INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

An Autonomous Institute under Department of Science and Technology
Govt. of India**,** Paschim Boragaon, Garchuk, Guwahati-781035

Notice Inviting Tender (NIT)

Advt. No: 281 Date: 22/01/2021

On behalf of the Director IASST, Paschim Boragaon, Guwahati-781035, Assam sealed tenders for Technical Bids are invited in the first stage for the following work. Financial bids will be received in the second stage from the qualified selected successful bidders after evaluation of the Technical bids.

NIT No	Name of works and Location	Earnest Money	Time of Completion	Last date & time of		Time & date of opening tender	Time & date of pre Bid Discussion
				Issue/ Download of tender documents	Submission of Tender Documents		
1	2	3	4	5	6	7	8
	Construction of new QAQC lab facility, confirming to GLP and ISO: Class – 03, 04 & 05 standard Clean room classifications, purely on Design & Built project construction on TURNKEY basis at the Institute of Advanced Study in Science and Technology (IASST) at Paschim Boragaon, Guwahati, Assam	2.5% of tender value	180 days	27.01.2021 to 15.02.2021	14.00 hours 16.02.2021	15.00 hours 16.02.2021	15.00 hours 02.02.2021

Tender forms and other details can be obtained from the IASST website. Bidder downloading Tender Document from the website shall deposit **Rs. 3000.00 (Rupees three thousand**) only in the form of Demand Draft in favour of Director, IASST , Paschim Boragaon , Guwahati-781035, Assam along with the tender.

Details of tenders/terms & Conditions can be downloaded from the website of the Institute www.iasst.gov.in

Registrar
Institute of Advanced Study in science & Technology,
Paschim Boragaon , Ghy-35

INSTITUTE OF ADVANCED STUDY IN SCIENCE AND TECHNOLOGY

An Autonomous Institute under Department of Science and Technology
Govt. of India**,** Paschim Boragaon, Garchuk, Guwahati-781035

TENDER DOCUMENT FOR

Construction of new QA & QC (Quality Assurance and Quality Control) lab facility, confirming to GLP and ISO: Class – 03, 04 & 05 standard Clean room classifications, purely on Design & Built project construction on TURNKEY basis (Design and Build) at the first floor of the Central Instrumentation Facility building of Institute of Advanced Study in Science and Technology (IASST) at Paschim Boragaon, Guwahati, Assam.

TENDER NOTICE FOR Construction of new QA & QC (Quality Assurance and Quality Control) lab facility, confirming to GLP and ISO: Class – 03, 04 &

05 standard Clean room classifications, purely on Design & Built project construction on TURNKEY basis(Design and Build) at the first floor of the Central Instrumentation Facility building of Institute of Advanced Study in Science and Technology (IASST) at Paschim Boragaon, Guwahati, Assam.

NAME OF THE WORK:

Construction of new QA & QC lab facility, confirming to GLP and ISO: Class – 03, 04 & 05 standard Clean room classifications, purely on Design & Built project construction on TURNKEY basis (Design and Build)in 204.47 sq. meter (approx..) area at the first floor of the Central Instrumentation Facility (CIF) building of Institute of Advanced Study in Science and Technology (IASST) at Paschim Boragaon, Guwahati, Assam.

Name of Contractor/Firm…….
Address of Communication……..
…….Mobile No. :……

Photograph

TENDER DOCUMENT NO IASST/ /2020-21

INSTRUCTION TO BIDDER

PLEASE NOTE:*This is a* ***Two stage bidding process: The institute shall obtain bids in two stages***

with receipt of financial bids after receipt and evaluation of technical bids.

1.0 GENERAL

Tenderers are advised to acquaint themselves fully with the description of work, scope of services, time schedule and terms and conditions including all the provisions of the tender documents before framing up their tender.

2.0 SITE PARTICULARS

Site of the work is at the first floor (part) of the CIF building of IASST, Guwahati to develop the facility for the QAQC laboratories.**Tenderers are advised to inspect and examine the site and its surroundings and satisfy themselves before submitting their tenders as to nature of work, site conditions, means of access to the site etc**. Non-familiarity with the site conditions will not be considered areas on either for extra claims or for not carrying out the work in strict conformity with the specifications. For site visit and clarification / information/ Assistance, the intending tenderers may contact the Assistant Engineer (Civil) and JE (Electrical), Institute of Advanced Study in Science and Technology, Paschim Boragaon, Guwahati-781035, Assam.

3.0 SUBMISSION OF TENDER

a) The expression "Tender Notice" referred to in the Tender Documents shall be deemed to include any Notice/ Letter Inviting Tender with respect to the work forming the subject matter of the documents and vice-versa.

b) The tender complete in all respects shall be submitted along with Tender Fee and Earnest Money as stipulated in the Notice/ Letter Inviting Tender ONLY. Tenders without Tender Fee and Earnest Money Deposit will be out rightly rejected.

TERMS AND CONDITIONS:

(A) Technical Eligibility:

Only the qualified and registered contractors/firms who have satisfactorily completed similar works, Construction of new QA & QC or similar lab facility, confirming to GLP and ISO: Class – 03, 04 & 05 standard Clean room classifications, purely on Design & Built project construction on TURNKEY basis (Design and Build)of magnitude specified below may apply.

(a) Three similar works each of value not less than Rs. 35.00 lakhs or two similar works each of values not less than Rs. 60.00 lakhs or one similar work of value not less than Rs. 90.00 lakhs in last 5 years ending previous day of Last date of submission of Tender.

(b) The bidder must have designed, manufactured; type tested new Clean room lab facility, confirming to GLP and ISO: Class – 03, 04 & 05 standard Clean room classifications, which are in successful operation for at least two years as on the date of Bid opening. The bidders should furnish a list of such works executed along with clients' performance certificates to substantiate the requirement of this Clause.

The system design shall meet the parameters of the facility in terms of space requirement, meet at least all environmental requirements viz. Temperature, humidity, automation system and controls, scope of services, internal & external finishes etc. complete as per NIT documents referred above. The facility shall be tested for parameters mentioned in the NIT documents.

(B) Financial Eligibility

(a) Shall have average financial turnover of Rs. 250.00 lakhs on similar works during the last three years.
(b) Should not have incurred any loss in more than two years during the last five years ending 31st march 2020.
(c) Shall have a solvency of an amount of 40% of the tenderer's bid value duly certified by bank not earlier than 6 (six) months from date of submission of bids.

(C) BIDS shall be submitted in two Stages:

Stage – 1:-Technical Bidin CPWD Form 7/8 along with Earnest Money deposit (EMD).

Tender shall be accompanied with earnest money of 2.5% of quoted tender value only of which 50% money will have to be deposited in the shape of Demand Draft/ Call Deposit / Bankers cheese/FDR of a scheduled Bank issued in favour of Director, IASST, Guwahati-781035, Assam and Balance 50% of amount of earnest money can be accepted in the form of Bank Guarantee issued by a Scheduled Bank having validity for 6 months or more from the last date of receipt of tenders.

Stage – 2:- **Price bidfilling up the BOQ issued with Tender document only after evaluation of the Technical bid.**

Evaluation of Technical Bid: - The Envelope containing the Technical bid in first stage of bidding will be opened and evaluated in terms of criteria for Evaluation as per CPWD norms (refer Annexure I of Appendix 20 of CPWD works Manual 2014).

The technical bid will be evaluated by the Technical expert committee of IASST after presentation by the bidders for eligibility of biddersand acceptability of the technical bids.
In the second stage of bidding, Price bids will be received from the eligible bidders.……The expert committee may give weightage to design 60%

and weightage to price 40.0% to arrive at final selection of bid. The technically eligible bidder quoting lowest price will score 40.0% marks on price. The other eligible bidders will score marks proportional to their price bid (Inverse proportion)

Bids opening: - The technical bid opening will be done in the presence of contractors who wish to witness the bid opening. Price bid opening will also be done in presence of contractors who have qualified forPrice bid opening. The Bidder's designated representative is invited to attend a pre-bid meeting on the date and time as indicated in the tender documents. The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

(D) DEVIATIONS TO TENDER CLAUSES:

Tenderers are advised to submit the tender strictly based on the terms and conditions and specifications contained in the Tender Documents and not to stipulate any deviations. Conditional tenders are liable to be rejected.

Scrutiny/ evaluation of the technical cum commercial bid shall be done by the Institute or in consultation with any agency as deemed necessary. In case if it is found that the Technical cum Commercial Bid of a tenderer is not in line with NIT specifications, requirement and or contains many deviations, the department reserves the right to reject the technical bid of such firms(s) without assigning any reason thereof(making any reference to the tenderers).

(E) VALIDITY OF OFFER

Tender submitted by tenderers shall remain valid for acceptance for a minimum period of 120 days from the date of opening of the tenders. The tenderers shall not be entitled during the said period of 120 days, to revoke or cancel their Tender or to vary the Tender given or any term thereof, without the consent in writing of the institute. In case of tenderers revoking or canceling their tenders or varying any terms in regard thereof withoutthe consent in writing, IASST shall forfeit Earnest money paid by them along with their tender without giving any reason thereof (any notice).

(F) ACCEPTANCE / REJECTION OF TENDER

i. IASST does not bind itself to accept the lowest tender.
ii. IASST also reserves the right to accept or reject any tender in part or full without assigning any reason thereof (whatsoever).
iii. IASST also reserves the absolute right to reject any or all the tenders at any point of time solely based on the past unsatisfactory performance by the bidder(s). The opinion/ decision of IASST regarding the same shall be final and conclusive.

(G) CORRECTIONS

No corrections or overwriting will be entertained in schedule of rates by using correcting fluid. All correction in the schedule of rate should be initialed.

(H) FIRM RATES

The rates quoted by bidder shall remain in force (firm) till completion of all works even during the extended period, if any, on any account whatsoever. It may be noted that no deviation on this account will be acceptable and offer not containing firm price shall not be considered. The quoted rate shall be inclusive of all taxes, duties and levies and all charges for packing forwarding, insurance, freight and delivery, installation, testing, commissioning, validation etc. at site, risks, overhead charges general liabilities/ obligations and clearance from local authorities.

It will be obligatory on the part of the tenderer to sign the tender documents for all the components and parts. After the work is awarded the contractor will have to enter upon an agreement for work awarded on a non-judicial stamp paper of requisite value at his own cost within ten days from date of receipt of acceptance order or before the work is undertaken.

Date:

Place:

Registrar
IASST, Paschim Boragaon,
Guwahati – 781035, Assam

FORM 'A'

Financial Information:

Financial Analysis – details to be furnished duly supported by figures in balance sheet / profit and loss account for the last five years duly certifiedby the Chartered Accountant, as submitted by the applicant to the Income Tax Department.
(Copies to be attached)

YEARS

(i) Gross Annual turnover on construction works.
(ii) Profit/s
(iii) Financial arrangements for carrying out the proposed work.
(iv)Solvency Certificate from Bankers of the bidder in the prescribed FORM 'B'

Signature of Chartered Accountant with seal

Signature of Bidder(s)

FORM 'B'

FORM OF BANKERS' CERTIFICATE FROM A SCHEDULED BANK

This is to certify that to the best of our knowledge and information the M/s Shri / Mr..... having marginally noted address, a customer of our bank is / are respectable and can be treated as good for any engagement up to a limit of Rs..... (Rupees .....)

This certificate is issued without any guarantee or responsibility on the bank or any of the Officers.

Signature
For the Bank

Note:

1. Bankers certificates should be on letter head of the Bank, sealed in cover addressed toTendering authority.

2. In case of partnership firm, certificate should include names of all partners asRecorded with the Bank.

FORM 'C'

DETAILS OF ALL WORKS OF SIMILAR CLASS COMPLETED DURING THE LAST FIVE YEARS
ENDING LAST DAY OF THE MONTH.....

1. Sl. No:
2. Name of work / project and location:
3. Owner or sponsoring organization:
4. Cost of work in Lakh of rupees:
5. Date of commencement as per contract:
6. Stipulated date of completion:
7. Actual date of completion:
8. Litigation arbitration cases pending / in progress with details:
9. Name & address / telephone No. of officer to whom reference may be made:
10. Remarks:

Indicate gross amount claimed and amount awarded by the Arbitrator.

Signature of Bidder(s)

FORM 'D'

PROJECTS UNDER EXECUTION OR AWARDED

1. Sl. No:
2. Name of work / project and location:
3. Owner or sponsoring organization:
4. Cost of work in Lakh of rupees:
5. Date of commencement as per contract:
6. Stipulated date of completion:
7. Up to date percentage of progress of work:
8. Reason of slow progress if any:
9. Name & address / telephone No. of officer to whom reference may be made:
10. Remarks:

Certified that the above list of works is complete and no work has been left out and that the information given is correct to my knowledge and belief.

Signature of Bidder(s)

FORM 'E'

PERFORMANCE REPORT OF WORKS REFERRED TO IN FORMS 'B' & 'C'

1. Name of work / project & location

2. Agreement No.

3. Estimated cost.

4. Tendered cost

5. Date of start

6. Date of completion

(i) Stipulated date of completion
(ii) Actual date of completion

7. Amount of compensation levied for delayed completion, if any

8. Amount of reduced rate items, if any

9. Performance Report
(a) Quality of work very good/good/fair/poor
(b) Financial soundness very good/good/fair/poor
(c) Technical proficiency very good/good/fair/poor
(d) Resourcefulness very good/good/fair/poor
(e) General behaviour very good/good/fair/poor

Dated:

Executive Engineer or Equivalent

FORM 'F'

STRUCTURE & ORGANISATION

1. Name & address of the bidder:

2. Telephone No / Fax No/ Email ID:

3. Legal status of the bidder (attached copies of original document defining the legalStatus)
(a) An individual
(b) A proprietary firm
(c) A firm in partnership
(d) A limited company or Corporation

4. Particulars or registration with various government Bodies (attach attested photocopy)
Organization /place of registration/ Registration No.
(1)
(2)

5. Names and titles of Director and Officers with designation to be concerned with this work.

6. Designation of individuals authorized to act for the organization.

7. Was the bidder ever required to suspend construction for a period of more than six months continuously after he commenced the construction? If so, give the name of theProject and reasons of suspension of work.

8. Has the bidder, or any constituent partner in case of partnership firm, ever abandonedthe awarded work before its completion? If so, give name of the project and reasons for abandonment.

9. Has the bidder, or any constituent partner in case of partnership firm, ever been debarred / black listed for tendering in any organization at any time? If so, give details.

10. Has the bidder, or any constituent partner in case of partnership firm, ever been convicted by the court of law? If so, give details.

11. In which field of engineering construction the bidder has specialization andInterest?

FORM 'G'

Organization chart:

Graduate Civil & Electrical Engineer(s) with 10 years' experience = …….. No(s).
Diploma Holder Electrical = …….. No(s)
Work Supervisor = …….. No(s)

With appointment latter.

Signature of Bidder(s)

FORM 'H'

List of Equipment:

Construction: (For civil, Electrical, Others) Batch NoCapacity Nos

1. Insulation Test Magar -
2. Earth Test Magar –
3. Any others Equipment if any -

Signature of Bidder(s)

GENERAL CONDITIONS OF CONTRACT

1. Where the context so requires, words importing the singular only also include the plural and vice versa.

2. Institutes shall mean 'Institute of Advanced Study in Science and Technology, Paschim Boragaon, Guwahati-781035, Assam' and shall include their legal representatives, successors and permitted assignees.

