

# HLL LIFECARE LIMITED

(A GOVERNMENT OF INDIA ENTERPRISE)

## PILOT PLANT CLEAN ROOM AT R&D CENTRE AKKULAM

### TENDER DOCUMENT TECHNICAL BID (Volume-1)

ENGINEERED BY:-

**Alliance Consulting Engineers**  
½ Akkarapadam Vaikom 686 143  
Tel. +91 944 70 37512 / +91 9495 99 7512  
Fax. 04829 222 638 Email. [acevkm@gmail.com](mailto:acevkm@gmail.com)

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**INVITATION FOR BIDS (IFB)**

Date : 19/11/2012  
IFB No. : HLL/ CRD/PUR/159/2012-13/3445  
Sub: TENDER FOR PILOT PLANT CLEAN ROOM AT  
R&D CENTRE, AKKULAM, Thiruvananthapuram.

1. HLL Life care limited, a Government of India Enterprise, invites sealed and super scribed tenders (Technical & Price Bid- Volume 1 & 2) from the interested and eligible contractors having minimum five years experience in the relevant field.

Name of work	Period of completion	EMD (Rs.Ps)
PILOT PLANT – CLASS 10,000 CLEAN ROOM AT R&D CENTRE HLL LIFECARE LIMITED AKKULAM Thiruvananthapuram.	120 days	2 Lakh

**2. Eligibility criteria**

- a) Minimum 5 years experience in the relevant field.  
b) Tenderers should have executed satisfactorily at least 1 job of similar kind with a contract value of not less than Rs 120 Lakhs or 2 jobs each having a contract value of not less than 100 Lakhs or 3 jobs each having a contract value of not less than 80 Lakhs during the last 3 years.

(Copy of work orders and completion certificates shall be submitted along with the Tender).

3. A complete set of bid documents can be had from the office of the R&D Centre HLL Lifecare limited, Akkulam, Thiruvananthapuram – 695 017, Kerala, India Ph- +91 471 2774700 during office hours on any working day on submission of written application along with the documental evidence of the above mentioned eligibility criteria and remitting a non-refundable fee of Rs.1000 /- (excluding taxes) in the form of DD drawn from a scheduled bank in favour of HLL Lifecare limited, Trivandrum. Those who want the tender documents by post shall pay an additional amount of Rs. 300.00. The bidders who are downloading the Tender document from the website shall submit a DD of Rs.1000.00/- drawn from a scheduled bank in favour of HLL Lifecare limited, Trivandrum, along with the Technical Bid.

The bid documents will be available up to 15.00 Hrs. on the previous day of the Opening of the bids.

- a) Date of issue of bid document - 19-11-2012  
b) Date of pre Bid Meeting - 30-11-2012  
c) Last date and time for receipt of bids- - 15 -12-2012  
d) Date and time of opening of bids - 15-12-2012  
d) Address for communication, receipt and Place of opening of bids:

**VICE PRESIDENT (R&D)  
HLL R&D CENTRE, HLL LIFECARE LIMITED,  
AKKULAM, SREEKARIYAM.P.O  
THIRUVANANTHAPURAM – 695 017 ,  
KERALA, INDIA**

4. The completed bid documents and all schedules should be submitted to VP (R&D) HLL R&D CENTRE in the above address along with sealed bids and the EMD in a separate cover. Bids received after due date and time will be rejected. Any bid not accompanied by EMD will be rejected.
5. Bids will be opened in the presence of Bidders representative(s) who choose to attend on the specified date and time, at the office of HLL at the address given in Clause '3' above.
6. In the event of the date specified for bid receipt and opening being declared as a closed holiday for HLL's office, the due date for submission of bids and opening of bids will be the following working day at the appointed times.
7. The HLL may, at its discretion, extend this deadline for submission of bids by amending the Bid Documents or any other reasons, in which case all rights and obligations of the HLL and Bidders previously subject to the deadline will thereafter be subject to the deadline as extended. HLL will not be held responsible for the postal delay, if any, in the delivery of the bidding document or the non-receipt of the same. Bids sent by Telex/Fax/Telegraph will not be accepted. The company reserves the right to club or split the items of works, change the qualifying criteria at their discretion and to reject / cancel the tender without assigning any reason there of.

## SUMMARY OF NOTICE INVITING TENDER

1. E.M.D : Rs.2.0 Lakhs which will be released upon finalization of the contract
  
2. Period of completion of works : 120 days from the date of receipt of work order
  
3. Security Deposit 5% of the contract value/irrevocable performance Bank guarantee for the equivalent amount which will be released upon satisfactory completion and commissioning of total works
  
4. Retention Money : 10 % of the value of work will be deducted from each running bill which **will be released after defect liability period.**
  
5. Date of Commencement of works **With in 7 days on receipt of work order.**
  
6. Payment terms:
  - 1)**40% of the executed amount will be released upon completion of 60% of the ordered value of work subject to measurement and recommendation.**
  
  - 2)**Balance amount after successful completion and commissioning**
  
7. Period of final measurement and valuation : One month from the satisfactory completion of the entire work
  
8. Penalty : 0.5% of the total contract value per week delay up to a maximum of 7.5% of the contract value
  
9. Defects Liability Period : Twelve months
  
10. Warranty /guarantee for equipments : Twelve months from date of handing over.

## NOTICE INVITING TENDER

To

-----  
-----  
-----

Dear Sir,

Sub: - TENDER FOR PILOT PLANT – CLASS 10,000 CLEAN ROOM AT R&D CENTRE HLL LIFECARE LIMITED AKKULAM TRIVANDRUM

Sealed Two Part (Technical and Price bid) tenders are invited on behalf of M/s R&D CENTRE HLL Lifecare Ltd Akkulam Trivandrum from eligible contractors who had successfully completed similar turnkey projects satisfactorily - at least 1 job of with a contract value of not less than Rs 120 Lakhs or 2 jobs each having a contract value of not less than 100 Lakhs or 3 jobs each having a contract value of not less than 80 Lakhs during the last 3 years.

The blank tender forms together with conditions of contract, bill of quantities and drawings for the subject work will be issued at the office of VP (R&D) HLL R&D CENTRE HLL LIFECARE LIMITED AKKULAM TRIVANDRUM from 19/11/2012 on all working days between 9am to 5pm to eligible contractors

### 1.0 Validity of Tender.

- 1.1 The rates quoted by the bidder shall hold good minimum for three months and if accepted the rates shall hold good till the completion of the work.
- 1.2 The rates quoted shall be submitted in duplicate.
- 1.3 If there is any difference between the two copies, the lower rate will be taken into consideration.
- 1.4 Each page of the tender document shall be signed by the bidder and corrections if any shall be Counter signed.
- 1.5 The rates quoted shall be inclusive of all taxes, duties, insurance, handling, supervision and establishment charges. The rates shall further include PF, ESI and comprehensive insurance coverage for all workmen etc complete.

