TATA INSTITUTE OF FUNDAMENTAL RESEARCH
(Autonomous Institution of the Department of Atomic Energy, Government of India)
Survey No.36/P, Gopanpally Village, Serilingampally Mandal,Ranga Reddy District,
Hyderabad-500046, Telangana

Telephone:+91-40-20203009	**Date:09-10-2021**
Website :www.tifrh.res.in	**Email: rajasekharr@tifrh.res.in**

PUBLIC TENDER

(TWO PART TENDER) **for the following Works:**

Supply, Installation, Testing and Commissioning of Air Conditioning System and other related works for Biosafety Level (BSL) Lab-2 in Hanger Building-2, at TIFR, Plot-B, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.	
Tender No.	**TIFR/PD/CA21-109/210815**
Type of Tender	**Two Part Tender (Part-I: Technical Bid and Part- II: Price Bid)**
Estimated Cost	**Rs. 13,50,000/-**
Cost of EMD	**As per Office Memorandum, No. F.9/4/2020-PPD Government of India, Ministry of Finance Department of Expenditure Procurement Policy Division. Dated 12th Nov. 2020. No provisions regarding Bid Security should be kept in the bid documents in future and only provision for Bid Security Declaration should be kept in the Bid Document. Accordingly the bidder should give the bid security declaration as per Annexure I**
Pre bidding meeting & Time	**14-10-2021 at 11:00 Hrs**
Last Date for Submission of Tender	**18-10-2021 by 13:00 Hrs**
Date of Opening Bids(Only Part-I: Technical Bid)	**18-10-2021 at 15:00 Hrs**
Tender Fee	**Rs. 500/-(Demand Draft to be drawn in favour of "TIFR Centre for Interdisciplinary Sciences "Payable at Hyderabad (To be enclosed with the Technical Bid Part –I)). However, contractors who have a valid MSME/NSIC certificate are exempted from the tender fee.**

- In case the Part "I" and Part "II" bids are not sealed in separate envelopes the tender will be rejected.
- The technical bid should not contain any indication of the price.
- The Technical Bid received without payment of tender fees and EMD/declaration letter for exemption of EMD shall be summarily rejected.

- Contacts: Mr. Krishna, Tel: 040- 20203009 for any technical or commercial terms clarifications mentioned in the tender.

Sealed tenders are invited for the aforesaid works from contractors having similar work experience in reputed Research Institutions, Universities, Central Government/Public Sector Undertaking, Private Laboratories, Multinational Companies, etc. Interested contractors who are satisfying prequalification criteria stipulated by TIFR-Hyderabad shall only submit their bids. For further details and any clarification on the tender you may please contact Head-Technical Services, Survey No.36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy District, Hyderabad-500046.

Last date for submission of the tender is 18-10-2021 by 13:00 Hrs.

(Rajasekhar. R)

Head-Technical Services

TENDER DOCUMENT

Supply, Installation, Testing and Commissioning of Air Conditioning System and other related works for Biosafety Level (BSL) Lab-2 in Hanger Building-2, at TIFR, Plot-B, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.

NAME OF THE TENDERER:.....

Address: .....

.....

.....

.....

Last date of submission of the tender: On or before 18-10-2021 by 13:00 Hrs.

TECHNICAL BID

VOLUME-I

Supply, Installation, Testing and Commissioning of Air Conditioning System and other related works for Biosafety Level (BSL) Lab-2 in Hanger Building-2, at TIFR, Plot-B, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.

Tender Notice	:	**TIFR/PD/CA21-109/210815**
Name of Work	:	**Supply, Installation, Testing and Commissioning of Air Conditioning System and other related works for Biosafety Level (BSL) Lab-2 in Hanger Building-2.**
Location	:	**Tata Institute of Fundamental Research Survey No. 36/P, Gopanpally village, Serilingampally Mandal, Ranga Reddy District, Hyderabad – 500046.**
Estimated Cost	:	**Rs.13,50,000/-**
EMD	:	**As per Office Memorandum, No. F.9/4/2020-PPD Government of India, Ministry of Finance Department of Expenditure Procurement Policy Division. Dated 12th Nov. 2020. No provisions regarding Bid Security Should be kept in the bid documents in future and only provision for Bid Security Declaration should be kept in the Bid Document. Accordingly the Bidder should give the bid security declaration as per Annexure I.**
Delivery Period	:	**15 Days (Completion Period)**
Validity	:	**One Eighty (90) days after opening of Part-I, Technical Bid**

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SECTION-I	IMPORTANT INFORMATION

INTRODUCTION

The Tata Institute of Fundamental Research is a National Centre of the Government of India, under the umbrella of the Department of Atomic Energy, as well as a deemed University awarding degrees for master's and doctoral programs. Tata Institute of Fundamental Research Centre for Interdisciplinary Sciences, Hyderabad invites bids for the following work:

Supply, Installation, Testing and Commissioning of Air Conditioning System and other related works for Biosafety Level (BSL) Lab-2 in Hanger Building-2, at TIFR, Plot-B, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.

1. PARTICULARS

a)	Location	TIFR, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.
b)	Pre-Bid Meeting Date & Time	14-10-2021 at 11:00 Hrs
c)	Closing date & time of receipt of bids	18-10-2021 by 13:00 Hrs
d)	Date & time of opening of Sealed Cover-I containing Technical Bid	18-10-2021 at 15:00 Hrs
e)	Date of opening of Sealed cover-II containing Financial Bid of eligible bidders	To be intimated to eligible bidders subsequently which is likely to be sometime around 1-3 Days

2. GENERAL INSTRUCTIONS

2.1. TIFR shall award the contract for the project through the two Bid systems.

2.2. The Contractor is advised to visit and examine the site of work and its surroundings and obtain any information that may be necessary, in addition to those provided in this document. The Contractor shall be deemed to have fully acquainted himself about the site condition, whether he inspects it or not.

2.3. The Contractor should adhere to the building bye-laws applicable for the area.

2.4. All clarifications shall be sought before the date of pre-bid meeting. The bidders may make suggestions which shall be considered during the Pre Bid Meeting. No further clarifications shall be issued after the issue of noteworthy replies to the pre-bid queries.

2.5. The submission of the bid by Contractor would imply that they have carefully read and agreed to the terms and conditions contained in this bid document.

2.6. The bid for the work shall remain open for acceptance for a period of 90 (Ninety) days from the date of submission of the bids, which period may be extended by mutual agreement and the Contractor shall not cancel or withdraw the offer during this period.

2.7. This bid document shall form a part of the contract agreement.

3. SUBMISSION OF BIDS

Bids shall be submitted to Head- Technical Services***, TIFR,*** **Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist, Hyderabad-500046** in a sealed Master envelope super scribed "Bid for **Supply, Installation, Testing and Commissioning of Air Conditioning System and other related works for Biosafety Level (BSL) Lab-2 in Hanger Building-2, at TIFR** with our enquiry no. and due date, containing two separate sealed covers clearly super scribed as **"Technical Bid"** and **" Financial Bid"** before the closing date and time of submission in the following manner:

a) **"Technical Bid":** This will contain Technical part, Eligibility Documents along with testimonials. Earnest Money Deposit (EMD)/declaration letter for exemption of EMD.

b) **"Financial Bid":** This will contain the complete bidding document with duly filled in Schedule of Financial Quote of Financial Bid & Tender Drawings.

The Bids without signature of the authorized person of bidder and seal, without EMD/ Declaration Letter for exemption of EMD with conditions or conditional rebates shall be summarily rejected.

4. EVALUATION OF BID

4.1. **EVALUATION OF TECHNICAL BID:** The bids received will first be first opened and will be examined for EMD/ Declaration Letter, Eligibility Criteria, Conditions, etc. Conditional Tenders and Tenders without EMD/Declaration Letter shall be summarily rejected.

4.2. **EVALUATION OF FINANCIAL BID:** The Financial Bid should contain the complete bid document with duly filled in Schedule of Financial Quote of Financial Bid and signed Tender drawings. Financial Bids of Technically qualified Bidders will only be opened. Work will be awarded to lowest bidder (L1) based on their quotes after making necessary arithmetical checks.

5. SCOPE & OBJECTIVE

The Objective of the tender is to **Supply, Installation, Testing and Commissioning of Air Conditioning System and other related works for Biosafety Level (BSL) Lab-2 in Hanger Building-2, at TIFR, Plot-B, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046** as per the specifications and Bill of quantities mentioned in the Financial Bid.

Period of Completion of Work: 30 days from the date of issue of work order

Defect Liability Period: 12 months from the date of handing over of completed system as per tender.

6. PAYMENT SCHEDULE:

The contractor shall submit the bills for payments along with a detailed statement showing the actual works carried out under different heads of items in the format specified by the TIFR. Minimum value of the work for interim payment (Running Bill) shall be Rs.5,40,000/-. All interim and final bills will be settled based on the joint measurements of each item of work and certified by TIFR Engineer. The bills for nonperishable materials on site may also be submitted and the payment by TIFR against the same shall be to the maximum extent of 60% of the value of these materials on production of sufficient documentary evidence ie. Original invoice, Inventory, etc. All interim bills will be paid within **30** days from the date of submission and Final Bill along with all relevant documents will be settled within **30** days from the date of submission with certification of TIFR Engineer.

SECTION-II	ELIGIBILITY CRITERIA FOR TENDER QUALIFICATION

Supply, Installation, Testing and Commissioning of Air Conditioning System and other related works for Biosafety Level (BSL) Lab-2 in Hanger Building-2, at TIFR, Plot-B, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.

- **Eligibility criteria:**
  1. The Agencies/Contractors shall hold valid labour license issued by appropriate authority and must be valid throughout the contractual period
  2. IT Returns for the last three consecutive financial years ended on March 31, 2021 audited by CA.
  3. The Agencies/Contractors should have average annual turnover of Rs.5.4 lakhs during three previous financial years ending March 31, 2021.
  4. The Agencies/Contractors shall be in profit for the last three financial years and should have valid PAN from Income Tax Authority, GST registration No. etc. and any other registration applicable/mandatory for contract.
  5. The Agencies/Contractors should have executed similar installation of Air conditioning systems for Clean rooms or Biosafety level labs or similar works successfully at least
     - 5.1. One similar work costing Rs.10.8 Lakhs or
     - 5.2. Two similar works costing Rs. 8.1 Lakhs or
     - 5.3. Three similar works costing Rs. 5.4 Lakhs during the last 7 financial years ended on March 31st 2021 for Research Institutes, Universities, Private Laboratories, R & D institutes, etc. in any Government /PSU/Private organizations of repute.

     The Agencies/Contractors should furnish copies of work orders and completion certificates from the clients in support of the above.

Note:

- ❖ Agencies/Contractors should have a full-fledged in-house project management team to undertake the jobs.
- ❖ The Agencies/Contractors shall **strictly furnish** aforesaid information in the formats/schedules given. **Non adherence to furnishing of information in the given format/schedules given will lead to disqualification of tender.**
- ❖ Instructions to Agencies/Contractors for furnishing the information is given as under:
  - ➢ Each page of the application shall be signed by a person having necessary authority to do so.
  - ➢ If the space in the proforma is insufficient for furnishing full details, such information may be given in separate sheets.
  - ➢ Applicants are required to furnish information against each item of the application. In case a certain item is not applicable, please write NA. Application containing incorrect and or inadequate information is liable to be rejected.

SCHEDULE – A

BASIC INFORMATION

1.	Name of the firm	:
2.	a) Address	:
	b) Telephone / Fax No.	:
	c) Mobile No. Contact Person	:
	d) PAN No.	:
	e) GST Registration No.	:
	f) Labour License Details	:
	Branch Office if any in Hyderabad	:
3.	Type of Organization (Proprietorships / Partnership) Ltd. Co. / Co-Operative) (Copy of relevant document to be enclosed)	:
4.	Date of Incorporation	:
5.	Nature of Business	:
6.	Experience as prime Agencies/ Contractors (in Yrs.)	:
7.	Name and address of Bankers	:
8.	Organization chart of the Company including names and positions of directors / key personnel	:

Signature of the Applicant (s)

SCHEDULE – B

Major Internal Electrification works (Copies of the completion certificate to be enclosed)

A. Similar work of costing Rs 10.8 lakhs or two similar works of costing Rs.8.1 lakhs or 3 similar works of costing Rs.5.4 Lakhs during last 7 financial year ending March 31st 2021 for Research Institutes, Universities, Private Laboratories, R & D institutes, etc

Sr.No	Name of the project & Address	Description of work in brief	Name of the Engineer	Name of the client also indicate whether Govt or semi Govt or Pvt body with full postal address	Contract Amount in Rs.	Year of commence ment	Date of Completion		Whether work was left /uncompleted or the contract was terminated from either side? Give Details.	Any other relevant information relevant information
							Stipulated	Actual		
1.										
2.										

B. List of works in progress above Rs. 5.4 lakhs.

Sr No.	Name of the project & Address	Description of work in brief	Name of the Engineer with full postal address.	Name of the Client. Also indicate whether Govt. or semi Govt. or Pvt. Body with full postal address	Contract Amount in (Rs.)	Date of Completion	Present stage of work with reasons if the work is getting delayed	Any other relevant information
1.								
2.								

Signature of the Applicant (s)

SCHEDULE – C

TECHNICAL PERSONNEL & SPECIAL EXPERIENCE

List of technical personnel in your establishment giving details about their technical qualification and experience

Sr No.	Name	Age	Qualifications	Project Experience	Nature of works handled	Name of the project Handled	Date from which employed in your organization	Indicate special experience in Air Conditioners installation & Testing projects in which were employed
1								
2								

2. Indicate other points if any to show your technical and managerial competency to indicate any important point in your favour.

