, to the authoritative standard appropriate to the Goods' country of origin and such standards shall be the latest issued by the concerned institution.

2.11 Use of Contract Documents and Information

- 2.11.1 The Supplier shall not, without the Purchaser's prior written consent, disclose the Contract, or any provision thereof, or any specification, plan, drawing, pattern, sample or information furnished by or on behalf of the Purchaser in connection therewith, to any person other than a person employed by the Supplier in performance of the Contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far, as may be necessary for purposes of such performance.
- 2.11.2 The Supplier shall not, without the Purchaser's prior written consent, make use of any document or information enumerated above except for purposes of performing the Contract.
- 2.11.3 Any document, other than the Contract itself, enumerated above shall remain the property of the Purchaser and shall be returned (in all copies) to the Purchaser on completion of the Supplier's performance under the Contract if so required by the Purchaser.

2.12 Patent Indemnity

- 2.12.1 The Supplier shall, subject to the Purchaser's compliance with GCC Sub-Clause 2.12.2 Indemnify and hold harmless the Purchaser and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of any nature, including attorney's fees and expenses, which the Purchaser may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright, or other intellectual property right registered or otherwise existing at the date of the Contract by reason of:

- (a) the installation of the Goods by the Supplier or the use of the Goods in India; and

(b) the sale in any country of the products produced by the Goods.

2.12.2 If any proceedings are brought or any claim is made against the Purchaser, the Purchaser shall promptly give the Supplier a notice thereof, and the Supplier may at its own expense and in the Purchaser's name conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim.

2.13 Performance Security

2.13.1 **Within 21 days of receipt of the notification of award/PO, the Supplier shall furnish performance security** in the amount specified in SCC, valid till 60 days after the warranty period.

2.13.2 The proceeds of the performance security shall be payable to the Purchaser as compensation for any loss resulting from the Supplier's failure to complete its obligations under the Contract.

2.13.3 The Performance Security shall be denominated in Indian Rupees for the offers received for supplies within India and denominated in the currency of the contract in the case of offers received for supply from foreign countries or in equivalent Indian Rupees in case the Performance Security is submitted by the Indian Agent.

2.13.4 In the case of imports, the PS may be submitted either by the principal or by the Indian agent and, in the case of purchases from indigenous sources, the PS may be submitted by either the manufacturer or their authorized dealer/bidder.

2.13.5 The Performance security shall be in one of the following forms:

- (a) A Bank guarantee issued by a Nationalized/Scheduled bank located in India or a bank located abroad in the form provided in the bidding documents.
Or
- (b) Account Payee demand draft in favour of the purchaser. Or
- (c) A Fixed Deposit Receipt pledged in favour of the Purchaser.

2.13.6 The performance security will be discharged by the Purchaser and returned to the Supplier not later than 60 days following the date of completion of the Supplier's performance obligations, including any warranty obligations, unless specified otherwise in SCC, without levy of any interest.

2.13.7 In the event of any contract amendment, the supplier shall, within 21 days of receipt of such amendment, furnish the amendment to the performance security, rendering the same valid for the duration of the contract, as amended for further period of 60 days thereafter.

2.13.8 The order confirmation must be received within 14 days. However, the Purchaser has the powers to extend the time frame for submission of order confirmation and submission of Performance Security (PS). Even after extension of time, if the order confirmation /PS are not received, the contract shall be cancelled provided that the purchaser, on being satisfied that it is not a case of cartelization and the integrity of the procurement process has been maintained, may, for cogent reasons, offer the next successful bidder an opportunity to match the financial bid of the first successful bidder, and if the offer is accepted, award the contract to the next successful bidder at the price bid of the first successful bidder.

2.13.9 **Whenever, the bidder chooses to submit the Performance Security in the form of Bank Guarantee, then he should advise the banker issuing the Bank Guarantee to immediately send by Registered Post (A.D.) an unstamped duplicate copy of the Guarantee directly to the Purchaser with a covering letter to compare with the original BG for the correctness, genuineness, etc.**

2.14 Inspections and Tests

- 2.14.1 The inspections & test, training required would be as detailed in Chapter-4 of the Bidding Document relating to Specification and Allied Technical details.

2.15 Packing

- 2.15.1 The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination as indicated in the Contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the Goods' final destination and the absence of heavy handling facilities at all points in transit.
- 2.15.2 The packing, marking and documentation within and outside the packages shall comply strictly with such special requirements as shall be provided for in the Contract including additional requirements, if any, specified in SCC and in any subsequent instructions ordered by the Purchaser.

2.16 Delivery and Documents

- 2.16.1 Delivery of the Goods and completion and related services shall be made by the supplier in accordance with the terms specified by the Purchaser in the contract. The details of shipping and/or other documents to be furnished by the supplier are specified in SCC.
- 2.16.2 The terms FOB, FCA, CIF, CIP, etc. shall be governed by the rules prescribed in the current edition of the Inco terms published by the International Chambers of Commerce, Paris.
- 2.16.3 The mode of transportation shall be as specified in SCC. In case the purchaser elects to have the transportation done through Air, then air lifting needs to be done through Air India only. In case Air India does not operate in the Airport of despatch, then the bidder is free to engage the services of any other Airlines.

2.17 Insurance

- 2.17.1 Should the purchaser elect to buy on CIF/CIP basis, the Goods supplied under the Contract shall be fully insured against any loss or damage incidental to manufacture or acquisition, transportation, storage and delivery in the manner specified in SCC.
- 2.17.2 Where delivery of the goods is required by the purchaser on CIF or CIP basis the supplier shall arrange and pay for Cargo Insurance, naming the purchaser as beneficiary and initiate & pursue claims till settlement, on the event of any loss or damage.
- 2.17.3 Where delivery is on FOB or FCA basis, insurance would be the responsibility of the purchaser.
- 2.17.4 With a view to ensure that claims on insurance companies, if any, are lodged in time, the bidders and /or the Indian agent shall be responsible for follow up with their principals for ascertaining the dispatch details and informing the same to the Purchaser and he shall also liaise with the Purchaser to ascertain the arrival of the consignment after clearance so that immediately thereafter in his presence the consignment could be opened and the insurance claim be lodged, if required, without any loss of time. Any delay on the part of the bidder/Indian Agent would be viewed seriously and he shall be directly responsible for any loss sustained by the purchaser on the event of the delay.

2.18 Transportation

- 2.18.1 Where the Supplier is required under the Contract to deliver the Goods FOB, transport of the Goods, up to and including the point of putting the Goods on board the vessel at the specified port of loading, shall be arranged and paid for by the Supplier, and the cost thereof shall be included in the Contract price. Where the Supplier is required under the Contract to deliver the Goods FCA, transport of the

Goods and delivery into the custody of the carrier at the place named by the Purchaser or other agreed point shall be arranged and paid for by the Supplier, and the cost thereof shall be included in the Contract Price.

2.18.2 Where the Supplier is required under the Contract to deliver the Goods CIF or CIP, transport of the Goods to the port of destination or such other named place of destination in the Purchaser's country, as shall be specified in the Contract, shall be arranged and paid for by the Supplier, and the cost thereof shall be included in the Contract Price.

2.18.3 In the case of supplies from within India, where the Supplier is required under the Contract to transport the Goods to a specified destination in India, defined as the Final Destination, transport to such destination, including insurance and storage, as specified in the Contract, shall be arranged by the Supplier, and the related costs shall be included in the Contract Price.

2.19 Incidental Services

2.19.1 The supplier may be required to provide any or all of the services, including training, if any, specified in chapter 4.

2.20 Spare Parts

2.20.1 The Supplier shall be required to provide any or all of the following materials, notifications, and information pertaining to spare parts manufactured or distributed by the Supplier:

- (a) Such spare parts as the Purchaser may elect to purchase from the Supplier, providing that this election shall not relieve the Supplier of any warranty obligations under the Contract; and
- (b) In the event of termination of production of the spare parts:
 - (i) Advance notification to the Purchaser of the pending termination, in sufficient time to permit the Purchaser to procure needed requirements; and
 - (ii) Following such termination, furnishing at no cost to the Purchaser, the blueprints, drawings and specifications of the spare parts, if requested.

2.21 Warranty

2.21.1 The Supplier warrants that all the Goods are new, unused, and of the most recent or current models, and that they incorporate all recent improvements in design and materials, unless provided otherwise in the Contract.

2.21.2 The Supplier further warrants that the Goods shall be free from defects arising from any act or omission of the Supplier or arising from design, materials, and workmanship, under normal use in the conditions prevailing in India.

2.21.3 Unless otherwise specified in the SCC, the warranty shall remain valid for Twelve months after the Goods, or any portion thereof as the case may be, have been delivered to and accepted at the final destination indicated in the SCC, or for Eighteen (18) months after the date of shipment from the port or place of loading in the country of origin, whichever period concludes earlier.

2.21.4 The Purchaser shall give notice to the Supplier stating the nature of any such defects together with all available evidence thereof, promptly following the discovery thereof. The Purchaser shall afford all reasonable opportunity for the Supplier to inspect such defects.

- 2.21.5 Upon receipt of such notice, the Supplier shall, within a reasonable period of time, expeditiously repair or replace the defective Goods or parts thereof, at no cost to the Purchaser.
- 2.21.6 If having been notified, the Supplier fails to remedy the defect within a reasonable period of time; the Purchaser may proceed to take within a reasonable period such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights which the Purchaser may have against the Supplier under the Contract.
- 2.21.7 Goods requiring warranty replacements must be replaced on free of cost basis to the purchaser.

2.22 Terms of Payment

- 2.22.1 The method and conditions of payment to be made to the Supplier under this Contract shall be as specified in the SCC.
- 2.22.2 The Supplier's request(s) for payment shall be made to the Purchaser in writing, accompanied by an invoice describing, as appropriate, the Goods delivered and the Services performed, and by documents, submitted pursuant to Delivery and document Clause of the GCC and upon fulfilment of other obligations stipulated in the contract.
- 2.22.3 *Payments shall be made promptly by the Purchaser but in no case later than thirty days after submission of the invoice or claim by the Supplier. While claiming the payment, the supplier should certify in the bill/invoice that the payment being claimed strictly in terms of the contract and all obligations on the part of the supplier for claiming the payment have been fulfilled as required under the contract.*
- 2.22.4 Payment shall be made in currency as indicated in the contract.

2.23 Change Orders and Contract Amendments

- 2.23.1 The Purchaser may at any time, by written order given to the Supplier pursuant to Clause on Notices of the GCC make changes within the general scope of the Contract in any one or more of the following:
- (a) Increase or decrease in the quantity required, exercise of quantity opinion clause;
 - (b) Changes in schedule of deliveries and terms of delivery;
 - (c) The changes in inspection arrangements;
 - (d) Changes in terms of payments and statutory levies;
 - (e) Changes due to any other situation not anticipated;
- 2.23.2 No changes in the price quoted shall be permitted after the purchase order has been issued except on account of statutory variations.
- 2.23.3 No variation or modification in the terms of the contract shall be made except by written amendment signed by the parties.

2.24 Assignment

- 2.24.1 The Supplier shall not assign, in whole or in part, its obligations to perform under the Contract, except with the Purchaser's prior written consent.

2.25 Subcontracts

- 2.25.1 The Supplier shall notify the Purchaser in writing of all subcontracts awarded under this Contract if not already specified in the bid. Such notification, in the original bid or later, shall not relieve the Supplier from any liability or duties or obligation under the contract.

2.26 Extension of time.

- 2.26.1 Delivery of the Goods and performance of the Services shall be made by the Supplier in accordance with the time schedule specified by the Purchaser.
- 2.26.2 If at any time during performance of the Contract, the Supplier or its sub-contractor(s) should encounter conditions impeding timely delivery of the Goods and performance of Services, the Supplier shall promptly notify the Purchaser in writing of the fact of the delay, its likely duration and its cause(s). As soon as practicable after receipt of the Supplier's notice, the Purchaser shall evaluate the situation and may, at its discretion, extend the Supplier's time for performance with or without liquidated damages, in which case the extension shall be ratified by the parties by amendment of the Contract.
- 2.26.3 Except as provided under the Force Majeure clause of the GCC, a delay by the Supplier in the performance of its delivery obligations shall render the Supplier liable to the imposition of liquidated damages pursuant to liquidated damages Clause of the GCC unless an extension of time is agreed upon pursuant to above clause without the application of penalty clause.

2.27 Liquidated Damages

- 2.27.1 Subject to GCC Clause on Force Majeure, if the Supplier fails to deliver any or all of the Goods or to perform the Services within the period(s) specified in the Contract, the Purchaser shall, without prejudice to its other remedies under the Contract, deduct from the Contract Price, as penalty, a sum equivalent to the percentage specified in SCC of the delivered price of the delayed Goods or unperformed Services or contract value in case the delivered price of the delayed goods or unperformed services cannot be ascertained from the contract, for each week or part thereof of delay until actual delivery or performance, up to a maximum deduction of the Percentage specified in SCC. Once the maximum is reached, the Purchaser may consider termination of the Contract pursuant to GCC Clause on Termination for Default.

2.28 Termination for Default

- 2.28.1 The Purchaser may, without prejudice to any other remedy for breach of contract, by written notice of default sent to the Supplier, terminate the Contract in whole or part
- (a) If the Supplier fails to deliver any or all of the Goods within the period(s) specified in the contract, or within any extension thereof granted by the Purchaser pursuant to GCC Clause on Extension of Time; or
 - (b) If the Supplier fails to perform any other obligation(s) under the Contract.
 - (c) If the Supplier, in the judgment of the Purchaser has engaged in corrupt or fraudulent or collusive or coercive practices etc as defined in GCC Clause and ITB clause on code of integrity in competing for or in executing the Contract.
- 2.28.2 In the event the purchaser terminates the contract in whole or in part, he may take recourse to any one or more of the following action:
- (a) The Performance Security is to be forfeited;
 - (b) The purchaser may procure, upon such terms and in such manner as it deems appropriate, stores similar to those undelivered, and the supplier shall be liable for all available actions against it in terms of the contract.
 - (c) However, the supplier shall continue to perform the contract to the extent not terminated.

2.29 Force Majeure

- 2.29.1 Notwithstanding the provisions of GCC Clauses relating to extension of time, Liquidated damages and Termination for Default 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.

- 2.29.2 For purposes of this Clause, "Force Majeure" means an event or situation beyond the control of the Supplier that is not foreseeable, is unavoidable, and its origin is not due to negligence or lack of care on the part of the Supplier. Such events may include, but not be limited to, acts of the Purchaser in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions, and freight embargoes.
- 2.29.3 If a Force Majeure situation arises, the Supplier shall promptly notify the Purchaser in writing of such conditions and the cause thereof within 21 days of its occurrence. 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.
- 2.29.4 If the performance in whole or in part or any obligations under the contract is prevented or delayed by any reason of Force Majeure for a period exceeding 60 days, either party may at its option terminate the contract without any financial repercussions on either side.

2.30 Termination for Insolvency

- 2.30.1 The Purchaser may at any time terminate the Contract by giving written notice to the Supplier, if the Supplier becomes bankrupt or otherwise insolvent. In this event, termination will be without compensation to the Supplier, provided that such termination will not prejudice or affect any right of action or remedy, which has accrued or will accrue thereafter to the Purchaser.

2.31 Termination for Convenience

- 2.31.1 The Purchaser, by written notice sent to the Supplier, may terminate the Contract, in whole or in part, at any time. The notice of termination shall specify that termination is for the Purchaser's convenience, the extent to which performance of the Supplier under the Contract is terminated, and the date upon which such termination becomes effective.
- 2.31.2 The Goods that are complete and ready for shipment within 30 days after the Supplier's receipt of notice of termination shall be accepted by the Purchaser at the Contract terms and prices. For the remaining Goods, the Purchaser may elect:
- (a) To have any portion completed and delivered at the Contract terms and prices; and/or
 - (b) To cancel the remainder and pay to the Supplier an agreed amount for partially completed Goods and for materials and parts previously procured by the Supplier.

2.32 Settlement of Disputes

- 2.32.1 The Purchaser and the supplier shall make every effort to resolve amicably by direct informal negotiation any disagreement or dispute arising between them under or in connection with the Contract.
- 2.32.2 If, after twenty-one (21) days, the parties have failed to resolve their dispute or difference by such mutual consultation, then either the Purchaser or the Supplier may give notice to the other party of its intention to commence arbitration, as hereinafter provided, as to the matter in dispute, and no arbitration in respect of this matter may be commenced unless such notice is given. Any dispute or difference in respect of which a notice of intention to commence arbitration has been given in accordance with this Clause shall be finally settled by arbitration. Arbitration may be commenced prior to or after delivery of the Goods under the Contract.
- 2.32.3 The dispute settlement mechanism/arbitration proceedings shall be concluded as under:

- (a) If any dispute or difference arises between the parties hereto as to the construction, interpretation, effect and implication of any provision of this agreement including the rights or liabilities or any claim or demand of any party against other or in regard to any other matter under these presents but excluding any matters, decisions or determination of which is expressly provided for in this Agreement, such disputes or differences shall be referred to an Arbitral Bench consisting of three Arbitrators, one each to be appointed by each party and the two Arbitrators shall appoint a third Arbitrator who shall be the presiding Arbitrator. A reference to the Arbitration under this Clause shall be deemed to be submission within the meaning of the Arbitration and Conciliation Act, 1996 and the rules framed thereunder for the time being in force. Each party shall bear and pay its own cost of the arbitration proceedings unless the Arbitrators otherwise decides in the Award.
- (b) In the case of a dispute between the purchaser and a Foreign Supplier, the dispute shall be settled by arbitration in accordance with provision of sub-clause (a) above. But if this is not acceptable to the supplier then the dispute shall be settled in accordance with provisions of UNCITRAL (United Nations Commission on International Trade Law) Arbitration Rules.

2.32.4 The venue of the arbitration shall be the place from where the purchase order or contract is issued. i.e **JAMMU(J&K)**

2.32.5 Notwithstanding, any reference to arbitration herein,

- (a) The parties shall continue to perform their respective obligations under the Contract unless they otherwise agree; and
- (b) the Purchaser shall pay the Supplier any monies due the Supplier.

2.33 Governing Language

2.33.1 The contract shall be written in English language which shall govern its interpretation. All correspondence and other documents pertaining to the Contract, which are exchanged by the parties, shall be written in the English language only.

2.34 Applicable Law

2.34.1 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 as specified in SCC.

2.35 Notices

2.35.1 Any notice given by one party to the other pursuant to this contract/order shall be sent to the other party in writing or by cable, telex, FAX, e-mail or and confirmed in writing to the other party's address specified in the SCC.

2.35.2 A notice shall be effective when delivered or on the notice's effective date, whichever is later.

2.36 Taxes and Duties

2.36.1 For goods manufactured outside India, the Supplier shall be entirely responsible for all taxes, stamp duties, license fees, and other such levies imposed outside India.

2.36.2 For goods Manufactured within India, the Supplier shall be entirely responsible for all taxes, duties, license fees, etc., incurred till its final manufacture/production.

2.36.3 If any tax exemptions, reductions, allowances or privileges may be available to the Supplier in India, the Purchaser shall make its best efforts to enable the Supplier to benefit from any such tax savings to the maximum allowable extent.

2.36.4 **All payments due under the contract shall be paid after deduction of statutory levies (at source) (like IT, etc.) wherever applicable.**

- 2.36.5 **Customs Duty** – If the supply is from abroad this Institute is permitted to import goods as per notification No.51/96 – Customs and pay a concessional duty up to 5% as per notification 24/2002 – Customs on all imports.

2.37 Right to use Defective Goods

- 2.37.1 If after delivery, acceptance and installation and within the guarantee and warranty period, the operation or use of the goods proves to be unsatisfactory, the Purchaser shall have the right to continue to operate or use such goods until rectifications of defects, errors or omissions by repair or by partial or complete replacement is made without interfering with the Purchaser's operation.

2.38 Protection against Damage

- 2.38.1 The system shall not be prone to damage during power failures and trip outs. The normal voltage and frequency conditions available at site as under:
- (a) Voltage 230 volts – Single phase/ 415 V 3 phase (+_ 10%)
 - (b) Frequency 50 Hz.

2.39 Site preparation and installation

- 2.39.1 The Purchaser is solely responsible for the construction of the equipment sites in compliance with the technical and environmental specifications defined by the Supplier. The Purchaser will designate the installation sites before the scheduled installation date to allow the Supplier to perform a site inspection to verify the appropriateness of the sites before the installation of the Equipment, if required. The supplier shall inform the purchaser about the site preparation, if any, needed for installation, of the goods at the purchaser's site immediately after notification of award/contract.

2.40 Import and Export Licenses

- 2.40.1 If the ordered materials are covered under restricted category of EXIM policy in India the Vendor / Agent may intimate such information for obtaining necessary, license in India.
- 2.40.2 If the ordered equipment is subject to Vendor procuring an export license from the designated government agency / country from where the goods are shipped / sold, the vendor has to mention the name, address of the government agency / authority. The vendor must also mention the time period within which the license will be granted in normal course.

2.41 Risk Purchase Clause

- 2.41.1 If the supplier fails to deliver the goods within the maximum delivery period specified in the contract or Purchase Order, the purchaser may procure, upon such terms and in such a manner as it deems appropriate, Goods or Services similar to those undelivered and the Supplier shall be liable to the purchaser for any excess costs incurred for such similar goods or services.

2.42 Option Clause

- 2.42.1 The Purchaser reserves the right to increase or decrease the quantity of the required goods up to 25% (Twenty-Five) per cent at any time, till final delivery date (or the extended delivery date of the contract), by giving reasonable notice even though the quantity ordered initially has been supplied in full before the last date of the delivery period (or the extended delivery period)

2.43 Integrity Pact

- 2.43.1 The SCC shall specify whether there is a need to enter into a separate Integrity pact or not.
- 2.43.2 The names and contact details of the Independent External Monitors (IEM) on the event of the need of IP is as detailed in the SCC.

2.44 Order Acceptance

- 2.44.1 The successful bidder should submit Order acceptance within 14 days from the date of issue of order/signing of contract, failing which it shall be presumed that the vendor is not interested and his bid security is liable to be forfeited pursuant to clause 1.16.9 of ITB.

B SPECIAL CONDITIONS OF CONTRACT Table of Contents

Sl. No.	GCC Clause
01.	GCC 2.1.1 (m)
02.	GCC 2.1.1 (n)
03.	GCC 2.13.1
04.	GCC 2.15.2
05.	GCC 2.16.1
06.	GCC 2.16.3
07.	GCC 2.17.1
08.	GCC 2.21.3
09.	GCC 2.22.1
10.	GCC 2.27.1
11.	GCC 2.27.1
12.	GCC 2.34.1
13.	GCC 2.35.1
14.	GCC 2.43.1
15.	GCC 2.43.2

Special conditions of contract (SCC)

The following Special Conditions of Contract (SCC) shall supplement and / or amend the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the GCC.

S.N.	GCC Clause Ref	Condition
1	GCC 2.1.1(l)	The Purchaser is: Indian Institute of Integrative Medicine , Canal Road Jammu -180001 <i>(name and complete postal address)</i>
2	GCC 2.1.1(m)	The Final Destination is: Canal Road Jammu -180001 (<i>complete postal address</i>)
3	GCC 2.13.1	The amount of the Performance Security shall be 10 % of the contract value.
4	GCC 2.15.2	The marking and documentation within and outside the packages shall be: (a) Each package should have a packing list within it detailing the part No(s), description, quantity etc. (b) Outside each package, the contract No., the name and address of the purchaser and the final destination should be indicated on all sides and top. (c) Each package should be marked as 1/x, 2/x, 3/x.....x/x, where "x" is the total No. of packages contained in the consignment. (d) All the sides and top of each package should carry an appropriate indication/ label/ stickers indicating the precautions to be taken while handling/storage.
5	GCC 2.16.1	Details of Shipping and other Documents to be furnished by the Supplier are : <u>For goods manufactured within India</u> Within 24 hours of dispatch, the supplier shall notify the purchaser the complete details of dispatch and also supply following documents by registered post / speed post and copies thereof by FAX/Email. (a) Two copies of Supplier's Invoice indicating, <i>inter-alia</i> description and specification of the goods, quantity, unit price, total value; (b) Packing list; (c) Certificate of country of origin; (d) Insurance certificate, if required under the contract; (e) Railway receipt/Consignment note; (f) Manufacturer's guarantee certificate and in-house inspection certificate;

- (g) Inspection certificate issued by purchaser's inspector, if any; and
- (h) Any other document(s) as and when required in terms of the contract.

Note:

1. **The nomenclature used for the item description in the invoices(S), packing list(s) and the delivery note(s) etc. should be identical to that used in the contract. The dispatch particulars including the name of the transporter should also be mentioned in the Invoice(s).**
2. **The above documents should be received by the Purchaser before arrival of the Goods and, if not received, the Supplier will be responsible for any consequent expenses.**

For goods manufactured abroad

Within 24 hours of dispatch, the supplier shall notify the purchaser the complete details of dispatch and also supply following documents by Registered Post/courier and copies thereof by FAX/Email.

- (a) Two copies of supplier's Invoice giving full details of the goods including quantity, value, etc.;
- (b) Packing list;
- (c) Certificate of country of origin issued by supplier;
- (d) Manufacturer's guarantee and Inspection certificate;
- (e) Inspection certificate issued by the Purchaser's Inspector, if any;
- (f) Insurance Certificate, if required under the contract;
- (g) Name of the Vessel/Carrier;
- (h) Bill of Lading/Airway Bill;
- (i) Any other document(s) as and when required in terms of the contract.

Note:

1. **The nomenclature used for the item description in the Invoices (s), packing list(s) and the delivery note(s) etc. should be identical to that used in the contract. The dispatch particulars including the name of the transporter should also be mentioned in the Invoice(s).**
2. **The above documents should be received by the Purchaser before arrival of the Goods and, if not received, the Supplier will be responsible for any consequent expenses.**

- | | | |
|---|------------|--|
| 6 | GCC 2.16.3 | In case of supplies from within India, the mode of transportation shall be by <i>Air/Rail/Road.</i>
<i>(retain one only)</i>
In case of supplies from abroad, the mode of transportation shall be by <i>Air/Ocean.</i>
<i>(retain one only)</i> |
|---|------------|--|

7	GCC 2.17.1	The Insurance shall be for an amount equal to 110% of the CIF or CIP value of the contract from within “warehouse to warehouse (final destination)” on “all risk basis” including strikes, riots and civil commotion.
8	GCC 2.21.3	The period of validity of the Warranty shall be 1YEARS(12 months) from the date of acceptance/installation and commissioning .
9	GCC2.22.1	<p>The method and conditions of payment to be made to the Supplier under this Contract shall be as follows: <u>Payment for Goods supplied from abroad:</u> Payment of foreign currency portion shall be made in currency of the Contract in the following manner:</p> <p>(a) On Shipment: 80 percent (80 %) of the Contract Price Of the Goods shipped shall be paid through irrevocable letter of credit opened in favour of the Supplier in a bank in its country, upon submission of documents specified in GCC Clause 2.16.</p> <p>(b) On Acceptance: 20 percent (20 %) of the Contract Price of Goods received shall be paid within thirty (30) days of receipt of Goods and successful installation & commissioning upon submission of claim supported by the acceptance certificate issued by the Purchaser along with the Performance security, if any.</p>
	GCC 2.22.1	The L/C will be confirmed at the suppliers cost, if requested specifically by the supplier. All bank charges abroad shall be to the account of the beneficiary i.e. supplier and all bank charges in India shall be to the account of the opener i.e. purchaser. If L/C is requested to be extended/ reinstated for reasons not attributable to the purchaser, the charges thereof would be to the suppliers' account. Payment of local currency portion shall be made in Indian Rupees within thirty (30) days of presentation of claim supported by a certificate from the Purchaser declaring that the Goods have been delivered and that all other contracted Services have been performed. The LC

		<p>for 100% value of the contract shall be established after deducting the agency commission payable if any, to the Indian agent from the FOB/FCA value.</p> <p><u>Payment for Goods and Services supplied from India:</u></p> <p>The payment shall be made in Indian Rupees, as follows:</p> <p><i>Payments shall be made promptly by the Purchaser but in no case later than thirty days after submission of the invoice or claim by the Supplier. While claiming the payment, the supplier should certify in the bill/invoice that the payment being claimed strictly in terms of the contract and all obligations on the part of the supplier for claiming the payment have been fulfilled as required under the contract.</i></p> <p>OR</p> <p>After shipment/delivery of 100% material at site : 70percent of the total material supplied .</p> <p>Price shall be paid on receipt of the Goods in good condition and upon submission of the documents specified in GCC Clause 16.1</p> <p>(b) On Acceptance: Balance amount of the contract value shall be paid to the Supplier within thirty (30) days after the date of the acceptance certificate by the Purchaser subject to submission of performance Bank Gaurantee.</p>
		<p>Note:</p> <p>All payments due under the Contract shall be paid after deduction of statutory levies at source (like ESIC, Income Tax, etc.), wherever applicable.</p>
10	GCC 2.27.1	The penalty shall be 0.5% per week or part of a week towards late delivery and towards delay in installation and commissioning.
	GCC 2.27.1	The maximum amount of penalty shall be 10%
11	GCC 2.34.1	The place of jurisdiction is Jammu (J&K) <i>(name of the place from where the contract is issued)</i>
12	GCC 2.35.1	For notices, the Purchaser's address is

		The Director, Indian Institute of Integrative Medicine Canal Road Jammu
13	GCC 2.35.1	Telephone: :+91- 2585032 EPABX Tel:+91_____ Facsimile number: :+91_____ Electronic mail address praphul.spo@iiim.res.in
14	GCC 2.43.1	The integrity pact is to be signed.
15	GCC 2.43.2	<i>The name and contact details of the IEMs are as under:</i> i) Sri Anand Deep IRS (Retd) IEM – CSIR Address 117/363, H-1 Next to Gurudwara Pandu Nagar Kanpur UP 208005 Mob No. :- 9044796781 Email anand.deep117@gmail.com

CHAPTER 3

(To be filled by the bidder as appropriate and enclosed with the Technical Bid)

SCHEDULE OF REQUIREMENT

Sl. No.	Brief Description of Goods & Services	Quantity	Physical Unit	Final destination/ Place	Delivery Schedule (to be filled by the bidder)	Time frame required for conducting installation, commissioning of the eqpt., acceptance test, etc. after the arrival of consignment (to be filled by the bidder)

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Term of delivery: FOB / FCA / CIF / CIP _____ *(named port of shipment or named place of delivery)*
(retain only one)

Period of delivery shall count from : _____

(to be filled by the bidder)

Scope of Supply : _____

Training requirement: _____

(Location, no. of persons, period of training, nature of training)

Date :

Place :

Signature of the Bidder

Notes for Bidders:

- (1) The delivery schedule shall clearly indicate the time period within which the successful bidder must deliver the consignment in full from the date of establishment of LC or from the date of contract or from the date of advance payment etc. It should also indicate separately the time period desired for installation and commissioning of the equipment after arrival of the consignment at the premises of the Purchaser.
- (2) The date or period for delivery should be carefully specified, taking into account
 - (a) The implications of delivery terms stipulated in the Instructions to Bidders pursuant to the Incoterms rules (i.e., EXW, or CIF, CIP, FOB, FCA terms—that “delivery” takes place when goods are delivered to the carriers), and
 - (b) The date prescribed herein from which the delivery obligations start (i.e., notice of award, contract signature, opening or confirmation of the letter of credit, date of releasing advance payment etc.).

Chapter 4

TECHNICAL SPECIFICATION

SUPPLY, INSTALLATION, TEATING & COMMISSING OF FUME HOOD,
LABORATORY FURNITURE AND SERVICING ON A TURNKY BASIS OF NPC
LAB. (ROOM No.-228 & 229) AT IIIM, JAMMU

Indian Institute of Integrative Medicine

Canal Road, Jammu Tawi. 180 001

(2020-21)

Sl. No.	Description	Reference
1	Pre Qualification Criteria for Tendering Bidding	1
2	Scope & Specification	2
3	Make List for the Scope of Work	3
4	Drawing	4

Sl. No.	Description	Reference
1	Pre Qualification Criteria for Tendering Bidding	1

BIDDER PREQUALIFICATION CRITERIA

Bidder shall meet all the pre qualification criteria as given below for qualifying to this tender. In the event of only one Bidder qualifying technically, the Technical Committee shall have the right to accept or reject the concerned bidder.

The bidder shall furnish a covering page indicating item wise compliance to all the Pre-qualification criteria. Bidder Prequalification Criteria are as given below:

- The Bidder shall have experience in Designing, Manufacturing, Supply, Execution, Commissioning & Servicing of Fume Hood & Laboratory Furniture on a turnkey basis **the following during the last 5 years ending the last day of the month**, as stated below:-
 - Fume Hood system
 - Lab furniture and accessories
 - Exhaust system
 - Gas and utility distribution system
 - Electrical / Fire extinguisher work
 - Utility Equipments and minor repair works
- The Bidder has carried out preferably similar works, same value of the estimated cost, in the 5 years ending on the last day of the month. At least one contract should be in Govt. Universities/any of Central PSU's / Autonomous Bodies. The project executed as such by the Bidder should be in operation currently. **The Bidder should produce the backup documents like Purchase Order, completion certificates etc.**
- Similar work shall mean "Manufacturing, Supply, Execution, Commissioning and Servicing of Laboratory Furniture Comprising of Lab Work Benches, Fume Hoods, Exhaust system, Gas and utility distribution system, Electrical and accessories"

- The bidder must have an experience of supply and installation of lab furniture and fume hoods in Chemistry Lab. At least one contract must be submitted for the same in addition to the above. The project executed as such by the Bidder should be in operation currently.
- The vendor should have a well established make in India (in house) manufacturing unit for the Lab Furniture & Fume Hood, Quality Management System as per International Standards providing the products and services on the continued basis for the last 5 years. The vendor shall possess the current / valid approval for such equipment manufacturing facility by a Statutory Certifying Authority, like Factory Inspectorate etc. A notarized copy of valid certificate needs to be enclosed.
- The Bidder should be an Official Member with SEFA for a continued basis from past 3 Year from this notification. (Supporting documents for the same need to be furnished) and bidder should provide have document of third party test facility.
- All tests referenced herein shall be performed in the bidder's fume hood test facility **"factory tested" & also the Field ASHRAE or EN 14175 testing is must.**
- If required, the technical committee from IIIM Jammu shall visit the similar works completed by vendors and submitted as mentioned above to assess their capability.
- The Participating bidder should have local Service set up in J&K (UT) or North India (Punjab, Haryana and Delhi NCR etc.)
- **The Bidder shall visit IIIM, Jammu, and Project site TO UNDERSTAND THE REQUIREMENTS OF THE SITE is must. The Bidder shall study the scope along with the technical team in detail before submitting a bid, if any query, they will put a question to Scientist In-charge or Site Engineer.**
- **The Bidder shall provide the complete documentary evidence duly self attested by notary for the following in support of Bidder Pre-Qualification Criteria.**

For Clause no. 1.0, 1.1, 1.2, 1.3, 1.4

1) Purchase Orders

2) Completion Certificates and experience of performance for jobs, issued by the clients.

3) Experience details duly filled in following format.

S.	Name	Name & location of the	Brief description of	Value of the	Documents
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No	of client	project	project	Project	submitted
					(PO copy & completion certificate) – (Y/N)

For Clause no. 2.0

1) Audited balance sheets of financial years 2015, 2016 & 2017.

2) Annual Turnover details duly filled in the following format.

Financial year	2016-17	2017-18	2018-19
Annual Turnover			

- **Note to Bidders: Offers of Bidders failing to submit the prescribed documents in support of the above prequalification criteria shall be rejected.**

The bidder shall perform AMC i.e maintenance of Laboratory Furniture, Fume Hood and utilities during defect liability period. (FREE after sell service)

Project substantial completion shall be withheld until all required Unit certification letters, tests, and reports have been submitted to and approved by the IIIM

Specifications and allied Technical details

FUME HOOD & ACCESSORIES:-

	TENDERED SPECIFICATIONS
	<p>SUMMARY AND SCOPE</p> <p>Furnishing and delivering all service outlets, accessory fittings, electrical receptacles and switches, as listed in these specifications, equipment schedules or as shown on drawings. Fittings attached to the fume hood superstructure shall be mounted on the front fascia of the hood as per the drawings. Furnishing and delivering all service outlets, accessory fittings, electrical receptacles and switches, as listed in these specifications, equipment schedules or as shown on drawings. Plumbing fixtures mounted on the fume hood superstructures shall be pre-plumbed with SS-304 TUBING. Electrical fixtures shall be prewired. The fume hood superstructure shall be listed to UL Standards for Safety by Underwriters Laboratories Inc. (UL). Final plumbing and electrical connections are the responsibility of Lab Furniture & Fume hood Supplier.</p> <p><u>SPECIFICATIONS:</u></p> <p><i>Frame construction:- (compulsory)</i></p> <p>Entire structure should be "C" frame type. 60 X 30 X 2 mm pipe is used for main frame structure. 30 X 30 X 1.5 mm pipe should be used for bottom support. CO₂ welded & finished with highly chemical resistant epoxy powder coating.</p> <p><u>Design Structure:</u> Aerodynamic, Floor mounted</p>

Airflow Type: AUTOSASH Type

Construction (Exterior): Pure Epoxy Powder coated 40-60 micron on 18 Gauge Galvanized steel with rigid structure

Construction (Interior): Phenol based high-pressure compressed compact laminate (6 -7mm thick)

Baffle arrangement: 3-point suction system (for light, normal & heavy fumes) with baffle to ensure smooth and immediate exhaust of fumes.

Airfoil: Flush powder coated airfoil mounted on the frame of the hood.

Worktop: Chemical resistant splash & spillage proof 'Jet Black Granite' worktop. The work surface and cup drain shall be available in black.

Sink, Water tap with drain arrangement: Worktop should have oval shaped 'PP' Cup-Sink for drainage with water valve.

Sash (Shutter): Vertical rising counter-balanced 'Toughened Float Glass' (5 mm thick) fitted in the Powder coated Aluminium extrusion from Hettich Germany or equivalent. Smooth and light sash operation. Clear sash open height = 770-775 mm.

Fume Hood Plumbing Services: Utility services like **Raw Water, Chilled Water Supply & Return, Compressed Air, Nitrogen, Vacuum** 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. All plumbing fittings shall be factory installed and piped between the valve and the outlet. Inlet piping shall have a single-point connection for each valve provided and carried to a point 1" above the fume hood roof or 1" above the worktop rear corner depending on the rough-in locations shown in the drawings, **All the Plumbing services connecting to the Valves & to the Header line, will be SS-304 ONLY.**

Fume Hood Electrical Services : The hood superstructure shall be wired and contain a UL label certifying acceptable wire gauge, connections, fixtures and wire color coding. Wiring electrical services shall consist of two duplex receptacles and a light switch. **3+3 nos of 5/15Amps Socket & switch, 230 Volt AC,** and 3-wire polarized grounded with ground fault interruption

Lighting: CFL/ LED/ tube light (20 or 40 watt, 2 No.) with metal enclosure for better illumination with less power consumption.

Electrical Utilities: Four nos. electrical sockets & switches, 'North West' make or equivalent (230 V, 5/16 A, 50 Hz), Switches have LED to indicate 'ON' position. A soft touch button panel with main switch, switch for blower & tube light & spare switch should be provided. LED indicators to show the ON & OFF positions of switches should be provided.

The control panel in the hood is provided with starter for blower.

Chemical Storage Base Cabinet : Castors type

Standard Steel

- Unless otherwise indicated 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 gauge except as follows:
- Corner gussets for leveling bolts and apron corner braces, 12 gauge.
- Hinge reinforcements, 14 gauge.
- 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.
- Complete rigid steel structure to support Fume hood
- Epoxy powder coated attractive color combination
- There should be two storage units with two shutters each. Each unit should have one shelf.

Level adjusting screws :To adjust fume hood level by ± 20 mm.

Damper :To regulate airflow a damper is provided at the outlet of hood.

Testing : All fume hoods are “**factory tested**” for design as per **ASHRAE 110 or EN 14175**. Also, “**on site validation**” for face velocity will be carried out to ensure working of fume hood as per international norms.

Location of Tests and Test Facility: All tests referenced herein shall be performed in the bidder’s fume hood test facility & **also the Field ASHRAE or EN 14175 testing is must.**

Hood shall be tested with a face velocity of 100 FPM open vertically till safe opening height and at 100 FPM right, left and centre 100% open horizontal.

Standards: Fume hoods must have third party certification of

ASHRAE 110

Or

EN 14175

QUALITY ASSURANCE

The laboratory fume hood manufacturer shall provide fume hood work tops and casework all **manufactured & shipped with** proper packing & should take the full responsibility of the entire scope of works as specified in the tender.

General Performance: Provide certification that fume hoods meet the performance requirements described in section.

PERFORMANCE TEST RESULTS.

Performance Test Results (Chemical Spot Tests):

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 2ounce wide mouth bottle to retard evaporation. 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.

- 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.

- **After testing, panel shall show no more than four (4) Level 3 conditions.**

- 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.	Dimethylformanide	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.		
Project substantial completion shall be withheld until all required fume hood certification letters, tests, and reports have been submitted to and approved by the IIIM.			

LABORATORY FURNITURE & ACCESSORIES:- CRCA (Cold Rolled Close Annealed or G. I. Sheets)

	TENDERED SPECIFICATIONS
	<p>SUMMARY AND SCOPE</p> <ul style="list-style-type: none"> Furnish all cabinets and casework, including granite tops, ledges, supporting structures. Include delivery to the building, set in place, level, and scribe to walls and floors as required. Supply & Installation of all utility service outlet accessory fittings, electrical receptacles, plumbing and electrical switches & fittings identified on drawings as mounted on the laboratory furniture. Supply & Installation of, 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. All tailpieces shall be furnished less the couplings required to connect them to

the drain piping system.

- Supply & Installation of service strip supports where specified, and setting in place service tunnels, service turrets, supporting structures and reagent racks of the type shown on the drawings.

I. GENERAL REQUIREMENTS:

SEFA Standard:

The entire Laboratory furniture should be tested as per SEFA-8M standards in SEFA Approved labs with latest 2016 Guidelines published by SEFA., Failing which it lead to disqualification of bid.

Note: - CRCA (Cold Rolled Close Annealed or Skin passed/zero spangle G. I. Sheets or both materials can be used.

Frame construction:- (compulsory)

Entire structure should be "C" frame fabricated out of heavy gauge hollow pipes size 60 x 30 x 2 mm and 2.0 mm thick steel plates. The structure will be provided with necessary leveling bolts suitable for ± 5 mm level adjustment. Open ends of the pipe will be provided with elegant finish plastic caps. The structure shall be duly treated for the rust prevention and coated with epoxy powder coated.

Powder Coating:-

Complete module & frame work are processed with 8 tank pre- treatment and finished with highly corrosion resistant 'Akzonbel/ PolyBond' epoxy powder coated for better corrosion resistance. The thickness of powder coat shall not be less than 50-60 microns, conforming to relevant BIS code, which accordingly passes the test of Salt Spray for 1000 hours.

II. TECHNICAL REQUIREMENTS:

General Requirements: It is the intent of this specification to provide a high quality steel cabinet specifically designed for the laboratory environment.

Sheet Steel: Cold rolled sheet or G. I steel shall be prime grade 16, 18 and 20 gauge; roller leveled, and shall be treated at the mill to be free of scale, ragged edges, deep scratches or other injurious effects.

Glass: Glass used for framed sliding and swinging doors shall be 1/8" float glass. Glass used for unframed sliding doors, shall be 1/4" float glass.

Steel Gauges:

- Gauges of steel used in construction of cases shall be 18 gauge, except as follows:
- Corner gussets for leveling bolts and apron corner braces, 12 gauge.
- Hinge reinforcements, case and drawer suspension channels, 14 gauge.
- Top and intermediate front horizontal rails, table aprons and reinforcement gussets, 16 gauge.
- Drawer assemblies, door assemblies and adjustable shelves, 20 gauge.

1. 0 Storage Cabinets Castors type : Standards Heavy Duty under Module along with two front lockable castor wheels & two rear non lockable castor wheels (For Easy cleaning Purpose & Aesthetic looks) , comprising of one drawer one shutter, one drawer and two shutter, all drawers and adjustable height shelf. Cabinet shutter should be in double skin construction and should be provided with heavy duty, knuckle and barrel type SS hinges and positive catch arrangement.

1.1 Cabinet Frame: 1.2 mm horizontal and vertical stiffeners and 1.0 mm vertical panel of CRCA (Cold Rolled Close Annealed) Or G.I sheet.

1.2 Cover Panels: End side panel and back panel should be of 1.2 mm thick CRCA MS sheet. All panels should be removable to repair any service line behind the units in future.

1.3 Shutters: Metal Shutters of CRCA or G.I sheet and 40-50 microns pure epoxy powder coating having a Scratch Hardness of 3Kgs.

1.4 Shelves & Drawers: CRCA or GI shelves with a load carrying capacity of 40-50 Kg. The overall load carrying capacity of cabinet to be 80 Kg of UDL – Uniformly Distributed Load (40-50 kgs. on each shelf and 40-50 kgs. on bottom). The overall load carrying capacity of drawer should be 40 kgs. of UDL for a pair of ball slide.

1.5 Slides & Handles: High precision double extension ball slides. Hinges to be spring loaded with CED (Cathode Electrode Deposition) coating with self closing mechanism. Handles should be PVC Recessed.

1.6 Locks: Each unit should have a locking facility with 180°, 10 lever cam lock mechanism.

1.7 Legs: The units to be supported on wide base Polystyrene legs (Hettich Make or equivalent) high impact proof material of base diameter 40-50 mm. Load bearing capacity of each leg should be at least 425- 450kg/ leg. The legs should be height -adjustable with a range of +/- 50 mm.

2. Reagent Shelves: should of be of complete modular design consisting of horizontal 2 stage storage shelves. The end vertical support should be 1.2 mm & horizontal shelves of 1.0 mm thick CRCA M.S./ G.I Sheet. Each shelf should have a load carrying capacity of 30-40 kgs. of UDL for the length of 1000 mm. The complete M.S. material of cabinet to be pretreated (degreased, Zinc phosphated) and epoxy powder coated for better corrosion resistance. The thickness of powder coat to be 45-50 microns, which

passes the test of Salt Spray for 1000 hours and having the Scratch Hardness of 3Kgs.

3. Polypropylene Drop in Sinks of size 558X455X300mm (approx.) made of high density 5mm polypropylene elasticity 5 micron/ thickness, should have PH resistance with organic desolvent.

4. 3 way faucets: Sink unit shall have 3 way (2 straight+1 swan neck) 360° turn type water faucets made up of Brass with epoxy powder coating. It should be PH and rust resistant. the switch valve cast to be made of ceramic that can avoid acid wear. The outlet produced in PVC, has detachable hose nozzles, alloy pressure, changeable high-pressure outlet constructed or normal clean outlet control of water flow faucet immediately.

5. SS Pegboard of overall size of 550x420mm (approx.). Adjustable PP pegs of 10mm dia. It should have a welded square tube of 20x40x1mm (approx.). Tube should be of PVC material.

6. Electrical Accessories and fittings should consist of electrical trunking of 1.0 mm thick CRCA MS sheet. It should have a high temperature withstanding capacity with excellent electrical insulation properties. The rear portion of above accessories which is in contact with live metal shall be made from thermo set material which should not melt on heating. Each electrical module consists of (North-West make or equivalent):

1) 2 No. 16 Amp 5 Pin socket

2) 2 No. 16 Amp Switch with LED

7. Work surface should be 18-19mm (± 1 mm) thick high quality granite in jet black color with pre moulded, pre polished edges. The backing material for granite should be 6 mm thick Neoprene mat.

8. Service Indexes:

Fittings shall be identified with service indexes in the following color coding:

Cold Water out-	Dark Green
Helium-	Dark Blue
Raw water-	Orange
Cold Water in-	Light Green
Nitrogen-	Brown
Vacuum-	Green
Hydrogen-	Pink
Nitrogen-	Light Blue

Applicable Standards:

SEFA 3 : Scientific Equipments & Furniture Association

SEFA 8M : Scientific Equipments & Furniture Association

Quality assurance and workmanship :

- ❖ Only approved brands of items shall be accepted. Samples shall be got approved before taking up full supply/installation.
- ❖ If required Tests on representative samples and/or components thereof shall be got conducted from reputed Laboratory as decided by the In-charge.
- ❖ Samples shall be taken/made as per the direction of the In-Charge in presence of the authorized representative of the contractors. Samples shall be signed and sealed by both the parties. Manufacture's Test certificate for the product being offered is to be provided to the department.
- ❖ The specifications are intended for the general description of the work quality and workmanship. The specifications are however not intended to cover the minute details and work shall be execute according to the specification given herein or in its absence the relevant **BIS/SEFA** specification/standards or the best practice recommended by relevant Indian Manufacturers or best trade practices.
- ❖ All material shall confirm to the approved makes of materials specified. The procurement of various materials shall be either from the manufacturers or their authorized dealers so that there is no duplicate/spurious makes are used. Notwithstanding all above, contractor shall be held responsible for the execution of works and use of proper best available quality of materials as per the tender specifications. For the items/materials not appearing in the list, the decision of Engineer-in-charge shall be final and binding.
- ❖ The contractor shall arrange stage wise inspection of the furniture at factory of the works by In-Charge or his authorized representative if asked for. Contractor will have no claim if the furniture brought at site is rejected by In-Charge in part or full lot due to bad workmanship /quality. Such furniture will not be paid for and the contractor shall remove the same from the site of work within 7 days after the written instructions in this regard are issued by In-Charge or his authorized representative.
- ❖ The contractor shall produce all materials in advance so that there is sufficient time for testing and approving of the material and clearance of the same for use in work. The contractor shall produce test certificates of all the material in respect of their conformation to the relevant Indian standards/quotation specifications. All tests required for the materials as desired by the In-Charge shall be at the contractors cost.
- ❖ Testing may also be carried out at the discretion of the In-Charge, from the lot of finished product brought at site by the contractor. In case such tests have been carried out by the principal manufacturer at its testing facility, the same will may be provided by the contractor for consideration.

List of approved makes of materials:-

- | | | |
|------------------------------------|---|---|
| ❖ Paint | : | ICI/Asian Paints/Berger/Oikos/Nerolac/Berger/Vijay coat/Jotun |
| ❖ Float Glass | : | Modi Guard/Glaver Bel/Saint Gobain |
| ❖ Expansion Bolts | : | Hilti/Fischer/Hettich |
| ❖ Glazing Sealant | : | Dow Corning/GE Sealant |
| ❖ SS/Chrome Coated Hardware | : | Dorma/Hafele/Hettich |
| ❖ Aluminum Alloy Extruded Section: | : | Hindalco/Indalco/ Jindal |
| ❖ Hinges | : | Hettich/Haffle/Grass |

Locks :	Dorset/Locksmith/Godrej/ Hettich/Haffle

EXHAUST SYSTEM (PP/FRP DUCTING AND ACCESSORIES) :-

	TENDERED SPECIFICATIONS
	<p><u>1. Exhaust duct (PP/FRP) Specification</u></p> <ol style="list-style-type: none"> 1. All ventilation duct components should be fabricated of polypropylene type I, Grade-I (dark gray) and /or polypropylene .The PP Grade I material can be rolled without heating, resulting in a lower cost for the finished product. 2. Round Duct- All ducts should be fabricated using polypropylene with glass lining sheets with fusion joints completed with flanges, bends, transition pieces, branch entries, MS supports with epoxy Painting ,GI hardware's etc. The polypropylene ducting should be lined with FRP lining of 3mm thickness and total thickness of PP-FRP should be 6-7mm. All supports used should be of MS with Epoxy painting. 3. Elbows should have radius an approximate centerline of 1-1/2" times duct diameter, 90° elbows can be either 3-piece or 5-piece meter, 45° elbows, 2 or 3 piece meter. If no preference is given, 3-piece 90° elbows and 2-piece 45° elbows will be provided. 4. Transitions should be tapered cone –type only. The cone will be the same material thickness as the duct material. Transitions should be concentric. 5. Branches should enter the main ducting at a 45° angle, unless otherwise specified. Couplings for sizes up to 24" can be either sleeve type (no stop) or standard with a stop. Only sleeve couplings are available in sizes above 24". Socket depth for both to be 3"-4". 6. Flanges for Size 6" through 20" will be heat formed from PP duct or cut from flat sheet stock. Leg size will either 1-1/2" x 3/16" for diameters up to 30" . 7. Bolt holes will be 3/8 "diameter on approximate 4"-5" centers. Suggested bolting can be either galvanized GI both should be 1/4"-20 x 1-1/2" long with a nut and two washers provided for each bolt. 8. Suggested gaskets should be 1/8" thick, closed cell neoprene for duct size up to 24". 9. Quadrant dampers or blast gates should be provided with a locking device for permanently setting after balancing. 10. End caps can be either permanently welded in place or fabricated to allow removal. 11. Access panels and / or view ports can be provided with clear PVC material or Plexiglas and will be held in place with SS self –tapping screws. 12. Installation (joining) can be accomplished with the belt and spigot (cementing) method, flanging or thermal welding.

Duct Construction

The fabricated duct dimensions should be as per approved drawings and all connecting sections are dimensionally matched to avoid any gaps.

Duct Sizes In mm	Thickness of PP	Thickness of FRP
0-750mm	3 mm	3 mm
750-1500mm	5 mm	5 mm
1500-2000mm	5 mm	8 mm

Support System

A completely supporting system consisting of fully threaded rods, double L bottom brackets nuts, Washers, clamps for circular ducts and anchor bolts as supplied.

Flexible Connections

Provide flexible duct connections wherever ductwork connects to vibration isolated equipment and on all exhaust final connections to spot extractor and as indicated on the drawings. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make air-tight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse and tensional movement and also capable of absorbing vibrations of connected equipment.

Flexible connections shall be air tight and resistant to water and fire.

Flexible connections shall be fitted to isolate fans from equipments and/or ductwork. The connections shall be arranged to permit the renewal of the connection without disturbing the duct work or the plant. The metal parts of connected equipment shall be separated by not less than six inches and installed with sufficient slack to compensate for free movement of fans or spring vibration isolators.

2. SPECIFICATION FOR PP EXHAUST BLOWER

- The exhaust fans supplied and installed shall be of 'Centrifugal Corrosion Resistant' type and shall be capable of delivering the design flow rate against all duct losses.
- The fans shall be robust in construction and suitable for continuous duty operation. It shall be mounted with ease of maintenance and shall be installed with proper vibration isolators to minimize vibration transmission to ductwork and support structure.
- Fans selected shall be silent and vibration free when running and suitable for outdoor use.
- The fan speed shall not exceed 3000rpm.
- Aerodynamic performance of the fan shall be tested and comply with 'AMCA' and 'ISO5801' standards.
- The casing shall be of self-supporting design, thermoformed (size 400 and below), welded by machine (automatically welded for size 400 and below). The material of construction shall be fire retardant polypropylene (PPs) for fire safety and suitable for use against corrosive 'medium' and a maximum allowable operating temperature of 70°C.
- Impeller material shall be fire retardant polypropylene (PPs) for fan size up to 400 (polypropylene {PP} for fan size 450 and above) suitable for use against corrosive 'medium' and a maximum allowable operating temperature of 70°C.
- A standard hub seal shall be incorporated onto the impeller hub to prevent corrosive 'medium' from contacting the shaft.
- The fan shall be driven by a standard TEFC electric motor with class 'F' insulation and class 'B' temperature rise. Motor shall be suitable for outdoor installation with IP55 protection and suitable for operation with 415V/3Ph/50Hz electrical supply. Motor supplied shall be in accordance to IEC standards.

The fans have to be installed with easy access for maintenance. The installation has to be made by well-trained specialists of the OEM :

- The fans have to be erected on vibration absorbers to avoid the transmission of sound and vibrations to the building or foundations.
- The vibration absorbers have to be fixed to the foundation.
- The inlet and outlet ducts have to be connected with flexible sleeves to the fan.
- The regulation of standard DIN EN 60204-1 for the electrical installation and the electrical safety requirements have to be fulfilled.
- Start and stop devices shall be easy to operate and have to be marked clearly.
- In case of condensation liquid occurring inside the housing, it has to be equipped with a condensation drain at the lowest position of the housing and to be connected to a drainage pipe.
- For cooling, a sufficient air stream has to be assured.
- If a fan inlet is not connected to a duct, the inlet must be protected with a grid.
- Fans, which are openly accessible, have to be protected with a scatter shield around the housing.

Test run and commissioning:

- Check, whether inlet and outlet are connected to ducts or protected by a protection grid.
- Check mechanical and electrical safety devices; make sure, they are properly installed.
- Check the rotation of the impeller by means of a quick switch on/off of the motor; it must run in the direction as shown on the arrow. In case of wrong direction, change the connection of the

wires.

- To protect the motors against overload, the fans shall never be operated with open
- Inlet or outlet. For test runs, the inlet has to be covered with a suitable plate.
- The current (Amps) as indicated on the motor data plate shall never exceed. The fan has to be checked for its' smooth running.