### 2.0 Tender Forms.

- 2.1 No corrections or alterations in the form shall be made nor any condition stipulated therein.
- 2.2 Tender forms will be issued upto 14.12.2012

2.3 When drawings are issued along with the tender documents they shall be returned along with the tender duly signed.

2.4 Sealed tenders (Technical bid with EMD and Price bid separately sealed) duly completed in all respects shall be submitted to VP R&D on or before 10am 15.12.2012. No consideration will be given to tenders received after stipulated time.

### **3.0 Tender Covers.**

Tenders with technical bid with EMD & Price bid separately sealed shall be submitted in a sealed cover super scribed "TENDER FOR PILOT PLANT – CLASS 10,000 CLEAN ROOM AT R&D CENTRE HLL LIFECARE LIMITED AKKULAM TRIVANDRUM".

### **4.0**

**O**

#### **Opening of Tenders.**

The tenders will be opened in the office 15.12.2012 on 10.30 am or any other convenient day there after decided by the clients.

### **5.0**

#### **Acceptance of Tender.**

5.1 The final acceptance of the tender rests with the clients who reserve the right to accept or reject any tender without assigning any reasons thereof in consultation with the consultants.

5.2 The contractor whose tender is accepted shall be informed in writing by the clients.

### **6.0**

#### **Agreement & security deposit.**

The bidder whose tender is accepted shall execute within three days from the date of issue of the intimation, an agreement in the prescribed form on a stamp paper in accordance with the draft articles of agreement enclosed. All expenses relating to the agreement shall be borne by the bidder. Also shall deposit the security amount/BG for the specified amount (Point No 3, summary of NIT) along with the agreement.

### **7.0**

#### **Time Limit.**

The work shall be completed in all respects within a period of 120 days from the date of receipt of order.

### **8.0**

#### **Statutory Approvals.**

The contractor shall be responsible for obtaining all statutory approvals from CEI/KSEB for the installation. All liaison work, preparation of working drawings shall be part of this contract.

## FORM OF TENDER

From

-

-

Date

Dear Sir,

I/We do hereby tender for the execution of the work specified in the tender documents at the rates quoted for each item specified in the schedule of quantities and in accordance with specifications, drawings and instructions in writing as per the annexed conditions of contract in all respect.

### MEMORANDUM

General description of work.                      -Pilot Plant Clean Room at R&D Centre  
HLL Lifecare Akkulam TVM

Earnest money deposit                      - Rs. 2.0 Lakhs  
Security Deposit                                      - 5% of the contract value/irrevocable  
Performance Bank Guarantee for the  
equivalent amount

Retention money to be deducted  
from running bill(defect liability period) - 10% of bill value.

Time allowed for completion                      - 120 days.

Should my/our tender be accepted I/We hereby agree to execute an agreement to abide by and fulfill all the terms and provisions of the conditions of contract annexed to the tender. I/We furnish the schedule for installation, experience, qualification, tools, tackles and skilled personnel duly filled.

I/We hereby distinctly and expressly declare and acknowledge that before the submission of this tender I/We have carefully followed the instructions, read the specifications attached the relevant standards and that I/We have studied the contract documents, bill of quantities, drawings and locality where such work is to be done.

We distinctly agree that I/We would not claim or demand upon the Architects/Consultants any claim based upon or arising out of any alleged misunderstanding or misconceptions or mistakes on my/our part of the said covenants, agreements, stipulations and conditions.

If upon written information to me/us by the Architects/Consultants I/We fail to attend the office therein before the end of the period specified on such intimation and if upon intimation being given to me/us by the Architects/Consultants of the acceptance of the tender, I/We fail to make



additional security deposit or fail to enter into the agreement as defined in the tender notice, then I/We agree to forfeiture of the earnest money.

Any notice required to be served on me/us shall be sufficiently served by me/us if delivered to me/us personally or forwarded to me/us by post or left at my/our given address.

I/We fully understand the terms and agreements of the contract to be entered into between me/us and client and the written agreement shall be the foundation of the rights of both the parties and the contract shall not be deemed to be complete until agreement has been signed by me/us and by the proper officer authorized to enter into contract.

Challan No./Demand Draft No.-----

Dated-----

From----- in  
respect of the sum of

Rs-----/- (Rupees-----only) is herewith enclosed representing  
the earnest money deposit bearing no interest (amount to be specified in  
words and figures).

Contractor's Address  
Contractor

Signature of the

Dated the

day of

## GENERAL CONDITIONS OF CONTRACT

### 1.0 Definitions.

The following notes shall have meanings as stated herein except where the context otherwise requires: -

- 1.1 Owner/Client/Employer Shall mean VP (R&D) HLL R&D CENTRE HLL LIFECARE LIMITED and shall include their assigns and /or successors
- 1.2 Consultant M/s. Alliance Consulting Engineers  
1/2 Akkarapadam, Vaikom 686 143.
- 1.3 Contractor Shall mean -----  
-----  
and shall include his/their legal representatives, assigns or successors.
- 1.4 Site Shall mean the site of the contract works at R&D CENTRE HLL Lifecare Ltd Akkulam Trivandrum Kerala including any building and erections thereon and any other land (inclusively) as aforesaid allotted by the owner for contractor's use.
- 1.5 This Contract Shall mean instructions, conditions of contract, commercial terms and conditions, the schedule of quantities and drawings issued during the course of work.
- 1.6 Written Notice Shall mean a notice in written, typed or printed characters sent (unless delivered personally or otherwise proved to have been received) by registered post to the last known private or business address or registered office of the addressee and shall be deemed to have been received when in the ordinary course of post it would have been delivered.
- 1.7 Act of Insolvency Shall mean any act of insolvency as defined by the Presidency Towns

Insolvency act or any act  
amending such original.

## **2.0 Scope of Work.**

2.1 The scope of work covers Supply, installation, testing and commissioning of items as per attached drawings/revisions, specifications, bill of quantities, etc.

2.2 The contractor shall carry out and complete the said work in accordance with this contract and as directed by the Owner/Consultant. The Consultant in consultation with the Employer may from time to time issue further drawings/specifications with regard to:

2.2.1 Any additions or omissions or substitution of any work.

2.2.2 Any discrepancy in the drawings or between the schedule of quantities and/or drawings and/or specifications.

2.2.3 Removal of any material brought to the site by the contractor and rejected by the consultant/client.

2.2.4 Removal/re- execution of any works executed by the contractor.

2.2.5 Removal from the works of any persons employed by the contractor.

**2.2.6 Submission of weekly progress report.**

2.2.7 The bidder shall include the proposed Quality Assurance program containing overall quality management and procedural requirements to be adhered to during the execution of the contract to maintain effective Quality Assurance system as outlined by the recognized codes for various works in their offer, along with quality assurance manual. Officials responsible for the same and their organizational approach for quality control.