3. Definitions:

a) The 'Contract' means and includes the documents forming the tender and acceptance thereof together with the documents referred to therein including the conditions, the specifications, designs, drawing and instructions issued from time to time by the Registrar/Engineer-in-charge the formal agreement executed between the Institute and the Contractor, and all these documents taken together shall be complementary to one another.

b) The 'Site' shall mean the place/location where the work will be executed under the contractor used for the purpose of carrying out the contract.

c) The 'Contractor' shall mean the individual or firm or company, whether corporate or not, undertaking the works and shall include the legal personal representative or such individual or the persons composing such firm or company and the permitted assignee of such individual or firm or company.

d) The 'Competent Authority' means the Director of the institute and his successors.

e) The Engineer-in-charge means the technical Officer assigned by the institute, who shall supervise and be the In-charge of the works.

f) The Director means the officer who holds the charge of that post in the institute at DST-IASST, Guwahati during the currency of this agreement.

g) 'IS Specification' means the Specification of latest edition with amendments, if any, upto time of receipt often derby institute issued by the Bureau of Indian Standards as referred to in the specifications and/or work orders.

h) The 'Contract Sum' means the sum agreed, or the sum calculate in accordance with the prices accepted by the IASST in the tender and/or the contract/ negotiated rates payable on completion of the works.

i) The 'Final Sum' means the amount payable under the Contract by the Institute to the Contract or for the full and entire execution and completion of works, in time.

j) The 'Date of Completion' is the date/date(s) for completion of the whole works, set out in the tender documents, or any subsequently amended by the Institute.

k) A 'Week'means seven days without regard to the number of hours worked or not worked in any day in a week.

l) Expected Risks' are risks due to riots (otherwise than among contractor's employees) and civil commotion (in so far as both these are uninsurable) war (whether declared or not), invasion act of foreign enemies, hostilities civil war, rebellion, revolution, insurrection military or usurped power, Acts of God, such as earthquake, lightening, unprecedented floods and other causes over which the contractor has no control and accepted as such by the Competent Authority or causes solely due to use or occupation by the 'Institute' of the part of works in respect of which a certificate of completion has been issued.

m) The 'Works' shall mean the works to be executed in accordance with the contractor part(s) thereof as the case maybe and shall include all extra or additional, altered or instituted works or temporary and urgent works as required for performance of the contract.

SCOPE AND PERFORMANCE

4. Works to be carried out:

The work to be carried out under the Contract shall, except as otherwise provided in these conditions, include all labour, materials, tools, plant, equipment and transport which may be required in preparation of and for and in the full and entire execution and completion of the works. The descriptions given in the Schedule of Quantities shall, unless otherwise stated, be held, to include wastage on materials, carriage and cartage, carrying in return of empties hoisting, setting, fitting and fixing in position and all other labour necessary in and for the full and entire execution and completion as aforesaid in accordance with good practice and recognized principles.

5. Sufficiency of Tender:

The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the rates and prices quoted in the Schedule of Quantities, which rates and prices shall except as otherwise provided, cover all his obligations under the contract and all matters and things necessary for the proper completion and maintenance of the Works.

6. Discrepancies and Adjustment of Errors:

The several documents forming the contract are to be taken as mutually explanatory of one another:

6.1(A) In the case of discrepancy between Schedules of quantities, the Specifications and/ or the Drawings, the following order of preference shall be observed.

a) Schedule of quantities
b) Technical specifications
c) Drawing (if any)
d) Additional Commercial & Technical Conditions
e) General Specifications
f) Relevant IS or other international code in case IS code is not available.

6.1(B) If there are varying or conflicting provisions made in any one documents forming part of the Contract, the Accepting Authority shall be the deciding authority with regard to the intention of the document.

6.2 Any error in description, quantity or rate in Schedule of Quantities or any omission there from shall not vitiate the Contractor release the Contractor from the execution of the whole or any part of the Works comprised therein according to drawings and specifications or from any of his obligations under the Contract.

6.3 If on check there are found to be differences between the rates given by the contractor in words and figures or in the amount worked out by him in the schedule of quantities and general summary, the following procedure shall be followed:-

a) When there is a difference between the rates in figures and in words, the rates which correspond to the amounts worked out by the contractor shall be taken as correct.

b) When the amount of an item is not worked out by the contractor, or if it does not correspond with the rates written either in figures or in words, then the rate quoted by the contractors in words shall be taken as correct.

c) When the rate quoted by the contractor in figures and in words tallies, but the amount is not worked out correctly, the rates quoted by the contractor shall be taken as correct and not the amount.

7. Performance guarantee and Security deposits

7.1 Performance guarantee:

(1) The successful tenderer shall deposit an amount equal to 5% of the tendered and accepted value of the work (without limit) as performance guarantee in one of the following forms:
   (i) Cash (in case of guarantee amount is less than Rs. 10,000/-)
   (ii) Deposit a Call receipts/Bankers cheque/Demand draft//Pay order of a schedule bank (in case guarantee amount is less than Rs. 1, 00,000/-).
   (iii) Government Securities.
   (iv) Fixed deposit receipt of a schedule bank.
   (v) An irrevocable bank guarantee bond of any schedule bank or the State Bank of India in the prescribed form.

(2) The time allowed for submission of the performance guarantee by the contractor shall be decided by the institute authority for a period ranging from 4 to 15 days of the issue of the letter of acceptance.

7.2 Security Deposit:

(1) The Security deposit shall be collected by deductions from the running bill of the

contractor at the rate mentioned below. The Security deposit can also be deposited in cash or in theform of Government Securities, fixed deposit receipts etc.

(2) A sum @ 2.5% of the gross amount of the bill shall be deducted from each running bill as well as final bill of the contractor. Such deductions shall be made unless the contractor has deposited amount of security at the rate mentioned in cash of government securities or fixed deposit receipt. This is in addition to the performance guarantee that the contractor has to depositas per above clause.

(3) Security deposit can be released against Bank guarantee issued by a schedule bank on its accumulation to a minimum amount of Rs. 5.00 lakhs subject to the condition that amount of any bank Guarantee except last one, shall not be less than Rs. 5.00 lakhs.

8. Refund of Security deposit:

8.1 All compensation or other sums of money payable by the contractor under the terms of this Contract or any other Contract or any other account whatsoever may be deducted from the security deposit.

8.2 **Refund ofSecurity deposit**: Security deposit refundable to the Contract isworked out on the basis of the value of work completed and shall be refunded to the Contractor on the Engineer-In-Charge certifying in writing that the work has been completed satisfactorily after defect liability period of 12 months.

8.3 No interest shall be payable to the contractor by the Institute against the Security deposit furnished by the contractor or recovered from him.

9. Time and Extension for Delay:

The time allowed for execution of the works as specified in the Appendix or the extended time in accordance with these conditions shall be the essence of the Contract. The execution of the works shall commence as per the date mentioned in the letter of award. If the Contractor commits default in commencing the execution of the work as aforesaid, Institute shall withoutprejudice to any other right or remedy be at liberty to forfeit the earnest money absolutely.

9.1 Assoon as possible after the Contract is concluded the Institute and the Contractor shall agree upon a Time and Progress Chart. The Chart shall be prepared in direct relation to the time stated in the Contract documents for completion of items of the works. It shall indicate the forecast of the dates of commencement and completion of various trades or sections of the work and may be amended as necessary by agreement between the Institute and the Contractor within the limitations of time imposed in the Contract Documents.

9.2 If the work be delayed by

(a) Force majeure or

(b) Abnormally bad weather or

(c) Serious loss or damage by fire, or

(d) Civil commotion, local combination of workmen strike or lockout, affecting any of the trades employed on the work, or\

(e) Delay on the part of other contractors or tradesmen engaged byInstitute in executing work not forming part of the contract, or

(f) Any other cause which, in the absolute discretion of the authority

Mentioned in Appendix is beyond the Contractor's control;

Then upon the happening of any such event causing delay, the Contractor shall immediately give notice thereof in writing to the Institute but shall nevertheless use constantly his best endeavors to prevent or make good the delay and shall do all that may be reasonably required to the satisfaction of the Institute to proceed with the Works.

9.3 Request for extension of time, to be eligible for consideration, shall be made by the Contractor in writing within fourteen days of the happening of the event causing delay. The Contractor may also if practicable, indicate in such as request the period for which extension is desired.

9.4 In any such case, the competent authority may give a fair and reasonable extension of time for completion of the work. Such extension shall be communicated to the contractor by the Institute. In case the Extension of time is given to the contractor without levy of any L.D. based on the merit of the case, the contractor in no case shall claim any compensation whatsoever for the extended period and the decision of the Institute shall be binding on the contractor.

10. The Contractor shall arrange, at his own expense, all tools, plant and equipment hereafter referred to as (T& P) labour, P.O.L. & electricity required for execution of the work.

11. FORCE MAJEURE

Any delays in or failure of the performance of either party herein shall not constitute default here under or give rise to any claim for damages, if any, to the extent such delays or failure of performance is caused by occurrences such as Act of god or the public enemy; expropriation or confiscation of facilities by Government authorities, or incompliance with any order or request of any Governmental authorities or due acts of war, rebellion or sabotage or fires, floods, explosions, riots or illegal joint strikes of all the workers of all the contractors.

12. MATERIALS

i. All materials to be provided by the Contractor shall be in conformity with the specifications laid down in the contract and the Contractor shall, if requested by the Engineer-in-Charge, furnish proof to the satisfaction of Engineer-in-Charge in this regard.

ii. The contractor shall indemnify the Institute, its representatives or employees against any action, claim or proceeding relating to infringement or use of any patent or design or any alleged patent or design rights and shall pay any royalties or other charges which may be payable in respect of any article or material or part thereof included in the Contract. In the event of any claim being made or action being brought against the Institute or any agent, servant or employee of the Institute in respect of any such matters as aforesaid, the Contractor shall immediately be notified thereof.

iii. All charges on account of tax and other duties on material obtained for the Works from any source shall be borne by the Contractor.

iv. The Engineer-in-Charge shall be entitled to have tests carried out as specified as per relevant standard code of practice for any materials supplied by the Contractor even for those for which, as stated above, satisfactory proof has already been furnished, at the cost of the Contractorand the Contractor shall provide at his expense all facilities which the Engineer-in-Charge may require for the purpose. The cost of materials consumed in tests shall be borne by the Contractor.

v. Stores and Materials required for the works, brought by the Contractor, shall be stored by the Contractor only at places approved by the Engineer-in-Charge.Storage and safe custody of material shall be the responsibility of the contractor.

(a) Institute's officials concerned with the Contract shall be entitled at any time to inspect and examine any materials intended to be used in the works, either on the site or at factory or work shop or other place(s) where such materials are assembled,

fabricated or at any place(s) where these are lying or from where these are being procured and the contractor shall give such facilities as may be required for such inspection and examination.

(b) All materials brought to the Site shall be come and remain the property of the Institute and shall not be removed off the Site without the prior written; approval of Engineer-in-Charge of the Corporation. But whenever the works are finally completed the Contractor shall, at his own expense forth with, but with the prior approval from the Institute, remove from the Site all surplus materials originally supplied by him and upon such removal the same shall revert in and become the property of the contractor. However, before given any approval as aforesaid the Institute shall be entitled to recover or adjust any amount given as advance to the Contractor.

13. Labour laws and payment of wages to be complied:

The contractor shall comply the labour laws in force. No labourer below the age of eighteen years shall be employed on the works. The tenderer should make their own arrangement for the assign of all labourers trained in the particular field of work preferably local.

The contractor shall comply fully with local laws dealing with the employment of persons including the employment of children act 1938, payment of wages act 1936, the workmen compensation act 1923, Industrial dispute act 1947, the factories act 1948, mate benefit act 1961, the contractor's labour (Regulation and abolition) act 1970, theminimum wages act 1978 and any statutory amendments or re-amendments thereof for the time being in force. The labour license shall be taken by the contractor as per rules.

In respect to fall, laborers directly or indirectly employed in the work for the performance of the contractor's part of this contract, the contractor shall his own expense arrange the safety provision as per safety code framed from time to time and shall his own expense provide for all facilities in connection there with. In case, the contractor fails to make arrangement and provide necessary facilities as aforesaid he shall be responsible for any compensation for each default and in addition the Engineer-In-Charge shall be at liberty to make arrangement and provide facilities as aforesaid and recover the costs incurred in that behalf from the contractor.

All the liabilities regarding EPF or ESI of the labours / workmen engaged at the work, wherever applicable as per the prevailing Central or State governmentnorms, shall be borne by the contractor. Institute shall not be responsible for any liability/claims what so ever in this regard. Further as and when demanded by the Institute, the contractor shall submit the proof of deductions/deposits of such liabilities of their labors/workmen

engaged in the work to the Institute. In case of default, the Institute may deduct the payments against these liabilities from the bills of the contractor or may stop the payment of the bill till such time until the compliance is proved by the contractor.

14. Liquidated Damages for Delay

14.1 Time is essence of the contract. In case the CONTRACTOR fails to complete the whole work within the stipulated period, and clear the site, he shall be liable to pay liquidated damages @0.5% (One Half of one percent only) of the value of contract per week and or part thereof of the delay subject to a maximum of 10% (ten percent only) of the value of the contract. The parties agree that this is a genuine pre-estimate loss/damage which will be suffered on account of delay on the part of the Contractor and the said amount will be payable on demand without there being any proof of the actual loss of damages caused by such delay.

14.2 The amount of Compensation may be adjusted or set-off against any sum payable to the Contractor under this or any other contract with the Institute.

15 Defects Liability Period:

The Contractor shall be responsible to make good and remedy at his own expense within defect liability period of one year from the date of completion of the work. *The contractor has to carry out routine and preventive maintenance during the defects liability period and nothing extra shall be paid for the same.*

16. Contractor's Liability and Insurance

From commencement to completion of the works, the Contractor shall take full responsibility, care of and precautions to prevent loss or damage and to minimize loss or damage to the greatest extent possible and shall be liable for any damage or loss that may happen to the Works or any part thereof from any cause whatsoever (save and except the Excepted Risks) and shall at his own cost repair and make good the same so that, at completion ,the works shall be in good order and conditions and inconformity in every respect with the requirements of the Contract and instructions of the Engineer-in-Charge.

16.1. In the event of any loss or damage to the Works or any part there of or to any material or articles at the Site from any of the Excepted Risks the following provisions shall have effect:

(a) The Contractor shall, as may be directed in writing by the Engineer- in-Charge, remove from the site any debris and so much of the works as shall have been damaged.

(b) (b) The Contractor shall, as may be directed in writing by the Engineer-

in- Charge, proceed with the completion of the works under and in accordance with the provisions and Conditions of the Contract, and

16.2 Provided always that the Contractor shall not be entitled to payment under the above provisions in respect of so much loss or damage as has been occasioned by any failure on his part to perform his obligations under the Contractor not taking precautions to prevent loss or damage or minimize the amount of such loss or damage.

16.3 The Contractor shall indemnify and keep indemnified the Corporation against all losses and claims for injuries or damage to any persons or any property what so ever which may arise out of or in consequence of the construction and maintenance of works and against all claims, demands proceedings, damages costs, charges and expenses whatsoever in respect of or in relation thereto. Provided always that nothing here in contained shall be deemed to render the Contract or liable for or in respectto for to indemnify the Corporation against any compensation or damage caused by the Excepted Risks.

16.4 Before commencing execution of the work, the Contractor shall, without in any way limiting his obligations and responsibilities under this condition, obtain and deposit with the Institute-Contractors "All Risk Policy" and "Third Party" Insurance policy.

16.5 The Contractor shall at all times indemnify the Institute against all claims, damages or compensation under the provisions of Payment of Wages Act,1936, Minimum Wages Act. 1948, Employer's Liability Act, 1938the Workmen's Compensation Act, 1923, Industrial Disputes Act, 1947 and the Maternity Benefit Act. 1961 or any modifications there of or any other law relating thereto and rules made there under from time to time.

16.6 The Contractor shall provide to the Engineer-in-Charge from time to time that he has taken all the insurance policies referred to above and has paid the necessary premiums for keeping the policies alive till expiry of the Defects Liability Period.