3. SPECIFICATIONS FOR MOTOR AND ACCESSORIES

Use an electric motors built to IEC standards flange mounted (B5) and Foot mounted (B3), also in ex-protected or multistage versions, for the drive. The impeller hub is coated with aluminum. Power transmission from motor to impeller by means of a directly mounting the impeller on motor shaft. The impeller is fixed on to a flange bearing and the tightening adopter system guarantees secure mechanical connection.

Motor Standard IEC three-phase motors in accordance with IEC.Mounting B5 and B3

Available in motor-mounted (IP55) or cabinet-mounted versions.

The fan shall be driven by a standard TEFC electric motor with class 'F' insulation and class 'B' temperature rise. Motor shall be suitable for outdoor installation with IP55 protection and suitable for operation with 415V/3Ph/50Hz electrical supply. Motor supplied shall be in accordance to IEC standards.

GAS, UTILITY & DRAIN DISTRIBUTION SYSTEM:-

	TENDERED SPECIFICATIONS
	<p>UTILITY & GAS DISTRIBUTION SYSTEM</p> <p>GENERAL:</p> <p>The Gas Distribution System has two independent types of systems namely Bottled Gas System and Compressed Gas System. Utility Services like Raw Water fed from Header line located around the building wall provided by Client. Whereas the Compressed Air, Vacuum, Nitrogen & Chilled Water services are fed from the respective source Equipments located behind the MCD lab-2 building wall for old block and behind the Gents wash room at Ground level.</p> <p>The Gas Distribution System consists of following: Source points, Compressed Gas Cylinders and accessories like Bull noses, Flexible Hoses, Change over Panel, Cylinder Isolation Valves, Check Valves, Excess Flow Check Valves, and Flash Back Arrestors. Tubs & Tube Fittings, Floor Isolation Valves, Branch Isolation Valves, Point of Use Regulators, Pressure Gauges, Gas Purifier, Gas Distribution Panel, All Tubing and fittings are supported by aluminum profile, MS angles and clamps with Nut & bolts.</p> <p>TECHNICAL REQUIREMENTS:</p> <p>GENERAL:</p> <p>It is the intent of this specification to provide a high quality gas distribution system for the laboratory usage.</p> <p>GAS TUBING:</p> <ul style="list-style-type: none">• Tubing sizes up to 1" and including ¼", ½", ¾" OD should be bright annealed. Tubing with outside diameter larger than 1" OD should be supplied in annealed and pickled condition.• Material of Construction (MOC) of the Tubing & Fittings shall be SS304.• Tubing hardness should have a max HRB 80.• The tubing should be supplied with plugged ends.• Tubing should fully annealed, high quality, Stainless tubing as per ASTM A269 or A213, or DIN-17456 & 17458 (Class-1).• Working Pressure of tubing as listed in ASME B31.3, for ASTM A269 tubing at –20 to 100°F (–28 to 37°C).

TUBE FITTINGS:

- The fittings shall be of welded type, the fittings shall be capable of holding the maximum working pressure of the tubing without any leak.
- All the fittings end connections shall be compatible to tube of hardness less than or equal to RB 80.
- Fittings for the Tubing running above the false Ceiling, Header & Sub Header shall be Welded type. Fittings for the droppers connected to sub Header shall be Compression type.
- Tube to tube joints and braches are joined by the way of orbital welding up to 1" OD tubes. And Socket welding/Butt Welding to be carried out for the Tubes which are greater than 1" OD.

AIR COMPRESSOR:

Air Compressor shall be installed behind the back side of MCD left side of flag post feed the Compressed Air to 24 User Points installed on left side of ground floor of (Room No- 202, 203, 228 to 231) old block. This Compressed Air shall be fed from the compressor with 6.9 bar pressure. The Air Compressor of 10 CFM (15 M3/Hr) capacity shall be able to deliver 15 LPM at user point @ 60% Diversity.

Delivery	14 CFM
Discharge Pressure	6.9 Bar
Type	V Belt Drive
Electrical Conditions	415 / 3 PH / 50
Type of Motor	TEFC
Driver	5 HP
Accessories:	a). Horizontal Receiver with safety Valve, pressure gauge & Auto drain. b). Air Drier with pre & after filter c). After Cooler

VACUUM PUMP:

Vacuum Pump shall be installed behind the back side of MCD left side of flag post to maintain vacuum for 30 User Points installed on left side of ground floor of (Room No- 202, 203, 228 to 231) old block. Vacuum Pump of capacity 34 CFM (58 m3//Hr) capacity considered. This pump can be able to receive 28 LPM at User point @ 60% Diversity.

Actual Delivery	34 CFM
Max. Vacuum	24" of Hg with closed intake
Electrical Conditions	415 / 3 PH / 50
Type of Motor	TEFC
Speed	1800 RPM
Driver	5 HP
Accessories:	a). Vacuum Switch b). Vacuum Gauge c). Silencer d). 500 Lts. Scrubber

Piping: Piping for Vacuum System inside the Laboratory shall be considered as closed Loop.

PROCESS CHILLER

Process Chiller shall be installed behind the back side of MCD left side of flag post to feed the Chilled Water to 32 User Points installed (Room No- 202, 203, 228 to 231) old block. The Water comes out from the Equipment shall be directed through necessary tubing & fittings. Chilled Water System considered as Closed Loop System. The Process Chiller of 4 TR Capacity shall be able to discharge 50 LPM at user point @ 30% Diversity.

Refrigeration Load	4 TR
Inlet Temp to Chiller	-20° C approx
Outlet Temp to Chiller	-10° C approx
Cooling type	Air Cooled
Flow Rate	50 LPM
Refrigerant	R-22
Condenser Type	Finned Tube type
Power Consumption	Less than 6.5 KW
Noise Level	Less than 75 db at 1.0 m distance

INSULATION:

To avoid heat gain and reduced efficiency of cooling systems, condensation of water on surfaces, and potential corrosion problems, pipes in chilled water systems should always be insulated. For Outdoor application, should be painted with Arm finish FR paint of Two Coats.

Material	Nitrile Rubber
Max. Surface Temperature	+105° C
Min. Surface Temperature	-50° C
Thermal Conductivity @ 0° C	0.035 W /(m . k)

The Insulation wall thickness schedule is based upon Normal Design Conditions of 85°F (29.4°C) and 70% RH. Deviations from these design conditions may change the Insulation thickness requirements.

Pipe Size	Insulation Thickness
Up to 1"	13 mm
Up to 6"	19 mm

HOT WATER SYSTEM:**PPR Pipes**

The PPR pipe (Poly Propylene Random Copolymer) is one of the latest pipes resulting from European advanced technology. The quality of our PPR pipes is entirely up to the standard of DIN8077/8078. Polymers which are a high molecular weight polymer and contain stabilization package in order to prevent thermal degradation of material during the piping processing and to provide outstanding performance during the usage of pipe. It is considered as the optimal pipe material for cold and hot water system. PPR SDR 7.4 (PN 20) pipes shall be used for hot Water System.

Advantages:

- Widely used in distribution of water / drinking water installation in Residential area as it is not detrimental to human health. It's Hygienic and Odourless. There is no bacterial or Fungal Growth and no Contamination.
- Resistant to heat or cold. No need for insulation against heat. Withstands temperature range – 2 Degree Celsius to 90 Degree Celsius. Keeps inner climate constant.

- Endures to climatic condition.
- Resistant to corrosion, does not rust or decay, No scaling or calcification.
- Resistant to chemical reaction, acids, salt and alkalis, may safely be used together.
- Low friction losses. Resistant to abrasion.
- Extremely light weight – easy to transport & install.
- Strong tough and long lasting - can be safely used for duration of minimum 50 Years.
- Leak Proof Joints (Zero maintenance, Easy repairs)

Mechanical & Thermal Properties

Impact Strength	1.1 - 14.0
VICAT Softening Temp., 0C	130
Maximum Safe Working Temp., 0C	95
Water Absorption (%) Maximum	0.03
Specific Gravity g/cm ³	0.9
Density g/cm ³	0.91
Thermal conductivity at 23oC W/m.k	0.23
Friction Factor	Very Low
Chemical resistance	Very High

Permissible Operating Pressure

Temp Deg C	Pressure Kg/cm ² SDR 6 (PN 20)
10	38
20	32.4
30	27.3
40	23
50	19.5
60	16.2
70	12.3
80	7.7

Chemical Resistance

One of the characteristic of Polypropylene Random Copolymer (PP-R) is its property of having the greatest chemical resistance. The chemical resistance of any substance has direct relation with its properties, its composition, its concentration, heat and duration under effect. The chemical resistance chart for the Chemicals with different composition and concentration and their resistance at various temperatures can be provided on request.

Thermal Insulation

Thermal Insulation may be installed for the purpose of preventing sweating and condensation. However Polypropylene material has rather low thermal conductivity, thus PP-R pipes require less insulation material than metal pipes. For example PN 20 pipe will have 53 deg C surface temperatures as a result of transporting water at temperature 80 deg C for a continuous time.

Insulation Thickness for Exposed Hot Water Pipes.

Dimension (mm)	Thermal Conductivity (W/mk) of Insulation Material	
	0.030	0.035
	Recommended Minimum Insulation Thickness	
20	6 mm or 1/4"	10 mm or 3/8"
25	6 mm or 1/4"	10 mm or 3/8"
32	10 mm or 3/8"	13 mm or 1/2"
40	10 mm or 3/8"	13 mm or 1/2"
50	10 mm or 3/8"	13 mm or 1/2"

GEYSER

An electrical geyser is a sizable container which heats water using an electrical element. This is to control

the temperature and control power consumption. A geyser is fitted with valves than control pressure caused by the expansion and possible over heating of the geyser. Electric Geyser equipped with safety measures like thermostat, reset, fuse plug, vacuum release valve and pressure release valve.

Capacity	03 LPM
Tank Capacity	06 Liters
Power Consumption	03 kW
Temperature Output	69.5° C
Size	469 X 295 X 290 (LXWXB)

GAS CYLINDER CHANGE OVER PANEL:

Single-Stage Gas Panel to reduce cylinder pressure to a certain line pressure for in house use with internal gas purging and Process gas outlet shut-off valve. These Gas Panels are used for Inert, Reactive, Flammable and Oxidizing Gases and gas mixtures.

These gas panels are mounted on a stainless steel panel and consist of a pressure regulator, inlet and outlet pressure gauges, a relief valve and shut-off valves for the process gas. A choice of stainless steel coils or flexible high pressure hoses is available for the connection to the gas cylinder. Provision for contact pressure gauges (accessories) facilitates monitoring of the gas reserves.

Gas panels are permanently installed in the cylinder stock room or cabinet and reduce the cylinder pressure to a lower line pressures. The gas is guided to the point of use via the subsequent piping system. This Gas Panel allows purging to be carried out with internal gas while cylinders are being changed and flushes the atmospheric air from the system; gas purity is maintained and also shutting-off of gas flow during cylinder change with the panel itself. Standard application for these panels: centralized or decentralized gas supply for highly sensitive analysis devices.

Pressure decreases of the active cylinder (or bundle) below a preset level cause's semi-automatic switch over to the full cylinder side. This is achieved by two integrated regulators (factory set to slightly different delivery pressure levels), connected at their outlet ports. Moving the lever towards the full battery side, this allows disconnecting & replacing the empty cylinder without interrupting the gas supply. The level position always indicates cylinder priority in being discharged.

Technical Details:

Body material : Brass

Dimensions (LxHxD)	:	400 x 155 x 240 mm
Purity	:	Max. 6.0
Inlet pressure	:	230 bar
Outlet Pressure range	:	14 bar
Inlet Connection	:	N14 (=NPT ¼")
Outlet Connection	:	N14 (=NPT ¼")
 Cylinder Bracket: Cylinder Brackets are used to mount the cylinder on Wall to avoid down fall of Gas Cylinder.		
 <u>VALVES:</u>		
 BALL VALVES		
Ball Valves of required size shall be installed at each source Point of the Service. Ball valve with required size shall be considered at shaft opening of each floor.		
Type:	Ball type	
Size	½" OD to 1" OD	
MOC:	SS304	
Flow:	Straight (2-Way)	
Seat Material:	Reinforced PTFE	
Rating:	-29°C @ 1965 kPag to 150°C @ 1580 kPag.	
Teflon gland packing with Silicone base lubricant and the valves shall be factory tested at 1000 PSIG and certification shall be produced.		
 PRESSURE GAUGE:		
General Purpose Stainless Steel Pressure gauges of 63 m dial size to be installed in every lab / bench or special purpose equipments in order to know the pressure rating.		

Rating: 0 – 25 bar

Accuracy: 63 mm (2 1/2 in.): ± 1.5 % of span.

Mounting type: Center back mount type.

End Connection: ¼" Male NPT

Dial Size: 63 mm (2 ½")

Operating temp.: Unfilled: –40 to 140°F (–40 to 60°C)

MOC: End Connection & Burdon tube will be SS 316, Casing will be SS304.

Temp. Error: ± 0.4 % for every 18°F (10°C) temperature change from 68°F (20°C)

LINE REGULATOR

Single-stage line regulator used for inert, reactive, flammable, oxidizing gases and gas mixtures in laboratory system. Line regulators are used to reduce line pressure to various low pressure levels at the specified area to be controlled. Pressurized gas enters the regulators from the line. When the hand wheel is turned clockwise, it compresses the spring and gives a force on the diaphragm, which pushes the valve stem open. This releases gas into the low-pressure chamber, exerting an opening force on the diaphragm. Equilibrium is reached, when the spring force on the diaphragm is equal to the opposing force of the gas in the low-pressure chamber.

Type of pressure reducing	: laboratory regulator system
Pressure stages	: single-stage
Mounting details	: plate mounted with inlet from top
Material	: Brass chrome-plated.
Inlet Pressure	: 50 bar
Outlet Pressure	: 0.2 to 14 bar
Inlet connection	: NPT 1/4"
Outlet connection	: NPT 1/4"

GAS PURIFIER:

Gs Purifiers are used to get Ultra High purity (UHP) gases. It contains Moisture Trap, Hydrocarbon Trap & Oxygen Trap with Micron Filters and also Pressure Gauge, Pressure Regulators and Toggle Valve.

Moisture Trap:

Application	: Moisture Removal
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	<p>Filter Type : Silica gel / Molecular Sieve</p> <p>MOC : Clear acrylic / safe glass tube</p> <p>Capacity : 210 CC</p> <p>Working Pressure : 10 Bar</p> <p>Max. Operating Temp : 50° C</p> <p>Hydro Carbon Trap:</p> <p>Application : Hydrocarbon Removal</p> <p>Filter Type : Activated Charcoal</p> <p>MOC : Clear acrylic / safe glass tube</p> <p>Capacity : 210 CC</p> <p>Working Pressure : 10 Bar</p> <p>Max. Operating Temp : 50° C</p> <p>Oxygen Trap:</p> <p>Application : Oxygen Removal</p> <p>Filter Type : De-Oxo Chemical catalyst</p> <p>MOC : SS316</p> <p>Capacity : 210 CC</p> <p>Working Pressure : 10 Bar</p> <p>Max. Operating Temp : 50° C</p> <p>Gas Distribution Panel:</p> <p>Gas Distribution Panel is used where more than one gas required for a single instrument. It helps to controls the flow and Pressure of different gases for the particular instruments. The Gas Distribution Panel consists Toggle Valve, Pressure Gauge, Pressure Regulator and Spiral Tubing.</p>
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WELDING:

Tube to tube joints and braches are joined by the way of orbital welding up to 1" OD tubes. And Socket welding/Butt Welding to be carried out for the Tubes which are greater than 1" OD.

Orbital Welding:

Method for joining tubes will be orbital welding, Orbital welding is cleaner, reliable way of joining pipes and purity is guaranteed by orbital welding.

Orbital welding is a mechanism in which the arc from a tungsten electrode was rotated around the tubing weld joint. The arc welding current was regulated with a control system thus automating the entire process. The result was a more precision and reliable method than the manual welding method it replaced. Orbital welding systems offer computer control where welding parameters for a variety of applications can be stored in memory and called up when needed for a specific application. The skills of a certified welder are thus built into the welding system, producing enormous numbers of identical welds and leaving significantly less room for error or defects. In the orbital welding process, tubes/pipes are clamped in place and an orbital weld head rotates an electrode and electric arc around the weld joint to make the required weld.

Radiographic Test for Welds:

Radiographic Testing for Welded Joints of higher size pipes should be carried out.

The beam of radiation must be directed to the middle of the section under examination and must be normal to the material surface at that point, except in special techniques where known defects are best revealed by a different alignment of the beam. The length of [weld](#) under examination for each exposure shall be such that the thickness of the material at the diagnostic extremities, measured in the direction of the incident beam, does not exceed the actual thickness at that point by more than 6%. The specimen to be inspected is placed between the source of radiation and the detecting device, usually the film in a light tight holder or cassette, and the radiation is allowed to penetrate the part for the required length of time to be adequately recorded.

INSPECTION AND TESTING

Performance Test for Gas System:

A. Installation Purging Procedures:

- The sealed tubes after starting the process of cutting and debarring has to be purged with general purity nitrogen.
- Connect the tubes to the flexible hose of the regulated supply (at 2 bars) and blow the debris for 5 min.
- To ensure the purging is totally complete, blow the tubes intermittently holding the pressure for few seconds at the end of the tube.
- Now use the tube to swage the fitting. And install the tube with the fitting at the required place.

B. Pre Testing Purging Procedure

- Once the main header and the sub header installation is complete, check for the misalignment or improper fitting connections.
- Connect the regulated pressure from the Nitrogen cylinder and blow the system for 15 mins nonstop.
- Start the process again after 15 mins duration and blow the system for another 10 mins.
- Reconnect the needle valves and open the port fully.
- Start the purging process one more time with the valve open blow the whole system for 30 mins.
- Now the system is completely purged and now ready for handing over after the pressure test.
- Please note purged air must be directed to outside of Lab.

C. Pressure Testing Procedure

- Ensure complete piping is purged with prior to pressure test. Use Nitrogen for leak check. Please

note purged air must be directed to outside of Lab.

- Ensure the system point is not hooked up to the lab equipment.
- Shut-off point of use valve and pressurize system through the cylinder regulator.
- Increase pressure slowly to maintain 30 psi and shut-off the cylinder valve. Observe the pressure gauge for evidence of pressure drop.
- If the pressure drops, trouble-shoot leaking joints by using "Snoop" liquid leak detector rectify as necessary.
- Proceed to increase pressure to 100 psi if no leak is detected after 15 mins. of pressurization at 30 psi.
- Repeat above if leak is detected.
- Proceed to increase pressure to 1.5 times the working pressure of the system. (Normally system with same procedure as above.
- Maintain pressure for 12 hours and check for evidence of pressure drop.

D. Preliminary Testing

Preliminary Leak testing will be carried out in two phases:

Pressure decrease method (Pressure testing: 1, 5 times the maximum working pressure). Necessary formats will be used and all relevant data will be recorded during the test. GDS vendor and Management staff of client will jointly witness the test and certify the same.

TIFF leak detection:

Necessary formats will be used and all relevant data will be recorded during the test. GDS vendor and Management staff of client will jointly witness the test and certify the same.

MATERIAL OF CONSTRUCTION (M OC):

SL N.	ITEM'S NAME	MOC
01	Change Over Regulator	Brass
02	Line Regulator	Brass
03	Point of Use Regulator	Brass

04	Utility & Gas Tubing	SS 304
05	Tube Fittings	SS 304
06	Hot Water Pipes & fittings	PPR
07	Chilled Water Insulation	Nitrile Rubber
08	Valves	SS304
09	Tubing Support	Mild Steel
10	U Clamps	Stainless steel
11	Clamps	Virgin Polypropylene
12	Cylinder Bracket	MS Steel

SCOPE OF WORK:

- Supply & Installation of the Utility & Gas Distribution System comprises the following.
- Supply, Installation, testing & commissioning of Source Equipments (i.e. Air Compressor, Vacuum Pump & Process Chiller) at Ground level.
- Preparing the Foundation Details for the Source Equipments and submit the same to the Project Manager in order to co ordinate with Civil Vendor.
- Supply, installation and joining of tubes/Pipes with fittings by means of Orbital Welding and Socket Welding from the Source Equipments to the respective Header inside the lab.
- Raw Water shall be tapped from the Header line with necessary source connector located around the building wall provided by Client.
- The Routing of the Pipes & location of supports as per the specifications & approved Drawing.
- All Services considered from the Source Point to user points with necessary accessories & fittings.
- Performance test for whole System shall carry out by contractor/vendor in order to find any defects in the System. Pre-installation Purging Procedure for the tubes shall be carried out as per specifications. Pre-Testing Purging Procedure shall be carried out to eliminate the misalignment or improper fittings connection as per specifications. Pressure Testing Procedure Ensure complete piping is purged with prior to pressure test. Use Nitrogen for leak check. Purged air must be directed to outside of Lab.
- Technical Data Sheets of all equipment, materials and Samples shall be submitted for approval prior to installation works.
- Preparation of execution drawings and descriptive Technical Documents for all equipment shall be

submitted.

- Coordination with other contractors/Vendors with regard to installation of Source Equipments, Tubes/Pipes, Supports, Cables etc.
- Submission of hard-bound copies of Operation and Maintenance Manuals complete with as-built drawings.

LAB EFFLUENT DRAINAGE SYSTEM

GENERAL:

Drainage System considered from Fume Hood cup sink outlet, Sink Outlet to Header line located around the building wall provided by Client.

Drain Header with necessary supports and connected to the Drain Header. Drainage pipes and fittings thermal weld type. Drain Point for Safety Shower is not considered. Floor Drain / Drain Pan should be provided by client, for periodic testing. Civil cut out on Wall/Floor, Floor Trenches to be carried out by client/others.

PIPES:

High density polyethylene (HDPE) is being used as drainage pipe material. These HDPE pipe shall comprise following features.

- The Pipe shall be lightweight, corrosion resistant, easy to install, and has a low maintenance cost.
- The pipe shall be safely used as waste pipe for temperatures of up to 80°C. Temperatures of up to 100°C are permissible for short periods (e.g. surges of steam). The system is equally suited for freezing temperatures and adapts elastically to cope with expansion, remaining completely intact and undamaged after thawing.
- These pipes undergo a licensed annealing process in hot water to reduce inherent tensile stresses created during manufacture. This process ensures long-term joint integrity, as thermal expansion and reversion are reduced compared with untreated pipes.
- Pipe shall be unbreakable at room temperature and offers excellent impact resistance even at temperatures of – 40°C, thus meeting the requirements for drainage systems.
- Also offers considerable resistance to chemicals, because of its paraffin structure. The system is insoluble in all inorganic or organic solutions at 20°C.
- The flexibility of these pipes guarantees crush resistance and superior performance in applications where pipes pass through expansion joints or are subject to traffic vibration.
- Pipe's resistance to abrasion is a particularly important factor for branch pipes, soil stacks and ground pipes. It is very resistant to abrasion; its extra thick walls offer superior protection from both internal and external abrasion.

	<p>PIPE FITTINGS</p> <p>Pipe Fittings like Tees, Elbows, sleeves, etc shall be considered at appropriate location and all these shall be welded or electro welded.</p> <p>The Expansion Socket is designed to counteract the variation in length due to thermal expansion and contraction of max. 6 m pipes. When fitting collector pipelines extend 6 m it is necessary to fit expansion sockets and secure them with pipe supports. HDPE expansion socket absorb thermal expansion and contraction due to temperature changes caused by water discharge, but it also makes pipe assembly easier, assisting connection at each floor level.</p> <p>Some Connections shall be made by Electro weld Sleeve coupling, the electro weld sleeve coupling is the ideal connection on-site, for subsequent changes or wherever access is not easy.</p>
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ELECTRICAL WORKS AND ACCESSORIES) :-

	TENDERED SPECIFICATIONS
	<p>GENERAL</p> <p>Prior to laying and fixing of conduits, the contractor shall mark the conduit route, carefully examine the working drawings prepared by him and approved by the Consultant indicating the layout, satisfy himself about the non interference in the route, sufficiency of number and sizes of conduits, location of junction boxes, sizes and location of switch boxes and other relevant details. Any discrepancy found shall be brought to the notice of the Owner's site representative. Any modifications suggested by the contractor should get written approval before the actual laying of conduits is commenced.</p> <p>PVC CONDUIT AND ACCESSORIES</p> <p><u>PVC Conduit</u></p> <p>Conduits and accessories shall conform to latest edition of IS-9537 part 3 and shall be heavy duty wall thickness of 2.0 mm rigid tubes which are unscrewed without coupling and with plain ends. All conduits used shall not be less than 20 mm diameter. PVC conduit shall be used for all concealed / embedded installation.</p> <p><u>PVC Conduit Accessories</u></p> <p>Accessories used for conduit shall be of an approved type complying to relevant IS code.</p>

All accessories used shall be of standard white or black colour, identical to conduit used.

Plain conduits shall be joined by slip type of couplers with manufacturer's standard sealing.

MAINS AND SUB-MAINS

Mains and sub-mains cable or wires where called for shall be of the rated capacity and approved make. Every main and sub main wires shall be drawn into an independent adequate size of conduit. Earthing shall be in conformity with relevant IS codes and calculations shall be submitted for verification. An independent earth wire of the proper rating shall be provided for every single phase sub-main. For every 3 -phase sub-main, 2 No. earth wires of proper rating shall be provided along with the sub-main. The earth wires shall be drawn along with circuit wires through conduit. Where mains and sub-mains cables are connected to switchgear, sufficient extra lengths of cable shall be provided to facilitate easy connections and maintenance.

1. WIRING FOR POWER AND LIGHTING CIRCUITS

Wiring for power and lighting circuits shall be carried out in separate and distinct wiring systems. Wiring for emergency system shall also be carried out in a separate and distinct wiring system. Balancing of circuits in a three phase system shall be arranged before the installation is taken up. The wiring system envisaged is generally shown on the layout drawings and line diagrams. However, a brief account of the general wiring system is given below:

- a. Sub mains wiring - Wiring from Main / Sub Main Switch Board to the individual MCB distribution boards.
- b. Circuit wiring - Wiring from MCB DB to the nearest switch/control box for lighting, fans, sockets, switches, call bells for each circuit, and onward looping to the next switch / control boxes.

The sub-main wiring shall be either in 3 phase 4 wire or single phases 2 wire system. Each sub-main wiring circuit shall also have its own PVC insulated copper earth continuity wire/s as per detailed drawings and specifications.

Circuit wiring shall be in single phase system. However, a maximum of 2 single phase circuits belonging to the same pole/phase could be installed in the same conduit. Not more than ten points - light, fan, and 5A socket shall be grouped on one lighting circuit.

R - Red	Neutral	:	N - Black
Y - Yellow	Earth	:	G - Green
B - Blue	Emergency	:	E - Grey

SWITCHES, SOCKETS & ACCESSORIES

Light control switches shall be of a 5/15A rating for controlling light points as specified in bill of quantities. Light control switches shall be of plate type design with MS/GI/PVC/WOOD boxes suitable for flush mounting for general lighting, as specified in BOQ.

All sockets 5A and 15 A ratings shall be of flush mounting type with control switches of plate type design of the same rating as that of the sockets. All sockets outlet shall be of 3 pin type with box.

2. SWITCHES, RECEPTACLES (MODULAR), LIGHTING FIXTURES & LIGHTING CONTROL EQUIPMENT

2.1 SWITCHES

All switches shall be enclosed type flush mounted suitable for 240 volts AC. All switches shall be fixed inside the switch boxes on adjustable flat M S strips/plates with tapped holes and brass machine screws, leaving ample space at the back and sides for accommodating wires. Switch controlling the light point shall be connected to the phase wire of the circuit and load on each switch shall be restricted to maximum 800 watts & maximum 1500 watts per circuit. All wiring accessories shall be BIS approved. Perfect alignment shall be maintained while fixing of the back boxes.

2.2 WALL SOCKET OUTLET

Wall socket outlets shall be of the three pin. The switch controlling the socket outlet shall be on the phase wire of the circuit and not more than two socket outlets of 16 amps shall be connected on one circuit. An earth wire shall be provided along with the circuit wires and shall be connected to earthing screw inside the box. The earth terminal of the socket shall be connected to the earth terminal provided inside the box. All sockets shall be shuttered type.

2.3 LIGHTING FIXTURES & ACCESSORIES

The light fixtures and fittings shall be assembled and installed in position complete and ready for service, in accordance with details, drawings, manufacturer's instructions and to the satisfaction of the Project Manager.

2.3.1 SCOPE

Scope of work under this section shall include inspection at suppliers/manufacturer's premises at site, receiving at site, safe storage, transportation from point of storage to point of erection, erection and commissioning of light fittings, fixtures and accessories including all necessary supports, brackets, down rods and painting etc as required.

3. DISTRIBUTION PANELS/BOARDS

Main Distribution Panels, Sub-Distribution Panels and Final Distribution shall be covered under this section. Panels/Boards shall be suitable for operation on 3 Phase/single phase, 415/240 volts, 50 cycles, 4 wire system with neutral grounded at transformer. All Distribution panels shall be CPRI tested design and manufactured by a approved manufacturer. **CPRI certificate shall be made available.**

3.1 CONSTRUCTION FEATURES

Distribution panels shall be 2 mm thick sheet steel cabinet for indoor installation, dead front, floor mounting/wall mounting type and shall be form 3b construction. The Distribution panels shall be totally enclosed, completely dust and vermin proof and shall be with hinged doors and folded covers, Neoprene gasket, padlocking arrangement and bolted back. All removable/ hinged doors and covers shall be grounded by flexible standard connectors. Distribution panel shall be suitable for the climatic conditions as specified in Special Conditions. Steel sheets used in the construction of Distribution panels shall be 2 mm thick and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet metal shall be seam welded, all welding, slag shall be rounded off and welding pits wiped smooth with plumber metal. The general construction shall confirm to IS-8623-1977 (Part-1) for factory built assembled switchgear & control gear for voltage upto and including 1100 V AC.

All panels and covers shall be properly fitted and square with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with wing nuts. Self threading screws shall not be used in the construction of Distribution panels. A base channel of 75 mm x 40 mm x 5 mm thick shall be provided at the bottom for floor mounted panels. Minimum **operating** clearance of 275 mm shall be provided between the floor of Distribution panels and the lowest feeder compartment.

Distribution panels shall be of adequate size with a provision of spare switchgear as indicated on the Single Line Diagram. Feeders shall be arranged in multi-tier. Knockout holes of appropriate size and number shall be provided in the Distribution panels in conformity with the location of cable/conduit connections. Removable sheet steel plates shall be provided at the top to make holes for additional cable entry at site if required.

Every cabinet shall be provided with Trifoliolate or engraved metal name plates. All panels shall be provided with circuit diagram engraved on PVC sheet. All live accessible connections shall be shrouded and shall be finger touch proof and minimum clearance between phase and earth shall be 20 mm and phase to phase shall be 25 mm.

3.2 BUS BAR CONNECTIONS

Bus bar and interconnections shall be of high conductivity electrolytic grade aluminium / copper as indicated in the bill of quantities complying with requirement of IS : 5082 – 1981 and of rectangular cross section suitable for carrying the rated full load current and short circuit current and shall be extendable on either side. Bus bars and interconnections shall be insulated with heat shrinkable sleeve of 1.1 KV grade and shall be colour coded. Bus bars shall be supported on glass fiber reinforced thermosetting plastic insulated supports at regular intervals to withstand the force arising from in case of short circuit in the system. All bus bars shall be provided in a separate chamber and all connections shall be done by bolting. Additional cross sectional area to be added to the bus bar to compensate for the holes. All connections between bus bars and breakers shall be through solid copper / aluminium strips of proper size to carry full rated current and insulated with insulating sleeves. Maximum current density for the busbars shall be 1A/sq.mm for aluminium and 1.4 A/sq.mm for copper busbars.

Maximum allowable temperature for the Bus bar to be restricted to 85 deg C

4.3 CABLE COMPARTMENTS

Cable compartment of adequate size shall be provided in the Distribution panels for easy clamping of all incoming and outgoing cables entering from the top/bottom. Adequate supports shall be provided in cable compartment to support cables.

4.4 MOULDED CASE CIRCUIT BREAKER (MCCB)

The MCCB should be current limiting type with trip time of less than 10 msec under short circuit conditions. The MCCB should be either 3 or 4 poles as specified in BOQ. MCCB shall comply with the requirements of the relevant standards IS13947 – Part 2/IEC 60947-2 and should have test certificates for Breaking capacities from independent test authorities CPRI / ERDA or any accredited international lab.

MCCB shall comprise of Quick Make -break switching mechanism, arc extinguishing device and the

tripping unit shall be contained in a compact, high strength, heat resistant, flame retardant, insulating moulded case with high withstand capability against thermal and mechanical stresses

The breaking capacity of MCCB shall be as specified in the schedule of quantities. The rated service breaking capacity (Ics) should be equal to rated ultimate breaking capacities (Icu). MCCBs for motor application should be selected in line with Type-2 Co-ordination as per IEC-60947-2, 1989/IS 13947-2. The breaker as supplied with ROM should meet IP54 degree of protection.

The manufacturer shall provide both the discrimination tables and let-through energy curves for all.

a. Protection Functions

- MCCBs with ratings up to 200 A shall be equipped with Thermal-magnetic (thermal for overload and magnetic for short-circuit protection) trip units
- Microprocessor MCCBs with ratings 250A and above shall be equipped with microprocessor based trip units.
- Microprocessor and thermal-magnetic trip units shall be adjustable and it shall be possible to fit lead seals to prevent unauthorised access to the settings
- Microprocessor trip units shall comply with appendix F of IEC 60947-2 standard (measurement of rms current values, electromagnetic compatibility, etc.)
- Protection settings shall apply to all poles of circuit breaker.
- All Microprocessor components shall withstand temperatures up to 125 °C

b. Testing

Original test certificate of the MCCB as per IEC 60947-1 &2 or IS13947 shall be furnished. Pre-commissioning tests on the switch board panel incorporating the MCCB shall be done as per standard specifications.

c. Interlocking

Moulded, case circuit breakers shall be provided with the following interlocking devices for interlocking the door of a switch board.

- Handle interlock to prevent unnecessary manipulations of the breaker.
- Door interlock to prevent the door being opened when the breaker is in ON position.
- Defeat-interlocking device to open the door even if the breaker is in ON position.

The MCCB shall be current limiting type and comprise of quick make – Break switching mechanism. MCCBs shall be capable of defined variable overload adjustment. All MCCBs rated 200 Amps and above shall have adjustable over load & short circuit pick-up both in Thermal magnetic and Microprocessor Trip Units.

All MCCB with microprocessor based release unit, the protection shall be adjustable Overload, Short circuit and earth fault protection with time delay.

The trip command shall override all other commands.

4.5 MINIATURE CIRCUIT BREAKER (MCB)

Miniature Circuit Breaker shall comply with IS-8828-1996/IEC898-1995. Miniature circuit breakers shall be quick make and break type for 240/415 VAC 50 Hz application with magnetic thermal release for over current and short circuit protection. The breaking capacity shall not be less than 10 KA at 415 VAC. MCBs shall be DIN mounted. The MCB shall be Current Limiting type (Class-3). MCBs shall be classified (B, C, D ref IS standard) as per their Tripping Characteristic curves defined by the manufacturer. The MCB shall have the minimum power loss (Watts) per pole defined as per the IS/IEC and the manufacturer shall publish the values. MCB shall ensure complete electrical isolation & downstream circuit or equipment when the MCB is switched OFF.

The housing shall be heat resistant and having high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection. All DP, TP, TPN and 4 Pole miniature circuit breakers shall have a common trip bar independent to the

External operating handle.

5. EARTHING

5.1 EARTHING

The system shall be TNS with four wire supply system (R,Y,B,N and 2 Nos. E) brought from the main L T Panel. All the non-current carrying metal parts of electrical installation and all metal conduits trunking, cable sheaths, switchgear, distribution panels, light fittings and all other parts made of metal shall be bonded together and connected by means of specified earthing conductors to an efficient earthing system. All metal work such as pipe lines, ducts, cable trays, stair case railing etc shall be bonded to earth.

All earthing shall be in conformity with IS: 3043 1987, and the basic system of earthing shall be TNS.

5.2 EARTHING CONDUCTORS

Earthing conductors shall be of copper / GI as mentioned in schedule of quantities and shall be protected against mechanical injury and corrosion.

5.3 SIZING OF EARTHING CONDUCTORS

The cross sectional area of earthing conductor shall not be smaller than half of the largest current carrying conductor subject to an upper limit of 80 Sq.mm. If the area of the largest current carrying conductor or bus bar exceeds 160 sq.mm then two or more earthing conductors shall be used in parallel, to provide at least half the cross sectional area of the current carrying conductor or bus bars. All fixtures, outlet boxes, junction boxes and power circuits upto 15 amps shall be earthed with PVC insulated copper wire.

5.4 CONNECTION OF EARTHING CONDUCTORS

Main earthing conductors shall be taken from the earth connections at the main L T panel to an earth electrode with which the connection is to be made. All joints in tapes shall be with four rivets and shall be brazed in case of copper and by welding bolting in case of GI, wires shall be connected with crimping lugs, all bolts shall have spring washers. Sub- mains earthing conductors shall run from the main distribution panel to the sub distribution panel. Final distribution panel earthing conductors shall run from sub-distribution panel.

Circuit earthing conductor shall run from the exposed metal of equipment and shall be connected to any point on the main earthing conductor, or its distribution panel. Metal conduits, cable sheathing and armouring shall be earthed at the ends adjacent to distribution panel at which they originate, or otherwise at the commencement of the run by an earthing conductor in effective electrical contact with cable sheathing. Where equipment is connected by flexible cord, all exposed metal parts of the equipment shall be earthed by means of an earthing conductor enclosed with the current carrying conductors within the flexible cord. Switches, accessories, lighting fitting etc. which are rigidly secured in effective electrical contact with a run of metallic conduit shall not be considered as a part of the earthing conductor for earthing purposes, even though the run of metallic conduit is earthed. The installation shall be complete in all respects for efficient and trouble free service. All work shall be carried out in a first class quality and neat workmanship. Grounding conductors shall be handled carefully to avoid kinking and cutting of the conductors during their installation. All exposed ground conductors run shall be taken in a neat manner horizontal, vertical and parallel to the building walls or columns and shall not be laid haphazardly. All connections to the grounding grid shall be made with **earthing** strip welded to grid and bolted at equipment ends.

APPENDIX – II

LIST OF INDIAN STANDARDS (IS)

	Latest edition of following standards shall be referred	
IS : 694	PVC insulated	Electric cable for working voltage upto and including 1100 volts.
IS : 732	Code of practice for electrical wiring and installation	
IS : 1255	Code of Practice for installation and maintenance of Power Cables upto and including KV rating (Second Revision)	
IS : 1293	Three pin plugs and sockets outlets rated voltage upto and including 250 volts and current upto and including 160 amps.	
IS : 1554 (Part - I)	PVC insulated (Heavy Duty)	electric cables for working voltages upto and including volts.
IS : 1646	Electrical installation fire safety of buildings (general) Code of practice.	
IS : 1885	Glossary of items for electrical cables and conductors	
IS : 1913	General and safety requirements for fluorescent lamps luminaries Tubular.	
IS : 2309	Protection of building and allied structures against lightning	
IS : 2551-	Danger notice plate.	
IS : 3043	Code of practice for earthing.	
IS : 3427	AC Metal enclosed switch gear and control gear for rated voltages above 1 KV and including 52 KV.	

IS : 3480	Flexible steel conduits for electrical wiring.
IS : 3837	Accessories for rigid steel conduit for electrical wiring.
IS : 4146	Application guide for voltage transformers
IS : 4615	Switch socket outlets.
IS : 5133 (Part -I)	Boxes for the enclosure of electrical accessories.
IS : 5216 (Part-I)	Guide for safety procedures and practices in electrical work.
IS : 5424	Rubber mats for electrical purposes.
IS : 5578 & 11353	Marking and arrangement of bus bars
IS : 5578 & 11353	Marking and arrangement of bus bars
IS : 7098 - (Part - II)	Cross linked polyethylene insulated PVC sheathed cables. For working voltages from 3.3 KV upto and including 33 kV
IS : 8130	Conductors for insulated electric cables and flexible cords
IS : 8623 - (Part -I)	Factory built assemblies of switchgear and control gear for voltages upto and including 1000 V AC and 1200 VDC.
IS : 8623 - (Part -II)	Bus Bar trunking system
IS : 8828	Miniature Circuit Breakers

IS : 9537	Rigid Steel Conduits for electrical wiring (Second Revisions)
IS : 10810	Methods of test for cables.
IS : 12640	Earth Leakage Circuit Breakers
IS : 13947 (Part-II)	Air Circuit Breakers
IS : 13947- (Part-)	Moulded Case Circuit Breakers
IS : 13947 - (Part-)	Degree of protection provided by enclosures for LV switchgear and control gear.
IS : 13947 (Part-)	General requirement for switchgear and control gear for voltage not exceeding 1000 Volts.

OFFICE FURNITURE

TENDERED SPECIFICATIONS	
	<p><u>Table 5 ft with ERU and pestastal</u></p> <p>Table size shall be 1500 Width mm x 750 Depth mm x 740 Height mm (approx) .Table top shall be 25 mm thick plain particle board (PPB) Clad with 0.6 mm thick post formed laminate and 1 mm thick backing laminate (bdl) .Flat edge Duly sealed with 2 mm thick PVC beading. The modesty shall be 18 mm thick plain particle board with 1.0 mm thick decorative laminate (DL) on both sides. Edge Sealed with 2 mm thick PVC beading. ERU size shall be 1050 Width x 450 Depth x 705 Height (approx). The top of Finesse shall be 25 mm thick plain particle board (PPB) Clad with 0.6 mm thick post formed laminate and 1 mm thick Backing Laminate (BDL). Flat Edge duly sealed with 2 mm thick PVC beading. The Modesty shall be 18 mm thick plain particle board (PPB) Clad with 1.0 mm thick Decorative Laminate (DL) on both sides. Edge sealed with 2 mm thick PVC Beading. Shall be supplied with 3 drawer pedestal of size 646H x 390W x 440D (approx)</p>



Mid Back Ergonomic Chairs on castors with arms

1) SEAT/BACK ASSEMBLY: The seat is made up of hot pressed moulded reconstituted wood of 12mm average thickness and back is two part injection moulded plastic.

SEAT SUB ASSEMBLY SIZE: 49.0cm (W) X 49.5cm (D)

BACK SUB

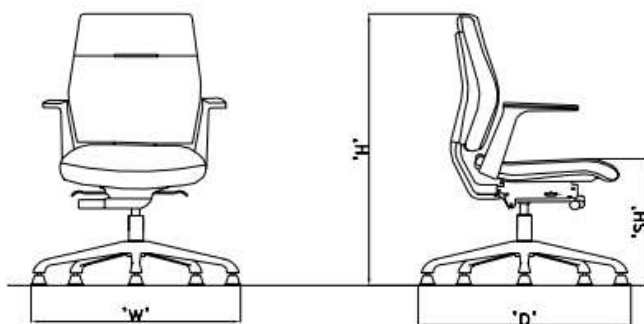
ASSEMBLY SIZE: (MID BACK): 45.0 cm (W) X 49.0 cm (H)

2) POLYURETHANE2 FOAM: The Polyurethane foam is moulded in Density 45 kg/m3,

3) ARMRESTS : The armrests are Pressure die casted in polished Aluminium with PP Arm Tops.

3) AUTO-RETURN MECHANISM: The Conference and Board room chair has an Auto-return mechanism to allow the user free movement while being sitted and after use guides the upper structure to rotate back to its origional position enabling all chairs around the table to be aligned.

4) ADJUSTABLE BACK SUPPORT : Backrest is connected to the mechanism with a drop-lift mechanism which can be adjusted in the range of 7.0 cm for the comfortable back support to suitable individual need.



Officers Visitor Chair

1) SEAT/BACK ASSEMBLY: The seat and back are made up of 1.2 cm. thick hot-pressed plywood, upholstered with fabric upholstery covers and moulded Polyurethane foam. The back foam is designed with contoured lumbar support for extra comfort.

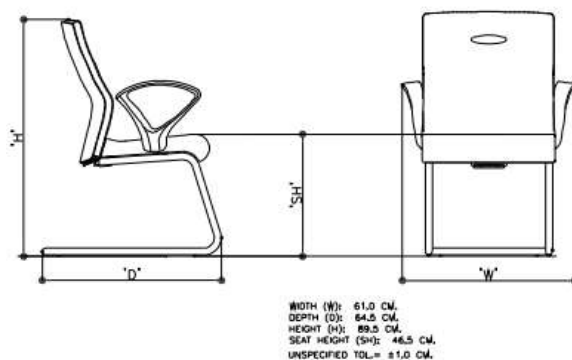
BACK SIZE : 47.5 cm. (W) x 58.0cm. (H)

SEAT SIZE: 47.0 cm. (W) x 48.0 cm. (D)

2) POLYURETHANE FOAM: The Polyurethane foam is moulded with density = 45 ± 2 kg/m³ and Hardness = 20 ± 2 at 25% compression.

3) ARMRESTS: The one-piece armrests are injection moulded from black Co-polymer Polypropylene.

4) TUBULAR FRAME (FOR 9U12RX): The powder coated tubular frame is cantilever type & made of dia 25.4mm x 2mm thk SS Tube.



High Rise Revolving stool (Black seat cover) with cushion in seat & lumbar support at back, SS metal stand with ring type foot rest & castors & Gas Lift



Sliding Door Unit

Storage file cases with as per drawing ref: with product Size shall be: 1200 mm (W) x 450 mm (D) x 1200 mm (H) These components are made of CRCA 'D'grade high yield strength as per IS: 513. The trowel Minor should have a three way locking mechanism with Shooting Bolts. It should have a height wise adjustable shelf mounting (3 nos.) which shall have a Uniformly Distributed Load capacity of max 40 Kg. It should also have a M10 Screw type Leveller with Hex plastic base. The finishing shall include Epoxy powder coated to the thickness of 50 microns (+/- 10). CRCA (Cold Rolled Close Annealed) or G. I. Sheets or both materials can be used. **Pl refer dwg as per attached.**



Wall cabinet (W 750 x D 450 x H 750)

Wall Mounted Overhead File Cabinets (Float Glass Door) CRCA (Cold Rolled Close Annealed) or G. I. Sheets Two Shutter with one adjustable shelf Size: - 750Lmm x 370mm W x 750 mmH (approx.) **Pl refer dwg as per attached.**



MISCELLANEOUS WORK

	TENDERED SPECIFICATIONS
	<p>1. <u>FALSE CEILING</u></p> <p><u>12.5 mm thick tapered edge gypsum moisture resistant board</u> Providing and fixing false ceiling at all height including providing and fixing of frame work made of special sections, power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/sqm (both side inclusive) as per IS : 277 and consisting of angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 27 mm and 37mm, at 1200 mm centre to centre, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50mm long with 6mm dia bolts, other flange</p>

of cleat fixed to the angle hangers of 25x10x0.50 mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I. channels 45x15x0.9 mm running at the spacing of 1200 mm centre to centre, to which the ceiling section 0.5 mm thick bottom wedge of 80 mm with tapered flanges of 26 mm each having lips of 10.5 mm, at 450 mm centre to centre, shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction, including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm centre, with 25mm long dry wall screws @ 230 mm interval, including fixing of gypsum board to ceiling section and perimeter channel with the help of dry wall screws of size 3.5 x 25 mm at 230 mm c/c, including jointing and finishing to a flush finish of tapered and square edges of the board with recommended jointing compound, jointing tapes, finishing with jointing compound in 3 layers covering upto 150 mm on both sides of joint and two coats of primer suitable for board, all as per manufacturer's specification and also including the cost of making openings for light fittings, grills, diffusers, cutouts made with frame of perimeter channels suitably fixed, all complete as per drawings, specification and direction of the Engineer in Charge but excluding the cost of painting with :

GI Metal Ceiling Lay in perforated Tegular edge global white color tiles of size 595x595 mm and 0.5 mm, Providing and fixing tiled false ceiling of specified materials of size 595x595 mm in true horizontal level, suspended on inter locking metal grid of hot dipped galvanized steel sections (galvanized @ 120 grams/ sqm, both side inclusive) consisting of main "T" runner with suitably spaced joints to get required length and of size 24x38 mm made from 0.30 mm thick (minimum) sheet, spaced at 1200 mm center to center and cross "T" of size 24x25 mm made of 0.30 mm thick (minimum) sheet, 1200 mm long spaced between main "T" at 600 mm center to center to form a grid of 1200x600 mm and secondary cross "T" of length 600 mm and size 24x25 mm made of 0.30 mm thick (minimum) sheet to be interlocked at middle of the 1200x600 mm panel to form grids of 600x600 mm and wall angle of size 24x24x0.3 mm and laying false ceiling tiles of approved texture in the grid including, required cutting/making, opening for services like diffusers, grills, light fittings, fixtures, smoke detectors etc. Main "T" runners to be suspended from ceiling using GI slotted cleats of size 27 x 37 x 25 x 1.6 mm fixed to ceiling with 12.5 mm dia and 50 mm long dash fasteners, 4 mm GI adjustable rods with galvanized butterfly level clips of size 85 x 30 x 0.8 mm spaced at 1200 mm center to center along main T, bottom exposed width of 24 mm of all T-sections shall be pre-painted with polyester paint, all complete for all heights as per specifications, drawings and as directed by Engineer-in-charge.

GI Metal Ceiling Lay in perforated Tegular edge global white color tiles of size 595x595 mm and 0.5 mm thick with 8 mm drop; made of GI sheet having galvanizing of 100 gms/sqm (both sides inclusive) and 20% perforation area with 1.8 mm dia holes and having NRC (Noise Reduction Coefficient) of 0.5, electro statically polyester powder coated of thickness 60 microns (minimum), including factory painted after bending and perforation, and backed with a black Glass fiber acoustical fleece.

2. ALUMINIUM WORK

Aluminium Sections

Aluminium sections used for fixed/openable windows, ventilators, partitions, frame work & doors etc. shall be suitable for use to meet architectural designs to relevant works and shall be subject to approval of the Engineer-in-Charge for technical, structural, functional and visual considerations. The aluminium extruded sections shall conform to IS 733 and IS 1285 for chemical composition and mechanical properties. The

stainless steel screws shall be of grade AISI 304. The permissible dimensional tolerances of the extruded sections shall be as per IS 6477 and shall be such as not to impair the proper and smooth functioning/operation and appearance of door and windows.

Anodising

Standard aluminium extrusion sections are manufactured in various sizes and shapes in wide range of solid and hollow profiles with different functional shapes for architectural, structural glazing, curtain walls, doors, window & ventilators and various other purposes. The anodizing of these products is required to be done before the fabrication work by anodizing/electro coating plants which ensures uniform coating in uniform colour and shades. The extrusions are anodized up to 30 micron in different colours. The anodized extrusions are tested regularly under strict quality control adhering to Indian Standard.

DOOR, WINDOW, VENTILATOR AND PARTITION FRAMES

Frame Work

First of all the shop drawings for each type of doors/windows/ventilators etc. shall be prepared by using suitable sections based on architectural drawings, adequate to meet the requirement/ specifications and by taking into consideration varying profiles of aluminium sections being extruded by approved manufacturers. The shop drawings shall show full size sections of glazed doors, windows, ventilators etc. The shop drawings shall also show the details of fittings and joints. Before start of the work, all the shop drawings shall be got approved from the Engineer-in-Charge.

Actual measurement of openings left at site for different type of door/window etc. shall be taken. The fabrication of the individual door/windows/ventilators etc. shall be done as per the actual sizes of the opening left at site. The frames shall be truly rectangular and flat with regular shape corners fabricated to true right angles. The frames shall be fabricated out of section which have been cut to length, mitered and jointed mechanically using appropriate machines.

Detail of Door Frame / Partition Section

1. Frame- Single Grove (Section No. 20067) – 101.60mm x 44.45mm x 3.0 mm thick (weight between (2.34 kg/m)
2. Frame - Double Grove (Section No. 20066) – 101.60mm x 44.45mm x 3.0 mm thick (weight between (2.42 kg/m)

Detail of Door Shutter Section

1. Shutter Vertical Style Section (Section No. 19509) – 85.00mm x 44.45mm x 3.0 mm thick (weight between (2.05 kg/m)
2. Shutter Vertical Plane Section (Section No. 19508) – 83.50mm x 44.45mm x 3.0 mm thick (weight between (2.05 kg/m)
3. Shutter Top & Bottom Section (Section No. 19510) – 113.30mm x 44.45mm x 3.0 mm thick (weight between (2.64 kg/m)
4. Shutter Middle Section (Section No. 19583) – 83.50mm x 44.45mm x 3.18 mm thick (weight between (2.14 kg/m)
5. Glazing Clip (Section No. 19360) – 19.00mm x 17.30mm x 1.00 mm thick (weight between (0.12 kg/m)
6. Glazing Plate (Section No. 19353) – 44.45mm x 5.72mm x 3.22 mm thick (weight between (0.45 kg/m)

Fixing of Frames

The holes in concrete/masonry/wood/any other members for fixing anchor bolts/fasteners/screws shall be drilled with an appropriate electric drill. Windows/doors/ventilators etc. shall be placed in correct final position in the opening and fixed to Sal wood backing using stainless steel screws of star headed, counter sunk and matching size groove. of required size at spacing not more than 250 mm c/c or dash fastener. All joints shall be sealed with approved silicone sealants. In the case of composite windows and doors, the different units are to be assembled first. The assembled composite units shall be checked for line, level and plumb before final fixing is done. Engineer-in-Charge in his sole discretion may allow the units to be assembled in their final location if the situation so warrants. Snap beadings and EPDM gasket shall be fixed as per the detail shown in the shop drawings. Where aluminium comes into contact with stone masonry,

brick work, concrete, plaster or dissimilar metal, it shall be coated with an approved insulation lacquer, paint or plastic tape to ensure that electrochemical corrosion is avoided. Insulation material shall be trimmed off to a clean flush line on completion. The contractor shall be responsible for the doors, windows etc. being set straight, plumb, level and for their satisfactory operation after fixing is complete.

PANELING MATERIAL

Pre-laminated Particle Board

Fixing 12 mm thick prelaminated particle board flat pressed three layer or graded wood particle board conforming to IS: 12823 Grade I Type II, in panelling fixed in aluminum doors, windows shutters and partition frames with C.P. brass / stainless steel screws etc. complete as per architectural drawings and directions of engineer-in-charge.

A particles board laminated on both surfaces by synthetic resin impregnated base papers under heat and pressure. Pre-laminated particle boards shall be of two grades, namely, Grade I and II corresponding to IS 3087 & 12823. Each of the grades specified shall be of four types, namely, Types-I, II, III, and IV classified by the surface abrasion characteristics specified in Table 21.1. The grade and types of pre-laminated particle board shall be represented by symbols as follows:

Grade	Type	Designation
Grade I	Type I	PLB-11
	Type II	PLB-12
	Type III	PLB-13
	Type IV	PLB-14
Grade II	Type I	PLB-21
	Type II	PLB-22
	Type III	PLB-23
	Type IV	PLB-24

FLOAT GLASS

Fixing glazing in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber /

neoprene gasket etc. complete as per the architectural drawings and the directions of engineer-in-charge. With float glass panes of 5 mm thickness (weight not less than 12.50 kg/ sqm)

- The glass shall be clear float glass and should be approved by the Engineer in Charge. It shall be clear, float transparent and free from cracks subject to allowable defects. The float glass shall conform to the IS 14900.
- The EPDM Gaskets shall be of size and profile as shown in drawings and as called for, to render the glazing, doors, windows, ventilators etc. air and water tight. Samples of gaskets shall be submitted for approval and the EPDM gasket approved by Engineer-in-Charge shall only be used. The contractor shall submit documentary proof of using the above material in the work to the entire satisfaction of Engineer in- Charge.

Double Action Hydraulic Floor Spring

Fixing double action hydraulic floor spring of approved brand and manufacture conforming to IS : 6315, having brand logo embossed on the body / plate with double spring mechanism and door weight upto 125 kg, for doors, including cost of cutting floors, embedding in floors as required and making good the same matching to the existing floor finishing and cover plates with brass pivot and single piece M.S. sheet outer box with slide plate etc. complete as per the direction of Engineer-in-charge.

With stainless steel cover plate minimum 1.25 mm thickness

Lock

Fixing **Brass 100mm mortice latch and lock with 6 levers without pair of handles** (best make of approved quality) for aluminium doors including necessary cutting and making good etc. complete.

Handler

Fixing anodized (AC 15) aluminium round shape handle of outer dia 100 mm with SS screws etc. complete as per direction of Engineer-in charge.

3. PAINTING SYNTHETIC ENAMEL PAINT OVER G.S. SHEETS

Synthetic enamel Paint

Paint, suitable for painting over G.S. sheets, of approved brand and manufacture and of the required shade shall be used. New or weathered G.S. sheets shall be painted with a priming coat of one coat of red oxide zinc chromate Paint. Primer shall be applied before fixing sheets in place.