Bidder should furnish the following details along with their offer:-

- Quality Assurance Plan
- Bar Chart / Project Schedule

2.3 The contractor shall forthwith comply and duly execute any such works provided always verbal instructions, directions and explanations given to the contractor or his representative if involving a variation, be confirmed in writing by the contractor to the consultants and employer within seven days and if not dissented in writing within further seven days by the Architects/consultants, such shall be deemed to be Architect's/Consultant's instructions.

## **3.0 Extra Work.**

Owner in consultation with the consultant may issue any instructions verbal or in writing for extra works. The contractor shall submit a statement of such work giving quantities and rates duly supported by an analysis of such rates. The owner shall not be liable for payment for such extra work until it is approved by him. Payment for such extra work shall be made as per the terms of payment agreed to.

#### **4.0 Local Regulations & Safety.**

The contractor shall abide by the regulations and bye-laws of any statutory authority and it shall be contractor's responsibility to obtain any approvals as may be required. The contractor shall also exercise all care necessary to maintain personal safety in the entire site pertaining to this installation and contract.

#### **5.0 Material & Workmanship.**

All materials and workmanship shall conform to the specifications of the consultants, relevant standards and codes of practice. Any work that is not upto the acceptable standards shall be dismantled and reconstructed by the contractor to the satisfaction of the consultants/architects. Any substitution of prescribed brands/makes shall be brought well in advance after obtaining approval from client/consultant/architects.

#### **6.0 Supervision & Staff.**

- 6.1 Contractor shall deploy qualified & experienced site engineer, supervisors and skilled workmen throughout the execution of the works at site. No minors shall be employed/allowed for the work. Any directions/ instructions or notices given by the owner/ consultant/ architect to site engineer/supervisors shall be deemed to have been given to the contractor. Failing to comply the same the owner/ consultant/ architect reserves the right to suspend the work and or termination of contract.
- 6.2 The contractor shall comply with all statutory provisions with regard to minimum wages. All the provisions of labour regulations (CPWD) made by the Government shall also be complied with.

#### **7.0 Bill of Quantities.**

- 7.1 The bill of quantities forming a part of this contract indicates estimated quantities, which are subject to variation. The employer shall have the right to add/ delete any item fully or partly during the course of the contract and no change in unit rates during the course of contract shall be acceptable for any variation in quantities.
- 7.2 Any item, which is not covered in the bill of quantities but required to be carried out, shall be paid as per the actual cost of materials, transportation, labor etc and contractor's profit at 15%.
- 7.3 Incase of any discrepancy between the bill of quantities, specifications and or drawings the consultant/ architect and the owner shall be the deciding authorities as to which shall prevail and their decision will be final and conclusive.
- 7.4 It shall be contractor's responsibility to ascertain the actual quantities of all items and procure only requisite quantities.

#### **8.0 Measurement of work.**

The installation work shall be measured by the contractor's representative in presence of the consultant/employer (triparty). Such measurement shall be recorded in a measurement book, which shall be available at the site office at all times. The measurement shall be recorded in duplicate. The duplicate copy duly certified by the consultant shall be submitted along with the bills to the employer.

## **9.0 Site Facilities.**

- 9.1 The owner shall make available open space near about the work spot free of cost for storage of contractor's tools and materials. It shall be contractor's responsibility to ensure the materials are maintained in safe custody and the owner shall not be responsible for any loss or damage to the same during the course of the contract.
- 9.2 The contractor shall construct their own store at the place provided by the client and the same shall be demolished and clear the debris after completion of work.
- 9.3 Power & Water supply. The contractor shall arrange to install a sub meter to record their power & water consumption and the consumption charges shall be recovered from the contractor's bills at actuals.

## **10.0 Defects Liability Period**

Any defects in the installation arising out of manufacturing defect, poor workmanship within the first twelve months after the handing over the installation shall be rectified/replaced by the contractor free of cost. In case of default by the contractor the owner may employ any other agencies to make good such defects and all expenses consequent thereon or incidental thereto shall be made good and borne by the contractor.

## **11.0 Completion Certificate.**

The work shall not be considered as complete until the contractor submit the validation report after successful commissioning with satisfactory results and "AS BUILT" drawings and client/architect/consultant have certified in writing that the contractor has completed all the work. The defect liability period shall commence from the date of such certificate.

## **12.0 Insurance.**

- 12.1 The contractor shall be responsible for covering himself his workmen and third parties involved in the construction work by suitable insurance policies. It shall include but not be limited to the following:
  - Erection Insurance.
  - Workmen Compensation Insurance.
  - Third Party Liability.
  - Fire Insurance.

The documents of the same shall be submitted to HLL.

- 12.2 The contractor shall indemnify the owner against all claims which may be made against the owner by any member of the public or third party in respect of the works carried out by the contractor and shall maintain at his expense a policy of insurance in the joint names of owner and the contractor against such reasons and deposit such policy with the owner during the period of the contract. The contractor shall also indemnify the owner/consultant/architect against all claims, which may be made upon under the workmen compensation act, or any other statute in force during the period of the contract.

### **13.0 Safety & Security.**

- 13.1 The contractor shall be responsible for providing all security arrangements for protection of the work and materials, tools, plant, machinery and equipment and anything lying on the site during the progress of their part of work.
- 13.2 They shall be solely responsible for proper steps for protecting, securing, lighting and watching all places of work and site, which may be dangerous to any person, whomsoever.
- 13.3 The contractor must take necessary and effective measures and precaution to prevent death and injuries to his laborers or to any third party.
- 13.4 The contractor is solely responsible for the consequences arising out of deaths or injuries or robbery or any other losses of any sort caused through his carelessness or that of agents, representatives or his labors.
- 13.5 The contractor is bound to pay all compensations including workmen compensation, ESI, PF claims etc in every.

### **14.0 Liquidated Damages.**

If the contractor fails to complete the work by the dates stated in the contract or within any extended time that may be allotted by the consultant/owner he shall pay or allow the owner to deduct the sum named in the contract as liquidated damages for the period during which the said work shall so remain incomplete from the money due to the contractor.

### **15.0 Force Majeure.**

- 15.1 The right of contractor to proceed with the work shall not be terminated because of any delay in completion of the works due to unforeseeable cause beyond the control of the contractor including but not be limited to acts of God, restraints of the state, fire, floods, unusually severe weather conditions and acts of owner.
- 15.2 If the contractor is wholly prevented from the performance of the contract for a period in excess of thirty consecutive days because of force majeure, the owner may terminate this contract by thirty days written notice and if the period of force majeure exceed ninety days the contractor may terminate this contract by thirty days notice to the owner. In the event the contract is so terminated the contractor shall be paid all costs to be mutually settled between owner/consultant/architect and the contractor. Failure to agree on any equitable adjustment shall be deemed to be a dispute.
- 15.3 If in the opinion of the consultant/architects/owner the works are delayed due to reasons beyond the control of the contractor the owner in consultation with the consultants shall allow a fair and reasonable extension of time for completion of the contract works.