16.7. All statutory deductions as applicable like GST, TDS etc. shall be made from the due payment of the contractor.

16.8 No claim for interest will be entertained by the Institute in respect of any balance payments or any deposits which may be held up with the Institute due to any dispute between the institute and contractor or in respect of any delay on the part of the institute in making final payment or otherwise.

16.9 The contractor shall ensure that no materials/wastes/plant, equipment's etc. are dumped at the site. In case any of the above items are dumped the contractor shall clear the same from the site by or before completion of the work at his own cost or otherwise IASST will carry out the work at the contractor's risk and cost after 7days notice.

16.10 The contractor will have to make suitable arrangement at his own cost for facilitating movement of labour to worksite and back. Facilities are to be given to labour as per statutory provision at no extra cost to IASST.

16.11 Obtaining approval from the appropriate authorities for installation and commissioning of the installations, laboratories and connected work shall be the responsibility of the contractor and no extra payment shall be made on this account. However, statuary fees if any in this regard will be borne by the institute.

16.12 The lab site earmarked as per layout drawing shall be provided to the contractor 'as-is-where-is' position who has to design and build the GLP Labs as per specifications including the civil work mentioned in the tender documents.

17. PAYMENTS:

The following percentage of contract rates for the various items included in the contract shall be payable against the stage of works shown herein:

(a) 20% advance against acceptance and signing of contract fulfilling the required procedure.

(b) 50% against delivery of materials at site in good conditions of pro rata basis.

(c) 20% against installation at site on pro-rata basis.

(d) Balance 10% shall be paid after testing, commissioning trial run and handing over of the completed facility to the institute.

The TDS and security deposit as applicable shall be effected from the each stage of payments.

18. MOBILISATION ADVANCE:

Generally no mobilization advance shall be paid for this work. However, it is up to the institute authority to consider, if feasible and justified for an advance under certain terms and conditions to be agreed by both the parties.

19. ARBITRATION AND LAWS

In the event of any dispute, the same shall be referred to the sole arbitration of Director of the Institute or such officer he may appoint to be the arbitrator. There would be no objection that the Arbitrator is an employee of the Institute or that he had to deal with the

matter to which this tender relates is that in the course of his duties as an employee of the Institute, he has expressed his views or all or any of the matters in dispute or differences. The award of the officer so appointed by him shall be final and binding on the tenderers.

The venue of Arbitration is at Guwahati only.

The award of the arbitrator shall be final, conclusive and binding on all parties to this contract.

The cost of arbitration shall be borne by the parties to the dispute, as maybe decided by the arbitrator(s).

Registrar, IASST

SIGNATURE OF THE CONTRACTOR

ADDITIONAL COMMERCIAL & TECHNICAL CONDITIONS

1.0 General

1.1 The specification as mentioned elsewhere in this tender document covers manufacture, testing as may be necessary before dispatch, delivery at site, all preparatory work, assembly and installation, commissioning putting into operations of the Laboratories.

1.2 **Location**

The specified work on Laboratories will be done at the first floor in an area of 204.47 sq. meter (approx.) atthe newly constructed CIF (Central Instrumentation Facility) building of the Institute of Advanced Study in Science and Technology, Vigyan Path, Paschim Boragaon, Guwahati, Assam 781035

1.3 The work shall be executed as per statutory guidelines of setting up GLP BSL 3, 4 and 5 lab and standards. These additional specifications are to be read in conjunction with above and in case of variations; specifications given in this Additional conditions shall apply. However, nothing extra shall be paid on account of these additional specifications &conditions as the same are to be read along with schedule of quantities for the work.

1.4 The tenderer should in his own interest visit the site and familiarizes himself with the site conditions before tendering.

1.5 No T&P shall be issued by the Institute and nothing extra shall be paid on account of this.

2.0 Commercial Conditions

2.1 Type of contract

The work to be awarded by this tender shall be treated as indivisible works contract to be executed on design and built TURN KEY basis.

2.2 Submission and opening of Tenders:

2.2.1 The tenderers are advised not to deviate from the technical specifications/items, commercial terms and conditions of NIT like terms of payment, guarantee, arbitration clause, escalation etc.

2.2.2. The technical cum commercial bid only, shall be opened first on the due date and time, as specified in the NIT in the presence of tenderers or their authorized representatives who wish to remain present.

2.2.3 Scrutiny/ evaluation of the Technical, and commercial bids shall be done by the Institute or in consultation with any agency as deemed necessary by the Institute. In case it is found that the technical, and/or commercial bid of a tenderer is not in line

with NIT specifications, requirements and/or contains many deviations, the Institute reserves the right to reject the technical/commercial bid of such firms(s) without making any reference to the tenderer (s).

2.2.4. Necessary clarifications required by the Institute shall have to be furnished by the tenderer within the time given by the Institute for the same. The tenderer will have to depute his representative to discuss with the officer(s) of the Institute as and when so desired. In case, in the opinion of the Institute a tenderer is taking undue long time in furnishing the desired clarifications, his bid will be rejected without making reference.

2.2.5. After obtaining clarifications from all the tenderers, the Institute may modify the technical & commercial conditions/specifications if required, and will intimate the tenderers who's technical cum commercial bids are acceptable. The date and time of opening of price-bid will be intimated in advance.

2.2.6. The Envelop-II of the tender i.e. price bid will be opened by the Institute in the presence of the representatives of the tenderers who wish to be present.

2.2.7 In the price bid, there shall be no conditions whatsoever. In case any tenderer mentions any condition including conditional rebates in their price part, tender shall be rejected forthwith.

A tendered will also not be allowed to withdraw or modify any condition at a time after the technical bids have been accepted and the decision to open the price bid has been taken by the Institute.

3.0 Rates:

3.1 The rates quoted by the tenderer, shall be firm and inclusive of all taxes/ octroi (including works contract taxes/ Service tax), duties and levies and all charges for Packing forwarding, insurance, freight and delivery, installation, testing, Commissioning etc. at site i/c temporary constructional storage, risks, overhead charges general liabilities /obligations and clearance from local authorities.

3.2 The contractor has to carryout routine & preventive maintenance for 12 months from the date of handing over i.e. Defect liability period. Noextra amount shall be paid for this.

4.0 Completeness of tender:

All sundry equipment, fittings, unit assemblies, accessories, hardware items, Foundation bolts, termination lugs for electrical connections ,and all other items which are useful and necessary for efficient assembly and installation of equipment and components of the work shall be deemed to have been included in the tender

irrespectively of the fact whether such items are specifically mentioned in the tender documents or not.

5.0 For item/equipment requiring initial inspection at manufacturer's works' the contractor will intimate the date of testing of equipment at the manufacturer's works before dispatch. The Institute also reserves the right to inspect the fabrication job at factory and the successful tenderer has to make the arrangement for the same. The successful tenderer shall give sufficient advance notice regarding the dates proposed for such tests/inspection to the Institute's representatives(s) to facilities his presence during Testing/fabrication. The Engineer-in-charge at his discretion may witness such testing/fabrication. The cost of the Engineer's visit to the factory will be borne by the Institute. Also equipment may be inspected at the Manufacturer's premises, before dispatch to the site by the contractor.

6.0 Storage and Custody of materials:

The required space for storage of materials and erection of equipment if needed will be made available wherever possible or else the contractor has to make his own arrangement. Watch and ward of the stores and their safe custody shall be the responsibility of the contractor till the final taking over of the assets and installation by the institute.

7.0 Care of the Building:

Care shall be taken by the contractor while handing and installing the variousEquipment and components of the work to avoid damage to the building. He shall be responsible for repairing all damages and restoring the same to their original finish at his cost. He shall also remove at his cost all unwanted and waste materials arising out of the work and installation from the site.

8.0 Completion of period:

The completion period of 06 months indicated in the tender documents is for the entire work of planning, designing, supplying, installation, testing, commissioning and handing over of the entire system to the satisfaction of the Engineer-in-charge and the competent authority of the institute.

9.0 Performance Guarantee:

The tender shall guarantee among other things, the following

a) Quality, strength and performance of the materials used.
b) Safe mechanical and electrical stress on all parts under all specified conditions of operations.
c) Satisfactory operation during the maintenance period.

10.0 Guarantee:

10.1. All equipment and installations shall be guaranteed for a period of 12 months from the date of taking over the installation and the lab by the institute against unsatisfactory performance and/or breakdown due to defective design, workmanship of material. The equipment or components, or any part thereof, so found defective during guarantee period shall be forth with repaired or replaced free of cost, to the satisfaction of the Engineer-in Charge. In case it is felt by the Institute that undue delay is being caused by the contractor in doing this, the same will be got done by the Institute at the risk and cost of the contractor. The decision of the Engineer-in- Charge in this regard shall be final.

10.2.Periodical Service for the first 12 months will be carried out after the equipment and installations has been handed over or offered for inspection.

11.0Power Supply:

Electric service connection of required capacity and supply shall be provided by the Institute for installation, testing and commissioning purpose of the facility free of charge.

12.0Water Supply:

Water supply shall be made available by the institute at one point whenever needed.

13.0Data Manual and Drawings to be furnished by the tenderers:

13.1.**With Tender**: The tenderer shall furnish along with the tender, detailed technical Literature, pamphlet, and performance data for appraisal and evaluation of the offer.

13.2.**AfterAward of work:**

The successful tenderer would be required to submit the followings before commencement of the works for approval.

(a) The required layout and design drawings and details.

(b) Complete layout dimensions for every unit/group of units with dimensions required for the labs, AHU etc.

(c) Any other drawings/ information not specifically mentioned above but deemed to be necessary for the job by the contractor.

14.0 The successful tenderer should furnish well in advance three copies of detailed Instructions and manuals of manufacturers for all items of equipment regarding installation, adjustments operation and maintenance i/c preventive maintenance & trouble shooting together with all the relevant data sheets, spare parts catalogue and workshop procedure for repairs, assembly and adjustment etc. all in triplicate.

15.0 Extent of work:

15.1 The work shall comprise of entire labour including supervision and all materials necessary to make a complete installation and such tests and adjustments and Commissioning as may be required by the Institute. The term complete installation shall not only mean major items of the equipment and facility covered by specifications but all incidental sundry components necessary for complete execution and satisfactory performance of installation with all layout charts whether or not those have been mentioned in details in the tender document in connection with this contract.

15.2.Minor building works necessary for installation of equipment, foundation, making of opening in walls or in floors and restoring to their original condition, finishand necessary grouting etc. as required.

15.3.Maintenance (Routine & preventive) for one year from date of completion andhanding over i.e. Defect liability period.

15.4.The work is turnkey project. Any item required for completion of the project but left inadvertently shall be executed with in the quoted rates.

16.0Inspection and testing:

16.1. Copies of all documents of routine and type test certificates of the equipment, carried out at the manufacturers premises shall be furnished to the Engineer-in- charge and consignee.

16.2. After completion of the work in all respect the contractor shall offer the Installation for testing and operation.

17.0 Validity:

Tenders shall be valid for acceptance for a period of 120 days from the date of opening of price bid.

18.0 Compliance with Regulations and Indian standards:

18.1. All works shall be carried out in accordance with relevant regulation, both statutory and those specified by the Indian Standards related to the works covered by this specification. In particular, the equipment and installation will comply with the following:

i) Factories Act
ii) Indian Electricity Rules
iii) I.S.&BS Standards as applicable
iv)Workmen's compensation Act
v) Statutory norms prescribed by local bodies, if any.

18.2. Nothing in this specification shall be construed to relieve the successful tenderer of his responsibility for the design, manufacture and installation of the equipment with all accessories in accordance with current applicable statutory regulations and safety codes.

18.3. Successful tenderer shall arrange for compliance with statutory provisions of safety regulations and departmental requirements of safety codes in respect of labour employed on the work by the tenderer. Failure to provide such safety requirement would make the tenderer liable for monetary penalty as decided by the institute for each default. In addition, the Institute will be at liberty to make arrangement for the safety requirements at the cost of tenderer and cover the cost thereof from him.

19.0 Indemnity:

The successful tenderer shall at all times indemnify the Institute, consequent on this works contract. The successful tenderer shall be liable, in accordance with the Indian Law and Regulations for any accident occurring due to any cause and the Institute shall not be responsible for any accident or damage incurred or claims arising there from during the period of erection, construction and putting into operation the equipment and ancillary equipment under the supervision of the successful tenderer in so far as the latter is responsible. The successful tenderer shall also provide all insurance including third party insurance as may be necessary to cover the risk. No extra payment would be made to the successful tenderer due to the above.

20.0 Erection Tools:

No tools and tackles either for unloading or for shifting the equipment for erection purposes would be made available by the Institute. The successful tenderer shall make his own arrangement for all these facilities.

21.0 Cooperation with other agencies

The successful tender shall co-ordinate with other contractors and agencies engaged in the construction of building, if any, and exchange freely all technical information so as to make the execution of this works contract smooth. NO remuneration should be

claimed from the Institute for such technical cooperation. If any unreasonable hindrance is caused to other agencies and any completed portion of the work has to be dismantled and re-done for want of cooperation and coordination by the successful tenderer during the course of work, such expenditure incurred will be recovered from the successful tenderer if the restoration work to the original condition or specification of the dismantled portion of the work was not undertaken by the successful tenderer himself.

22.0 Insurance and Storage

All consignments are to be duly insured up to the destination from ware house to warehouse at the cost of the contractor. The insurance covers shall be valid till the equipment is handed over duly installed, tested and commissioned.

23.0 Verification of correctness of Equipment at Destination

The contractor shall have to produce all the relevant records to certify that the genuine equipment from the manufacturers has been supplied and erected.

24.0 Painting

This shall include the whole facility to be set up as prescribed and required for different parts before testing and commissioning.

25.0 Training

The scope of works include one job technical training of two persons of the institute at site. Nothing extra shall be payable on this account.

26.0 Maintenance

27.1.Sufficient trained and experienced staff shall be made available to meet any exigency of work during the guarantee period of one year from the handing over of the installation i.e. for the Defect liability period.

27.2.The maintenance, routine as well as preventive for one year or more as decided by the institute and the tenderer from the date of taking over the facility as per prescribed recommendations shall be carried out and the record of the same shall have to be maintained.

SPECIAL CONDITIONS

SCOPE OF WORK:

Sub: Construction of new "QA & QC lab facility, confirming to GLP and ISO: Class – 03, 04 & 05 standard Clean room classifications" in 204.47 sq. meter (approx.) area purely on Design & Built project construction on TURNKEY basis at Institute of Advanced Study in Science and Technology, Vigyan Path, Paschim Boragaon, Guwahati, Assam 781035.

The general character and the scope of work to be carried out under this contract is illustrated inEnclosed G.A Drawings, Technical Specifications, suggested Schedule of Quantities etc.

1. Interested Tenderers are requested to visit the above site in their own interest to examine the site details at the first floor of the CIF building in the institute campus which would enable them to submit their bid in a confident and informed manner. Tenderer to meet all the Technical and other specifications as per prescribed and relevant standards and guidelines of developing such a facility.

2. The entire job is required to be undertaken by the Tenderer on a **Turnkey Basis.** However, IASST would provide storage space at the site and Power, electricity and running water etc. as required by the tenderer.

3. If any damage takes place to the structure of the building during work, same will be repaired by the Tenderer.

4. It is the responsibility of the Tenderer to arrange for inspection and/or examination of the facility/work as required for testing, commissioning, validation and accreditation the facility developed before handing over to the institute for use to IASST.

5. The facility developed shall be under comprehensive warranty maintenance (inclusive of all spares and labor) of the Tenderer for a minimum of 12 monthsfrom the date of handing over. IASST will not make any payment on any maintenance during warranty period including attending the break down calls for fault rectification.