The painting of G.S. sheets shall not usually be done till the sheets have weathered for about a year. When new sheets are to be painted before they have weathered they shall be treated with a mordant solution prepared by mixing 38 gm of copper acetate in a litre of soft water or 13 gm hydrochloric acid in a solution of 13 gm each of copper chloride, copper nitrate and ammonium chloride dissolved in a litre of soft water. This quantity of solution is sufficient for about 235 sqm. to 280 sqm of area and is applied for ensuring proper adhesion of Paint. Before painting on new or weathered G.S. sheets, rust patches shall be completely cleaned with coarse emery paper and brush. All grease marks shall also be removed and the surface washed and dried and rusted surface shall be touched with synthetic enamel paint of approved brand, manufacturer and shade.

4. REPAIRS TO PLASTER

The work includes cutting the patch and preparing the wall surface. The masonry joints which become exposed after removal of old plaster shall be raked out to a minimum depth of 10 mm in the case of brick work and 20 mm in the case of stone work. The raking shall be carried out uniformly with a raking tool and not with a basuli, and loose mortar dusted off. The surface shall then be thoroughly washed with water, and kept wet till plastering is commenced.

In case of concrete surfaces, the same shall be thoroughly scrubbed with wire brushes after the plaster had been cut out and pock marked as described in 13.1.2. The surface shall be washed and cleaned and kept wet till plastering is commenced.

The mortar of the patch, where the existing plaster has cracked, crumbled or sounds hollow when gently tapped on the surface, shall be removed. The patch shall be cut out to a square or rectangular shape at position marked on the wall as directed by the Engineer-in-Charge or his authorized representative. The edges shall be slightly under cut to provide a neat joint.

5. OIL EMULSION (OIL BOUND) WASHABLE DISTEMPERING

Oil emulsion (Oil Bound) washable distemper (IS 428) of approved brand and manufacture shall be used. The primer where used as on new work shall be cements primer or distemper primer as described in the item. These shall be of the same manufacture as distemper. The distemper shall be diluted with water or any other prescribed thinner in a manner recommended by the manufacturer. Only sufficient quantity of distemper required for day's work shall be prepared. The distemper and primer shall be brought by the contractor in sealed tins in sufficient quantities at a time to suffice for a fortnight's work, and the same shall be kept in the joint custody of the contractor and the Engineer-in-Charge.

For new work the surface shall be thoroughly cleaned of dust, old white or colour wash by washing and scrubbing. The surface shall then be allowed to dry for at least 48 hours. It shall then be sand papered to give a smooth and even surface. Any unevenness shall be made good by applying putty, made of plaster of paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it is dry.

In the case of old work, all loose pieces and scales shall be removed by sand papering. The surface shall be cleaned of all grease, dirt etc. Pitting in plaster shall be made good with plaster of paris mixed with the colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of the distemper shall be applied over the patches. The patched surface shall be allowed to dry thoroughly before the regular coat of distemper is applied.

APPROVED MAKE OF MATERIALS FOR FUMEHOODS AND LABORATORY FURNITURE SYSTEM

1	LABORATORY FITTINGS	WATER SAVER / BROEN / FAG/ FAR
2	LABORATORY SINKS / DRIP CUPS	WATER SAVER / BROEN/ALLOYPLAS/MALAYSIA
3	LABORATORY ELECTRICAL SOCKET	NORTHWEST / LEGRAND / MK / NORISYS
4	DATA & VOICE SOCKET	NORTHWEST / LEGRAND / MK/ NORISYS
5	EYEWASH / SHOWER	WATER SAVER / BROEN / FAG/ TOF/FAR
6	SPOT EXTRACTOR	FUMEX / ALSIDENT / NEDERMANN
7	FLAMMABLE STORAGE TALL CABINET	JUSTRITE / EAGLE/ SECURALL
8	OFFICE FURNITURE	GODREJ / WIPRO / SPACE DESIGN / FORM DESIGN
9	FUME HOOD SERVICE FIXTURES	WATER SAVER/BROEN/FAG/FAR
10	FUME HOOD ELECTRICAL SOCKET	NORTHWEST/LEGRAND/MK /NORISYS
11	FACE VELOCITY & VAV CONTROLS	TEL /SAUTER / SIEMENS

APPROVED MAKE OF MATERIALS FOR EXHAUST SYSTEM

S.NO	DESCRIPTION	APPROVED MAKE
1	PP sheets	Mandhani/Dugar/Khanna
2	Isothelic Resin with Fire retardent	Mechemco/Kaysynth/Orsyn
3	PP Dampers	Any reputed make
4	PP Exhaust Fans	Colasit/Colourplast/ Seat
5	VFD	Invertek/Siemens/ABB/Danfoss/Schneider
6	Fume hood face velocity monitor	TEL/Siemens/Sauter

7	Room pressure Monitor	TEL/Siemens/Sauter
8	Actuator	Siemens/Belimo/Neptronic
9	Motor	ABB/CG/Kirloskar

APPROVED MAKE OF MATERIALS FOR ELECTRICAL SYSTEM

S.NO	DESCRIPTION	APPROVED MAKE
1	MCCB	GE / ABB / SCHNIDER
2	LT CABLE as per IS:7098(2)1988	HAVELLS NICCO / POLYCAB / RPG / UNIVERSAL (Unistar) / PRIMECAB
3	END TERMINATION MATERIALS	DOWELS / SMI / HMI
4	INDICATING METERS	SIMCO / MECO / AE / RISHAB
5	INDICATING LAMPS	GE / SIEMENS / SCHNEIDER / L&T
6	POWER CONTACTORS	GE / SIEMENS / ABB / SCHNEIDER / L&T
7.	MCB / MCB DB	Havell's /Legrand/ GENERAL ELECTRIC (GE) HAVELLS
8.	ELCB / ELMCB	Havell's /Legrand/ GENERAL ELECTRIC (GE) HAVELLS
9	PVC CONDUITS - FRLS	VIP / AVON / UNIVERSAL / PRECISION / NELCO
10.	PVC COPPER WIRES - FRLS	FINOLEX / ANCHOR/ POLYCAB/ HAVELLS
11.	INDUSTRIAL SOCKETS	MGE / NEPTUNE / BCH
12.	LT PANELS	ANY LOCAL PANEL FABRICATOR
13.	PANEL ACCESSORIES	DIRAK / ELMAX
14.	TERMINAL BLOCK	PHOENIX CONTACT / ELMAX
15.	HEAVY DUTY PVC PIPE / HDPE PIPE 6KG & 4 KG	SUPREME / FINOLEX
16.	EARTHING - G I	ANY LOCAL SUPPLIER.
17.	EARTHING - COPPER	ANY LOCAL SUPPLIER.
18.	FIRE ALARM PANEL	MORLEY / HONEYWELL/NOTIFIER

19.	SMOKE DETECTOS	SYSTEM SENSOR /APPOLO
20	FIRE EXTINGUISHERS	SAFEX/ NITIN
21	LT CABLES	RR KABEL / POWER FLEX
21	M.S PIPES	TATA / JINDAL / SAIL

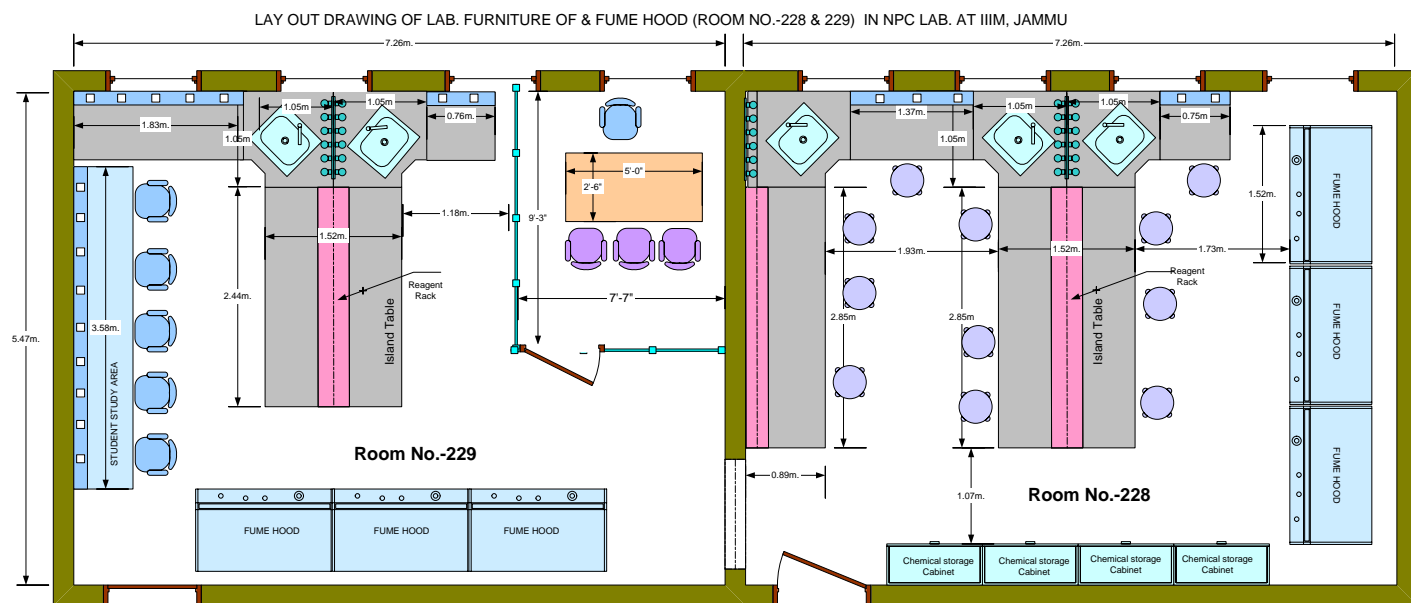
Materials/ accessories shall be used approved make or APPENDIX II (Technical Specification).

APPROVED MAKE OF MATERIALS FOR PROCESS EQUIPMENT

S.NO	DESCRIPTION	APPROVED MAKE
Chiller	Blue Star, Voltas, Kirloskar, Julabo, Cole Parmer, First Source Lab Solution Pvt Ltd, Local Indian Made –PCI, or equivalent	
Compressor	Blue Star, Voltas, Kirloskar, Senco PC1010, DEWALT DWFP55130 Bostitch , Local Indian Made –PCI or equivalent	
Vacuum pump	Kirloskar, Reynold, Blue Sta,r Vaccubrand, Buchi Cole Parmer, Gardner Denver , KNF Pumps , Local Indian Made –PCI or equivalent	

Note:-

1. The sample, catalogue color, texture etc. of all above furniture shall be finalized before approved by IIM Technical Purchases Committee.
2. The All finished product shall be delivered to the IIM Jammu, duly covered with bubble sheet to avoid any breakage etc. However in case of any minor repair arising out of transportation etc. the same shall be repaired/ replaced immediately by the supplier without any extra cost.



DESIGN & DRAWING:- S. N. BHARTI

Requirement for Room No. 231

TECHNICAL SPECIFICATION

SUPPLY, INSTALLATION, TEATING & COMMISSING OF FUME HOOD,
LABORATORY FURNITURE AND SERVICING ON A TURNKY BASIS OF NPC
LAB. (ROOM No.-231) AT IIIM, JAMMU

Sl. No.	Description	Reference
1	Pre Qualification Criteria for Tendering Bidding	1
2	Scope & Specification	2
3	Make List for the Scope of Work	3
4	Drawing	4

Sl. No.	Description	Reference
1	Pre Qualification Criteria for Tendering Bidding	1

BIDDER PREQUALIFICATION CRITERIA

Bidder shall meet all the pre qualification criteria as given below for qualifying to this tender. In the event of only one Bidder qualifying technically, the Technical Committee shall have the right to accept or reject the concerned bidder.

The bidder shall furnish a covering page indicating item wise compliance to all the Pre-qualification criteria. Bidder Prequalification Criteria are as given below:

- The Bidder shall have experience in Designing, Manufacturing, Supply, Execution, Commissioning & Servicing of Fume Hood & Laboratory Furniture on a turnkey basis **the following during the last 5 years ending the last day of the month**, as stated below:-
 - **Fume Hood system**
 - **Lab furniture and accessories**
 - **Exhaust system**
 - **Gas and utility distribution system**
 - **Electrical / Fire extinguisher work**
 - **Utility Equipments and minor repair works**
- The Bidder has carried out preferably similar works, same value of the estimated cost, in the 5 years ending on the last day of the month. At least one contract should be in Govt. Universities/any of Central PSU's / Autonomous Bodies. The project executed as such by the Bidder should be in operation currently. **The Bidder should produce the backup documents like Purchase Order, completion certificates etc.**
- Similar work shall mean "Manufacturing, Supply, Execution, Commissioning and Servicing of Laboratory Furniture Comprising of Lab Work Benches, Fume Hoods, Exhaust system, Gas and utility distribution system, Electrical and accessories"
- The bidder must have an experience of supply and installation of lab furniture and fume hoods in Chemistry Lab. At least one contract must be submitted for the same in addition to the above. The project executed as such by the Bidder should be in operation currently.
- The vendor should have a well established make in India (in house) manufacturing unit for the Lab Furniture & Fume Hood, Quality Management System as per International Standards providing the products and services on the continued basis for the last 5 years. The vendor shall possess the current / valid approval for such equipment manufacturing facility by a Statutory Certifying Authority, like Factory Inspectorate etc. A notarized copy of valid certificate needs to be enclosed.
- The Bidder should be an Official Member with SEFA for a continued basis from past 3 Year from this notification. (Supporting documents for the same need to be furnished) and bidder should provide have document of third party test facility.
- All tests referenced herein shall be performed in the bidder's fume hood test facility **"factory tested" & also the Field ASHRAE or EN 14175 testing is must.**

- If required, the technical committee from IIIM Jammu shall visit the similar works completed by vendors and submitted as mentioned above to assess their capability.
- The Participating bidder should have local Service set up in J&K (UT) or North India (Punjab, Haryana and Delhi NCR etc.)
- **The Bidder shall visit IIIM, Jammu, and Project site TO UNDERSTAND THE REQUIREMENTS OF THE SITE is must. The Bidder shall study the scope along with the technical team in detail before submitting a bid, if any query, they will put a question to Scientist In-charge or Site Engineer.**
- **The Bidder shall provide the complete documentary evidence duly self attested by notary for the following in support of Bidder Pre-Qualification Criteria.**

For Clause no. 1.0, 1.1, 1.2, 1.3, 1.4

1) Purchase Orders

2) Completion Certificates and experience of performance for jobs, issued by the clients.

3) Experience details duly filled in following format.

S. No	Name of client	Name & location of the project	Brief description of project	Value of the Project	Documents submitted
					(PO copy & completion certificate) – (Y/N)

For Clause no. 2.0

1) Audited balance sheets of financial years 2015, 2016 & 2017.

2) Annual Turnover details duly filled in the following format.

Financial year	2016-17	2017-18	2018-19
Annual Turnover			

- **Note to Bidders: Offers of Bidders failing to submit the prescribed documents in support of the above prequalification criteria shall be rejected.**

Project substantial completion shall be withheld until all required Unit certification letters, tests, and reports have been submitted to and approved by the IIIM

Specifications and allied Technical details

FUME HOOD & ACCESSORIES:-

TENDERED SPECIFICATIONS

SUMMARY AND SCOPE

Furnishing and delivering all service outlets, accessory fittings, electrical receptacles and switches, as listed in these specifications, equipment schedules or as shown on drawings. Fittings attached to the fume hood superstructure shall be mounted on the front fascia of the hood as per the drawings. Furnishing and delivering all service outlets, accessory fittings, electrical receptacles and switches, as listed in these specifications, equipment schedules or as shown on drawings. Plumbing fixtures mounted on the fume hood superstructures shall be pre-plumbed with **SS-304 TUBING**. Electrical fixtures shall be prewired. The fume hood superstructure shall be listed to UL Standards for Safety by Underwriters Laboratories Inc. (UL). Final plumbing and electrical connections are the responsibility of Lab Furniture & Fume hood Supplier.

SPECIFICATIONS:

Frame construction:- (compulsory)

Entire structure should be "C" frame type. 60 X 30 X 2 mm pipe is used for main frame structure. 30 X 30 X 1.5 mm pipe should be used for bottom support. CO₂ welded & finished with highly chemical resistant epoxy powder coating.

Design Structure: Aerodynamic, Floor mounted

Airflow Type: AUTOSASH Type

Construction (Exterior): Pure Epoxy Powder coated 40-60 micron on 18 Gauge Galvanized steel with rigid structure

Construction (Interior): Phenol based high-pressure compressed compact laminate (6 -7mm thick)

Baffle arrangement: 3-point suction system (for light, normal & heavy fumes) with baffle to ensure smooth and immediate exhaust of fumes.

Airfoil: Flush powder coated airfoil mounted on the frame of the hood.

Worktop: Chemical resistant splash & spillage proof 'Jet Black Granite' worktop. The work surface and cup drain shall be available in black.

Sink, Water tap with drain arrangement: Worktop should have oval shaped 'PP' Cup-Sink for drainage with water valve.

Sash (Shutter): Vertical rising counter-balanced 'Toughened Float Glass' (5 mm thick) fitted in the Powder coated Aluminium extrusion from Hettich Germany or equivalent. Smooth and light sash operation. Clear sash open height = 770-775 mm.

Fume Hood Plumbing Services: Utility services like **Raw Water, Chilled Water Supply & Return, Compressed Air, Nitrogen, Vacuum** 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. All plumbing fittings shall be factory installed and piped between the valve and the outlet. Inlet piping shall have a single-point connection for each valve provided and carried to a point 1" above the fume hood roof or 1" above the worktop rear corner depending on the rough-in locations shown in the drawings, **All the Plumbing services connecting to the Valves & to the Header line, will be SS-304 ONLY.**

Fume Hood Electrical Services : The hood superstructure shall be wired and contain a UL label certifying acceptable wire gauge, connections, fixtures and wire color coding. Wiring electrical services shall consist of two duplex receptacles and a light switch. **3+3 nos of 5/15Amps Socket & switch, 230 Volt AC,** and 3-wire polarized grounded with ground fault interruption

Lighting: CFL/ LED/ tube light (20 or 40 watt, 2 No.) with metal enclosure for better illumination with less power consumption.

Electrical Utilities: Four nos. electrical sockets & switches, 'North West' make or equivalent (230 V, 5/16 A, 50 Hz), Switches have LED to indicate 'ON' position. A soft touch button panel with main switch, switch for blower & tube light & spare switch should be provided. LED indicators to show the ON & OFF positions of switches should be provided.

The control panel in the hood is provided with starter for blower.

Chemical Storage Base Cabinet : Castors type

Standard Steel

- Unless otherwise indicated 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 gauge except as follows:
- Corner gussets for leveling bolts and apron corner braces, 12 gauge.
- Hinge reinforcements, 14 gauge.
- 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.
- Complete rigid steel structure to support Fume hood
- Epoxy powder coated attractive color combination
- There should be two storage units with two shutters each. Each unit should have one shelf.

Level adjusting screws :To adjust fume hood level by ± 20 mm.

Damper :To regulate airflow a damper is provided at the outlet of hood.

Testing : All fume hoods are "factory tested" for design as per **ASHRAE 110 or EN 14175**. Also, "on site validation" for face velocity will be carried out to ensure working of fume hood as per international norms.

Location of Tests and Test Facility: All tests referenced herein shall be performed in the bidder's fume hood test facility & **also the Field ASHRAE or EN 14175 testing is must.**

Hood shall be tested with a face velocity of 100 FPM open vertically till safe opening height and at 100 FPM right, left and centre 100% open horizontal.

Standards: Fume hoods must have third party certification of

ASHRAE 110

Or

EN 14175

QUALITY ASSURANCE

The laboratory fume hood manufacturer shall provide fume hood work tops and casework all **manufactured & shipped with** proper packing & should take the full responsibility of the entire scope of works as specified in the tender.

General Performance: Provide certification that fume hoods meet the performance requirements described in section.

PERFORMANCE TEST RESULTS.

Performance Test Results (Chemical Spot Tests):

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 2ounce wide mouth bottle to retard evaporation. 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.

- 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.

- **After testing, panel shall show no more than four (4) Level 3 conditions.**

- 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.	Dimethylformanide	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.

Project substantial completion shall be withheld until all required fume hood certification letters, tests, and reports have been submitted to and approved by the IIIM.

LABORATORY FURNITURE & ACCESSORIES:- CRCA (Cold Rolled Close Annealed or G. I. Sheets)

	TENDERED SPECIFICATIONS
	<p>SUMMARY AND SCOPE</p> <ul style="list-style-type: none"> • Furnish all cabinets and casework, including granite tops, ledges, supporting structures. Include delivery to the building, set in place, level, and scribe to walls and floors as required. • Supply & Installation of all utility service outlet accessory fittings, electrical receptacles, plumbing and electrical switches & fittings identified on drawings as mounted on the laboratory furniture. • Supply & Installation of, 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. All tailpieces shall be furnished less the couplings required to connect them to the drain piping system. • Supply & Installation of service strip supports where specified, and setting in place service tunnels, service turrets, supporting structures and reagent racks of the type shown on the drawings. <p>I. GENERAL REQUIREMENTS:</p> <p><u>SEFA Standard:</u></p> <p>The entire Laboratory furniture should be tested as per SEFA-8M standards in SEFA Approved labs with latest 2016 Guidelines published by SEFA., Failing which it lead to disqualification of bid.</p> <p>Note: - CRCA (Cold Rolled Close Annealed or Skin passed/zero spangle G. I. Sheets or both materials can be used.</p> <p><i>Frame construction:- (compulsory)</i></p>

Entire structure should be "C" frame fabricated out of heavy gauge hollow pipes size 60 x 30 x 2 mm and 2.0 mm thick steel plates. The structure will be provided with necessary leveling bolts suitable for ± 5 mm level adjustment. Open ends of the pipe will be provided with elegant finish plastic caps. The structure shall be duly treated for the rust prevention and coated with epoxy powder coated.

Powder Coating:-

Complete module & frame work are processed with 8 tank pre- treatment and finished with highly corrosion resistant 'Akzonbel/ PolyBond' epoxy powder coated for better corrosion resistance. The thickness of powder coat shall not be less than 50-60 microns, conforming to relevant BIS code, which accordingly passes the test of Salt Spray for 1000 hours.

II. TECHNICAL REQUIREMENTS:

General Requirements: It is the intent of this specification to provide a high quality steel cabinet specifically designed for the laboratory environment.

Sheet Steel: Cold rolled sheet or G. I steel shall be prime grade 16, 18 and 20 gauge; roller leveled, and shall be treated at the mill to be free of scale, ragged edges, deep scratches or other injurious effects.

Glass: Glass used for framed sliding and swinging doors shall be 1/8" float glass. Glass used for unframed sliding doors, shall be 1/4" float glass.

Steel Gauges:

- Gauges of steel used in construction of cases shall be 18 gauge, except as follows:
- Corner gussets for leveling bolts and apron corner braces, 12 gauge.
- Hinge reinforcements, case and drawer suspension channels, 14 gauge.
- Top and intermediate front horizontal rails, table aprons and reinforcement gussets, 16 gauge.
- Drawer assemblies, door assemblies and adjustable shelves, 20 gauge.

1. 0 Storage Cabinets Castors type : Standards Heavy Duty under Module along with two front lockable castor wheels & two rear non lockable castor wheels (For Easy cleaning Purpose & Aesthetic looks) , comprising of one drawer one shutter, one drawer and two shutter, all drawers and adjustable height shelf. Cabinet shutter should be in double skin construction and should be provided with heavy duty, knuckle and barrel type SS hinges and positive catch arrangement.

1.1 Cabinet Frame: 1.2 mm horizontal and vertical stiffeners and 1.0 mm vertical panel of CRCA (Cold

Rolled Close Annealed) Or G.I sheet.

1.2 Cover Panels: End side panel and back panel should be of 1.2 mm thick CRCA MS sheet. All panels should be removable to repair any service line behind the units in future.

1.3 Shutters: Metal Shutters of CRCA or G.I sheet and 40-50 microns pure epoxy powder coating having a Scratch Hardness of 3Kgs.

1.4 Shelves & Drawers: CRCA or GI shelves with a load carrying capacity of 40-50 Kg. The overall load carrying capacity of cabinet to be 80 Kg of UDL – Uniformly Distributed Load (40-50 kgs. on each shelf and 40-50 kgs. on bottom). The overall load carrying capacity of drawer should be 40 kgs. of UDL for a pair of ball slide.

1.5 Slides & Handles: High precision double extension ball slides. Hinges to be spring loaded with CED (Cathode Electrode Deposition) coating with self closing mechanism. Handles should be PVC Recessed.

1.6 Locks: Each unit should have a locking facility with 180°, 10 lever cam lock mechanism.

1.7 Legs: The units to be supported on wide base Polystyrene legs (Hettich Make or equivalent) high impact proof material of base diameter 40-50 mm. Load bearing capacity of each leg should be at least 425- 450kg/ leg. The legs should be height -adjustable with a range of +/- 50 mm.

2. Reagent Shelves: should be of complete modular design consisting of horizontal 2 stage storage shelves. The end vertical support should be 1.2 mm & horizontal shelves of 1.0 mm thick CRCA M.S./ G.I Sheet. Each shelf should have a load carrying capacity of 30-40 kgs. of UDL for the length of 1000 mm. The complete M.S. material of cabinet to be pretreated (degreased, Zinc phosphated) and epoxy powder coated for better corrosion resistance. The thickness of powder coat to be 45-50 microns, which passes the test of Salt Spray for 1000 hours and having the Scratch Hardness of 3Kgs.

3. Polypropylene Drop in Sinks of size 558X455X300mm (approx.) made of high density 5mm polypropylene elasticity 5 micron/ thickness, should have PH resistance with organic desolvent.

4. 3 way faucets: Sink unit shall have 3 way (2 straight+1 swan neck) 360° turn type water faucets made up of Brass with epoxy powder coating. It should be PH and rust resistant. the switch valve cast to be made of ceramic that can avoid acid wear. The outlet produced in PVC, has detachable hose nozzles, alloy pressure, changeable high-pressure outlet constructed or normal clean outlet control of water flow faucet immediately.

5. SS Pegboard of overall size of 550x420mm (approx.). Adjustable PP pegs of 10mm dia. It should have a welded square tube of 20x40x1mm (approx.). Tube should be of PVC material.

6. Electrical Accessories and fittings should consist of electrical trunking of 1.0 mm thick CRCA MS sheet. It should have a high temperature withstanding capacity with excellent electrical insulation properties. The rear portion of above accessories which is in contact with live metal shall be made from thermo set material which should not melt on heating. Each electrical module consists of (North-West make or equivalent):

1) 2 No. 16 Amp 5 Pin socket

2) 2 No. 16 Amp Switch with LED

7. Work surface should be 18-19mm (± 1 mm) thick high quality granite in jet black color with pre moulded, pre polished edges. The backing material for granite should be 6 mm thick Neoprene mat.

8. Service Indexes:

Fittings shall be identified with service indexes in the following color coding:

Cold Water out-	Dark Green
Helium-	Dark Blue
Raw water-	Orange
Cold Water in-	Light Green
Nitrogen-	Brown
Vacuum-	Green
Hydrogen-	Pink
Nitrogen-	Light Blue

Applicable Standards:

SEFA 3 : Scientific Equipments & Furniture Association

SEFA 8M : Scientific Equipments & Furniture Association

Quality assurance and workmanship :

- ❖ Only approved brands of items shall be accepted. Samples shall be got approved before taking up full supply/installation.
- ❖ If required Tests on representative samples and/or components thereof shall be got conducted from reputed Laboratory as decided by the In-charge.
- ❖ Samples shall be taken/made as per the direction of the In-Charge in presence of the authorized representative of the contractors. Samples shall be signed and sealed by both the parties. Manufacture's Test certificate for the product being offered is to be provided to the department.
- ❖ The specifications are intended for the general description of the work quality and workmanship. The specifications are however not intended to cover the minute details and work shall be execute according to the specification given herein or in its absence the relevant **BIS/SEFA** specification/standards or the best practice recommended by relevant Indian Manufacturers or best trade practices.
- ❖ All material shall confirm to the approved makes of materials specified. The procurement of various materials shall be either from the manufacturers or their authorized dealers so that there is no duplicate/spurious makes are used. Notwithstanding all above, contractor shall be held responsible for the execution of works and use of proper best available quality of materials as per the tender specifications. For the items/materials not appearing in the list, the decision of Engineer-in-charge shall be final and binding.
- ❖ The contractor shall arrange stage wise inspection of the furniture at factory of the works by In-

	<p>Charge or his authorized representative if asked for. Contractor will have no claim if the furniture brought at site is rejected by In-Charge in part or full lot due to bad workmanship /quality. Such furniture will not be paid for and the contractor shall remove the same from the site of work within 7 days after the written instructions in this regard are issued by In-Charge or his authorized representative.</p> <ul style="list-style-type: none"> ❖ The contractor shall produce all materials in advance so that there is sufficient time for testing and approving of the material and clearance of the same for use in work. The contractor shall produce test certificates of all the material in respect of their conformation to the relevant Indian standards/quotation specifications. All tests required for the materials as desired by the In-Charge shall be at the contractors cost. ❖ Testing may also be carried out at the discretion of the In-Charge, from the lot of finished product brought at site by the contractor. In case such tests have been carried out by the principal manufacturer at its testing facility, the same will may be provided by the contractor for consideration. <p><u>List of approved makes of materials:-</u></p> <ul style="list-style-type: none"> ❖ Paint : ICI/Asian Paints/Berger/Oikos/Nerolac/Berger/Vijay coat/Jotun ❖ Float Glass : Modi Guard/Glaver Bel/Saint Gobain ❖ Expansion Bolts : Hilti/Fischer/Hettich ❖ Glazing Sealant : Dow Corning/GE Sealant ❖ SS/Chrome Coated Hardware : Dorma/Hafele/Hettich ❖ Aluminum Alloy Extruded Section: Hindalco/Indalco/ Jindal ❖ Hinges : Hettich/Haffle/Grass Locks : Dorset/Locksmith/Godrej/ Hettich/Haffle

EXHAUST SYSTEM (PP/FRP DUCTING AND ACCESSORIES) :-

	TENDERED SPECIFICATIONS
	<p><u>1. Exhaust duct (PP/FRP) Specification</u></p> <p>1. All ventilation duct components should be fabricated of polypropylene type I, Grade-I (dark gray) and /or polypropylene .The PP Grade I material can be rolled without heating, resulting in a lower coat for the finished product.</p> <p>2. Round Duct- All ducts should be fabricated using polypropylene with glass lining sheets with fusion joints completed with flanges, bends, transition pieces, branch entries, MS supports with epoxy Painting ,GI hardware's etc. The polypropylene ducting should be lined with FRP lining of 3mm thickness and total thickness of PP-FRP should be 6-7mm. All supports used should be of MS with Epoxy painting.</p> <p>3. Elbows should have radius an approximate centerline of 1-1/2" times duct diameter, 90° elbows can be either 3-piece or 5-piece meter, 45° elbows, 2 or 3 piece meter. If no preference is given, 3-piece 90° elbows and 2-piece 45° elbows will be provided.</p> <p>4. Transitions should be tapered cone –type only. The cone will be the same material thickness as the duct material. Transitions should be concentric.</p> <p>5. Branches should enter the main ducting at a 45° angle, unless otherwise specified. Couplings for sizes up to 24" can be either sleeve type (no stop) or standard with a stop. Only sleeve couplings are available in sizes above 24" . Socket depth for both to be 3"-4" .</p> <p>6. Flanges for Size 6" through 20" will be heat formed from PP duct or cut from flat sheet stock. Leg size will either 1-1/2" x 3/16" for diameters up to 30" .</p> <p>7. Bolt holes will be 3/8 "diameter on approximate 4"-5" centers. Suggested bolting can be either galvanized GI both should be ¼"-20 x 1-1/2" long with a nut and two washers provided for each bolt.</p>

8. Suggested gaskets should be 1/8" thick, closed cell neoprene for duct size up to 24".
9. Quadrant dampers or blast gates should be provided with a locking device for permanently setting after balancing.
10. End caps can be either permanently welded in place or fabricated to allow removal.
11. Access panels and / or view ports can be provided with clear PVC material or Plexiglas and will be held in place with SS self –tapping screws.
12. Installation (joining) can be accomplished with the belt and spigot (cementing) method, flanging or thermal welding.

Duct Construction

The fabricated duct dimensions should be as per approved drawings and all connecting sections are dimensionally matched to avoid any gaps.

Duct Sizes In mm	Thickness of PP	Thickness of FRP
0-750mm	3 mm	3 mm
750-1500mm	5 mm	5 mm
1500-2000mm	5 mm	8 mm

Support System

A completely supporting system consisting of fully threaded rods, double L bottom brackets nuts, Washers, clamps for circular ducts and anchor bolts as supplied.

Flexible Connections

Provide flexible duct connections wherever ductwork connects to vibration isolated equipment and on all exhaust final connections to spot extractor and as indicated on the drawings. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make air-tight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse and tensional movement and also capable of absorbing vibrations of connected equipment.

Flexible connections shall be air tight and resistant to water and fire.

Flexible connections shall be fitted to isolate fans from equipments and/or ductwork. The connections shall be arranged to permit the renewal of the connection without disturbing the duct work or the plant. The metal parts of connected equipment shall be separated by not less than six inches and installed with

sufficient slack to compensate for free movement of fans or spring vibration isolators.

2. SPECIFICATION FOR PP EXHAUST BLOWER

- The exhaust fans supplied and installed shall be of 'Centrifugal Corrosion Resistant' type and shall be capable of delivering the design flow rate against all duct losses.
- The fans shall be robust in construction and suitable for continuous duty operation. It shall be mounted with ease of maintenance and shall be installed with proper vibration isolators to minimize vibration transmission to ductwork and support structure.
- Fans selected shall be silent and vibration free when running and suitable for outdoor use.
- The fan speed shall not exceed 3000rpm.
- Aerodynamic performance of the fan shall be tested and comply with 'AMCA' and 'ISO5801' standards.
- The casing shall be of self-supporting design, thermoformed (size 400 and below), welded by machine (automatically welded for size 400 and below). The material of construction shall be fire retardant polypropylene (PPs) for fire safety and suitable for use against corrosive 'medium' and a maximum allowable operating temperature of 70°C.
- Impeller material shall be fire retardant polypropylene (PPs) for fan size up to 400 (polypropylene {PP} for fan size 450 and above) suitable for use against corrosive 'medium' and a maximum allowable operating temperature of 70°C.
- A standard hub seal shall be incorporated onto the impeller hub to prevent corrosive 'medium' from contacting the shaft.
- The fan shall be driven by a standard TEFC electric motor with class 'F' insulation and class 'B' temperature rise. Motor shall be suitable for outdoor installation with IP55 protection and suitable for operation with 415V/3Ph/50Hz electrical supply. Motor supplied shall be in accordance to IEC standards.

The fans have to be installed with easy access for maintenance. The installation has to be made by well-trained specialists of the OEM :

- The fans have to be erected on vibration absorbers to avoid the transmission of sound and vibrations to the building or foundations.
- The vibration absorbers have to be fixed to the foundation.
- The inlet and outlet ducts have to be connected with flexible sleeves to the fan.
- The regulation of standard DIN EN 60204-1 for the electrical installation and the electrical safety requirements have to be fulfilled.
- Start and stop devices shall be easy to operate and have to be marked clearly.
- In case of condensation liquid occurring inside the housing, it has to be equipped with a condensation drain at the lowest position of the housing and to be connected to a drainage pipe.
- For cooling, a sufficient air stream has to be assured.
- If a fan inlet is not connected to a duct, the inlet must be protected with a grid.

- Fans, which are openly accessible, have to be protected with a scatter shield around the housing.

Test run and commissioning:

- Check, whether inlet and outlet are connected to ducts or protected by a protection grid.
- Check mechanical and electrical safety devices; make sure, they are properly installed.
- Check the rotation of the impeller by means of a quick switch on/off of the motor; it must run in the direction as shown on the arrow. In case of wrong direction, change the connection of the wires.
- To protect the motors against overload, the fans shall never be operated with open
- Inlet or outlet. For test runs, the inlet has to be covered with a suitable plate.
- The current (Amps) as indicated on the motor data plate shall never exceed. The fan has to be checked for its' smooth running.

3. SPECIFICATIONS FOR MOTOR AND ACCESSORIES

Use an electric motors built to IEC standards flange mounted (B5) and Foot mounted (B3), also in ex-protected or multistage versions, for the drive. The impeller hub is coated with aluminum. Power transmission from motor to impeller by means of a directly mounting the impeller on motor shaft. The impeller is fixed on to a flange bearing and the tightening adopter system guarantees secure mechanical connection.

Motor Standard IEC three-phase motors in accordance with IEC. Mounting B5 and B3

Available in motor-mounted (IP55) or cabinet-mounted versions.

The fan shall be driven by a standard TEFC electric motor with class 'F' insulation and class 'B' temperature rise. Motor shall be suitable for outdoor installation with IP55 protection and suitable for operation with 415V/3Ph/50Hz electrical supply. Motor supplied shall be in accordance to IEC standards.

GAS, UTILITY & DRAIN DISTRIBUTION SYSTEM:-

	TENDERED SPECIFICATIONS
	<p>UTILITY & GAS DISTRIBUTION SYSTEM</p> <p>GENERAL:</p> <p>The Gas Distribution System has two independent types of systems namely Bottled Gas System and Compressed Gas System. Utility Services like Raw Water fed from Header line located around the building wall provided by Client. Whereas the Compressed Air, Vacuum, Nitrogen & Chilled Water services are fed from the respective source Equipments located behind the MCD lab-2 building wall for old block and behind the Gents wash room at Ground level.</p> <p>The Gas Distribution System consists of following: Source points, Compressed Gas Cylinders and accessories like Bull noses, Flexible Hoses, Change over Panel, Cylinder Isolation Valves, Check Valves, Excess Flow Check Valves, and Flash Back Arrestors. Tubs & Tube Fittings, Floor Isolation Valves, Branch Isolation Valves, Point of Use Regulators, Pressure Gauges, Gas Purifier, Gas Distribution Panel, All Tubing and fittings are supported by aluminum profile, MS angles and clamps with Nut & bolts.</p> <p>TECHNICAL REQUIREMENTS:</p> <p>GENERAL:</p> <p>It is the intent of this specification to provide a high quality gas distribution system for the laboratory usage.</p> <p>GAS TUBING:</p> <ul style="list-style-type: none">• Tubing sizes up to 1" and including ¼", ½", ¾" OD should be bright annealed. Tubing with outside diameter larger than 1" OD should be supplied in annealed and pickled condition.• Material of Construction (MOC) of the Tubing & Fittings shall be SS304.• Tubing hardness should have a max HRB 80.

- The tubing should be supplied with plugged ends.
- Tubing should fully annealed, high quality, Stainless tubing as per ASTM A269 or A213, or DIN-17456 & 17458 (Class-1).
- Working Pressure of tubing as listed in ASME B31.3, for ASTM A269 tubing at –20 to 100°F (–28 to 37°C).

TUBE FITTINGS:

- The fittings shall be of welded type, the fittings shall be capable of holding the maximum working pressure of the tubing without any leak.
- All the fittings end connections shall be compatible to tube of hardness less than or equal to RB 80.
- Fittings for the Tubing running above the false Ceiling, Header & Sub Header shall be Welded type. Fittings for the droppers connected to sub Header shall be Compression type.
- Tube to tube joints and braches are joined by the way of orbital welding up to 1" OD tubes. And Socket welding/Butt Welding to be carried out for the Tubes which are greater than 1" OD.

INSULATION:

To avoid heat gain and reduced efficiency of cooling systems, condensation of water on surfaces, and potential corrosion problems, pipes in chilled water systems should always be insulated. For Outdoor application, should be painted with Arm finish FR paint of Two Coats.

Material	Nitrile Rubber
Max. Surface Temperature	+105° C
Min. Surface Temperature	-50° C
Thermal Conductivity @ 0° C	0.035 W /(m . k)

The Insulation wall thickness schedule is based upon Normal Design Conditions of 85°F (29.4°C) and 70% RH. Deviations from these design conditions may change the Insulation thickness requirements.

Pipe Size	Insulation Thickness
Up to 1"	13 mm
Up to 6"	19 mm

HOT WATER SYSTEM:

PPR Pipes

The PPR pipe (Poly Propylene Random Copolymer) is one of the latest pipes resulting from European advanced technology. The quality of our PPR pipes is entirely up to the standard of DIN8077/8078. Polymers which are a high molecular weight polymer and contain stabilization package in order to prevent thermal degradation of material during the piping processing and to provide outstanding performance during the usage of pipe. It is considered as the optimal pipe material for cold and hot water system. PPR SDR 7.4 (PN 20) pipes shall be used for hot Water System.

Advantages:

- Widely used in distribution of water / drinking water installation in Residential area as it is not detrimental to human health. It's Hygienic and Odourless. There is no bacterial or Fungal Growth and no Contamination.
- Resistant to heat or cold. No need for insulation against heat. Withstands temperature range – 2 Degree Celsius to 90 Degree Celsius. Keeps inner climate constant.
- Endures to climatic condition.
- Resistant to corrosion, does not rust or decay, No scaling or calcification.
- Resistant to chemical reaction, acids, salt and alkalis, may safely be used together.
- Low friction losses. Resistant to abrasion.
- Extremely light weight – easy to transport & install.
- Strong tough and long lasting - can be safely used for duration of minimum 50 Years.
- Leak Proof Joints (Zero maintenance, Easy repairs)

Mechanical & Thermal Properties

Impact Strength	1.1 - 14.0
VICAT Softening Temp., °C	130
Maximum Safe Working Temp., °C	95
Water Absorption (%) Maximum	0.03
Specific Gravity g/cm ³	0.9
Density g/cm ³	0.91
Thermal conductivity at 23°C W/m.k	0.23
Friction Factor	Very Low
Chemical resistance	Very High

Permissible Operating Pressure

Temp Deg C	Pressure Kg/cm ² SDR 6 (PN 20)
10	38
20	32.4
30	27.3
40	23
50	19.5
60	16.2
70	12.3
80	7.7
95	5.2

Chemical Resistance

One of the characteristic of Polypropylene Random Copolymer (PP-R) is its property of having the greatest chemical resistance. The chemical resistance of any substance has direct relation with its properties, its composition, its concentration, heat and duration under effect. The chemical resistance chart for the Chemicals with different composition and concentration and their resistance at various temperatures can be provided on request.

Thermal Insulation

Thermal Insulation may be installed for the purpose of preventing sweating and condensation. However Polypropylene material has rather low thermal conductivity, thus PP-R pipes require less insulation material than metal pipes. For example PN 20 pipe will have 53 deg C surface temperatures as a result of transporting water at temperature 80 deg C for a continuous time.

Insulation Thickness for Exposed Hot Water Pipes.

Dimension (mm)	Thermal Conductivity (W/mk) of Insulation Material	
	0.030	0.035
	Recommended Minimum Insulation Thickness	
20	6 mm or 1/4"	10 mm or 3/8"

25	6 mm or 1/4"	10 mm or 3/8"
32	10 mm or 3/8"	13 mm or 1/2"
40	10 mm or 3/8"	13 mm or 1/2"
50	10 mm or 3/8"	13 mm or 1/2"

GEYSER

An electrical geyser is a sizable container which heats water using an electrical element. This is to control the temperature and control power consumption. A geyser is fitted with valves than control pressure caused by the expansion and possible over heating of the geyser. Electric Geyser equipped with safety measures like thermostat, reset, fuse plug, vacuum release valve and pressure release valve.

Capacity	03 LPM
Tank Capacity	06 Liters
Power Consumption	03 kW
Temperature Output	69.5° C
Size	469 X 295 X 290 (LXWXB)

GAS CYLINDER CHANGE OVER PANEL:

Single-Stage Gas Panel to reduce cylinder pressure to a certain line pressure for in house use with internal gas purging and Process gas outlet shut-off valve. These Gas Panels are used for Inert, Reactive, Flammable and Oxidizing Gases and gas mixtures.

These gas panels are mounted on a stainless steel panel and consist of a pressure regulator, inlet and outlet pressure gauges, a relief valve and shut-off valves for the process gas. A choice of stainless steel coils or flexible high pressure hoses is available for the connection to the gas cylinder. Provision for contact pressure gauges (accessories) facilitates monitoring of the gas reserves.

Gas panels are permanently installed in the cylinder stock room or cabinet and reduce the cylinder pressure to a lower line pressures. The gas is guided to the point of use via the subsequent piping system. This Gas Panel allows purging to be carried out with internal gas while cylinders are being changed and flushes the atmospheric air from the system; gas purity is maintained and also shutting-off of gas flow during cylinder change with the panel itself. Standard application for these panels: centralized or decentralized gas supply

for highly sensitive analysis devices.

Pressure decreases of the active cylinder (or bundle) below a preset level cause's semi-automatic switch over to the full cylinder side. This is achieved by two integrated regulators (factory set to slightly different delivery pressure levels), connected at their outlet ports. Moving the lever towards the full battery side, this allows disconnecting & replacing the empty cylinder without interrupting the gas supply. The level position always indicates cylinder priority in being discharged.

Technical Details:

Body material : Brass

Dimensions (LxHxD) : 400 x 155 x 240 mm

Purity : Max. 6.0

Inlet pressure : 230 bar

Outlet Pressure range : 14 bar

Inlet Connection : N14 (=NPT ¼")

Outlet Connection : N14 (=NPT ¼")

Cylinder Bracket: Cylinder Brackets are used to mount the cylinder on Wall to avoid down fall of Gas Cylinder.

VALVES:

BALL VALVES

Ball Valves of required size shall be installed at each source Point of the Service. Ball valve with required size shall be considered at shaft opening of each floor.

Type: Ball type

Size ½" OD to 1" OD

MOC: SS304

Flow: Straight (2-Way)

Seat Material: Reinforced PTFE

Rating: -29°C @ 1965 kPag to 150°C @ 1580 kPag.

Teflon gland packing with Silicone base lubricant and the valves shall be factory tested at 1000 PSIG and certification shall be produced.

PRESSURE GAUGE:

General Purpose Stainless Steel Pressure gauges of 63 mm dial size to be installed in every lab / bench or special purpose equipments in order to know the pressure rating.

Rating: 0 – 25 bar

Accuracy: 63 mm (2 1/2 in.): ± 1.5 % of span.

Mounting type: Center back mount type.

End Connection: 1/4" Male NPT

Dial Size: 63 mm (2 1/2")

Operating temp.: Unfilled: -40 to 140°F (-40 to 60°C)

MOC: End Connection & Burdon tube will be SS 316, Casing will be SS304.

Temp. Error: ± 0.4 % for every 18°F (10°C) temperature change from 68°F (20°C)

LINE REGULATOR

Single-stage line regulator used for inert, reactive, flammable, oxidizing gases and gas mixtures in laboratory system. Line regulators are used to reduce line pressure to various low pressure levels at the specified area to be controlled. Pressurized gas enters the regulators from the line. When the hand wheel is turned clockwise, it compresses the spring and gives a force on the diaphragm, which pushes the valve stem open. This releases gas into the low-pressure chamber, exerting an opening force on the diaphragm. Equilibrium is reached, when the spring force on the diaphragm is equal to the opposing force of the gas in the low-

pressure chamber.

Type of pressure reducing	: laboratory regulator system
Pressure stages	: single-stage
Mounting details	: plate mounted with inlet from top
Material	: Brass chrome-plated.
Inlet Pressure	: 50 bar
Outlet Pressure	: 0.2 to 14 bar
Inlet connection	: NPT 1/4"
Outlet connection	: NPT 1/4"

GAS PURIFIER:

Gs Purifiers are used to get Ultra High purity (UHP) gases. It contains Moisture Trap, Hydrocarbon Trap & Oxygen Trap with Micron Filters and also Pressure Gauge, Pressure Regulators and Toggle Valve.

Moisture Trap:

Application	: Moisture Removal
Filter Type	: Silica gel / Molecular Sieve
MOC	: Clear acrylic / safe glass tube
Capacity	: 210 CC
Working Pressure	: 10 Bar
Max. Operating Temp	: 50° C

Hydro Carbon Trap:

Application	: Hydrocarbon Removal
Filter Type	: Activated Charcoal

	MOC	: Clear acrylic / safe glass tube
	Capacity	: 210 CC
	Working Pressure	: 10 Bar
	Max. Operating Temp	: 50° C
	Oxygen Trap:	
	Application	: Oxygen Removal
	Filter Type	: De-Oxo Chemical catalyst
	MOC	: SS316
	Capacity	: 210 CC
	Working Pressure	: 10 Bar
	Max. Operating Temp	: 50° C
	Gas Distribution Panel:	
	<p>Gas Distribution Panel is used where more than one gas required for a single instrument. It helps to controls the flow and Pressure of different gases for the particular instruments. The Gas Distribution Panel consists Toggle Valve, Pressure Gauge, Pressure Regulator and Spiral Tubing.</p>	
	WELDING:	
	<ul style="list-style-type: none"> • Tube to tube joints and braches are joined by the way of orbital welding up to 1" OD tubes. And Socket welding/Butt Welding to be carried out for the Tubes which are greater than 1" OD. 	
	Orbital Welding:	
	<p>Method for joining tubes will be orbital welding, Orbital welding is cleaner, reliable way of joining pipes and purity is guaranteed by orbital welding.</p>	

Orbital welding is a mechanism in which the arc from a tungsten electrode was rotated around the tubing weld joint. The arc welding current was regulated with a control system thus automating the entire process. The result was a more precision and reliable method than the manual welding method it replaced. Orbital welding systems offer computer control where welding parameters for a variety of applications can be stored in memory and called up when needed for a specific application. The skills of a certified welder are thus built into the welding system, producing enormous numbers of identical welds and leaving significantly less room for error or defects. In the orbital welding process, tubes/pipes are clamped in place and an orbital weld head rotates an electrode and electric arc around the weld joint to make the required weld.

Radiographic Test for Welds:

Radiographic Testing for Welded Joints of higher size pipes should be carried out.

The beam of radiation must be directed to the middle of the section under examination and must be normal to the material surface at that point, except in special techniques where known defects are best revealed by a different alignment of the beam. The length of [weld](#) under examination for each exposure shall be such that the thickness of the material at the diagnostic extremities, measured in the direction of the incident beam, does not exceed the actual thickness at that point by more than 6%. The specimen to be inspected is placed between the source of radiation and the detecting device, usually the film in a light tight holder or cassette, and the radiation is allowed to penetrate the part for the required length of time to be adequately recorded.

INSPECTION AND TESTING

Performance Test for Gas System:

A. Installation Purging Procedures:

- The sealed tubes after starting the process of cutting and debarring has to be purged with general purity nitrogen.
- Connect the tubes to the flexible hose of the regulated supply (at 2 bars) and blow the debris for 5

min.

- To ensure the purging is totally complete, blow the tubes intermittently holding the pressure for few seconds at the end of the tube.
- Now use the tube to swage the fitting. And install the tube with the fitting at the required place.

B. Pre Testing Purging Procedure

- Once the main header and the sub header installation is complete, check for the misalignment or improper fitting connections.
- Connect the regulated pressure from the Nitrogen cylinder and blow the system for 15 mins nonstop.
- Start the process again after 15 mins duration and blow the system for another 10 mins.
- Reconnect the needle valves and open the port fully.
- Start the purging process one more time with the valve open blow the whole system for 30 mins.
- Now the system is completely purged and now ready for handing over after the pressure test.
- Please note purged air must be directed to outside of Lab.

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C. Pressure Testing Procedure

- Ensure complete piping is purged with prior to pressure test. Use Nitrogen for leak check. Please note purged air must be directed to outside of Lab.
- Ensure the system point is not hooked up to the lab equipment.
- Shut-off point of use valve and pressurize system through the cylinder regulator.
- Increase pressure slowly to maintain 30 psi and shut-off the cylinder valve. Observe the pressure gauge for evidence of pressure drop.
- If the pressure drops, trouble-shoot leaking joints by using "Snoop" liquid leak detector rectify as necessary.
- Proceed to increase pressure to 100 psi if no leak is detected after 15 mins. of pressurization at 30 psi.
- Repeat above if leak is detected.
- Proceed to increase pressure to 1.5 times the working pressure of the system. (Normally system with same procedure as above.
- Maintain pressure for 12 hours and check for evidence of pressure drop.

D. Preliminary Testing

Preliminary Leak testing will be carried out in two phases:

Pressure decrease method (Pressure testing: 1, 5 times the maximum working pressure). Necessary formats will be used and all relevant data will be recorded during the test. GDS vendor and Management staff of client will jointly witness the test and certify the same.

TIFF leak detection:

Necessary formats will be used and all relevant data will be recorded during the test. GDS vendor and Management staff of client will jointly witness the test and certify the same.

MATERIAL OF CONSTRUCTION (M OC):

SL N.	ITEM'S NAME	MOC
01	Change Over Regulator	Brass
02	Line Regulator	Brass
03	Point of Use Regulator	Brass
04	Utility & Gas Tubing	SS 304
05	Tube Fittings	SS 304
06	Hot Water Pipes & fittings	PPR
07	Chilled Water Insulation	Nitrile Rubber
08	Valves	SS304
09	Tubing Support	Mild Steel
10	U Clamps	Stainless steel
11	Clamps	Virgin Polypropylene
12	Cylinder Bracket	MS Steel

SCOPE OF WORK:

- Supply & Installation of the Utility & Gas Distribution System comprises the following.
- Supply, Installation, testing & commissioning of Source Equipments (i.e. Air Compressor, Vacuum Pump & Process Chiller) at Ground level.
- Preparing the Foundation Details for the Source Equipments and submit the same to the Project Manager in order to co ordinate with Civil Vendor.
- Supply, installation and joining of tubes/Pipes with fittings by means of Orbital Welding and Socket Welding from the Source Equipments to the respective Header inside the lab.
- Raw Water shall be tapped from the Header line with necessary source connector located around the building wall provided by Client.
- The Routing of the Pipes & location of supports as per the specifications & approved Drawing.
- All Services considered from the Source Point to user points with necessary accessories & fittings.
- Performance test for whole System shall carry out by contractor/vendor in order to find any defects in the System. Pre-installation Purging Procedure for the tubes shall be carried out as per specifications. Pre-Testing Purging Procedure shall be carried out to eliminate the misalignment or improper fittings connection as per specifications. Pressure Testing Procedure Ensure complete piping is purged with prior to pressure test. Use Nitrogen for leak check. Purged air must be directed to outside of Lab.
- Technical Data Sheets of all equipment, materials and Samples shall be submitted for approval prior to installation works.
- Preparation of execution drawings and descriptive Technical Documents for all equipment shall be submitted.
- Coordination with other contractors/Vendors with regard to installation of Source Equipments, Tubes/Pipes, Supports, Cables etc.
- Submission of hard-bound copies of Operation and Maintenance Manuals complete with as-built drawings.

LAB EFFLUENT DRAINAGE SYSTEM

GENERAL:

Drainage System considered from Fume Hood cup sink outlet, Sink Outlet to Header line located around the building wall provided by Client.

Drain Header with necessary supports and connected to the Drain Header. Drainage pipes and fittings thermal weld type. Drain Point for Safety Shower is not considered. Floor Drain / Drain Pan should be provided by client, for periodic testing. Civil cut out on Wall/Floor, Floor Trenches to be carried out by client/others.

PIPES:

High density polyethylene (HDPE) is being used as drainage pipe material. These HDPE pipe shall comprise following features.

- The Pipe shall be lightweight, corrosion resistant, easy to install, and has a low maintenance cost.
- The pipe shall be safely used as waste pipe for temperatures of up to 80°C. Temperatures of up to 100°C are permissible for short periods (e.g. surges of steam). The system is equally suited for freezing temperatures and adapts elastically to cope with expansion, remaining completely intact and undamaged after thawing.
- These pipes undergo a licensed annealing process in hot water to reduce inherent tensile stresses created during manufacture. This process ensures long-term joint integrity, as thermal expansion and reversion are reduced compared with untreated pipes.
- Pipe shall be unbreakable at room temperature and offers excellent impact resistance even at temperatures of – 40°C, thus meeting the requirements for drainage systems.
- Also offers considerable resistance to chemicals, because of its paraffin structure. The system is insoluble in all inorganic or organic solutions at 20°C.
- The flexibility of these pipes guarantees crush resistance and superior performance in applications where pipes pass through expansion joints or are subject to traffic vibration.
- Pipe's resistance to abrasion is a particularly important factor for branch pipes, soil stacks and ground pipes. It is very resistant to abrasion; its extra thick walls offer superior protection from both internal and external abrasion.

PIPE FITTINGS

Pipe Fittings like Tees, Elbows, sleeves, etc shall be considered at appropriate location and all these shall be welded or electro welded.