### **16.0 Termination of contract.**

This contract shall be terminated after giving seven days notice in writing if in the opinion of owner/consultant/architect the contractor:

- 16.1 Has abandoned the contract.
- 16.2 Has failed to commence the works in reasonable time.

16.3 Has failed to keep up the progress of the work as per program.

16.4 Has neglected or failed persistently in his performance.

16.5 Has sublet the work to the detriment of good workmanship or in defiance of owner/consultant/ architect's instructions then the owner may after giving seven days notice in writing terminate the contract.

### **17.0 Arbitration.**

17.1 All disputes and differences of any kind whatever arising out of or in connection with the contract or carrying out of the works shall be referred to and settled by consultant/architect who shall state their decision in writing. Such decision shall be final and without appeal. But if either the owner or the contractor be dissatisfied with the decision of the consultant/architect then either party may within twenty six days give a written notice to the other party stating the matter in dispute be arbitrated upon. Such written notice shall be referred to the arbitration and final decision of a single arbitrator being a fellow of institution of engineers to be agreed upon and appointed by both parties.

17.2 The arbitrator shall have power to review, revising, certificate decision referred to in the proceeding clause and the determine all matters in dispute which shall be submitted to him of which notice shall have been given as aforesaid. The award of the arbitrator shall be final and binding on both the parties.

### **18.0 As Built Drawings.**

The contractor shall prepare and submit the As BUILT drawings after completion of the work. One set of tracings along with **six** sets of blue prints shall be submitted.

## COMMERCIAL TERMS & CONDITIONS

- 1.0 Security Deposit : 5% of the ordered amount /BG shall be deposited along with agreement
- 2.0 Retention Money. : To be deducted from the bills at the rate of 10% which will be released after the defect liability period of 1 year .
- 3.0 Earnest money Deposit. : Rs. 2.0 Lakhs
- 4.0 Validity of Tender. : Till the completion of the defect liability period.
- 5.0 Date of Commencement. : With in 7 days from the receipt of written order.
- 5.0 Completion period. : 120 days from the commencement of work.
- 6.0 Terms of payment. :  
40% of the executed amount will be released upon completion of 60% of the ordered value of work subject to measurement and recommendation.  
  
2) Balance amount after successful completion and commissioning
7. Penalty : 0.5% of the total contract value per week delay up to a maximum of 7.5%.
- 8.0 Defect liability period . : 12 months from the date of Commissioning.
- 9.0 Minimum Value of Bill for certification & payment. : Rs.20 Lakhs
- 10.0 Period for Honoring completion Certificate. : One Month from date of Commissioning & Handing over.
11. Prices shall be written in ink and shall be entered both in figures and words. In case of discrepancy the figure quoted in words shall be taken as accurate. In case of any discrepancy in the unit and amount, the unit rate shall be taken as accurate.



## DRAFT AGREEMENT

ARTICLES                                      OF                                      AGREEMENT                                      made  
the.....day of  
.....between.....  
.....  
..... (herein after  
called the employer/  
owner)                                      of                                      the                                      one                                      part  
and.....  
(herein after called the contractor) of the other part.

Whereas        the        employer        is        desirous        of        Installation  
of.....  
and has caused all specifications, drawings, bill of quantities describing the  
work to be done prepared by  
..... (herein after  
called consultant)  
and whereas the said specifications drawings and bill of quantities have been  
signed by or on behalf of the parties hereto and whereas the contractor has  
agreed to execute upon a subject to the conditions set forth in the schedule  
hereto (herein after referred to as the said conditions) the work shown upon  
the said drawings and described in the said specifications and included in the  
said bill of quantities for the estimated sum of Rupees .....

### NOW IT IS HEREBY AGREED AS FOLLOWS:

In consideration of the said estimated contract amount of  
Rupees.....  
To be paid in the times and in the manner set forth in the said conditions, the  
contractor shall upon and subject to the said conditions execute and complete  
the works shown upon the said drawings and described in the said  
specifications and/or the bill of quantities.

The employer will pay the contractor the said contract amount or such other  
sum as shall become payable hereunder at the times and in the manner  
herein after specified in the said conditions.

The said conditions, drawings, specifications and bill of quantities with agreed  
rates thereto shall be read and construed as forming part of this agreement,  
and the parties hereto shall respectively abide by, submit themselves to the  
conditions and perform the agreements on their part respectively in such  
conditions contained.

AS    WITNESS    WE    SET    OUR    HANDS    THIS    DAY    OF  
.....  
.....  
.....

TENDER FOR PILOT PLANT CLEAN ROOM AT R&D CENTRE

Signed by the said employer

In the presence of

Address

Occupation.

Signed by the said contractor

In the presence of

Address

Occupation.

## **SPECIAL CONDITIONS**

1. For the purpose of this clause.
  - a) 'Similar work' shall mean construction of class10000 / class 1000 /class 100 clean rooms which includes design, Fabrication, supply, installation, testing, validation and commissioning .
  - b) Cost of work shall mean the cost of work executed excluding cost of materials supplied by the department or agency. Certificate of satisfactory completion of work obtained from an officer not below the rank of an executive engineer in the case of Government departments or from an officer of equivalent position in the case of other organization shall be produced. The certificate will clearly indicate the name of work completed, period during which completed (giving date of commencement and date of completion of cost work). The certificate should bear the name, signature and seal of the officer. In the absence of such a certificate the tender may not be considered.
2. Average annual financial turn over of the bidder during the last 3 years, ending 31<sup>st</sup> March of the previous financial year, should be at least Rs. 3.00 Crore.
3. Earnest Money Deposit in the manner specified.
4. The tenderer should have adequate number of technical/ Skilled /Un-Skilled persons for executing the work.
5. The tenderer should have adequate construction machineries / tools and equipments for the execution of the tendered work(Annexure IV).
6. Power of Attorney in case an authorized representative has signed the tender.
7. The duly signed acceptance form conforming that All terms & conditions, technical specifications, drawings & volume of job are understood by the bidder Certificate that bid is in total conformity with the specifications and terms and conditions mentioned in the bid document and certificate on period of validity (Annexure V)

### **Other information's to be furnished:**

- i) Valid latest income tax clearance certificate (Certified copy to be attached)
- ii) In the case of proprietary or partnership firms it will be necessary to produce the certificate afore mentioned for the proprietor or proprietors and for each of the partners as the case may be.
- iii) Sales tax clearance certificate (Certified copy)

- iv) Attested copy of contract registration certificate (including VAT registration) (in the case of registered contractors)
8. Assurance that supplier will take all risk insurance policy jointly in the name HLL and the supplier valid till completion of the awarded work.
9. Deviation if any, giving reasons for the deviation.
10. Even though the bidder meet the above qualifying criteria, they are subject to be disqualified if they have:
  - I. Record of poor performance such as abandoning the works, not properly completing the contract, inordinate delays in completion, litigation history, or financial failures etc...
11. Number of major similar projects completed successfully in India. Enclose completion certificates from the client certified that the similar projects are installed and commissioned at their site successfully executed during the last 5 years and is working satisfactorily. Details to be furnished in **Annexure I**
12. Total No. of Major ongoing Work. Details to be furnished in **Annexure II**
13. Has the Contractor/ Firm/Company ever been black listed by the Govt/or the registering authority.  
  