Signature of the Applicant (s)

SCHEDULE – D

FINANCIAL POSITION AND WORKING RESULTS

				2018-19	2019-20	2020-21
1	Annual turnover	:	Rs.			
2.	Net Profit	:	Rs.			
3.	Credit Facilities from the Bank	:	Rs.			
a)	Cash Credit	:	Rs.			
b)	Overdraft Limit	:	Rs.			
c)	Guarantee	:	Rs.			
d)	Others	:	Rs.			
4.	Certificate from the Bankers regarding financial soundness of the applicant	:	Enclosed (Yes / No)			
5.	Solvency Certificate from the Bankers	:	Enclosed (Yes / No)			

Signature of the Application (s)

SCHEDULE – E

MISCELLANEOUS INFORMATION

1	Whether it would be possible to process Bank Guarantee for various advances during execution of the work.	:
2	Details of Civil Suits / Litigations arised during execution of the contracts in the last 5 years.	:
3	Latest Income Tax Clearance Certificate	:
4	Name of the two senior official of Organizations preferably Govt./Semi Govt/ Autonomous/ Public Sector Organization for whom you have executed important and major Electrical works, who may be directly contracted by TIFR to gather information about your ability, competence and capacity of your work/organization/etc.	:
5	Number of Supplementary sheets attached.	:

Signature of the Applicant (s)

SECTION-III	**NOTICE & INSTRUCTIONS**

1. Sealed item rate tenders in the prescribed form are invited from Head-Technical Services, Tata Institute of Fundamental Research, Centre for Interdisciplinary Services, Hyderabad, for the following:

Tender Notice No.	**TIFR/PD/CA21-109/210815**
Name of Work	**Supply, Installation, Testing and Commissioning of Air Conditioning System and other related works for Biosafety Level (BSL) Lab-2 in Hanger Building-2, at TIFR, Plot-B, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.**
Estimated Cost	**Rs.13,50,000/-**
Time Limit	**15 days (Completion Period)**
Earnest Money Deposit	**As per Office Memorandum, No. F.9/4/2020-PPD Government of India, Ministry of Finance Department of Expenditure Procurement Policy Division. Dated 12th Nov. 2020. No provisions regarding Bid Security should be kept in the bid documents in future and only provision for Bid Security Declaration should be kept in the Bid Document. Accordingly the bidder should give the bid security declaration as per Annexure I**
Tender Fee	**Rs.500 (Rupees Five Hundred only)**
Last Date & Time of Submission of Tender	**18-10-2021 by 13:00 Hrs**
Date & Time of Opening of Technical Bid	**18-10-2021 at 15:00 Hrs**

2. Submission of Tender & Opening:

Tenders shall be submitted in a sealed envelope super scribed with Tender enquiry No., Due Date and with heading as "**Supply, Installation, Testing and Commissioning of Air Conditioning System and other related works for Biosafety Level (BSL) Lab-2 in Hanger Building-2, at TIFR, Plot-B, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046"** containing two separate sealed covers clearly super scribed as "TECHNICAL BID" and "FINANCIAL BID" on or before the closing date and time of submission in the following manner:

"TECHNICAL BID": This will contain the following:

a) Proof of Tender Cost paid already

b) Earnest Money Deposit as stipulated

c) Schedules giving information on Eligibility Criteria with supporting documents specified for tender qualification.

"FINANCIAL BID": Signed copy of the Financial Bid quoting amount in the stipulated format and signed copies of the tender drawings.

3. Earnest Money Deposit (EMD): As per Office Memorandum, No. F.9/4/2020-PPD Government of India, Ministry of Finance Department of Expenditure Procurement Policy Division. Dated 12th Nov. 2020. No provisions regarding Bid Security should be kept in the bid documents in future and only provision for Bid Security Declaration should be kept in the Bid Document. Accordingly the bidder should give the bid security declaration as per Annexure I (To be enclosed with the Technical Bid Part –I)).

4. Performance guarantee/Security Deposit:

The tenderer, whose tender is accepted, will be required to furnish a performance guarantee/security deposit of 3% of the tendered amount within 7 (seven) working days from the date of intimation. This guarantee shall be in the form Demand Draft / Pay Order / Banker's cheque / Deposit or Government Securities / Fixed Deposit Receipt (FDR) or Guarantee Bonds (BG) of any Scheduled Bank in accordance with the form as Annexure – II hereto. In case a fixed deposit receipt of any Bank is furnished by the contractor to TIFR as part of the performance guarantee and the Bank is unable to make payment against the said fixed deposit receipt, the loss caused thereby shall fall on the contractor and the contractor shall forthwith on demand furnish additional security to TIFR to make good the deficit.

The Performance Guarantee/Security Deposit shall be initially valid up to 12 months from date of commissioning. The performance guarantee shall be returned to the contractor, without any interest, after recording of the completion certificate for the work by the competent authority.

The Engineer-in-charge shall make a claim under the Performance guarantee for amounts to which TIFR entitled under the contract (notwithstanding and / or without prejudice to any other provisions in the contract agreement) in the event of:

a) Failure to attend and rectify the problems in the guarantee period, in which event the Engineer-in-charge may claim the full amount of the Performance guarantee.
b) Failure by the contractor to pay TIFR, Hyderabad any amount due, either as agreed by the contractor or determined under any of the Clauses / Conditions of the agreement, within 30 days of the service of notice to this effect by Engineer-in-charge.

In the event of the contract being determined under provisions of any of the relevant clauses of the agreement, the performance guarantee shall stand forfeited in full and shall be absolutely at the disposal of TIFR, Hyderabad.

5. Acceptance of Tender: The competent authority, on behalf of TIFR, Hyderabad does not bind itself to accept the lowest or any other tender, and reserves to himself the authority to reject any or all the tenders received, without assignment of any reason. All tenders, in which any of the prescribed conditions is not fulfilled or any condition, including that of conditional rebates, is put forth by the tenderer, shall be summarily rejected.

The Competent Authority, on behalf of TIFR, Hyderabad reserves to itself the right of accepting the whole or any part of the tender and the tenderer shall be bound to perform the same at the rates quoted. The officer inviting tenders shall have the right of rejecting all or any of the tenders and will not be bound to accept the lowest tender or any other tender.

6. Validity of Tender: The tender for the work shall remain open for acceptance for a period of 90 days from the last date of submission of tenders. If any tenderer withdraws his tender before the said period, or before issue of Letter of Intent, whichever is earlier, or makes any modifications in the terms and conditions of the tender which are not acceptable to the Department, then TIFR, Hyderabad shall, without prejudice to any other right or remedy, be at liberty to forfeit 50% of the said earnest money absolutely. Further the tenderer shall not be allowed to participate in the retendering process of the work.

7. Levy / Taxes payable by contractor:

i. GST or any other tax on materials and services in respect of this contract shall be payable by the contractor and TIFR shall not entertain any claim whatsoever in this respect.

ii. The contractor shall deposit royalty and obtain necessary permit as required for supply of the sand, aggregate, stone etc. from local authorities.

8. Deduction of Income Tax : As per Section 194-C of Income tax Act 1961, as amended by letter No. 275/9/72/9-TJ (Circular No. 86) dated 19.5.72 and No. 275/14/91-IT (B) (Circular No. 593) dated 5.2.91, received from Ministry of Finance, Department of Revenue, Central Board of Direct Taxes, New Delhi, the Income tax @ 2% and Surcharge thereon @12% (or any other amended rate by Ministry of Finance from time to time), of the gross value of the work done will be recovered from the bills. A certificate for the amount so recovered will be issued by the Department.

9. Site visit by the tenderer before tendering: Tenderers are advised to inspect and examine the site and its surroundings during working hours and satisfy themselves before submitting their tenders as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall

themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their tender. A tenderer shall be deemed to have full knowledge of the site whether he inspects it or not and no extra charges consequent on any misunderstanding or otherwise shall be allowed.

10. Signing of Tender and receipts for payments: In the event of the tender being submitted by a firm, it must be signed separately by each partner thereof or in the event of the absence of any partner, it must be signed on his behalf by a person holding a power-of-attorney authorizing him to do so, such power of attorney to be produced with the tender, and it must disclose that the firm is duly registered under the Indian Partnership Act-1952. Receipts for payments made on account of work, when executed by a firm, must also be signed by all the partners, except where contractors are described in their tender as a firm, in which case the receipts must be signed in the name of the firm by one of the partners, or by some other person having due authority to give effectual receipts for the firm.

11. Tenderer's responsibilities: The tenderer shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a tender by a tenderer implies that they have read this notice & all other contract documents, and has made himself aware of the scope & specifications of the work to be done and local conditions and factors having a bearing on the execution of the work.

12. Signing of contract: The Notice Inviting Tender shall form a part of the contract document. The successful tenderer / contractor, on acceptance of his tender by the Accepting Authority, shall, within 15 days from the stipulated date of start of the work, sign the contract consisting of: the Notice Inviting Tender, all the documents including all conditions, specifications and drawings, if any, forms the tender as issued at the time of invitation of tender and acceptance thereof together with any correspondence leading thereto.

13. Canvassing, either directly or indirectly, in connection with the tenders is strictly prohibited and the tenders submitted by the contractors who resort to canvassing will be liable to rejection and may be barred from future participation in TIFR works.

Head-Technical Services
*For and on behalf of **TIFR, Hyderabad***

SECTION-IV **GENERAL CONDITIONS OF CONTRACT**

1. Definition of Terms:

1.1. In constructing these general conditions and the specifications the following works shall have the meanings herein assigned to them unless there is something in the subject or context inconsistent with such construction.

1.2. The `Purchaser' shall mean Tata Institute of Fundamental Research- -Hyderabad, Tata Institute of Fundamental Research, 36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy District, Hyderabad 500046 and shall include the Purchaser's heirs, successors and assigns.

1.3. The term 'Engineer In-Charge' and `Engineer' shall mean Engineer In-Charge, TIFR-Hyderabad or some other person for the time being or from time to time duly appointed in writing by the Purchaser to act as Engineer In-Charge for the purpose of the Contract or in default of such appointment the Purchaser.

1.4. The term `Contractor'/`Supplier'/`Bidder'/`Vender' shall mean the Bidder whose tender has been accepted by the Owner and shall include the Bidder's heirs, successors and assigns approved by the Purchaser:

1.5. The term `Sub-Contractor' shall mean the firm or persons named in the contract for any art of the work or any person to whom any part of the work has been sublet with the consent in writing of the Engineer In-Charge and shall include his heirs, successors and assigns approved by the Purchaser.

1.6. The Term `Inspector' shall mean any person appointed by or on behalf of the Purchaser to inspect supplies, stores or work under the contract or any person deputed by the Inspector for the purpose.

1.7. The term `Particulars' shall mean, the following :

1.7.1. Specifications
1.7.2. Drawing (ANNEXURE-V)
1.7.3. Sealed Pattern denoting a pattern sealed and signed by the Inspector.
1.7.4. Proprietary make denoting the product of an individual firm.
1.7.5. Any other details governing the construction, manufacture and/or supply as existing for the contract.

1.8. The term `Specification' shall mean the specifications annexed to or issued with these Conditions of Contract.

1.9. The term `Site' shall mean the place or places at which the Equipment is to be delivered or work done by the Contractor; and shall include, where applicable, the lands and buildings upon or in which the works are to be executed and shall also include the place or places at which fabrication and other work is being carried out by the Contractor.

1.10. `Electrical Equipment', `Stores', `Work' or `Works' shall mean and include equipment and materials to be provided and work to be done by the Contractor under the Contract.

1.11. The `Contract' shall mean acceptance of the work order placed on contractor/supplier under section (2) of these conditions and shall include these conditions of Contract, Specifications, Schedule, Drawing, Letter of Intent of the Purchaser and any subsequent amendments mutually agreed upon.

1.12. 'Tests on Completion' shall mean such tests which are prescribed by the specifications or have been mutually agreed to between the Contractor/Supplier and the Purchaser to be made before the equipment is taken over by the Purchaser.

1.13. Writing' shall include any manuscript, typewritten or printed statement under or over signature or seal as the case may be. Words importing `person' shall include firms, companies, corporations and association of individuals whether incorporated or not.

1.14. Words importing singular shall also include plural and vice versa where context requires.

1.15. Bidders are advised to visit and inspect the work-site to make themselves fully conversant with the site conditions and nature of work. Any claim by them after the opening of bids on account of themselves being unaware of any site condition shall not be entertained.

2. Contract

Contractor/Supplier/Manufacturer should send their acceptance letter on receipt of `Letter of Intent' or 'Work Order' or 'Purchase Order' within the stipulated period. On expiry of said period or exorbitant delay in commencing or executing the work, the Purchaser shall not be liable to any claim from the Contractor/ Supplier for work entrusted to and may revoke the contract.

3. Work at Site

3.1. Access to the works shall be allowed only to the Contractor/Supplier, Sub-Contractors or his duly appointed representatives. The Contractor/ Supplier shall not object to the execution of other works by other contractors or tradesmen and shall afford them every facility for execution of their several works simultaneously with his own.

3.2. Work at the Purchaser's premises shall be carried out at such time as the Purchaser may approve but the Purchaser shall give the Contractor/ Supplier all reasonable facilities for the same. The Contractor/Supplier shall provide sufficient fencing, notice boards etc. to guard the works and warn the public.

3.3. The Contractor shall obey Central, Local and State regulations and enactments pertaining to workmen and labour and the Engineer In-Charge shall have the right to enquire into and decide all complaints on such matters. The Contractor should comply with the Minimum Wages Act and should also ensure that safe practices are followed by his people at site.

4. Delays

The Contractor/Supplier shall not be entitled to any compensation for any loss suffered by him on account of delays in commencing or executing the work, whatever the cause for such delays may be, including delays in procuring Government controlled or other materials and delay in obtaining instructions and decisions from the Engineer In-Charge.

5. Taking Over

The equipment when erected at site shall be deemed to have been taken over by the Purchaser when the Engineer In-Charge will have certified in writing that the equipment has fulfilled the contract conditions.

6. Extension of Time

If the Contractor/Supplier is delayed in the progress of work by changes ordered in the work, or by any cause, which the Engineer In-Charge shall decide to justify the delay, then the time of completion shall be extended by a reasonable time. In this regard, Contractor shall maintain proper hindrance register and record all such events with due signature of E-I-C on occurrence of such instants for seeking extension of time. However, no such extension shall be allowed unless requested for extension is made in writing by the Contractor/Supplier to the Engineer In-Charge within 15 days from the date of occurrence of the delay.