6. Electrical installation shall be carried out in accordance with the specifications,local rules, Indian Electricity Act 1910 as amended up to date and rules issued there under. All items of work under this contract shall be executed strictly to fulfill the requirement as laid down in the specifications.

7. During working at site, some restrictions may be imposed by Engineer-in- Charge/Security staff of the institute authorities regarding safety and security etc., the contractor shall be bound to follow all such restrictions/instruction and nothing extra shall be payable on this account.

8. No compensation shall be payable to the contract or for any damage caused by rains, lightening, wind, storm, floods, Tornado, earthquakes or other natural calamities during the execution of work. He shall make good all such damages at his own cost; and no claim on this account will be entertained.

9. No labour hutment maybe allowed in the premises. The security & watch ward of site contractor materials/work etc. shall be at his cost only.

9.1.1. All rates quoted by the bidders shall remain firm for the contract period/extended contract period.

10. If the contractor fails to proceed with the work within the stipulated time as specified from the date of issue of letter of intent/letter to proceed with the work, the Institute shall forfeit the earnest money deposited by him along with the tender.

11. All the civil works for the Air Handling Unit and labs included in the job shall be done by the contractor and nothing extra on this account shall be considered or paid.

12. In addition to the developing the facility as per specifications the following works shall be deemed to be included within the scope of the work to be done by the contractor and nothing extra on this account shall be paid.

12.1. All minor building work necessary for installation of equipment such as making of opening in walls/floors, either of RCC or brick masonry, etc., and restoring them to original condition and finish.

12.2. Temporary barricade with caution board wherever needed to prevent damage and to take precautionary measures so that no harm is done to the adjacent structures or labs during execution of work.

13. The work is turnkey project. Any item required for completion of the project but left in-advertently shall be executed within the quoted rates.

14. The contractor shall be fully responsible for the any injury or damaged caused to the workmen deployed at site for carrying out the work and Institute has nothing to do with such happenings and in no way shall be held responsible for the same.

All communication should be addressed *to* ***The Registrar***, **Institute of Advanced Study in Science and Technology, Vigyan Path, Paschim Boragaon, Guwahati-781035, Assam.**

FORM OF TENDER

To: The Registrar,
Institute of Advanced Study in Science and Technology,
Vigyan Path, Paschim Boragaon, Guwahati, Assam 781035

I/We have read and examined the following documents relating

to…….
……..……
…….

(Name of the Work)

(a) Notice inviting tender.

(b) Instructions to Tenderers

(c) Technical Specifications

(d) General Conditions of Contract including Contractors, Labour Regulations, and Model Rules for Labour Welfare and Safety Code appended to these conditions together with the amendments there to, if any.

(e) Additional commercial& technical conditions

(f) Special Conditions of contracts, if any.

(g) Bill of Quantities

I/We hereby tender for execution of the works referred to in the aforesaid documents upon the terms and conditions contained or referred to there in and in accordance in all respects with the specifications, designs, drawings and other relevant details at the rates contained in Schedule and within the period(s) of completion as stipulated in Appendix.

In consideration of I/we being invited to tender, I/we agree to keep the tender open for acceptance for 120 daysfrom the due date of submission thereof and not to make any modifications in its terms and conditions which are not acceptable to the Institute (IASST).

A sum of Rs……..…… (Rupees……) is hereby forwarded as Earnest Money Deposit in the form of Demand Draft/……. in favour of ……. If/ We fail to keep the tender open as aforesaid andmake any modifications in the terms and conditions of the tender which are not acceptable to the Institute, I/we agree that the Institute shall without prejudice to any other right or remedy, be at liberty to forfeitthe said earnest money absolutely. Should this tender be accepted, I/we agree to abide by and fulfill all the terms conditions of aforesaid document.

If after the tender is accepted, I/we fail to commence the execution of the work as provided in the conditions, I/we agree that Institute shall without prejudice to any other right or remedy is at liberty to forfeit the said earnest money absolutely.

Signature of contractor……

Duly authorized to sign the tender on behalf

of the (in block capitals)……

Dated……

Witness……

Date……

Address……

APPENDIX-

1.	Competent Authority	Director, IASST, Guwahati or his Authorized executives
1.	a) Estimated cost of the Works (Design& Build Turnkey project)	Rs.……..lakhs
	b)Time allowed for execution of work	06 Months
3.	Authority competent to decide if "Any other cause" of delay is beyond Contractor's control	Director, IASST, Guwahati
4.	Liquidated Damaged	Followed General condition of contract CPWD 2014.
5.	Defect Liability Period	12 months from the date of Completionof work.
6.	Authority competent to reduce Compensation	Director, IASST, Guwahati
7.	Approving Authority for releasing the payment Up to the accepted tender cost.	Director, IASST, Guwahati

(Signature of the Contractor)

Price Bid

Schedule of construction works, Supply, installation, Testing, Commissioning and validation of ……. at IASST, Guwahati, Assam

S. No.	Description	Qty	Rate	Unit	Amount
1.				**No.**	
	Taxes if any				
2.	Total amount in words & Figures (Rs.)				

Signature:_____

Name &Designation:_____

Co Name& Seal:_____

Date:_____

Place:

TECHNICAL SPECIFICATION
FOR SETTING UP QAQC LAB FACILITIES (ANALYTICAL & MICROBIOLOGY LABS) WITH OTHER REQUIRED PROVISIONS AT IASST, GUWAHATI

SECTION 1

1. General:

These are special conditions to the contract and intended for the same.

2. Scope of works:

Construction of new QA & QC lab facility, confirming to GLP and ISO: Class – 03, 04 & 05 standard Clean room classifications, purely on Design & Built project construction on TURNKEY basis. The general character and the scope of work to be carried out under this contract is illustrated in;

a. Enclosed G.A Drawings
b. Enclosed Technical Specifications
c. Enclosed Suggested Schedule of Quantities.

The contractor shall carry out and complete the said work under this contract in every respect in conformity with the contract documents and with the direction of and to the satisfaction of the owner's site representative. The contractor shall furnish all labor, materials and equipment as listed under the schedule of quantities and specified otherwise, transportation and incidentals necessary for supply, installation, testing and commissioning of the complete Clean Lab facility including required interior finish, electrical and automation system, air conditioning system and security and surveillance including fire detection and alarm systems as described in the specifications and as shown on the drawings. This also includes any material, equipment, appliances and incidental work not specifically mentioned herein or noted on the drawings/documents as being furnished or installed. But which are necessary and customary to be performed under this contract. The central heating, ventilating and air conditioning, BMS system and Electrical system shall comprise of the following:

a) Supply and installation of the Condensing outdoor units with multiple compressors
b) Necessary copper refrigerant Systems piping inclusive of all valves, fittings and thermal insulation.
c) Air Handling Units recirculation type (AHUs).
d) Required tubular heating element.
e) Centrifugal and propeller fans for mechanical ventilation.
f) Motor Control Centers.
g) All necessary Power and Lighting system including distribution boards

h) All power and control/communication cabling including terminations
i) Sheet metal ducts inclusive of external thermal insulation, acoustic lining, canvas connection, and volume Control Dampers and smoke & fire dampers as specified.
j) Supply of SA air registers and diffusers, RA risers with filter.
k) Vibration isolation for HVAC equipment
l) Automatic Controls and instruments.
m) Wiring and new earthing from MCC panels to various refrigeration, air-conditioning and mechanical - ventilation equipment control wiring and interlocking.
n) Cutting holes, chases and the likes through all types of non-structural walls and finishing for all type of wall crossings, including sealing, framework, fire proofing, providing sleeves, cover plates, making good structure and finishing to an approved standard, and keeping provision for about 12 numbers of piping facility to transport gas(s) from cylinders/source (located in an adjacent room) to the Analytical laboratory,
o) Balancing, testing and commissioning of the entire HVAC and mechanical ventilation installations.
p) Maintaining clan classifications with relevant DQ, IQ, OQ and PQ documentations.
q) On-site facility validation according to required differential pressure cascade system.
r) Test report, list of recommended spares, as installed drawings, operation and maintenance manuals for the entire Mechanical, Electrical and HVAC installations.
s) Training of owner's staff.
t) Integrated Building Management system allied works for field devices.

3. Associated Civil Works:

a) RCC foundation for chilling machines/Hot water Generator with angle iron framework at the edges to protect these from damage.
b) PCC foundation blocks for Motor Control Center with angle iron frame work at the edges to protect these from damage.
c) PCC foundation blocks for all Air Handling Units.
d) Double skin PUF insulated doors with minimum 11/2 Hr fire ratings for facility clean Room, AHU rooms, Fan Rooms and other equipment Rooms.
e) Water proofing of the floors of AHU rooms, air-washer rooms and fan rooms.
f) Masonry drain channels and sumps with CI gratings in AC plant Room including provision for sump pump and disposal.
g) Supply and fixing of GI/wooden frames for fixing the grilles in masonry walls.
h) Supply and fixing of GSS frames for mounting of HEPA Terminals, grilles/diffusers in false ceiling /boxing.
i) EPOXY flooring with necessary wall to floor coving
j) Thermal Insulation of terraces above air-conditioned area exposed to sun.

4. Associated Services works:

4.1. All associated **electrical works** listed below are also included in the scope of this contract. These shall be installed by successful agencies in accordance with the approved shop drawings and under supervision of the authorized representatives of the owner / contractor.

a) Providing 15 amps power outlet within 3 meters reach at locations called for on air-conditioning contractor's shop drawings.

b) Providing 15 amps power outlet within 3 meters reach of single phase fans at locations called for on air-conditioning contractor's shop drawings.

4.2 All associated **plumbing works** listed below wherever necessary are also included in the scope of works of the contractor.

a) Providing sump pump and necessary piping for drainage of air-conditioning plant room and other machine rooms at ground level if required.

b) Providing suitable civil foundations at GF for housing HVAC system high-side installations.

c) SITC of necessary Copper refrigerant pipeline including necessary control valves in the circuit.

ENTIRE QA & QC LAB FACILITY SHALL BE DESIGNED AND COMPLIED WITH "ISO CLEAN ROOM STANDARD – CLASS: ISO CLASS-4 & 5 ONLY. ISO CLASSIFICATION IS DESCRIBED IN BELOW TABLE:

Table 1 — Selected airborne particulate cleanliness classes for cleanrooms and clean zones

ISO classification number (*N*)	Maximum concentration limits (particles/m³ of air) for particles equal to and larger than the considered sizes shown below (concentration limits are calculated in accordance with equation (1) in 3.2)					
	0,1 µm	0,2 µm	0,3 µm	0,5 µm	1 µm	5 µm
ISO Class 1	10	2				
ISO Class 2	100	24	10	4		
ISO Class 3	1 000	237	102	35	8	
ISO Class 4	10 000	2 370	1 020	352	83	
ISO Class 5	100 000	23 700	10 200	3 520	832	29
ISO Class 6	1 000 000	237 000	102 000	35 200	8 320	293
ISO Class 7				352 000	83 200	2 930
ISO Class 8				3 520 000	832 000	29 300
ISO Class 9				35 200 000	8 320 000	293 000
NOTE Uncertainties related to the measurement process require that concentration data with no more than three significant figures be used in determining the classification level						

5.Project Execution and management:

The contractor shall ensure that senior planning and execution personnel from his organization are assigned exclusively for quality control & monitoring of workmanship of this project. They shall have minimum 5 years of experience in this type of installations who would be exclusively responsible for ensuring strict quality control, adherence to the specifications and ensuring top class workmanship for the clean room and air-conditioning installation.

6.Performance Guarantee:

The Contractor shall carry out the works in accordance with the drawings, specifications, schedule of the quantities and other documents forming part of the contract. The contractor shall be fully responsible for the performance of selected equipment (Supplied & Installed by him) at the specified parameters and for the efficiency of the installations to deliver the required end results. The contractor shall guarantee that the HVAC system as installed shall maintain the inside conditions in the air-conditioning clean room lab spaces as described under the Basis of Design and ROOM DATA SHEET in the specifications. The guarantee shall be submitted in the Performa sheet. One set of suggested architectural drawing of the proposed QA & QC lab area located at 1st floor of the CIF building are enclosed with the tender document. The contractor shall also guarantee that the performance of various equipment individually, shall not be less than the quoted capacity, actual power consumption shall not exceed the quoted rating, during testing and commissioning, performing design qualification, installation qualification, operation qualification and performance qualification activities,handling over and guarantee period.

7. Bye–Laws and Regulations:

The installations shall be in conformity with the by-laws and regulations and standards of the GLP, in so far as these become applicable to the installations. But if these specifications and drawings call for a higher standard of material and /or workmanship than those required by any of the above regulations and standards then these drawings and specifications shall take precedence over the said regulations and standards. However, if the drawings and specifications require something which violates the bye-laws and regulations, then the bye-laws and regulations shall govern the requirement of the installations.

8. Fees and permits:

The contractor shall obtain all permits/licenses and pay for any or all fees required for inspection, approvals and commissioning of their installations.

9. Drawings:

9.1. The facility drawings listed herewith, which may be issued with tenders are diagrammatic only and indicate arrangement of various systems and the extent of works covered in the contract. These drawings indicate the points of supply and termination of services and broadly follows the QA & QC lab facility configuration to be followed. Under no circumstances shall dimension be scaled from the drawings. The architectural/interior drawings and details shall be examined for exact location of the equipment, controls, grilles and diffusers.

9.2. The contractor shall follow the tender drawings in preparation of his necessary Heat Load Calculations considering various room international conditions like desired (-)Pressure gradients, Temperature and Relative Humidity to be maintained all day 365x24 Hrs, shop drawings and for subsequent installation work. He shall check the drawings of other trades/services to verify spaces in which his works shall be installed.

9.3. Maximum headroom and space conditions shall be maintained at all points. Where head room appears inadequate the contractor shall notify architect/consultant/owner's site representative before proceeding with the installations. In case installation is carried out without notifying the works shall be rejected and the contractor shall rectify the same at his own cost. The contractor shall examine all the architectural, structural, plumbing, electrical, automation and other services drawings and check the scope of total job content before starting the work, report to the owner's site representative of any discrepancies and obtain clarification. Any changes found essential to coordinate his work with other services and trades, shall be made with prior approval of architect/consultant/owner's site representative without additional cost to the owner. The data given in the drawings and specifications as exact as could be procured, but its accuracy is not guaranteed.

10. Technical Data:

Each tenderer shall submit along with his tender, the technical data for all items listed in the indicated format. Failure to submit complete data with the tenders may result in summary rejection of the tender.

11. Shop Drawings:

11.1. All the shop drawings shall be prepared on computer through Autocad system based on the architectural drawings, site measurements and interior designer's drawings. All heat load calculation shall be done within eight weeks of the award of the contract, contractor shall

furnish for the approval of the architect /consultant two set of detailed shop drawing of all equipment and material including the layouts of the plant rooms, AHU rooms, Fan rooms, Cooling Towers, fan coil units, ventilation fans. Detailed ducting drawing and external insulation details for ducts, pipe insulation etc. Electrical panels inside/outside views, power and control wiring schematics, cable trays, supports and terminations. These shop drawings shall contain all information required to complete terminations. These shop drawings shall contain all the information required to complete DQ, IQ, OQ and PQ for the project as per specifications.

11.2. Each item of equipment/material proposed shall be a standard catalogue product of an established manufacturer strictly from the manufactures listed in Appendix (List of Approved Make/Manufacturer) and quoted by tenderer in technical data part of Appendix.

11.3. When the Architect/Consultant makes any amendment in the above drawings, the contractor shall comply and supply two fresh sets of drawings with the amendments duly incorporated along with check prints for approval. The contractor shall submit further 5 sets of the shop drawings to the owner's site representative for the exclusive use of the owner's site representative and all other agencies. No material or equipment may be delivered or installed at the job site until the contractor has in his possession the approved shop drawing for the particular material/equipment/installations.