If so, give the period and details.
14. Average annual financial turnover of the bidder during the last 3 years, ending 31<sup>st</sup> March of the previous financial year.

1. 2008-2009 :	Rs.
2. 2009-2010 :	Rs
3. 2010-2011:	Rs
15. Details of latest income tax clearance certificate:  
Assessment year (attested copy of latest I.T.C.C to be enclosed)
16. Sales tax Registration No. :  
(VAT Reg)
17. Details of organization :  
  
(Bio data with willingness letters to be enclosed in **Annexure III**)
18. Details of Machinery, tools and plans
  1. Whether the tenderer is in possession of the required machinery , tools and equipments for the execution of this work? : Yes/No.  
(Give details in **Annexure IV**)

### ANNEXURE-I

DETAILS OF MAJOR CLEAN ROOM CONSTRUCTION WORK COMPLETED SUCCESSFULLY IN INDIA BY THE TENDERER AS PRIME CONTRACTOR DURING THE LAST 5 YEARS				
Sl. No.	Name of Client with full address, telephone numbers and nature of work	<b>Project details</b>	Value of works completed (in lakhs)	Period of Completion with dates (in months)

SIGNATURE OF BIDDER

**ANNEXURE - II**

<b>DETAILS OF MAJOR ONGOING INSTALLATIONS OF SIMILAR CONSTRUCTION WORKS</b>			
<b>Sl. No.</b>	<b>Name of Client with full address, telephone numbers and nature of work</b>	<b>Project details</b>	<b>Value of works (in lakhs)</b>

**ANNEXURE-III****DETAILS OF ORGANIZATION**

Sl.No	Name & Postal Address	Qualification	Total experience in years	Name of organization served showing position held and period of service in each position
1.	A.ENGINEERING PERSONNELS			
2				
3.				
4				
5.				
6				
1.	<b><u>B.MANAGEMENT (NON TECHNICAL)</u></b>			
2				

**SIGNATURE OF BIDDER**

**ANNEXURE IV**

**BIDDER'S EQUIPMENTS**

**LIST OF EQUIPMENTS**

SL.NO	EQUIPMENTS	NOS.AVAILABLE	NOS.PROPOSED TO BE DEPLOYED IN THIS PROJECT

SIGNATURE OF BIDDER



## **ANNEXURE V**

### **ACCEPTANCE FORM**

*(To be submitted in the letter pad of the firm indicating full name and address, telephone & fax numbers etc.)*

From

To

**VP (R&D) HLL R&D CENTRE HLL LIFECARE LIMITED,  
AKKULAM, SREEKARIYAM.P.O  
THIRUVANANTHAPURAM – 695 017 ,  
KERALA, INDIA**

Dear Sir,

I / We, hereby offer to supply/fabricate/erect/validate/commission as detailed in schedule hereto or such portion thereof as you may specify in the acceptance of Bid at the price given in the price bid and agree to hold this offer open till **120 DAYS** from the date of bid opening prescribed by the Purchaser. I/We have understood the terms and conditions mentioned in the invitation for bid and Conditions of Contract furnished by you and have thoroughly examined the specifications quoted in the bid document hereto and are fully aware of the nature of the scope of work required and my/our offer is to comply strictly in accordance with the requirement and the terms and conditions mentioned above.

The following pages have been added to and form part of this bid.

Yours faithfully,

**SIGNATURE OF THE BIDDER**

## ANNEXURE VI

### CERTIFICATE

I / we hereby certify that the information given with this bidding document is correct. If, at any stage, it is found to be incorrect, I/We understand that the contract will be liable to be terminated and action could be taken against me/us by the company for damages.

SIGNATURE (S) OF BIDDER

*(To be submitted in the letter pad of the firm indicating full name and & fax numbers etc.)*

**TECHNICAL SPECIFICATION****GENERAL****1. SITE CONDITIONS**

- |                              |   |  |
|------------------------------|---|--|
| i. Temperature               | : | Maximum 38 Deg.C.<br>Minimum 22 Deg.C. |
| ii. Humidity<br>temperature. | : | Around 98% at Max                      |
| iii. Rainfall                | : | Around 3000mm per annum.               |
| iv. Altitude<br>MSL.         | : | Less than 500 meters from              |

**2. ELECTRIC SUPPLY PARTICULARS**

- |                      |   |                      |
|----------------------|---|----------------------|
| i. Nominal voltage   | : | 415 Volts.           |
| ii. Frequency        | : | 50 Hertz.            |
| iii. Number of wires | : | 3 phase and Neutral. |
| iv. Neutral earthing | : | Solidly earthed.     |

**3. STANDARDS**

The installation and components thereon shall conform to the requirements of following specifications:-

- |                              |   |   |
|------------------------------|---|---|
| i. ISO 14644 2004/Schedule M | : | Clean rooms & associated controlled Environments. |
| ii. NBC                      | : | National Building Code.                           |

**4. DRAWINGS & DOCUMENTS**

Following documents will be the part of this tender:-

**Drawings**

- |  |   |                |
|--|---|----------------|
| • Wall Panel Layout                        | - | ACE/116/110/R2 |
| • REFLECTED CEILING PLAN                   | - | ACE/116/111/R2 |
| • Architectural Plan 3 <sup>rd</sup> Floor | - | ACE/116/116    |
| • Building Cross sections                  | - | ACE/116/117    |
| • AHU & Chiller Layout                     | - | ACE/116/118    |

**PRICE BID**

- |                      |   |           |
|----------------------|---|-----------|
| • Bill of Quantities | - | 22 Pages. |
| • Price Abstract     | - | 1 Page.   |

Contractor shall prepare all working drawings including ducting and supporting steel work for the execution. And drawings if any required by

statutory bodies and obtain necessary approvals. All such working drawings to be approved by the client / consultant.

## 5. BILL OF QUANTITIES

The quantities mentioned in the bill of quantities are for the guidance of the bidder to quote. The client/consultant do not in any way guarantee that the actual work will exactly correspond to the quantities now indicated. It shall be the contractors responsibility to procure only requisite quantity. The client reserves the right to add/delete any portion of the work within the project site.