7. Liquidated Damages

7.1. For all delays, which do not merit any extension of time, the Contractor/ Supplier shall attract 1% penalty per week for the first 4 weeks of delay and 2% penalty per week for the next 4 weeks of the total contract value. The amount of liquidated damages shall be recoverable from the payment due to the Contractor/Supplier up to maximum of 10% of value of contract.

7.2. The deduction of liquidated damages shall not, however, absolve the Contractor/Supplier of his responsibility and obligations under the contract to complete the work in its entirety and shall also be without prejudice to action by the Purchaser under clause:

`Termination of Contract by the Purchaser'. After that the same shall be completed by the Purchaser at the Contractor's/Supplier's risk and cost.

8. Other Damages:

8.1. The Contractor/Supplier/Manufacturer shall be responsible for all injury to persons, animals or things and for all damage to the works, structure of, and decorative work in the property which may arise from operation or neglect of himself or any of his Subcontractor or of his or Sub-Contractor's employees, whether such injury or damage may arise from carelessness, accident or any other cause whatever in any way connected with the carrying out of this contract. This clause shall be held to include any damage to buildings, whether immediately adjacent or otherwise, any damage to roads, streets, foot paths, as well as all damage caused to the works forming the subject of this contract by frost or other inclemency of weather. The Contractor/Supplier shall indemnify the Purchaser and hold him harmless in respect of all and any expenses on property as aforesaid and also in respect of any claim made in respect of injury or damage under any acts of Government or otherwise and also in respect of any award of compensation or damages consequent upon such claim. Contractor shall furnish necessary insurance documents (Contractor All Risk Policy) taken for the site before commencement of work.

8.2. The Contractor/Supplier/Manufacturer shall reinstate all damage of every sort mentioned in this clause, so as to deliver up the whole of the contract works complete and perfect in every respect and so as to make good or otherwise satisfy all claims for damage to the property of the Owner/third parties.

8.3. The Contractor/Supplier/Manufacturer shall indemnify the Purchaser against all claims which may be made against the Purchaser, by any member of the public or other party, in respect of anything which may arise in respect of the works or in consequence thereof and shall, at his own expense, effect and maintain, until the work has been 'Taken Over' under clause 5.

8.4. The Contractor/Supplier/Manufacturer shall also indemnify the Purchaser against all claims which may be made upon the Purchaser whether under the Workmen's Compensation Act or any other statute in force during the currency of this contract or at common law in respect of any employee of the Contractor/Supplier or of any of his sub-contractor and shall at his own expense effect and maintain until the work has been `Taken Over', with an approved office. Contractor shall furnish a copy of the labour licence before commencement of work. If the aforesaid are not applicable contractor should furnish declaration to this effect and shall indemnify TIFR-Hyderabad, Hyderabad for violation of any such compliances.

8.5. The Purchaser, with the concurrence of the Engineer In-Charge, shall be at liberty and is hereby empowered to deduct the amount of any damages compensation costs, charges and expenses arising or accruing from or in respect of any such claims or damages from any sums due to or become due to the Contractor/Supplier.

9. Guarantee and Defects Liability Period:

9.1. The Contractor/Supplier/Manufacturer shall guarantee that all equipment shall be free from any defect due to the defective materials and bad workmanship and that the equipment shall operate satisfactorily and that the performance and efficiencies of the equipment shall be not less than the guaranteed values. The guarantee shall be valid for a period of 12 months after the date of commissioning as certified by the Engineer In-Charge. Any parts found defective shall be replaced free of all costs by the Contractor/Supplier. The services of the Contractor's/Supplier's personnel if requisitioned during this period for such work shall be made available free of any cost to the Purchaser.

9.2. If the defects be not remedied within a reasonable time, the Purchaser may proceed to do so at the Contractor's/Supplier's risk and expense without prejudice to any other rights.

10. Terms of Payment

The contractor will be paid only 2 Running Account (RA) Bills and Final Bill considering the progress of works based on measurement of works completed. The contractor shall submit the bills for payments along with a detailed statement showing the actual works carried out under different heads of items in the format specified by TIFR-, Hyderabad. Minimum value of the work for interim payment shall be Rs.5,40,000/-.

BILL FORMAT

Tender Item No.	Description of Items (At least 2 lines)	Unit	Tender Quantity	Executed Quantity	Rate	% work done	Amount

NOTE: All quantities in the bill should be cumulative.

All measurements should be in the order of tender sequence and should be recorded in the measurement book.The Measurement should be strictly in the below mentioned format only.

MEASUREMENT FORMAT

Tender Item No.	Description of Item & Location against each Measurement taken	Nos.	Length	Breadth /width	Height	Qty.	Remarks

The works which have been certified for running bills will also be verified along with the final bill and any defects found need to be replaced / rectified by the contractor at his cost. Till the time, the site is handed over in full, it is the contractor's liability to safeguard the works done and completed at site. The Progress of work should not be affected in any way quoting the reason of non-availability of funds / materials / releasing of Running bill. The liability of the contractor is to complete all works in his scope in the scheduled time as per the terms of contract and will not relieve the contractors from his obligations once the Running bill is paid / kept pending.

Final Payment

Payments of Final bill shall be made after deduction of d /Performance guarantee as specified. The Security Deposit / Performance guarantee, shall be refunded on expiry of the Defects Liability Period after rectifying all defects to the satisfaction of the TIFR-Hyderabad/E.I.C. The acceptance of payment

of the final bill by the Contractor would indicate that he would have no further claim in respect of the work executed.

11. Special conditions of Contract governing supplies of the Equipment of this Tender:

11.1. **Scope:**

11.1.1. This specification covers the supply of material as per the enclosed details and quantities and supervision of erection/installation, testing and commissioning of the material.

11.1.2. The Contractor/Manufacturer/Supplier shall quote for all the materials along with accessories as mentioned in the enquiry.

11.1.3. All the supply shall be in accordance with relevant I.S. Specifications and recognized standards.

11.2. **Inspection & Testing of Material:**

11.2.1. Contractor/Manufacturer/Supplier shall submit the lists of Type Tests and Routine Tests to be conducted on the material in the Technical Data Sheet.

11.2.2. All the materials shall be tested at factory as per IS Specifications of material by Purchaser's Engineer In-Charge/Engineers before dispatch at the cost of Contractor/Manufacturer/Supplier.

11.2.3. Contractor/Manufacturer/Supplier shall inform the concerned Engineer In-Charge for inspection and testing in accordance and fix up a suitable date for the same.

11.3. **Test Certificates:**

Contractor/Manufacturer/Supplier shall submit the Test Certificates of all materials.

11.4. **Taxes & Duty:**

11.4.1. Contractor/Manufacturer/Supplier shall quote the basic price of material. Excise Duty, Custom Duty, Sales Tax, GST, Octroi, Delivery Charges, Transit Insurance and/or any other charges, if any, must be indicated separately.

11.4.2. TIFR being a research institute of Govt. of India, is eligible for Excise Duty Exemption on equipment supplies. Necessary exemption certificate will be provided by TIFR.

11.4.3. Transit Insurance: The Transit Insurance from the point of dispatch to the site of erection shall be in the scope of Supplier and the cost shall be indicated separately.

11.5. **Delivery of Material:**

11.5.1. The Contractor/Manufacturer/Supplier shall be held responsible for loading of all equipment and for the stores being sufficiently and properly packed for transport by rail, road, sea or air so as to ensure their being free from any loss or damage on arrival at destination. The packing and marking of packages shall be done by and at the expenses of Manufacturer/Supplier. Each package shall contain a packing note quoting purchase order number and detail of the contents.

11.5.2. All the materials must be delivered at site i.e. Hyderabad - TIFR at 36/P, Gopanpally Village, Serilingampally Mandal, Ranga Reddy District, Hyderabad-500046. The unloading and positioning of all equipment at the designated locations specified by the Engineer In-Charge shall be in the scope of the Supplier. The Supplier shall arrange for handling equipment, labour for rigging, etc. as required.

11.5.3. Material must be delivered at site in all respects as mentioned in the Purchase Order.

11.6. **Guarantee:**

If during the period of guarantee any fault or defect arises, the material shall be replaced/repaired immediately free of cost, as well as any replacement of accessories required shall be done free of cost.

11.7. **Mistake in Drawing:**

The Contractor/Supplier shall be responsible for and shall pay for any alterations in works due to any discrepancies, errors or omissions the drawings or other particulars supplied by him whether such drawings or particulars have been approved by the Purchaser or not.

11.8. **Responsibility for Completeness:**

Any fittings or accessories which may not be specifically mentioned in the specifications but which are usual or necessary are to be provided by the Contractor/Supplier without extra charge and the equipment must be complete in all details.

11.9. **Extra/Deviation items & Variations in quantity**

TIFR-Hyderabad has the right to omit/delete any of the items and also increase/decrease the quantities mentioned in the tender. No claim or any compensation in this regard will be accepted or paid to the contractor. However, if any new /additional items/deviated items are to be executed, the contractor is bound to execute such items with prior approval from TIFR-Hyderabad after furnishing the proper rate analysis for such extra/deviated items

11.10. **Rejection of Defective Equipment:**

11.10.1. If the equipment after the acceptance thereof is discovered to be defective, notwithstanding that such defects could have been discovered at the time of inspection or found to have failed to fulfill the requirements of the contract or developed defects after the erection within a period of 12 months from the date of erection, even if such erection is done by the Purchaser, he shall be entitled to give a notice on the Contractor/Supplier setting forth details of such defects or failure and the Contractor/Supplier shall, provided such notice is given within a period of 14 months from the date of such erection or acceptance, forthwith make the defective equipment good or alter the same to make it comply with the requirements of the contract at his own cost and further if in the opinion of the Purchaser, the defects are of such a nature

that the defects cannot be made good or required without impairing the efficiency or workability of the equipment or if in the opinion of the Purchaser the Equipment cannot be repaired or altered to make it comply with the requirements of the Contract, the Contractor/Supplier shall, provided a notice given by the Purchaser in this behalf within a period of 14 months from the date of erection or acceptance thereof, remove and replace the same with the equipment conforming to the stipulated particulars, in all respects at the Contractor's/Supplier's own cost. Should he fail to do so within a reasonable time, the Purchaser may reject and replace, at the cost of the Contractor/Supplier, with equipment of the same particulars or if equipment conforming to the stipulated particulars are not in the opinion of the Purchaser readily procurable, such opinion being final, then with the nearest substitutes.

11.10.2. In the event of such rejection the Purchaser shall be entitled to use the Equipment in a reasonable and proper manner for a time reasonably sufficient to enable him to obtain replacement equipment as herein before provided.

11.11. **Inspection and Final Tests:**

All tests necessary to ensure that the Equipment complies with the particulars and guarantee shall be carried out at such place or places as may be determined by the Inspector. Should, however, it be necessary for the final test as to performance or guarantee to be held over until the Equipment is erected at site they shall be carried out within one month of completion of erection.

11.12. **Intimation about Delivery:**

If the Purchaser shall have notified the Contractor/Supplier in writing that the former is not ready to take delivery, no equipment or materials shall be forwarded until an intimation in writing shall have been given to the Contractor/Supplier by the Purchaser that he is ready to take delivery.

11.13. **Delay in erection:**

Wherever erection of an equipment or machinery is the responsibility of the Contractor/Supplier as a term of the contract and in case the Contractor fails to carry out the erection as and when called upon as to do within the period specified by the Purchaser, the Purchaser shall have right to get the erection done through any source of his choice. In such an event, the Contractor/Supplier shall be liable to bear any additional expenditure that the Purchaser may incur towards erection. The Contractor/Supplier shall, however not be entitled to any gain due to such an action by the Purchaser.

11.14. **Definition of Equipment:**

The work `Equipment' wherever, it appears in these `Special Conditions of Contract' governing supplier of Equipment in this Tender shall mean all switchgears, panels, etc. or parts thereof or what the Contractor/Supplier agrees to supply under Contract as specified in the work order.

11.15. **Force Majeure:**

Normally Force Majeure shall cover only acts of God, fire, wars, strike, riots and civil commotion, floods, epidemic, quarantine related strikes, freight embargoes, etc. The contractor shall not be liable for any liquidated damages for delay or any failure to perform the contract arising out of Force Majeure conditions, provided that the contractor shall within ten days from the beginning of such delay notify the department in writing the cause of delay along with convincing supporting evidence. The department once convinced and accepted the reason may extend the supply completion period by a suitable / reasonable margin.

11.16. **Termination of Contract by the Purchaser:**

11.16.1. If the Contractor/Supplier commits any `Act of Insolvency' or shall be adjudged an Insolvent or shall have an order for compulsory winding up made against him or pass effective resolution for winding up voluntarily, or if the Contractor/Supplier shall suffer any payment under this contract to be attached by or on behalf of any of the creditors of the Contractor/ Supplier, or shall assign the Contract without the prior consent in writing of the Engineer In-Charge, or shall charge or encumber this Contract or any payments due or which may become due to the Contractor/Supplier there under, or if the Engineer In-Charge shall certify in writing to the Purchaser that the Contractor/Supplier –

11.16.1.1. has abandoned the Contract, or

11.16.1.2. has failed to commence the works, or has without any lawful excuse these conditions suspended the progress of the works for seven days after receiving from the Engineer In-Charge written notice to proceed, or

11.16.1.3. has failed to proceed with the work with such due diligence and failed to make such due progress as would enable the works to be completed in accordance with the approved programme of work,, or

11.16.1.4. has failed to remove materials from the site or to pull down and replace work for seven days after receiving from the Engineer In-Charge written notice that the said materials or work were condemned and rejected by the Engineer In-Charge under these conditions, or

11.16.1.5. has neglected or failed persistently to observe and perform all or any of the acts matters or things by this contract to be observed and performed by the Contractor for seven days after written notice shall have been given to the Contractor/ Supplier requiring the Contractor/Supplier to observe or perform the same, or

11.16.1.6. has to the detriment of good workmanship or in defiance of the Engineer In-Charge's instructions to the contrary sub-let any part of the contract, then and in any of the above said causes, the Purchaser with the written consent of the Engineer In-Charge may, notwithstanding any previous waiver, after giving seven days' notice in writing under the provisions of this clause to the Contractor/Supplier, determine the contract but without prejudice to the powers of the Engineer In- Charge or the obligations and liabilities of the Contract, the

whole of which shall continue to be in force as if the contract has not been so determined and as if the work subsequently executed has been executed by and on behalf of the Contractor/ Supplier.