The Expansion Socket is designed to counteract the variation in length due to thermal expansion and contraction of max. 6 m pipes. When fitting collector pipelines extend 6 m it is necessary to fit expansion sockets and secure them with pipe supports. HDPE expansion socket absorb thermal expansion and contraction due to temperature changes caused by water discharge, but it also makes pipe assembly easier,

	<p>assisting connection at each floor level.</p> <p>Some Connections shall be made by Electro weld Sleeve coupling, the electro weld sleeve coupling is the ideal connection on-site, for subsequent changes or wherever access is not easy.</p>
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ELECTRICAL WORKS AND ACCESSORIES) :-

	TENDERED SPECIFICATIONS
	<p>GENERAL</p> <p>Prior to laying and fixing of conduits, the contractor shall mark the conduit route, carefully examine the working drawings prepared by him and approved by the Consultant indicating the layout, satisfy himself about the non interference in the route, sufficiency of number and sizes of conduits, location of junction boxes, sizes and location of switch boxes and other relevant details. Any discrepancy found shall be brought to the notice of the Owner's site representative. Any modifications suggested by the contractor should get written approval before the actual laying of conduits is commenced.</p> <p>PVC CONDUIT AND ACCESSORIES</p> <p><u>PVC Conduit</u></p> <p>Conduits and accessories shall conform to latest edition of IS-9537 part 3 and shall be heavy duty wall thickness of 2.0 mm rigid tubes which are unscrewed without coupling and with plain ends. All conduits used shall not be less than 20 mm diameter. PVC conduit shall be used for all concealed / embedded installation.</p> <p><u>PVC Conduit Accessories</u></p> <p>Accessories used for conduit shall be of an approved type complying to relevant IS code.</p> <p>All accessories used shall be of standard white or black colour, <u>identical to conduit used</u>.</p> <p>Plain conduits shall be joined by slip type of couplers with manufacturer's standard sealing.</p>

MAINS AND SUB-MAINS

Mains and sub-mains cable or wires where called for shall be of the rated capacity and approved make. Every main and sub main wires shall be drawn into an independent adequate size of conduit. Earthing shall be in conformity with relevant IS codes and calculations shall be submitted for verification. An independent earth wire of the proper rating shall be provided for every single phase sub-main. For every 3 -phase sub-main, 2 No. earth wires of proper rating shall be provided along with the sub-main. The earth wires shall be drawn along with circuit wires through conduit. Where mains and sub-mains cables are connected to switchgear, sufficient extra lengths of cable shall be provided to facilitate easy connections and maintenance.

1. WIRING FOR POWER AND LIGHTING CIRCUITS

Wiring for power and lighting circuits shall be carried out in separate and distinct wiring systems. Wiring for emergency system shall also be carried out in a separate and distinct wiring system. Balancing of circuits in a three phase system shall be arranged before the installation is taken up. The wiring system envisaged is generally shown on the layout drawings and line diagrams. However, a brief account of the general wiring system is given below:

- a. Sub mains wiring - Wiring from Main / Sub Main Switch Board to the individual MCB distribution boards.
- b. Circuit wiring - Wiring from MCB DB to the nearest switch/control box for lighting, fans, sockets, switches, call bells for each circuit, and onward looping to the next switch / control boxes.

The sub-main wiring shall be either in 3 phase 4 wire or single phases 2 wire system. Each sub-main wiring circuit shall also have its own PVC insulated copper earth continuity wire/s as per detailed drawings and specifications.

Circuit wiring shall be in single phase system. However, a maximum of 2 single phase circuits belonging to the same pole/phase could be installed in the same conduit. Not more than ten points - light, fan, and 5A socket shall be grouped on one lighting circuit.

R - Red	Neutral	:	N - Black
Y - Yellow	Earth	:	G - Green
B - Blue	Emergency	:	E - Grey

SWITCHES, SOCKETS & ACCESSORIES

Light control switches shall be of a 5/15A rating for controlling light points as specified in bill of quantities. Light control switches shall be of plate type design with MS/GI/PVC/WOOD boxes suitable for flush mounting for general lighting, as specified in BOQ.

All sockets 5A and 15 A ratings shall be of flush mounting type with control switches of plate type design of the same rating as that of the sockets. All sockets outlet shall be of 3 pin type with box.

2. SWITCHES, RECEPTACLES (MODULAR), LIGHTING FIXTURES & LIGHTING CONTROL EQUIPMENT

2.1 SWITCHES

All switches shall be enclosed type flush mounted suitable for 240 volts AC. All switches shall be fixed inside the switch boxes on adjustable flat M S strips/plates with tapped holes and brass machine screws, leaving ample space at the back and sides for accommodating wires. Switch controlling the light point shall be connected to the phase wire of the circuit and load on each switch shall be restricted to maximum 800 watts & maximum 1500 watts per circuit. All wiring accessories shall be BIS approved. Perfect alignment shall be maintained while fixing of the back boxes.

2.2 WALL SOCKET OUTLET

Wall socket outlets shall be of the three pin. The switch controlling the socket outlet shall be on the phase wire of the circuit and not more than two socket outlets of 16 amps shall be connected on one circuit. An earth wire shall be provided along with the circuit wires and shall be connected to earthing screw inside the box. The earth terminal of the socket shall be connected to the earth terminal provided inside the box. All sockets shall be shuttered type.

a. Every socket outlet shall be controlled by an individual switch unless mentioned otherwise.

b. The switch controlling the socket outlet shall be on the 'Live' side of the line.

c. 6 amps and 16 amps socket outlet shall normally be fixed at any convenient height above the floor level as desired by the Architect. The switch for 6 and 16 amps, socket outlet shall be kept along with the socket outlet. However, in special case, if desired by the Architect the 6 amp. Socket outlet can be placed at the normal switch level.

2.3 LIGHTING FIXTURES & ACCESSORIES

The light fixtures and fittings shall be assembled and installed in position complete and ready for service, in accordance with details, drawings, manufacturer's instructions and to the satisfaction of the Project Manager.

2.3.1 SCOPE

Scope of work under this section shall include inspection at suppliers/manufacturer's premises at site, receiving at site, safe storage, transportation from point of storage to point of erection, erection and commissioning of light fittings, fixtures and accessories including all necessary supports, brackets, down rods and painting etc as required.

4. DISTRIBUTION PANELS/BOARDS

Main Distribution Panels, Sub-Distribution Panels and Final Distribution shall be covered under this section. Panels/Boards shall be suitable for operation on 3 Phase/single phase, 415/240 volts, 50 cycles, 4 wire system with neutral grounded at transformer. All Distribution panels shall be CPRI tested design and manufactured by a approved manufacturer. **CPRI certificate shall be made available.**

3.1 CONSTRUCTION FEATURES

Distribution panels shall be 2 mm thick sheet steel cabinet for indoor installation, dead front, floor mounting/wall mounting type and shall be form 3b construction. The Distribution panels shall be totally enclosed, completely dust and vermin proof and shall be with hinged doors and folded covers, Neoprene gasket, padlocking arrangement and bolted back. All removable/ hinged doors and covers shall be grounded by flexible standard connectors. Distribution panel shall be suitable for the climatic conditions as specified in Special Conditions. Steel sheets used in the construction of Distribution panels shall be 2 mm thick and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet metal shall be seam welded, all welding, slag shall be rounded off and welding pits wiped smooth with plumber metal. The general construction shall conform to IS-8623-1977 (Part-1) for factory built assembled switchgear & control gear for voltage upto and including 1100 V AC.

All panels and covers shall be properly fitted and square with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with wing nuts. Self threading screws shall not be used in the construction of Distribution panels. A base channel of 75 mm x 40 mm x 5 mm thick shall be provided at the bottom for floor mounted panels. Minimum **operating** clearance of 275 mm shall be provided between the floor of Distribution panels and the lowest feeder compartment.

Distribution panels shall be of adequate size with a provision of spare switchgear as indicated on the Single Line Diagram. Feeders shall be arranged in multi-tier. Knockout holes of appropriate size and number shall be provided in the Distribution panels in conformity with the location of

cable/conduit connections. Removable sheet steel plates shall be provided at the top to make holes for additional cable entry at site if required.

Every cabinet shall be provided with Trifoliate or engraved metal name plates. All panels shall be provided with circuit diagram engraved on PVC sheet. All live accessible connections shall be shrouded and shall be finger touch proof and minimum clearance between phase and earth shall be 20 mm and phase to phase shall be 25 mm.

3.2 BUS BAR CONNECTIONS

Bus bar and interconnections shall be of high conductivity electrolytic grade aluminium / copper as indicated in the bill of quantities complying with requirement of IS : 5082 – 1981 and of rectangular cross section suitable for carrying the rated full load current and short circuit current and shall be extendable on either side. Bus bars and interconnections shall be insulated with heat shrinkable sleeve of 1.1 KV grade and shall be colour coded. Bus bars shall be supported on glass fiber reinforced thermosetting plastic insulated supports at regular intervals to withstand the force arising from in case of short circuit in the system. All bus bars shall be provided in a separate chamber and all connections shall be done by bolting. Additional cross sectional area to be added to the bus bar to compensate for the holes. All connections between bus bars and breakers shall be through solid copper / aluminium strips of proper size to carry full rated current and insulated with insulating sleeves. Maximum current density for the busbars shall be 1A/sq.mm for aluminium and 1.4 A/sq.mm for copper busbars.

Maximum allowable temperature for the Bus bar to be restricted to 85 deg C

3.3 CABLE COMPARTMENTS

Cable compartment of adequate size shall be provided in the Distribution panels for easy clamping of all incoming and outgoing cables entering from the top/bottom. Adequate supports shall be provided in cable compartment to support cables.

4.0 MOULDED CASE CIRCUIT BREAKER (MCCB)

The MCCB should be current limiting type with trip time of less than 10 msec under short circuit conditions. The MCCB should be either 3 or 4 poles as specified in BOQ. MCCB shall comply with the requirements of the relevant standards IS13947 – Part 2/IEC 60947-2 and should have test certificates for Breaking capacities from independent test authorities CPRI / ERDA or any accredited international lab.

MCCB shall comprise of Quick Make -break switching mechanism, arc extinguishing device and the

tripping unit shall be contained in a compact, high strength, heat resistant, flame retardant, insulating moulded case with high withstand capability against thermal and mechanical stresses

The breaking capacity of MCCB shall be as specified in the schedule of quantities. The rated service breaking capacity (Ics) should be equal to rated ultimate breaking capacities (Icu). MCCBs for motor application should be selected in line with Type-2 Co-ordination as per IEC-60947-2, 1989/IS 13947-2. The breaker as supplied with ROM should meet IP54 degree of protection.

The manufacturer shall provide both the discrimination tables and let-through energy curves for all.

a. Protection Functions

- MCCBs with ratings up to 200 A shall be equipped with Thermal-magnetic (thermal for overload and magnetic for short-circuit protection) trip units
- Microprocessor MCCBs with ratings 250A and above shall be equipped with microprocessor based trip units.
- Microprocessor and thermal-magnetic trip units shall be adjustable and it shall be possible to fit lead seals to prevent unauthorised access to the settings
- Microprocessor trip units shall comply with appendix F of IEC 60947-2 standard (measurement of rms current values, electromagnetic compatibility, etc.)
- Protection settings shall apply to all poles of circuit breaker.
- All Microprocessor components shall withstand temperatures up to 125 °C

b. Testing

Original test certificate of the MCCB as per IEC 60947-1 &2 or IS13947 shall be furnished. Pre-commissioning tests on the switch board panel incorporating the MCCB shall be done as per standard specifications.

c. Interlocking

Moulded, case circuit breakers shall be provided with the following interlocking devices for interlocking the door of a switch board.

- Handle interlock to prevent unnecessary manipulations of the breaker.
- Door interlock to prevent the door being opened when the breaker is in ON position.
- Defeat-interlocking device to open the door even if the breaker is in ON position.

The MCCB shall be current limiting type and comprise of quick make – Break switching mechanism. MCCBs shall be capable of defined variable overload adjustment. All MCCBs rated 200 Amps and above shall have adjustable over load & short circuit pick-up both in Thermal magnetic and Microprocessor Trip Units.

All MCCB with microprocessor based release unit, the protection shall be adjustable Overload, Short circuit and earth fault protection with time delay.

The trip command shall override all other commands.

4.1 MINIATURE CIRCUIT BREAKER (MCB)

Miniature Circuit Breaker shall comply with IS-8828-1996/IEC898-1995. Miniature circuit breakers shall be quick make and break type for 240/415 VAC 50 Hz application with magnetic thermal release for over current and short circuit protection. The breaking capacity shall not be less than 10 KA at 415 VAC. MCBs shall be DIN mounted. The MCB shall be Current Limiting type (Class-3). MCBs shall be classified (B, C, D ref IS standard) as per their Tripping Characteristic curves defined by the manufacturer. The MCB shall have the minimum power loss (Watts) per pole defined as per the IS/IEC and the manufacturer shall publish the values. MCB shall ensure complete electrical isolation & downstream circuit or equipment when the MCB is switched OFF.

The housing shall be heat resistant and having high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection. All DP, TP, TPN and 4 Pole miniature circuit breakers shall have a common trip bar independent to the

External operating handle.

5. EARTHING

5.1 EARTHING

The system shall be TNS with four wire supply system (R,Y,B,N and 2 Nos. E) brought from the main L T Panel. All the non-current carrying metal parts of electrical installation and all metal conduits trunking, cable sheaths, switchgear, distribution panels, light fittings and all other parts made of metal shall be bonded together and connected by means of specified earthing conductors to an efficient earthing system. All metal work such as pipe lines, ducts, cable trays, stair case railing etc shall be bonded to earth.

All earthing shall be in conformity with IS: 3043 1987, and the basic system of earthing shall be TNS.

5.2 EARTHING CONDUCTORS

Earthing conductors shall be of copper / GI as mentioned in schedule of quantities and shall be protected against mechanical injury and corrosion.

5.3 SIZING OF EARTHING CONDUCTORS

The cross sectional area of earthing conductor shall not be smaller than half of the largest current carrying conductor subject to an upper limit of 80 Sq.mm. If the area of the largest current carrying conductor or bus bar exceeds 160 sq.mm then two or more earthing conductors shall be used in parallel, to provide at least half the cross sectional area of the current carrying conductor or bus bars. All fixtures, outlet boxes, junction boxes and power circuits upto 15 amps shall be earthed

with PVC insulated copper wire.

APPENDIX – II

LIST OF INDIAN STANDARDS (IS)

Latest edition of following standards shall be referred

IS : 694	PVC insulated Electric cable for working voltage upto and including 1100 volts.
IS : 732	Code of practice for electrical wiring and installation
IS : 1255	Code of Practice for installation and maintenance of Power Cables upto and including 11 KV rating (Second Revision)
IS : 1293	Three pin plugs and sockets outlets rated voltage upto and including 250 volts and current upto and including 160 amps.
IS : 1554 (Part - I)	PVC insulated (Heavy Duty) electric cables for working voltages upto and including 1100 volts.
IS : 1646	Electrical installation fire safety of buildings (general) Code of practice.
IS : 1885	Glossary of items for electrical cables and conductors
IS : 1913	General and safety requirements for fluorescent lamps luminaries Tubular.
IS : 2309	Protection of building and allied structures against lightning
IS : 2551-	Danger notice plate.

IS : 3043	Code of practice for earthing.
IS : 3427	AC Metal enclosed switch gear and control gear for rated voltages above 1 KV and upto and including 52 KV.
IS : 3480	Flexible steel conduits for electrical wiring.
IS : 3837	Accessories for rigid steel conduit for electrical wiring.
IS : 4146	Application guide for voltage transformers
IS : 4615	Switch socket outlets.
IS : 5133 (Part -I)	Boxes for the enclosure of electrical accessories.
IS : 5216 (Part-I)	Guide for safety procedures and practices in electrical work.
IS : 5424	Rubber mats for electrical purposes.
IS : 5578 & 11353	Marking and arrangement of bus bars
IS : 5578 & 11353	Marking and arrangement of bus bars
IS : 7098 - (Part - II)	Cross linked polyethylene insulated PVC sheathed cables. For working voltages from 3.3 KV upto and including 33 kV
IS : 8130	Conductors for insulated electric cables and flexible cords

	IS : 8623 - (Part -I)	Factory built assemblies of switchgear and control gear for voltages upto and including 1000 V AC and 1200 VDC.
	IS : 8623 - (Part -II)	Bus Bar trunking system
	IS : 8828	Miniature Circuit Breakers
	IS : 9537	Rigid Steel Conduits for electrical wiring (Second Revisions)
	IS : 10810	Methods of test for cables.
	IS : 12640	Earth Leakage Circuit Breakers
	IS : 13947 (Part-II)	Air Circuit Breakers
	IS : 13947- (Part-)	Moulded Case Circuit Breakers
	IS : 13947 - (Part-)	Degree of protection provided by enclosures for LV switchgear and control gear.
	IS : 13947 (Part-)	General requirement for switchgear and control gear for voltage not exceeding 1000 Volts.

OFFICE FURNITURE

	TENDERED SPECIFICATIONS
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Mid Back Ergonomic Chairs on castors with arms

1) SEAT/BACK ASSEMBLY: The seat is made up of hot pressed moulded reconstituted wood of 12mm average thickness and back is two part injection moulded plastic.

SEAT SUB ASSEMBLY SIZE: 49.0cm (W) X 49.5cm (D)

BACK SUB

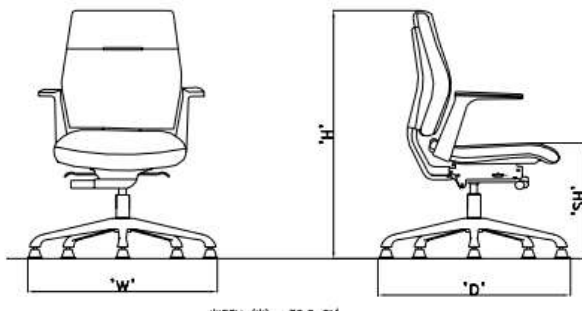
ASSEMBLY SIZE: (MID BACK): 45.0 cm (W) X 49.0 cm (H)

2) POLYURETHANE2 FOAM: The Polyurethane foam is moulded in Density 45 kg/m³,

3) ARMRESTS : The armrests are Pressure die casted in polished Aluminium with PP Arm Tops.

3) AUTO-RETURN MECHANISM: The Conference and Board room chair has an Auto-return mechanism to allow the user free movement while being sitted and after use guides the upper structure to rotate back to its original position enabling all chairs around the table to be aligned.

4) ADJUSTABLE BACK SUPPORT : Backrest is connected to the mechanism with a drop-lift mechanism which can be adjusted in the range of 7.0 cm for the comfortable back support to suitable individual need.



High Rise Revolving stool (Black seat cover) with cushion in seat & lumbar support at back, SS metal stand with ring type foot rest & castors & Gas Lift



Wall cabinet (W 750 x D 450 x H 750)

Wall Mounted Overhead File Cabinets (Float Glass Door) CRCA (Cold Rolled Close Annealed) or G. I. Sheets Two Shutter with one adjustable shelf Size: - 750Lmm x 370mm W x 750 mmH (approx.) **PI refer dwg as per attached.**

MISCELLANEOUS WORK**TENDERED SPECIFICATIONS****6. FALSE CEILING**

12.5 mm thick tapered edge gypsum moisture resistant board Providing and fixing false ceiling at all height including providing and fixing of frame work made of special sections, power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/sqm (both side inclusive) as per IS : 277 and consisting of angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 27 mm and 37mm, at 1200 mm centre to centre, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50mm long with 6mm dia bolts, other flange of cleat fixed to the angle hangers of 25x10x0.50 mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I. channels 45x15x0.9 mm running at the spacing of 1200 mm centre to centre, to which the ceiling section 0.5 mm thick bottom wedge of 80 mm with tapered flanges of 26 mm each having lips of 10.5 mm, at 450 mm centre to centre, shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction, including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm centre, with 25mm long dry wall screws @ 230 mm interval, including fixing of gypsum board to ceiling section and perimeter channel with the help of dry wall screws of size 3.5 x 25 mm at 230 mm c/c, including jointing and finishing to a flush finish of tapered and square edges of the board with recommended jointing compound , jointing tapes , finishing with jointing compound in 3 layers covering upto 150 mm on both sides of joint and two coats of primer suitable for board, all as per manufacturer's specification and also including the cost of making openings for light fittings, grills, diffusers, cutouts made with frame of perimeter channels suitably fixed, all complete as per drawings, specification and direction of the Engineer in Charge but excluding the cost of painting with :

GI Metal Ceiling Lay in perforated Tegular edge global white color tiles of size 595x595 mm and 0.5 mm, Providing and fixing tiled false ceiling of specified materials of size 595x595 mm in true horizontal level, suspended on inter locking metal grid of hot dipped galvanized steel sections (galvanized @ 120

	<p>grams/ sqm, both side inclusive) consisting of main "T" runner with suitably spaced joints to get required length and of size 24x38 mm made from 0.30 mm thick (minimum) sheet, spaced at 1200 mm center to center and cross "T" of size 24x25 mm made of 0.30 mm thick (minimum) sheet, 1200 mm long spaced between main "T" at 600 mm center to center to form a grid of 1200x600 mm and secondary cross "T" of length 600 mm and size 24x25 mm made of 0.30 mm thick (minimum) sheet to be interlocked at middle of the 1200x600 mm panel to form grids of 600x600 mm and wall angle of size 24x24x0.3 mm and laying false ceiling tiles of approved texture in the grid including, required cutting/making, opening for services like diffusers, grills, light fittings, fixtures, smoke detectors etc. Main "T" runners to be suspended from ceiling using GI slotted cleats of size 27 x 37 x 25 x 1.6 mm fixed to ceiling with 12.5 mm dia and 50 mm long dash fasteners, 4 mm GI adjustable rods with galvanized butterfly level clips of size 85 x 30 x 0.8 mm spaced at 1200 mm center to center along main T, bottom exposed width of 24 mm of all T-sections shall be pre-painted with polyester paint, all complete for all heights as per specifications, drawings and as directed by Engineer-in-charge.</p> <p>GI Metal Ceiling Lay in perforated Tegular edge global white color tiles of size 595x595 mm and 0.5 mm thick with 8 mm drop; made of GI sheet having galvanizing of 100 gms/sqm (both sides inclusive) and 20% perforation area with 1.8 mm dia holes and having NRC (Noise Reduction Coefficient) of 0.5, electro statically polyester powder coated of thickness 60 microns (minimum), including factory painted after bending and perforation, and backed with a black Glass fiber acoustical fleece.</p> <p>.</p>
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APPROVED MAKE OF MATERIALS FOR FUMEHOODS AND LABORATORY FURNITURE SYSTEM

1	LABORATORY FITTINGS	WATER SAVER / BROEN / FAG/ FAR
2	LABORATORY SINKS / DRIP CUPS	WATER SAVER / BROEN/ALLOYPLAS/MALAYSIA
3	LABORATORY ELECTRICAL SOCKET	NORTHWEST / LEGRAND / MK / NORISYS
4	DATA & VOICE SOCKET	NORTHWEST / LEGRAND / MK/ NORISYS
5	EYEWASH / SHOWER	WATER SAVER / BROEN / FAG/ TOF/FAR
6	SPOT EXTRACTOR	FUMEX / ALSIDENT / NEDERMANN
7	FLAMMABLE STORAGE TALL CABINET	JUSTRITE / EAGLE/ SECURALL
8	OFFICE FURNITURE	GODREJ / WIPRO / SPACE DESIGN / FORM DESIGN

9	FUME HOOD SERVICE FIXTURES	WATER SAVER/BROEN/FAG/FAR
10	FUME HOOD ELECTRICAL SOCKET	NORTHWEST/LEGRAND/MK /NORISYS
11	FACE VELOCITY & VAV CONTROLS	TEL /SAUTER / SIEMENS

APPROVED MAKE OF MATERIALS FOR EXHAUST SYSTEM

S.NO	DESCRIPTION	APPROVED MAKE
1	PP sheets	Mandhani/Dugar/Khanna
2	Isothelic Resin with Fire retardent	Mechemco/Kaysynth/Orsyn
3	PP Dampers	Any reputed make
4	PP Exhaust Fans	Colasit/Colourplast/ Seat
5	VFD	Invertek/Siemens/ABB/Danfoss/Schneider
6	Fume hood face velocity monitor	TEL/Siemens/Sauter
7	Room pressure Monitor	TEL/Siemens/Sauter
8	Actuator	Siemens/Belimo/Neptronic
9	Motor	ABB/CG/Kirloskar

APPROVED MAKE OF MATERIALS FOR ELECTRICAL SYSTEM

S.NO	DESCRIPTION	APPROVED MAKE
1	MCCB	GE / ABB / SCHNIDER
2	LT CABLE as per IS:7098(2)1988	HAVELLS NICCO / POLYCAB / RPG / UNIVERSAL (Unistar) / PRIMECAB
3	END TERMINATION MATERIALS	DOWELS / SMI / HMI
4	INDICATING METERS	SIMCO / MECO / AE / RISHAB

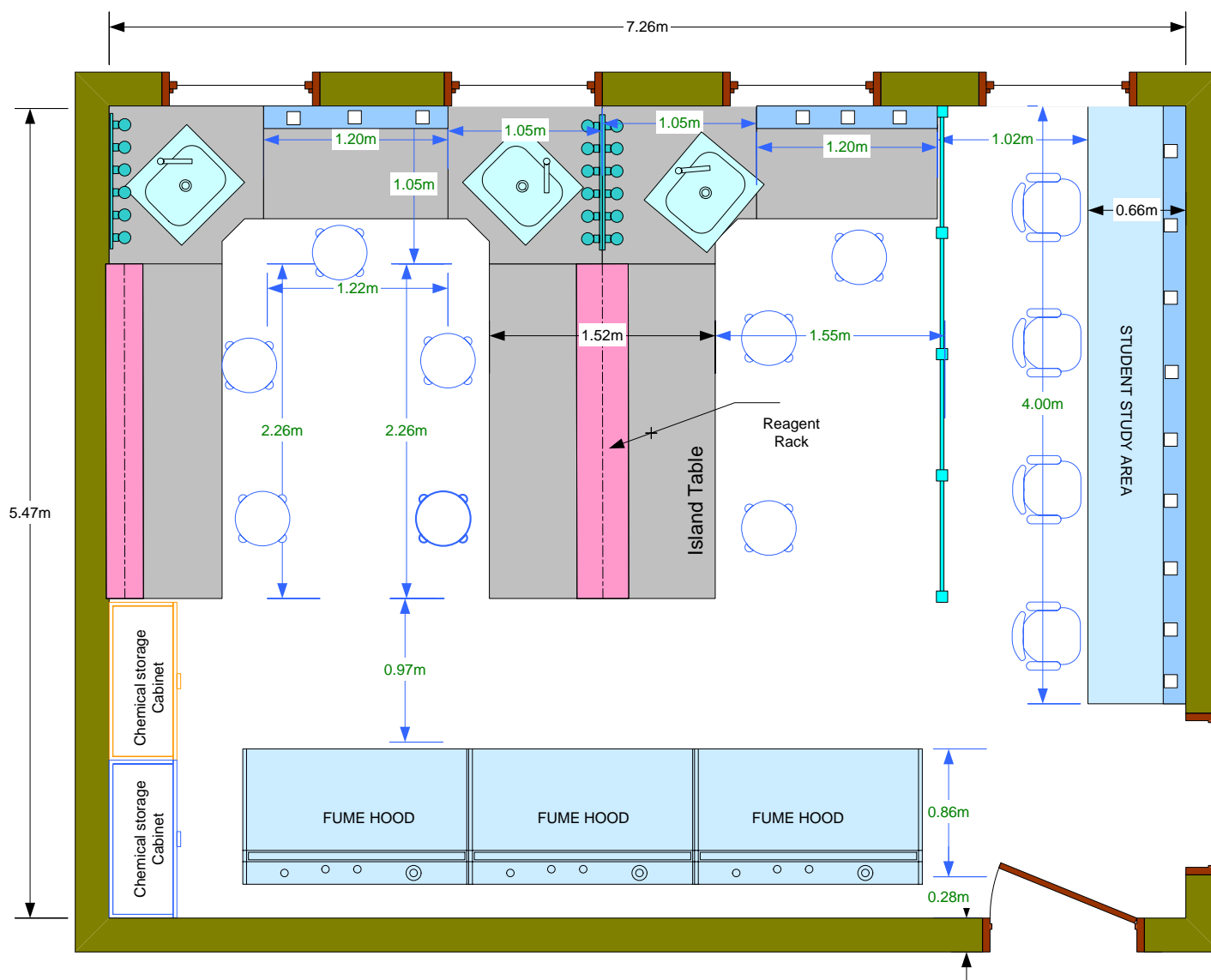
5	INDICATING LAMPS	GE / SIEMENS / SCHNEIDER / L&T
6	POWER CONTACTORS	GE / SIEMENS / ABB / SCHNEIDER / L&T
7.	MCB / MCB DB	Havell's /Legrand/ GENERAL ELECTRIC (GE) HAVELLS
8.	ELCB / ELMCB	Havell's /Legrand/ GENERAL ELECTRIC (GE) HAVELLS
9	PVC CONDUITS - FRLS	VIP / AVON / UNIVERSAL / PRECISION / NELCO
10.	PVC COPPER WIRES - FRLS	FINOLEX / ANCHOR/ POLYCAB/ HAVELLS
11.	INDUSTRIAL SOCKETS	MGE / NEPTUNE / BCH
12.	LT PANELS	ANY LOCAL PANEL FABRICATOR
13.	PANEL ACCESSORIES	DIRAK / ELMAX
14.	TERMINAL BLOCK	PHOENIX CONTACT / ELMAX
15.	HEAVY DUTY PVC PIPE / HDPE PIPE 6KG & 4 KG	SUPREME / FINOLEX
16.	EARTHING - G I	ANY LOCAL SUPPLIER.
17.	EARTHING - COPPER	ANY LOCAL SUPPLIER.
18.	FIRE ALARM PANEL	MORLEY / HONEYWELL/NOTIFIER
19.	SMOKE DETECTOS	SYSTEM SENSOR /APPOLO
20	FIRE EXTINGUISHERS	SAFEX/ NITIN
21	LT CABLES	RR KABEL / POWER FLEX
21	M.S PIPES	TATA / JINDAL / SAIL

Materials/ accessories shall be used approved make or APPENDIX II (Technical Specification).

Note:-

- 2. The sample, catalogue color, texture etc. of all above furniture shall be finalized before approved by IIIM Technical Purchases Committee.**
- 3. The All finished product shall be delivered to the IIIM Jammu, duly covered with bubble sheet to avoid any breakage etc. However in case of any minor repair arising out of transportation etc. the same shall be repaired/ replaced immediately by the supplier without any extra cost.**

LAY OUT DRAWING OF LAB. FURNITURE OF & FUME HOOD (ROOM NO.-231) IN NPC LAB. AT IIIM, JAMMU



SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF FUME HOOD,
LABORATORY FURNITURE AND SERVICING ON A TURNKEY BASIS OF BIO-
ORGANIC CHEMISTRY LAB. AT IIIM, JAMMU

Sl. No.	Description	Reference
1	Pre Qualification Criteria for Tendering Bidding	1
2	Scope & Specifications	2
3	Make List for the Scope of Work	3
4	Drawing	4

Sl. No.	Description	Reference
1	Pre Qualification Criteria for Tendering Bidding	1

BIDDER PREQUALIFICATION CRITERIA

Bidder shall meet all the pre qualification criteria as given below for qualifying to this tender. In the event of only one Bidder qualifying technically, the Technical Committee shall have the right to accept or reject the concerned bidder.

The bidder shall furnish a covering page indicating item wise compliance to all the Pre-qualification criteria. Bidder Prequalification Criteria are as given below:

- The Bidder shall have experience in Designing, Manufacturing, Supply, Execution, Commissioning & Servicing of Fume Hood & Laboratory Furniture on a turnkey basis **the following during the last 5 years ending the last day of the month**, as stated below:-
 - Fume Hood System
 - Lab furniture and accessories
 - Exhaust system
 - Gas & Utility Distribution and Drainage System
 - Electrical, Data & Voice System
 - Utility Equipments and other allied works
- The Bidder has carried out preferably similar works, same value of the estimated cost, in the 5 years ending on the last day of the month. At least one contract should be in Govt. Universities/any of Central PSU's / Autonomous Bodies (CSIR, ICAR, ICMR, DRDO, ISRO, IIMs, IITs etc.) The project executed as such by the Bidder should be in operation currently. **The Bidder should produce the backup documents like Purchase Order, completion certificates etc.**
- Similar work shall mean "Manufacturing, Supply, Execution, Commissioning and Servicing of Laboratory Furniture Comprising of Lab Work Benches, Fume Hoods, Exhaust system, Gas and utility distribution system, Electrical and accessories"

- The bidder must have an experience of supply and installation of lab furniture and fume hoods in Chemistry Lab. At least one contract must be submitted for the same in addition to the above. The project executed as such by the Bidder should be in operation currently.
- The vendor should have a well established make in India (in house) manufacturing unit for the Lab Furniture & Fume Hood, Quality Management System as per International Standards providing the products and services on the continued basis for the last 5 years. The vendor shall possess the current / valid approval for such equipment manufacturing facility by a Statutory Certifying Authority, like Factory Inspectorate etc. A notarized copy of valid certificate needs to be enclosed.
- The Bidder should be an Official Member with SEFA for a continued basis from past 3 Year from this notification. (Supporting documents for the same need to be furnished) and bidder should provide have document of third party test facility.
- All tests referenced herein shall be performed in the bidder's fume hood test facility **"factory tested"** & **also the Field ASHRAE or EN 14175 testing is must.**
- The Participating bidder should have local Service set up in J&K (UT) or North India (Punjab, Haryana and Delhi NCR etc.)
- **The Bidder shall visit IIIM, Jammu, and Project site TO UNDERSTAND THE REQUIREMENTS OF THE SITE is must. The Bidder shall study the scope along with the technical team in detail before submitting a bid, if any query, they will put a question to Scientist In-charge or Site Engineer.**
- **The Bidder shall provide the complete documentary evidence duly self attested by notary for the following in support of Bidder Pre-Qualification Criteria.**

For Clause no. 1.0, 1.1, 1.2, 1.3, 1.4

1) Purchase Orders

2) Completion Certificates and experience of performance for jobs, issued by the clients.

3) Experience details duly filled in following format.

S. No	Name of	Name & location of the project	Brief description of project	Value of the Project	Documents submitted
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	client				(PO copy & completion certificate) – (Y/N)

For Clause no. 2.0

1) Audited balance sheets of financial years 2016, 2017 & 2018.

2) Annual Turnover details duly filled in the following format.

Financial year	2016-17	2017-18	2018-19
Annual Turnover			

- **Note to Bidders: Offers of Bidders failing to submit the prescribed documents in support of the above prequalification criteria shall be rejected.**

(The bidder shall perform AMC i.e maintenance of Laboratory Furniture, Fume Hood and utilities during defect liability period.)

Project substantial completion shall be withheld until all required Unit certification letters, tests, and reports have been submitted to and approved by the IIIM

Specifications and allied Technical details

FUME HOOD & ACCESSORIES:-

	TENDERED SPECIFICATIONS
	<p>SUMMARY AND SCOPE</p> <p>Furnishing and delivering all service outlets, accessory fittings, electrical receptacles and switches, as listed in these specifications, equipment schedules or as shown on drawings. Fittings attached to the fume hood superstructure shall be mounted on the front fascia of the hood as per the drawings. Furnishing and delivering all service outlets, accessory fittings, electrical receptacles and switches, as listed in these specifications, equipment schedules or as shown on drawings. Plumbing fixtures mounted on the fume hood superstructures shall be pre-plumbed with SS-304 TUBING. Electrical fixtures shall be prewired. The fume hood superstructure shall be listed to UL Standards for Safety by Underwriters Laboratories Inc. (UL). Final plumbing and electrical connections are the responsibility of Lab Furniture & Fume hood Supplier.</p> <p><u>SPECIFICATIONS:</u></p> <p><i>Frame construction:- (compulsory)</i></p> <p>Entire structure should be "C" frame type. 60 X 30 X 2 mm pipe is used for main frame structure. 30 X 30 X 1.5 mm pipe should be used for bottom support. CO₂ welded & finished with highly chemical resistant epoxy powder coating.</p> <p><u>Design Structure:</u> Aerodynamic, Floor mounted</p> <p><u>Airflow Type:</u> AUTOSASH Type</p> <p><u>Construction (Exterior):</u> Pure Epoxy Powder coated 40-60 micron on 18 Gauge Galvanized steel with rigid structure</p> <p><u>Construction (Interior):</u> Phenol based high-pressure compressed compact laminate (6 -7mm thick)</p> <p><u>Baffle arrangement:</u> 3-point suction system (for light, normal & heavy fumes) with baffle to ensure smooth and immediate exhaust of fumes.</p> <p><u>Airfoil:</u> Flush powder coated airfoil mounted on the frame of the hood.</p> <p><u>Worktop:</u> Chemical resistant splash & spillage proof 'Jet Black Granite' worktop. The work surface and cup drain shall be available in black.</p> <p><u>Sink, Water tap with drain arrangement:</u> Worktop should have oval shaped 'PP' Cup-Sink for drainage with water valve.</p> <p><u>Sash (Shutter):</u> Vertical rising counter-balanced 'Toughened Float Glass' (5 mm thick) fitted in the Powder coated Aluminium extrusion from Hettich Germany or equivalent. Smooth and light sash operation. Clear</p>

sash open height = 770-775 mm.

Fume Hood Plumbing Services: Utility services like **Raw Water, Chilled Water Supply & Return, Compressed Air, Nitrogen, Vacuum** 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. All plumbing fittings shall be factory installed and piped between the valve and the outlet. Inlet piping shall have a single-point connection for each valve provided and carried to a point 1" above the fume hood roof or 1" above the worktop rear corner depending on the rough-in locations shown in the drawings, **All the Plumbing services connecting to the Valves & to the Header line, will be SS-304 ONLY.**

Fume Hood Electrical Services : The hood superstructure shall be wired and contain a UL label certifying acceptable wire gauge, connections, fixtures and wire color coding. Wiring electrical services shall consist of two duplex receptacles and a light switch. **3+3 nos of 5/15Amps Socket & switch, 230 Volt AC,** and 3-wire polarized grounded with ground fault interruption

Lighting: *CFL/ LED/ tube light* (20 or 40 watt, 2 No.) with metal enclosure for better illumination with less power consumption.

Electrical Utilities: Four nos. electrical sockets & switches, 'North West' make or equivalent (230 V, 5/16 A, 50 Hz), Switches have LED to indicate 'ON' position. A soft touch button panel with main switch, switch for blower & tube light & spare switch should be provided. LED indicators to show the ON & OFF positions of switches should be provided.

The control panel in the hood is provided with starter for blower.

Base Cabinets Fume Hood

- Unless otherwise indicated 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 gauge except as follows:
- Corner gussets for leveling bolts and apron corner braces, 12 gauge.
- Hinge reinforcements, 14 gauge.
- 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.
- Complete rigid steel structure to support Fume hood
- Epoxy powder coated attractive color combination
- There should be two storage units with two shutters each. Each unit should have one shelf.

(Chemical Storage Base Cabinet : Castors type)

Level adjusting screws: To adjust fume hood level by ± 20 mm.

Damper: To regulate airflow a damper is provided at the outlet of hood.

Testing Method: All fume hoods are “**factory tested**” for design as per the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) 110-1995 **or EN 14175**. Also, “**on site validation**” for face velocity will be carried out to ensure working of fume hood as per international norms.

Location of Tests and Test Facility: All tests referenced herein shall be performed in the bidder’s fume hood test facility & **also the Field ASHRAE or EN 14175 testing is must.** Hood shall be tested with a face velocity of 100 FPM open vertically till safe opening height and at 100 FPM right, left and centre 100% open horizontal.

Standards: Fume hoods must have third party certification of

ASHRAE 110

Or

EN 14175

QUALITY ASSURANCE

The laboratory fume hood manufacturer shall provide fume hood work tops and casework all **manufactured & shipped with** proper packing & should take the full responsibility of the entire scope of works as specified in the tender.

General Performance: Provide certification that fume hoods meet the performance requirements described in section.

PERFORMANCE TEST RESULTS.

Performance Test Results (Chemical Spot Tests):

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 2ounce wide mouth bottle to retard evaporation. 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.

- **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.

- **After testing, panel shall show no more than four (4) Level 3 conditions.**

- **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

	<p>48. Xylene Cotton ball & bottle</p> <p>49. Zinc Chloride, Saturated Watch glass</p> <p>* Where concentrations are indicated, percentages are by weight.</p> <p>Project substantial completion shall be withheld until all required fume hood certification letters, tests, and reports have been submitted to and approved by the IIIM.</p>

LABORATORY FURNITURE & ACCESSORIES:- CRCA (Cold Rolled Close Annealed or G. I. Sheets)

	TENDERED SPECIFICATIONS
	<p>AND SCOPE SUMMARY</p> <ul style="list-style-type: none"> Furnish all cabinets and casework, including granite tops, ledges, supporting structures. Include delivery to the building, set in place, level, and scribe to walls and floors as required. Supply & Installation of all utility service outlet accessory fittings, electrical receptacles, plumbing and electrical switches & fittings identified on drawings as mounted on the laboratory furniture. Supply & Installation of, 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. All tailpieces shall be furnished less the couplings required to connect them to the drain piping system. Supply & Installation of service strip supports where specified, and setting in place service tunnels, service turrets, supporting structures and reagent racks of the type shown on the drawings. <p>I. GENERAL REQUIREMENTS:</p> <p><u>SEFA Standard:</u></p>

The entire Laboratory furniture should be tested as per SEFA-8M (Scientific Equipment and Furniture Association) standards in SEFA Approved labs with latest 2016 Guidelines published by SEFA and NFPA- 30 or 45 - National Fire Protection Association, Failing which it lead to disqualification of bid.

Note: - CRCA (Cold Rolled Close Annealed or Skin passed/zero spangle G. I. Sheets or both materials can be used.

Frame construction:- (compulsory)

Entire structure should be "C" frame fabricated out of heavy gauge hollow pipes size 60 x 30 x 2 mm and 2.0 mm thick steel plates. The structure will be provided with necessary leveling bolts suitable for ± 5 mm level adjustment. Open ends of the pipe will be provided with elegant finish plastic caps. The structure shall be duly treated for the rust prevention and coated with epoxy powder coated.

Powder Coating:-

Complete module & frame work are processed with 8 tank pre- treatment and finished with highly corrosion resistant 'Akzonbel/ PolyBond' epoxy powder coated for better corrosion resistance. The thickness of powder coat shall not be less than 50-60 microns, conforming to relevant BIS code, which accordingly passes the test of Salt Spray for 1000 hours.

II. TECHNICAL REQUIREMENTS:

General Requirements: It is the intent of this specification to provide a high quality steel cabinet specifically designed for the laboratory environment.

Sheet Steel: Cold rolled sheet or G. I steel shall be prime grade 16, 18 and 20 gauge; roller leveled, and shall be treated at the mill to be free of scale, ragged edges, deep scratches or other injurious effects.

Glass: Glass used for framed sliding and swinging doors shall be 1/8" float glass. Glass used for unframed sliding doors, shall be 1/4" float glass.

Steel Gauges:

- Gauges of steel used in construction of cases shall be 18 gauge, except as follows:
- Corner gussets for leveling bolts and apron corner braces, 12 gauge.
- Hinge reinforcements, case and drawer suspension channels, 14 gauge.
- Top and intermediate front horizontal rails, table aprons and reinforcement gussets, 16 gauge.

- Drawer assemblies, door assemblies and adjustable shelves, 20 gauge.

1. 0 Storage Cabinets Castors type : Standards Heavy Duty under Module along with two front lockable castor wheels & two rear non lockable castor wheels (For Easy cleaning Purpose & Aesthetic looks) , comprising of one drawer one shutter, one drawer and two shutter, all drawers and adjustable height shelf. Cabinet shutter should be in double skin construction and should be provided with heavy duty, knuckle and barrel type SS hinges and positive catch arrangement.

1.1 Cabinet Frame: 1.2 mm horizontal and vertical stiffeners and 1.0 mm vertical panel of CRCA (Cold Rolled Close Annealed) Or G.I sheet.

1.2 Cover Panels: End side panel and back panel should be of 1.2 mm thick CRCA MS sheet. All panels should be removable to repair any service line behind the units in future.

1.3 Shutters: Metal Shutters of CRCA or G.I sheet and 40-50 microns pure epoxy powder coating having a Scratch Hardness of 3Kgs.

1.4 Shelves & Drawers: CRCA or GI shelves with a load carrying capacity of 40-50 Kg. The overall load carrying capacity of cabinet to be 80 Kg of UDL – Uniformly Distributed Load (40-50 kgs. on each shelf and 40-50 kgs. on bottom). The overall load carrying capacity of drawer should be 40 kgs. of UDL for a pair of ball slide.

1.5 Slides & Handles: High precision double extension ball slides. Hinges to be spring loaded with CED (Cathode Electrode Deposition) coating with self closing mechanism. Handles should be PVC Recessed.

1.6 Locks: Each unit should have a locking facility with 180°, 10 lever cam lock mechanism.

1.7 Legs: The units to be supported on wide base Polystyrene legs (Hettich Make or equivalent) high impact proof material of base diameter 40-50 mm. Load bearing capacity of each leg should be at least 425- 450kg/ leg. The legs should be height -adjustable with a range of +/- 50 mm.

2. Flammable Chemical Storage Cabinets Castors type: Standards Heavy Duty under Module along with two front lockable castor wheels & two rear non lockable castor wheels. Flammable Safety Cabinets meet or exceed the NFPA Flammable Liquid and the OSHA standard 1910.106 for storage of class I, II and III liquids. FM approved. The **all welded double wall 18 gauge steel** of these flammable storage cabinets offer superior fire protection. Double-walled doors feature 14 gauge steel outside and 18 gauge interior

3. Reagent Shelves: should of be of complete modular design consisting of horizontal 2 stage storage shelves. The end vertical support should be 1.2 mm & horizontal shelves of 1.0 mm thick CRCA M.S./ G.I Sheet. Each shelf should have a load carrying capacity of 30-40 kgs. of UDL for the length of 1000 mm. The complete M.S. material of cabinet to be pretreated (degreased, Zinc phosphated) and epoxy powder coated for better corrosion resistance. The thickness of powder coat to be 45-50 microns, which passes the test of Salt Spray for 1000 hours and having the Scratch Hardness of 3Kgs.

4. Polypropylene Drop in Sinks of size 558X455X300mm (approx.) made of high density 5mm polypropylene elasticity 5 micron/ thickness, should have PH resistance with organic desolvent.

5. SS Pegboard of overall size of 550x420mm (approx.). Adjustable PP pegs of 10mm dia. It should have a welded square tube of 20x40x1mm (approx.). Tube should be of PVC material.

6. Electrical Accessories and fittings should consist of electrical trunking of 1.0 mm thick CRCA MS sheet. It should have a high temperature withstanding capacity with excellent electrical insulation

properties. The rear portion of above accessories which is in contact with live metal shall be made from thermo set material which should not melt on heating. Each electrical module consists of (North-West make or equivalent):

1) 2 No. 16 Amp 5 Pin socket

2) 2 No. 16 Amp Switch with LED

7. Work surface should be 19mm (± 1 mm) thick high quality granite in jet black color with pre moulded, pre polished edges. The backing material for granite should be 6 mm thick Neoprene mat.

8. Service Indexes:

Fittings shall be identified with service indexes in the following color coding:

Cold Water out-	Dark Green
Helium-	Dark Blue
Raw water-	Orange
Cold Water in-	Light Green
Nitrogen-	Brown
Vacuum-	Green
Hydrogen-	Pink
Nitrogen-	Light Blue

Applicable Standards:

SEFA 3 : Scientific Equipments & Furniture Association

SEFA 8M : Scientific Equipments & Furniture Association

Quality assurance and workmanship :

- ❖ Only approved brands of items shall be accepted. Samples shall be got approved before taking up full supply/installation.
- ❖ If required Tests on representative samples and/or components thereof shall be got conducted from reputed Laboratory as decided by the In-charge.
- ❖ Samples shall be taken/made as per the direction of the In-Charge in presence of the authorized representative of the contractors. Samples shall be signed and sealed by both the parties.

	<p>Manufacture's Test certificate for the product being offered is to be provided to the department.</p> <ul style="list-style-type: none"> ❖ The specifications are intended for the general description of the work quality and workmanship. The specifications are however not intended to cover the minute details and work shall be execute according to the specification given herein or in its absence the relevant BIS/SEFA specification/standards or the best practice recommended by relevant Indian Manufacturers or best trade practices. ❖ All material shall confirm to the approved makes of materials specified. The procurement of various materials shall be either from the manufacturers or their authorized dealers so that there is no duplicate/spurious makes are used. Notwithstanding all above, contractor shall be held responsible for the execution of works and use of proper best available quality of materials as per the tender specifications. For the items/materials not appearing in the list, the decision of Engineer-in-charge shall be final and binding. ❖ The contractor shall arrange stage wise inspection of the furniture at factory of the works by In-Charge or his authorized representative if asked for. Contractor will have no claim if the furniture brought at site is rejected by In-Charge in part or full lot due to bad workmanship /quality. Such furniture will not be paid for and the contractor shall remove the same from the site of work within 7 days after the written instructions in this regard are issued by In-Charge or his authorized representative. ❖ The contractor shall produce all materials in advance so that there is sufficient time for testing and approving of the material and clearance of the same for use in work. The contractor shall produce test certificates of all the material in respect of their conformation to the relevant Indian standards/quotation specifications. All tests required for the materials as desired by the In-Charge shall be at the contractors cost. ❖ Testing may also be carried out at the discretion of the In-Charge, from the lot of finished product brought at site by the contractor. In case such tests have been carried out by the principal manufacturer at its testing facility, the same will may be provided by the contractor for consideration.

EXHAUST SYSTEM (PP/FRP DUCTING AND ACCESSORIES) :-

	TENDERED SPECIFICATIONS
	<p>Technical Specification for PP/FRP Ducting:</p> <p>a. PP means PPGL: One side smooth & glassy finish and other end is mat finish.</p> <ul style="list-style-type: none"> ▪ The smooth surface should be the inner surface of the duct. ▪ On mat side, FRP lining to be done.

- 25 mm x 25 mm Stitch welding is done on inner surface and continuous welding on outer surface with 5 mm welding thickness.
- b. FRP Lining to be done on the outer surface of PPGL I.e. on mat side.
 - One layer FRP is one mm.
 - The final layer should be with fine mat to have smooth and good finish.
 - While making the lining, there should not be any air pockets or any sort of Uneven finish.
 - There should be time gap between the FRP layers, allowing each layer to be got dried.
 - c. The flange thickness should be 1.5 times of the duct thickness up to 750 mm and 2 times above 750 mm ducting.
 - d. All flanges are to be matched with M8, GI fasteners and flat washers on both the sides.
 - e. All the flanges should have fasteners at the 4 corners.
 - f. All the fasteners to be fixed at a pitch distance of between 125 mm to 150mm.
 - g. All the flanges should be properly ground and dressed.
 - h. Duct support distance should not be more than 2500 mm.
 - i. Any duct length should not be more than 3600 mm.
 - j. All square / rectangular ducts with more than 1800 mm length should have a brazing frame at the center on the external surface.
 - k. Provide 40 x 40 flanges up 750 mm duct size and 50 x 50 above 750 mm.
 - l. The finish paint should be admiral grey unless specified.
 - m. 5 mm Thick Neoprene gasket to be used between the flanges.

Duct Construction

The fabricated duct dimensions should be as per approved drawings and all connecting sections are dimensionally matched to avoid any gaps.

Duct Sizes In mm	Thickness of PP	Thickness of FRP
0-750mm	3 mm	3 mm

750-1500mm	5 mm	5 mm
1500-2000mm	5 mm	8 mm

Support System

A completely supporting system consisting of fully threaded rods, double L bottom brackets nuts, Washers, clamps for circular ducts and anchor bolts as supplied.

Flexible Connections

Provide flexible duct connections wherever ductwork connects to vibration isolated equipment and on all exhaust final connections to spot extractor and as indicated on the drawings. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make air-tight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse and tensional movement and also capable of absorbing vibrations of connected equipment.

Flexible connections shall be air tight and resistant to water and fire.

Flexible connections shall be fitted to isolate fans from equipments and/or ductwork. The connections shall be arranged to permit the renewal of the connection without disturbing the duct work or the plant. The metal parts of connected equipment shall be separated by not less than six inches and installed with sufficient slack to compensate for free movement of fans or spring vibration isolators.

2. SPECIFICATION FOR PP EXHAUST BLOWER

- The exhaust fans supplied and installed shall be of 'Centrifugal Corrosion Resistant' type and shall be capable of delivering the design flow rate against all duct losses.
- The fans shall be robust in construction and suitable for continuous duty operation. It shall be mounted with ease of maintenance and shall be installed with proper vibration isolators to minimize vibration transmission to ductwork and support structure.
- Fans selected shall be silent and vibration free when running and suitable for outdoor use.
- The fan speed shall not exceed 3000rpm.
- Aerodynamic performance of the fan shall be tested and comply with 'AMCA' and 'ISO5801' standards.
- The casing shall be of self-supporting design, thermoformed (size 400 and below), welded by machine (automatically welded for size 400 and below). The material of construction shall be fire retardant polypropylene (PPs) for fire safety and suitable for use against corrosive 'medium' and a maximum

allowable operating temperature of 70°C.

- Impeller material shall be fire retardant polypropylene (PPs) for fan size up to 400 (polypropylene {PP} for fan size 450 and above) suitable for use against corrosive 'medium' and a maximum allowable operating temperature of 70°C.
- A standard hub seal shall be incorporated onto the impeller hub to prevent corrosive 'medium' from contacting the shaft.
- The fan shall be driven by a standard TEFC electric motor with class 'F' insulation and class 'B' temperature rise. Motor shall be suitable for outdoor installation with IP55 protection and suitable for operation with 415V/3Ph/50Hz electrical supply. Motor supplied shall be in accordance to IEC standards.

The fans have to be installed with easy access for maintenance. The installation has to be made by well-trained specialists of the OEM :

- The fans have to be erected on vibration absorbers to avoid the transmission of sound and vibrations to the building or foundations.
- The vibration absorbers have to be fixed to the foundation.
- The inlet and outlet ducts have to be connected with flexible sleeves to the fan.
- The regulation of standard DIN EN 60204-1 for the electrical installation and the electrical safety requirements have to be fulfilled.
- Start and stop devices shall be easy to operate and have to be marked clearly.
- In case of condensation liquid occurring inside the housing, it has to be equipped with a condensation drain at the lowest position of the housing and to be connected to a drainage pipe.
- For cooling, a sufficient air stream has to be assured.
- If a fan inlet is not connected to a duct, the inlet must be protected with a grid.
- Fans, which are openly accessible, have to be protected with a scatter shield around the housing.

Test run and commissioning:

- Check, whether inlet and outlet are connected to ducts or protected by a protection grid.
- Check mechanical and electrical safety devices; make sure, they are properly installed.
- Check the rotation of the impeller by means of a quick switch on/off of the motor; it must run in the direction as shown on the arrow. In case of wrong direction, change the connection of the wires.
- To protect the motors against overload, the fans shall never be operated with open
- Inlet or outlet. For test runs, the inlet has to be covered with a suitable plate.
- The current (Amps) as indicated on the motor data plate shall never exceed. The fan has to be checked for its' smooth running.

3. SPECIFICATIONS FOR MOTOR AND ACCESSORIES

	<p>Use an electric motors built to IEC standards flange mounted (B5) and Foot mounted (B3), also in ex-protected or multistage versions, for the drive. The impeller hub is coated with aluminum. Power transmission from motor to impeller by means of a directly mounting the impeller on motor shaft. The impeller is fixed on to a flange bearing and the tightening adopter system guarantees secure mechanical connection.</p> <p>Motor Standard IEC three-phase motors in accordance with IEC.Mounting B5 and B3</p> <p>Available in motor-mounted (IP55) or cabinet-mounted versions.</p> <p>The fan shall be driven by a standard TEFC electric motor with class 'F' insulation and class 'B' temperature rise. Motor shall be suitable for outdoor installation with IP55 protection and suitable for operation with 415V/3Ph/50Hz electrical supply. Motor supplied shall be in accordance to IEC standards.</p>
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GAS, UTILITY & DRAIN DISTRIBUTION SYSTEM:-

	TENDERED SPECIFICATIONS
	<p>UTILITY & GAS DISTRIBUTION SYSTEM</p> <p>GENERAL:</p> <p>The Gas Distribution System has two independent types of systems namely Bottled Gas System and Compressed Gas System. Utility Services like Raw Water fed from Header line located around the building wall provided by Client. Whereas the Compressed Air, Vacuum, Nitrogen & Chilled Water services are fed from the respective source Equipments located behind the NPC lab-I(basement) building .</p> <p>The Gas Distribution System consists of following: Source points, Compressed Gas Cylinders and accessories like Bull noses, Flexible Hoses, Change over Panel, Cylinder Isolation Valves, Check Valves, Excess Flow Check Valves, and Flash Back Arrestors. Tubs & Tube Fittings, Floor Isolation Valves, Branch Isolation Valves, Point of Use Regulators, Pressure Gauges, Gas Purifier, Gas Distribution Panel, All Tubing and fittings are supported by aluminum profile, MS angles and clamps with Nut & bolts.</p>

TECHNICAL REQUIREMENTS:

GENERAL:

It is the intent of this specification to provide a high quality gas distribution system for the laboratory usage.