12.Quite Operation and Vibration Isolation:

12.1 All equipment shall operate under all conditions of load without any sound and vibration which is objectionable in the opinion of the owner's site representative.

12.2. In case of rotating machinery sound or vibration noticeable outside the room in which it is installed or annoyingly noticeable inside its own room shall be considered objectionable. Such condition shall be corrected by the contractor at his own expenses. The contractor shall guarantee that the equipment installed shall maintain the specified NC levels.

13. Accessibility:

The contractor shall verify the sufficiency of the size of the shaft openings, clearances in cavity walls and suspended ceiling for proper installation of his ducting and piping. His failure to communicate insufficiency of the same. The contractor shall locate all equipment which must be serviced, operated or maintained in fully accessible positions. The exact location and size of all access panels required for each concealed damper, valves or other devices requiring attendance shall be finalized and communicated in

sufficient time to be provided in the normal course of work. Failing this the contractor shall make all necessary changes and repairs at his own expenses. Access panel shall be standardized for each piece of equipment/device/accessory and shall be clearly nomenclatured / marked.

14. Materials and equipment:

All materials and equipment shall conform to the relevant Indian standards and shall be of the approved make and design. Makes shall be strictly in conformity with the list of approved manufactures.

15. Manufactures Instructions:

Where manufacturer has furnished specific instructions relating to the material/equipment used in this project, covering points especially not mentioned in these documents, such instructions shall be followed in all cases.

16.Electrical Installations:

16.1.The electrical work related to HVAC system, shall be carried out in full knowledge of, and with complete coordination of contractor. The electrical installation shall be in total conformity with the control wiring drawings prepared by the contractor and approved by the architect /consultant. All air-conditioning equipments shall be connected and tested in the presence of an authorized representative of the contractor.

16.2. The electrical and air-conditioning system shall be commissioned only after the contractor has certified in writing that the electrical installation work for HVAC system has been thoroughly checked, tested and found to be totally satisfactory and in full conformity with the contract drawings, specifications and manufacturer's instructions. It is to be clearly understood that the final responsibility for the sufficiency, adequacy and conformity to the contract requirement s of the electrical supply, installation work for HVAC system, lies solely with the contractor.

17.Completion Certificate:

On completion of the electrical installation for entire facility set up and the HVAC system, a certificate shall be furnished by the contractor, counter signed by the authorized supervisor, under whose direct supervision the installation was carried out.

18. Balancing, Testing and Commissioning:

18.1 Balancing of all air and water systems and all tests as called for the specifications shall be carried out by the contractor through a specialist group, in accordance with the specifications and ASHRAE guidelines and standards. Performance test shall consist of two days of 10 hrs each operation of each season. Formats for Performance Test are enclosed with tender document for reference.

18.2. The results for testing of the clean room facility, shall be submitted for scrutiny. Four copies of the certified manufacturer's performance curves for each piece of equipment, highlighting operational parameters for the project, shall be submitted along with the test certificates. Contractors shall also provide four copies of record of all safety and automatic control settings for entire installation. Total cost for validation and performance testing shall be on sole responsibility of the contractor.

19. Completion Drawings

Contractor shall periodically submit completion drawings as and when work in all respects is completed in a particular area. These drawings shall be submitted in the form of two sets of portfolios (300 x 450mm) each containing complete set of drawings. These drawings shall clearly indicate complete room layouts, location of wiring and sequencing of automatic controls, locations of all concealed piping, valves, controls, dampers, wiring and other services. Each portfolio shall also contain consolidated control diagrams and technical literature on all controls.

20. Operating Instructions & Maintenance Manual:

Upon completion and commissioning of part HVAC, Electrical and BMS system the contractor shall submit a draft copy of operating instructions, maintenance schedules and log sheets for all system and equipment included in this contract. This shall be supplementary to manufacturers operating and maintenance manual. One each for retention by consultant and the clients. These manuals shall also include basis of design, detailed technical data for each piece of equipment as installed, spare parts manual and recommended spares for 2 years period of maintenance of each equipment.

21. Maintenance during defects Liability Period (DLP):

21.1 Complaints:

The contractor shall receive calls for any or all problems experienced in the operation of the system under this contract, attend to these within four hours of receiving the complaints and shall take steps to immediately correct any deficiencies that may exist.

21.2 Repairs:

a) All equipment that require repairing shall be immediately serviced and repaired. Since the period of mechanical maintenance runs for two years concurrently with the defects liability period, all replacement parts and labor shall be supplied promptly free of charge to the owner.
b) The contractor shall provide log in the form of diskettes and bound printed comprehensive log book containing tables for daily record of all temperature. Pressure, humidity, power consumption starting and stopping times for various equipment, daily service rendered for the system alarms, maintenance records of unusual observations etc.
c) Contractor shall also submit preventive maintenance schedule.
d) Each tenderer shall submit along with the tender, a detailed operation assistance proposal for the owner's site representative / consultant's review. This should include the type of service planned to be offered during the defects liability period and beyond. The operation assistance proposal shall give the details of the proposed monthly reports to the management.
e) The tenderer shall include a list of such project where such operation assistance has been provided along with list of CLEAN ROOM lab construction / completion certificates issued by relevant organization established and in operation in India.

22.Soft water and power requirement:

The contractor shall submit with their tender, the requirement of soft make up water and power at each of their equipment/system wise/floor wise/section wise. 9

SECTION 2

SYSTEM DESIGN DATA

A. SCHEMATIC FACILITY LAYOUT & DESIGN PHLOSOPHY;

HVAC system in the CLEAN ROOM Lab stands out for its complexities and stringent demands on indoor and exhaust air quality, airflow patterns, cross contamination control, odour control and noise control etc. The CLEAN ROOM HVAC system further demands more care in energy aspects due to its longer hours of operations.

The following factors have been considered for the design of HVAC services:

1. Individual and quickly responding temperature control for each area.
2. Draft-free air distribution.
3. Recirculation and treated fresh air with total filtered/decontaminated exhaust philosophy.
4. Treated Fresh air or makeup air supply to maintain IAQ.
5. Humidity control.
6. Acceptable noise level.
7. Ceiling mounted HEPA filter Terminals and clean room double skin modular wall concealed low return risers complete with filters shall be considered for air condition system air flow circulation design.
8. Global standards recommended by cGMP/ GLP and WHO should be prime consideration.

To effectively design an HVAC system for this CLEAN ROOM facility building, the design is made as per the building layout and the departmental areas or zones. These zones are broadly classified as follows.

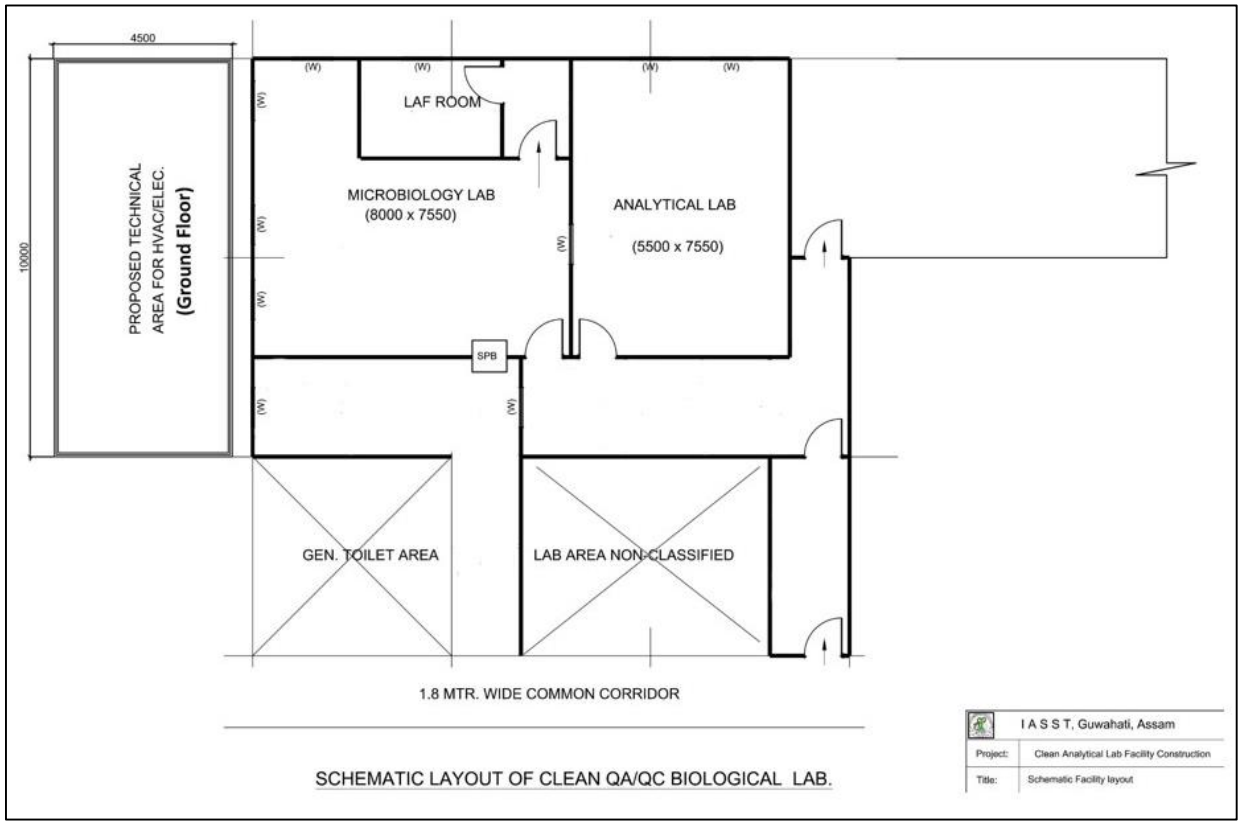
1. Non-CLEAN ROOM Administration/Faculty: For general official use.
2. CLEAN ROOM Lab Area: QA & QC-CLEAN ROOM Lab / Working CLEAN ROOM Lab. Washing / Autoclave section.
3. Procedure & Change area: Specific entry to controlled CLEAN ROOM lab area

ZONING:

The individual requirements of the above will be considered for designing the system

B. SCHEMATIC LAYOUT:

The system design, basis of design, requirements and other relevant data are outlined in this section. The detailed specifications and specific requirements are outlined in the subsequent sections.



SCHEMATIC LAYOUT OF CLEAN QA/QC BIOLOGICAL LAB.

C. SCOPE OF WORKS:

1. The work proposed under this tender includes providing and fixing air-conditioning, heating and ventilation systems for the above work.
2. Providing and fixing at site all main equipment associated with air-conditioning and ventilation for the above.
3. To execute all incidental work at site including material supply at site associated with the system asked in the specifications.
4. Nature of such works will be sheet metal ductwork, air distribution devices viz. grilles and diffusers, copper refrigerant piping and its insulation, drain piping etc., incidental civil works, incidental electrical works, cable, control panel etc. at site for all manufactured items at works and also items fabricated at site.
5. Routine Testing, pressure testing of fabricated components, commissioning of complete plant at site.
6. Performance testing at site of complete air-conditioning, air-cooling and ventilation system / installations at site.

D. BASIS OF DESIGN:

Station Name – IASST, Paschim Boragaon (Kamakhya)
Latitude & Longitude - 26.1445° N, 91.7362° E
Altitude - 55 Metre from MSL
Daily Range - 15ºC to 38.6ºC

E. Inside Design Conditions:

Clean Lab
(Class-ISO 5): Class 100,000 (min. ACPH - 60)
(Class-ISO 4): Class 10,000 (min. ACPH – 40)
Ventilation: 10 cfm per person
Lighting Load: 2w/ft2 in all areas, 3w/ft2 in OTs
Toilets/Labs - 10 air changes per hour
Kitchen -10 air changes per hour
Dirty utility Room - 10 air changes per hour

F. System Design details:

Heating, ventilation and Air-conditioning System:

1. The total air-conditioning load for the above areas works out to be 22 TR. It is proposed to install out-door condensing unit with multiple compressors air cooled type air-

conditioning system to provide year round thermal environmental control for the above areas. It is proposed to use 2 Nos. 11 TR Cooling Capacity air cooled condensing units with multiple compressor type chilling system. Air Handling Units, TFA units, Fan coil units as per the requirements at various floors/areas.

2. The plant shall be installed at the Plant space allocated in Ground floor and MCC with all electrical systems shall be installed at GF electrical room area. The system shall be complete with electrical panel boards, power cabling, control cabling, earthing and controls. GSS ducting confirming to IS 655 / 266 shall be installed from GF plant area to the specified FF clean room lab area complete with thermal insulation and necessary structural supports.

SECTION 3

AIR HANDLING UNITS

1. SCOPE:

The Scope of this section comprises the supply, erection, testing and commissioning of double skin Air Handling Units conforming to these Specifications and in accordance with requirements of drawings and schedule of quantities.

2. TYPE:

The Air Handling Units shall be of floor mounted draw through type having sections such as filter section with pre-filters, microvee filters and HEPA filters as required under BOQ, cooling coil section with suitable chilled water cooling coil, fan section with PLUG fan, mixing section where required under BOQ, humidification section with centrifugal fan as per schedule of quantities and arrangement shown on the drawings.

3.CAPACITY:

The air moving and coil capacities (Air Conditioning Load) shall be as shown in Schedule of equipment and quantities and on drawings.

4.CASING:

a) The housing/ casing of the air handling unit shall be of double skin construction. The housing shall be so made that it can be delivered at site in total/ semi knock down conditions depending upon the conditions. The frame work shall be of extruded aluminium hollow sections fitted with pre-formed insulated sections. All the members

shall be assembled thru mechanical joints to make a sturdy and strong frame work for various sections.

b) Double skin panels (each not exceeding 750mm wide) shall be made of 22G pre-coated Galvanised sheet steel and 22G galvanised sheet inside with pressure injected PU foam insulation of 50mm thick X 48 Kg/Cu.M in in between. The panels shall be bolted from inside on to the frame work with soft rubber gasket in between to make the joints air tight.
c) Thermal Break Frame work for each section shall be bolted together with soft rubber gasket in between to make the joints air tight. Suitable doors with powder coated hinges and latches shall be provided for access to various panels for maintenance.
d) The fan and the motor arrangement shall be mounted on to the extruded aluminium frame work. The entire housing i.e. The Air Handling Unit shall be mounted on extruded aluminium base channel framework.
e) Drain pan shall be constructed of 16 SS sheet having 12 mm thick 32 Kq/Cu. XPE insulation.The pan shall have necessary slope to facilitate for fast removal of condensate.

5.MOTOR AND DRIVE:

Fan motors shall be 230 ± 10% volts 50 cycles 3 phase totally enclosed fan cooled with IP-55 rotation. Motor shall be especially designed for quite operation and motor speed shall not exceed 1440 RPM. Drive to fan shall be provided through belt drive arrangement. Belts shall be of oil-resistant type. Adjustable sheaves shall be provided.

6.FAN:

The fan shall be forward, curved double inlet double width type complete with motor and drive package. The wheel and housing shall be fabricated from heavy gauge galvanized steel. The fan impeller shall be mounted on a solid shaft supported to housing with angle iron frame and pillow block heavy duty ball bearings. The fan shall be selected for a speed not exceeding 1000 RPM. The fan outlet velocity shall not be more than 1800 rpm. Fan housing with motor shall be mounted on a common steel base mounted inside the AHU on anti-vibration springs or cushy foot mount. The fan shall be direct driven type. Another fire retardant canvass connection shall be providing at unit outlet to connect the ducts.