11.16.2. After the issue of such notice, the Contractor/Supplier shall not be at liberty to remove from site any equipment, tools and materials belonging to him which shall have been placed thereon for the purpose of the works and the Purchaser shall have lien upon such equipment, tools or materials to subsist from the date of such notice and until the notice shall have been complied with.

11.16.3. If the Contractor/Supplier shall fail to comply with the requirements of said notice for seven days after such notice has been given, the Purchaser shall have the power to enter upon and take possession of the works and site and all equipment, tools and materials thereon, and to engage any other person, firm or agency to complete the works, utilizing the equipment, tools and materials to the extent possible. The Purchaser shall not in any way be responsible for damage or loss of the tools, equipment and materials and the Contractor/Supplier shall not have any compensation therefore.

11.16.4. Upon completion of the works, the Engineer In-Charge shall certify the amount of expenditure properly incurred consequent on and incidental to the default of the Contractor/Supplier as aforesaid and such amount shall be deducted from the payments due to the Contractor/Supplier, including the Security Deposit. If the said amount exceeds the payment due to the Contractor/Supplier, the Purchaser shall be at liberty to dispose off any of the Contractor's/Supplier's materials, tools or equipment and apply the proceeds for the payments due from the Contractor/Supplier and recover the balance by process of law.

11.16.5. After the works have been completed after the amounts due to the Contractor/Supplier, the Engineer In- Charge shall give notice in writing to the Contractor/Supplier to remove the surplus equipment and material from site. If such equipment and materials are not removed within a period of 14 days after such notice, the Purchaser shall have the power to remove and sell the same holding the proceed less the cost of removal and sale, to the credit of the Contractor/Supplier. The Purchaser shall not be responsible for any loss sustained by the Contractor/Supplier from the sale of the equipment and material.

13. Contractor's Representative:

13.1. The Contractor/Supplier shall employ at least one qualified representative (ie. Electrical supervisory License with minimum 3 years of experience of similar works as stipulated by TIFR-Hyderabad in the work order) whose name shall have previously been communicated in writing to the Engineer In-Charge and approved by him to supervise the erection. Any written order or instructions given to the representative shall be deemed to have been given to the Contractor/Supplier. The Engineer In-Charge shall be at liberty to object to any particular representative/or any persons employed by the Contractor/Supplier on the work and the

Contractor/Supplier shall remove the person objected to, on the receipt of the Engineer In-Charge, in writing, a request requiring him to do so and shall provide in his place another competent representative acceptable to the Engineer In-Charge.

13.2. The Contractor's/Supplier's representative shall be a qualified electrical/ mechanical engineer possessing adequate site experience in similar nature of works.

14. Completion Time:

Unless otherwise agreed in writing between the Purchaser and the Contractor/Supplier, the work contract shall be completed within the stipulated period mentioned elsewhere in this tender document from the date of Work/Purchase Order issued to Contractor/Supplier by the Purchaser.

15. Delivery of Material at Site:

The Contractor/Supplier/Manufacturer shall arrange for safe transit and delivery of material at site and unloading the material at site.

16. Validity of Tender:

The quotation should be valid for 90 days after opening of the Part—I: Technical Bids.

17. Measurements:

All joint measurements of quantities shall be done by the Contractor at his own cost in the presence of the Engineer In-Charge or any authorized person deputed by him who will certify the routes, length and quantities etc. for the purpose of determination of the amount payable.

18. Spare Parts & Manuals:

Manufacturer/Contractor/Supplier should submit operation, maintenance and spare part list and manuals for all equipment.

19. Training:

Manufacturer/Contractor/Supplier should provide training for operation and maintenance free of cost for equipment supplied.

20. Special Instruction for bidding process

This tender is a two part tender. The Part-I: Technical Bid and Part-II: Financial Bid. Bidders shall seal each bid separately with a clear label on the envelope about its content. Both the bids should be submitted in a single drop two cover method. Any pricing details must not appear in the Part-I: Technical Bid.

21. Drawings and Documentation:

As-built drawings as specified in this technical specifications shall be submitted by the Contractor.

22. Permissions and Approvals:

All statutory permissions and approvals from Electricity authority as may be required for commissioning of the entire system shall be carried out by the contractor. All necessary documentation for obtaining such permissions and approvals shall be done by the contractor. Purchaser shall assist in providing required declarations. Statutory fees shall be paid by the purchaser.

23. Guarantee:

The equipment shall be guaranteed against all design and manufacturing defects, poor workmanship etc. for a period of 12 months from the date of commissioning or 18 months from the date of supply, whichever is earlier. Any defects discovered during this period shall be rectified by the vendor free of cost to the purchaser.

SECTION-V **TECHNICAL SPECIFICATIONS**

SELECTION CRITERIA

Equipment and materials shall be selected for the following parameters.

1. FLOOR MOUNTED HORIZONTAL AIR HANDLING UNITS:

AHUs shall be selected for the air quantity, capacity and static as mentioned in the BOQ. The following specifications are to be followed.

Type of AHU	:	Double Skin
Air quantity and static pressure	:	As specified in the BOQ
Type of fan	:	EC Fan with necessary controls with one extra stand by supply fan
AHU sections	:	Mixing Box Section, Filter section, coil section, fan section and fine filter section
Maximum velocity across the coil	:	500 FPM
Maximum velocity across the filter	:	400 FPM
Maximum air velocity at fan outlet	:	9.5 mt. / sec
Coil face area	:	Full Face Area
Minimum coil rows deep	:	8 Row
Coil fins per inch	:	12 FPI
Inner sheet thick	:	0.8 mm GI plain sheet
Outer sheet thick	:	0.8 mm pre plasticized / pre-coated GI
Panel thickness	:	50± 2 mm
Aluminum profiles	:	Thermal break profiles
Return / Fresh / Bleed air / Supply dampers	:	AL aerofoil opposed blade type

Motor	:	EC Fan with necessary controls
Pre and Commissioning Filters	:	EN 779 : G4 pre filter – 50mm deep
Fine Filters	:	EN 779 : F9 fine filter – 300mm deep
Pressure sensing probes	:	Shall be provided for pre filters and fine filters to install magnehelic gauges.
Noise level	:	Should not exceed 65 dBA @ one meter distance from AHU.

- AHU shall have viewing port in fan section, limit switch for access door in the fan section, marine lamp with switch in mixing box section, blower section and fine filter section.
- AHU's and coils shall be suitable for VRF ODUs. Necessary coil kits with corded remote, controls & controller etc., shall be considered. Coil shall have multiple circuits to suits number of VRF ODUs.
- 100% fresh air AHU shall be two tier & shall have one extra stand by supply fan and exhaust air side one extra fan to consider. Pre filters with heavy duty fresh air louvers to be considered.
- One AHU shall be offered for factory inspection after complete assembly for physical inspection, run test and performance test.
- EC fans shall be selected with the lowest noise level possible. EC fan speed shall be controlled based on the static pressure in the supply duct in variable air volume AHUs. Necessary static pressure sensor, controller, wiring, etc., shall be in the scope of AHU. EC fans shall be able to integrate with third party BMS.

2. DUCTING:

Factory / site fabricated : Factory fabricated
GSS sheet : IS 277 – 120 grade
Fabrication standard : SMACNA – 2005 – 500 Pa
Transverse Joints : TDF and slip on flanges as specified in BOQ.
Supports : GI threaded rod and slotted rail
Bolt & Nuts : 6 mm GI bolt & nuts with two side washers shall be used at a distance of < 150mm

Ducting length shall be 4ft or less as per the approved drawings and as per the site conditions. Elbows, partial elbows, taper pieces and other fittings shall be as per the drawing and as per site conditions.

Factory / site fabricated : Factory fabricated

GSS sheet	: IS 277 – 120 grade
Fabrication standard	: SMACNA – 2005 – 1000 Pa
Transverse Joints and bracing	: MS angle frames
Supports	: GI threaded rod and slotted rail
Bolt & Nuts	: 6 mm GI bolt & nuts with two side washers shall be used at a distance of 100mm

Ducting length shall be 4ft or less as per the approved drawings and as per the site conditions. Elbows, partial elbows, taper pieces and other fittings shall be as per the drawing and as per site conditions.

3. VENTILATION UNITS:

Type of unit	: Double Skin
Fan	: EC Fan with necessary controls
Maximum air velocity at fan outlet	: 9.5 mt. / sec.
Motor Efficiency	: High Efficiency Motor
Maximum velocity across filters	: 500 FPM
Inner sheet thick	: 0.63 mm or 24 G GI
Outer sheet thick	:0.63 mm or 24 G pre plasticized sheet
Insulation thickness	: 25 mm
Aluminum sections	: Non thermal break profile
Outlet dampers	: Al aerofoil opposed blade type
Motor	: TEFC
Motor RPM	: 1450
Drive	: Direct

Exhaust air units shall have the filters. Exhaust units shall have plenum for duct connection. Units on the terrace shall have cowl and bird screen.

Ventilation fans shall have a limit switch for access door in the fan section and marine lamp with switch in fan section.

4. DUCT THERMAL INSULATION:

Thickness	: Supply Air Duct with 25mm thick : Return Air Duct with 19mm thick
Material	: aluminum foil laminated class “O” closed cell, chemically cross-linked polyethylene Foam (XLPE)
Finish	: All joints shall be finished with 50mm wide Self-adhesive tape.
Density	: Min. 55Kg/ cub. Mt.

Thermal conductivity at 0 deg C.	: 0.037 W/mt. deg. K
Water permeability	: 10000 u
Adhesive	: Low VOC

All exposed ducting shall be insulated with class “O” XLPE of thickness 25mm thick for supply & 19mm thick for return ducts (40kg/m3 density) running in non-air conditioned areas and outside the building. The insulation shall be finished with polythene paper and 24G chicken wire mesh and finished with 24G aluminium cladding.

5. DUCT ACOUSTIC INSULATION:

Thickness	: 15 mm thick
Material	: Class ‘1’ Open closed cell nitrile rubber Insulation.
Density	: Min. 140 Kg/ cub. Mt.
Thermal conductivity at 20 deg C.	: 0.047 W/mt. deg. K
Water permeability	: 10000 u
Adhesive	: Low VOC

TECHNICAL SPECIFICATIONS

1. DX Condensing Unit:

The unit shall have a heavy sheet metal cabinet. The body shall be machine pressed and adequately stiffened. It shall be chemically treated for corrosion and then powder coated. Refrigerant shall be R 410a.

The compressor shall be of scroll / rotary type as specified and shall operate with a wide voltage Variation. It shall have a high-energy efficient ratio. The evaporator fan shall be with forward curved blades. The fan shall be statically and dynamically balanced and shall develop a minimum static pressure of 40mm wg. The motor and fan shall be resilient mounted and shall be belt driven. The fan shall be connected to the unit with an inbuilt canvas. The filter shall be of synthetic woven type having a dust arrestance of 10 microns and shall be cleanable. Provide throwaway commissioning filters apart from the standard filters. The coils for both the condenser and evaporator shall be of multi row with copper tubes and Aluminium fins. The fins shall be bonded to the coil under hydraulic pressure. Provide Thermostatic expansion valve with drier for the units. Capillary tubes are not acceptable. Provide shut off valves for the liquid and hot gas lines for the packaged unit and the Condenser unit. The unit shall have microprocessor based electronic control for operation and temperature control. The condenser shall have upward or horizontal throw configuration. The fan shall be of propeller type with lesser noise level as specified. Provide mesh condenser fans and the cooling coils. The

condenser fan shall be provided with an isolator to switch off the power during service. The unit shall be suitable for operation at 415 Volts as specified. The noise level of the unit shall not exceed 60 dBA at 1m from the unit and the vibration shall not exceed 75 microns peak to peak. Provide supporting stands for the packaged unit and condenser units. The stand shall be hot dip galvanized or fabricated out of MS with zinc chromate primer and 2 coats of approved shade synthetic shade enamel paint.

Split units should have a control panel for distribution of power to all the circuits within the unit and should have precise control on temperature to maintain the desired indoor conditions.

The unit shall be factory assembled and tested. Provide test certificates for the units.

2. COPPER REFRIGERANT PIPING:

Soft copper piping of 20/21 SWG shall be used for VRF indoor unit connections. All other copper piping shall be hard drawn 18/19 SWG shall be used. Copper piping shall be of VRF grade with 100% eddy current testing. Copper piping shall be supported or clamped at every 1.5mt. distance Only imported refnet joints from the equipment supplier should be used for VRF piping. All other pipe fittings shall be of approved make drawn with 18/19 G copper piping. Pressure testing of copper piping should be carried out floor wise as per site condition. Final pressure testing should be carried out after completing the entire piping and after connecting to the indoor units and outdoor units. Copper piping shall be tested at 400 PSI for 24 hours. Valves for the maintenance shall be provided at the required places. Proper supports on the first floor shall be provided for copper refrigerant piping at 1.5m interval.

Refrigerant piping inside the building shall be laid in an inverted cable tray of 1.6mm thk perforated GI with all fittings. Refrigerant piping on the open areas shall be covered at bottom and top with powder coated GI cable tray to avoid physical damage. Bottom tray shall be perforated and top tray shall be without any perforations. Both trays shall be of 1. 6mm thick

3. INSULATION TO REFRIGERANT PIPING:

19 mm thick Class “O” nitrile rubber with factory laminated glass cloth tube insulation shall be used for VRF copper piping. The density of nitrile rubber insulation shall be 40 to 60 Kg/cu. m. Both the copper refrigerant piping shall be insulated. Insulation shall be finished properly and neatly at all fittings and joints. PVC sleeve shall be provided at all supports and shall be tied firmly with wire tie. Insulation shall not be damaged at supports. PVC sleeves shall be provided over the insulation when passing through the walls or slabs. All joints shall be sealed with self-adhesive tape. Nitrile rubber insulation shall be UV resistant and suitable for outdoor application without any treatment. Thermal conductivity at 0 deg. C shall be 0.033 W/m. deg. K. Water vapor permeability u shall be more than 10,000. Exposed insulation shall be painted with two coats of UV resistant paint.