GAS TUBING:

- Tubing sizes up to 1" and including ¼", ½", ¾" OD should be bright annealed. Tubing with outside diameter larger than 1" OD should be supplied in annealed and pickled condition.
- Material of Construction (MOC) of the Tubing & Fittings shall be SS304.
- Tubing hardness should have a max HRB 80.
- Tubing should fully annealed, high quality, Stainless tubing as per ASTM A269 or A213, or DIN-17456 & 17458 (Class-1).
- Working Pressure of tubing as listed in ASME B31.3, for ASTM A269 tubing at –20 to 100°F (–28 to 37°C).

TUBE FITTINGS:

- The fittings shall be of welded type, the fittings shall be capable of holding the maximum working pressure of the tubing without any leak.
- All the fittings end connections shall be compatible to tube of hardness less than or equal to RB 80.
- Fittings for the Tubing running above the false Ceiling, Header & Sub Header shall be Welded type. Fittings for the droppers connected to sub Header shall be Compression type.
- Tube to tube joints and braches are joined by the way of orbital welding up to 1" OD tubes. And Socket welding/Butt Welding to be carried out for the Tubes which are greater than 1" OD.

AIR COMPRESSOR:

Air Compressor shall be installed behind the back side of BOC Lab. The Compressed Air to 12 User Point installed on BOC Lab. This Compressed Air shall be fed from the compressor with 6.9 bar pressure. The Ai

Compressor of 12-14 CFM (15 M3/Hr) capacity shall be able to deliver 15 LPM at user point @ 60% Diversity.

Delivery	10 CFM
Discharge Pressure	6.9 Bar
Type	V Belt Drive
Electrical Conditions	415 / 3 PH / 50
Type of Motor	TEFC
Driver	5 HP
Accessories:	a). Horizontal Receiver with safety Valve, pressure gauge & Auto drain. b). Air Drier with pre & after filter c). After Cooler

VACUUM PUMP:

Vacuum Pump shall be installed behind the back side of BOC Lab to maintain vacuum for 12 User Point installed on BOC Lab. Vacuum Pump of capacity 34 CFM (58 m3/Hr) capacity considered. This pump can be able to receive 28 LPM at User point @ 60% Diversity.

Actual Delivery	20 CFM
Max. Vacuum	24" of Hg with closed intake
Electrical Conditions	415 / 3 PH / 50
Type of Motor	TEFC
Speed	1800 RPM
Driver	5 HP
Accessories:	a). Vacuum Switch b). Vacuum Gauge c). Silencer d). 500 Lts. Scrubber

Piping: Piping for Vacuum System inside the Laboratory shall be considered as closed Loop.

PROCESS CHILLER

Process Chiller shall be installed behind the back side of BOC Lab to feed the Chilled Water to 12 User Point installed on BOC lab. The Water comes out from the Equipment shall be directed through necessary tubing & fittings. Chilled Water System considered as Closed Loop System. The Process Chiller of 4 TR Capacity shall be able to discharge 50 LPM at user point @ 30% Diversity.

Refrigeration Load	2 TR
Inlet Temp to Chiller	-20° C approx
Outlet Temp to Chiller	-10° C approx
Cooling type	Air Cooled
Flow Rate	45-50 LPM
Refrigerant	R-22
Condenser Type	Finned Tube type
Power Consumption	Less than 6.5 KW
Noise Level	Less than 75 db at 1.0 m distance

INSULATION:

To avoid heat gain and reduced efficiency of cooling systems, condensation of water on surfaces, and potential corrosion problems, pipes in chilled water systems should always be insulated. For Outdoor application, should be painted with Arm finish FR paint of Two Coats.

Material	Nitrile Rubber
Max. Surface Temperature	+105° C
Min. Surface Temperature	-50° C

Thermal Conductivity @ 0° C	0.035 W /(m . k)
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The Insulation wall thickness schedule is based upon Normal Design Conditions of 85°F (29.4°C) and 70% RH. Deviations from these design conditions may change the Insulation thickness requirements.

Pipe Size	Insulation Thickness
Up to 1”	13 mm
Up to 6”	19 mm

HOT WATER SYSTEM:

PPR Pipes

The PPR pipe (Poly Propylene Random Copolymer) is one of the latest pipes resulting from European advanced technology. The quality of our PPR pipes is entirely up to the standard of DIN8077/8078. Polymers which are a high molecular weight polymer and contain stabilization package in order to prevent thermal degradation of material during the piping processing and to provide outstanding performance during the usage of pipe. It is considered as the optimal pipe material for cold and hot water system. PPR SDR 7.4 (PN 20) pipes shall be used for hot Water System.

Advantages:

- Widely used in distribution of water / drinking water installation in Residential area as it is not detrimental to human health. It's Hygenic and Odourless. There is no bacterial or Fungal Growth and no Contamination.
- Resistant to heat or cold. No need for insulation against heat. Withstands temperature range – 2 Degree Celsius to 90 Degree Celsius. Keeps inner climate constant.
- Endures to climatic condition.
- Resistant to corrosion, does not rust or decay, No scaling or calcification.
- Resistant to chemical reaction, acids, salt and alkalis, may safely be used together.
- Low friction losses. Resistant to abrasion.
- Extremely light weight – easy to transport & install.
- Strong tough and long lasting - can be safely used for duration of minimum 50 Years.
- Leak Proof Joints (Zero maintenance, Easy repairs)

Mechanical & Thermal Properties

Impact Strength	1.1 - 14.0
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VICAT Softening Temp., 0C	130
Maximum Safe Working Temp., 0C	95
Water Absorption (%) Maximum	0.03
Specific Gravity g/cm ³	0.9
Density g/cm ³	0.91
Thermal conductivity at 23oC W/m.k	0.23
Friction Factor	Very Low
Chemical resistance	Very High

Permissible Operating Pressure

Temp Deg C	Pressure Kg/cm2 SDR 6 (PN 20)
10	38
20	32.4
30	27.3
40	23
50	19.5
60	16.2
70	12.3
80	7.7
95	5.2

Chemical Resistance

One of the characteristic of Polypropylene Random Copolymer (PP-R) is its property of having the greatest chemical resistance. The chemical resistance of any substance has direct relation with its properties, its composition, its concentration, heat and duration under effect. The chemical resistance chart for the Chemicals with different composition and concentration and their resistance at various temperatures can be provided on request.

Thermal Insulation

Thermal Insulation may be installed for the purpose of preventing sweating and condensation. However Polypropylene material has rather low thermal conductivity, thus PP-R pipes require less insulation material than metal pipes. For example PN 20 pipe will have 53 deg C surface temperatures as a result of transporting water at temperature 80 deg C for a continuous time.

Insulation Thickness for Exposed Hot Water Pipes.

Dimension (mm)	Thermal Conductivity (W/mk) of Insulation Material	
	0.030	0.035
	Recommended Minimum Insulation Thickness	
20	6 mm or 1/4"	10 mm or 3/8"
25	6 mm or 1/4"	10 mm or 3/8"
32	10 mm or 3/8"	13 mm or 1/2"
40	10 mm or 3/8"	13 mm or 1/2"
50	10 mm or 3/8"	13 mm or 1/2"

GEYSER

An electrical geyser is a sizable container which heats water using an electrical element. This is to control the temperature and control power consumption. A geyser is fitted with valves to control pressure caused by the expansion and possible over heating of the geyser. Electric Geyser equipped with safety measures like thermostat, reset, fuse plug, vacuum release valve and pressure release valve.

Capacity	03 LPM
Tank Capacity	06 Liters
Power Consumption	03 kW
Temperature Output	69.5° C
Size	469 X 295 X 290 (LXWXB)

GAS CYLINDER CHANGE OVER PANEL:

Single-Stage Gas Panel to reduce cylinder pressure to a certain line pressure for in house use with internal gas purging and Process gas outlet shut-off valve. These Gas Panels are used for Inert, Reactive, Flammable and Oxidizing Gases and gas mixtures.

These gas panels are mounted on a stainless steel panel and consist of a pressure regulator, inlet and outlet pressure gauges, a relief valve and shut-off valves for the process gas. A choice of stainless steel coils or flexible high pressure hoses is available for the connection to the gas cylinder. Provision for contact pressure gauges (accessories) facilitates monitoring of the gas reserves.

Gas panels are permanently installed in the cylinder stock room or cabinet and reduce the cylinder pressure to a lower line pressures. The gas is guided to the point of use via the subsequent piping system. This Gas Panel allows purging to be carried out with internal gas while cylinders are being changed and flushes the atmospheric air from the system; gas purity is maintained and also shutting-off of gas flow during cylinder change with the panel itself. Standard application for these panels: centralized or decentralized gas supply for highly sensitive analysis devices.

Pressure decreases of the active cylinder (or bundle) below a preset level cause's semi-automatic switch over to the full cylinder side. This is achieved by two integrated regulators (factory set to slightly different delivery pressure levels), connected at their outlet ports. Moving the lever towards the full battery side, this allows disconnecting & replacing the empty cylinder without interrupting the gas supply. The level position always indicates cylinder priority in being discharged.

Technical Details:

Body material	:	Brass
Dimensions (LxHxD)	:	400 x 155 x 240 mm
Purity	:	Max. 6.0
Inlet pressure	:	230 bar
Outlet Pressure range	:	14 bar
Inlet Connection	:	N14 (=NPT ¼")
Outlet Connection	:	N14 (=NPT ¼")

Cylinder Bracket: Cylinder Brackets are used to mount the cylinder on Wall to avoid down fall of Gas Cylinder.

VALVES:

BALL VALVES

Ball Valves of required size shall be installed at each source Point of the Service. Ball valve with required size shall be considered at shaft opening of each floor.

Type:	Ball type
Size	½" OD to 1" OD
MOC:	SS304
Flow:	Straight (2-Way)
Seat Material:	Reinforced PTFE
Rating:	-29°C @ 1965 kPag to 150°C @ 1580 kPag.

Teflon gland packing with Silicone base lubricant and the valves shall be factory tested at 1000 PSIG and certification shall be produced.

PRESSURE GAUGE:

General Purpose Stainless Steel Pressure gauges of 63 mm dial size to be installed in every lab / bench or special purpose equipments in order to know the pressure rating.

Rating	; – 25 bar
Accuracy:	63 mm (2 1/2 in.): ± 1.5 % of span.
Mounting type	: Center back mount type.
End Connection	: ¼" Male NPT
Dial Size	: 63 mm (2 ½")
Operating temp.: Unfilled	: –40 to 140°F (–40 to 60°C)
MOC	: End Connection & Burdon tube will be SS 316, Casing will be SS304.
Temp. Error	: ± 0.4 % for every 18°F (10°C) temperature change from 68°F (20°C)

LINE REGULATOR

Single-stage line regulator used for inert, reactive, flammable, oxidizing gases and gas mixtures in laboratory system. Line regulators are used to reduce line pressure to various low pressure levels at the specified area to be controlled. Pressurized gas enters the regulators from the line. When the hand wheel is turned clockwise, it compresses the spring and gives a force on the diaphragm, which pushes the valve stem open. This releases gas into the low-pressure chamber, exerting an opening force on the diaphragm. Equilibrium is reached, when the spring force on the diaphragm is equal to the opposing force of the gas in the low-pressure chamber.

Type of pressure reducing	: laboratory regulator system
Pressure stages	: single-stage
Mounting details	: plate mounted with inlet from top
Material	: Brass chrome-plated.
Inlet Pressure	: 50 bar
Outlet Pressure	: 0.2 to 14 bar
Inlet connection	: NPT 1/4"
Outlet connection	: NPT 1/4"

GAS PURIFIER:

Gs Purifiers are used to get Ultra High purity (UHP) gases. It contains Moisture Trap, Hydrocarbon Trap & Oxygen Trap with Micron Filters and also Pressure Gauge, Pressure Regulators and Toggle Valve.

Moisture Trap:

Application	: Moisture Removal
Filter Type	: Silica gel / Molecular Sieve
MOC	: Clear acrylic / safe glass tube
Capacity	: 210 CC
Working Pressure	: 10 Bar
Max. Operating Temp	: 50° C

Hydro Carbon Trap:

Application	: Hydrocarbon Removal
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Filter Type	: Activated Charcoal
MOC	: Clear acrylic / safe glass tube
Capacity	: 210 CC
Working Pressure	: 10 Bar
Max. Operating Temp	: 50° C

Oxygen Trap:

Application	: Oxygen Removal
Filter Type	: De-Oxo Chemical catalyst
MOC	: SS316
Capacity	: 210 CC
Working Pressure	: 10 Bar
Max. Operating Temp	: 50° C

Gas Distribution Panel:

Gas Distribution Panel is used where more than one gas required for a single instrument. It helps to controls the flow and Pressure of different gases for the particular instruments. The Gas Distribution Panel consists Toggle Valve, Pressure Gauge, Pressure Regulator and Spiral Tubing.

WELDING:

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Tube to tube joints and braches are joined by the way of orbital welding up to 1" OD tubes. And Socket welding/Butt Welding to be carried out for the Tubes which are greater than 1" OD.

Orbital Welding:

Method for joining tubes will be orbital welding, Orbital welding is cleaner, reliable way of joining pipes and purity is guaranteed by orbital welding. Orbital welding is a mechanism in which the arc from a tungsten electrode was rotated around the tubing weld joint. The arc welding current was regulated with a control system thus automating the entire process. The result was a more precision and reliable method than the manual welding method it replaced. Orbital welding systems offer computer control where welding parameters for a variety of applications can be stored in memory and called up when needed for a specific

application. The skills of a certified welder are thus built into the welding system, producing enormous numbers of identical welds and leaving significantly less room for error or defects. In the orbital welding process, tubes/pipes are clamped in place and an orbital weld head rotates an electrode and electric arc around the weld joint to make the required weld.

Radiographic Test for Welds:

Radiographic Testing for Welded Joints of higher size pipes should be carried out.

The beam of radiation must be directed to the middle of the section under examination and must be normal to the material surface at that point, except in special techniques where known defects are best revealed by a different alignment of the beam. The length of [weld](#) under examination for each exposure shall be such that the thickness of the material at the diagnostic extremities, measured in the direction of the incident beam, does not exceed the actual thickness at that point by more than 6%. The specimen to be inspected is placed between the source of radiation and the detecting device, usually the film in a light tight holder or cassette, and the radiation is allowed to penetrate the part for the required length of time to be adequately recorded.

INSPECTION AND TESTING

Performance Test for Gas System:

A. Installation Purging Procedures:

- Connect the regulated pressure from the Nitrogen cylinder and blow the system for 15 mins nonstop.

Start the p

- The sealed tubes after starting the process of cutting and debarring has to be purged with general purity nitrogen.
- Connect the tubes to the flexible hose of the regulated supply (at 2 bars) and blow the debris for 5 min.
- To ensure the purging is totally complete, blow the tubes intermittently holding the pressure for few seconds at the end of the tube.
- Now use the tube to swage the fitting. And install the tube with the fitting at the required place.

B. Pre Testing Purging Procedure

- Once the main header and the sub header installation is complete, check for the misalignment or improper fitting connections.
- Process again after 15 mins duration and blow the system for another 10 mins.
- Reconnect the needle valves and open the port fully.
- Start the purging process one more time with the valve open blow the whole system for 30 mins.
- Now the system is completely purged and now ready for handing over after the pressure test.
- Please note purged air must be directed to outside of Lab.

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C. Pressure Testing Procedure

- Ensure complete piping is purged with prior to pressure test. Use Nitrogen for leak check. Please note purged air must be directed to outside of Lab.
- Ensure the system point is not hooked up to the lab equipment.
- Shut-off point of use valve and pressurize system through the cylinder regulator.
- Increase pressure slowly to maintain 30 psi and shut-off the cylinder valve. Observe the pressure gauge for evidence of pressure drop.
- If the pressure drops, trouble-shoot leaking joints by using “Snoop” liquid leak detector rectify as necessary.
- Proceed to increase pressure to 100 psi if no leak is detected after 15 mins. of pressurization at 30 psi.
- Repeat above if leak is detected.
- Proceed to increase pressure to 1.5 times the working pressure of the system. (Normally system with same procedure as above.
- Maintain pressure for 12 hours and check for evidence of pressure drop.

D. Preliminary Testing

Preliminary Leak testing will be carried out in two phases:

Pressure decrease method (Pressure testing: 1, 5 times the maximum working pressure). Necessary formats will be used and all relevant data will be recorded during the test. GDS vendor and Management staff of client will jointly witness the test and certify the same.

TIFF leak detection:

Necessary formats will be used and all relevant data will be recorded during the test. GDS vendor and Management staff of client will jointly witness the test and certify the same.

MATERIAL OF CONSTRUCTION (M OC):

SL N.	ITEM'S NAME	MOC
01	Change Over Regulator	Brass
02	Line Regulator	Brass
03	Point of Use Regulator	Brass
04	Utility & Gas Tubing	SS 304
05	Tube Fittings	SS 304
06	Hot Water Pipes & fittings	PPR
07	Chilled Water Insulation	Nitrile Rubber
08	Valves	SS304
09	Tubing Support	Mild Steel
10	U Clamps	Stainless steel
11	Clamps	Virgin Polypropylene
12	Cylinder Bracket	MS Steel

SCOPE OF WORK:

- Supply & Installation of the Utility & Gas Distribution System comprises the following.
- Supply, Installation, testing & commissioning of Source Equipments (i.e. Air Compressor, Vacuum Pump & Process Chiller) at Ground level.
- Preparing the Foundation Details for the Source Equipments and submit the same to the Project Manager in order to co ordinate with Civil Vendor.
- Supply, installation and joining of tubes/Pipes with fittings by means of Orbital Welding and Socket Welding from the Source Equipments to the respective Header inside the lab.

- Raw Water shall be tapped from the Header line with necessary source connector located around the building wall provided by Client.
- The Routing of the Pipes & location of supports as per the specifications & approved Drawing.
- All Services considered from the Source Point to user points with necessary accessories & fittings.
- Performance test for whole System shall carry out by contractor/vendor in order to find any defects in the System. Pre-installation Purging Procedure for the tubes shall be carried out as per specifications. Pre-Testing Purging Procedure shall be carried out to eliminate the misalignment or improper fittings connection as per specifications. Pressure Testing Procedure Ensure complete piping is purged with prior to pressure test. Use Nitrogen for leak check. Purged air must be directed to outside of Lab.
- Technical Data Sheets of all equipment, materials and Samples shall be submitted for approval prior to installation works.
- Preparation of execution drawings and descriptive Technical Documents for all equipment shall be submitted.
- Coordination with other contractors/Vendors with regard to installation of Source Equipments, Tubes/Pipes, Supports, Cables etc.
- Submission of hard-bound copies of Operation and Maintenance Manuals complete with as-built drawings.

LAB EFFLUENT DRAINAGE SYSTEM

GENERAL:

Drainage System considered from Fume Hood cup sink outlet, Sink Outlet to Header line located around the building wall provided by Client.

Drain Header with necessary supports and connected to the Drain Header. Drainage pipes and fittings thermal weld type. Drain Point for Safety Shower is not considered. Floor Drain / Drain Pan should be provided by client, for periodic testing. Civil cut out on Wall/Floor, Floor Trenches to be carried out by client/others.

PIPES:

	<p>High density polyethylene (HDPE) is being used as drainage pipe material. These HDPE pipe shall comprise following features.</p> <ul style="list-style-type: none"> • The Pipe shall be lightweight, corrosion resistant, easy to install, and has a low maintenance cost. • The pipe shall be safely used as waste pipe for temperatures of up to 80°C. Temperatures of up to 100°C are permissible for short periods (e.g. surges of steam). The system is equally suited for freezing temperatures and adapts elastically to cope with expansion, remaining completely intact and undamaged after thawing. • These pipes undergo a licensed annealing process in hot water to reduce inherent tensile stresses created during manufacture. This process ensures long-term joint integrity, as thermal expansion and reversion are reduced compared with untreated pipes. • Pipe shall be unbreakable at room temperature and offers excellent impact resistance even at temperatures of – 40°C, thus meeting the requirements for drainage systems. • Also offers considerable resistance to chemicals, because of its paraffin structure. The system is insoluble in all inorganic or organic solutions at 20°C. • The flexibility of these pipes guarantees crush resistance and superior performance in applications where pipes pass through expansion joints or are subject to traffic vibration. • Pipe's resistance to abrasion is a particularly important factor for branch pipes, soil stacks and ground pipes. It is very resistant to abrasion; its extra thick walls offer superior protection from both internal and external abrasion. <p>PIPE FITTINGS</p> <p>Pipe Fittings like Tees, Elbows, sleeves, etc shall be considered at appropriate location and all these shall be welded or electro welded.</p> <p>The Expansion Socket is designed to counteract the variation in length due to thermal expansion and contraction of max. 6 m pipes. When fitting collector pipelines extend 6 m it is necessary to fit expansion sockets and secure them with pipe supports. HDPE expansion socket absorb thermal expansion and contraction due to temperature changes caused by water discharge, but it also makes pipe assembly easier, assisting connection at each floor level.</p> <p>Some Connections shall be made by Electro weld Sleeve coupling, the electro weld sleeve coupling is the ideal connection on-site, for subsequent changes or wherever access is not easy.</p>
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ELECTRICAL WORKS AND ACCESSORIES) :-

	TENDERED SPECIFICATIONS
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GENERAL

Prior to laying and fixing of conduits, the contractor shall mark the conduit route, carefully examine the working drawings prepared by him and approved by the Consultant indicating the layout, satisfy himself about the non interference in the route, sufficiency of number and sizes of conduits, location of junction boxes, sizes and location of switch boxes and other relevant details. Any discrepancy found shall be brought to the notice of the Owner's site representative. Any modifications suggested by the contractor should get written approval before the actual laying of conduits is commenced.

PVC CONDUIT AND ACCESSORIES

PVC Conduit

Conduits and accessories shall conform to latest edition of IS-9537 part 3 and shall be heavy duty wall thickness of 2.0 mm rigid tubes which are unscrewed without coupling and with plain ends. All conduits used shall not be less than 20 mm diameter. PVC conduit shall be used for all concealed / embedded installation.

PVC Conduit Accessories

Accessories used for conduit shall be of an approved type complying to relevant IS code.

All accessories used shall be of standard white or black colour, identical to conduit used.

Plain conduits shall be joined by slip type of couplers with manufacturer's standard sealing.

MAINS AND SUB-MAINS

Mains and sub-mains cable or wires where called for shall be of the rated capacity and approved make. Every main and sub main wires shall be drawn into an independent adequate size of conduit. Earthing shall be in conformity with relevant IS codes and calculations shall be submitted for verification. An independent earth wire of the proper rating shall be provided for every single phase sub-main. For every 3 -phase sub-main, 2 No. earth wires of proper rating shall be provided along with the sub-main. The earth wires shall be drawn along with circuit wires through conduit. Where mains and sub-mains cables are connected to switchgear, sufficient extra lengths of cable shall be provided to facilitate easy connections and maintenance.

1. WIRING FOR POWER AND LIGHTING CIRCUITS

Wiring for power and lighting circuits shall be carried out in separate and distinct wiring systems. Wiring for emergency system shall also be carried out in a separate and distinct wiring system. Balancing of circuits in a three phase system shall be arranged before the installation is taken up. The wiring system envisaged is generally shown on the layout drawings and line diagrams. However, a brief account of the general wiring system is given below:

- a. Sub mains wiring - Wiring from Main / Sub Main Switch Board to the individual MCB distribution boards.
- b. Circuit wiring - Wiring from MCB DB to the nearest switch/control box for lighting, fans, sockets, switches, call bells for each circuit, and onward looping to the next switch / control boxes.

The sub-main wiring shall be either in 3 phase 4 wire or single phases 2 wire system. Each sub-main wiring circuit shall also have its own PVC insulated copper earth continuity wire/s as per detailed drawings and specifications.

Circuit wiring shall be in single phase system. However, a maximum of 2 single phase circuits belonging to the same pole/phase could be installed in the same conduit. Not more than ten points - light, fan, and 5A socket shall be grouped on one lighting circuit.

R - Red	Neutral	:	N - Black
Y - Yellow	Earth	:	G - Green
B - Blue	Emergency	:	E - Grey

SWITCHES, SOCKETS & ACCESSORIES

Light control switches shall be of a 5/15A rating for controlling light points as specified in bill of quantities. Light control switches shall be of plate type design with MS/GI/PVC/WOOD boxes suitable for flush mounting for general lighting, as specified in BOQ.

All sockets 5A and 15 A ratings shall be of flush mounting type with control switches of plate type design of the same rating as that of the sockets. All sockets outlet shall be of 3 pin type with box.

2. SWITCHES, RECEPTACLES (MODULAR), LIGHTING FIXTURES & LIGHTING CONTROL EQUIPMENT

2.1 SWITCHES

All switches shall be enclosed type flush mounted suitable for 240 volts AC. All switches shall be

fixed inside the switch boxes on adjustable flat M S strips/plates with tapped holes and brass machine screws, leaving ample space at the back and sides for accommodating wires. Switch controlling the light point shall be connected to the phase wire of the circuit and load on each switch shall be restricted to maximum 800 watts & maximum 1500 watts per circuit. All wiring accessories shall be BIS approved. Perfect alignment shall be maintained while fixing of the back boxes.

2.2 WALL SOCKET OUTLET

Wall socket outlets shall be of the three pin. The switch controlling the socket outlet shall be on the phase wire of the circuit and not more than two socket outlets of 16 amps shall be connected on one circuit. An earth wire shall be provided along with the circuit wires and shall be connected to earthing screw inside the box. The earth terminal of the socket shall be connected to the earth terminal provided inside the box. All sockets shall be shuttered type.

- a. Every socket outlet shall be controlled by an individual switch unless mentioned otherwise.
- b. The switch controlling the socket outlet shall be on the 'Live' side of the line.
- c. 6 amps and 16 amps socket outlet shall normally be fixed at any convenient height above the floor level as desired by the Architect. The switch for 6 and 16 amps, socket outlet shall be kept along with the socket outlet. However, in special case, if desired by the Architect the 6 amp. Socket outlet can be placed at the normal switch level.

2.3 LIGHTING FIXTURES & ACCESSORIES

The light fixtures and fittings shall be assembled and installed in position complete and ready for service, in accordance with details, drawings, manufacturer's instructions and to the satisfaction of the Project Manager.

2.3.1 SCOPE

Scope of work under this section shall include inspection at suppliers/manufacturer's premises at site, receiving at site, safe storage, transportation from point of storage to point of erection, erection and commissioning of light fittings, fixtures and accessories including all necessary supports, brackets, down rods and painting etc as required.

5. DISTRIBUTION PANELS/BOARDS

Main Distribution Panels, Sub-Distribution Panels and Final Distribution shall be covered under this section. Panels/Boards shall be suitable for operation on 3 Phase/single phase, 415/240 volts, 50 cycles, 4 wire system with neutral grounded at transformer. All Distribution panels shall be CPRI tested design and manufactured by a approved manufacturer. **CPRI certificate shall be made available.**

3.1 CONSTRUCTION FEATURES

Distribution panels shall be 2 mm thick sheet steel cabinet for indoor installation, dead front, floor mounting/wall mounting type and shall be form 3b construction. The Distribution panels shall be totally enclosed, completely dust and vermin proof and shall be with hinged doors and folded covers, Neoprene gasket, padlocking arrangement and bolted back. All removable/ hinged doors and covers shall be grounded by flexible standard connectors. Distribution panel shall be suitable for the climatic conditions as specified in Special Conditions. Steel sheets used in the construction of Distribution panels shall be 2 mm thick and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet metal shall be seam welded, all welding, slag shall be rounded off and welding pits wiped smooth with plumber metal. The general construction shall confirm to IS-8623-1977 (Part-1) for factory built assembled switchgear & control gear for voltage upto and including 1100 V AC.

All panels and covers shall be properly fitted and square with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with wing nuts. Self threading screws shall not be used in the construction of Distribution panels. A base channel of 75 mm x 40 mm x 5 mm thick shall be provided at the bottom for floor mounted panels. Minimum **operating** clearance of 275 mm shall be provided between the floor of Distribution panels and the lowest feeder compartment.

Distribution panels shall be of adequate size with a provision of spare switchgear as indicated on the Single Line Diagram. Feeders shall be arranged in multi-tier. Knockout holes of appropriate size and number shall be provided in the Distribution panels in conformity with the location of cable/conduit connections. Removable sheet steel plates shall be provided at the top to make holes for additional cable entry at site if required.

Every cabinet shall be provided with Trifoliate or engraved metal name plates. All panels shall be provided with circuit diagram engraved on PVC sheet. All live accessible connections shall be shrouded and shall be finger touch proof and minimum clearance between phase and earth shall be 20 mm and phase to phase shall be 25 mm.

3.2 BUS BAR CONNECTIONS

Bus bar and interconnections shall be of high conductivity electrolytic grade aluminium / copper as indicated in the bill of quantities complying with requirement of IS : 5082 – 1981 and of rectangular cross section suitable for carrying the rated full load current and short circuit current and shall be extendable on either side. Bus bars and interconnections shall be insulated with heat shrinkable sleeve of 1.1 KV grade and shall be colour coded. Bus bars shall be supported on glass fiber reinforced thermosetting plastic insulated supports at regular intervals to withstand the force arising from in case of short circuit in the system. All bus bars shall be provided in a separate chamber and all connections shall be done by bolting. Additional cross sectional area to be added to the bus bar to compensate for the holes. All connections between bus bars and breakers shall be through solid copper / aluminium strips of proper size to carry full rated current and insulated with insulating sleeves. Maximum current density for the busbars shall be 1A/sq.mm for aluminium and 1.4 A/sq.mm for copper busbars.

Maximum allowable temperature for the Bus bar to be restricted to 85 deg C

4.3 CABLE COMPARTMENTS

Cable compartment of adequate size shall be provided in the Distribution panels for easy clamping of all incoming and outgoing cables entering from the top/bottom. Adequate supports shall be provided in cable compartment to support cables.

4.4 MOULDED CASE CIRCUIT BREAKER (MCCB)

The MCCB should be current limiting type with trip time of less than 10 msec under short circuit conditions. The MCCB should be either 3 or 4 poles as specified in BOQ. MCCB shall comply with the requirements of the relevant standards IS13947 – Part 2/IEC 60947-2 and should have test certificates for Breaking capacities from independent test authorities CPRI / ERDA or any accredited international lab.

MCCB shall comprise of Quick Make -break switching mechanism, arc extinguishing device and the tripping unit shall be contained in a compact, high strength, heat resistant, flame retardant, insulating moulded case with high withstand capability against thermal and mechanical stresses

The breaking capacity of MCCB shall be as specified in the schedule of quantities. The rated service breaking capacity (Ics) should be equal to rated ultimate breaking capacities (Icu). MCCBs for motor application should be selected in line with Type-2 Co-ordination as per IEC-60947-2, 1989/IS 13947-2. The breaker as supplied with ROM should meet IP54 degree of protection.

The manufacturer shall provide both the discrimination tables and let-through energy curves for all.

a. Protection Functions

- MCCBs with ratings up to 200 A shall be equipped with Thermal-magnetic (thermal for overload and magnetic for short-circuit protection) trip units
- Microprocessor MCCBs with ratings 250A and above shall be equipped with microprocessor based trip units.
- Microprocessor and thermal-magnetic trip units shall be adjustable and it shall be possible to fit lead seals to prevent unauthorised access to the settings
- Microprocessor trip units shall comply with appendix F of IEC 60947-2 standard (measurement of rms current values, electromagnetic compatibility, etc.)
- Protection settings shall apply to all poles of circuit breaker.
- All Microprocessor components shall withstand temperatures up to 125 °C

b. Testing

Original test certificate of the MCCB as per IEC 60947-1 & 2 or IS13947 shall be furnished. Pre-commissioning tests on the switch board panel incorporating the MCCB shall be done as per standard specifications.

c. Interlocking

Moulded, case circuit breakers shall be provided with the following interlocking devices for interlocking the door of a switch board.

- Handle interlock to prevent unnecessary manipulations of the breaker.
- Door interlock to prevent the door being opened when the breaker is in ON position.
- Defeat-interlocking device to open the door even if the breaker is in ON position.

The MCCB shall be current limiting type and comprise of quick make – Break switching mechanism. MCCBs shall be capable of defined variable overload adjustment. All MCCBs rated 200 Amps and above shall have adjustable over load & short circuit pick-up both in Thermal magnetic and Microprocessor Trip Units.

All MCCB with microprocessor based release unit, the protection shall be adjustable Overload, Short circuit and earth fault protection with time delay.

The trip command shall override all other commands.

4.5 MINIATURE CIRCUIT BREAKER (MCB)

Miniature Circuit Breaker shall comply with IS-8828-1996/IEC898-1995. Miniature circuit breakers

shall be quick make and break type for 240/415 VAC 50 Hz application with magnetic thermal release for over current and short circuit protection. The breaking capacity shall not be less than 10 KA at 415 VAC. MCBs shall be DIN mounted. The MCB shall be Current Limiting type (Class-3). MCBs shall be classified (B, C, D ref IS standard) as per their Tripping Characteristic curves defined by the manufacturer. The MCB shall have the minimum power loss (Watts) per pole defined as per the IS/IEC and the manufacturer shall publish the values. MCB shall ensure complete electrical isolation & downstream circuit or equipment when the MCB is switched OFF.

The housing shall be heat resistant and having high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection. All DP, TP, TPN and 4 Pole miniature circuit breakers shall have a common trip bar independent to the

External operating handle.

5. EARTHING

5.1 EARTHING

The system shall be TNS with four wire supply system (R,Y,B,N and 2 Nos. E) brought from the main L T Panel. All the non-current carrying metal parts of electrical installation and all metal conduits trunking, cable sheaths, switchgear, distribution panels, light fittings and all other parts made of metal shall be bonded together and connected by means of specified earthing conductors to an efficient earthing system. All metal work such as pipe lines, ducts, cable trays, stair case railing etc shall be bonded to earth.

All earthing shall be in conformity with IS: 3043 1987, and the basic system of earthing shall be TNS.

5.2 EARTHING CONDUCTORS

Earthing conductors shall be of copper / GI as mentioned in schedule of quantities and shall be protected against mechanical injury and corrosion.

5.3 SIZING OF EARTHING CONDUCTORS

The cross sectional area of earthing conductor shall not be smaller than half of the largest current carrying conductor subject to an upper limit of 80 Sq.mm. If the area of the largest current carrying conductor or bus bar exceeds 160 sq.mm then two or more earthing conductors shall be used in

parallel, to provide at least half the cross sectional area of the current carrying conductor or bus bars. All fixtures, outlet boxes, junction boxes and power circuits upto 15 amps shall be earthed with PVC insulated copper wire.

5.4 CONNECTION OF EARTHING CONDUCTORS

Main earthing conductors shall be taken from the earth connections at the main L T panel to an earth electrode with which the connection is to be made. All joints in tapes shall be with four rivets and shall be brazed in case of copper and by welding bolting in case of GI, wires shall be connected with crimping lugs, all bolts shall have spring washers. Sub- mains earthing conductors shall run from the main distribution panel to the sub distribution panel. Final distribution panel earthing conductors shall run from sub-distribution panel.

Circuit earthing conductor shall run from the exposed metal of equipment and shall be connected to any point on the main earthing conductor, or its distribution panel. Metal conduits, cable sheathing and armouring shall be earthed at the ends adjacent to distribution panel at which they originate, or otherwise at the commencement of the run by an earthing conductor in effective electrical contact with cable sheathing. Where equipment is connected by flexible cord, all exposed metal parts of the equipment shall be earthed by means of an earthing conductor enclosed with the current carrying conductors within the flexible cord. Switches, accessories, lighting fitting etc. which are rigidly secured in effective electrical contact with a run of metallic conduit shall not be considered as a part of the earthing conductor for earthing purposes, even though the run of metallic conduit is earthed. The installation shall be complete in all respects for efficient and trouble free service. All work shall be carried out in a first class quality and neat workmanship. Grounding conductors shall be handled carefully to avoid kinking and cutting of the conductors during their installation. All exposed ground conductors run shall be taken in a neat manner horizontal, vertical and parallel to the building walls or columns and shall not be laid haphazardly. All connections to the grounding grid shall be made with **earthing** strip welded to grid and bolted at equipment ends.

APPENDIX – II

LIST OF INDIAN STANDARDS (IS)

Latest edition of following standards shall be referred

IS : 694	PVC insulated Electric cable for working voltage upto and including 1100 volts.
IS : 732	Code of practice for electrical wiring and installation

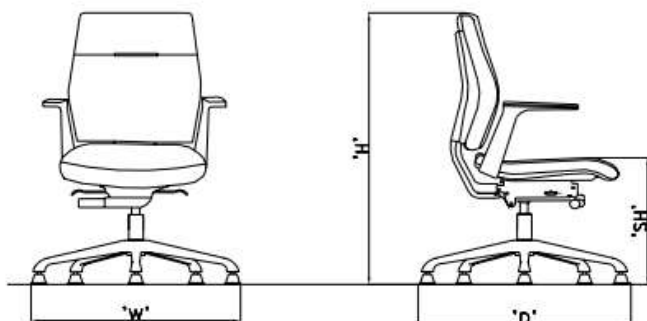
IS : 1255	Code of Practice for installation and maintenance of Power Cables upto and including 33 KV rating (Second Revision
IS : 1293	Three pin plugs and sockets outlets rated voltage upto and including 250 volts and rated current upto and including 160 amps.
IS : 1554 (Part - I)	PVC insulated (Heavy Duty) electric cables for working voltages upto and including 1100 volts.
IS : 1646	Electrical installation fire safety of buildings (general) Code of practice.
IS : 1885	Glossary of items for electrical cables and conductors
IS : 1913	General and safety requirements for fluorescent lamps luminaries Tubular.
IS : 2309	Protection of building and allied structures against lightning
IS : 2551-	Danger notice plate.
IS : 3043	Code of practice for earthing.
IS : 3427	AC Metal enclosed switch gear and control gear for rated voltages above 1 KV and upto and including 52 KV.
IS : 3480	Flexible steel conduits for electrical wiring.
IS : 3837	Accessories for rigid steel conduit for electrical wiring.
IS : 4146	Application guide for voltage transformers
IS : 4615	Switch socket outlets.

IS : 5133 (Part -I)	Boxes for the enclosure of electrical accessories.
IS : 5216 (Part-I)	Guide for safety procedures and practices in electrical work.
IS : 5424	Rubber mats for electrical purposes.
IS : 5578 & 11353	Marking and arrangement of bus bars
IS : 5578 & 11353	Marking and arrangement of bus bars
IS : 7098 - (Part - II)	Cross linked polyethylene insulated PVC sheathed cables. For working voltages from 3.3 KV upto and including 33 kV
IS : 8130	Conductors for insulated electric cables and flexible cords
IS : 8623 - (Part -I)	Factory built assemblies of switchgear and control gear for voltages upto and including 1000 V AC and 1200 VDC.
IS : 8623 - (Part -II)	Bus Bar trunking system
IS : 8828	Miniature Circuit Breakers
IS : 9537	Rigid Steel Conduits for electrical wiring (Second Revisions)
IS : 10810	Methods of test for cables.
IS : 12640	Earth Leakage Circuit Breakers

IS : 13947 (Part-II)	Air Circuit Breakers
IS : 13947- (Part-)	Moulded Case Circuit Breakers
IS : 13947 - (Part-)	Degree of protection provided by enclosures for LV switchgear and control gear.
IS : 13947 (Part-)	General requirement for switchgear and control gear for voltage not exceeding 1000

Office Furniture

	TENDERED SPECIFICATIONS
	<p><u>Mid Back Ergonomic Chairs on castors with arms</u></p> <p>1) SEAT/BACK ASSEMBLY: The seat is made up of hot pressed moulded reconstituted wood of 12mm average thickness and back is two part injection moulded plastic.</p> <p>SEAT SUB ASSEMBLY SIZE: 49.0cm (W) X 49.5cm (D) BACK SUB ASSEMBLY SIZE: (MID BACK): 45.0 cm (W) X 49.0 cm (H)</p> <p>2) POLYURETHANE2 FOAM: The Polyurethane foam is moulded in Density 45 kg/m3,</p> <p>3) ARMRESTS : The armrests are Pressure die casted in polished Aluminium with PP Arm Tops.</p> <p>3) AUTO-RETURN MECHANISM: The Conference and Board room chair has an Auto-return mechanism to allow the user free movement while being sitted and after use guides the upper structure to rotate back to its original position enabling all chairs around the table to be aligned.</p> <p>4) ADJUSTABLE BACK SUPPORT : Backrest is connected to the mechanism with a drop-lift mechanism which can be adjusted in the range of 7.0 cm for the comfortable back support to suitable individual need.</p>



High Rise Revolving stool (Black seat cover) with cushion in seat & lumbar support at back, SS metal stand with ring type foot rest & castors & Gas Lift



Wall cabinet (W 750 x D 450 x H 750)

Wall Mounted Overhead File Cabinets (Float Glass Door) CRCA (Cold Rolled Close Annealed) or G. I. Sheets Two Shutter with one adjustable shelf Size: - 750Lmm x 370mm W x 750 mmH (approx.) **PI refer dwg as per attached.**



MISCELLANEOUS WORK

	TENDERED SPECIFICATIONS
	<p>7. <u>VITRIFIED FLOOR TILES</u></p> <p>Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS: 15622, of approved make, in all colours and shades, laid on 20mm thick cement mortar 1:4 (1 cement : 4 coarse sand), jointing with grey cement slurry @ 3.3 kg/ sqm including grouting the joints with white cement and matching pigments etc., complete. Size of Tile 600x600 mm</p> <p>Preparation of Surface and Laying</p> <ol style="list-style-type: none"> a) Base concrete or the RCC slab on which the tiles are to be laid shall be cleaned, wetted and mopped. The bedding for the tile shall be with cement mortar 1:4 (1 cement: 4 coarse sand) or as specified. The average thickness of the bedding shall be 20 mm or as specified while the thickness under any portion of the tiles shall not be less than 10 mm. b) Mortar shall be spread, tamped and corrected to proper levels and allowed to harden sufficiently to offer a fairly rigid cushion for the tiles to be set and to enable the mason to place wooden plank across and squat on it. c) Over this mortar bedding neat grey cement slurry of honey like consistency shall be spread at the rate of 3.3 kg of cement per square metre over an area upto one square metre. Tiles shall be

	<p>soaked in water washed clean and shall be fixed in this grout one after another, each tile gently being tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints shall be kept as thin as possible and in straight lines or to suit the required pattern.</p> <p>d) The surface of the flooring during laying shall be frequently checked with a straight edge about 2 m long, so as to obtain a true surface with the required slope. In bath, toilet W.C. kitchen and balcony/verandah flooring, suitable tile drop or as shown in drawing will be given in addition to required slope to avoid spread of water. Further tile drop will also be provided near floor trap.</p> <p>e) Where full size tiles cannot be fixed these shall be cut (sawn) to the required size, and their edge rubbed smooth to ensure straight and true joints. Tiles which are fixed in the floor adjoining the wall shall enter not less than 10 mm under the plaster, skirting or dado.</p> <p>f) After tiles have been laid surplus cement slurry shall be cleaned off.</p> <p>g)</p> <p>Pointing and Finishing</p> <p>The joints shall be cleaned off the grey cement slurry with wire/coir brush or trowel to a depth of 2 mm to 3 mm and all dust and loose mortar removed. Joints shall then be flush pointed with white cement added with pigment if required to match the colour of tiles. Where spacer lug tiles are provided, the half the depth of joint shall be filled with polysulphide or as specified on top with under filling with cement grout without the lugs remaining exposed. The floor shall then be kept wet for 7 days. After curing, the surface shall be washed and finished clean. The finished floor shall not sound hollow when tapped with a wooden mallet.</p>
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APPROVED MAKE OF MATERIALS FOR FUMEHOODS AND LABORATORY FURNITURE SYSTEM

1	LABORATORY FITTINGS	WATER SAVER / BROEN / FAG/ FAR
2	LABORATORY SINKS / DRIP CUPS	WATER SAVER / BROEN/ALLOYPLAS/MALAYSIA
3	LABORATORY ELECTRICAL SOCKET	NORTHWEST / LEGRAND / MK / NORISYS
4	DATA & VOICE SOCKET	NORTHWEST / LEGRAND / MK/ NORISYS
5	EYEWASH / SHOWER	WATER SAVER / BROEN / FAG/ TOF/FAR
6	SPOT EXTRACTOR	FUMEX / ALSIDENT / NEDERMANN

7	FLAMMABLE STORAGE TALL CABINET	JUSTRITE / EAGLE/ SECURALL
8	OFFICE FURNITURE	GODREJ / WIPRO / SPACE DESIGN / FORM DESIGN
9	FUME HOOD SERVICE FIXTURES	WATER SAVER/BROEN/FAG/FAR
10	FUME HOOD ELECTRICAL SOCKET	NORTHWEST/LEGRAND/MK /NORISYS
11	FACE VELOCITY & VAV CONTROLS	TEL /SAUTER / SIEMENS

APPROVED MAKE OF MATERIALS FOR EXHAUST SYSTEM

S.NO	DESCRIPTION	APPROVED MAKE
1	PP sheets	Mandhani/Dugar/Khanna
2	Isothelic Resin with Fire retardent	Mechemco/Kaysynth/Orsyn
3	PP Dampers	Any reputed make
4	PP Exhaust Fans	Colasit/Colourplast/ Seat
5	VFD	Invertek/Siemens/ABB/Danfoss/Schneider
6	Fume hood face velocity monitor	TEL/Siemens/Sauter
7	Room pressure Monitor	TEL/Siemens/Sauter
8	Actuator	Siemens/Belimo/Neptronic
9	Motor	ABB/CG/Kirloskar

APPROVED MAKE OF MATERIALS FOR ELECTRICAL SYSTEM

S.NO	DESCRIPTION	APPROVED MAKE
1	MCCB	GE / ABB / SCHNIDER

2	LT CABLE as per IS:7098(2)1988	HAVELLS NICCO / POLYCAB / RPG / UNIVERSAL (Unistar) / PRIMECAB
3	END TERMINATION MATERIALS	DOWELS / SMI / HMI
4	INDICATING METERS	SIMCO / MECO / AE / RISHAB
5	INDICATING LAMPS	GE / SIEMENS / SCHNEIDER / L&T
6	POWER CONTACTORS	GE / SIEMENS / ABB / SCHNEIDER / L&T
7.	MCB / MCB DB	Havell's /Legrand/ GENERAL ELECTRIC (GE) HAVELLS
8.	ELCB / ELMCB	Havell's /Legrand/ GENERAL ELECTRIC (GE) HAVELLS
9	PVC CONDUITS - FRLS	VIP / AVON / UNIVERSAL / PRECISION / NELCO
10.	PVC COPPER WIRES - FRLS	FINOLEX / ANCHOR/ POLYCAB/ HAVELLS
11.	INDUSTRIAL SOCKETS	MGE / NEPTUNE / BCH
12.	LT PANELS	ANY LOCAL PANEL FABRICATOR
13.	PANEL ACCESSORIES	DIRAK / ELMAX
14.	TERMINAL BLOCK	PHOENIX CONTACT / ELMAX
15.	HEAVY DUTY PVC PIPE / HDPE PIPE 6KG & 4 KG	SUPREME / FINOLEX
16.	EARTHING - G I	ANY LOCAL SUPPLIER.
17.	EARTHING - COPPER	ANY LOCAL SUPPLIER.
18.	FIRE ALARM PANEL	MORLEY / HONEYWELL/NOTIFIER
19.	SMOKE DETECTOS	SYSTEM SENSOR /APPOLO
20	FIRE EXTINGUISHERS	SAFEX/ NITIN
21	LT CABLES	RR KABEL / POWER FLEX
21	M.S PIPES	TATA / JINDAL / SAIL

Materials/ accessories shall be used approved make or APPENDIX II (Technical Specification).

S.No	Materials	Approved Make / Manufactures
1	Flexible Copper wires	Finolex/ Havell's/ Polycab wires / Shalimar (FR)
2	Switch & Sockets	Legrand/ Anchor/ Havells

3	Distribution board	Legrand/ Hager/ Havell's
4	MCCB, MCB, RCCB	Legrand/ Hager/ Havell's/ L&T.
5	Lugs	Dowells
6	Casing caping/Conduit	Berlia/ Polypack/ Pestoplast/ Richa / Setia (2 mm Thickness)
7	Cable gland	Commet
8	Exhaust fan	Bajaj/ Crompton Greaves/ Havells/ Usha/Orient
9	Lighting fixture	Phillips/ Bajaj/ Crompton Greaves/Havells/Wipro
10	Ceiling fan	Bajaj/ Crompton Greaves/ Havells/ Usha/Orient
11	BUS BARS / Panels	CPRI Approved
12	Cables	Armoured/ Havells / Polycab/ Khaitan (IS Approved)

APPROVED MAKE OF MATERIALS FOR PROCESS EQUIPMENT

S.NO	DESCRIPTION	APPROVED MAKE
1.	Chiller	Blue Star, Voltas, Julabo, Cole Parmer, First Source Lab. Solution Pvt Ltd, Local Indian Made –PCI, or equivalent
2.	Compressor	Blue Star, Voltas, Senco PC1010, DEWALT DWFP55130 Bostitch , Local Indian Made –PCI or equivalent
3.	Vacuum pump	Reynold, Blue Sta,r Vaccubrand, Buchi Cole Parmer, Gardner Denver , KNF Pumps , Local Indian Made –PCI or equivalent

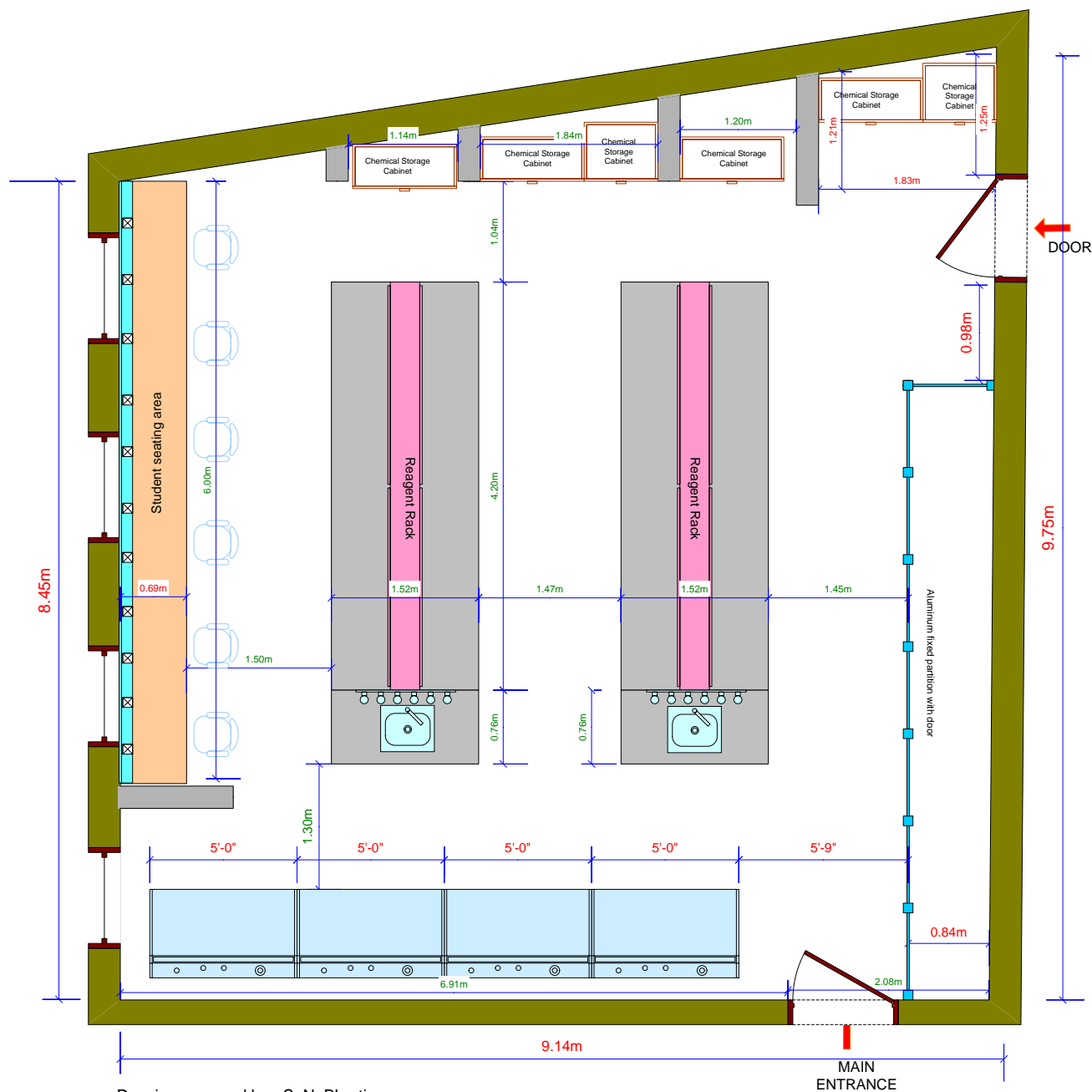
List of approved makes of materials:-

❖ Paint	: ICI/Asian Paints/Berger/Oikos/Nerolac/Berger/
❖ Float Glass	: Modi Guard/Glaver Bel/Saint Gobain
❖ Expansion Bolts	: Hilti/Fischer/Hettich
❖ Glazing Sealant	: Dow Corning/GE Sealant
❖ SS/Chrome Coated Hardware	: Dorma/Hafele/Hettich
❖ Aluminum Alloy Extruded Section:	: Hindalco/Indalco/ Jindal

❖ Hinges	: Hettich/Haffle/Grass
❖ Locks	: Dorset/Locksmith/Godrej/ Hettich/Haffle

Note:-

- 3. The sample, catalogue color, texture etc. of all above furniture shall be finalized before approved by IIM Technical Purchases Committee.**
- 4. The All finished product shall be delivered to the IIM Jammu, duly covered with bubble sheet to avoid any breakage etc. However in case of any minor repair arising out of transportation etc. the same shall be repaired/ replaced immediately by the supplier without any extra cost.**



Drawing prepared by:- S. N. Bharti

Requirement For Fermentation Lab:

BIDDER PREQUALIFICATION CRITERIA

Bidder shall meet all the pre qualification criteria as given below for qualifying to this tender. In the event of only one Bidder qualifying technically, the Technical Committee shall have the right to accept or reject the concerned bidder.

The bidder shall furnish a covering page indicating item wise compliance to all the Pre-qualification criteria. Bidder Prequalification Criteria are as given below:

- The Bidder shall have experience in Designing, Manufacturing, Supply, Execution, Commissioning & Servicing of Laboratory Furniture & Utility on a turnkey basis **the following during the last 5 years ending the last day of the month**, as stated below:-
 - **Fume Hood system**
 - **Lab furniture and accessories**
 - **Exhaust System**
- The Bidder has carried out preferably similar works, same value of the estimated cost, in the 5 years ending on the last day of the month. At least one contract should be in Govt. Universities/any of Central PSU's / Autonomous Bodies. The project executed as such by the Bidder should be in operation currently. **The Bidder should produce the backup documents like Purchase Order, completion certificates etc.**
- Similar work shall mean "Designing, Manufacturing, Supply, Execution, Commissioning and Servicing of Laboratory Furniture Comprising of Lab Work Benches, Fume Hoods, Exhaust and accessories"
- The vendor should have a well established in house manufacturing unit for the Lab Furniture & Fume Hood, Quality Management System as per International Standards providing the products and services on the continued basis for the last 5 years. The vendor shall possess the current / valid approval for such equipment manufacturing facility by a Statutory Certifying Authority, like Factory Inspectorate etc. A notarized copy of valid certificate needs to be enclosed.
- The Bidder should be an Official Member with SEFA for a continued basis from past 3 Year from this notification. (Supporting documents for the same need to be furnished) and bidder should provide have document of third party test facility.

- If required, the technical committee from IIIM Jammu shall visit the similar works completed by vendors and submitted as mentioned above to assess their capability.

- **The Bidder shall visit IIIM, Jammu, and Project site TO UNDERSTAND THE REQUIREMENTS OF THE SITE. The Bidder shall study the scope in detail before submitting bid.**
- **The Bidder shall provide the complete documentary evidence duly self attested by notary for the following in support of Bidder Pre-Qualification Criteria.**

For Clause no. 1.0, 1.1, 1.2, 1.3, 1.4

1) Purchase Orders

2) Completion Certificates and experience of performance for jobs, issued by the clients.

3) Experience details duly filled in following format.

S. No	Name of client	Name & location of the project	Brief description of project	Value of the Project	Documents submitted
					(PO copy & completion certificate) – (Y/N)

For Clause no. 2.0

1) Audited balance sheets of financial years 2015, 2016 & 2017.