7.Cooling Coils:

a) The cooling coil shall be seamless copper tubes not less than 0.437 mm thick and 12.5 mm O.D. The coil shall have continuous aluminium fins. The tube shall be staggered in the direction of air flow. The fins shall be uniformly bonded to the tubes by mechanical expansion of the tube. The coil shall be tested against leaks

b) At a hydraulic pressure of 21kg/m3 for a period of two hours. The water headers shall be of copper pipes to connect all the tubes. The header shall be complete with water In/Out connections, vent plug and drain at the bottom and designed to provide a water velocity between 0.6 to 1.8 m/s (2 to 6 FPS)

8. Filters:

As asked for under Bill of quantities.

9. Electrical Panel:

Each unit shall have its own electric panel consisting of MCCB / fuse switch unit, starter, indicating lamps, incoming/outgoing internal and external wiring and earthing as per the details in BOQ.

10.Fresh Air Control:

An adjustable damper of GI sheet along with bird screen, air inlet louvers and air filters shall be provided for fresh air entry. The damper shall be sized for 50% of designed air quantity.

11.Limitations:

a) The air velocity across the cooling coils shall not exceed 500 fpm.
b) The fan outlet velocity shall not exceed 1800 fps (9m/s) in any case.
c) The velocity across the filters shall not exceed 500 fpm in any case.

SECTION 4

Refrigerant Piping:

The refrigerant circuit piping shall be of carbon steel seamless, as per ASTMA-106, grade B or BS-3602 grade 23 and dimensioned as per ANSI B-36.1, schedule 40. The fittings shall be heavy class. The pipes and fittings shall be connected by means of welded joints. The connections to gauges, controls, etc. shall be with flare fittings.The refrigerant valves, required in the circuit shall be as follows:

Valve Size	Valve Material	Type of Connections fittings
Up to 12mm	Brass pack less type	Flare
16mm and above	Brass/Steel packed	Brazed/Welded type

Note: - All valves shall be tested against leaks up to 28 kg/sq.cm.

- The strainers for the refrigerant liquid line shall be 'Y' type with gun metal body and bronze filter screen of fine mesh. The filter screen shall be easily removable type without dismantling the strainer from the circuit. The moisture indication sight glass in the liquid line shall have leak proof glass on opposite sides to permit easy inspection of the liquid refrigerant. Silencers and moisture drier etc. shall be provided as part of the refrigerant piping.
- Bolts wherever used shall be electro-galvanised steel. Brazed joints, in the refrigerant piping, which has leak, shall be opened and re-done. These shall in, no case be repaired by addition of brazing alloy to the joint.

SECTION 5

Sheet Metal Work & Air Distribution

1.Scope:

The scope of work shall include supply, fabrication and installation of site fabricated G.I. sheet metal duct as shown in the relevant duct drawing, testing at site, loading & unloading of G.I. sheets at site, and shifting the G.I. sheets and other hardware from site stores to exact location inside the office complex. The packing shall be suitable for marine transportation purpose and all

other natural disasters and the same shall be transported to respective office warehouses to achieve a guaranteed commercial operation of the same to the entire satisfaction of client.

2. Materials

Ducts shall be made of either galvanized steel sheets or aluminum sheets. The galvanized steel sheet shall confirm to IS: 277 – 1977 Aluminum shall be of grade SIC of B-3 as specified in IS: 177 – 1974.

Thickness of sheet shall be as per the table given below:

Maximum Side (mm)	Thickness (mm)	
	Galvanized Steel Sheet	Aluminum Sheet
Up to 750 mm	0.63	0.80
751-1500	0.80	1.00
1501-2250	1.00	1.50
2250-2500	1.20	
Plenums and Ducts above 2500	1.60	

- The bracing shall be as per ISS 655-1964. Supports for ducts at 2.4m distance apart up to 2250/1.2m distance apart for larger ducts.
- Ducts shall be rectangular in cross section and fabricated in accordance with the following table

Maximum Side of Duct (mm)	**Minimum Thickness of Sheet (mm/SWG)**	**Transverse Joints**	**Reinforcement**	**Hanger Rod Diameter (mm)**
Up to 400	0.63 (24 SWG)	25mm pocket/s slip	Cross Break	8
401 to 750	0.63 (24 SWG)	25mm pocket/s slip	25 X 25 X 4.2 Girth angle @ 1000 mm c/c	8
751 to 900	0.80(22SWG)	38x38x4.2 Companion Flanges	25 X 25 X 4.2 Girth angle @ 1000 mm c/c	8
901 to 1500	0.80(22SWG)	38x38x4.2 Companion Flanges	38x38x4.2 Girth angle @ 760 mm c/c	10

1501 to 2250	1.00(20SWG)	38x38x4.2 Companion Flanges	38x38x4.2 Girth angle @ 760 mm c/c	10
2250 and above	1.25(18 SWG)	50x50x4.2 Companion Flanges	50x50x4.2 Girth angle @ 610 mm c/c	12
Plenums	1.25(18 SWG)	50x50x6.4 Companion Flanges	50x50x6.4 Girth angle @ 610 mm c/c	12

Girth angles and companion flanges shall be mitered and welded at corners and riveted to duct sheets at 75mm centers. Flanged joints shall be made with 9.5-mm GI bolts spaced at 1.5cm centers and provided with 4.2mm rubber or 6.0mm. All joints and seams shall be rendered airtight. All duct seams and joints to be sealed with silicon sealant to stop supply air leakage. Duct panels are not to be cross-broken if insulated. Longitudinal seams shall be inside groove of Pittsburgh type. All ducting supports, bracing and framework shall be painted with 2 coats of epoxy primer and 2 coats of epoxy paint min. (50 microns).

3. Accessories:

- All dampers, except where shown, shall be louver dampers having multiple opposed blades type or with parallel blades of airfoil construction. The construction of the dampers shall be robust and tight fitting. They should be made from 18 gauge galvanized sheets. The depth should be minimum of 150mm and flanges of 40mm. Blades shall be connected with a suitable linkage for operation by an extending by an extending lever, which shall have a locking quadrant with positions of the damper indicated on it. Dampers and their operating device shall be made robust, easily operable and accessible through suitable access doors in the ducts.
- Dampers shall be provided in ducts at every branch supply or return air duct connections whether or not indicated on the drawings for the proper volume control and balancing the system.
- Where shown, splitter dampers shall be installed. This damper consists of double thickness airfoil blade hinged on the downstream edge. The operating lever shall extend outside the duct and insulation with an airtight hub and locking arrangements. The thickness of the damper blades shall be the same as the duct in which they are installed but not less than 1.5mm thickness.
- Fire dampers shall be motorized / solenoid type wherever specified shall be provide in the ducts to minimize spreading of fire through ducts, i.e. points where duct passes fire (rated 1 ½ hrs. or more) wall or slab. Fire dampers shall be 230mm – deep and face area as required. The outlet casing of the damper shall be fabricated out of 12 gauges M.S. sheet

duly epoxy painted with two coats. The louvers shall be provided with smooth pivoted linkage, tripping mechanism of steel bar with heavy-duty spring assembly and provision of motor. The louvers to be arranged to pivot and hold in an open position and can be closed by an electrically operated motor. The damper is used in conjunction with a smoke alarm system. The entire assembly shall be duly epoxy primer of 2 coats (epoxy paint) or aluminum spray painted. The dampers shall be designed for automatic as well as manual tripping.

- Motors shall be rated for fire damper (spring to close power to open) operation and shall be suitable for outdoor installation (IP55). Fire dampers are closed on a signal from the fire control module. Module supply and wiring by fire control contractor.
- Motorised dampers should be single flap dampers with 18 gauge construction with Belimo or Equivalent make spring return type. Opening time should be more than 75secs. And closing time should be 30secs. The power shall be given from the electrical panel and will be routed through the unit.
- 300mm X 300mm access panels with gasket neoprene and stud bolt type shall be provided near lower dampers/ splitters dampers and fire damper. All main ducting work shall be accessible throughout using tight fitted hinged access doors. Doors shall be cemented sponge rubber gaskets of 6mm thickness. Felt is not acceptable. In the case of insulated ducts with access doors, the same shall be properly insulated, such that it can be operated without damaging the duct insulation and there should be no condensation either on the access doors or on the ducts when he plant is running.

4. Installation Guidelines

- The duct fabrication and installation shall generally confirm to IS 655-1963.
- All ducts shall be supported from the concrete slab or beams. Duct supports shall be fixed through the use of two anchor fasteners for each leg. The anchor fasteners shall be of approved make. If ducting is supported from steel structure, Beam Clamps shall be provided. In no case shall the duct be supported from the false ceiling hangers or be permitted to rest on a hung ceiling.
- Transverse joints shall be provided with rubber gaskets (6mm thk.) of non-flammable type. Use of felt shall not be permitted.
- Wherever the ducts are acoustically lined, the duct size shall be increased by the thickness of the duct lining.
- The contractor shall provide and neatly erect all sheet metal work as per the specifications and drawings. This work,in all its parts and details, shall meet with the approval of the Engineer
- The contractor shall make all necessary allowances and provisions for beams, pipes or other obstructions in the ducting, whether or not the same has been shown in the drawings.

- Wherever necessary to avoid beams or other structural works, plumbing or other pipes / conduits, the ducts shall be transformed, divided or curved to one side as approved or directed by the Engineer. However, the required cross-sectional area shall be maintained.
- All metal work shall be done in dead or furred down spaces so as not to cause any delay to other contractors on the building.
- If a duct cannot be installed as shown in the drawings, the contractor shall install the duct between the required points by any path available subject to the approval of the Engineer and Architect.
- All ducts shall be rigid and shall be adequately supported with standing seams, tees or angles of ample size wherever required to keep the ducts true to shape, prevent buckling, vibration and breathing.
- All duct joints shall be tightly fitted using rubber gasket of non-flammable type and all interior surfaces shall be smooth. Bends shall be made with radius not less than one-half of the width of the duct or with properly designed interior curved vanes. Two vanes shall be spaced such that the aspect ratio of each of the individual elbows formed by the vane will be about five to one.
- All sheet metal connections, partitions and plenums required to confine the flow of air to and through the filters and fans, shall be constructed from 16G galvanised iron thoroughly stiffened with 25mm X 25mm angle iron braces and fitted with all necessary doors as required to give access to all parts of the apparatus. Doors shall not be less than 46 cm X 71cm. Sheet Metal connections to indoor units shall be flexible, double thickness fiberglass cloth or equivalent non-flammable material of 100mm long.
- Where metal ducts or sleeves terminate in woodwork, brick or masonry openings tight joints shall be made by the means of closely fittings heavy flanged collars.
- Resistoflex or similar vibration isolation material of 6mm thickness shall be provided between ducts and duct support.
- Where ductwork is connected to rotating equipment duct such as fans, air handling units (indoor unit of split/package system), the connections shall be made with double thickness non-flammable flexible material, 100mm long.

5. Grilles and Diffusers:

- **Supply Air Side Wall Outlets**
  Wherever specified in the B.O.Q. shall be in Aluminum construction.

- **Double Deflection Grilles:**
  Wherever specified in the B.O.Q. shall be in Aluminum construction. Aluminum double deflection grills for supply air shall be provided with vertical and horizontal adjustable bars and an approved blade damper adjustable from the front face of the grille. The grilles will be powder -coated in a shade as given in the schedule of finishes of this handbook.

- **Fixed Bar Linear Grilles**
  Fixed bar grilles will be in extruded aluminium construction. Bars shall be fixed in position using vertical tie bars. Bar spacing shall not exceed 12mm and the grilles shall have 60% free area. Deflection angle of the bars shall be 0. The grilles will be powder coated in a shade as per the owner/architect. Irrespective of grille finish, vertical tie bars shall be powder coated in Matt black. Supply air outlets shall be provided with volume control dampers to be installed in the duct collar. Dampers shall be in black Matt powder coated finish. Where required by the Architects/Consultants, the grilles shall be provided with a margin on all sides. Supply air outlets shall be provided with end closure pieces for the supply portion of the grille. The end closure pieces shall not come to the grille face.

- Continuous grilles shall butt with hairline joints and be provided with interlocking splines.
- All return air grilles shall be similar and equal to the above as determined by consultants.
- All exhaust air grilles shall be similar and equal to the supply air grilles specified above.

6.Ceiling Outlets:

Square / Rectangular HEPA TERMINALS:

Shall be of heavy gauge GI sheet construction wherever specified in the BOQ. Corners of inner and outer cores shall be assembled to provide precise mitered corners. Supply air Terminals shall be provided with multi blade butterfly dampers. Damper flaps shall be provided with a nylon worm gear assembly for ease of operation. Diffusers will be powder -coated in a shade as approved by client/Architect. HEPA filter holding pressure plates with locking bolting system. Ports shall be provided for checking Up-stream and Down stream flow DOP test. Diffuser shall be half step down type.

7. Guidelines for Installation of Grilles/Diffusers

Installation of the grilles/diffusers shall be done by the air conditioning contractor irrespective of the type/model of false ceiling systems. The diffusers will have to be individually suspended from the duct and aligned to match the ceiling line level. In case gypsum or any other false ceiling system, all wooden frames, rectangular or circular for supply/return/exhaust air diffusers will be provided by the Air conditioning contractor.

All air outlets/return air inlets in the same room shall be of the same size unless otherwise specified.

Grilles and diffuser samples must be submitted to the consultants for prior approval before procurement and installation.

SECTION 6

1. Duct and Pipe Insulation:

Ductwork shall be insulated as per the below specified guidelines.

2.Painting:

Angle iron Flanges, Stiffeners, hangers and supports shall be painted with 2 coats of anti-rust primer and remaining uncovered duct shall be further painted with 2 coats of synthetic enamel paints of black color.

3. Insulation:

All tests like pressure testing should be completed and recorded. All systems shall be approved by the Consultants before insulation is applied to the equipment, duct and piping. Insulation material shall be supplied by approved manufacturers and shall be of the type specifically intended for the services required.

4.Ductwork & Piping Insulation Application Guidelines:

Piping and accessory insulation application shall be as follows:

a) Pipes shall be thoroughly cleaned with wire brush and rendered free from all rust and grease.
b) For insulation of straight pipe slip on method shall be used. For elbows and bends snap off method will be used.
c) First 2 coats of specified Insulation adhesive shall be applied then the Insulation shall be fixed tightly on the surface taking care to seal all joints.
d) Adequately sized PVC self-adhesive tape shall be provided to seal all joints afterwards Al cladding shall be done as per requirements.

5.Ductwork Insulation:

Preformed pipe sections of chemically cross linked closed cell polyethylene FR-XPE of fire retardant grade in roll form the insulation up to 32 mm thick and density shall not be less than 33 kg/m3 and the thermal conductivity shall be 0.027kcal/hrm2C at mean temperature of 0ºC. The insulation thickness shall be 19 mm on all ducts except the toilet and basement exhaust.

SECTION 7

Control Panel, Motors and switchgears

1. **General**
   a) This specification covers the designs, material, construction features, manufacture, inspection and testing at the VENDOR'S/his sub-contractors work, delivery and performance testing of metal-enclosed Medium Voltage Switchgear of voltage not exceeding 1000 V AC.
   b) The switchgears would comprise of Motor Control Centres (MCCs) required for the supply of power to the motors of the plant for medium voltage equipment.

2. **Codes & Standards**
   a) The design, construction, manufacture and performance of equipment shall conform to latest applicable standards and comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. Nothing in this specification shall be construed to relieve the VENDOR of this responsibility.
   b) Equipment shall conform to the latest applicable standards as mentioned. In case of conflict between the standards and this specification, this specification shall govern.
   c) All components shall be of reputed make and subject to Purchaser's approval and as per recommended manufacture.

3. **Power Supply System**
   a) The incomer power supply shall be 415V, 3 phase, 3 wire, 50 Hz, non-effectively earthed AC system. The fault level for the switchgear shall be 40 KA for 1 sec.
   b) Dynamic - 84 Ka (Peak) - Short time
   c) Variation of voltage and frequency from their rated values as required.