4. COMMUNICATION CABLE AND CONTROL CABLING:

Communication cable and control cabling: Communication cable and control cabling shall be laid in 20mm dia. FRLS PVC conduits. PVC conduit should be clamped neatly. Cable terminations and dressing shall be done properly and neatly.

5. DRAIN PIPING:

CPVC drain piping shall be used for the drain piping. Proper care shall be taken to lay the drain piping with sufficient slope and should be clamped or supported at 1.5m interval. All drain pipe joints shall be done with adhesive. Drain piping should be tested for leaks before commissioning. Drain piping shall be insulated with 13 mm thick Closed cell nitrile foam insulation (40 kg/m3 density). Insulation joints shall be finished with self-adhesive tape procured from the same supplier.

6. FLOOR MOUNTED HORIZONTAL AIR HANDLING UNITS (AHUs):

Casing: Double skinned panels shall be made of galvanized steel PUF insulation and shall be fixed to 2. 5 mm thick aluminum alloy box section frame work with stainless screws. Aluminum profile shall have thermal break profiles. Panel thickness shall be 48±2 mm thick Outer sheet of panels shall be made of galvanized 0. 8 mm thick pre-painted / pre plasticized sheet and inner skin of 0.8 mm thick plain GI sheet.

The casing shall be mounted on an aluminum alloy channel base. The panels shall be sealed to the frame work by ‘O’ ring gaskets held captive in the framed extrusion. All panels shall be detachable. Inspection door hinges shall be made of die cast aluminum with stainless steel pivots, handles shall be made of hard nylon.
Units with various sections shall be suitable for onsite assembly with continuous foam gasket. All fixing screws and gaskets shall be concealed. Units shall have hinged quick opening access door in the fan and filter section.

Bigger AHUs shall have required reinforcement to take care of the static. AHU cabinet should not sag or bend during starting and running.

Dampers: Dampers shall be opposed blade type. Blades shall be made of double skinned aero foil aluminum extruded sections with integral gasket and assembled with rigid extruded aluminium alloy frame. Manual dampers shall be provided with Bakelite knob of locking the damper blades in positions.

Volume control dampers are to be provided at fresh air, return air, bleed air and supply air provisions. Also fresh air & bleed air damper shall have pre filter fitted.

Mixing Box Section: Mixing box section shall be provided with return air provision and fresh air provision with dampers. Mixing box section shall have pre filters. Mixing box section shall have access doors.

Filter banks shall be easily accessible and designed for easy removal and renewal of filter cells. Pre filters shall be 50mm deep synthetic washable type EN 779 : G4 pre filter. Filter frame shall be made of 18 G SS 304.

Coil Section: cooling coil shall be constructed from 12 / 16 mm OD copper tubes 24 gauge wall thickness, mechanically bonded to aluminium fins of 34 / 36 gauge thick and assembled within a heavy gauge galvanized steel frame work. Coils shall be provided with air vent and drain plugs. Coil assembly shall be supported on slide frames for easy withdrawal.

Cooling coil shall be complete with drain pan constructed from stainless steel sheet and shall be installed inside the double skin panel to avoid condensation. The drain pan shall be fitted with drainage coupling on both sides. Drain tray shall have the three directional slope and to be insulated with 9mm thick nitrile rubber.

FAN SECTION:

Fan section shall comprise of EC fan. EC fan shall have integrated plug fan, EC motor and variable speed drive and shall be supplied as single integrated assembly. Fan wheels shall be made of galvanized steel sheet. Fan shall be of direct driven and shall be individually tested and precision balance dynamically. The fan impeller is directly mounted onto the motor rotor. The high efficiency permanent magnet motor and variable speed drive are designed as matched components.

When the multiple fans are provided in the AHU, motorized damper shall be provided at the outlet of the fan to avoid short circuiting of air when the fan is not working.

EC fan shall be selected with lowest noise level possible. EC fan speed shall be controlled based on the static pressure in the supply duct in variable air volume AHUs.

Necessary static pressure sensor, controller, wiring, etc., shall be in the scope of AHU. EC fan shall be able to integrated with third party BMS.

Fine Filter Section: Fine filters section shall be at the outlet of fan. Fine filter section shall have fine filters, provision for connecting supply duct with damper. Fine filters section shall have provision to bleed off the air if required. Fine filter section shall have access door, marine lamp, switch, etc.,

Filter banks shall be easily accessible and designed for easy removal and renewal of filter cells. EN 779: F9 fine filter with 300mm deep shall be provided. Filter frame shall be made of 18G GI.

INSTALLATION:

Floor mounted AHUs shall be installed with continuous loose pedestals in the AHU room. Pedestals shall be two or three depending on the size of the AHU. Minimum two ribbed rubber pads of size 150 x 150 x 12 mm separated by GI sheet shall be provided at 6 or 9 places depends on the size of the AHU. AHUs shall be taken to the respective places and shall be assembled as per manufacturer guide lines.

AHUs placed in open space shall have canopy without any joint to ensure rain water do not fall on the AHUs.

TESTING & PERFORMANCE:

Cooling capacity of various unit models shall be computed from the measurements of air flow and dry and wet bulb temperatures of air entering and leaving the coil. Flow measuring meters shall be accurately calibrated. Computed results shall conform to the specified capacities and quoted ratings. Power consumption shall be computed from measurements of incoming voltage and input current.

7 DUCTING:

7.1. GSS DUCTING WITH TDF & SLIP ON FLANGES:

GI sheets shall be as per IS 277 – 120 Grade. Fabrication shall be as per SMACNA 2005. Ducting shall be factory fabricated and delivered at site. Thickness of the sheet and type connector shall be as per the following table.

Duct Dimension (mm)	500 Pa	
	Sheet Gauge	Connector
0 - 450	26	TDF
451 - 750	26	TDF
751 - 900	24	TDF
901 - 1000	22	TDF
1001 - 1200	22	Slip-on
1201 - 1300	20	Slip-on
1301 - 1500	20	Slip-on

1501 - 1800	20	Slip-on
1801 - 2100	18	Slip-on
2101 - 2200	18	Slip-on
2201 - 2400	18	Slip-on
2401 - 2700	16	Slip-on

Duct Dimension (mm)	**1000 Pa**	
	Sheet Gauge	**Connector**
0 - 450	24	TDF
451 - 750	24	TDF
751 - 900	22	TDF
901 - 1000	20	TDF
1001 - 1200	20	MS angle frame
1201 - 1300	18	MS angle frame
1301 - 1500	18	MS angle frame
1501 - 1800	18	MS angle frame
1801 - 2100	16	MS angle frame
2101 - 2200	16	MS angle frame
2201 - 2400	16	MS angle frame
2401 - 2700	16	MS angle frame

For GSS ducting, rivets shall be of MS. The distance between the rivets shall not exceed 150mm. The distance between bolt & nuts shall not exceed 150mm.

All bolts, nut & washers shall be of GI. Bolt & nuts shall provide with both sides washers. Good quality self-adhesive rubber gasket with 5 mm thickness shall be used.

Ducting shall be supported on MS pre painted ‘L’ shaped brackets with required cross bracing for all the ducts which are running along the wall. All the MS supports shall be painted with one coat of red-oxide and two coats of black enamel paint. For hanging ducts supported from true ceiling, GI full threaded rod and slotted angle shall be used as per the following table.

S. No.	Duct Size	Thickness of formed channel	Gauge	Rod dia.	Anchor Fastener
1	Up to 500mm	1.0mm	20	8 mm	M 8
2	501 – 1000mm	1.5 mm	16	8 mm	M 8
3	1001 – 1500mm	2.0mm	14	10 mm	M 10
4	Above 1500mm	3.0mm	14	12 mm	M 12

Anchor fasteners make shall be Hilti / Fischer.

Ducting supports shall be provided at every 2400mm distance. Ducting supports shall be provided on both sides of the wall / partition when it is passing through the wall / partition. Ducting shall not be supported on the wall or false ceiling. Duct support shall not be sagging. Proper care should be taken to avoid duct leakages. Sealant shall be used if required. Vanes in elbows and collar take off shall be provided. Sealant shall be applied to all transverse joints and longitudinal joints for exhaust ducting. Measurements for the ducting shall be taken at center line.

Duct sleeves made of 18 G sheet shall be provided at wall crossings. MS angle frames shall be provided on the both sides and at the middle to take the weight of the wall. The sleeve size shall be 50mm more than duct size. Duct shall be supported on both sides of the wall / sleeve.

Gap between the sleeve and duct shall be filled with fibre glass material tightly around the duct. This needs to be done by HVAC contractor.

On both sides of the wall, fire sealant shall be applied on the surface. This work will be part of civil work / interior work.

Each duct piece shall not be longer than 4’ and shall be smaller wherever required as per the drawing and as per the site conditions. Full elbows / partial elbows shall be as required.

Ducting shall be subjected to pressure testing at designed pressure as per SMACNA. Necessary opening of ducts, taking of take offs, providing dummies, etc. shall be done before conducting the duct pressure test.

8. DIFFUSER PLENUMS:

Diffuser plenums shall be factory fabricated with 26 G GI sheet. Plenum shall not have gaps at the corners. Sealant shall be used wherever required. Plenum shall have round connection on the side with groove for connecting with the flexible ducting. Plenum shall have the collar to fix the diffuser. Collar size shall suite with size of the diffuser neck. Collar shall not have any gaps or leaks. Plenum shall have hooks for suspending from the slab. Diffuser plenum shall be installed with two anchor fasteners and chain. Diffuser size shall be 550 x 550 x 450 / 300Ht outer and neck size of 375 x 375 / 450 x 450mm. Inside of the plenums shall be painted with black enamel paint with mat finish.

9. ROUND SPIGOT & BUTTERFLY DAMPER:

Round spigot and butterfly damper shall be fabricated with 20 G GI sheet. Butterfly dampers shall have handles for opening and closing. Handle should have the locking arrangement. Open and close positions shall be marked with stickers on the damper. Rubber lining shall be fixed on the inner face of the damper at the blade to avoid any metal to metal contact. Blade shall have smooth edges. Butterfly dampers shall be fixed with gasket, bolt and nuts. Duct thermal insulation and acoustic insulation shall be finished neatly around the butterfly damper.

10. VOLUME CONTROL DAMPERS:

Volume control dampers shall be made out of 1.2 mm thickness galvanized steel sheet frame with 1 mm thick blade. Blades should be double skinned aero foil construction and opposed blades should be at 50mm pitch centers. The blades should be mounted in nylon bushes operated by an interior wheel gear system. The operating lever or knob shall have locking arrangement and markings of various positions including open and closed position. VCD shall be low leakage type and volume control of 0-100% complete with neoprene rubber gasket, nuts, bolts, screws linkages, flanges etc.,

11. GRILLES / DIFFUSERS:

Grilles shall be linear type made out of heavy extruded aluminium sections. The grilles shall be rectangular linear type for supply and return air. Supply air grilles shall have opposed blade volume control dampers of aluminium construction. All the grilles shall be powder coated with approved colour shade. Teak wood frames treated with anti-termite solution shall be used wherever necessary. Grilles shall have concealed fixing screws. Ducting and all items at the back side of the grilles shall be painted with dull black paint. The discrete grilles will have end flanges. Ends of the continuous grilles shall have an end piece with three side flanges. Alignment strips shall be used for proper alignment.

Diffusers shall be square in shape and made out of heavy extruded aluminium sections with removable core and concealed fixing screw. Teak wood frames treated with anti-termite solution shall be provided wherever necessary.

12. COLLAR DAMPERS FOR GRILLS / DIFFUSERS / SLOT DIFFUSERS:

Collar dampers shall be made of Aluminium with nylon geared control & with aerofoil blades in black matt powder coated finish. Collar dampers shall be 26G gauge. Opposed blade volume control dampers made out of aluminium extruded sections with nylon geared with aerofoil blades & black matt powder coated shall be provided for supply air diffusers.

13. LOUVERS:

Weather proof Louvers shall be made out of extruded aluminium and colour should match with the building finish or as approved by the Owner / Consultant and these shall be of rain protection and metal bird screen to be fitted on the inner surface. The louvers shall have a nylon mosquito net. Louvers shall be curved wherever necessary to match with building profile.

14. HEPA FILTER MODULE:

HEPA Module made of Galvanized Iron sheet duly powder coated with suspension arrangement and provision for grill fixing arrangement. VCD controlled from inside the cleanroom with bevel gear arrangement. Filter loading from inside the cleanroom.

HEPA Filter shall be Hooded Terminal type. HEPA filter shall be of mini pleat type with efficiency of not less than 99.97% down to 0.3 microns EN 1822 standard H13 grade with protection grid on one side. HEPA filter initial pressure drop shall be of 25 mmhg at the rated flow. HEPA Filter shall be fixed in a soldered GI box with a flanged frame & facility to have DOP / PAO Test at site. Each filter shall be tested by DOP / PAO method and a certificate/s to the effect that such tests have been conducted shall be furnished by the contractor. The details of the DOP / PAO method adopted by the contractors / manufacturers at their works including those applicable to the aerosol generator, particle counter and the method of testing shall be described fully by the tenderers in their tender. The tenderer shall confirm that they will afford every facility for the owners / consultants or their representatives to observe the manufacturing of filters and witness the tests if they so desire. The owners / consultants reserve the right to stipulate that a leak test be performed on any or all filters on their receipt at site before taking delivery. The tenderers shall specifically confirm that they are agreeable to comply with this requirement. Owners / Consultants will witness the Test of few HEPA filters as desired.

15. SS GRILL:

Perforated Grilles made of 20G SS 304 for Supply air outlet at HEPA terminal with pressure plate arrangement along with all accessories to be provided. For Return Air Riser inlet complete with provision for fixing / holding the Pre-Filter (EN 779 : G4) with magnetic arrangement shall be provided.