2) Annual Turnover details duly filled in the following format.

Financial year	2017-18	2018-19	2019-20
Annual Turnover			

- **Note to Bidders: Offers of Bidders failing to submit the prescribed documents in support of the above prequalification criteria shall be rejected.**

Project substantial completion shall be withheld until all required Unit certification letters, tests, and reports have been submitted to and approved by the IIIM

Specifications and allied Technical details

FUME HOOD & ACCESSORIES:-

Frame construction:- (compulsory)

Entire structure should be "C" frame type. 60 X 30 X 2 mm pipe is used for main frame structure. 30 X 30 X 1.5 mm pipe should be used for bottom support. CO₂ welded & finished with highly chemical resistant epoxy powder coating.

Sr. No.	Specification	Description
1.	Design Basis	American Design Standard: ASHRAE 110-1995 All tests including "Tracer gas containment test" passed. European Design Standard : EN – 14175- 2003 Inner Plane Containment test' Passed
2.	Design Structure	Aerodynamic, Floor mounted
3.	Airflow Type	Low constant volume (for A.C. environment)
4.	Color Combination	White and Grey
5.	Powder coating	Pre-treated with 8 tank chemical processes and powder coated with highly chemical resistant epoxy colors having dry film thickness of 70 to 80 microns. Passes all conformity performance tests as per IS standards.
6.	Material of Construction of Superstructure	Galvanized Iron (GI) as per 277 : 2003 standard of <ul style="list-style-type: none"> mm thickness for all sheet metal paneling 1.2 mm for back pillars 1.2 mm for front corner post
7.	Front Top Panel	Easily openable hinged Top panel for easy access to Flow Control Valve and Electrical Lighting fixture for maintenance.
8.	Corner Post	Triangular profiled Corner Post is placed on Left and Right Hand Side of the Fume Hood and it houses the utility line fittings and electrical receptacles.
9.	Construction (Interior)	Chemical & hear Resistant, Fire Retardant, Smooth Finish, Easily Cleanable Panels Made out of durable PRL integral work walls (6mm thick). ASTM flames spread index < 25.
10.	Active Kinetics	Interstitial 7- point active kinetics exhaust system (for light, normal &

	exhaust system	heavy fumes) with baffle to ensure rapid exhaust of fumes.
11.	Airfoil	Aerodynamic Design, Horizontal fixed airfoil mounted on the worktop made of SS 304 (2mm). with Teflon Coated
12.	Worktop	Chemical resistant splash & spillage proof dished ' Jet Black Granite ' worktop (20 ± 2mm thick). Skirting of 15 mm from all sides for no chemical spillage.
13.	Sink, Water tap with drain arrangement	Worktop will have sink sealed with silicon sealant for drainage with water tap on left back side of worktop. Sink will have a trap for waste collection. Oval shaped 100 mm x 200 mm sink
14	Sash (Shutter)	Vertical rising sash counter-balanced with pulley and counter- weight system. Toughened Float Glass (4mm thick). Smooth and light sash operation. Clear openable height =750 mm. Impact Resistance of the sash (Toughened Glass) if four times higher than other sash materials (like safety Glass and Polycarbonate). Breaking stress value for fully toughened glass (Tempered Glass) = 24,000 psi
15.	Wet & Dry Service Valves	Remote operated Colour Coded Brass Needle Valves for fine control over utilities (as per D IN 12920 norms) total 3 nos. service Valves with PU Plumbing with 6 mm internal dia, withstands up to 5kgf pressure (All on LHS) <ul style="list-style-type: none"> • 1 For Raw water (PU) • 1 For Nitrogen (PU) • 1 For Vacuum (Teflon)
16.	Maintenance Ports	<ul style="list-style-type: none"> • Openable top panel for easy maintenance of tube light and flow control valve • Triangular service panel for maintenance of utility valves and tubing.
17.	Internal nozzles	Brass powder coated fittings are staggered in the fume hood to avoid the intermingling of the flexible tubes. Also the taps are tapered in shape to use with flexible tubing of sizes from ¼" to ½" in dia, to provide greater flexibility to the user. Note:- Our scope of supply for utility lines ends at ¼" BSP male adapter.
18.	Lighting	Fluorescent light (40 watt, 2 Nos.) with vapour – proof fitting for proper illumination. Intensity approx 400 lux at worktop level.
19.	Electrical Utilities	4 nos. electrical sockets North- west make (230 V, 6/16 A, 50 Hz), 4 nos. "North – west make MCBs with blower NO/NC switch with built-in starter & light switch on front fascia. Cables & wires : Fire Retardant' grade (2 LHS + 2 RHS)

20.	Built – in Starter	The electrical wiring will have built in starter of “Telemechanique” make; suitable to blower motor capacity
21.	Cable entering port	For easy access of cables from fume hood to electrical sockets.
22.	Chemical storage Base Cabinet (Ventilated & on Casters)	<p>Base cabinet will be ready to receive the fume hood at its top. It will have following features:</p> <ol style="list-style-type: none"> 1. Completely made from 1mm thick GI sheet with highly corrosion resistant epoxy powder coating 60-80 microns thickness. 2. Cabinet integral work walls will be special chemical & heat resistant, smooth finish, easily cleanable panels made out of durable PRL sheets. 3. Two exhaust ports connected to the fume hood exhaust system internally. 4. One removable horizontal partition to store chemicals. 5. PP Trays for chemical storage. 6. Cabinets on Casters. 7. Roller catch of ISI Make for the Base Cabinet doors. 8. Polyamide Hinges from outside of Base Cabinet. <p>Overall Dimensions: 700mm (W) X 540mm (D) x 700mm (H) – 20 nos.</p>
23.	Apparatus Holding Grid (Lattice Assembly)	A grid made up of Duralumin powder coated rod (Dia 12.7 mm) to hold the apparatus. It will cover the entire length of the fume hood and will be built in at fume hood backside. Installed at the distance of 150mm from backside of fume hood.
24.	Level adjusting screws	Made of SS Bolts to adjust the fume hood level by ± 10 mm.
25.	Exhaust Port	Unique exhaust port design ensures that the fumes will be exhausted smoothly without any turbulence at the exhaust port. Also it ensures low noise level.
26.	Flow Control valve	To regulate airflow.
27.	Noise Level	< 70db at 1 meter from fume hood.

CENTRIFUGAL BLOWER: (For air suction in cluster of 3 nos. of Fume hood) - 1 no. Silent PP + FRP high efficiency remote blower, consisting of continuous rating motor and chemical resistant impeller. It satisfies international safe velocity norms.

Sr. No.	Specification	Description
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1.	Construction	SISW type, Chemical & heat resistant PP + FRP blower with aerodynamically balanced PP impeller, with drain plug.
2.	Air Suction Capacity	2000 CFM confirming to international face velocity norms and as per safe fume hood airflow pattern.
3.	Motor	'Crompton / LHP/ Other Reputed' make, 1.5 HP Motor 3 Phase TEFC, IP 55, Class F, Continuous rating. As per IS 325.
4.	Drive	Direct Drive

Testing : All fume hoods are **"factory tested"** for design as per **ASHRAE 110 or EN 14175**. Also, **"on site validation"** for face velocity will be carried out to ensure working of fume hood as per international norms.

Location of Tests and Test Facility: All tests referenced herein shall be performed in the bidder's fume hood test facility & **also the Field ASHRAE or EN 14175 testing is must.**

Standards: Fume hoods must have third party certification of

ASHRAE 110

Or

EN 14175

QUALITY ASSURANCE

The laboratory fume hood manufacturer shall provide fume hood work tops and casework all **manufactured & shipped with** proper packing & should take the full responsibility of the entire scope of works as specified in the tender.

General Performance: Provide certification that fume hoods meet the performance requirements described in section.

PERFORMANCE TEST RESULTS.

Performance Test Results (Chemical Spot Tests):

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 2ounce wide mouth bottle to retard evaporation. 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.

- 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.

- **After testing, panel shall show no more than four (4) Level 3 conditions.**

- 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.	Dimethylformanide	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.

Project substantial completion shall be withheld until all required fume hood certification letters, tests, and reports have been submitted to and approved by the IIIM.

Specifications and allied Technical details

LAB. FURNITURE & ACCESSORIES:-

CRCA (Cold Rolled Close Annealed or G. I. Sheets)

	TENDERED SPECIFICATIONS
	<p>SUMMARY AND SCOPE</p> <ul style="list-style-type: none"> Furnish all cabinets and casework, including granite tops, ledges, supporting structures. Include delivery to the building, set in place, level, and scribe to walls and floors as required. Supply & Installation of all utility service outlet accessory fittings, electrical receptacles, plumbing and electrical switches & fittings identified on drawings as mounted on the laboratory furniture. Supply & Installation of, 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. All tailpieces shall be furnished less the couplings required to connect them to the drain piping system. Supply & Installation of service strip supports where specified, and setting in place service

tunnels, service turrets, supporting structures and reagent racks of the type shown on the drawings.

I. GENERAL REQUIREMENTS:

SEFA Standard:

The entire Laboratory furniture should be tested as per SEFA-8M standards in SEFA Approved labs with latest 2016 Guidelines published by SEFA., Failing which it lead to disqualification of bid.

Note :- CRCA (Cold Rolled Close Annealed or Skin passed/zero spangle G. I. Sheets or both materials can be used.

Frame construction:- (compulsory)

Entire structure should be "C" frame fabricated out of heavy gauge hollow pipes size 60 x 30 x 2 mm and 2.0 mm thick steel plates. The structure will be provided with necessary levelling bolts suitable for ± 5 mm level adjustment. Open ends of the pipe will be provided with elegant finish plastic caps. The structure shall be duly treated for the rust prevention and coated with epoxy powder coated.

Powder Coating:-

Complete module & frame work are processed with 8 tank pre- treatment and finished with highly corrosion resistant 'Akzonbel/PolyBond' epoxy powder coated for better corrosion resistance. The thickness of powder coat shall not be less than 50-60 microns, conforming to relevant BIS code, which accordingly passes the test of Salt Spray for 1000 hours.

II . TECHNICAL REQUIREMENTS:

General Requirements: It is the intent of this specification to provide a high quality steel cabinet specifically designed for the laboratory environment.

Sheet Steel: Cold rolled sheet or G. I steel shall be prime grade 16, 18 and 20 gauge; roller leveled, and shall be treated at the mill to be free of scale, ragged edges, deep scratches or other injurious effects.

Glass: Glass used for framed sliding and swinging doors shall be 1/8" float glass. Glass used for

unframed sliding doors, shall be 1/4" float glass.

Steel Gauges:

- Gauges of steel used in construction of cases shall be 18 gauge, except as follows:
- Corner gussets for leveling bolts and apron corner braces, 12 gauge.
- Hinge reinforcements, case and drawer suspension channels, 14 gauge.
- Top and intermediate front horizontal rails, table aprons and reinforcement gussets, 16 gauge.
- Drawer assemblies, door assemblies and adjustable shelves, 20 gauge.

1. 0 Storage Cabinets Castors type : Standards Heavy Duty under Module along with two front lockable castor wheels & two rear non lockable castor wheels (For Easy cleaning Purpose & Aesthetic looks) , comprising of one drawer one shutter, one drawer and two shutter, all drawers and adjustable height shelf. Cabinet shutter should be in double skin construction and should be provided with heavy duty, knuckle and barrel type SS hinges and positive catch arrangement.

1.1 Cabinet Frame: 1.2 mm horizontal and vertical stiffeners and 1.0 mm vertical panel of CRCA (Cold Rolled Close Annealed) Or G.I sheet.

1.2 Cover Panels: End side panel and back panel should be of 1.2 mm thick CRCA MS sheet. All panels should be removable to repair any service line behind the units in future.

1.3 Shutters: Metal Shutters of CRCA or G.I sheet and 40-50 microns pure epoxy powder coating having a Scratch Hardness of 3Kgs.

1.4 Shelves & Drawers: CRCA or GI shelves with a load carrying capacity of 40-50 Kg. The overall load carrying capacity of cabinet to be 80 Kg of UDL – Uniformly Distributed Load (40-50 kgs. on each shelf and 40-50 kgs. on bottom). The overall load carrying capacity of drawer should be 40 kgs. of UDL for a pair of ball slide.

1.5 Slides & Handles: High precision double extension ball slides. Hinges to be spring loaded with CED (Cathode Electrode Deposition) coating with self closing mechanism. Handles should be PVC Recessed.

1.6 Locks: Each unit should have a locking facility with 180°, 10 lever cam lock mechanism.

1.7 Legs: The units to be supported on wide base Polystyrene legs (Hettich Make or equivalent) high impact proof material of base diameter 40-50 mm. Load bearing capacity of each leg should be at least 425- 450kg/ leg. The legs should be height -adjustable with a range of +/- 50 mm.

2. Reagent Shelves: should be of complete modular design consisting of horizontal 2 stage

storage shelves. The end vertical support should be 1.2 mm & horizontal shelves of 1.0 mm thick CRCA M.S./ G.I Sheet. Each shelf should have a load carrying capacity of 30-40 kgs. of UDL for the length of 1000 mm. The complete M.S. material of cabinet to be pretreated (degreased, Zinc phosphated) and epoxy powder coated for better corrosion resistance. The thickness of powder coat to be 45-50 microns, which passes the test of Salt Spray for 1000 hours and having the Scratch Hardness of 3Kgs.

3. Polypropylene Drop in Sinks of size 558X455X300mm (approx.) made of high density 5mm polypropylene elasticity 5 micron/ thickness, should have PH resistance with organic desolvent.

4. 3 way faucets: Sink unit shall have 3 way (2 straight+1 swan neck) 360° turn type water faucets made up of Brass with epoxy powder coating. It should be PH and rust resistant. the switch valve cast to be made of ceramic that can avoid acid wear. The outlet produced in PVC, has detachable hose nozzles, alloy pressure, changeable high-pressure outlet constructed or normal clean outlet control of water flow faucet immediately.

5. SS Pegboard of overall size of 550x420mm (approx.). Adjustable PP pegs of 10mm dia. It should have a welded square tube of 20x40x1mm (approx.). Tube should be of PVC material.

6. Electrical Accessories and fittings should consist of electrical trunking of 1.0 mm thick CRCA MS sheet. It should have a high temperature withstanding capacity with excellent electrical insulation properties. The rear portion of above accessories which is in contact with live metal shall be made from thermo set material which should not melt on heating. Each electrical module consists of (North-West make or equivalent):

1) 2 No. 16 Amp 5 Pin socket

2) 2 No. 16 Amp Switch with LED

7. Work surface should be 18-19mm (± 1 mm) thick high quality granite in jet black color with pre moulded, pre polished edges. The backing material for granite should be 6 mm thick Neoprene mat.

8. Service Indexes:

Fittings shall be identified with service indexes in the following color coding:

Cold Water out-	Dark Green
Helium-	Dark Blue
Raw water-	Orange
Cold Water in-	Light Green
Nitrogen-	Brown
Vacuum-	Green

Hydrogen-

Pink

Nitrogen-

Light Blue

Applicable Standards:

SEFA 3 : Scientific Equipments & Furniture Association

SEFA 8M : Scientific Equipments & Furniture Association

Quality assurance and workmanship :

- ❖ Only approved brands of items shall be accepted. Samples shall be got approved before taking up full supply/installation.
- ❖ If required Tests on representative samples and/or components thereof shall be got conducted from reputed Laboratory as decided by the In-charge.
- ❖ Samples shall be taken/made as per the direction of the In-Charge in presence of the authorized representative of the contractors. Samples shall be signed and sealed by both the parties. Manufacture's Test certificate for the product being offered is to be provided to the department.
- ❖ The specifications are intended for the general description of the work quality and workmanship. The specifications are however not intended to cover the minute details and work shall be execute according to the specification given herein or in its absence the relevant **BIS/SEFA** specification/standards or the best practice recommended by relevant Indian Manufacturers or best trade practices.
- ❖ All material shall confirm to the approved makes of materials specified. The procurement of various materials shall be either from the manufacturers or their authorized dealers so that there is no duplicate/spurious makes are used. Notwithstanding all above, contractor shall be held responsible for the execution of works and use of proper best available quality of materials as per the tender specifications. For the items/materials not appearing in the list, the decision of Engineer-in-charge shall be final and binding.
- ❖ The contractor shall arrange stage wise inspection of the furniture at factory of the works by In-Charge or his authorized representative if asked for. Contractor will have no claim if the furniture brought at site is rejected by In-Charge in part or full lot due to bad workmanship /quality. Such furniture will not be paid for and the contractor shall remove the same from the site of work within 7 days after the written instructions in this regard are issued by In-Charge or his authorized representative.
- ❖ The contractor shall produce all materials in advance so that there is sufficient time for testing and approving of the material and clearance of the same for use in work. The contractor shall produce test certificates of all the material in respect of their conformation to the relevant Indian standards/quotation specifications. All tests

	<p>required for the materials as desired by the In-Charge shall be at the contractors cost.</p> <p>❖ Testing may also be carried out at the discretion of the In-Charge, from the lot of finished product brought at site by the contractor. In case such tests have been carried out by the principal manufacturer at its testing facility, the same will may be provided by the contractor for consideration.</p> <p><u>List of approved makes of materials:-</u></p> <table><tr><td>❖ Paint</td><td>:</td><td>: Asian Paints/Berger/Oikos/Nerolac/Berger/</td></tr><tr><td>❖ Float Glass</td><td>:</td><td>: Modi Guard/Glaver Bel/Saint Gobain</td></tr><tr><td>❖ Expansion Bolts</td><td>:</td><td>: Hilti/Fischer/Hettich</td></tr><tr><td>❖ Glazing Sealant</td><td>:</td><td>: Dow Corning/GE Sealant</td></tr><tr><td>❖ SS/Chrome Coated Hardware</td><td>:</td><td>: Dorma/Hafele/Hettich</td></tr><tr><td>❖ Aluminum Alloy Extruded Section:</td><td>:</td><td>Hindalco/Indalco/ Jindal</td></tr><tr><td>❖ Hinges</td><td>:</td><td>: Hettich/Haffle/Grass</td></tr><tr><td>❖ Locks</td><td>:</td><td>: Dorset/Locksmith/Godrej/ Hettich/</td></tr></table>	❖ Paint	:	: Asian Paints/Berger/Oikos/Nerolac/Berger/	❖ Float Glass	:	: Modi Guard/Glaver Bel/Saint Gobain	❖ Expansion Bolts	:	: Hilti/Fischer/Hettich	❖ Glazing Sealant	:	: Dow Corning/GE Sealant	❖ SS/Chrome Coated Hardware	:	: Dorma/Hafele/Hettich	❖ Aluminum Alloy Extruded Section:	:	Hindalco/Indalco/ Jindal	❖ Hinges	:	: Hettich/Haffle/Grass	❖ Locks	:	: Dorset/Locksmith/Godrej/ Hettich/
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❖ Locks	:	: Dorset/Locksmith/Godrej/ Hettich/																							

EXHAUST SYSTEM (PP/FRP DUCTING AND ACCESSORIES) :-

	TENDERED SPECIFICATIONS
	<p><u>1. Exhaust duct (PP/FRP) Specification</u></p> <ol style="list-style-type: none"> 1. All ventilation duct components should be fabricated of polypropylene type I, Grade-I (dark gray) and /or polypropylene .The PP Grade I material can be rolled without heating, resulting in a lower coat for the finished product. 2. Round Duct- All ducts should be fabricated using polypropylene with glass lining sheets with fusion joints completed with flanges, bends, transition pieces, branch entries, MS supports with epoxy Painting ,GI hardware's etc. The polypropylene ducting should be lined with FRP lining of 3mm thickness and total thickness of PP-FRP should be 6-7mm. All supports used should be of MS with Epoxy painting. 3. Elbows should have radius an approximate centerline of 1-1/2" times duct diameter, 90° elbows can be either 3-piece or 5-piece meter, 45° elbows, 2 or 3 piece meter. If no preference is given, 3-piece 90° elbows and 2-piece 45° elbows will be provided. 4. Transitions should be tapered cone –type only. The cone will be the same material thickness as the duct material. Transitions should be concentric. 5. Branches should enter the main ducting at a 45° angle, unless otherwise specified. Couplings for

sizes up to 24" can be either sleeve type (no stop) or standard with a stop. Only sleeve couplings are available in sizes above 24". Socket depth for both to be 3"-4".

6. Flanges for Size 6" through 20" will be heat formed from PP duct or cut from flat sheet stock. Leg size will either 1-1/2" x 3/16" for diameters up to 30" .

7. Bolt holes will be 3/8 "diameter on approximate 4"-5" centers. Suggested bolting can be either galvanized GI both should be 1/4"-20 x 1-1/2" long with a nut and two washers provided for each bolt.

8. Suggested gaskets should be 1/8" thick, closed cell neoprene for duct size up to 24" .

9. Quadrant dampers or blast gates should be provided with a locking device for permanently setting after balancing.

10. End caps can be either permanently welded in place or fabricated to allow removal.

11. Access panels and / or view ports can be provided with clear PVC material or Plexiglas and will be held in place with SS self –tapping screws.

12. Installation (joining) can be accomplished with the belt and spigot (cementing) method, flanging or thermal welding.

Duct Construction

The fabricated duct dimensions should be as per approved drawings and all connecting sections are dimensionally matched to avoid any gaps.

Duct Sizes In mm	Thickness of PP	Thickness of FRP
0-750mm	3 mm	3 mm
750-1500mm	5 mm	5 mm
1500-2000mm	5 mm	8 mm

Support System

A completely supporting system consisting of fully threaded rods, double L bottom brackets nuts, Washers, clamps for circular ducts and anchor bolts as supplied.

Flexible Connections

Provide flexible duct connections wherever ductwork connects to vibration isolated equipment and on all exhaust final connections to spot extractor and as indicated on the drawings. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make air-tight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse and tensional movement and also capable of absorbing vibrations of connected equipment.

Flexible connections shall be air tight and resistant to water and fire.

Flexible connections shall be fitted to isolate fans from equipments and/or ductwork. The connections shall be arranged to permit the renewal of the connection without disturbing the duct work or the plant. The metal parts of connected equipment shall be separated by not less than six inches and installed with sufficient slack to compensate for free movement of fans or spring vibration isolators.

2. SPECIFICATION FOR PP EXHAUST BLOWER

- The exhaust fans supplied and installed shall be of 'Centrifugal Corrosion Resistant' type and shall be capable of delivering the design flow rate against all duct losses.
- The fans shall be robust in construction and suitable for continuous duty operation. It shall be mounted with ease of maintenance and shall be installed with proper vibration isolators to minimize vibration transmission to ductwork and support structure.
- Fans selected shall be silent and vibration free when running and suitable for outdoor use.
- The fan speed shall not exceed 3000rpm.
- Aerodynamic performance of the fan shall be tested and comply with 'AMCA' and 'ISO5801' standards.
- The casing shall be of self-supporting design, thermoformed (size 400 and below), welded by machine (automatically welded for size 400 and below). The material of construction shall be fire retardant polypropylene (PPs) for fire safety and suitable for use against corrosive 'medium' and a maximum allowable operating temperature of 70°C.
- Impeller material shall be fire retardant polypropylene (PPs) for fan size up to 400 (polypropylene {PP} for fan size 450 and above) suitable for use against corrosive 'medium' and a maximum allowable operating temperature of 70°C.
- A standard hub seal shall be incorporated onto the impeller hub to prevent corrosive

	<p>'medium' from contacting the shaft.</p> <ul style="list-style-type: none"> The fan shall be driven by a standard TEFC electric motor with class 'F' insulation and class 'B' temperature rise. Motor shall be suitable for outdoor installation with IP55 protection and suitable for operation with 415V/3Ph/50Hz electrical supply. Motor supplied shall be in accordance to IEC standards. <p><u>3. SPECIFICATIONS FOR MOTOR AND ACCESSORIES</u></p> <p>Use an electric motors built to IEC standards flange mounted (B5) and Foot mounted (B3), also in ex-protected or multistage versions, for the drive. The impeller hub is coated with aluminum. Power transmission from motor to impeller by means of a directly mounting the impeller on motor shaft. The impeller is fixed on to a flange bearing and the tightening adopter system guarantees secure mechanical connection.</p> <p>Motor Standard IEC three-phase motors in accordance with IEC.Mounting B5 and B3</p> <p>Available in motor-mounted (IP55) or cabinet-mounted versions.</p> <p>The fan shall be driven by a standard TEFC electric motor with class 'F' insulation and class 'B' temperature rise. Motor shall be suitable for outdoor installation with IP55 protection and suitable for operation with 415V/3Ph/50Hz electrical supply. Motor supplied shall be in accordance to IEC standards.</p>
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CLASS II BIOLOGICAL SAFETY CABINET

- External size: Width 4 to 4.5 Feet, Depth 2.4 to 3.5 feet Height 4.5 to 5 feet (approx.)
- Internal size: Width 4 to 4.5 Feet, Depth 1.8 to 2.0 feet, Height 2.0 to 2.3 feet (approx)
- With an usable work area of 6.0 feet sq to 7 feet sq
- Should include support stand for mounting of the cabinet with wheels
- The main body should be composed of galvanized steel. The side wall should be composed of stainless steel / rust free with antimicrobial coating.
- The work area should be composed of stainless steel.
- Class-II bio-safety cabinet with 70% recirculation and 30% exhaust.
- Should include Germicidal UV Lamp
- The UV light timer and life indicator should be included.

- Airflow: Nominal in flow velocity of 90 to 105 ft/ minute
- The system Should include ULPA filter, with efficiency of > 99.999% at 0.1 to 0.3 micron
- Remaining Filter Life Display should be there
- Transparent UV absorbing sliding vertical front door.
- Closing clear tempered safety glass sash (UV safe)
- Frameless, shatterproof sash with automatic UV shut-off on sash opening
- Slot for LPG supply should be provided within the chamber. Burner for LPG gas should be included
- One electrical socket should be within the work area
- With Microprocessor for supervision of all cabinet functions
- With an inbuilt display for various operations
- The system should be quiet during operation with noise level being less than 63 dBA.
- Electrical: 230 V 50/60 Hz
- With minimum three years of warranty

APPROVED MAKE OF MATERIALS FOR FUMEHOODS AND LABORATORY FURNITURE SYSTEM

1	LABORATORY FITTINGS	WATER SAVER / BROEN / FAG/ FAR
2	LABORATORY SINKS / DRIP CUPS	WATER SAVER / BROEN/ALLOYPLAS/MALAYSIA
3	LABORATORY ELECTRICAL SOCKET	NORTHWEST / LEGRAND / MK / NORISYS
4	DATA & VOICE SOCKET	NORTHWEST / LEGRAND / MK/ NORISYS
5	EYEWASH / SHOWER	WATER SAVER / BROEN / FAG/ TOF/FAR
6	SPOT EXTRACTOR	FUMEX / ALSIDENT / NEDERMANN
7	FLAMMABLE STORAGE TALL CABINET	JUSTRITE / EAGLE/ SECURALL
8	OFFICE FURNITURE	GODREJ / WIPRO / SPACE DESIGN / FORM DESIGN
9	FUME HOOD SERVICE FIXTURES	WATER SAVER/BROEN/FAG/FAR
10	FUME HOOD ELECTRICAL SOCKET	NORTHWEST/LEGRAND/MK /NORISYS
11	FACE VELOCITY & VAV CONTROLS	TEL /SAUTER / SIEMENS

APPROVED MAKE OF MATERIALS FOR EXHAUST SYSTEM

S.NO	DESCRIPTION	APPROVED MAKE
1	PP sheets	Mandhani/Dugar/Khanna
2	Isothelic Resin with Fire retardent	Mechemco/Kaysynth/Orsyn
3	PP Dampers	Any reputed make
4	PP Exhaust Fans	Colasit/Colourplast/ Seat
5	VFD	Invertek/Siemens/ABB/Danfoss/Schneider
6	Fume hood face velocity monitor	TEL/Siemens/Sauter
7	Room pressure Monitor	TEL/Siemens/Sauter
8	Actuator	Siemens/Belimo/Neptronic
9	Motor	ABB/CG/Kirloskar

APPROVED MAKE OF MATERIALS FOR ELECTRICAL SYSTEM

S.NO	DESCRIPTION	APPROVED MAKE
1	MCCB	GE / ABB / SCHNIDER
2	LT CABLE as per IS:7098(2)1988	HAVELLS NICCO / POLYCAB / RPG / UNIVERSAL (Unistar) / PRIMECAB
3	END TERMINATION MATERIALS	DOWELS / SMI / HMI
4	INDICATING METERS	SIMCO / MECO / AE / RISHAB
5	INDICATING LAMPS	GE / SIEMENS / SCHNEIDER / L&T
6	POWER CONTACTORS	GE / SIEMENS / ABB / SCHNEIDER / L&T
7.	MCB / MCB DB	Havell's /Legrand/ GENERAL ELECTRIC (GE)
8.	ELCB / ELMCB	Havell's /Legrand/ GENERAL ELECTRIC (GE)
9	PVC CONDUITS - FRLS	VIP / AVON / UNIVERSAL / PRECISION / NELCO
10.	PVC WIRES - FRLS	FINOLEX / ANCHOR
11.	INDUSTRIAL SOCKETS	MGE / NEPTUNE / BCH

12.	LT PANELS	ANY LOCAL PANEL FABRICATOR
13.	PANEL ACCESSORIES	DIRAK / ELMAX
14.	TERMINAL BLOCK	PHOENIX CONTACT / ELMAX
15.	HEAVY DUTY PVC PIPE / HDPE PIPE 6KG & 4 KG	SUPREME / FINOLEX
16.	EARTHING - G I	ANY LOCAL SUPPLIER.
17.	EARTHING - COPPER	ANY LOCAL SUPPLIER.
18.	FIRE ALARM PANEL	MORLEY / HONEYWELL/NOTIFIER
19.	SMOKE DETECTOS	SYSTEM SENSOR /APPOLO
20	FIRE EXTINGUISHERS	SAFEX/ NITIN
21	LT CABLES	RR KABEL / POWER FLEX
22.	M.S PIPES	TATA / JINDAL / SAIL

Note:-

Materials/ accessories shall be used approved make or APPENDIX II (Technical Specification).

OFFICE FURNITURE

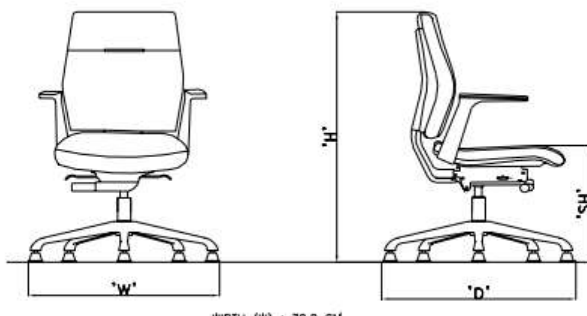
	TENDERED SPECIFICATIONS
	<p><u>Mid Back Chair</u></p> <p>1) SEAT/BACK ASSEMBLY: The seat and back are made up of 1.2 cm. thick hot-pressed plywood, upholstered with fabric upholstery covers and moulded Polyurethane foam. The back foam is designed with contoured lumbar support for extra comfort.</p> <p>BACK SIZE : 47.5 cm. (W) x 58.0cm. (H)</p>

SEAT SIZE: 47.0 cm. (W) x 48.0 cm. (D)

2) POLYURETHANE FOAM: The Polyurethane foam is moulded with density = $45 \pm 2 \text{ kg/m}^3$ and Hardness = 20 ± 2 at 25% compression.

3) ARMRESTS: The one-piece armrests are injection moulded from black Co-polymer Polypropylene.

4) TUBULAR FRAME (FOR 9U12RX): The powder coated tubular frame is cantilever type & made of dia 25.4mm x 2mm thk SS Tube.



Wall cabinet (W 750 x D 450 x H 750)

Wall Mounted Overhead File Cabinets (Float Glass Door) CRCA (Cold Rolled Close Annealed) or G. I. Sheets Two Shutter with one adjustable shelf Size: - 750Lmm x 370mm W x 750 mmH (approx.) **PI refer dwg as per attached.**



High Rise Revolving stool (Black seat cover) with cushion in seat & lumbar support at back, SS

metal stand with ring type foot rest & castors & Gas Lift



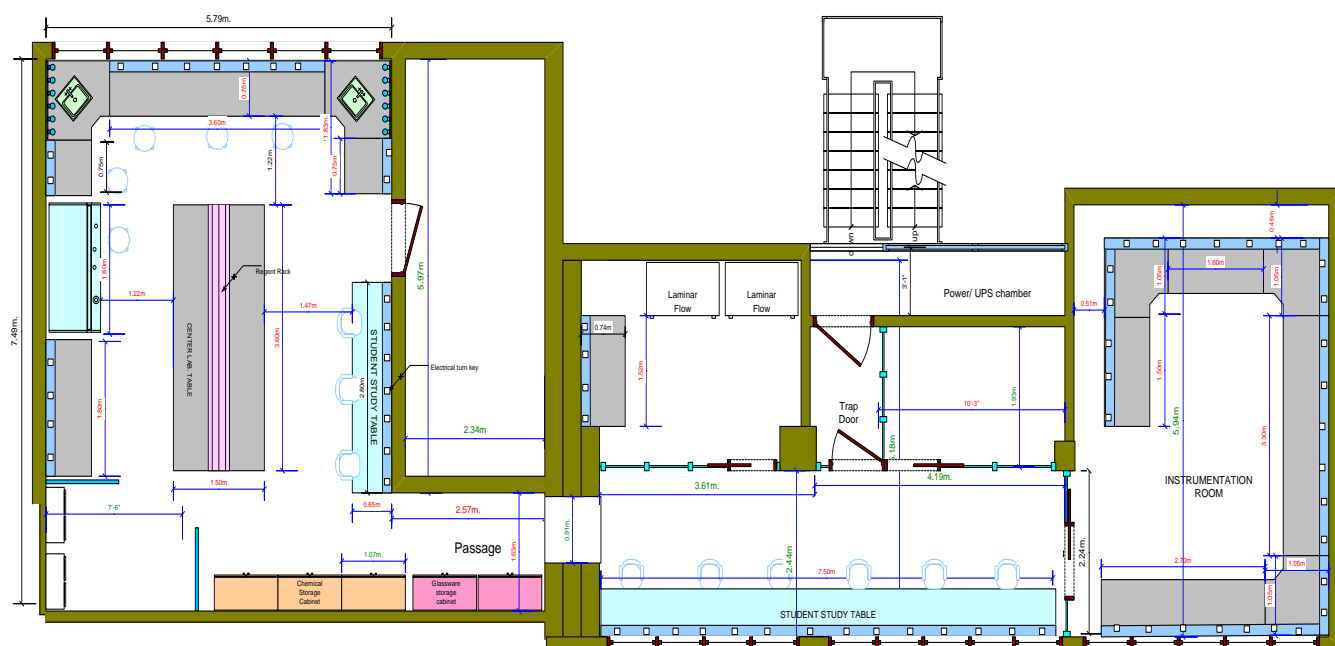
Sliding Door Unit

Storage file cases with as per drawing ref: with product Size shall be: 1200 mm (W) x 450 mm (D) x 1200 mm (H) These components are made of CRCA 'D'grade high yield strength as per IS: 513. The trowel Minor should have a three way locking mechanism with Shooting Bolts. It should have a height wise adjustable shelf mounting (3 nos.) which shall have a Uniformly Distributed Load capacity of max 40 Kg. It should also have a M10 Screw type Leveller with Hex plastic base. The finishing shall include Epoxy powder coated to the thickness of 50 microns (+/- 10). CRCA (Cold Rolled Close Annealed) or G. I. Sheets or both materials can be used. **PI refer dwg as per attached.**



Note:-

- 4. The sample, catalogue color, texture etc. of all above furniture shall be finalized before approved by IIM Technical Purchases Committee.**
- 5. The All finished product shall be delivered to the IIM, Jammu, duly covered with bubble sheet to avoid any breakage etc. However in case of any minor repair arising out of transportation etc. the same shall be repaired/ replaced immediately by the supplier without any extra cost.**



LAY OUT PLAN OF PROPOSED LABORATORY FOR FERMENTATION TECHNOLOGY IN SET UP, FIRST FLOOR OF BAY NO.-1 AT IIIM, JAMMU

Design & Drawing :- S. N. Bharti

SUPPLY, INSTALLATION, TESTING & COMMISSIONING OF FUME HOOD,
LABORATORY FURNITURE AND SERVICING ON A TURNKEY BASIS OF
CHEMISTRY LAB. (ROOM No.- 215, 216 & 217) AT IIIM, JAMMU

Sl. No.	Description	Reference
1	Pre Qualification Criteria for Tendering Bidding	1
2	Scope & Specifications	2
3	Make List for the Scope of Work	3
4	Drawing	4

Sl. No.	Description	Reference
1	Pre Qualification Criteria for Tendering Bidding	1

BIDDER PREQUALIFICATION CRITERIA

Bidder shall meet all the pre qualification criteria as given below for qualifying to this tender. In the event of only one Bidder qualifying technically, the Technical Committee shall have the right to accept or reject the concerned bidder.

The bidder shall furnish a covering page indicating item wise compliance to all the Pre-qualification criteria. Bidder Prequalification Criteria are as given below:

- The Bidder shall have experience in Designing, Manufacturing, Supply, Execution, Commissioning & Servicing of Fume Hood & Laboratory Furniture on a turnkey basis **the following during the last 5 years ending the last day of the month**, as stated below:-
 - Fume Hood System
 - Lab furniture and accessories
 - Exhaust system
 - Gas & Utility Distribution and Drainage System
 - Electrical, Data & Voice System
 - Fire alarm System
 - Utility Equipments and other allied works

- The Bidder has carried out preferably similar works, same value of the estimated cost, in the 5 years ending on the last day of the month. At least one contract should be in Govt. Universities/any of Central PSU's / Autonomous Bodies (CSIR, ICAR, ICMR, DRDO, ISRO, IIMs, IITs etc.) The project executed as such by the Bidder should be in operation currently. **The Bidder should produce the backup documents like Purchase Order, completion certificates etc.**

- Similar work shall mean "Manufacturing, Supply, Execution, Commissioning and Servicing of Laboratory Furniture Comprising of Lab Work Benches, Fume Hoods, Exhaust system, Gas and utility distribution system, Electrical and accessories"

- The bidder must have an experience of supply and installation of lab furniture and fume hoods in Chemistry Lab. At least one contract must be submitted for the same in addition to the above. The project executed as such by the Bidder should be in operation currently.
- The vendor should have a well established Make in India (in house) manufacturing unit for the Lab Furniture & Fume Hood, Quality Management System as per International Standards providing the products and services on the continued basis for the last 5 years. The vendor shall possess the current / valid approval for such equipment manufacturing facility by a Statutory Certifying Authority, like Factory Inspectorate etc. A notarized copy of valid certificate needs to be enclosed.
- The Bidder should be an Official Member with SEFA for a continued basis from past 3 Year from this notification. (Supporting documents for the same need to be furnished) and bidder should provide have document of third party test facility.
- All tests referenced herein shall be performed in the bidder's fume hood test facility **"factory tested"** & **also the Field ASHRAE or EN 14175 testing is must.**
- The Participating bidder should have local Service set up in J&K (UT) or North India (Punjab, Haryana and Delhi NCR etc.)
- **The Bidder shall visit IIIM, Jammu, and Project site TO UNDERSTAND THE REQUIREMENTS OF THE SITE is must. The Bidder shall study the scope along with the technical team in detail before submitting a bid, if any query, they will put a question to Scientist In-charge or Site Engineer.**
- **The Bidder shall provide the complete documentary evidence duly self attested by notary for the following in support of Bidder Pre-Qualification Criteria.**

For Clause no. 1.0, 1.1, 1.2, 1.3, 1.4

1) Purchase Orders

2) Completion Certificates and experience of performance for jobs, issued by the clients.

3) Experience details duly filled in following format.

S. No	Name of	Name & location of the project	Brief description of project	Value of the Project	Documents submitted
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	client				(PO copy & completion certificate) – (Y/N)

For Clause no. 2.0

1) Audited balance sheets of financial years 2015, 2016 & 2017.

2) Annual Turnover details duly filled in the following format.

Financial year	2016-17	2017-18	2018-19
Annual Turnover			

- **Note to Bidders: Offers of Bidders failing to submit the prescribed documents in support of the above prequalification criteria shall be rejected.**

(The bidder shall perform AMC i.e maintenance of Laboratory Furniture, Fume Hood and utilities during defect liability period.)

Project substantial completion shall be withheld until all required Unit certification letters, tests, and reports have been submitted to and approved by the IIIM

Specifications and allied Technical details

FUME HOOD & ACCESSORIES:-

	TENDERED SPECIFICATIONS
	SUMMARY AND SCOPE

Furnishing and delivering all service outlets, accessory fittings, electrical receptacles and switches, as listed in these specifications, equipment schedules or as shown on drawings. Fittings attached to the fume hood superstructure shall be mounted on the front fascia of the hood as per the drawings. Furnishing and delivering all service outlets, accessory fittings, electrical receptacles and switches, as listed in these specifications, equipment schedules or as shown on drawings. Plumbing fixtures mounted on the fume hood superstructures shall be pre-plumbed with **SS-304 TUBING**. Electrical fixtures shall be prewired. The fume hood superstructure shall be listed to UL Standards for Safety by Underwriters Laboratories Inc. (UL). Final plumbing and electrical connections are the responsibility of Lab Furniture & Fume hood Supplier.

SPECIFICATIONS:

Frame construction:- (compulsory)

Entire structure should be "C" frame type. 60 X 30 X 2 mm pipe is used for main frame structure. 30 X 30 X 1.5 mm pipe should be used for bottom support. CO₂ welded & finished with highly chemical resistant epoxy powder coating.

Design Structure: Aerodynamic, Floor mounted

Airflow Type: AUTOSASH Type

Construction (Exterior): Pure Epoxy Powder coated 40-60 micron on 18 Gauge Galvanized steel with rigid structure

Construction (Interior): Phenol based high-pressure compressed compact laminate (6 -7mm thick)

Baffle arrangement: 3-point suction system (for light, normal & heavy fumes) with baffle to ensure smooth and immediate exhaust of fumes.

Airfoil: Flush powder coated airfoil mounted on the frame of the hood.

Worktop: Chemical resistant splash & spillage proof 'Jet Black Granite' worktop. The work surface and cup drain shall be available in black.

Sink, Water tap with drain arrangement: Worktop should have oval shaped 'PP' Cup-Sink for drainage with water valve.

Sash (Shutter): Vertical rising counter-balanced 'Toughened Float Glass' (5 mm thick) fitted in the Powder coated Aluminium extrusion from Hettich Germany or equivalent. Smooth and light sash operation. Clear sash open height = 770-775 mm.

Fume Hood Plumbing Services: Utility services like **Raw Water, Chilled Water Supply & Return, Compressed Air, Nitrogen, Vacuum** 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. All plumbing fittings shall be factory installed and piped between the valve and the outlet. Inlet piping shall have a single-point connection for each valve provided and carried to a point 1" above the fume hood roof or 1" above the worktop rear corner depending on the rough-in locations shown in the drawings,

All the Plumbing services connecting to the Valves & to the Header line, will be SS-304 ONLY.

Fume Hood Electrical Services : The hood superstructure shall be wired and contain a UL label certifying acceptable wire gauge, connections, fixtures and wire color coding. Wiring electrical services shall consist of two duplex receptacles and a light switch. **3+3 nos of 5/15Amps Socket & switch, 230 Volt AC,** and 3-wire polarized grounded with ground fault interruption

Lighting: *CFL/ LED/ tube light* (20 or 40 watt, 2 No.) with metal enclosure for better illumination with less power consumption.

Electrical Utilities: Four nos. electrical sockets & switches, 'North West' make or equivalent (230 V, 5/16 A, 50 Hz), Switches have LED to indicate 'ON' position. A soft touch button panel with main switch, switch for blower & tube light & spare switch should be provided. LED indicators to show the ON & OFF positions of switches should be provided.

The control panel in the hood is provided with starter for blower.

Base Cabinets Fume Hood

- Unless otherwise indicated 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 gauge except as follows:
- Corner gussets for leveling bolts and apron corner braces, 12 gauge.
- Hinge reinforcements, 14 gauge.
- 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.
- Complete rigid steel structure to support Fume hood
- Epoxy powder coated attractive color combination
- There should be two storage units with two shutters each. Each unit should have one shelf.

(Chemical Storage Base Cabinet : Castors type)

Level adjusting screws: To adjust fume hood level by ± 20 mm.

Damper: To regulate airflow a damper is provided at the outlet of hood.

Testing Method: All fume hoods are "**factory tested**" for design as per the American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE) 110-1995 **or EN 14175**. Also, "**on site validation**" for face velocity will be carried out to ensure working of fume hood as per international norms.

Location of Tests and Test Facility: All tests referenced herein shall be performed in the bidder's fume hood test facility & **also the Field ASHRAE or EN 14175 testing is must.** Hood shall be tested with a face velocity

of 100 FPM open vertically till safe opening height and at 100 FPM right, left and centre 100% open horizontal.

Standards: Fume hoods must have third party certification of

ASHRAE 110

Or

EN 14175

QUALITY ASSURANCE

The laboratory fume hood manufacturer shall provide fume hood work tops and casework all **manufactured & shipped with** proper packing & should take the full responsibility of the entire scope of works as specified in the tender.

General Performance: Provide certification that fume hoods meet the performance requirements described in section.

PERFORMANCE TEST RESULTS.

Performance Test Results (Chemical Spot Tests):

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 2ounce wide mouth bottle to retard evaporation. 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.

- 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.

- **After testing, panel shall show no more than four (4) Level 3 conditions.**

- **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.	Dimethylformanide	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.

Project substantial completion shall be withheld until all required fume hood certification letters, tests,

	and reports have been submitted to and approved by the IIM.

LABORATORY FURNITURE & ACCESSORIES:- CRCA (Cold Rolled Close Annealed or G. I. Sheets)

	TENDERED SPECIFICATIONS
	<p>AND SCOPE SUMMARY</p> <ul style="list-style-type: none"> Furnish all cabinets and casework, including granite tops, ledges, supporting structures. Include delivery to the building, set in place, level, and scribe to walls and floors as required. Supply & Installation of all utility service outlet accessory fittings, electrical receptacles, plumbing and electrical switches & fittings identified on drawings as mounted on the laboratory furniture. Supply & Installation of, 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. All tailpieces shall be furnished less the couplings required to connect them to the drain piping system. Supply & Installation of service strip supports where specified, and setting in place service tunnels, service turrets, supporting structures and reagent racks of the type shown on the drawings. <p>I. GENERAL REQUIREMENTS:</p> <p><u>SEFA Standard:</u></p> <p>The entire Laboratory furniture should be tested as per SEFA-8M (Scientific Equipment and Furniture Association) standards in SEFA Approved labs with latest 2016 Guidelines published by SEFA and NFPA- 30 or 45 - National Fire Protection Association, Failing which it lead to disqualification of bid.</p> <p>Note: - CRCA (Cold Rolled Close Annealed or Skin passed/zero spangle G. I. Sheets or both materials</p>

can be used.

Frame construction:- (compulsory)

Entire structure should be "C" frame fabricated out of heavy gauge hollow pipes size 60 x 30 x 2 mm and 2.0 mm thick steel plates. The structure will be provided with necessary leveling bolts suitable for ± 5 mm level adjustment. Open ends of the pipe will be provided with elegant finish plastic caps. The structure shall be duly treated for the rust prevention and coated with epoxy powder coated.

Powder Coating:-

Complete module & frame work are processed with 8 tank pre- treatment and finished with highly corrosion resistant 'Akzonbel/ PolyBond' epoxy powder coated for better corrosion resistance. The thickness of powder coat shall not be less than 50-60 microns, conforming to relevant BIS code, which accordingly passes the test of Salt Spray for 1000 hours.

II. TECHNICAL REQUIREMENTS:

General Requirements: It is the intent of this specification to provide a high quality steel cabinet specifically designed for the laboratory environment.

Sheet Steel: Cold rolled sheet or G. I steel shall be prime grade 16, 18 and 20 gauge; roller leveled, and shall be treated at the mill to be free of scale, ragged edges, deep scratches or other injurious effects.

Glass: Glass used for framed sliding and swinging doors shall be 1/8" float glass. Glass used for unframed sliding doors, shall be 1/4" float glass.

Steel Gauges:

- Gauges of steel used in construction of cases shall be 18 gauge, except as follows:
- Corner gussets for leveling bolts and apron corner braces, 12 gauge.
- Hinge reinforcements, case and drawer suspension channels, 14 gauge.
- Top and intermediate front horizontal rails, table aprons and reinforcement gussets, 16 gauge.
- Drawer assemblies, door assemblies and adjustable shelves, 20 gauge.

1. 0 Storage Cabinets Castors type : Standards Heavy Duty under Module along with two front lockable castor wheels & two rear non lockable castor wheels (For Easy cleaning Purpose & Aesthetic looks) , comprising of one drawer one shutter, one drawer and two shutter, all drawers and adjustable height shelf. Cabinet shutter should be in double skin construction and should be provided with heavy duty, knuckle and barrel type SS hinges and positive catch arrangement.

1.1 Cabinet Frame: 1.2 mm horizontal and vertical stiffeners and 1.0 mm vertical panel of CRCA (Cold Rolled Close Annealed) Or G.I sheet.

1.2 Cover Panels: End side panel and back panel should be of 1.2 mm thick CRCA MS sheet. All panels should be removable to repair any service line behind the units in future.

1.3 Shutters: Metal Shutters of CRCA or G.I sheet and 40-50 microns pure epoxy powder coating having a Scratch Hardness of 3Kgs.

1.4 Shelves & Drawers: CRCA or GI shelves with a load carrying capacity of 40-50 Kg. The overall load carrying capacity of cabinet to be 80 Kg of UDL – Uniformly Distributed Load (40-50 kgs. on each shelf and 40-50 kgs. on bottom). The overall load carrying capacity of drawer should be 40 kgs. of UDL for a pair of ball slide.

1.5 Slides & Handles: High precision double extension ball slides. Hinges to be spring loaded with CED (Cathode Electrode Deposition) coating with self closing mechanism. Handles should be PVC Recessed.

1.6 Locks: Each unit should have a locking facility with 180°, 10 lever cam lock mechanism.

1.7 Legs: The units to be supported on wide base Polystyrene legs (Hettich Make or equivalent) high impact proof material of base diameter 40-50 mm. Load bearing capacity of each leg should be at least 425- 450kg/ leg. The legs should be height -adjustable with a range of +/- 50 mm.

2. Flammable Chemical Storage Cabinets Castors type: Standards Heavy Duty under Module along with two front lockable castor wheels & two rear non lockable castor wheels. Flammable Safety Cabinets meet or exceed the NFPA Flammable Liquid and the OSHA standard 1910.106 for storage of class I, II and III liquids. FM approved. The **all welded double wall 18 gauge steel** of these flammable storage cabinets offer superior fire protection. Double-walled doors feature 14 gauge steel outside and 18 gauge interior

3. Reagent Shelves: should of be of complete modular design consisting of horizontal 2 stage storage shelves. The end vertical support should be 1.2 mm & horizontal shelves of 1.0 mm thick CRCA M.S./ G.I Sheet. Each shelf should have a load carrying capacity of 30-40 kgs. of UDL for the length of 1000 mm. The complete M.S. material of cabinet to be pretreated (degreased, Zinc phosphated) and epoxy powder coated for better corrosion resistance. The thickness of powder coat to be 45-50 microns, which passes the test of Salt Spray for 1000 hours and having the Scratch Hardness of 3Kgs.

4. Polypropylene Drop in Sinks of size 558X455X300mm (approx.) made of high density 5mm polypropylene elasticity 5 micron/ thickness, should have PH resistance with organic desolvent.

5. SS Pegboard of overall size of 550x420mm (approx.). Adjustable PP pegs of 10mm dia. It should have a welded square tube of 20x40x1mm (approx.). Tube should be of PVC material.

6. Electrical Accessories and fittings should consist of electrical trunking of 1.0 mm thick CRCA MS sheet. It should have a high temperature withstanding capacity with excellent electrical insulation properties. The rear portion of above accessories which is in contact with live metal shall be made from thermo set material which should not melt on heating. Each electrical module consists of (North-West make or equivalent):

1) 2 No. 16 Amp 5 Pin socket

2) 2 No. 16 Amp Switch with LED

7. Work surface should be 19mm (± 1 mm) thick high quality granite in jet black color with pre moulded, pre polished edges. The backing material for granite should be 6 mm thick Neoprene mat.

8. Service Indexes:

Fittings shall be identified with service indexes in the following color coding:

Cold Water out-	Dark Green
Helium-	Dark Blue
Raw water-	Orange
Cold Water in-	Light Green
Nitrogen-	Brown
Vacuum-	Green
Hydrogen-	Pink
Nitrogen-	Light Blue

Applicable Standards:

SEFA 3 : Scientific Equipments & Furniture Association

SEFA 8M : Scientific Equipments & Furniture Association

Quality assurance and workmanship :

- ❖ Only approved brands of items shall be accepted. Samples shall be got approved before taking up full supply/installation.
- ❖ If required Tests on representative samples and/or components thereof shall be got conducted from reputed Laboratory as decided by the In-charge.
- ❖ Samples shall be taken/made as per the direction of the In-Charge in presence of the authorized representative of the contractors. Samples shall be signed and sealed by both the parties. Manufacture's Test certificate for the product being offered is to be provided to the department.
- ❖ The specifications are intended for the general description of the work quality and workmanship. The specifications are however not intended to cover the minute details and work shall be execute according to the specification given herein or in its absence the relevant **BIS/SEFA** specification/standards or the best practice recommended by relevant Indian Manufacturers or best trade practices.

	<ul style="list-style-type: none"> ❖ All material shall confirm to the approved makes of materials specified. The procurement of various materials shall be either from the manufacturers or their authorized dealers so that there is no duplicate/spurious makes are used. Notwithstanding all above, contractor shall be held responsible for the execution of works and use of proper best available quality of materials as per the tender specifications. For the items/materials not appearing in the list, the decision of Engineer-in-charge shall be final and binding. ❖ The contractor shall arrange stage wise inspection of the furniture at factory of the works by In-Charge or his authorized representative if asked for. Contractor will have no claim if the furniture brought at site is rejected by In-Charge in part or full lot due to bad workmanship /quality. Such furniture will not be paid for and the contractor shall remove the same from the site of work within 7 days after the written instructions in this regard are issued by In-Charge or his authorized representative. ❖ The contractor shall produce all materials in advance so that there is sufficient time for testing and approving of the material and clearance of the same for use in work. The contractor shall produce test certificates of all the material in respect of their conformation to the relevant Indian standards/quotation specifications. All tests required for the materials as desired by the In-Charge shall be at the contractors cost. ❖ Testing may also be carried out at the discretion of the In-Charge, from the lot of finished product brought at site by the contractor. In case such tests have been carried out by the principal manufacturer at its testing facility, the same will may be provided by the contractor for consideration.

EXHAUST SYSTEM (PP/FRP DUCTING AND ACCESSORIES) :-

	TENDERED SPECIFICATIONS
	<p><u>1. Technical Specification for PP/FRP Ducting:</u></p> <p>n. PP means PPGL: One side smooth & glassy finish and other end is mat finish.</p> <ul style="list-style-type: none"> ▪ The smooth surface should be the inner surface of the duct. ▪ On mat side, FRP lining to be done. ▪ 25 mm x 25 mm Stitch welding is done on inner surface and continuous welding on outer

surface with 5 mm welding thickness.

- o. FRP Lining to be done on the outer surface of PPGL I.e. on mat side.
 - One layer FRP is one mm.
 - The final layer should be with fine mat to have smooth and good finish.
 - While making the lining, there should not be any air pockets or any sort of Uneven finish.
 - There should be time gap between the FRP layers, allowing each layer to be got dried.
- p. The flange thickness should be 1.5 times of the duct thickness up to 750 mm and 2 times above 750 mm ducting.
- q. All flanges are to be matched with M8, GI fasteners and flat washers on both the sides.
- r. All the flanges should have fasteners at the 4 corners.
- s. All the fasteners to be fixed at a pitch distance of between 125 mm to 150mm.
- t. All the flanges should be properly ground and dressed.
- u. Duct support distance should not be more than 2500 mm.
- v. Any duct length should not be more than 3600 mm.
- w. All square / rectangular ducts with more than 1800 mm length should have a brazing frame at the center on the external surface.
- x. Provide 40 x 40 flanges up 750 mm duct size and 50 x 50 above 750 mm.
- y. The finish paint should be admiral grey unless specified.
- z. 5 mm Thick Neoprene gasket to be used between the flanges.

Duct Construction

The fabricated duct dimensions should be as per approved drawings and all connecting sections are dimensionally matched to avoid any gaps.

Duct Sizes In mm	Thickness of PP	Thickness of FRP
0-750mm	3 mm	3 mm

750-1500mm	5 mm	5 mm
1500-2000mm	5 mm	8 mm

Support System

A completely supporting system consisting of fully threaded rods, double L bottom brackets nuts, Washers, clamps for circular ducts and anchor bolts as supplied.