## 6. TESTING & VALIDATION

- i. Contractor shall do all necessary steps to integrate the proposed systems and components to the existing central system like chilled water line, plumbing line, FDA & building management system
- ii. All equipments and materials included in contractor's scope of design & supply shall be tested as per the relevant standards before delivery and necessary test certificates shall be submitted.
- iii. All pre-commissioning tests shall be carried out after the installation is completed, and results shall be recorded.
- iv. Contractor should carry out a validation as per relevant standards, cGMP practices and Schedule-M guide lines and validation report along with as built drawings shall be submitted.
- v. Client will depute a third party inspection agency in addition to the validation covered in contractors scope of work for undertaking various relevant tests to ascertain clean room standards. If found defective during such inspection / Validation, contractor should carry out all corrective.
- vi. Any rectification if found required may be carried out without any additional cost.

## 7. HANDING / TAKING OVER

The installation shall deem to have completed and taken over by the client when:-

- i Entire installation is physically tested in the presence of client / consultant and results are satisfactory.
- ii Obtaining final approval from statutory bodies including rectification of any defects pointed out during the third party inspection.
- iii Contractor submits set of 'AS BUILT' drawings covering layouts and wiring diagram for the scope of work covered.
- iv Contractor carries out all performance test & validation with satisfactory results and submits all reports and completion certificates.
- v The defect liability period will start once contractor has completed all formalities and commissioned the facility.
- vi The installation and accessories shall be guaranteed for satisfactory operation for a period 12 months from the date of handing over. Any defects noticed during this period shall be rectified free of cost.

## 8. SAFETY MEASURES

- i. All hand tools shall have insulated handle. Welding machine shall have proper terminal box for cable termination and earthing

- ii. Safety belt to be used when working at a height of 3mt and above from ground.
- iii. Properly designed ladders/scaffolding shall be used while working at heights.
- iv. RCCB/ELCB to be provided in the construction power distribution network.

## **CIVIL WORKS**

### **STORAGE**

Material shall be stored in such a manner as to prevent deterioration or intrusion of foreign matter and to ensure the preservation of their quality and fitness for the work. Materials stored at site, depending upon the individual characteristics, shall be protected from atmospheric actions, such as rain, sun, winds and moisture to avoid deterioration.

Cement bags brought to site shall be stored in a dry waterproof location at site. Bags shall be stacked and covered all round. Height of the stack shall not be more than 10 bags. All constructions shall be with 53 grade Portland cement of approved make

Bricks shall be stacked in regular tiers as and when they are unloaded to minimize breakage and defacement. These shall not be dumped at site. Bricks stacks shall be placed close to the site of work so that least effort is required to unload and transport the bricks again. Unloading of building bricks or handling in any other way likely to damage the corners or edges or other parts of bricks shall not be permitted.

Floor, wall tiles of different types, such as, vitrified, ceramic tiles (glazed and unglazed) shall be stacked on regular platform as far as possible under cover in proper layers and in tiers and they shall not be dumped in heaps. In the stack, the tiles shall be so placed that the mould surface of one faces that of another. Height of the stack shall not be more than one meter. During unloading, these shall be handled carefully so as to avoid breakage. Tiles of different quality, size and thickness shall be stacked separately to facilitate easy removal for use in work.

Aggregates shall be stored at site on a hard dry and level patch of ground. If such a surface is not available, a platform of planks or old corrugated iron sheets, or a floor of bricks, or a thin layer of lean concrete shall be made so as to prevent contamination with clay, dust, vegetable and other foreign matter. Stacks of fine and coarse aggregates shall be kept in separate stock piles sufficiently removed from each other to prevent the material at the edges of the piles from getting intermixed. Fine aggregate shall pass through a test sieve # 480 of IS and leaving a residue of not more than 5%.

### **CEMENT MORTAR**

This shall be prepared by mixing cement and sand in specified proportions. Proportioning on weight basis shall be preferred taking into account specific gravity of sand and moisture content. Boxes of suitable size shall be prepared to facilitate proportioning on weight basis. Cement bag weighting 50 kg shall be taken as 0.035 cubic meter. Other ingredients in specified proportion shall be measured using boxes of size 40 x 35 x 25 cm. Sand shall be measured on the basis of its dry volume in the case of volumetric proportioning.

The mixing of mortar shall be done in mechanical mixers or by manual hand mixing

*Mechanical Mixing-:* Cement and sand in the specified proportions shall be mixed dry thoroughly in a mixer. Water shall then be added gradually and wet mixing continued for at least three minutes. Only the required quantity of water shall be added which will produce mortar of workable consistency but not stiff paste. Only the quantity of mortar, which can be used within 30 minutes of its mixing, shall be prepared at a time. Mixer shall be cleaned with water each time before suspending the work.

*Hand Mixing-:* The measured quantity of sand shall be leveled on a clean masonry platform and cement bags emptied on top. The cement and sand shall be thoroughly mixed dry by being turned over and over, backwards and forwards, several times till the mixture is of a uniform color. The quantity of dry mix which can be used within 30 minutes shall then be mixed in a masonry trough with just sufficient quantity of water to bring the mortar to a stiff paste of necessary working consistency. mortar shall be used as soon as possible after mixing and before it begins to set, and in any case within half hour, after the water is added to the dry mixture

## CEMENT COCRETE

Concrete shall be generally M20 grade and properly mixed as per the proportion specified and transported from the mixer to the place of laying as rapidly as possible by methods which will prevent the segregation or loss of any of the ingredients and maintaining the required workability.

Suitable form work shall be provided wherever required. Form work shall include all temporary or permanent forms or moulds required for forming the concrete which is cast-in-situ, together with all temporary construction required for their support. It shall be strong enough to withstand the dead and live loads and forces caused by ramming and vibrations of concrete and other incidental loads, imposed upon it during and after casting of concrete. It shall be made sufficiently rigid by using adequate number of ties and braces, screw jacks or hard board wedges where required shall be provided to make up any settlement in the form work either before or during the placing of concrete.

The concrete shall be deposited as nearly as practicable in its final position to avoid rehandling. It shall be laid gently and shall be thoroughly vibrated and compacted before setting commences and should not be subsequently disturbed. Method of placing shall be such as to preclude segregation. Care shall be taken to avoid displacement of reinforcement or movement of form work and damage due to rains. As a general guidance, the maximum free fall of concrete may be taken as 1.5 meter.

Concrete shall be thoroughly compacted and fully worked around embedded fixtures and into corners of the form work. Compaction shall be done by mechanical vibrator of appropriate type till a dense concrete is obtained. To prevent segregation, over vibration shall be avoided. Compaction shall be completed before the initial setting starts. After compaction the top surface shall be finished even and smooth with wooden trowel before the concrete begins to set.

Proper curing as per standard practice shall be done for at least 10 days from date of concreting by covering with a layer of sacking, canvas, Hessian or similar materials and kept constantly wet for 10 days.