4. **Operating Mechanism**
   a) Circuit breaker shall be provided with operating mechanism as specified.
   b) Power operated mechanism shall be of the motor wound spring charging stored energy type.
   c) The closing action of the circuit breaker shall charge the tripping spring ready for tripping.
   d) Speed of closing of contacts shall be independent of the speed with which the handle is operated.

e) All stored energy mechanisms shall be provided with mechanical I ndicaters to show the `charged' and `discharged' conditions of the spring.

f) Circuit breakers provided with stored energy operating mechanisms shall be provided with the following interlocks.

   i. The circuit breaker shall not close unless the spring is fully charged.

   ii. Shocks, vibrations, or failure of springs shall not operate the breaker or prevent intended tripping.

   iii. Power operated mechanism shall be

   - Provided with a universal motor suitable for operation on A.C. and D.C. control supplies specified in Annexure-A with voltage variation from 85% to 110% rated voltage.
   - Designed to enable a continuous sequence of closing and opening operation as long as power is available and at least one opening operation on power supply failure.
   - Provided with emergency manual charging facilities.

5. Moulded Case Circuit Breaker:

a) Moulded case circuit breakers shall be made of insulating case and cover made of high strength, heat resistant and frame-retardant thermosetting insulating material.

b) The switching mechanism shall be made/quick-break type utilizing a trip free toggle mechanism. The handle position shall give positive indication of whether the breaker is ON (top), OFF(down) or tripped (midway). For overload protection, three bimetal magnetothermal release and electromagnets releases for short circuit protection to be provided. The magneto-thermal release shall be variation and direct acting. All releases shall operate on a common trip bar so that all phases are disconnected in the event when fault occurs even on only one of them.

c) The contacts shall be made of silver allow and arc chutes shall be made of de-lon plates. These plates shall be housed in a vulcanizedfiber casing. The arc chutes shall be capable of quenching the arc rapidly and drawing away the arc from contact tips.

d) The terminates shall have sufficiently large dimensions to accept links or cable lugs of suitable sizes.

6. Miniature Circuit Breakers (MCB)

a) MCBs shall be hand operated, air break, quick make, quick break type conforming to applicable standards.

b) MCB shall be provided with overload/short-circuit protective device for protection under overload and short-circuit conditions. The minimum breaking capacity of MCBs shall be 3 KA r.m.s. at 415V/220V D.C.

c) MCBs shall be provided with locking facility.

7. Air Break Switches

a) Air break switches shall be of heavy duty, group operated load break, fault make type, complying with the requirements of applicable standards.
b) The switches shall be capable of withstanding the thermal stresses caused by overloads, locked rotor and short circuit currents of values associated with protective relay settings and the let through current of the associated fuse.
c) The switches shall be capable of withstanding the mechanical stress caused by the peak short circuit current of value equal of the cut-off current of the associated fuse.
d) Whenever solid links are used for the connections between switches and fuses, such links shall be fitted with insulated sleeves.
e) All live parts of the switch shall be shrouded.
f) Switch operating handles shall be suitable for padlocking in 'OFF' position.
g) Each switch shall be interlocked with the associated compartment door to achieve the following interlocks.
    i. It shall be possible to open the door only when the switch is in the 'OFF' position.
    ii. It shall not be possible to close the switch with the door open.
h) Suitable means however shall be provided to intentionally release the interlocks specified above for making trip setting adjustments and operation tests.

8. Fuses

a) Fuses generally shall be of the HRC cartridge fuse-link type having a certified repturing capacity of not less than 80 kv at 440 V. Fuses up to 63A for distribution systems of medium short circuit levels may be of HRC cartridge screw-cap type, having a certified rupturing capacity of not less than 46ka at 440 V and 16 KA at 250V DC.
b) Fuses shall be provided with visible indication to show that they have operated.
c) Fuses shall preferably be mounted on moulded plastic carriers and shall be complete with fuse bases.
d) Wherever it is not possible to mount fuses on carriers, fuses shall be directly mounted on plug in type of bases. In such cases an insulated fuse pulling handle shall be provided for each size of fuse for each switch board.

9. Motor Starters

i. Contactor

a) Motor starter contactors shall be of the electromagnetic type rated for uninterrupted duty as defined in applicable standards.
b) Main contacts of motor starter contactors shall be of silver plated copper.

c) Each motor-starter contactor shall be provided with two NO and two NC auxiliary contacts.
d) Insulation class of operating coils shall be class B or better.
e) Operating coils of contactors shall be suitable for operation from the specified control supply system.
f) Contactors shall be of the double break, non-gravity type.
g) One number spare auxiliary contactor with 4 No./4NC contact along with its coil completely wired up to the terminal should be provided.

ii.Direct-On-Line Starters

Direct-on-line starters shall be suitable for Class AC 3 utilization category.

iii. Reversing Starters

a) Reversing starters shall comprise forward and reverse contactors, electrically interlocked with each other.
b) Reversing starters shall be suitable for Class AC 4 duty.

iv.Thermal Overload Relays

a) Starters shall be complete with a three elements, positive acting, ambient temperature compensated, time lagged thermal overload relay with adjustable settings. The settings range shall be properly selected in accordance with the rating of the motor.
b) Thermal overload relays shall be hand reset type.
c) `Stop' push button of the starter and hand reset device shall be separate from each other.
d) Overload relay hand reset push button shall be brought out on the front of the compartment door.
e) Overload relay shall be provided with at least one 'NO' and one 'NC' or one change-over contact.

10. Current Transformers

a) Current transformers shall be of the dry type.
b) Current transformer shall have a short time withstand rating equal to the short time withstand rating of the associated switchgear for one second.
c) Unless otherwise specified, the minimum performance requirement of current transformers are as follows:
    i. Measuring CTs-7.5VA, accuracy class 1.0 and an instrument safety factor of 5.
    ii. Protective CTs - 7.5 VA, accuracy class 5P and an accuracy limit factor of 10.

d) Notwithstanding the above it shall be the VENDOR'S responsibility to coordinate the current transformer burden with the requirements of relays, instruments and leads associated with that particular current transformer.
e) Test links shall be provided in both secondary leads of the CTs to easily carry out current and phase angle measurement tests.
f) All current transformers shall be earthed through a separate earth link on the terminal block to permit easy measurement of the current transformer insulation resistance. (CTs built-in with the thermal relays of the contactors are excluded).

11. Voltage Transformer

a) Voltage transformers shall be of dry type.
b) Unless otherwise specified, the minimum performance requirements of voltage transformers are as follows:
   i. Measuring VTs - 15 VA per phase and accuracy class 1.0.
   ii. Protective VTs - 15 VA per phase and accuracy class 1.0.
   iii. Dual purpose VTs - 100 VA and dual accuracy class 1.0/3.0 for metering and protection respectively. VA is per phase.

c) All secondary windings of voltage transformers including open delta windings shall be rated for 110/ 3 V per phase.
d) Voltage transformers shall have a continuous overvoltage factor of 1.2 and short time overvoltage factor as follows:
   1.5 for 30 seconds in case of effectively earthed. 1.9 for 8 hours in case of non-effectively earthed system.
e) Voltage transformers shall be complete with suitable rated primary, secondary and tertiary fuses. Primary fuses shall have a rupturing capacity equal to the rupturing capacity rating of the associated switchgear. Fuses shall be provided on each sub circuit.
f) It shall be possible to replace voltage transformers without having to de-energize the main bus bars.
g) The terminals of V.T. secondary and tertiary windings which are required to be connected to earth shall be earthed by an isolating link without a fuse.
h) Single phasing preventers relay shall be provided when required to protect motor against single phasing. The relay shall not operate for supply voltage unbalance of + 5% but shall positively operate for supply voltage unbalance of more than + 5%. The relay shall operate in the event of a single phase fuse blowing even though the motor c.m.f. in the concerned phase is of the order of 85%.
i) After sensing single phasing the relay shall operate with a time delay of 2 to 3 sec. The relay shall not operate for a 3 phase power supply failure. The relay shall be of

the hand reset type with a hand reset push button. Resetting shall be instantaneous and independent of the adjusted time delay in the tripping of the unit. Visual indication for the operation of the relay shall be provided.

j) The relay shall be suitable for application to protect reversible and non-reversible motors. The relay operation shall be independent of the motor KW rating, the loading conditions prior to the occurrence of the single phasing and rpm of the motor. The relay shall be of the failsafe type and shall operate to trip the motor when the relay internal wiring is accidentally open circuited.

12. Relays

The following clauses shall apply to the protective relays.

Relay shall be -

Enclosed in dust proof flush mounting draw out type cases.

a) Accessible for setting and resetting from the front.
b) Provided with positive acting hand-reset flag indicators visible from the front.
c) Access to setting devices shall be possible only after the front covers are removed. Access to resetting devices shall be external to the case.
d) Auxiliary relays shall be rated to operate satisfactorily between 70% and 110% rated voltage.
e) Each relay shall be provided with at least two separate voltage from contacts.
f) Make and type of relays shall be subject to the EIC approval.

13. Indicating Instruments and Meters

Electrical indicating instruments shall be of minimum 96mm x96mm square size, suitable for flush mounting.

a) Indicating instruments shall have provision for zero adjustment outside the cover.
b) Instrument dials shall be parallex free with black numerals on a white dial.
c) Ammeters provided on motor circuits shall be provided with a suppressed extended scale to indicate motor starting current.
d) Watthour meters shall be of the direct reading electro-dynamometer type complete with cyclometer type dials and reverse running stops.

14. Indicating Lamps

Indicating lamps shall be:

Filament type and of low watt consumption.

a) Provided with services resistors.
b) Provided with translucent lamp covers of colours 'Red', 'Green' and 'Amber' as required in the control wiring diagrams.

c) Bulbs and lenses shall be easily replaceable from the front.

15. Control and Selector Switches

Control and selector switches shall be:

a) Rotary type.
b) Adequately rated for the purpose intended (Minimum acceptable rating is 10A continuous at 240V AC and 1A inductive break) 220V DC.
c) Provided with escutcheon plates clearly marked to show the positions.
d) Control switches for circuit breakers shall be provided with pistol grip type handles.
e) Control switches for circuit breaker control shall be provided with contact development and sequencing device.
f) Selector switches shall be:
g) of the maintained contact stay put type. Switches in ammeter circuits shall have make-before-break type contact.
h) provided with oval handles.

16. Push Buttons

Push button shall be:

a) The momentary contact, push to actuate type rated to carry 10A at 240V AC and 1A (inductive breaking) at 220V DC.
b) Fitted with self-reset, 2 NO and 2 NC contacts.
c) Provided with integral escutcheon plates marked with its function.
d) `Start', `Open', 'Close' push buttons shall be green in colour.
e) `Stop' push buttons shall be red in colour.
f) All other push buttons shall be black in colour.
g) `Emergency Stop' push buttons shall be of the lockable in the pushed position type and shall be shrouded to prevent accidental operation. Key shall not be required for the operation of the push button.

17. Space Heaters (if applicable)

Space heaters for switchgear panels shall be:

a) Suitable for operation on a supply system as specified.
b) Provided with single pole MCD with overload and short circuit release.
c) Provided with thermostats to cut off the heaters at 45 deg.C.
d) For details for spacing between terminals; clearance between gland plate and first row terminals; and size of gland plate refer to be annexed

18. Cable Terminations

a) Suitable compression type heavy duty brass cable glands with nuts, rubber sealing ring and brass washers mounted on a removable and control cables entering the switchgear shall incorporate built in facilities for earthing the wire armour of cables. Cable glands shall be plated to avoid corrosion.

b) Power cable glands and crimping type lugs shall be supplied to suit the cable sizes given in clause 3. If during course of detailed engineering of the switchgear it is found necessary to provide more glands or glands of higher size than those envisaged the vendor shall provide and accommodate the same.

c) For supporting & clamping cable cores at regular intervals inside the cable alleys, suitable shutted angles, up to the respective terminal blocks shall be provided.

d) Necessary crimping type of tinned copper cable lugs for connecting the individual cores to the respective terminals, shall be provided.

19. Internal Wiring

Control wiring shall be of the rating of 650V and power wiring shall be of the rating of 1100V.

a) Wiring inside the switchgear shall be carried out with 1100/650 V grade, PVC insulated, stranded conductor wires. Minimum size of conductor for power circuits is 4 sq.mm copper or equivalent size aluminium conductor. Control circuits shall be wired with copper conductor of at least 2.5 sq.mm for CT circuits and 1.5 sq.mm for other circuits, the number and size of strands shall be 7 of 0.67 mm and 0.5mm diameter respectively.

b) Engraved identification ferrules, marked to correspond with the wiring diagrams shall be fitted to each wire. Ferrules shall be of yellow colour with black lettering.

c) Wires forming part of a tripping circuit of circuit breaker shall be provided with an additional red ferrule marked 'T'.

d) Spare auxiliary contacts of all equipment forming part of the switchgear shall be wired up to the terminal blocks.

e) Spare and unassigned modules shall be complete with internal wiring.

f) Wiring shall be terminated on preferably stud type terminal blocks such that the wires are connected by cable lugs with nuts and washers/lock-nuts.

g) Not more than two connections shall be made on any one terminal.

20. Terminal Blocks

Terminal blocks (both for power and control circuit) shall be of reputed make specially for CT and VT circuit. It shall comprise of finely threaded pairs of brass studs of at least 6mm diameter, links between each pair of studs, washers, nuts and locknuts. The studs, shall be securely locked within the mounting base to prevent their turning. Insulated barriers shall be provided between

adjacent terminals.

a) Terminals for circuits with voltage exceeding 125 V shall be shrouded. Terminal blocks shall be grouped depending on circuit voltage. Different voltage groups of terminal blocks shall be segregated.
b) Terminal blocks shall be adequately rated to carry the current of the associated circuit. Minimum rating of the terminal block is 10A.
c) Terminals shall be numbered for identification. Engraved white-on-black labels shall be provided on the terminal blocks, describing the function of the circuit. Where duplication of a terminal block is necessary it shall be achieved by solid bonding links.
d) Terminal blocks for CT secondary lead wires shall be provided with shorting and disconnecting/earthening facilities.
e) Terminal blocks shall be arranged with at least 100mm clearance between two sets of terminal blocks.
f) Control terminals for external connections shall be suitable for terminating at least two conductors each of 2.5 sq.mm size.

21. Labels

a) All labels shall comprise white letters one a black background.
b) Labels shall be made of non-rusting metal or 3-ply lamicoid, or engraved PVC.
c) Labels shall be properly fixed, with provision to prevent distortion due to expansion.
d) Size of lettering shall be 6mm.

22. Earthing

a) Each MCC and LCC shall be provided with an earth bus bar running along the entire length of the board. Material and size of the earth bus bar shall be as specified in data sheets. At either end of the earth bus, one (1) clamp type terminal with nuts, bolts and washers shall be provided for bolting the main earthing copper conductor of size and material indicated in data sheets. In case the earth bus is provided near top of the switchgear, one down comer at either end shall be provided for connection to the main earthing conductor.
b) Earth busbars shall be supported at suitable intervals.
c) Positive connection between all the frames of equipment mounted in the switchboard and earth busbar shall be provided by using insulated copper wires/bare busbars of cross section equal to that of the busbar, or equal to half the size of circuit load current carrying conductor, whichever is smaller.
d) All instrument and relay cases shall be connected to the earth busbar using 1100/650 V grade, 2.5 sq.mm stranded, copper, earthing conductor.