16. FLEXIBLE DUCTING:

The insulated flexible duct shall have an inner core made of double lamination of metalized polyester film permanently bonded to a coated spring steel wire helix. Fiberglass insulation of minimum 14 kg./cub.mt. density having a R-value 4.2oF-Ft2-hr/btu and 25mm thk shall be wrapped over the inner core and covered with stronger outer jacket cum vapor barrier made of fiberglass reinforced metalized polyester film laminate. The insulated flexible duct should be fire retardant type. Limit Flexible Duct to not more than 3ft Length for each connection. Flexible duct shall be properly supported to avoid touching other services with anchor fasteners, full threaded rod, GI clamps, etc. Proper care shall be taken to ensure the flexible duct is not damaged due to supports and due to touching other services.

17. THERMAL INSULATION OF DUCT:

Thermal insulation of the ducting shall be done with aluminium foil laminated 32/19 mm thick class “O” closed cell, chemically cross-linked polyethylene foam offering high performance in terms of flame retardant protection in the event of fire, plus long lasting constant thermal performance having a ‘K’ valve of 0.037 W/mK at a mean temperature of 20ºC and a minimum density of 40 Kg./Cu.mtr.

The insulation materials shall be fixed to the ducting with adhesive. All duct angle joints shall be covered with 6 inch wide insulation. All insulation joints shall be sealed with 50mm wide self-adhesive aluminium tape. Adhesive shall be of Low VOC adhesive. Necessary test certificates shall be submitted. Thermal insulation shall be cut to the required size with a sharp knife. Insulation edges shall be straight. Thermal insulation shall be applied without excessive pressure on the insulation. Insulation shall be finished properly around the branch tapings, collars, etc.,

All exposed ducting shall be insulated with class “O” XLPE of thickness 25mm thick for supply & 19mm thick for return ducts (40kg/m3 density) running in non-air conditioned areas and outside the building. The insulation shall be finished with polythene paper and 24G chicken wire mesh and finished with 24G aluminium cladding.

18. ACOUSTIC INSULATION OF DUCT:

Acoustic lining of ducts shall be carried out with 15mm thick Class 1 open cell nitrile rubber. Insulation shall be manufactured for anti-microbial properly. Ducts shall be cleaned before applying acoustic insulation. Acoustic insulation shall be cut to required size with a sharp knife and shall be fixed to the internal surface of the duct with adhesive. Insulation edges shall be straight. The adhesive shall be of low VOC type. Necessary test certificates shall be given. Acoustic insulation shall be applied as shown in the approved drawings. The density of insulation shall be within 140-160 Kg/m3. The material should have a thermal conductivity not exceeding 0.047 W/m. K @ 20 Deg. C.

19. AHU PLENUMS:

Double skin plenums shall be factory fabricated 0.6 mm GI powder coated outer skin, 25 mm thick PUF insulation, 0.6 mm GI inner skin, aluminum extrusions, etc. PUF shall be injected in to the panels. Panels shall be fixed to the aluminum extrusions with gasket. Density of PUF insulation shall be 36 Kg. /cub. mt. The construction of the plenum shall be similar to AHU. Necessary cutouts with GI collar shall be provided for duct connection and fan connection. Plenums shall be installed using GI full threaded rods of 12 mm dia rods, anchor fasteners and MS Channel. All the supports shall be painted with one coat of red oxide paint and two coats of black enamel paint.

20. VARIABLE FREQUENCY DRIVES:

Drive shall be a dedicated HVAC drive designed for variable torque. The frequency drive shall employ sine wave pulse width modulation control and shall be suitable for operation on a three phase, 415 Volts, 50 Hertz input supply with an input voltage variation of +10% and -15% and frequency variation of 1 Hertz. The drive shall be capable of providing a variable frequency output of 0 to 50 Hertz proportional to a 4 to 20 mA or 0 to 10V input signal obtained from a field sensor/transmitter. Adequate

Ventilation shall be ensured for continuous operation at the maximum ambient temperature specified by the manufacturer. Drives shall be capable of operating in

Ambient temperatures of 45 deg. C without any derating. Display shall be graphical, alphanumeric, 6 line and back lit. Drive shall have two level password protection for read & write to prevent unauthorized access. All power, control and instrument cabling shall be provided and installed as described elsewhere in this specification. Drives shall have Modbus RTU / Bacnet IP for integrating with third part BMS. VFDs shall have harmonic filters, RFI filters and shall have energy (kW-hr) measurement.

VFDs for pumps, cooling tower, AHUs, etc. shall have harmonic filters and RFI filters to eliminate harmonics.

21. ACCESS DOORS / PANELS IN THE DUCTING:

Access doors shall be factory fabricated or manufactured and should double skin with 22 G GI sheet. Thickness shall be 25 mm thick 25mm thick 48 Kg/cub. mt density fiberglass insulation or PUS insulation shall be provided between inner skin and outer skin. Access doors shall be supplied with a required frame made of 22 G GI sheet. Frame shall be provided with a 3 mm thick Neoprene gasket to avoid air leakage. Access door should have 4 no. cam locks on four sides and shall have handles for easy removal and fixing. It should have a tapered locking system. Size of the access door shall be

as mentioned in the BOQ. Access door frame, shall be fixed to the duct and access door shall be placed in the frame and to be locked.

22. CABINET FAN:

Double skinned panels shall be made of galvanized steel with 40mm thick PUF insulation and shall be fixed to 2.5 mm thick aluminium alloy normal / thermal break profiles framework with stainless steel screws. Outer sheet of panels shall be made of galvanized 0.8 mm thick pre-painted / pre-plasticized sheet and inner of 0.8 mm GSS. Aluminium profiles shall be internal round corners to avoid accumulation of dust.

The casing shall be mounted on an aluminium alloy channel base. The panels shall be sealed to the framework by 'O' ring gaskets held captive in the framed extrusion. All panels shall be detachable. Inspection door hinges shall be made of die cast aluminium with stainless steel pivots, handles shall be made of hard nylon. Units with various sections shall be suitable for onsite assembly with continuous foam gasket. All fixing screws and gaskets shall be concealed. Units shall have hinged quick opening access doors in the fan and filter section.

Fan shall be EC fan with an extra standby fan. Exhaust air fan shall have EN 779 : G4 pre filter. Fans shall be provided with outlet cowl bird screens. Exhaust fan shall have a built in plenum for terminating the ducting. Fans shall have outlet dampers. Fans shall be installed with ribbed rubber pads for vibration isolation.

23. MINIMUM PERFORMANCE PARAMETERS OF VARIOUS EQUIPMENT:

All equipment efficiencies shall meet or exceed the efficiencies stipulated by ASHRAE 90.1.

24. ADHESIVES:

All adhesives used shall be of low VOC type and technical data sheets shall be submitted for approval before using. Necessary test certificates and documentation shall be provided for the adhesives.

25. MOTORS:

All motors used for pumps, ventilation units, TFAs, etc. shall be of high efficiency motors.

26. FLUSH OUT:

All air conditioned areas are to be flushed out before occupation. AHUs and temporary fans if required to be installed during flush out. Flush out documentation shall be prepared and to be submitted.

27. BMS PROVISIONS:

All the provisions required in the VRF system, ducting and electrical panels for BMS integration shall be provided by HVAC vendors.

28. TEST CERTIFICATES AND CALIBRATION CERTIFICATES:

Test certificates shall be submitted for all materials, equipment, filters, etc. All instruments, gauges, etc. shall have valid calibration certificates.

29. DOCUMENTATION:

Colour drawings of scheme and layout in the appropriate size shall be laminated / framed and shall be displayed in the Plant room, AHU Room, Air conditioned area, etc. as per the instructions of Engineer – In - Charge.

30. IDENTIFICATION OF SERVICES AND EQUIPMENT:

For pipe work services & its insulation the colors of the bands shall comply with BS 1710: 1971. For duct work & its insulation the colors of the triangles shall comply with BS 1710: 1971.

All equipment, Panels, HEPA filter modules, Supply Air Diffusers / Grilles, Return Air Diffusers, etc. shall be numbered for proper identification. The tag numbers shall be stickered / painted on the equipment and same numbers shall be referred in the as built drawings / documents.

31. FILTERS:

AHUs, Ductable split units, VRF units, etc. shall have filters. This should form the part of the specification of the individual units. The price of the equipment should include these filters.

32. COMMISSIONING FILTERS:

All the air handling units shall be installed with commissioning filters. After commissioning and initial phase of operation, the commissioning filters shall be replaced with permanent filters. The cost of the equipment / items shall include the cost of commissioning filters. Commissioning filters shall include EN 779 : G4 pre filters.

Other Works:

All other civil works which might not have been specifically mentioned in the specifications and in the Schedule of quantities but are essential for operational requirements of the entire system shall be in

the scope of work. Bidder shall specifically bring out such items in Technical bid and submit quote in separate sheet along with the Financial Bid.

GENERAL & CODES

All the supply and work shall be in accordance with the relevant I.S. Specification and recognized standards and modern approved practice and shall meet the requirement of the latest issue of applicable codes, factory rates and regulations, supply codes and all standard accepted practice in locality where the installation is to be made.

All the materials and accessories provided by Contractor under terms of this contract shall conform to the relevant Indian Standard Specifications. Samples of all equipment, materials and accessories to be supplied by the Contractor shall be submitted for the approval of the Engineer before they are supplied and used.

Contractor shall provide all necessary labour, tools, and other requisite work like drilling, cutting, welding etc. at his own cost.

Good workmanship is the essence of this contract and shall be complied with at all time. The Contractor shall have the works supervised by qualified and experienced engineers. All the defects pointed out by the engineer shall be rectified immediately by the Contractor free of cost.

The installation shall generally be carried out strictly in conformity with the requirement of latest edition of the Indian Electricity Act, 1910 as amended and the Indian Electricity Rules, 1956 framed there under and all others statutory regulations that may be relevant to the installation.

No alteration which may affect the structures and architecture of building shall be done without the prior approval of the engineer. All work shall be carried out in such a manner that it should not cause any inconvenience to other works which are under progress. The Contractor shall cooperate with other agencies in the area for the smooth execution of all works.

Accidental damage to any property shall be reported immediately to site engineers and letter confirmed in writing.

The equipment shall comply with the requirement of latest revision of following standard issued by BIS (Bureau of Indian Standards), unless otherwise specified.

Site/Climate Conditions:
The Equipment shall be suitable for installation and satisfactory continuous operation in a sub-station in a generally hot and humid atmosphere. The equipment shall be designed to operate continuous under site condition as specified below.

Location	: Hyderabad
Max. ambient air temperature,	: 50 ^{0}C
Min. ambient air temperature,	: 10 ^{0}C
Max. average daily ambient air temp.,	: 40 ^{0}C
Max. yearly weighed average ambient temp,	: 32 ^{0}C
Max. relative humidity, %	: 95%
Average Annual rainfall, mm	: 800 mm
Max. altitude above mean sea level (Meters)	: 540 m

Completeness of work:

Contractor shall include and provide all necessary materials and labour for completing the job in approved manner following all applicable standards and code of practices.

SECTION-VI	LIST OF MAKES

LIST OF APPROVED MAKES

SL. NO.	ITEM	APPROVED MAKES
1	DX Condensing Unit	Voltas/Carrier/ Daikin / Toshiba / Bluestar
2	Hi wall split units / cassette units - Individual	Daikin / Toshiba / Mitsubishi Electric
3	Copper fittings	Daikin / Toshiba / Mitsubishi Electric
4	Copper piping	Mandev / Rajco / Maxwell - VRF Grade with 100% eddy current testing
5	Drain Piping - CPVC	Sudhakar / Supreme / Astral
6	Communication Cable / Power Cable	Universal / Finolex / CCI / Polycab
7	Air Handling Units	Stulz / Flaktwood / Systemair / VTS
8	Fans for AHUs and Ventilation Units / SISW Fans	Kruger / Nicotra / Systemair / Dyna Air
9	Cabinet fans	Edge Tech / Zeco / Systemair / Dyna Air / VTS
10	Motors	ABB / Crompton / GEC / Siemens
11	Round Inline fans	Kruger / Nicotra / Systemair / Dyna Air
12	Cabinet Inline fans	Edge Tech / Zeco / Systemair / Dyna Air
13	Variable Frequency Drives	Danfoss / ABB / Schneider
14	Factory Fabricated Ducting	Radiant / Harshavardhan / Ducto Fab / Helical Tubes / Spiral Tubes
15	GI Sheets	SAIL / Jindal / Tata
16	Glass wool / Fibre Glass	UP Twiga / Kimmco / K Flex

17	Grilles / Diffusers / Louvers / Toilet exhaust valves	Airmaster / Dynacraft / System Air / Cosmos
18	Flexible Ducting	Atco / Sevenstar / UP Twiga
19	AHU plenums, diffuser plenums and round butterfly dampers, Cross talk attenuators	Sri fab / Sagar air / Radiant / Airmaster / Systemair / Harshavardhan / Spiral Tubes / Ducto Fab / Helical Tubes
20	Fire Dampers – UL Listed & Stamped Class 1	Greenheck / Ruskin Titus
21	Nitrile Rubber Insulation	Armacell / K Flex / Alp Aeroflex
22	Anchor Fasteners	Shakti / Fischier / Hilti
23	MERV Filters	Spectrum / Camfil / Pyramid / EMW /AAF
24	UVGI System	Ruks / Aeropure / Alfaa UV
25	EC Fans	EBM Past / ZeihlAbegg
26	Drain Pumps	Aspen
27	Air Flow Limiters	Trox / Systemair / Mapro
28	Fan Filter Units	Camfil / AAF
29	Volume Control Dampers	Airmaster / Systemair / Cosmos / Dynacraft
30	Electrical Switchgear	Siemens / Schneider / L&T / ABB
31	Vibration Isolators	Dunlop / Resistoflex / Cori
32	Cable Trays / Wire ways	Indiana / PILCO / Steel ways / Profab
33	Glands	Commet, Braco
34	Lugs	Jainson, Dowel
35	Communication Cable	Universal / Finolex / CCI / Polycab
36	Control Cable	Universal / Finolex / CCI / Polycab
37	CPVC drain piping and fittings	Astral / Sudhakar / Supreme

38	**Power Cables**	**Universal / Finolex / CCI / Polycab**
39	**CO2 sensors / transmitters**	**Siemens / Honeywell / Jhonson**
40	**Electrical Panels**	**VK Power Master / Chaya Switchger / Emation**
41	**Duct Mounted Heater Module**	**Rapid Cool / Emerald / KEPL**
42	**XLPE Insulation**	**K Flex / Aerofoam / Supreme / Thermobreak**
43	**Supporting System**	**Bigfoot / Diamondwalraven**
44	**HEPA Filters**	**Spectrum / Camfil / Pyramid / EMW /AAF**

SECTION-VII	ANNEXURES

ANNEXURE I

TENDER SECURING DECLARATION

Date:

Tender No.:

To:

Head Technical Services
TIFR Hyderabad.