The steel used for reinforcement shall be Thermo-mechanically treated (TMT) Bars.

## BRICK WORK

The bricks shall be made of suitable clay and shall be thoroughly burnt at the maturing temperature of clay. They shall be free from cracks, flaws and nodules of free lime. They shall have rectangular face with sharp straight edge at right angle. They shall be of uniform color and texture. These bricks generally should conform to IS 2222. The bricks when tested in accordance with the procedure laid down in

IS 3495 (Parts 1 to 4) shall have a minimum average compressive strength of 7 N/mm<sup>2</sup> on net area. The compressive strength of any individual brick tested shall not fall below the minimum compressive strength specified for the corresponding class of bricks. The lot shall then be checked for next lower class of brick.

Bricks shall be soaked in water before use for a period for the water to just penetrate the whole depth of the bricks. Alternatively bricks may be adequately soaked in stacks by profusely spraying with clean water at regular intervals for a period not less than six hours.

Bricks shall be laid in English Bond unless otherwise specified. For brick work in half brick wall, bricks shall be laid in stretcher bond. Half or cut bricks shall not be used except as closer where necessary to complete the bond. Closers in such cases, shall be cut to the required size and used near the ends of the wall

Bricks shall be laid on a full bed of mortar, when laying, each brick shall, be properly bedded and set in position by gently pressing with the handle of a trowel. Its inside face shall be buttered with mortar before the next brick is laid and pressed against it. Joints shall be fully filled and packed with mortar such that no hollow space is left inside the joints.

The walls shall be taken up truly in plumb or true to the required batter where specified. All courses shall be laid truly horizontal and all vertical joints shall be truly vertical. Vertical joints in the alternate course shall come directly one over the other.

All quoins shall be accurately constructed and the height of brick courses shall be kept uniform. This will be checked using graduated wooden straight edge or storey rod indicating height of each course including thickness of joints. The position of damp proof course, window sills, bottom of lintels, top of the wall etc. along the height of the wall shall be marked on the graduated straight edge or storey rod.

The brick work shall be built in uniform layers. No part of the wall during its construction shall rise more than one meter above the general construction level. Parts of wall left at different levels shall be raked back at an angle of 45 degrees or less with the horizontal.

For half brick partition to be keyed into main walls, indents shall be left in the main walls.



All pipe fittings and specials, spouts, hold fasts and other fixtures which are required to be built into the walls shall be embedded, as specified, in their correct position.

## SUPPORTING STEEL WORK

This item shall be used as various supporting items like Mezzanine floor for AHU installation, Outdoor ducting at road crossing and other supports as required. Contractor shall prepare all necessary drawings and get it approved by the consultant before proceeding with the actual work.

Welding shall generally be done by electric arc process as per IS 816 and IS 823.

All surfaces which are to be painted, oiled or otherwise treated shall be dry and thoroughly cleaned to remove all loose scale and loose rust. Surfaces not in contact but inaccessible after shop assembly, shall receive the full specified protective treatment before assembly. 2 coats primer of approved steel primer such as Red Oxide/Zinc Chromate primer conforming to IS 2074 shall be applied and then applied with 2 coats of poly urethane paint of approved make.

## FLOOR TILES

The floor tiles shall be of vitreous ware and free from deleterious substances. The iron oxide content allowable in the raw material shall not exceed two percent. The tiles shall be vitrified at the temperature of 1100°C and above and shall be kept unglazed. The finished, tile, when fractured shall appear fine grained in texture, dense and homogenous. The tiles shall be sound, true to shape, flat and free from flaws and manufacturing defects affecting their utility. The tiles to be tested for water absorption, compressive strength, acid resistance as per IS 4457. Sampling procedure for acceptance tests and criteria for conformity to be as per IS 4457. The tiles shall be of required color. Tiles shall be legibly marked on the back with the name of the manufacturer or his trade mark. Manufacturer's batch number and year of manufacture.

Base floor on which the tiles are to be laid shall be cleaned, wetted and mopped. The bedding for the tile shall be with cement mortar 1:4 (1 cement : 4 coarse sand) or as

specified. The average thickness of the bedding shall be 12 mm or as specified while the thickness under any portion of the tiles shall not be less than 10 mm

The surface of the flooring during laying shall be frequently checked with a straight edge about 2 m long, so as to obtain a true surface with the required slope. In wash area flooring. Further tile drop will also to be provided near floor trap.

Where full size tiles cannot be fixed these shall be cut (sawn) to the required size, and their edge rubbed smooth to ensure straight and true joints. Tiles which are fixed in the floor adjoining the wall shall enter not less than 10 mm under the plaster, skirting or dado. After tiles have been laid surplus cement slurry shall be cleaned off. The joints shall be cleaned off the grey cement slurry with wire/coir brush or trowel to a depth of 2 mm to 3 mm and all dust and loose mortar removed. Joints shall then be flush pointed with white cement added with pigment to match the color of tiles. The floor shall then be kept wet for 7 days. After curing, the surface shall be washed and finished

clean. The finished floor shall not sound hollow when tapped with a wooden mallet.

### SYNTHETIC ENAMEL PAINTING

The surface shall ordinarily not be painted until it has dried completely. Wall putty suitable for enamel painting shall then applied properly. Two coats of primer shall be applied with brushes, worked well into the surface and spread even and smooth. Two coats Synthetic Enamel Paint (conforming to IS 2933) of approved brand and manufacture and of the required color shall be used for the top coat and an undercoat Additional finishing coats shall be applied if found necessary to ensure properly uniform glossy surface.

## **CLEAN ROOM INTERIOR**

### **SCOPE**

This part covers Requirements and Specifications for the clean room components associated with proposed class 10000 clean room facility for Pilot Plant at R& D Centre.

Contractor shall deploy a full time supervisor with sufficient experience in the similar kind of project.

The installation shall be carried out in accordance with good engineering practices available, latest Indian and International standards and specific requirements covered as below:-

### **CEILING PANELS**

This shall be walkable type made with stainless steel panels of grade ss 304 B sandwiched with PUF having a density 40 kg/m<sup>3</sup> as core. The panels shall be manufactured to a standard width of 120cm and continuous in length. Other details shall be as per bill of quantities and drawing attached herewith. The surface finish shall be Grade IV matt.

This shall be installed using proper supporting system installed from the existing RCC ceiling slab. Suitable cutouts shall be provided for installing luminaires and entering various service lines. Edges at cutout shall be duly finished.

### **WALL PANELS**

This shall be made with stainless steel panels of grade ss 304 B sandwiched with PUF having a density 40 kg/m<sup>3</sup> as core. The panels shall be manufactured to a standard width of 120cm and continuous in length. Other details shall be as per bill of quantities and drawing attached herewith. The surface finish shall be Grade IV matt.