Flexible Connections

Provide flexible duct connections wherever ductwork connects to vibration isolated equipment and on all exhaust final connections to spot extractor and as indicated on the drawings. Construct flexible connections of neoprene-coated flameproof fabric crimped into duct flanges for attachment to duct and equipment. Make air-tight joint. Provide adequate joint flexibility to allow for thermal, axial, transverse and tensional movement and also capable of absorbing vibrations of connected equipment.

Flexible connections shall be air tight and resistant to water and fire.

Flexible connections shall be fitted to isolate fans from equipments and/or ductwork. The connections shall be arranged to permit the renewal of the connection without disturbing the duct work or the plant. The metal parts of connected equipment shall be separated by not less than six inches and installed with sufficient slack to compensate for free movement of fans or spring vibration isolators.

2. SPECIFICATION FOR PP EXHAUST BLOWER

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

- Fans selected shall be silent and vibration free when running and suitable for outdoor use.
- The fan speed shall not exceed 3000rpm.
- Aerodynamic performance of the fan shall be tested and comply with 'AMCA' and 'ISO5801' standards.
- The casing shall be of self-supporting design, thermoformed (size 400 and below), welded by machine (automatically welded for size 400 and below). The material of construction shall be fire retardant polypropylene (PPs) for fire safety and suitable for use against corrosive 'medium' and a maximum allowable operating temperature of 70°C.
- Impeller material shall be fire retardant polypropylene (PPs) for fan size up to 400 (polypropylene {PP} for fan size 450 and above) suitable for use against corrosive 'medium' and a maximum allowable operating temperature of 70°C.
- A standard hub seal shall be incorporated onto the impeller hub to prevent corrosive 'medium' from contacting the shaft.
- The fan shall be driven by a standard TEFC electric motor with class 'F' insulation and class 'B' temperature rise. Motor shall be suitable for outdoor installation with IP55 protection and suitable for operation with 415V/3Ph/50Hz electrical supply. Motor supplied shall be in accordance to IEC standards.

The fans have to be installed with easy access for maintenance. The installation has to be made by well-trained specialists of the OEM :

- The fans have to be erected on vibration absorbers to avoid the transmission of sound and vibrations to the building or foundations.
- The vibration absorbers have to be fixed to the foundation.
- The inlet and outlet ducts have to be connected with flexible sleeves to the fan.
- The regulation of standard DIN EN 60204-1 for the electrical installation and the electrical safety requirements have to be fulfilled.
- Start and stop devices shall be easy to operate and have to be marked clearly.
- In case of condensation liquid occurring inside the housing, it has to be equipped with a condensation drain at the lowest position of the housing and to be connected to a drainage pipe.
- For cooling, a sufficient air stream has to be assured.
- If a fan inlet is not connected to a duct, the inlet must be protected with a grid.
- Fans, which are openly accessible, have to be protected with a scatter shield around the housing.

Test run and commissioning:

- Check, whether inlet and outlet are connected to ducts or protected by a protection grid.
- Check mechanical and electrical safety devices; make sure, they are properly installed.
- Check the rotation of the impeller by means of a quick switch on/off of the motor; it must run in the direction as shown on the arrow. In case of wrong direction, change the connection of the wires.
- To protect the motors against overload, the fans shall never be operated with open
- Inlet or outlet. For test runs, the inlet has to be covered with a suitable plate.
- The current (Amps) as indicated on the motor data plate shall never exceed. The fan has to be checked for its' smooth running.

3. SPECIFICATIONS FOR MOTOR AND ACCESSORIES

Use an electric motors built to IEC standards flange mounted (B5) and Foot mounted (B3), also in ex-protected or multistage versions, for the drive. The impeller hub is coated with aluminum. Power transmission from motor to impeller by means of a directly mounting the impeller on motor shaft. The impeller is fixed on to a flange bearing and the tightening adopter system guarantees secure mechanical connection.

Motor Standard IEC three-phase motors in accordance with IEC.Mounting B5 and B3

Available in motor-mounted (IP55) or cabinet-mounted versions.

The fan shall be driven by a standard TEFC electric motor with class 'F' insulation and class 'B' temperature rise. Motor shall be suitable for outdoor installation with IP55 protection and suitable for operation with 415V/3Ph/50Hz electrical supply. Motor supplied shall be in accordance to IEC standards.

GAS, UTILITY & DRAIN DISTRIBUTION SYSTEM:-

	TENDERED SPECIFICATIONS
	UTILITY & GAS DISTRIBUTION SYSTEM

GENERAL:

The Gas Distribution System has two independent types of systems namely Bottled Gas System and Compressed Gas System. Utility Services like Raw Water fed from Header line located around the building wall provided by Client. Whereas the Compressed Air, Vacuum, Nitrogen & Chilled Water services are fed from the respective source Equipments located behind the NPC lab-I(basement) building .

The Gas Distribution System consists of following: Source points, Compressed Gas Cylinders and accessories like Bull noses, Flexible Hoses, Change over Panel, Cylinder Isolation Valves, Check Valves, Excess Flow Check Valves, and Flash Back Arrestors. Tubs & Tube Fittings, Floor Isolation Valves, Branch Isolation Valves, Point of Use Regulators, Pressure Gauges, Gas Purifier, Gas Distribution Panel, All Tubing and fittings are supported by aluminum profile, MS angles and clamps with Nut & bolts.

TECHNICAL REQUIREMENTS:**GENERAL:**

It is the intent of this specification to provide a high quality gas distribution system for the laboratory usage.

GAS TUBING:

- Tubing sizes up to 1" and including ¼", ½", ¾" OD should be bright annealed. Tubing with outside diameter larger than 1" OD should be supplied in annealed and pickled condition.
- Material of Construction (MOC) of the Tubing & Fittings shall be SS304.
- Tubing hardness should have a max HRB 80.
- Tubing should fully annealed, high quality, Stainless tubing as per ASTM A269 or A213, or DIN-17456 & 17458 (Class-1).
- Working Pressure of tubing as listed in ASME B31.3, for ASTM A269 tubing at –20 to 100°F (–28 to 37°C).

TUBE FITTINGS:

- The fittings shall be of welded type, the fittings shall be capable of holding the maximum working pressure of the tubing without any leak.
- All the fittings end connections shall be compatible to tube of hardness less than or equal to RB 80.

- Fittings for the Tubing running above the false Ceiling, Header & Sub Header shall be Welded type. Fittings for the droppers connected to sub Header shall be Compression type.
- Tube to tube joints and braches are joined by the way of orbital welding up to 1" OD tubes. And Socket welding/Butt Welding to be carried out for the Tubes which are greater than 1" OD.

AIR COMPRESSOR:

Air Compressor shall be installed behind the back side of NPC Lab (Basement). The Compressed Air to 24 Use Points installed on (Room No- 213, 214, 215, 216 & 217). This Compressed Air shall be fed from the compressor with 6.9 bar pressure. The Air Compressor of 12-14 CFM (15 M3/Hr) capacity shall be able to deliver 15 LPM at user point @ 60% Diversity.

Delivery	14 CFM
Discharge Pressure	6.9 Bar
Type	V Belt Drive
Electrical Conditions	415 / 3 PH / 50
Type of Motor	TEFC
Driver	5 HP
Accessories:	a). Horizontal Receiver with safety Valve, pressure gauge & Auto drain. b). Air Drier with pre & after filter c). After Cooler

VACUUM PUMP:

Vacuum Pump shall be installed behind the back side of NPC Lab (Basement). to maintain vacuum for 24 Use Points installed on (Room No- 213, 214, 215, 216 & 217). Vacuum Pump of capacity 34 CFM (58 m3/Hr) capacity considered. This pump can be able to receive 28 LPM at User point @ 60% Diversity.

Actual Delivery	34 CFM
Max. Vacuum	24" of Hg with closed intake
Electrical Conditions	415 / 3 PH / 50
Type of Motor	TEFC
Speed	1800 RPM

Driver	5 HP
Accessories:	a). Vacuum Switch b). Vacuum Gauge c). Silencer d0. 500 Lts. Scrubber

Piping: Piping for Vacuum System inside the Laboratory shall be considered as closed Loop.

PROCESS CHILLER

Process Chiller shall be installed behind the back side of NPC Lab (Basement). to feed the Chilled Water to 2 User Points installed on (Room No- 213, 214, 215, 216 & 217). The Water comes out from the Equipment shall be directed through necessary tubing & fittings. Chilled Water System considered as Closed Loop System. The Process Chiller of 4 TR Capacity shall be able to discharge 50 LPM at user point @ 30% Diversity.

Refrigeration Load	4 TR
Inlet Temp to Chiller	-20° C approx
Outlet Temp to Chiller	-10° C approx
Cooling type	Air Cooled
Flow Rate	50 LPM
Refrigerant	R-22
Condenser Type	Finned Tube type
Power Consumption	Less than 6.5 KW
Noise Level	Less than 75 db at 1.0 m distance

INSULATION:

To avoid heat gain and reduced efficiency of cooling systems, condensation of water on surfaces, and potential corrosion problems, pipes in chilled water systems should always be insulated. For Outdoor application, should be painted with Arm finish FR paint of Two Coats.

Material	Nitrile Rubber
Max. Surface Temperature	+105° C
Min. Surface Temperature	-50° C
Thermal Conductivity @ 0° C	0.035 W /(m . k)

The Insulation wall thickness schedule is based upon Normal Design Conditions of 85°F (29.4°C) and 70% RH. Deviations from these design conditions may change the Insulation thickness requirements.

Pipe Size	Insulation Thickness
Up to 1"	13 mm
Up to 6"	19 mm

HOT WATER SYSTEM:

PPR Pipes

The PPR pipe (Poly Propylene Random Copolymer) is one of the latest pipes resulting from European advanced technology. The quality of our PPR pipes is entirely up to the standard of DIN8077/8078. Polymers which are a high molecular weight polymer and contain stabilization package in order to prevent thermal degradation of material during the piping processing and to provide outstanding performance during the usage of pipe. It is considered as the optimal pipe material for cold and hot water system. PPR SDR 7.4 (PN 20) pipes shall be used for hot Water System.

Advantages:

- Widely used in distribution of water / drinking water installation in Residential area as it is not detrimental to human health. It's Hygienic and Odourless. There is no bacterial or Fungal Growth and no Contamination.
- Resistant to heat or cold. No need for insulation against heat. Withstands temperature range – 2 Degree Celsius to 90 Degree Celsius. Keeps inner climate constant.
- Endures to climatic condition.
- Resistant to corrosion, does not rust or decay, No scaling or calcification.
- Resistant to chemical reaction, acids, salt and alkalis, may safely be used together.

- Low friction losses. Resistant to abrasion.
- Extremely light weight – easy to transport & install.
- Strong tough and long lasting - can be safely used for duration of minimum 50 Years.
- Leak Proof Joints (Zero maintenance, Easy repairs)

Mechanical & Thermal Properties

Impact Strength	1.1 - 14.0
VICAT Softening Temp., 0C	130
Maximum Safe Working Temp., 0C	95
Water Absorption (%) Maximum	0.03
Specific Gravity g/cm ³	0.9
Density g/cm ³	0.91
Thermal conductivity at 23oC W/m.k	0.23
Friction Factor	Very Low
Chemical resistance	Very High

Permissible Operating Pressure

Temp Deg C	Pressure Kg/cm ² SDR 6 (PN 20)
10	38
20	32.4
30	27.3
40	23
50	19.5
60	16.2
70	12.3

80	7.7
95	5.2

Chemical Resistance

One of the characteristic of Polypropylene Random Copolymer (PP-R) is its property of having the greatest chemical resistance. The chemical resistance of any substance has direct relation with its properties, its composition, its concentration, heat and duration under effect. The chemical resistance chart for the Chemicals with different composition and concentration and their resistance at various temperatures can be provided on request.

Thermal Insulation

Thermal Insulation may be installed for the purpose of preventing sweating and condensation. However Polypropylene material has rather low thermal conductivity, thus PP-R pipes require less insulation material than metal pipes. For example PN 20 pipe will have 53 deg C surface temperatures as a result of transporting water at temperature 80 deg C for a continuous time.

Insulation Thickness for Exposed Hot Water Pipes.

Dimension (mm)	Thermal Conductivity (W/mk)of Insulation Material	
	0.030	0.035
	Recommended Minimum Insulation Thickness	
20	6 mm or 1/4"	10 mm or 3/8"
25	6 mm or 1/4"	10 mm or 3/8"
32	10 mm or 3/8"	13 mm or 1/2"
40	10 mm or 3/8"	13 mm or 1/2"
50	10 mm or 3/8"	13 mm or 1/2"

GEYSER

An electrical geyser is a sizable container which heats water using an electrical element. This is to control the temperature and control power consumption. A geyser is fitted with valves than control pressure caused by the expansion and possible over heating of the geyser. Electric Geyser equipped with safety measures like thermostat, reset, fuse plug, vacuum release valve and pressure release valve.

Capacity	03 LPM
Tank Capacity	06 Liters
Power Consumption	03 kW
Temperature Output	69.5° C
Size	469 X 295 X 290 (LXWXB)

GAS CYLINDER CHANGE OVER PANEL:

Single-Stage Gas Panel to reduce cylinder pressure to a certain line pressure for in house use with internal gas purging and Process gas outlet shut-off valve. These Gas Panels are used for Inert, Reactive, Flammable and Oxidizing Gases and gas mixtures.

These gas panels are mounted on a stainless steel panel and consist of a pressure regulator, inlet and outlet pressure gauges, a relief valve and shut-off valves for the process gas. A choice of stainless steel coils or flexible high pressure hoses is available for the connection to the gas cylinder. Provision for contact pressure gauges (accessories) facilitates monitoring of the gas reserves.

Gas panels are permanently installed in the cylinder stock room or cabinet and reduce the cylinder pressure to a lower line pressures. The gas is guided to the point of use via the subsequent piping system. This Gas Panel allows purging to be carried out with internal gas while cylinders are being changed and flushes the atmospheric air from the system; gas purity is maintained and also shutting-off of gas flow during cylinder change with the panel itself. Standard application for these panels: centralized or decentralized gas supply for highly sensitive analysis devices.

Pressure decreases of the active cylinder (or bundle) below a preset level cause's semi-automatic switch over to the full cylinder side. This is achieved by two integrated regulators (factory set to slightly different delivery pressure levels), connected at their outlet ports. Moving the lever towards the full battery side, this allows disconnecting & replacing the empty cylinder without interrupting the gas supply. The level position always indicates cylinder priority in being discharged.

Technical Details:

Body material	:	Brass
Dimensions (LxHxD)	:	400 x 155 x 240 mm
Purity	:	Max. 6.0
Inlet pressure	:	230 bar
Outlet Pressure range	:	14 bar
Inlet Connection	:	N14 (=NPT ¼")

Outlet Connection : N14 (=NPT ¼")

Cylinder Bracket: Cylinder Brackets are used to mount the cylinder on Wall to avoid down fall of Gas Cylinder.

VALVES:

BALL VALVES

Ball Valves of required size shall be installed at each source Point of the Service. Ball valve with required size shall be considered at shaft opening of each floor.

Type:	Ball type
Size	½" OD to 1" OD
MOC:	SS304
Flow:	Straight (2-Way)
Seat Material:	Reinforced PTFE
Rating:	-29°C @ 1965 kPag to 150°C @ 1580 kPag.

Teflon gland packing with Silicone base lubricant and the valves shall be factory tested at 1000 PSIG and certification shall be produced.

PRESSURE GAUGE:

General Purpose Stainless Steel Pressure gauges of 63 mm dial size to be installed in every lab / bench or special purpose equipments in order to know the pressure rating.

Rating	; - 25 bar
Accuracy:	63 mm (2 1/2 in.): ± 1.5 % of span.
Mounting type	: Center back mount type.
End Connection	: ¼" Male NPT
Dial Size	: 63 mm (2 ½")

Operating temp.: Unfilled : –40 to 140°F (–40 to 60°C)

MOC : End Connection & Burdon tube will be SS 316, Casing will be SS304.

Temp. Error : ± 0.4 % for every 18°F (10°C) temperature change from 68°F (20°C)

LINE REGULATOR

Single-stage line regulator used for inert, reactive, flammable, oxidizing gases and gas mixtures in laboratory system. Line regulators are used to reduce line pressure to various low pressure levels at the specified area to be controlled. Pressurized gas enters the regulators from the line. When the hand wheel is turned clockwise, it compresses the spring and gives a force on the diaphragm, which pushes the valve stem open. This releases gas into the low-pressure chamber, exerting an opening force on the diaphragm. Equilibrium is reached, when the spring force on the diaphragm is equal to the opposing force of the gas in the low-pressure chamber.

Type of pressure reducing	: laboratory regulator system
Pressure stages	: single-stage
Mounting details	: plate mounted with inlet from top
Material	: Brass chrome-plated.
Inlet Pressure	: 50 bar
Outlet Pressure	: 0.2 to 14 bar
Inlet connection	: NPT 1/4"
Outlet connection	: NPT 1/4"

GAS PURIFIER:

Gs Purifiers are used to get Ultra High purity (UHP) gases. It contains Moisture Trap, Hydrocarbon Trap & Oxygen Trap with Micron Filters and also Pressure Gauge, Pressure Regulators and Toggle Valve.

Moisture Trap:

Application	: Moisture Removal
Filter Type	: Silica gel / Molecular Sieve
MOC	: Clear acrylic / safe glass tube

Capacity : 210 CC

Working Pressure : 10 Bar

Max. Operating Temp : 50° C

Hydro Carbon Trap:

Application : Hydrocarbon Removal

Filter Type : Activated Charcoal

MOC : Clear acrylic / safe glass tube

Capacity : 210 CC

Working Pressure : 10 Bar

Max. Operating Temp : 50° C

Oxygen Trap:

Application : Oxygen Removal

Filter Type : De-Oxo Chemical catalyst

MOC : SS316

Capacity : 210 CC

Working Pressure : 10 Bar

Max. Operating Temp : 50° C

Gas Distribution Panel:

Gas Distribution Panel is used where more than one gas required for a single instrument. It helps to controls the flow and Pressure of different gases for the particular instruments. The Gas Distribution Panel consists Toggle Valve, Pressure Gauge, Pressure Regulator and Spiral Tubing.

WELDING:

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Tube to tube joints and braches are joined by the way of orbital welding up to 1" OD tubes. And Socket welding/Butt Welding to be carried out for the Tubes which are greater than 1" OD.

Orbital Welding:

Method for joining tubes will be orbital welding, Orbital welding is cleaner, reliable way of joining pipes and purity is guaranteed by orbital welding. Orbital welding is a mechanism in which the arc from a tungsten electrode was rotated around the tubing weld joint. The arc welding current was regulated with a control system thus automating the entire process. The result was a more precision and reliable method than the manual welding method it replaced. Orbital welding systems offer computer control where welding parameters for a variety of applications can be stored in memory and called up when needed for a specific application. The skills of a certified welder are thus built into the welding system, producing enormous numbers of identical welds and leaving significantly less room for error or defects. In the orbital welding process, tubes/pipes are clamped in place and an orbital weld head rotates an electrode and electric arc around the weld joint to make the required weld.

Radiographic Test for Welds:

Radiographic Testing for Welded Joints of higher size pipes should be carried out.

The beam of radiation must be directed to the middle of the section under examination and must be normal to the material surface at that point, except in special techniques where known defects are best revealed by a different alignment of the beam. The length of [weld](#) under examination for each exposure shall be such that the thickness of the material at the diagnostic extremities, measured in the direction of the incident beam, does not exceed the actual thickness at that point by more than 6%. The specimen to be inspected is placed between the source of radiation and the detecting device, usually the film in a light tight holder or cassette, and the radiation is allowed to penetrate the part for the required length of time to be adequately recorded.

INSPECTION AND TESTING**Performance Test for Gas System:****B. Installation Purging Procedures:**

- Connect the regulated pressure from the Nitrogen cylinder and blow the system for 15 mins nonstop.

Start the p

- The sealed tubes after starting the process of cutting and debarring has to be purged with general purity nitrogen.
- Connect the tubes to the flexible hose of the regulated supply (at 2 bars) and blow the debris for 5 min.
- To ensure the purging is totally complete, blow the tubes intermittently holding the pressure for few seconds at the end of the tube.
- Now use the tube to swage the fitting. And install the tube with the fitting at the required place.

B. Pre Testing Purging Procedure

- Once the main header and the sub header installation is complete, check for the misalignment or improper fitting connections.
- Process again after 15 mins duration and blow the system for another 10 mins.
- Reconnect the needle valves and open the port fully.
- Start the purging process one more time with the valve open blow the whole system for 30 mins.
- Now the system is completely purged and now ready for handing over after the pressure test.
- Please note purged air must be directed to outside of Lab.
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C. Pressure Testing Procedure

- Ensure complete piping is purged with prior to pressure test. Use Nitrogen for leak check. Please note purged air must be directed to outside of Lab.
- Ensure the system point is not hooked up to the lab equipment.
- Shut-off point of use valve and pressurize system through the cylinder regulator.
- Increase pressure slowly to maintain 30 psi and shut-off the cylinder valve. Observe the pressure gauge for evidence of pressure drop.
- If the pressure drops, trouble-shoot leaking joints by using "Snoop" liquid leak detector rectify as necessary.
- Proceed to increase pressure to 100 psi if no leak is detected after 15 mins. of pressurization at 30 psi.
- Repeat above if leak is detected.
- Proceed to increase pressure to 1.5 times the working pressure of the system. (Normally system with same procedure as above.
- Maintain pressure for 12 hours and check for evidence of pressure drop.

D. Preliminary Testing

Preliminary Leak testing will be carried out in two phases:

Pressure decrease method (Pressure testing: 1, 5 times the maximum working pressure). Necessary formats will be used and all relevant data will be recorded during the test. GDS vendor and Management staff of client will jointly witness the test and certify the same.

TIFF leak detection:

Necessary formats will be used and all relevant data will be recorded during the test. GDS vendor and Management staff of client will jointly witness the test and certify the same.

MATERIAL OF CONSTRUCTION (M OC):

SL N.	ITEM'S NAME	MOC
01	Change Over Regulator	Brass
02	Line Regulator	Brass
03	Point of Use Regulator	Brass
04	Utility & Gas Tubing	SS 304
05	Tube Fittings	SS 304
06	Hot Water Pipes & fittings	PPR
07	Chilled Water Insulation	Nitrile Rubber
08	Valves	SS304
09	Tubing Support	Mild Steel
10	U Clamps	Stainless steel
11	Clamps	Virgin Polypropylene
12	Cylinder Bracket	MS Steel

SCOPE OF WORK:

- Supply & Installation of the Utility & Gas Distribution System comprises the following.
- Supply, Installation, testing & commissioning of Source Equipments (i.e. Air Compressor, Vacuum Pump & Process Chiller) at Ground level.
- Preparing the Foundation Details for the Source Equipments and submit the same to the Project Manager in order to co ordinate with Civil Vendor.
- Supply, installation and joining of tubes/Pipes with fittings by means of Orbital Welding and Socket Welding from the Source Equipments to the respective Header inside the lab.
- Raw Water shall be tapped from the Header line with necessary source connector located around the building wall provided by Client.
- The Routing of the Pipes & location of supports as per the specifications & approved Drawing.
- All Services considered from the Source Point to user points with necessary accessories & fittings.
- Performance test for whole System shall carry out by contractor/vendor in order to find any defects in the System. Pre-installation Purging Procedure for the tubes shall be carried out as per specifications. Pre-Testing Purging Procedure shall be carried out to eliminate the misalignment or improper fittings connection as per specifications. Pressure Testing Procedure Ensure complete piping is purged with prior to pressure test. Use Nitrogen for leak check. Purged air must be directed to outside of Lab.
- Technical Data Sheets of all equipment, materials and Samples shall be submitted for approval prior to installation works.
- Preparation of execution drawings and descriptive Technical Documents for all equipment shall be submitted.
- Coordination with other contractors/Vendors with regard to installation of Source Equipments, Tubes/Pipes, Supports, Cables etc.
- Submission of hard-bound copies of Operation and Maintenance Manuals complete with as-built drawings.

LAB EFFLUENT DRAINAGE SYSTEM

GENERAL:

Drainage System considered from Fume Hood cup sink outlet, Sink Outlet to Header line located around the building wall provided by Client.

Drain Header with necessary supports and connected to the Drain Header. Drainage pipes and fittings thermal weld type. Drain Point for Safety Shower is not considered. Floor Drain / Drain Pan should be provided by client, for periodic testing. Civil cut out on Wall/Floor, Floor Trenches to be carried out by client/others.

PIPES:

High density polyethylene (HDPE) is being used as drainage pipe material. These HDPE pipe shall comprise following features.

- The Pipe shall be lightweight, corrosion resistant, easy to install, and has a low maintenance cost.
- The pipe shall be safely used as waste pipe for temperatures of up to 80°C. Temperatures of up to 100°C are permissible for short periods (e.g. surges of steam). The system is equally suited for freezing temperatures and adapts elastically to cope with expansion, remaining completely intact and undamaged after thawing.
- These pipes undergo a licensed annealing process in hot water to reduce inherent tensile stresses created during manufacture. This process ensures long-term joint integrity, as thermal expansion and reversion are reduced compared with untreated pipes.
- Pipe shall be unbreakable at room temperature and offers excellent impact resistance even at temperatures of – 40°C, thus meeting the requirements for drainage systems.
- Also offers considerable resistance to chemicals, because of its paraffin structure. The system is insoluble in all inorganic or organic solutions at 20°C.
- The flexibility of these pipes guarantees crush resistance and superior performance in applications where pipes pass through expansion joints or are subject to traffic vibration.
- Pipe's resistance to abrasion is a particularly important factor for branch pipes, soil stacks and ground pipes. It is very resistant to abrasion; its extra thick walls offer superior protection from both internal and external abrasion.

PIPE FITTINGS

Pipe Fittings like Tees, Elbows, sleeves, etc shall be considered at appropriate location and all these shall be welded or electro welded.

The Expansion Socket is designed to counteract the variation in length due to thermal expansion and contraction of max. 6 m pipes. When fitting collector pipelines extend 6 m it is necessary to fit expansion sockets and secure them with pipe supports. HDPE expansion socket absorb thermal expansion and contraction due to temperature changes caused by water discharge, but it also makes pipe assembly easier, assisting connection at each floor level.

Some Connections shall be made by Electro weld Sleeve coupling, the electro weld sleeve coupling is the

ideal connection on-site, for subsequent changes or wherever access is not easy.
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ELECTRICAL WORKS AND ACCESSORIES) :-

	TENDERED SPECIFICATIONS
	<p>GENERAL</p> <p>Prior to laying and fixing of conduits, the contractor shall mark the conduit route, carefully examine the working drawings prepared by him and approved by the Consultant indicating the layout, satisfy himself about the non interference in the route, sufficiency of number and sizes of conduits, location of junction boxes, sizes and location of switch boxes and other relevant details. Any discrepancy found shall be brought to the notice of the Owner's site representative. Any modifications suggested by the contractor should get written approval before the actual laying of conduits is commenced.</p> <p>PVC CONDUIT AND ACCESSORIES</p> <p><u>PVC Conduit</u></p> <p>Conduits and accessories shall conform to latest edition of IS-9537 part 3 and shall be heavy duty wall thickness of 2.0 mm rigid tubes which are unscrewed without coupling and with plain ends. All conduits used shall not be less than 20 mm diameter. PVC conduit shall be used for all concealed / embedded installation.</p> <p><u>PVC Conduit Accessories</u></p> <p>Accessories used for conduit shall be of an approved type complying to relevant IS code.</p> <p>All accessories used shall be of standard white or black colour, <u>identical to conduit used</u>.</p> <p>Plain conduits shall be joined by slip type of couplers with manufacturer's standard sealing.</p> <p>MAINS AND SUB-MAINS</p>

Mains and sub-mains cable or wires where called for shall be of the rated capacity and approved make. Every main and sub main wires shall be drawn into an independent adequate size of conduit. Earthing shall be in conformity with relevant IS codes and calculations shall be submitted for verification. An independent earth wire of the proper rating shall be provided for every single phase sub-main. For every 3 -phase sub-main, 2 No. earth wires of proper rating shall be provided along with the sub-main. The earth wires shall be drawn along with circuit wires through conduit. Where mains and sub-mains cables are connected to switchgear, sufficient extra lengths of cable shall be provided to facilitate easy connections and maintenance.

1. WIRING FOR POWER AND LIGHTING CIRCUITS

Wiring for power and lighting circuits shall be carried out in separate and distinct wiring systems. Wiring for emergency system shall also be carried out in a separate and distinct wiring system. Balancing of circuits in a three phase system shall be arranged before the installation is taken up. The wiring system envisaged is generally shown on the layout drawings and line diagrams. However, a brief account of the general wiring system is given below:

- a. Sub mains wiring - Wiring from Main / Sub Main Switch Board to the individual MCB distribution boards.
- b. Circuit wiring - Wiring from MCB DB to the nearest switch/control box for lighting, fans, sockets, switches, call bells for each circuit, and onward looping to the next switch / control boxes.

The sub-main wiring shall be either in 3 phase 4 wire or single phases 2 wire system. Each sub-main wiring circuit shall also have its own PVC insulated copper earth continuity wire/s as per detailed drawings and specifications.

Circuit wiring shall be in single phase system. However, a maximum of 2 single phase circuits belonging to the same pole/phase could be installed in the same conduit. Not more than ten points - light, fan, and 5A socket shall be grouped on one lighting circuit.

R - Red	Neutral	:	N - Black
Y - Yellow	Earth	:	G - Green
B - Blue	Emergency	:	E - Grey

SWITCHES, SOCKETS & ACCESSORIES

Light control switches shall be of a 5/15A rating for controlling light points as specified in bill of quantities. Light control switches shall be of plate type design with MS/GI/PVC/WOOD boxes suitable for flush mounting for general lighting, as specified in BOQ.

All sockets 5A and 15 A ratings shall be of flush mounting type with control switches of plate type design of the same rating as that of the sockets. All sockets outlet shall be of 3 pin type with box.

2. SWITCHES, RECEPTACLES (MODULAR), LIGHTING FIXTURES & LIGHTING CONTROL EQUIPMENT

2.1. SWITCHES

All switches shall be enclosed type flush mounted suitable for 240 volts AC. All switches shall be fixed inside the switch boxes on adjustable flat M S strips/plates with tapped holes and brass machine screws, leaving ample space at the back and sides for accommodating wires. Switch controlling the light point shall be connected to the phase wire of the circuit and load on each switch shall be restricted to maximum 800 watts & maximum 1500 watts per circuit. All wiring accessories shall be BIS approved. Perfect alignment shall be maintained while fixing of the back boxes.

2.2. WALL SOCKET OUTLET

Wall socket outlets shall be of the three pin. The switch controlling the socket outlet shall be on the phase wire of the circuit and not more than two socket outlets of 16 amps shall be connected on one circuit. An earth wire shall be provided along with the circuit wires and shall be connected to earthing screw inside the box. The earth terminal of the socket shall be connected to the earth terminal provided inside the box. All sockets shall be shuttered type.

a. Every socket outlet shall be controlled by an individual switch unless mentioned otherwise.

b. The switch controlling the socket outlet shall be on the 'Live' side of the line.

c. 6 amps and 16 amps socket outlet shall normally be fixed at any convenient height above the floor level as desired by the Architect. The switch for 6 and 16 amps, socket outlet shall be kept along with the socket outlet. However, in special case, if desired by the Architect the 6 amp. Socket outlet can be placed at the normal switch level.

2.3. LIGHTING FIXTURES & ACCESSORIES

The light fixtures and fittings shall be assembled and installed in position complete and ready for service, in accordance with details, drawings, manufacturer's instructions and to the satisfaction of

the Project Manager.

2.3.1 SCOPE

Scope of work under this section shall include inspection at suppliers/manufacture's premises at site, receiving at site, safe storage, transportation from point of storage to point of erection, erection and commissioning of light fittings, fixtures and accessories including all necessary supports, brackets, down rods and painting etc as required.

3. DISTRIBUTION PANELS/BOARDS

Main Distribution Panels, Sub-Distribution Panels and Final Distribution shall be covered under this section. Panels/Boards shall be suitable for operation on 3 Phase/single phase, 415/240 volts, 50 cycles, 4 wire system with neutral grounded at transformer. All Distribution panels shall be CPRI tested design and manufactured by a approved manufacturer. **CPRI certificate shall be made available.**

3.1. CONSTRUCTION FEATURES

Distribution panels shall be 2 mm thick sheet steel cabinet for indoor installation, dead front, floor mounting/wall mounting type and shall be form 3b construction. The Distribution panels shall be totally enclosed, completely dust and vermin proof and shall be with hinged doors and folded covers, Neoprene gasket, padlocking arrangement and bolted back. All removable/ hinged doors and covers shall be grounded by flexible standard connectors. Distribution panel shall be suitable for the climatic conditions as specified in Special Conditions. Steel sheets used in the construction of Distribution panels shall be 2 mm thick and shall be folded and braced as necessary to provide a rigid support for all components. Joints of any kind in sheet metal shall be seam welded, all welding, slag shall be rounded off and welding pits wiped smooth with plumber metal. The general construction shall confirm to IS-8623-1977 (Part-1) for factory built assembled switchgear & control gear for voltage upto and including 1100 V AC.

All panels and covers shall be properly fitted and square with the frame, and holes in the panel correctly positioned. Fixing screws shall enter into holes tapped into an adequate thickness of metal or provided with wing nuts. Self threading screws shall not be used in the construction of Distribution panels. A base channel of 75 mm x 40 mm x 5 mm thick shall be provided at the bottom for floor mounted panels. Minimum **operating** clearance of 275 mm shall be provided between the floor of Distribution panels and the lowest feeder compartment.

Distribution panels shall be of adequate size with a provision of spare switchgear as indicated on the Single Line Diagram. Feeders shall be arranged in multi-tier. Knockout holes of appropriate size and number shall be provided in the Distribution panels in conformity with the location of cable/conduit connections. Removable sheet steel plates shall be provided at the top to make holes for additional cable entry at site if required.

Every cabinet shall be provided with Trifoliate or engraved metal name plates. All panels shall be provided with circuit diagram engraved on PVC sheet. All live accessible connections shall be shrouded and shall be finger touch proof and minimum clearance between phase and earth shall be 20 mm and phase to phase shall be 25 mm.

3.2. BUS BAR CONNECTIONS

Bus bar and interconnections shall be of high conductivity electrolytic grade aluminium / copper as indicated in the bill of quantities complying with requirement of IS : 5082 – 1981 and of rectangular cross section suitable for carrying the rated full load current and short circuit current and shall be extendable on either side. Bus bars and interconnections shall be insulated with heat shrinkable sleeve of 1.1 KV grade and shall be colour coded. Bus bars shall be supported on glass fiber reinforced thermosetting plastic insulated supports at regular intervals to withstand the force arising from in case of short circuit in the system. All bus bars shall be provided in a separate chamber and all connections shall be done by bolting. Additional cross sectional area to be added to the bus bar to compensate for the holes. All connections between bus bars and breakers shall be through solid copper / aluminium strips of proper size to carry full rated current and insulated with insulating sleeves. Maximum current density for the busbars shall be 1A/sq.mm for aluminium and 1.4 A/sq.mm for copper busbars.

Maximum allowable temperature for the Bus bar to be restricted to 85 deg C

3.3. CABLE COMPARTMENTS

Cable compartment of adequate size shall be provided in the Distribution panels for easy clamping of all incoming and outgoing cables entering from the top/bottom. Adequate supports shall be provided in cable compartment to support cables.

3.4. MOULDED CASE CIRCUIT BREAKER (MCCB)

The MCCB should be current limiting type with trip time of less than 10 msec under short circuit conditions. The MCCB should be either 3 or 4 poles as specified in BOQ. MCCB shall comply with the requirements of the relevant standards IS13947 – Part 2/IEC 60947-2 and should have test

certificates for Breaking capacities from independent test authorities CPRI / ERDA or any accredited international lab.

MCCB shall comprise of Quick Make -break switching mechanism, arc extinguishing device and the tripping unit shall be contained in a compact, high strength, heat resistant, flame retardant, insulating moulded case with high withstand capability against thermal and mechanical stresses

The breaking capacity of MCCB shall be as specified in the schedule of quantities. The rated service breaking capacity (Ics) should be equal to rated ultimate breaking capacities (Icu). MCCBs for motor application should be selected in line with Type-2 Co-ordination as per IEC-60947-2, 1989/IS 13947-2. The breaker as supplied with ROM should meet IP54 degree of protection.

The manufacturer shall provide both the discrimination tables and let-through energy curves for all.

a. Protection Functions

- MCCBs with ratings up to 200 A shall be equipped with Thermal-magnetic (thermal for overload and magnetic for short-circuit protection) trip units
- Microprocessor MCCBs with ratings 250A and above shall be equipped with microprocessor based trip units.
- Microprocessor and thermal-magnetic trip units shall be adjustable and it shall be possible to fit lead seals to prevent unauthorised access to the settings
- Microprocessor trip units shall comply with appendix F of IEC 60947-2 standard (measurement of rms current values, electromagnetic compatibility, etc.)
- Protection settings shall apply to all poles of circuit breaker.
- All Microprocessor components shall withstand temperatures up to 125 °C

b. Testing

Original test certificate of the MCCB as per IEC 60947-1 &2 or IS13947 shall be furnished. Pre-commissioning tests on the switch board panel incorporating the MCCB shall be done as per standard specifications.

c. Interlocking

Moulded, case circuit breakers shall be provided with the following interlocking devices for interlocking the door of a switch board.

- Handle interlock to prevent unnecessary manipulations of the breaker.
- Door interlock to prevent the door being opened when the breaker is in ON position.
- Defeat-interlocking device to open the door even if the breaker is in ON position.

The MCCB shall be current limiting type and comprise of quick make – Break switching mechanism. MCCBs shall be capable of defined variable overload adjustment. All MCCBs rated 200 Amps and above shall have adjustable over load & short circuit pick-up both in Thermal magnetic and Microprocessor Trip Units.

All MCCB with microprocessor based release unit, the protection shall be adjustable Overload, Short circuit and earth fault protection with time delay.

The trip command shall override all other commands.

3.5. MINIATURE CIRCUIT BREAKER (MCB)

Miniature Circuit Breaker shall comply with IS-8828-1996/IEC898-1995. Miniature circuit breakers shall be quick make and break type for 240/415 VAC 50 Hz application with magnetic thermal release for over current and short circuit protection. The breaking capacity shall not be less than 10 KA at 415 VAC. MCBs shall be DIN mounted. The MCB shall be Current Limiting type (Class-3). MCBs shall be classified (B, C, D ref IS standard) as per their Tripping Characteristic curves defined by the manufacturer. The MCB shall have the minimum power loss (Watts) per pole defined as per the IS/IEC and the manufacturer shall publish the values. MCB shall ensure complete electrical isolation & downstream circuit or equipment when the MCB is switched OFF.

The housing shall be heat resistant and having high impact strength. The terminals shall be protected against finger contact to IP20 Degree of protection. All DP, TP, TPN and 4 Pole miniature circuit breakers shall have a common trip bar independent to the

External operating handle.

4. EARTHING

4.1. EARTHING

The system shall be TNS with four wire supply system (R,Y,B,N and 2 Nos. E) brought from the main L T Panel. All the non-current carrying metal parts of electrical installation and all metal conduits trunking, cable sheaths, switchgear, distribution panels, light fittings and all other parts made of metal shall be bonded together and connected by means of specified earthing conductors to an efficient earthing system. All metal work such as pipe lines, ducts, cable trays, stair case railing etc shall be bonded to earth.

All earthing shall be in conformity with IS: 3043 1987, and the basic system of earthing shall be TNS.

4.2. EARTHING CONDUCTORS

Earthing conductors shall be of copper / GI as mentioned in schedule of quantities and shall be protected against mechanical injury and corrosion.

4.3. SIZING OF EARTHING CONDUCTORS

The cross sectional area of earthing conductor shall not be smaller than half of the largest current carrying conductor subject to an upper limit of 80 Sq.mm. If the area of the largest current carrying conductor or bus bar exceeds 160 sq.mm then two or more earthing conductors shall be used in parallel, to provide at least half the cross sectional area of the current carrying conductor or bus bars. All fixtures, outlet boxes, junction boxes and power circuits upto 15 amps shall be earthed with PVC insulated copper wire.

4.4. CONNECTION OF EARTHING CONDUCTORS

Main earthing conductors shall be taken from the earth connections at the main L T panel to an earth electrode with which the connection is to be made. All joints in tapes shall be with four rivets and shall be brazed in case of copper and by welding bolting in case of GI, wires shall be connected with crimping lugs, all bolts shall have spring washers. Sub- mains earthing conductors shall run from the main distribution panel to the sub distribution panel. Final distribution panel earthing conductors shall run from sub-distribution panel.

Circuit earthing conductor shall run from the exposed metal of equipment and shall be connected to any point on the main earthing conductor, or its distribution panel. Metal conduits, cable sheathing and armouring shall be earthed at the ends adjacent to distribution panel at which they originate, or otherwise at the commencement of the run by an earthing conductor in effective electrical contact with cable sheathing. Where equipment is connected by flexible cord, all exposed metal parts of the equipment shall be earthed by means of an earthing conductor enclosed with the current carrying conductors within the flexible cord. Switches, accessories, lighting fitting etc. which are rigidly secured in effective electrical contact with a run of metallic conduit shall not be considered as a part of the earthing conductor for earthing purposes, even though the run of metallic conduit is earthed. The installation shall be complete in all respects for efficient and trouble free service. All work shall be carried out in a first class quality and neat workmanship. Grounding conductors shall be handled carefully to avoid kinking and cutting of the conductors during their installation. All exposed ground conductors run shall be taken in a neat manner horizontal, vertical and parallel to the building walls or columns and shall not be laid haphazardly. All connections to the grounding grid shall be made with **earthing** strip welded to grid and bolted at equipment ends.

LIST OF INDIAN STANDARDS (IS)

Latest edition of following standards shall be referred

IS : 694	PVC insulated Electric cable for working voltage upto and including 1100 volts.
IS : 732	Code of practice for electrical wiring and installation
IS : 1255	Code of Practice for installation and maintenance of Power Cables upto and including 11 KV rating (Second Revision)
IS : 1293	Three pin plugs and sockets outlets rated voltage upto and including 250 volts and current upto and including 160 amps.
IS : 1554 (Part - I)	PVC insulated (Heavy Duty) electric cables for working voltages upto and including 1100 volts.
IS : 1646	Electrical installation fire safety of buildings (general) Code of practice.
IS : 1885	Glossary of items for electrical cables and conductors
IS : 1913	General and safety requirements for fluorescent lamps luminaries Tubular.
IS : 2309	Protection of building and allied structures against lightning
IS : 2551-	Danger notice plate.
IS : 3043	Code of practice for earthing.
IS : 3427	AC Metal enclosed switch gear and control gear for rated voltages above 1 KV and including 52 KV.

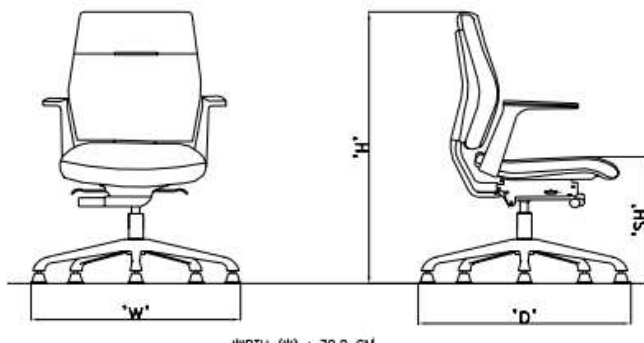
IS : 3480	Flexible steel conduits for electrical wiring.
IS : 3837	Accessories for rigid steel conduit for electrical wiring.
IS : 4146	Application guide for voltage transformers
IS : 4615	Switch socket outlets.
IS : 5133 (Part -I)	Boxes for the enclosure of electrical accessories.
IS : 5216 (Part-I)	Guide for safety procedures and practices in electrical work.
IS : 5424	Rubber mats for electrical purposes.
IS : 5578 & 11353	Marking and arrangement of bus bars
IS : 5578 & 11353	Marking and arrangement of bus bars
IS : 7098 - (Part - II)	Cross linked polyethylene insulated PVC sheathed cables. For working voltages from 3.3 KV upto and including 33 kV
IS : 8130	Conductors for insulated electric cables and flexible cords
IS : 8623 - (Part -I)	Factory built assemblies of switchgear and control gear for voltages upto and including 1000 V AC and 1200 VDC.
IS : 8623 - (Part -II)	Bus Bar trunking system

IS : 8828	Miniature Circuit Breakers
IS : 9537	Rigid Steel Conduits for electrical wiring (Second Revisions)
IS : 10810	Methods of test for cables.
IS : 12640	Earth Leakage Circuit Breakers
IS : 13947 (Part-II)	Air Circuit Breakers
IS : 13947- (Part-)	Moulded Case Circuit Breakers
IS : 13947 - (Part-)	Degree of protection provided by enclosures for LV switchgear and control gear.
IS : 13947 (Part-)	General requirement for switchgear and control gear for voltage not exceeding 1000

Office Furniture

	TENDERED SPECIFICATIONS
	<p><u>Mid Back Ergonomic Chairs on castors with arms</u></p> <p>1) SEAT/BACK ASSEMBLY: The seat is made up of hot pressed moulded reconstituted wood of 12mm average thickness and back is two part injection moulded plastic.</p> <p>SEAT SUB ASSEMBLY SIZE: 49.0cm (W) X 49.5cm (D) BACK SUB</p> <p>ASSEMBLY SIZE: (MID BACK): 45.0 cm (W) X 49.0 cm (H)</p>

- 2) POLYURETHANE2 FOAM: The Polyurethane foam is moulded in Density 45 kg/m³,
- 3) ARMRESTS : The armrests are Pressure die casted in polished Aluminium with PP Arm Tops.
- 3) AUTO-RETURN MECHANISM: The Conference and Board room chair has an Auto-return mechanism to allow the user free movement while being sitted and after use guides the upper structure to rotate back to its original position enabling all chairs around the table to be aligned.
- 4) ADJUSTABLE BACK SUPPORT : Backrest is connected to the mechanism with a drop-lift mechanism which can be adjusted in the range of 7.0 cm for the comfortable back support to suitable individual need.



High Rise Revolving stool (Black seat cover) with cushion in seat & lumbar support at back, SS metal stand with ring type foot rest & castors & Gas Lift



Wall cabinet (W 750 x D 450 x H 750)

Wall Mounted Overhead File Cabinets (Float Glass Door) CRCA (Cold Rolled Close Annealed) or G. I. Sheets Two Shutter with one adjustable shelf Size: - 750Lmm x 370mm W x 750 mmH (approx.) **PI refer dwg as per attached.**



MISCELLANEOUS WORK

TENDERED SPECIFICATIONS

8. VITRIFIED FLOOR TILES

Providing and laying vitrified floor tiles in different sizes (thickness to be specified by the manufacturer) with water absorption less than 0.08% and conforming to IS: 15622, of approved make, in all colours and shades, laid on 20mm thick cement mortar 1:4 (1 cement : 4 coarse sand), jointing with grey cement slurry @ 3.3 kg/sqm including grouting the joints with white cement and matching pigments etc., complete. **Size of Tile 600x600 mm**

Preparation of Surface and Laying

h) Base concrete or the RCC slab on which the tiles are to be laid shall be cleaned, wetted and

mopped. The bedding for the tile shall be with cement mortar 1:4 (1 cement: 4 coarse sand) or as specified. The average thickness of the bedding shall be 20 mm or as specified while the thickness under any portion of the tiles shall not be less than 10 mm.

- i) Mortar shall be spread, tamped and corrected to proper levels and allowed to harden sufficiently to offer a fairly rigid cushion for the tiles to be set and to enable the mason to place wooden plank across and squat on it.
- j) Over this mortar bedding neat grey cement slurry of honey like consistency shall be spread at the rate of 3.3 kg of cement per square metre over an area upto one square metre. Tiles shall be soaked in water washed clean and shall be fixed in this grout one after another, each tile gently being tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. The joints shall be kept as thin as possible and in straight lines or to suit the required pattern.
- k) The surface of the flooring during laying shall be frequently checked with a straight edge about 2 m long, so as to obtain a true surface with the required slope. In bath, toilet W.C. kitchen and balcony/verandah flooring, suitable tile drop or as shown in drawing will be given in addition to required slope to avoid spread of water. Further tile drop will also be provided near floor trap.
- l) Where full size tiles cannot be fixed these shall be cut (sawn) to the required size, and their edge rubbed smooth to ensure straight and true joints. Tiles which are fixed in the floor adjoining the wall shall enter not less than 10 mm under the plaster, skirting or dado.
- m) After tiles have been laid surplus cement slurry shall be cleaned off.

Pointing and Finishing

The joints shall be cleaned off the grey cement slurry with wire/coir brush or trowel to a depth of 2 mm to 3 mm and all dust and loose mortar removed. Joints shall then be flush pointed with white cement added with pigment if required to match the colour of tiles. Where spacer lug tiles are provided, the half the depth of joint shall be filled with polysulphide or as specified on top with under filling with cement grout without the lugs remaining exposed. The floor shall then be kept wet for 7 days. After curing, the surface shall be washed and finished clean. The finished floor shall not sound hollow when tapped with a wooden mallet.

9. FALSE CEILING

12.5 mm thick tapered edge gypsum moisture resistant board Providing and fixing false ceiling at all height including providing and fixing of frame work made of special sections, power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/sqm (both side inclusive) as per IS : 277 and consisting of angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 27 mm and 37mm, at 1200 mm centre to centre, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50mm long with 6mm dia bolts, other flange of cleat fixed to the angle hangers of 25x10x0.50 mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I. channels 45x15x0.9 mm running at the spacing of 1200 mm centre to centre, to which the ceiling section 0.5 mm thick bottom wedge of 80 mm with tapered flanges of 26 mm each having lips of 10.5 mm, at 450 mm centre to centre, shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction, including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm centre, with 25mm long dry wall screws @ 230 mm interval, including fixing of gypsum board to ceiling section and perimeter channel with the help of dry wall screws of size 3.5 x 25 mm at 230 mm c/c, including jointing and finishing to a flush finish of tapered and square edges of the board with recommended jointing compound , jointing tapes , finishing with jointing compound in 3 layers covering upto 150 mm on both sides of joint and two coats of primer suitable for board, all as per manufacturer's specification and also including the cost of making openings for light fittings, grills, diffusers, cutouts made with frame of perimeter channels suitably fixed, all complete as per drawings, specification and direction of the Engineer in Charge but excluding the cost of painting with :

GI Metal Ceiling Lay in perforated Tegular edge global white color tiles of size 595x595 mm and 0.5 mm, Providing and fixing tiled false ceiling of specified materials of size 595x595 mm in true horizontal level, suspended on inter locking metal grid of hot dipped galvanized steel sections (galvanized @ 120 grams/ sqm, both side inclusive) consisting of main "T" runner with suitably spaced joints to get required length and of size 24x38 mm made from 0.30 mm thick (minimum) sheet, spaced at 1200 mm center to center and cross "T" of size 24x25 mm made of 0.30 mm thick (minimum) sheet, 1200 mm long spaced between main "T" at 600 mm center to center to form a grid of 1200x600 mm and secondary cross "T" of length 600 mm and size 24x25 mm made of 0.30 mm thick (minimum) sheet to be interlocked at middle of the 1200x600 mm panel to form grids of 600x600 mm and wall angle of size 24x24x0.3 mm and laying false ceiling tiles of approved texture in the grid including, required cutting/making, opening for services like diffusers, grills, light fittings, fixtures, smoke detectors etc. Main "T" runners to be suspended from ceiling using GI slotted cleats of size 27 x 37 x 25 x 1.6 mm fixed to ceiling with 12.5 mm dia and 50 mm long dash fasteners, 4 mm GI adjustable rods with galvanized butterfly level clips of size 85 x 30 x 0.8 mm spaced at 1200 mm center to center along main T, bottom exposed width of 24 mm of all T-sections shall be pre-painted with polyester paint, all complete for all heights as per specifications, drawings and as directed by Engineer-in-charge.

GI Metal Ceiling Lay in perforated Tegular edge global white color tiles of size 595x595 mm and 0.5 mm thick with 8 mm drop; made of GI sheet having galvanizing of 100 gms/sqm (both sides inclusive) and 20% perforation area with 1.8 mm dia holes and having NRC (Noise Reduction Coefficient) of 0.5, electro statically polyester powder coated of thickness 60 microns (minimum), including factory painted after bending and perforation, and backed with a black Glass fiber acoustical fleece.

10. ALUMINIUM WORK

Aluminium Sections

Aluminium sections used for fixed/openable windows, ventilators, partitions, frame work & doors etc. shall be suitable for use to meet architectural designs to relevant works and shall be subject to approval of the Engineer-in-Charge for technical, structural, functional and visual considerations. The aluminium extruded sections shall conform to IS 733 and IS 1285 for chemical composition and mechanical properties. The stainless steel screws shall be of grade AISI 304. The permissible dimensional tolerances of the extruded sections shall be as per IS 6477 and shall be such as not to impair the proper and smooth functioning/operation and appearance of door and windows.

Anodising

Standard aluminium extrusion sections are manufactured in various sizes and shapes in wide range of solid and hollow profiles with different functional shapes for architectural, structural glazing, curtain walls, doors, window & ventilators and various other purposes. The anodizing of these products is required to be done before the fabrication work by anodizing/electro coating plants which ensures uniform coating in uniform colour and shades. The extrusions are anodized up to 30 micron in different colours. The anodized extrusions are tested regularly under strict quality control adhering to Indian Standard.

DOOR, WINDOW, VENTILATOR AND PARTITION FRAMES

Frame Work

First of all the shop drawings for each type of doors/windows/ventilators etc. shall be prepared by using suitable sections based on architectural drawings, adequate to meet the requirement/ specifications and by taking into consideration varying profiles of aluminium sections being extruded by approved manufacturers. The shop drawings shall show full size sections of glazed doors, windows, ventilators etc. The shop drawings shall also show the details of fittings and joints. Before start of the work, all the shop drawings shall be got approved from the Engineer-in-Charge.

Actual measurement of openings left at site for different type of door/window etc. shall be taken. The fabrication of the individual door/windows/ventilators etc. shall be done as per the actual sizes of the opening left at site. The frames shall be truly rectangular and flat with regular shape corners fabricated to true right angles. The frames shall be fabricated out of section which have been cut to length, mitered and

jointed mechanically using appropriate machines.

Detail of Door Frame / Partition Section

3. Frame- Single Grove (Section No. 20067) – 101.60mm x 44.45mm x 3.0 mm thick (weight between (2.34 kg/m)
4. Frame - Double Grove (Section No. 20066) – 101.60mm x 44.45mm x 3.0 mm thick (weight between (2.42 kg/m)

Detail of Door Shutter Section

7. Shutter Vertical Style Section (Section No. 19509) – 85.00mm x 44.45mm x 3.0 mm thick (weight between (2.05 kg/m)
8. Shutter Vertical Plane Section (Section No. 19508) – 83.50mm x 44.45mm x 3.0 mm thick (weight between (2.05 kg/m)
9. Shutter Top & Bottom Section (Section No. 19510) – 113.30mm x 44.45mm x 3.0 mm thick (weight between (2.64 kg/m)
10. Shutter Middle Section (Section No. 19583) – 83.50mm x 44.45mm x 3.18 mm thick (weight between (2.14 kg/m)
11. Glazing Clip (Section No. 19360) – 19.00mm x 17.30mm x 1.00 mm thick (weight between (0.12 kg/m)
12. Glazing Plate (Section No. 19353) – 44.45mm x 5.72mm x 3.22 mm thick (weight between (0.45 kg/m)

Fixing of Frames

The holes in concrete/masonry/wood/any other members for fixing anchor bolts/fasteners/screws shall be drilled with an appropriate electric drill. Windows/doors/ventilators etc. shall be placed in correct final

position in the opening and fixed to Sal wood backing using stainless steel screws of star headed, counter sunk and matching size groove. of required size at spacing not more than 250 mm c/c or dash fastener. All joints shall be sealed with approved silicone sealants. In the case of composite windows and doors, the different units are to be assembled first. The assembled composite units shall be checked for line, level and plumb before final fixing is done. Engineer-in-Charge in his sole discretion may allow the units to be assembled in their final location if the situation so warrants. Snap beadings and EPDM gasket shall be fixed as per the detail shown in the shop drawings. Where aluminium comes into contact with stone masonry, brick work, concrete, plaster or dissimilar metal, it shall be coated with an approved insulation lacquer, paint or plastic tape to ensure that electrochemical corrosion is avoided. Insulation material shall be trimmed off to a clean flush line on completion. The contractor shall be responsible for the doors, windows etc. being set straight, plumb, level and for their satisfactory operation after fixing is complete.