23. Local Push Button Stations

i. Constructional Features

The constructional features of the local push button stations shall be as follows:

a) Metal enclosed, weather-proof suitable for mounting on wall or steel structures. The enclosure shall be die cast aluminum or sheet metal of 2mm thickness.
b) Dust and vermin proof.
c) Provide a degree of protection of not less than IP:54.
d) Metal parts shall be given tropicalising treatment as per standards and painted with one coat of epoxy primer and two coats of light grey epoxy paint.
e) Provided with inscription plates of rear engraved perspex with white letters on black background. The letter size shall be 6mm.
f) Provided with two earthing terminals suitable for 12 SWG G.I. wire.
g) Provided with removable undrilled gland plate and adequate members of cable glands for PVC insulated, armoured cable. The cable entry shall be from the bottom.
h) All local push button stations shall have locking facility. The lock switch shall have two positions "locked" and "unlocked". When in unlocked position the switch shall allow individual starting of the equipment. Start/stop push buttons provided for local operation of the equipment shall be provided on the same enclosure and stop rush buttons shall be locakable in stop position. The lock switch shall be key operated.

ii. Push Buttons

a) The Open/Close/Start push buttons shall be of the momentary contact push to actuate type.
b) The stop push buttons shall be stay put type with mushroom knob.
c) All push buttons shall be:
    i. Fitted with two (2) normally open and two (2) normally closed contacts rated to carry and break 6 Amps at 415 Volts. (10A at 240 AC).
    ii. Provided with integral escutcheon plates marked with its function.
    iii. 'Open/Close/Start' push buttons shall be green colour.
    iv. 'Stop' push button shall be red in colour.

iii. Wiring

a) The push button stations shall be as follows: Push button station Type-A - Each P.B., station shall comprise three push buttons viz. 'OPEN' 'CLOSE' and 'STOP' for control of reversible motors.
b) Push button station type B - Each P.B. station shall comprise two push buttons viz. `START' and 'STOP' for control of non-reversible motors.

c) Push button station type-C - Each P.B. station shall comprise only one push button i.e. `STOP' for emergency stop function.
d) Power - Electricity at specified voltage (415/220V).
e) The controls shall be complete with actuators, probes, relays, transformers, wiring, etc.
f) Safety controls of chilled water unit shall be as under:
   a) Compressor - High/Low pressurestat/manual reset type high bearing temperature safety.
   b) Chiller thermostat - Manual reset type antifreeze.
   c) Oil pressure - Differential safety switch with manual reset button. it should have a time delay relay for startup of the compressor.
   d) Main motor - Thermal relay to avoid overloading of motor & overheating of winding.
   e) Interlocks for refrigeration unit shall be:
      - Flow switches in condenser and chiller lines to prevent compressor starting without water flow.
      - Oil temperature to be maintained at set point.
      - Condenser and chilled water pumps and cooling tower fans shall be interlocked with chilling units to prevent operation without pump and cooling tower fan running.

24. Tests

Switchgear shall be subjected to following tests:

a) Temperature rise test on power circuits.
b) Short time current tests on power circuits.
c) Mechanical operation test.
d) High voltage test.
e) Electrical control interlock and sequential operation tests.
f) Verification of wiring as per approved schematic.
g) Type tests and routine tests shall be carried out on all associated equipment as per relevant standards.
h) Certified copies of all type and routine test certificates shall be submitted for the Engineers approval before despatch of the switchgear.

25. Drawings and Data

As part of proposal BIDDER shall furnish the following drawings and data:

a) For each switchgear, overall dimension drawing showing front view, plan, elevation and cross-section.
b) All drawings and data sheets shall be annotated in English.

SECTION 8

1. Electrical Cabling Works

a) CABLES:

PVC insulated aluminum conductor Armoured cables shall be used for connecting motors.

b) CABLE GLANDS:

i. Heavy duty compression type cable gland alongwith the cable lugs shall be used for termination of cables. The cable glands shall be of cadmium plates brass. For all power cables, crimped type copper cable lugs shall be provided.
ii. The cable trays shall be channel type made out of M.S. sheets (slotted) having a minimum thickness of 2mm duly painted. (Cable trays exposed to atmosphere shall be hot dip galvanised). The Clamps used shall be Aluminium with G.I/Cadmium plated nut-bolts. The size of these trays shall be selected considering the number of cables and leaving minimum 20% spare area. The arrangement of cables in these trays shall be in Single Tier Formation.
iii. Sharp bending of the cables shall be avoided. The radius for bending PVC insulated cable and sheath armoured cable shall not be less than 10D where "D" overall diameter of the cable. Wherever cable rises from concrete trenches, these shall be taken in G.I. pipes of suitable size. The Contractor shall make sure that the 40% area of pipe shall be free after the cable is laid.

c) WIRE SIZES:

Final connection to the equipment shall be through flexible wiring enclosed in galvanized flexible conduit rigidly clamped at both ends. An isolator shall be provided near each motor/equipment wherever the motor/equipment is separated from the supply panel through a partition barrier or through ceiling construction. P.V.C. insulated single strand hard drawn copper conductor wires

shall be used inside the control panel for connecting different components and all the wires inside the control panel shall be neatly dressed and plastic beads shall be provided at both the ends for easy identification. All the wires shall be suitably sized for motor duty.

d) EARTHING

Main power upto the Electrical panels in Plant rooms along with earthing shall be provided by other agency. Each panel shall be earthed to building main earthing. All the motor etc. shall be double earthed to the panel. All three phase motors/equipment shall be earthed with two independent earth conductors as per the requirement of Indian Electricity Rules and Regulation - 1956.

e) DRAWINGS

Shop drawing for control panel and wiring of equipment showing the route of conduit/cables shall be got approved by the Consultant/Architect before starting the fabrication of panel and starting the work.On completion four sets of completion/"As installed" drawings incorporating all details like conduit routes, number of wires in conduit, location of panels, switches, junction/pull boxes and cable route etc. shall be furnished by the Contractor.

f) TESTING

Before commissioning of the equipment the entire Electrical Installation shall be tested in accordance with code of Practice IS:732-1963 (Revised) and test report furnished by a qualified and authorised person. The entire electrical installation shall be got approved by Electrical Inspector and certificate from Electrical Inspector shall be submitted. All tests shall be carried out in presence of Consultant/Architect.

g) PAINTING

All sheet steelwork shall undergo a process of degreasing, pickling in acid, cold rinsing, phosphatising passivating and then sprayed with a high corrosion resistant primer. It shall then be baked in an oven. The finishing treatment shall be by application

2. Unit Prices in the Schedule of Quantities

a) The item description in the Schedule of Quantities is in the form of a condensed resume. The unit price shall be held to include everything necessary to complete the work covered by this item in accordance with the specifications and drawings. The sum of all the individual item prices shall represent the total price of the installation ready to be handed over.

b) The unit price of the various items shall include all equipment, machinery, apparatus and materials required as well as the cost of any tests which the consultant may request in addition to the tests generally required to prove quality and performance of equipment.
c) All the labour required to supply and install the complete installation in accordance with the specifications. Use of any tools, equipment, machinery, lifting tackle, scaffolding ladders etc. required by the contractor to carry out his work.
d) All the necessary measures to prevent the transmission of vibration.
e) The necessary material to isolate equipment foundations, from the building structure, wherever necessary and suggested by the Engineer.
f) Storage and insurance of all equipment apparatus and materials.
g) The Contractor's unit price shall include all equipment, apparatus material and labour indicated in the drawings and/or specifications in conjunction with the item in question, as well as all additional equipment, apparatus, material and labour usual and necessary to complete the system even though not specifically shown, described or otherwise referred to.

Technical Data

Contractor shall submit catalogues of the equipment offered by him:

Sr.No.	Equipment description unit Condition of service
1.	**Air cooled outdoor condensing units:**
a.	Manufacturer /Make&Country of origin
b.	Model No.
c.	Type(Hermatic/semihermatic)
d.	No.of compressors
e.	Rated Capacity (Nominal)
f.	Actual capacity (conditions of tender)
g.	Refrigerant
h.	Working Pressusre (PSI)
	Suction Discharge
i.	Maximum (RPM)
j.	Mode of start
k.	Quantity of refrigerant for initial charge
l.	Power Consumption
	a) Total power consumption at full load
2.	**Air Handling Units:**

a. Manufacturer
b. Casing
c. Coil
d. Blower
e. Type
f. Overall Dimension
g. Unit Weight
h Air Quantity
i. Fan oulet velocity
j. Design static pressure
k Fan balancing static/and or Dynamic
h. Fan motor output
i. Motor location i.e inside or outside the fan section
j. Type of casing finish
k. Type of drive/vibration Isolators

3. AHU Coil Data:

a. Cooling Coil Area
b. No. of Rows
c. No. of fins/cm
d. Tube Material
e. Tube diameter
f. Coil Header material
g. Thickness of tube

4. Exhaust Fan /Fan section:

a. Make
b. Air Quantity at Operational speed
c. Static Pressure
d. Diameter/size
e. Type
f. Current characteristics
g. Motor Rating

h. Type of Motor
i. Fan outlet Speed
j. Fan Speed
k. Motor Speed at the duty conditions
l. Operating Weight
m. Type of vibration isolators
o. Type of bearings
p. Performance curves
q. Motor Efficiency
r. Class of Insulation

5. BMS & Electrical Controls

Make and Model of the following:

a. Flow Switch
b. 2/3 – way Valves
c. Operating Voltage
d. Field Sensors (Pressure, Temp. & RH)
e. Pressure Guage
f. Thermometer
g. DDC Controller / software
h. Central Control Station / PC configuration & Monitor

6. Electrical Accessories:

Make of the following:

a. Motor Control Centre (MCC)
b. Air Circuit Breaker
c. MCCB
d. MCB
e. Rotary Switch
f. Soft Starter
g. Auto-transformer starter
h Direct on line starter
i. Contactor
j. Current transformer
k. Single phase preventor
l. Push botton/changeover switch

m. Ammeter/Voltmeter

n Relays

o Indicating Lamps

p. Cables/wires

7. Galvanised Steel Sheets:

a. Make

b. Gauge/Thickness

c. Class of galvanizing

8. **Grilles/Diffusers & Dampers/Louvers**: Make/Material/Guage

9. Insulation

a. Manufacturer

b. Duct Insulation Material/Density

c. Duct Acc. Lining Material/Density

d. Pipe Insulation Material/density

10. Modular Clean room system

a. Manufacturer

b. Detailed specifications (wall / ceiling)

c. Double toughened glass air tight window system

d. Clean room compatible double skin door with closer

e. Air tight “0”leak door system

f. Emergency door with panic bar

g. Flooring system details

h. SS-304 Laboratory furniture as per GA Drg.

11. Access Control & Door Interlock system

a. Manifacturer

d. Detailed specifications

c. Compatible interface with central BMS system

d. Emergency de-activation system of electro-magnetic locking

e. Security and display system

g. Accessibility management protocol

12. Fire detection, address & suppuration system

a. Manufacturer
b. Detailed specifications
c. Addressable repeater 99 zone Fire panel
d. Sounder which synchronize with other system
e. Addressable Input/output modual
f. Optical type addressable smoke detector with base
g. Push and Reset type addressable manual call point
h. System integration details with drg

LIST OF BUREAU OF INDIAN STANDARD CODES

IS:277-1992	-	Galvanised steel Sheet (plain & corrugated)
IS:544-1985	-	Dimension for pipe Threads
IS:778	-	Valves (gate/globe/check type)
IS:655-1963	-	Metal Air Ducts
IS:13095-1991	-	Butterfly Valves
IS:659-1964	-	Air-conditioning (safety codes)
IS:1239-1990/92	-	Mild Steel Pipes
IS:325	-	3 phase induction motor
IS:822	-	Code of procedure for inspection of welds
IS:900	-	Code of practice for installation and maintenance of motors
IS:6392	-	Steel Pipe Flanges
IS:1822	-	Motor starters for voltage not exceeding 650 Volts
IEC	-	Relevant Sections
IS:996	-	Single phase small A.C. Motors
IS:4894-1987	-	Centrifugal Fans
IS:1554(I)	-	PVC Insulated (heavy duty)electric cables for working Voltage upto and including 1100 Volts
IS:8623-1993	-	Bus Bar Trunking System
IS:8828-1996 & IEC898-1995	-	Miniature Circuit Breakers
IS:9537-1981 Part II	-	Rigid steel conduit for electrical wiring
IS:10810-1989	-	Method of Test of Cables
IS:13947-1989	-	Circuit Breakers

IS:13947-1993	-	Switches, disconnectors, fuse combination units
IS:139-1993(Part IV)	-	Contactors & Motor Starters
IS 655 / 266	-	Duct Fabrication standards

LIST OF APPROVED MAKES FOR HVAC EQUIPMENT AND MATERIALS

Sr.No.	Details of the Items	Manufacturer's name
1.	Chilling Machines	Carrier/York/Trane/McQuay
2.	Hot Water Generator	Rapid Cool /Airflow/Heatex
3.	Primary Pumps	Mather & Platt / Kirloskar
	Hot water pumps	Grundfos.
3a	Secondary pumps	ITT Bell & Gossett/Grundfoss
4.	Air Handling Units	Caryaire/Suvidha Siver/ Carrier/Vikram Hitech
5.	Fan Coil Units	Caryaire/Coil company/Hitech
6.	Ducted Inline fans	Greenheck/Systemaire/Ostberg
7.	Centrifugal fans for AHUs	Nicotra/comefrei / Krugar
8.	Electric Motors	ABB/Crompton/Kirloskar/ GEC/Siemens
9.	MS/GI Pipes	Jindal- Hissar /TATA
10.	GI Sheet	Sail/TATA/ Bhushan
11.	Butterfly Valves	SKS / Audco /C&R
12.	Balancing Valves	Advance/Econosto/Sant/C&R/SKS
13.	Check Valve	Advance/Kirloskar/Econosto/Audco/C & R/SKS
14.	Ball Valves	CIM /Festo
15.	Ball Valves with Strainers	CIM /Festo
16.	Pot / Y-strainers	Rapidcool/Emerald/Sant
17.	Flexible Pipe Connections	Resistoflex/Kanwal
18.	Gate Valve	Leader/Kirloskar
19.	2 way mixing Valves for AHUs /FCUs	Siemens/Honeywell /Schneider/Belimo
20.	Thermostats for AHUs	Siemens/Honeywell/schneider /Belimo

21.	Pressure Guage	H.Guru/Feibig
22.	Thermometer	H.Guru/Taylor/Emerald
23.	Flow Switch	Rapidcool/Danfoss/Siemens
24.	Air Vents	Rapidcool/Anergy
25.	Grilles/Diffuser	Caryaire/Mapro/Tristar/Airmaster
26.	MS Dampers/ Fire Damper	Louvers/ Caryaire/Tristar/Mapro
27.	MCCB	L&T/Siemens/GE/Shneider
28.	MCB	L&T/MDS/Shneider
29.	Control Cables	Grandlay/Batra Henlay/Kalinga
30.	Power Cable	ICC/Skytone/Plycab/Kalinga
31.	DOL/Star Delta starters	L&T/Siemens
32.	Aux.Relay/contactors	L&T/Siemens
33.	Line Type Fuse	L&T/EnglishElectrc/Siemens
34.	Timer	L&T/EnglishElectrc/Siemens
35.	Terminal Block	Elmex
36.	Indicating Lamps	L&T/Siemens
37.	Selector Switches	L&T/Siemens
38.	Electrical Panel	Tricolite/Trident/Electrapower
39.	Duct Insulation	Supreme/Paramount/Armacell
40.	Flexible Duct Connection	Airflow/Pyroguard
41.	Gaskets	Neoprene rubber
42.	Adhesives	Fevicol / Superlon
43.	VIBRATION ISOLATOR	Resistoflex/Dunlope/kanwal
44.	FILTERS	Thermadyne/Anfilco
45.	Split Units	Hitachi/Toshiba/Daikin