We, the undersigned, declare that:

1. **We understand that, according to your conditions, bids must be supported by a Tender Securing Declaration.**
2. **We accept that we will automatically be suspended from being eligible for tendering in any public procurement tenders with any public entity for the period of time determined by the Public Procurement Oversight Authority, if we are in breach of our obligation(s) under the tendering conditions, because we:**

   a) **Have withdrawn our tender during the period of tender validity specified in the Tender Data Sheet;**

   or

   b) **having been notified of the acceptance of our Tender by the Procuring Entity during the period of tender validity fail or refuse to execute the contract; or fail or refuse to furnish the performance security, if so required.**

3. **We understand that this Tender Securing Declaration shall expire if we are not the successful Tenderer, upon our receipt of your notification or regret of the tender award letter; or thirty-eight days after the expiration of our tender, whichever is earlier.**

Signed:

Name:

Dated on_____day of _____,_____

ANNEXURE-II

FORM OF PERFORMANCE GUARANTEE (BY BANK GUARANTEE)

1. In consideration of the TIFR-Hyderabad, Hyderabad having agreed under the terms and conditions of Letter of Intent / Agreement No……. dated..... made between and…….....…… (Here in after..... called " the said Contractor{s}") .for the work ……..…… (Here in after called "the said Letter of Intent / Agreement") having agreed to production of a irrevocable bank Guarantee for Rs..... (Rupees …….. only), as a security / guarantee from the contractor(s) for compliance of his obligations in accordance with the terms and conditions in the said agreement, we ……..……..…….....(Indicate the name of the Bank) (hereinafter referred to as "the Bank") Here by undertake to pay to TIFR an amount not exceeding Rs. ……..... (Rs only) on demand by TIFR.

2. We..... (indicate the name of Bank) do hereby undertake to pay the amounts due and payable under this guarantee without any demur, merely on a demand from TIFR stating that the amount claimed is required to meet the recoveries due or likely to be due from the said Contractor(s). Any such demand made on the bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs…… (Rupees..... only).

3. We, the said bank, further undertake to pay to TIFR any money so demanded notwithstanding any dispute or disputes raised by the Contractor(s) in any suit or proceeding pending before any Court or Tribunal relating thereto, our liability under this present being absolute and unequivocal. The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the Contractor(s) shall have no claim against us for making such payment.

4. We (indicate the name of Bank) further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Agreement and that it shall continue to be enforceable till all the dues of TIFR under or by virtue of the said Agreement have been fully paid and its claims satisfied or discharged or till Engineer-in-charge on behalf of the TIFR certifies that the terms and conditions of the said Agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee.

5. We (indicate the name of Bank) further agree with TIFR that TIFR shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Agreement or to extend time of performance by the said Contractor(s) from time to time or to postpone for any time or from time to time any of the powers exercisable by TIFR against the said Contractor(s) and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor(s) or for any forbearance, act of omission on the part of TIFR or any indulgence by TIFR to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would, but for this provision, have effect of so relieving us.

6. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).

7. We,..... (indicate the name of Bank) lastly undertake not to revoke this guarantee except with the previous consent of TIFR in writing.

8. This guarantee shall be valid up to ....., unless extended on demand. Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs (Rupees ……..... only) and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this guarantee, all our liabilities under this guarantee shall stand discharged.

Signed and sealed

Dated the ……..... day of……..…… for..... (indicate the name of Bank)

***(Note: The Letter of Intent shall form part of the Agreement)**

ANNEXURE III

UNDERTAKING BY THE TENDERER

I / We have read and examined the Tender document including terms & conditions, specifications, Schedule of quantities, drawings and designs, general rules & directions, General Conditions of Contract, Special Conditions of Contract and all relevant other documents, publications and rules referred to in the Conditions of Contract and all other contents in the tender documents for the work.

I / We, hereby tender for execution of the work specified for the TIFR-Hyderabad, Hyderabad within the time specified and in accordance in all respects with the specifications, designs, drawings and instructions in writing.

We agree to keep the tender open for ninety (90) days from the last date of its submission and not to make any modifications in its terms and conditions. A sum of Rs..... ……has been deposited in cash / receipt treasury challan / deposit at call receipt of scheduled bank / fixed deposit receipt of scheduled bank / demand draft of a scheduled bank / Bank Guarantee issued by a Scheduled Bank as earnest money. If I / we, fail to furnish the prescribed performance guarantee within prescribed period, I / we agree that the said TIFR-Hyderabad, Hyderabad or its authorized officer shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely. Further, if I / we fail to commence work as specified, I / we agree that the TIFR-Hyderabad, Hyderabad shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said earnest money and the performance guarantee absolutely, otherwise the said earnest money shall be retained by TIFR- Hyderabad, Hyderabad towards security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein.

Further, I / We agree that in case of forfeiture of earnest money or both Earnest Money & Performance Guarantee as aforesaid, I / We shall be debarred for participation in the re-tendering process of the work.

I / We hereby declare that I / We shall treat the tender documents, drawings and other records connected with the work as secret / confidential documents and shall not communicate information derived there-from to any person other than a person to whom I / We am / are authorized to communicate the same or use the information in any manner prejudicial to the safety of the State.

Seal & Signature of Contractor Postal Address

Dated

Witness

Address Occupation

ANNEXURE-IV

CERTIFICATE OF LOCAL CONTENT

***We [name of manufacturer] hereby confirm in respect of quoted item(s) that local Content is equal to or more than 50% and come under 'Class-I Local Supplier' Category. As being 'Class-I Local Supplier', we are eligible for Purchase Preference under 'Make in India' Policy vide GoI Order No.P-45021/2/2017-PP (B.E.-II) dated 15.06.2017 (subsequently revised vide orders dated 28.05.2018, 29.05.2019 and 04.06.2020)**

OR

***We [name of manufacturer] hereby confirm in respect of quoted items(s) that Local Content is more than 20% but less than 50% and come under 'Class-II Local Supplier' Category.**

The details of the location (s) at which the local value addition made is /

are under: 1. ……

2. ……

Date: **Seal & Signature of the Bidder**

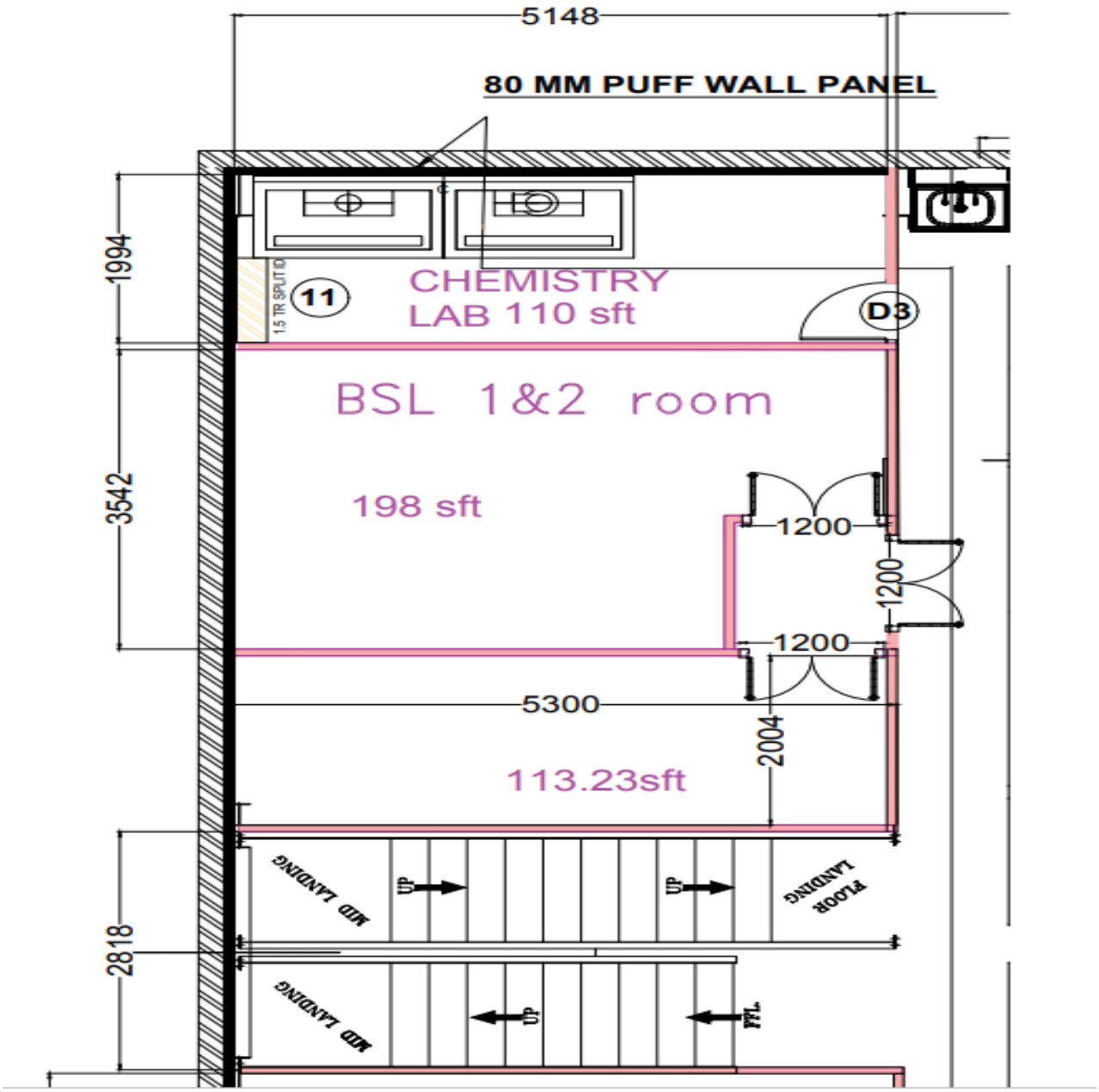
NOTE:

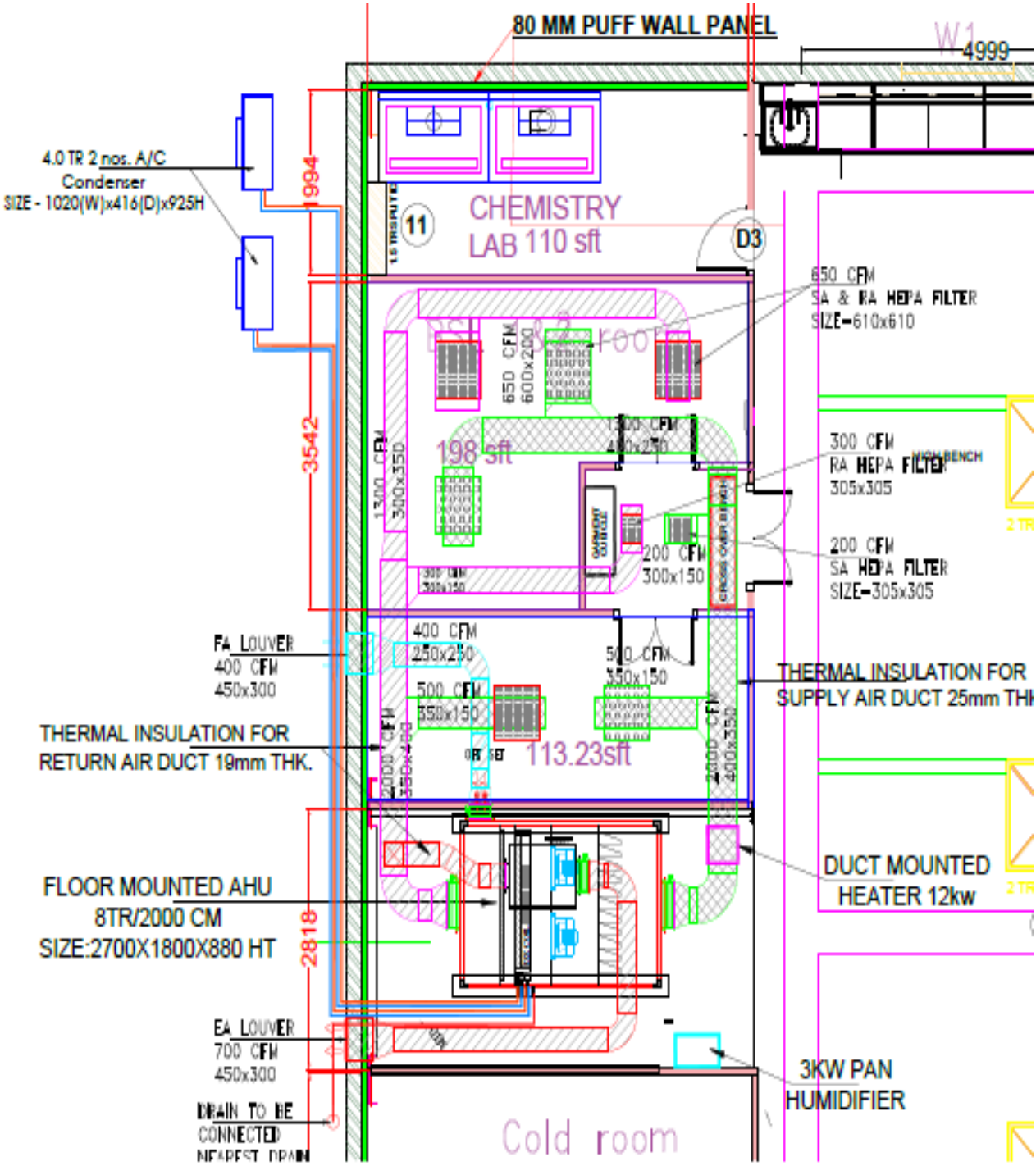
Self-certification that the item offered meets the minimum local content (as above) giving details of the location(s) at which the local value addition is made in case the bidder wishes to avail the benefits under the make in India policy, if applicable.