PANELING MATERIAL

Pre-laminated Particle Board

Fixing 12 mm thick pre-laminated particle board flat pressed three layer or graded wood particle board conforming to IS: 12823 Grade I Type II, in panelling fixed in aluminum doors, windows shutters and partition frames with C.P. brass / stainless steel screws etc. complete as per architectural drawings and directions of engineer in- charge.

A particles board laminated on both surfaces by synthetic resin impregnated base papers under heat and pressure. Pre-laminated particle boards shall be of two grades, namely, Grade I and II corresponding to IS 3087 & 12823. Each of the grades specified shall be of four types, namely, Types-I, II, III, and IV classified by the surface abrasion characteristics specified in Table 21.1. The grade and types of pre-laminated particle board shall be represented by symbols as follows:

<i>Grade</i>	<i>Type</i>	<i>Designation</i>
Grade I	Type I	PLB-11
	Type II	PLB-12
	Type III	PLB-13
	Type IV	PLB-14
Grade II	Type I	PLB-21
	Type II	PLB-22
	Type III	PLB-23
	Type IV	PLB-24

FLOAT GLASS

Fixing glazing in aluminium door, window, ventilator shutters and partitions etc. with EPDM rubber / neoprene gasket etc. complete as per the architectural drawings and the directions of engineer-in-charge. With float glass panes of 5 mm thickness (weight not less than 12.50 kg/ sqm)

- The glass shall be clear float glass and should be approved by the Engineer in Charge. It shall be clear, float transparent and free from cracks subject to allowable defects. The float glass shall conform to the IS 14900.
- The EPDM Gaskets shall be of size and profile as shown in drawings and as called for, to render the glazing, doors, windows, ventilators etc. air and water tight. Samples of gaskets shall be submitted for approval and the EPDM gasket approved by Engineer-in-Charge shall only be used. The contractor shall submit documentary proof of using the above material in the work to the entire satisfaction of Engineer in- Charge.

Lock

Fixing **Brass 100mm mortice latch and lock with 6 levers without pair of handles** (best make of approved quality) for aluminium doors including necessary cutting and making good etc. complete.

Handler

Fixing anodized (AC 15) aluminium round shape handle of outer dia 100 mm with SS screws etc. complete as per direction of Engineer-in charge.

11. OIL EMULSION (OIL BOUND) WASHABLE DISTEMPERING

Oil emulsion (Oil Bound) washable distemper (IS 428) of approved brand and manufacture shall be used. The primer where used as on new work shall be cements primer or distemper primer as described in the item. These shall be of the same manufacture as distemper. The distemper shall be diluted with water or

	<p>any other prescribed thinner in a manner recommended by the manufacturer. Only sufficient quantity of distemper required for day's work shall be prepared. The distemper and primer shall be brought by the contractor in sealed tins in sufficient quantities at a time to suffice for a fortnight's work, and the same shall be kept in the joint custody of the contractor and the Engineer-in-Charge.</p> <p>For new work the surface shall be thoroughly cleaned of dust, old white or colour wash by washing and scrubbing. The surface shall then be allowed to dry for at least 48 hours. It shall then be sand papered to give a smooth and even surface. Any unevenness shall be made good by applying putty, made of plaster of paris mixed with water on the entire surface including filling up the undulations and then sand papering the same after it is dry.</p> <p>In the case of old work, all loose pieces and scales shall be removed by sand papering. The surface shall be cleaned of all grease, dirt etc. Pitting in plaster shall be made good with plaster of paris mixed with the colour to be used. The surface shall then be rubbed down again with a fine grade sand paper and made smooth. A coat of the distemper shall be applied over the patches. The patched surface shall be allowed to dry thoroughly before the regular coat of distemper is applied.</p>
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APPROVED MAKE OF MATERIALS FOR FUMEHOODS AND LABORATORY FURNITURE SYSTEM

1	LABORATORY FITTINGS	WATER SAVER / BROEN / FAG/ FAR
2	LABORATORY SINKS / DRIP CUPS	WATER SAVER / BROEN/ALLOYPLAS/MALAYSIA
3	LABORATORY ELECTRICAL SOCKET	NORTHWEST / LEGRAND / MK / NORISYS
4	DATA & VOICE SOCKET	NORTHWEST / LEGRAND / MK/ NORISYS
5	EYEWASH / SHOWER	WATER SAVER / BROEN / FAG/ TOF/FAR
6	SPOT EXTRACTOR	FUMEX / ALSIDENT / NEDERMANN
7	FLAMMABLE STORAGE TALL CABINET	JUSTRITE / EAGLE/ SECURALL
8	OFFICE FURNITURE	GODREJ / WIPRO / SPACE DESIGN / FORM DESIGN

9	FUME HOOD SERVICE FIXTURES	WATER SAVER/BROEN/FAG/FAR
10	FUME HOOD ELECTRICAL SOCKET	NORTHWEST/LEGRAND/MK /NORISYS
11	FACE VELOCITY & VAV CONTROLS	TEL /SAUTER / SIEMENS

APPROVED MAKE OF MATERIALS FOR EXHAUST SYSTEM

S.NO	DESCRIPTION	APPROVED MAKE
1	PP sheets	Mandhani/Dugar/Khanna
2	Isothelic Resin with Fire retardent	Mechemco/Kaysynth/Orsyn
3	PP Dampers	Any reputed make
4	PP Exhaust Fans	Colasit/Colourplast/ Seat
5	VFD	Invertek/Siemens/ABB/Danfoss/Schneider
6	Fume hood face velocity monitor	TEL/Siemens/Sauter
7	Room pressure Monitor	TEL/Siemens/Sauter
8	Actuator	Siemens/Belimo/Neptronic
9	Motor	ABB/CG/Kirloskar

APPROVED MAKE OF MATERIALS FOR ELECTRICAL SYSTEM

S.NO	DESCRIPTION	APPROVED MAKE
1	MCCB	GE / ABB / SCHNIDER
2	LT CABLE as per IS:7098(2)1988	HAVELLS NICCO / POLYCAB / RPG / UNIVERSAL (Unistar) / PRIMECAB
3	END TERMINATION MATERIALS	DOWELS / SMI / HMI
4	INDICATING METERS	SIMCO / MECO / AE / RISHAB

5	INDICATING LAMPS	GE / SIEMENS / SCHNEIDER / L&T
6	POWER CONTACTORS	GE / SIEMENS / ABB / SCHNEIDER / L&T
7.	MCB / MCB DB	Havell's /Legrand/ GENERAL ELECTRIC (GE) HAVELLS
8.	ELCB / ELMCB	Havell's /Legrand/ GENERAL ELECTRIC (GE) HAVELLS
9	PVC CONDUITS - FRLS	VIP / AVON / UNIVERSAL / PRECISION / NELCO
10.	PVC COPPER WIRES - FRLS	FINOLEX / ANCHOR/ POLYCAB/ HAVELLS
11.	INDUSTRIAL SOCKETS	MGE / NEPTUNE / BCH
12.	LT PANELS	ANY LOCAL PANEL FABRICATOR
13.	PANEL ACCESSORIES	DIRAK / ELMAX
14.	TERMINAL BLOCK	PHOENIX CONTACT / ELMAX
15.	HEAVY DUTY PVC PIPE / HDPE PIPE 6KG & 4 KG	SUPREME / FINOLEX
16.	EARTHING - G I	ANY LOCAL SUPPLIER.
17.	EARTHING - COPPER	ANY LOCAL SUPPLIER.
18.	FIRE ALARM PANEL	MORLEY / HONEYWELL/NOTIFIER
19.	SMOKE DETECTOS	SYSTEM SENSOR /APPOLO
20	FIRE EXTINGUISHERS	SAFEX/ NITIN
21	LT CABLES	RR KABEL / POWER FLEX
21	M.S PIPES	TATA / JINDAL / SAIL

Materials/ accessories shall be used approved make or APPENDIX II (Technical Specification).

S.No	Materials	Approved Make / Manufactures
1	Flexible Copper wires	Finolex/ Havell's/ Polycab wires / Shalimar (FR)
2	Switch & Sockets	Legrand/ Anchor/ Havells
3	Distribution board	Legrand/ Hager/ Havell's
4	MCCB, MCB, RCCB	Legrand/ Hager/ Havell's/ L&T.
5	Lugs	Dowells
6	Casing caping/Conduit	Berlia/ Polypack/ Pestoplast/ Richa / Setia (2 mm Thickness)
7	Cable gland	Commet
8	Exhaust fan	Bajaj/ Crompton Greaves/ Havells/ Usha/Orient
9	Lighting fixture	Phillips/ Bajaj/ Crompton Greaves/Havells/Wipro
10	Ceiling fan	Bajaj/ Crompton Greaves/ Havells/ Usha/Orient
11	BUS BARS / Panels	CPRI Approved
12	Cables	Armoured/ Havells / Polycab/ Khaitan (IS Approved)

APPROVED MAKE OF MATERIALS FOR PROCESS EQUIPMENT

S.NO	DESCRIPTION	APPROVED MAKE
4.	Chiller	Blue Star, Voltas, Julabo, Cole Parmer, First Source Lab. Solution Pvt Ltd, Local Indian Made –PCI, or equivalent
5.	Compressor	Blue Star, Voltas, Senco PC1010, DEWALT DWFP55130 Bostitch , Local Indian Made –PCI or equivalent
6.	Vacuum pump	Reynold, Blue Sta,r Vaccubrand, Buchi Cole

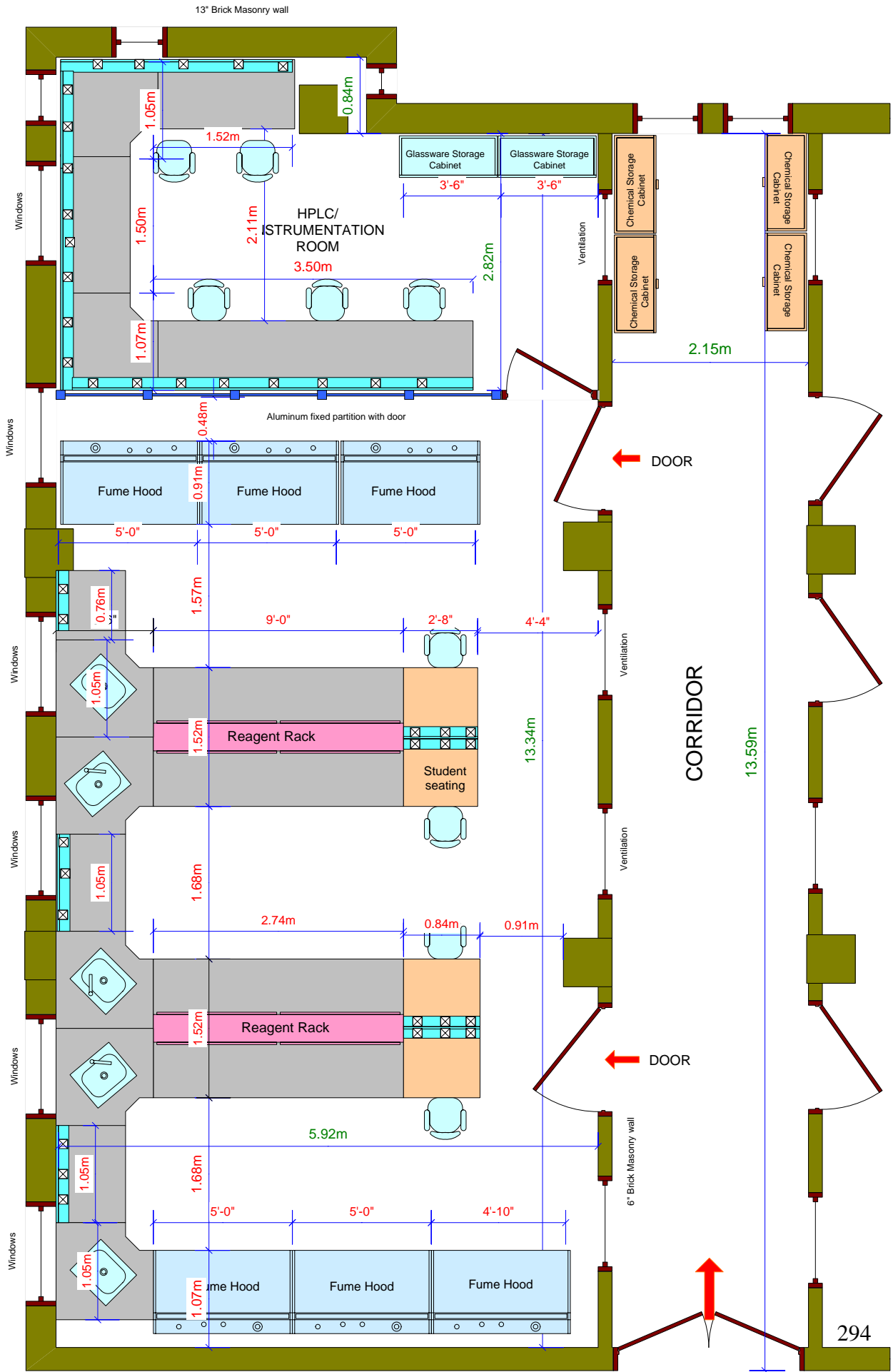
Parmer, Gardner Denver , KNF Pumps , Local Indian
Made –PCI or equivalent

List of approved makes of materials:-

❖ Paint	: ICI/Asian Paints/Berger/Oikos/Nerolac/Berger/
❖ Float Glass	: Modi Guard/Glaver Bel/Saint Gobain
❖ Expansion Bolts	: Hilti/Fischer/Hettich
❖ Glazing Sealant	: Dow Corning/GE Sealant
❖ SS/Chrome Coated Hardware	: Dorma/Hafele/Hettich
❖ Aluminum Alloy Extruded Section:	: Hindalco/Indalco/ Jindal
❖ Hinges	: Hettich/Haffle/Grass
❖ Locks	: Dorset/Locksmith/Godrej/ Hettich/Haffle

Note:-

- 5. The sample, catalogue color, texture etc. of all above furniture shall be finalized before approved by IIIM Technical Purchases Committee.**
- 6. The All finished product shall be delivered to the IIIM Jammu, duly covered with bubble sheet to avoid any breakage etc. However in case of any minor repair arising out of transportation etc. the same shall be repaired/ replaced immediately by the supplier without any extra cost.**



CHAPTER 5

Price Schedule Forms

Table of Contents

Sl. No.	Type of Price Schedule Form
	Price schedule for Goods being offered from abroad
	Price schedule for Goods offered from India

Note: The bidder may fill in the appropriate Price Schedule Form and enclose as per Clause 1.10 and 1.18.3 of the bidding documents.

PRICE SCHEDULE FOR GOODS BEING OFFERED FROM INDIA

Name of the Bidder _____

Tender No. _____

1	2	3	4	5	6	7	8	9	10	11	12
Sl. No	Item Description With HSN code	Country of origin	Unit	Quantity	Unit Rate Ex-Works, Ex-warehouse, Ex-show room off the shelf price (inclusive of all taxes already paid)	Total price Ex-Works, Ex-warehouse, Ex-show room off the shelf price (inclusive of all taxes already paid) 5x6	GST & other taxes payable, if contract is awarded	Packing & forwarding up to station of dispatch if any	Charges for inland transportation, insurance up to Lab. / Instt.by air/road/rail (retain one only)	Total Price	Installation, Commissioning and training charges, if any

Note: Total Bid price in foreign currency _____

(a) The cost of optional items, if any shall be indicated separately in words _____

(b) Cost of Spares, if any

Signature of Bidder _____

Name _____

Business Address _____

PRICE SCHEDULE FOR GOODS BEING OFFERED FROM ABROAD

Name of the Bidder _____

TENDER No. _____

1	2	3	4	5	6	7	8	9	10	11	12
Sl. No.	Item Description	Country of origin	Unit	Qty.	Unit price Indicating currency FOB (named port of shipment or FCA (named place of delivery) <i>(retain only one)</i>	Total price (5x6) FOB (named port of shipment) or FCA (named place of delivery) <i>(retain only one)</i>	Charges for Insurance & transportation to port//place of destination	Total price <i>CIF/CIP (retain one only)</i> (7+8)	Indian Agents Commission as a percent of FOB /FCA price included in the Quoted price	Approx. Ship- ment weight and volume	Indian Customs Tariff No and HSN No. (ICT & HSN No.)

Note:

Currency _____

Total Bid price in foreign currency _____

in words _____

(a) Indian agents name & address _____

(b) Installation, commissioning & training charges, if any _____

Signature of the Bidder

(c) Cost of Spares, if any _____

Business Address _____

(d) The Indian agent's commission shall be paid in Indian Rupees only based on the Exchange Rate prevailing on the date of negotiation of documents in accordance with clause 2.22 of GCC.

(e) The cost of optional items shall be indicated separately.

CHAPTER 6

Qualification Requirements

(refer to Annexure-4E of the CSIR Manual)

(Notes for internal use only)

Pre-Qualification Criteria (PQC) should be unrestrictive enough so as not to leave out even one capable vendor/contractor. Otherwise, it can lead to higher prices of procurement/works/services. However, on the other hand, these criteria should be restrictive enough so as not to allow even one incapable vendor/contractor and thus vitiate fair competition for capable vendors/contractors to the detriment of the buyer's objectives. A misjudgement in either direction may be detrimental. A sample PQC is given as under:

.Due consideration should be given while framing PQC, to its effect on adequacy of competition. To encourage MSEs, past successful bidders, a call may be taken – whether PQC should apply to full quantity/packages or be proportional to part quantity/ package quoted by a bidder. In case requirement is suddenly a multiple times the past procurements, blind adoption of past PQCs may lead to disqualification of successful past vendors leading to inadequate competition. PQC should therefore be carefully decided for each procurement with the approval of CA for acceptance of the tender. It should be clarified in the PQB documents that bidders have to submit authenticated documents in support of eligibility criteria. Sample Prequalification criteria

Criteria 1 - Experience and Past Performance:

- a) *The bidder (manufacturer or principal of authorised representative – hereinafter referred simply as 'The Bidder') should have regularly for at least the last _____] years, ending 31st March of the previous financial year (hereinafter called 'The relevant Date'), manufactured and supplied (/erected/ commissioned _____ [Name of Requirement], with the same or higher specifications having/with _____ parameters (hereinafter called 'The Product'). The bidder should submit the manufacturer authorisation form as appended in Chapter-8 and*
- b) *'The bidder' should have manufactured and supplied (/erected/commissioned) at least _____ numbers (herein after referred as 'The Qualifying Quantity') of 'The Product' in at least one of the last five years ending on 'The relevant Date', and out of which*
- c) *At least _____ numbers of offered version/model of 'The product' should be in successful operation for at least _____ years on the date of bid opening.*

Criteria 2 - Capability- Equipment & manufacturing Facilities:

'The bidder' must have an annual capacity to manufacture and supply (/erected/ commissioned)at least _____ (The Qualifying Quantity)

Note: In case of multiple products in a tender, this criterion shall be applicable product wise. For example, in case of Printing Paper of different specifications/sizes, it shall be applicable to quantity of paper manufactured and supplied specification/size wise.

Criteria 3 - Financial Standing – under all conditions

- a) *The average annual financial turnover of 'The bidder' during the last three years, ending on 'The relevant Date', should be at ₹ _____ (or equivalent in foreign currency at exchange rate prevalent on 'The Relevant Date') (fix the value as 40-80% or any other percentage of the estimated cost of the quantity in the bid*

document) as per the annual report (audited balance sheet and profit & loss account) of the relevant period, duly authenticated by a Chartered Accountant/Cost Accountant in India or equivalent in relevant countries.

Ministry of MSME have clarified that all Central Ministries/Departments/Central Public Section Undertakings may relax condition of prior turnover and prior experience with respect to Micro and Small Enterprises in all public procurements subject to meeting of quality and technical specifications. Further, the condition of prior turnover and prior experience may be relaxed for Start-ups (as defined by Department of Industrial Policy and Promotion) subject to meeting of quality & technical specifications and making suitable provisions in the bidding document (rule 173 (i) of GFR 2017))

- b) Bidder Firm (manufacturer or principal of authorised representative) should not have suffered any financial loss for more than one year during the last three years, ending on 'The Relevant Date'.
- c) The net worth of the Bidder firm (manufacturer or principal of authorised representative) should not be negative on 'The Relevant Date' and also ii) should have not eroded by more than 30% (thirty percent) in the last three years, ending on 'The Relevant Date'.

Note: In case of Indian Bidders/companies (manufacturer or principal of authorised representative) who have been restructured by Banks in India, under the statutory guidelines, they would be deemed to have qualified the Financial standing criteria considering the institutional financial backing available to them.

Applicability in Special Cases:

- a) Applicability to 'Make in India' :Bidders (manufacturer or principal of authorised representative) who have a valid/approved ongoing 'Make in India' agreement/program and who while meeting all other criteria above, except for any or more of sub-criteria in Experience and Past Performance above, would also be considered to be qualified provided:
 - i) their foreign 'Make-in-India' associates meet all the criteria above without exemption, and
 - ii) the Bidder submits appropriate documentary proof for a valid/approved ongoing 'Make in India' agreement/program.
 - iii) the bidder (manufacturer or principal of authorised representative) furnishes along with the bid a legally enforceable undertaking jointly executed by himself and such foreign Manufacturer for satisfactory manufacture, Supply (and erection, commissioning if applicable) and performance of 'The Product' offered including all warranty obligations as per the general and special conditions of contract.
- b) Authorized Representatives: Bids of bidders quoting as authorised representative of a principal manufacturer would also be considered to be qualified, provided:
 - i) their principal manufacturer meets all the criteria above without exemption, and
 - ii) the principal manufacturer furnishes a legally enforceable tender-specific authorisation in the prescribed form assuring full guarantee and warranty obligations as per the general and special conditions of contract; and
 - iii) the bidder himself should have been associated, as authorised representative of the same or other Principal Manufacturer for same set of services as in present bid (supply, installation, satisfactorily commissioning, after sales service as the case may be) for same or similar 'Product' for past three years ending on 'The Relevant Date'.

- c) *For Existing Successful Past Suppliers: In case the bidder (manufacturer or principal of authorised representative) who is a successful past supplier of 'The Product' in at least one of the recent past _____ procurements, who do not meet any or more of requirements above, would also be considered to be qualified in view of their proven credentials, for the maximum quantity supplied by him in such recent past.*
- d) *Joint Ventures and Holding Companies: Credentials of the partners of Joint ventures cannot (repeat cannot) be clubbed for the purpose of compliance of PQC in supply of Goods/Equipment, and each partner must comply with all the PQC criteria independently. However, for the purpose of qualifying the Financial Standing Criteria, the Financial Standing credentials of a Holding Company can be clubbed with only one of the fully owned subsidiary bidding company, with appropriate legal documents proving such ownership.*

Note for Bidders:

- a) 'Doctrine of Substantial Compliance': The Pre-Qualification Bidding (PQB) and Pre- Qualification Criteria (PQC) are for shortlisting of sources who are competent to perform this contract to ensure best value for money from expenditure of Public Money. This process is neither intended to bestow any entitlement upon nor to create any rights or privileges for the Bidders, by way of overly hair-splitting or viciously legalistic interpretations of these criteria, disregarding the very rationale of the PQB and PQC. Keeping this caveat in view, interpretation by the Purchaser would be based on common usage of terminologies and phrases in public procurement in accordance with the 'Doctrine of Substantial Compliance' and would be final.
- b) The Bidder must declare, whether asked or not in a bid document, any previous transgressions of such a code of integrity with any entity in any country during the last three years or of being debarred by any other Procuring Entity. Failure to do so would amount to violation of this code of integrity.
- c) In case of agents quoting in offshore procurements, on behalf of their principal manufacturers, one agent cannot represent two manufacturers or quote on their behalf in a particular tender enquiry. One manufacturer can also authorise only one agent/ dealer. There can be only one bid from the following:
 - i) The Principal manufacturer directly or through one Indian agent on his behalf; and
 - ii) Indian/foreign agent on behalf of only one principal.
- d) Along with all the necessary documents/certificates required as per the tender conditions, the bidder should furnish a brief write-up, backed with adequate data, explaining his available capacity (both technical and financial), for manufacture and supply of the required goods/equipment, within the specified time of completion, after meeting all their current commitments.
- e) Supporting documents submitted by the bidder must be certified as follows:
 - i) All copy of supply/work order; respective completion certificate and contact details of clients; documents issued by the relevant Industries Department/National Small Industries Corporation (NSIC)/ manufacturing licence; annual report, etc., in support of experience, past performance and capacity/capability should be authenticated by the by the person authorised to sign the tender on behalf of the bidder. Original Documents must be submitted for inspection, if so demanded.
 - ii) All financial standing data should be certified by certified accountants, for example, Chartered Accountants/Cost Accountants or equivalent in relevant countries; and Indian bidder or Indian counterparts of foreign bidders should furnish their Permanent Account Number.
- f) A bidder or any of its affiliates who participated as a consultant in the preparation of the design or technical specifications of the contract i.e. the subject of the bid; cannot participate in the bidding process.

- g) Indian agents quoting on behalf of its foreign principal need to submit a copy of the agency agreement with the foreign principal detailing the services to be rendered by them on behalf of the principals, failing which its bid shall not be considered.
- (h) Foreign bidders to disclose the name and address of agent and representatives in India and Indian bidder to disclose their foreign principal or associates.

CHAPTER 7

Contract Form

Contract No. _____ Date: _____

THIS CONTRACT AGREEMENT is made the [*insert: number*] day of [*insert: month*], [

insert: year].

BETWEEN

(1) The Council of Scientific & Industrial Research registered under the Societies Registration Act 1860 of the Government of India having its registered office at 2, Rafi Marg, New Delhi-110001, India represented by _____ [*insert complete name and address of Purchaser* (hereinafter called “the Purchaser”), and

(2) [*insert name of Supplier*], a corporation incorporated under the laws of [

insert: country of Supplier] and having its principal place of business at [*insert: address of Supplier*] (hereinafter called “the Supplier”).

WHEREAS the Purchaser invited bids for certain Goods and ancillary services, viz., [*insert brief description of Goods and Services*] and has accepted a Bid by the Supplier for the supply of those Goods and Services in the sum of [*insert Contract Price in words and figures, expressed in the Contract currency(ies)*] (hereinafter called “the Contract Price”).

NOW THIS AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract referred to.

2. The following documents shall constitute the Contract between the Purchaser and the Supplier, and each shall be read and construed as an integral part of the Contract:

- (a) This Contract Agreement
- (b) Special Conditions of Contract
- (c) General Conditions of Contract
- (d) Technical Requirements (including Schedule of Requirements and Technical Specifications)

- (e) The Supplier's Bid and original Price Schedules
- (f) The Purchaser's Notification of Award
- (g) *[Add here any other document(s)]*

3. This Contract shall prevail over all other Contract documents. In the event of any discrepancy or inconsistency within the Contract documents, then the documents shall prevail in the order listed above.

4. In consideration of the payments to be made by the Purchaser to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Purchaser to provide the Goods and Services and to remedy defects therein in conformity in all respects with the provisions of the Contract.

5. The Purchaser hereby covenants to pay the Supplier in consideration of the provision of the Goods and Services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

IN WITNESS whereof the parties hereto have caused this Agreement to be executed in accordance with the laws of Union of India on the day, month and year indicated above.

For and on behalf of the Council of Scientific & Industrial Research

Signed: *[insert signature]*

in the capacity of *[insert title or other appropriate designation]*

in the presence of *[insert identification of official witness]* Signed: *[insert signature]*

in the capacity of *[insert title or other appropriate designation]* in the presence of *[insert identification of official witness]* For and on behalf of the Supplier

Signed: *[insert signature of authorized representative(s) of the Supplier]* in the capacity of *[insert title or other appropriate designation]*

in the presence of *[insert identification of official witness]*

CHAPTER 8

Other Standard Forms

(To be enclosed as indicated below)

Table of Contents

Sl. No.	Name
01.	Bidder Information Form (to be enclosed with the technical bid)
02.	Manufacturers' Authorization Form (to be enclosed with the technical bid)
03.	Bid Security Form (to be enclosed with the technical bid)
04.	Bid Securing Declaration. (to be enclosed with the technical bid)
05.	Performance Statement Form (to be enclosed with the technical bid)
06.	Deviation Statement Form (to be enclosed with the technical bid)
07.	Service Support Detail Form (to be enclosed with the technical bid)
08.	Bid Form (to be enclosed with the priced bid)
09.	Performance Security Form (to be enclosed with the technical bid)
10.	Acceptance Certificate Form (to be enclosed with the technical bid)
11.	Integrity Pact (to be enclosed with the technical bid)
12.	Format of Letter of Authority for participating in bid opening

13.	Format of declaration of abiding by the code of integrity and conflict of interest to be submitted by the bidder.
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Note : Please refer clause 1.10.1 of the bidding documents for other documents to be attached with the bids/offers.

Bidder Information Form*(Refer para 5.1.2 (ix)(a) of the CSIR Manual)*

- (a) *The Bidder shall fill in this Form in accordance with the instructions indicated below. No alterations to its format shall be permitted and no substitutions shall be accepted. This should be done of the letter head of the firm]*

Date: *[insert date (as day, month and year) of Bid Submission]*

Tender No.: *[insert number from Invitation for bids]*

Page 1 of _____ pages

01.	Bidder's Legal Name <i>[insert Bidder's legal name]</i>
02.	In case of JV, legal name of each party: <i>[insert legal name of each party in JV]</i>
03.	Bidder's actual or intended Country of Registration: <i>[insert actual or intended Country of Registration]</i>
04.	Bidder's Year of Registration: <i>[insert Bidder's year of registration]</i>
05.	Bidder's Legal Address in Country of Registration: <i>[insert Bidder's legal address in country of registration]</i>
06.	Bidder's Authorized Representative Information Name: <i>[insert Authorized Representative's name]</i> Address: <i>[insert Authorized Representative's Address]</i> Telephone/Fax numbers: <i>[insert Authorized Representative's telephone/fax numbers]</i> Email Address: <i>[insert Authorized Representative's email address]</i>
07.	Attached are copies of original documents of: <i>[check the box(es) of the attached original documents]</i> Articles of Incorporation or Registration of firm named in 1, above.

Signature of Bidder _____

Name _____

Business Address _____

MANUFACTURERS' AUTHORIZATION FORM

(Refer para 5.1.2 (ix)(b) of the CSIR Manual)

[The Bidder shall require the Manufacturer to fill in this Form in accordance with the instructions indicated. This letter of authorization should be on the letterhead of the Manufacturer and should be signed by a person with the proper authority to sign documents that are binding on the Manufacturer and be enclosed with the technical bid.]

Date: *[insert date (as day, month and year) of Bid Submission]* Tender No.:

[insert number from Invitation for Bids] To: *[insert complete name and address of Purchaser]* WHEREAS

We *[insert complete name of Manufacturer]*, who are official manufacturers of *[insert type of goods manufactured]*, having factories at *[insert full address of Manufacturer's factories]*, do hereby authorize *[insert complete name of Bidder]* to submit a bid the purpose of which is to provide the following Goods, manufactured by us *[insert name and or brief description of the Goods]*, and to subsequently negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with Clause 2.21 of the General Conditions of Contract, with respect to the Goods offered by the above firm.

Signed: *[insert signature(s) of authorized representative(s) of the Manufacturer]*

Name: *[insert complete name(s) of authorized representative(s) of the Manufacturer]*

Title: *[insert title]*

Duly authorized to sign this Authorization on behalf of: *[insert complete name of Bidder]*

Dated on _____ day of _____, _____ *[insert date of signing]*

BID SECURITY FORM*(Refer para 5.1.2 (ix)(c) & 6.1.1 (01) of the CSIR Manual)*

Whereas _____ (hereinafter called the tenderer") has submitted

their offer dated _____ for the supply of _____

(hereinafter called the tender") against the purchaser's tender enquiry No. _____

KNOW ALL MEN by these presents that WE _____ of

_____ having our registered office at

_____ are bound unto _____

(hereinafter called the "Purchaser")

In the sum of _____

for which payment will 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 tenderer withdraws or amends or modifies or impairs or derogates from the Tender in any respect within the period of validity of this tender.
- (2) If the tenderer having been notified of the acceptance of his tender by the Purchaser during the period of its validity:-
 - (a) If the tenderer fails to furnish the Performance Security for the due performance of the contract.
 - (b) Fails or refuses to accept/execute the contract.

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 the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to and including 45 days after the period of tender validity i.e., up to _____ and any demand in respect thereof should reach the Bank not later than this date.

(Signature of the authorized officer of the Bank)

Name and designation of the officer Seal,
Name & Address of the Issuing Branch of the
Bank

Note: Whenever the bidder chooses to submit the Bid Security in the form of Bank Guarantee, then he should advise the banker issuing the Bank Guarantee to immediately send by Registered Post (A.D.) an unstamped duplicate copy of the Guarantee directly to the Purchaser with a covering letter to compare with the original BG for the correctness, genuineness, etc.

Annexure-5F

Bid-Securing Declaration Form

(Refer para 5.1.2 (ix)(d) & 6.1.1 (02) of the CSIR Manual)

Date: _____

Bid No. _____

To (insert complete name and address of the purchaser)

I/We. The undersigned, declare that:

I/We understand that, according to your conditions, bids must be supported by a Bid Securing Declaration.

I/We accept that I/We may be disqualified from bidding for any contract with you for a period of one year from the date of notification if I am /We are in a breach of any obligation under the bid conditions, because I/We

- (a) have withdrawn/modified/amended, impairs or derogates from the tender, my/our Bid during the period of bid validity specified in the form of Bid; or
- (b) having been notified of the acceptance of our Bid by the purchaser during the period of bid validity (i) fail or reuse to execute the contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with the Instructions to Bidders.

I/We understand this Bid Securing Declaration shall cease to be valid if I am/we are not the successful Bidder, upon the earlier of (i) the receipt of your notification of the name of the successful Bidder; or (ii) thirty days after the expiration of the validity of my/our Bid.

Signed: (insert signature of person whose name and capacity are shown) in the capacity of (insert legal capacity of person signing the Bid Securing Declaration).

Name: (insert complete name of person signing the Bid Securing Declaration)

Duly authorized to sign the bid for an on behalf of : (insert complete name of Bidder)

Dated on _____ day of _____ (insert date of signing)

Corporate Seal (where appropriate)

(Note: In case of a Joint Venture, the Bid Securing Declaration must be in the name of all partners to the Joint Venture that submits the bid)

PERFORMANCE STATEMENT FORM*(Refer para 5.1.2 (ix)(e) of the CSIR Manual)***(For a period of last 3 years)****Name of the Firm.....**

Order Placed by (full address of Purchaser)	Order No. and date	Description and quantity of ordered equipment	Value of order	Date of completion of delivery as per Contract	Date of actual completion of delivery	Remarks indicating reasons for late delivery, if any	Has the equipment been installed satisfactorily ? (Attach a certificate from the purchaser/ Consignee)	Contact person along with Telephone No., FAX No. and e-mail address

Signature and Seal of the manufacturer/Bidder

Place :
Date :

DEVIATION STATEMENT FORM*(Refer para 5.1.2 (ix)(f) of the CSIR Manual)*

Sl.No.	Name of Specifications / Parts / Accessories of Tender Enquiry	Specifications of Quote Model / Part /Accessory	Compliance Whether Yes of No	Deviation, if any to be indicated in unambiguous terms (The compliance / Deviation should be supported by relevant Technical Literature)	Technical justification for the deviation, if any. If specification is superior /inferior than asked for in the enquiry, it should be clearly brought out in the justification

Signature of Bidder

- ✓ If the bidder offers more than one model, then the Compliance Statement must be enclosed for each and every model separately.
- ✓ The technical and commercial deviations should be indicated separately.
- ✓ If the bidder fails to enclose the compliance statement, his bid is likely to be rejected.

Place:

Date:

Signature and seal of the
Manufacturer/Bidder**NOTE:**

- 1) Where there is no deviation, the statement should be returned duly signed with an endorsement indicating “No Deviations”.

SERVICE SUPPORT FORM
(Refer para 5.1.2(ix)(g) of the CSIR Manual)

S. No	Nature of Training	List of Similar Type equipment serviced in the past 3 years	Address, Telephone Nos., Fax Nos., and email address
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Signature and Seal of the manufacturer/Bidder.....

Place :

Date :

Bid Form*(Refer para 5.1.2 (ix)(h) of the CSIR Manual)*

[The Bidder shall fill in this Form in accordance with the instructions indicated. No alterations to its format shall be permitted and no substitutions shall be accepted.]

Date: *[insert date (as day, month and year) of Bid Submission]* Tender No.:

[insert number from Invitation for Bids] Invitation for Bid No.: *[insert No of IFB]*

To: *[insert complete name of Purchaser]* We, the undersigned, declare that:

- (a) We have examined and have no reservations to the Bidding Documents, including Addenda No.: *[insert the number and issuing date of each Addenda]*;
- (b) We offer to supply in conformity with the Bidding Documents and in accordance with the Delivery Schedules specified in the Schedule of Requirements the following Goods and Related Services *[insert a brief description of the Goods and Related Services]*;
- (c) The total price of our Bid, excluding any discounts offered in item (d) below, is: *[insert the total bid price in words and figures, indicating the various amounts and the respective currencies]*;
- (d) The discounts offered and the methodology for their application are:

Discounts: If our bid is accepted, the following discounts shall apply. *[Specify in detail each discount offered and the specific item of the Schedule of Requirements to which it applies.]*

- (e) Our bid shall be valid for the period of time specified in ITB Sub-Clause 1.17.1 from the date fixed for the bid opening, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
- (f) If our bid is accepted, we commit to obtain a performance security in accordance with ITB Clause 1.43 and GCC Clause 2.13 for the due performance of the Contract and also submit order acceptance within 14 days from the date of contract in accordance with ITB Clause 1.42 and GCC Clause 2.44;
- (g) The following commissions, gratuities, or fees have been paid or are to be paid with respect to the bidding process or execution of the Contract: *[insert complete name of each Recipient, its full address, the reason for which each commission or gratuity was paid and the amount and currency of each such commission or gratuity]*

Name of Recipient	Address	Reason	Amount
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

(If none has been paid or is to be paid, indicate "none.")

- (h) We understand that this bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed.
- (i) We understand that you are not bound to accept the lowest evaluated bid or any other bid that you may receive.

Signed:

[insert signature of person whose name and capacity are shown]

In the capacity of *[insert legal capacity of person signing the Bid Submission Form]*

Name: *[insert complete name of person signing the Bid Submission Form]*

Duly authorized to sign the bid for and on behalf of: *[insert complete name of Bidder]*

Dated on _____ day of _____, _____ *[insert date of signing]*

PERFORMANCE SECURITY FORM*(Refer para 5.1.2 (ix)(i) & 6.1.2 (02) of the CSIR Manual)***MODEL BANK GUARANTEE FORMAT FOR PERFORMANCE SECURITY**

To,

.....
 WHEREAS (name and address of the supplier) (hereinafter called "the supplier") has undertaken, in pursuance of contract No. datedto supply (description of goods and services) (herein after called "the contract").

AND WHEREAS it has been stipulated by you in the said contract that the supplier shall furnish you with a bank guarantee by a scheduled commercial bank recognized by you for the sum specified therein as security for compliance with its obligations in accordance with the contract;

AND WHEREAS we have agreed to give the supplier such a bank guarantee;

NOW THEREFORE we hereby affirm that we are guarantors and responsible to you, on behalf of the supplier, up to a total of (amount of the guarantee in words and figures), and we undertake to pay you, upon your first written demand declaring the supplier to be in default under the contract and without cavil or argument, any sum or sums within the limits of (amount of guarantee) as aforesaid, without your needing to prove or to show grounds or reasons for your demand or the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the supplier before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the contract to be performed there under or of any of the contract documents which may be made between you and the supplier shall in any way release us from any liability under this guarantee and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid until the day of, 20.....

(Signature of the authorized officer of the Bank)

.....
 Name and designation of the officer

.....
 Seal, Name & Address of the Issuing Branch of the Bank

Note: Whenever, the bidder chooses to submit the Performance Security in the form of Bank Guarantee, then he should advise the banker issuing the Bank Guarantee to immediately send by Registered Post (A.D.) an unstamped duplicate copy of the Guarantee directly to the Purchaser with a covering letter to compare with the original BG for the correctness, genuineness, etc.

ACCEPTANCE CERTIFICATE FORM
(Refer para 5.1.2 (ix) (j) of the CSIR Manual)

No
M/s

Date

Sub:

Certificate of commissioning of equipment

1. This is to certify that the equipment as detailed below has/have been received in good condition along with all the standard and special accessories (subject to remarks in Para 2). The same has been installed and commissioned.

- (a) Contract No. _____ Date _____
 (b) Description of the equipment _____
 (c) Name of the consignee _____
 (d) Scheduled date of delivery of the consignment to the Lab./Instts. _____
 (e) Actual date of receipt of consignment by the Lab./Instts. _____
 (f) Scheduled date for completion of installation/commissioning _____
 (g) Training Starting Date _____
 (h) Training Completion Date _____
 (i) Names of People Trained _____
 (j) Actual date of completion of installation/commissioning _____
 (k) Penalty for late delivery (at Lab./Instts. level) ₹ _____
 (l) Penalty for late installation (at Lab./Instts. level) ₹ _____

Details of accessories/items not yet supplied and recoveries to be made on that account:

Sl. No.	Description	Amount to be recovered

2. The acceptance test has been done to our entire satisfaction. The supplier has fulfilled his contractual obligations satisfactorily

or

The supplier has failed to fulfil his contractual obligations with regard to the following:

(a)

(b)

(c)

(d)

The amount of recovery on account of failure of the supplier to meet his contractual obligations is as indicated at Sr. No. 3.

For Supplier

Signature

Name

Designation

Name of the Firm

For Purchaser

Signature

Name

Designation

Name of the Institution

Format of Integrity Pact*(Refer para 5.1.2 (ix) (k) of the CSIR Manual)***INTEGRITY PACT**

Between

Council of Scientific & Industrial Research (CSIR) a Society registered under the Indian Societies Act 1860 represented by _____ hereinafter referred to as “The Principal”.

Andherein referred to as “The Bidder/ Contractor.”

Preamble

The Principal intends to award, under laid down organizational procedures, contract/s for

.....The Principal values full compliance with all relevant laws of the

land, rules, regulations, economic use of resources and of fairness/ transparency in its relations with its Bidder(s) and/or Contractor(s).

In order to achieve these goals, the Principal will appoint an Independent External Monitor (IEM), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section 1 – Commitments of the Principal

- (1) The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:
 - (a) No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.
 - (b) The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
 - (c) The Principal will exclude from the process all known prejudiced persons.
- (2) If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the IPC/PC Act, or if there be a substantive suspicion in this regard, the Principal will inform the Chief Vigilance Officer and in addition can initiate disciplinary action.

Section 2 – Commitments of the Bidder(s)/Contractor(s)

- (1) The Bidder(s)/Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.
 - (a) The Bidder(s)/Contractor(s) will not, directly or through any other Person or firm, offer, promise or give to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in

exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

- (b) The Bidder(s)/Contractor(s) will not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, Certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
 - (c) The Bidder(s)/Contractor(s) will not commit any offence under the relevant IPC/PC Act; further the Bidder(s)/Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
 - (d) The Bidder(s)/Contractor(s) of foreign origin shall disclose the name and address of the Agents/representatives in India, if any. Similarly the Bidder(s)/Contractors(s) of Indian Nationality shall furnish the name and address of the foreign principals, if any.

Further details as mentioned in the "Guidelines on Indian Agents of Foreign Suppliers" shall be disclosed by the Bidder(s)/Contractor(s). Further, as mentioned in the Guidelines all the payments made to the Indian agent/representative have to be in Indian Rupees only. Copy of the "Guidelines on Indian Agents of Foreign Suppliers" is annexed and marked as Annexure.
 - (e) The Bidder(s)/Contractor(s) will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- (2) The Bidder(s)/Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.
 - (3) The person signing IP shall not approach the courts while representing the matters to IEMs and he/she will await their decision in the matter.

Section 3 – Disqualification from tender process and exclusion from future Contracts

- (1) If the Bidder(s)/Contractor(s), before award or during execution has committed a transgression through a violation of Section 2, above or in any other form such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/Contractor(s) from the tender process or take action as per the procedure mentioned in the "Guidelines on Banning of business dealings". Copy of the "Guidelines on Banning of business dealings" is annexed and marked as Annex -"B".

Section 4 – Compensation for Damages

- (1) If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.
- (2) If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to Section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages of the contract value or the amount equivalent to Performance Bank Guarantee.

Section 5 – Previous transgression

- (1) The Bidder declares that no previous transgressions occurred in the last 3 Years with any other Company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

- (2) If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or action can be taken as per the procedure mentioned in “Guidelines on Banning of business dealings.”

Section 6 – Equal treatment of all Bidders / Contractors/ Sub-contractors

- (1) The Bidder(s)/Contractor(s) undertake(s) to demand from all Subcontractors a commitment in conformity with this Integrity Pact, and to submit it to the Principal before contract signing.
- (2) The Principal will enter into agreements with identical conditions as this one with all Bidders, Contractors and Subcontractors.
- (3) The Principal will disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

Section 7 – Criminal charges against violating Bidders / Contractors/ Subcontractors

- (1) If the Principal obtains knowledge of conduct of a bidder, Contractor or Subcontractor or of an employee or a representative or an associate of a bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the same to the Chief Vigilance Officer.

Section 8 - Independent External Monitors

- (1) The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
- (2) The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the JS (A), CSIR.
- (3) The Bidder(s)/Contractor(s) accepts that the Monitor has the right to access without restriction to all Project documentation of the Principal including that provided by the Contractor. The Contractor will also grant the 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 is under contractual obligation to treat the information and documents of the Bidder(s)/ Contractor(s) / Subcontractor(s) with confidentiality.
- (4) The Principal 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 Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.
- (5) As soon as the Monitor notice, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or to take other relevant action. The monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.
- (6) The Monitor will submit a written report to the JS(A), CSIR within 8 to 10 weeks from the date of reference or intimation to him by the Principal and should the occasion arise, submit proposals for correcting problematic situations.
- (7) Monitor shall be entitled to compensation on the same terms as being extended to/provided to Independent Directors on the CSIR.
- (8) If the Monitor has reported to the JS(A),CSIR, a substantiated suspicion of an offence under relevant IPC/PC Act, and the JS(A), CSIR has not, within the reasonable time taken visible action to proceed against such offence or reported it to the Chief Vigilance Officer, the Monitor may also transmit this information directly to the Central Vigilance Commissioner.
- (9) The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

This Pact begins when both parties have legally signed it. It expires for the Contractor 10 months after the last payment under the contract, and for all other Bidders 6 months after the contract has been awarded.

If any claim is made/lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/determined by JS(A), CSIR.

Section 10 – Other provisions

- (1) This agreement is subject to Indian Law. Place of performance and Jurisdiction is the Registered Office of the Principal, i.e. New Delhi

- (2) Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- (3) If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.
- (4) Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

(For & On behalf of the Principal) (Office Seal

For & On behalf of Bidder/Contractor) (Office Seal)

Place

Place

Date

Date

Witness 1:(Name & Address")

Witness 2:(Name & Address)

Format of Letter of Authority for participating in bid opening

(On the letter head of the bidder)

(Refer para 5.1.2 (ix)(I) & 5.3.2 of the CSIR Manual)

Ref.No. _____

Date: _____

Subject: Authorisation letter for participants in the bid opening process

To

(Name & Address of the Purchaser)

Sir

With reference to your invitation for bid No. _____ dated _____, we wish

to inform you that we have participated in the bidding process and have submitted bid bearing Ref. No. _____ dated _____.

In line with your requirement, we hereby authorise Sh/Smt. _____ to

participate in the bid opening process scheduled on _____ at _____ hrs (IST) in your

premises. A copy of the identity of the representative is attached duly certified by the undersigned.

Thanking you

Yours faithfully,

(Signature of the bidder with seal)

Format for declaration by the Bidder for Code of Integrity & conflict of interest (Refer para 3.2.1 & 5.1.2 (ix)(m) of the CSIR Manual)

(On the Letter Head of the Bidder)

Ref. No: _____

Date _____

To,

(Name & address of the Purchaser)

Sir,

With reference to your Tender No. _____ dated _____ I/We hereby declare that we shall abide by the Code of Integrity for Public Procurement as mentioned under Para 1.3.0 of ITB of your Tender document and have no conflict of interest.

The details of any previous transgressions of the code of integrity with any entity in any country during the last three years or of being debarred by any other Procuring Entity are as under:

a

b

c

We undertake that we shall be liable for any punitive action in case of transgression/contravention of this code.

Thanking you,

Yours sincerely,

Signature

(Name of the Authorized Signatory)

Company seal

Tender Ref: _____ Dated : _____

Certificate Regarding Procurement from a bidder of a country which shares a land border with India

“We have read the clauses regarding restrictions on procurement from a bidder of a country which shares a land border with India, as per Office Memorandums issued by Department of Expenditure, PPD, Ministry of Finance, under F. No. 6/18/2019-PPD and we hereby certify that our firm is not from such a country and is eligible to be considered”

Or

However if any bidder falls in the category of bidders as indicated in the Definitions clause at Cl. No.6,7,8,9,and 10 of Oder (F.NO. 6/18/2019-PPD, Public Procurement no. 1) Dt. 23-07-2020, should submit the certificate as under:

“We have read the clauses regarding restrictions on procurement from a bidder of a country which shares a land border with India as per Office Memorandums issued by Department of Expenditure, PPD, Ministry of Finance, under F. No. 6/18/2019-PPD and we hereby certify that our firm is from such a country and has been registered with Competent Authority (Specified in Annexure-I of Order (F.No. 6/18/2019-PPD, Public Procurement no. 1) dated 23.07.2020 and further certify that our firm fulfills all requirements in this regard and is eligible to be considered. The evidence of valid registration by the Competent Authority is attached herewith.”

Authorized Signatory of Bidder

Date:

Seal of the Firm

Note:

1. Choose any one of the above mentioned conditions, whichever is applicable.
2. In case of Indian Agents of the Local Suppliers have quoted against the Tender, both the Indian Agent and their Principals should submit the above mentioned certificate.

Annexure 5Q

Tender Ref: _____ Dated : _____

Certificate for Local Content under PPP for Make in India

In line with Government Public Procurement Order No. P-45021/2/2017-BE-II dated 15.06.2017, (subsequently revised vide orders dated 28.05.2018, 29.05.2019, 04.06.2020 & 16.09.2020) by Govt. of India, We hereby Certify that we M/s_____ (Name of the manufacturer) are local supplier meeting the requirement of minimum local content as defined in above orders.

As per terms and conditions of Rate Contract, Following details are as follows:-

Category of Local Supplier (Specify clearly either Class-I or Class II)	Percentage of local Content (in %)	Details of locations at which local value addition will be made.

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

Authorized Signatory of Bidder

Date:

Seal of the Firm

Verified by Chartered Accountant

Seal

Note:

1. In case of Indian Agents of the Local Suppliers have quoted against the Tender, both the Indian Agent and their Principals should submit the above mentioned certificate.

ANNEXURE – 5R

FORMAT OF INTEGRITY PACT

(Refer para 3.3.3 (10) of the CSIR Manual)

INTEGRITY PACT

Between

The Council of Scientific and Industrial Research, a society incorporated under the Societies Registration Act- 1860, having its corporate registered office at “Anusandhan Bhavan”, 2 Rafi Marg, New Delhi-110001 represented by _____ (name

of the procuring Entity) hereinafter referred to as “The Principal” which expression shall mean and include, unless the context otherwise requires, its successors and permitted assigns.

And

M/s.....represented by Designated Partner/ Director/ Chief Executive

Officer herein referred to as “The Bidder/Contractor” which expression shall mean and include, unless the context otherwise requires, its successors and permitted assigns.

Preamble

The Principal proposes to procure (Name of the Stores/Equipment/Item) at a competitive price in conformity with the specifications, under laid down organizational procedures and the BIDDER/ Contractor is willing to offer/has offered the stores and

The Principal values full compliance with all relevant laws of the land, rules, regulations, economic use of resources and of fairness/ transparency in its relations with its Bidder(s) and/or Contractor(s).

In order to achieve these goals, the Principal will appoint an Independent External Monitor (IEM), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

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

follows **Section 1 – Commitments of the Principal**

1. The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:
 - (a) No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.
 - (b) The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

- (c) The Principal will exclude from the process all known prejudiced persons.
- 2. If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the IPC/PC Act, or if there be a substantive suspicion in this regard, the Principal will inform the Chief Vigilance Officer and in addition can initiate disciplinary action.

Section 2 – Commitments of the Bidder(s)/Contractor(s)

- 1. The Bidder(s)/Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.
 - (a) The Bidder(s)/Contractor(s) will not, directly or through any other Person or firm, offer, promise or give to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material or other benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
 - (b) The Bidder(s)/Contractor(s) will not enter with other Bidders into any Undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, Certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
 - (c) The Bidder(s)/Contractor(s) will not commit any offence under the relevant IPC/PC Act; further the Bidder(s)/Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
 - (d) The Bidder(s)/Contractor(s) of foreign origin shall disclose the name and address of the Agents/representatives in India, if any. Similarly, the Bidder(s)/ Contractors(s) of Indian Nationality shall furnish the name and address of the foreign principals, if any. Further details as mentioned in the "Guidelines on Indian Agents of Foreign Suppliers" shall be disclosed by the Bidder(s)/ Contractor(s). Further, as mentioned in the Guidelines all the payments made to the Indian agent/representative have to be in Indian Rupees only. Copy of the "Guidelines on Indian Agents of Foreign Suppliers" is annexed and marked as Annexure.

- (e) The Bidder(s)/Contractor(s) will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- 2. The Bidder(s)/Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.
- 3. The person signing IP shall not approach the courts while representing the matters to IEMs and he/she will await their decision in the matter.

Section 3 – Disqualification from tender process and exclusion from future Contracts

1. If the Bidder(s)/Contractor(s), before award or during execution has committed a transgression through a violation of Section 2, above or in any other form such as to put his reliability or credibility in question, the Principal is entitled to disqualify the Bidder(s)/Contractor(s) from the tender process or take action as per the procedure mentioned in the “Guidelines on Banning of business dealings”. Copy of the “Guidelines on Banning of business dealings” is annexed and marked as Annex -“B”.

Section 4 – Compensation for Damages

1. If the Principal has disqualified the Bidder(s) from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.
2. If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to Section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages of the contract value or the amount equivalent to Performance Bank Guarantee.

Section 5 – Previous transgression

1. The Bidder declares that no previous transgressions occurred in the last 3 Years with any other Company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
2. If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or action can be taken as per the procedure mentioned in “Guidelines on Banning of business dealings.”

Section 6 – Equal treatment of all Bidders / Contractors/ Sub-contractors

1. The Bidder(s)/Contractor(s) undertake(s) to demand from all Subcontractors a commitment in conformity with this Integrity Pact, and to submit it to the Principal before contract signing.
2. The Principal will enter into agreements with identical conditions as this one with all Bidders, Contractors and Subcontractors.

3. The Principal will disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

Section 7 – Criminal charges against violating Bidders / Contractors/ Subcontractors

1. If the Principal obtains knowledge of conduct of a bidder, Contractor or Subcontractor or of an employee or a representative or an associate of a bidder, Contractor or Subcontractor which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the same to the Chief Vigilance Officer.

Section 8 - Independent External Monitors

1. The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
2. The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the JS(A), CSIR.
3. The Bidder(s)/Contractor(s) accepts that the Monitor has the right to access without restriction to all Project documentation of the Principal including that provided by the Contractor. The Contractor will also grant the 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 is under contractual obligation to treat the information and documents of the Bidder(s) / Contractor(s) / Subcontractor(s) with confidentiality.
4. The Principal 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 Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.
5. As soon as the Monitor notice, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or to take other relevant action. The monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.
6. The Monitor will submit a written report to the JS(A), CSIR within 8 to 10 weeks from the date of reference or intimation to him by the Principal and should the occasion arise, submit proposals for correcting problematic situations.
7. Monitor shall be entitled to compensation on the same terms as being extended to/provided to Independent Directors on the CSIR.
8. If the Monitor has reported to the JS(A), CSIR, a substantiated suspicion of an offence under relevant IPC/PC Act, and the JS(A), CSIR has not, within the reasonable time taken visible action to proceed against such offence or reported it to the Chief Vigilance Officer, the Monitor may also transmit this information directly to the Central Vigilance Commissioner.
9. The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

1. This Pact begins when both parties have legally signed it. It expires for the Contractor 10 months after the last payment under the contract, and for all other Bidders 6 months after the contract has been awarded.

2. If any claim is made/lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/determined by JS(A), CSIR.

Section 10 – Other provisions

1. This agreement is subject to Indian Law. Place of performance and Jurisdiction is the Registered Office of the Principal, i.e. New Delhi.
2. Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
3. If the Contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.
4. 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.
5. Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

(For & On behalf of the Principal)
(Office Seal)

(For & On behalf of Bidder/Contractor)
(Office Seal)

Place.....
.....

Place.....

Date.....

Date.....

Witness 1: (Name & Address)

Witness 2: (Name & Address)