In cases of procurement for a value in excess of Rs.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.

ANNEXURE-V

BSL LAB LAYOUT




80 MM PUFF WALL PANEL
4999
4.0 TR 2 nos. A/C
Condenser
SIZE - 1020(W)x416(D)x925H
1994
3542
2818
CHEMISTRY
LAB 110 sft
11
D3
198 sft
113.23sft
650 CFM
SA & RA HEPA FILTER
SIZE=610x610
650 CFM
600x200
1300 CFM
300x350
300 CFM
RA HEPA FILTER
305x305
200 CFM
300x150
200 CFM
SA HEPA FILTER
SIZE=305x305
FA LOUVER
400 CFM
450x300
400 CFM
250x250
500 CFM
350x150
500 CFM
350x150
2000 CFM
400x350
THERMAL INSULATION FOR
RETURN AIR DUCT 19mm THK.
THERMAL INSULATION FOR
SUPPLY AIR DUCT 25mm THK
DUCT MOUNTED
HEATER 12kw
FLOOR MOUNTED AHU
8TR/2000 CM
SIZE:2700X1800X880 HT
EA LOUVER
700 CFM
450x300
DRAIN TO BE
CONNECTED
NEAREST DRAIN
3KW PAN
HUMIDIFIER
Cold room

SECTION-VIII	FINANCIAL BID

INVITATION OF BIDS FOR

Supply, Installation, Testing and Commissioning of Air Conditioning System and other related works for Biosafety Level (BSL) Lab-2 in Hanger Building-2, at TIFR, Plot-B, Survey No. 36/P, Gopanpally (Village), Serilingampally (Mandal), Ranga Reddy Dist., Hyderabad-500046.

PART II

FINANCIAL BID

SCHEDULE OF QUANTITIES

S.No.	Work Description	Unit	Qty (A)	Supply Rate(B)	GST… … (C)	Supply Amount (D=B+C)	Total Supply Amount (E=A*D)	Installation Rate(F)	GST …… (G)	Installation Amount (H=F+G)	Total Installation Amount (I=A*H)	Sub Total (J=E+I)
1	**Supply, Installation, Testing and Commissioning of Air cooled 4 TR DX condensing units consisting of fixed speed compressors, condensers, including initial charge of R 410a refrigerant, fans, control panels, etc. and refrigerant piping accessories required to connect to AHU.** **Power Supply : 415 V +/-10%, 50Hz** **Refrigerant :R410 Compressor: Fixed speed Rotary /Scroll** **(Units shall be supplied with all accessories provided by the manufacturer (i.e. Cu Pipe, Remote, expansion valve, drier, Manuals, Warranty, etc)** **Make: Mitsubishi/Daikin/Toshiba/Bluestar/ Career/LG/Voltas**	No.s	2									

2	**Supply, Installation, Testing and Commissioning of Double skin 50mm thick 8TR / 2000 CFM at 125MMWG static Air Handling Unit, floor mounted 40±2kg density PUF insulated, 0.8mm thick GI plain sheet inside and 0.8mm precoated GI sheet outside, mounted on a base channel, Draw through type, Thermal Break profile with mixing box for return air & fresh air, pre filter section EN 779:G4 filters with frame, Cooling Coil section with 6 Row Deep DX cooling coil, insulated SS304 drain Pan, Fan section along with EC fans 2nos (1 working + 1 standby), Fine filter section with EN 779:F9 fine filters along with frame. Fan section should have limit switch & View Glass. Manually operated VCDs with extruded aluminum aero foil design for fresh air, return air, bleed air & supply air outlet. AHU shall be designed with sufficient space between sections with access door across. AHU shall be provided with canopy sheets. Air velocity across Coil and filter shall not exceed 500 FPM & 400 FPM respectively. Probes for differential pressure measurement across filters & fans with Magnehelic Gauges. Vibration Isolators for AHU shall be provided with vibration isolation**	**No.s**	**1**									

	efficiency 95%. AHU shall have a suitable DX cooling coil with two circuits to connect S. No. 1 DX systems.											
3	**Supply, Installation, Testing & Commissioning of IAQ UVGI system in supply duct to generate necessary UV-C light to achieve kill rate of minimum 99% in single pass. UV lamps shall be fixed with necessary framework and shall be installed inside the supply duct. By-products should not be CO2 / O3. UV lamps shall be suitable for 2000 CFM air. UV C dosage shall be minimum 3000 uW-sec/cm2 for S.No. 2 AHU**	**No.s**	**1**									
4	**Supply, Installation, Testing and Commissioning of Cu piping for supply & return flow of refrigerant (as recommended by manufacturer) with 19 / 13 mm thick closed cell nitrile tube insulation to connect Sr.No. 1 outdoor DX systems to Sr.No. 2 AHU. Necessary cabling between indoor unit and outdoor unit shall be included. One running meter includes two copper pipes and cabling of 1 meter length. Copper piping insulation shall be finished with glass cloth and shall be painted with two coats of UV resistant paint.**	**Mtr**	**30**									

5	**Supply, Installation, Testing and Commissioning of 0.80 mm (22 WG) GSS ducting square / rectangular Factory Fabricated Ducting (120GSM) complete with gaskets, elbows, splitters, vanes, cowls, supports arrangement using GI full threaded rods and slotted rails as per drawings, air distribution specifications and requirements. Ducts are joined with iron angle frames with suitable nut, bolts, gaskets etc., Proper care shall be taken to avoid noise and vibrations. Sleeves shall be provided at wall crossings. Ducting shall be smoke tested before insulation. Ducting shall be designed for 1000 pascals ESP for supply air ducting and 500 pascals ESP for exhaust or return air ducting as per SMACNA-2005 & specifications.**	**Sq.Mtr**	**60**									
6	**Supply, laying, termination, testing & commissioning of GSS made volume control damper with opposed blades as per the tender specification, frame shall be made of 18G and blades shall be made of 20G. Blades shall be aerofoil double skin low leakage type and volume control of 0-100% complete with neoprene rubber gasket, nuts, bolts, screws linkages, flanges etc.,**	**Sq.Mtr**	**1**									

7	**Supply, Installation, testing & commissioning of fusible link and limit switch type 16 G galvanised sheet fire damper. The damper shall have a fire rating of 90 minutes as per UL 555 listed & stamped and shall be installed at all wall crossings in SA / RA ducts & AHU inlet.**	**No.s**	**2**									
8	**Supply, Installation, testing & commissioning of 3KW pan humidifier with actuator, SS tank, fresh water connection, overflow connection, drain connection, humidistat for controlling the RH with in ±5%, supports, etc.**	**No.s**	**1**									
9	**Supply & installation of Aluminum powder coated Fresh air louvers of non vision type with nylon mosquito net etc. as per approved drawings 1.6 thick 150mm x 50mm perforated GI cable tray with cover for Cu pipe laying including necessary hardware material as per site conditions.**	**Sq.Mtr**	**1**									
10	**Supply & installation of factory made fire retardant canvas cloth for connecting the AHU inlets & outlets to duct connection with GI strip, nut, bolts & accessories as required**	**Sq.Mtr**	**0.5**									

11	**Supply, Installation, testing & commissioning of Duct mounted electric type 4KWX3No.s strip heater module with control & wiring to maintain the RH of the following capacities to be accommodated in the Supply air duct. Suitable Control panel shall be provided with isolators, safety thermostat, 2-stage humidistat for switching ON the heaters in 2-stages.**	**No.s**	**1**									
12	**Supply, Installation, testing & commissioning of floor mounted /ceiling suspended, 40±2kg density PUF insulated, 40mm thick, 0.8mm thick GI plain sheet inside and 0.8mm precoated GI sheet outside, Draw through type, Double skin 700 CFM - Cabinet type fan with 40 mmWG static pressure (Filters excluded) Exhaust Air Handling Units (EAU), Horizontal, EN 779 : G4 pre filter, Fan section along with EC fan with anti vibration mountings etc.. Fan section should have a limit switch and light along with View Glass and access door. Probes for Differential pressure measurement across filter & fan. Manually operated VCDs with extruded aluminium aerofoil blade at outlet.**	**No.s**	**1**									

13	**Supply and fixing of 25mm thick thermal insulation (Class O) on supply air ducts XLPE AL foil faced fixed using recommended adhesive (on duct) of density 40-60 Kg/ cu.m after applying two coats of adhesive, sealing all joints complete as per specifications and as required. Self adhesive aluminium faced XLPE tape shall be applied at all joints.**	**Sq.Mtr**	**30**									
14	**Supply and fixing of 19 mm thick thermal insulation (Class O) on return air ducts XLPE AL foil faced fixed using recommended adhesive (on duct) of density 40-60 Kg/ cu.m after applying two coats of adhesive, sealing all joints complete as per specifications and as required. Self adhesive aluminium faced XLPE tape shall be applied at all joints.**	**Sq.Mtr**	**30**									
15	**Design, Supply of Ceiling Suspended, placed on ceiling panel, supply air / return air HEPA Module made of with Galvanized Iron sheet duly powder coated with suspension arrangement and provision for grill fixing arrangement, VCD controlled from inside the cleanroom with bevel gear arrangement. Filter loading from inside the clean room. HEPA filter size: 610mm x 610mm x 150mm Ht (For Supply Module)**	**No.s**	**6**									

16	**Design, Supply of Ceiling Suspended, placed on ceiling panel, supply air / return air HEPA Module made of with Galvanized Iron sheet duly powder coated with suspension arrangement and provision for grill fixing arrangement, VCD controlled from inside the cleanroom with bevel gear arrangement. Filter loading from inside the clean room. HEPA filter size: 305mm x 305mm x 150mm Ht.**	**No.s**	**2**									
17	**Supply & fixing of Supply Air / return air HEPA filter mini pleat type, box type, GI Powder Coated frame EN 1822 H13 standard HEPA Filter. HEPA Filter Size: 610mm x 610mm x 150mm Ht - 800cfm capacity**	**No.s**	**6**									
18	**Supply & fixing of Supply Air / return air HEPA filter mini pleat type, box type, GI Powder Coated frame EN 1822 H13 standard HEPA Filter. HEPA Filter Size: 305mm x 305mm x 150mm Ht - 200cfm capacity**	**No.s**	**2**									
19	**Design, Supply, Installation of perforated type Supply Air / return air Grilles made of 20G SS 304 for HEPA filters of Grille Size: 750 x 750 MM (Outer / Outer)**	**No.s**	**6**									

20	**Design, Supply, Installation of perforated type Supply Air / return air Grilles made of 20G SS 304 for HEPA filters of Grille Size: 450 x 450 MM (Outer / Outer)**	**No.s**	**2**									
21	**Design, Supply, Installation of perforated type Return Air Grilles made of 20G SS 304 complete with provision for fixing / holding the Pre-Filter (EN 779 : G4). Grill Size: 750 x 400 MM (Outer/Outer)**	**No.s**	**R/O**									
22	**Supply, installation, testing and commissioning of Digital Gauges indicating the Temperature / RH as display for BSL ROOM**	**No.s**	**2**									
23	**VALIDATION AND DOCUMENTATION: Commissioning of total job with validation reports comprising of 1. Duct Smoke Test, 2. Velocity check with velocity meter, 3. Differential Pressure cascades and Room Air Change Rates, 4. Room Particle count , 5. HEPA filter Integrity Test , 6. Temperature and Humidity range. Three sets of DQ, IQ and OQ with maintenance manual (Soft and Hard Copy)**	**Job**	**1**									

24	**STRUCTURAL STEEL WORK FOR SUPPORTING STRUCTURE OF AHU & Outdoor AC UNIT: Supplying, fabricating, hoisting and erecting in position HS structural steel works similar to Prefabricated structures using columns, canopies, rafter , sub rafters and Purlins at all elevations/levels/heights including aligning/leveling, providing and fixing bolts, nuts, washers, angles, channels, joists, rails, tees, plates, rounds, squares,etc., of various sizes and other structural steel sections conforming to latest IS 2062-Grade A & B as applicable including straightening, cutting, welding, bending to shape, bolting, cleaning the rust and scales. Scope is inclusive of following finishes ie.Grit / sand blasting and applying one coat of Red Oxide Primer DFT 30 Microns and synthetic enamel paint DFT 35 microns. Only paint touchup wherever needed to be done after erection. The rate to include the cost of all materials, labours, tools, tackles, cranes, devices, fasteners, welding, connection required for work shop and packing pieces, fabrication in the work shop, transportation to site and erection at site as per specifications and drawing complete.**	**Kg**	**500**									

	Make: JSW, Tata Steel,RINL,SAIL etc with ISI											
											Grand Total in Rs.	
	Grand Total in words Rs……..only											

Note:	
1.	**Rates are all inclusive of profit, Transport, Taxes, Etc.**
2.	**TIFR, Hyderabad has right to delete any of above items from scope of work or may increase/reduce quantities as per its requirement during execution of work. No claim or compensation for such deletion/increase/decrease will be accepted/paid to the contractor. Payment will be made as per actual quantities executed at tender rates**
3.	**Manufacturer's warranty of respective supply items to be provided.**
4.	**For any above item quantity exceeding more than 10% of projected qty, contractor shall take prior approval from TIFR Engineer in writing.**
5.	**For any deviating items, the contractor shall take prior approval from TIFR Engineer In charge with proper rate analysis.**