Thickness of wall panels is as per drawings and bill of quantities. For 250mm wall panels return air duct made out of 22G aluminum shall be provided inside. This shall be connected to the main return air duct above ceiling.

Wall panels shall have a male edge one side and female edge on other side. This when two panels joined forms a sturdy interlock. Further the joints shall be finished with silicon sealant.

### **DOOR FRAME**

SS 304 conforming to IS: 277-1992 shall be the material for the frame. Maximum tolerance shall be 1mm.

Profile size shall be 100 x 75mm. Thickness of the sheet shall be min 2mm. The frame may be supplied in knock down form with joints. This shall be able to assemble at site easily using nut and bolts.

Hinge plates shall be recessed and manufactured with 5mm thick sheet and this shall be suitable for flush mounting for the hinges.

Reinforcement pads shall be used for fixing the automatic door closer.

The surface finish shall be Grade IV matt.

## SHUTTERS

SS 304 conforming to IS: 277-1992 shall be the material for the frame. Maximum tolerance shall be 1mm.

This shall be 45mm in thickness and made with 1mm thick stainless steel. Core material shall be PUF as specified elsewhere.

Hinges shall be 3mm thick and this shall be concealed type. All fasteners used shall be of machine screws.

Reinforcement pads shall be used for fixing the automatic door closer.

The surface finish shall be Grade IV matt.

## EPOXY COATING

Surface should be prepared using acid etching and wire brushing so that all loose particles, grease and oil are removed. The moisture content should not be more than 5%.

One coat of penetration primer may be applied to the cleaned surface followed by spreading of epoxy mortar screed made out of epoxy resin with reactor and silica sand aggregate of a suitable proportion. Proper care should be taken for a uniform spread so that thickness is uniform.

After allowing for an initial curing of the mortar screed, final layer of self leveling epoxy is applied within 8 hours and final curing time may be 10hours. Average thickness shall be 3mm.

Coving to the vertical wall to 100mm shall be provided. Coving radius shall be 6mm. All internal and external corners may be rounded off.

Minimum 24 hours shall be allowed for complete curing. The flooring should be protected using 6mm thick hardboard or particle board if other project activities has to be carried out after the epoxy flooring is done. This covering may be removed only after completing all above activities and at the time of commissioning.

;

## HVAC SYSTEM

### 1. SCOPE

This part covers Requirements and Specifications for the clean room components associated with proposed class 10000 clean room facility for Pilot plant at R&D Centre.

The installation shall be carried out in accordance with good engineering practices available, latest Indian and International standards and specific requirements covered as below:-

### 2. SPECIFIC REQUIREMENTS

- i. The work has to be executed in a running plant; hence necessary care shall be taken accordingly.
- ii. Minor civil work like making through holes, necessary cutouts, rough plastering or any job required for the smooth execution of project as per scope of service may be carried out.
- iii. Contractor shall work in coordination with other agencies involved in the project.
- iv. All working drawings including ducting drawings, AHU & duct supporting structure shall be prepared by the contractor and get it approved by the client / consultant.
- v. Any item if found necessary for the smooth completion of the job may be included separately in the offer by the bidder.
- vi. Deviations if any shall be indicated clearly as a deviation statement.

### 3. INSIDE CONDITIONS REQUIRED

- |      |                    |   |                                       |
|------|--------------------|---|---------------------------------------|
| i    | Air Flow type      | - | Mixed                                 |
| ii   | Air Change/Hr      | - | 75/Hr (For Class 10000 Clean Room ) . |
| iii  | Fresh Air          | - | 20%                                   |
| iv   | Chilled water      | - | Available at site.                    |
| v    | Type of Filter     | - | HEPA terminal filter                  |
| vi   | Overall Efficiency | - | 99.97% @ 0.3 micron.                  |
| vii  | Location of Filter | - | At AHU. & Terminal filter             |
| viii | Supply Air         | - | From TOP.                             |

- ix Return Air - Through Bottom side walls. (No False Flooring)
- x Inside temperature - 22 +/- 2 Deg.C
- xi Humidity - 55 % MAX

#### 4. AIR HANDLING UNITS

- i AHU shall be Chilled water type Factory assembled.
- ii This shall be double skin with PUF insulation, multi row type.
- iii AHUs shall have Fan section, Coil section, Damper section, Humidity control and Filter section.
- iv This should have necessary humidity control device fitted so that inside humidity shall be 50% at maximum temperature.
- v Suitable type centrifugal Fan may be coupled directly or with a belt drive.
- vi Fan section shall be mounted on anti-vibration pads or springs.
- vii Interconnection between AHU& Duct shall be with flexible ducting.
- viii Various level Air filters as specified in the BOQ shall be supplied & installed in the AHU.
- ix AHU control shall be with Variable Speed drive (VFD).
- x There shall be a condensate collecting tray.
- xi Suitable pvc piping with 'U' trap shall be attached to the above tray.
- xii Proper slope shall be maintained in the drain piping to avoid water stagnation.
- xiii AHUs shall be located at terrace floor level.
- xiv Suitable room with brickwork and RCC roof shall be constructed as per design and BOQ covered elsewhere.

#### 5. VARIABLE SPEED DRIVE

- i This shall be wall mounting type suitable for speed control of the AHU Fan.
- ii An alpha Numeric control panel with LCD display shall be provided which can display and control minimum parameters as follows:- Local/Remote Indication, Direction of rotation, Set speed, Actual Speed, Output current, Real time clock.
- iii It shall be able to program various function parameters for different performance characteristics on a real time axis.

- iv There shall be suitable “swinging DC chokes” for reducing harmonics on a variable load conditions. Max THD shall not be more than 25%.
- v Suitable RFI filters shall be provided.
- vi There shall be in built user friendly fault diagnostic feature.
- vii RS 485 port with built in modbus and sensor less vector control for better motor performance.
- viii 2nos. built in PID controllers for any external device control like motorized damper or valve.
- ix The equipment shall be supplied with necessary software & operating manual.

## 7. DUCTING

- i All duct work shall be with Aluminum only and cross section may be rectangular or circular as decided later.
- ii Duct routing should be straight with minimum deviations as far as possible.
- iii Minimum thickness of the ducting shall be 22 gauges.
- iv Sheet metal work shall be with good quality workman ship using right engineering practices.
- v Contractor shall prepare all working drawings and duct routing layout.
- vi Approval from the consultant shall be obtained before commencing the work.
- vii Maximum air velocity in the main and branch duct may be limited to 1200 fpm.
- viii Maximum air velocity in the outlets may be limited to 500 fpm.
- ix Maximum air velocity at return air grill may be limited to 400 fpm.
- x Extract panels with inbuilt ducts are envisaged for return air from the clean room.
- xi This extract panel will get connected to the return air duct network above false ceiling and finally to the AHU located at terrace floor.
- xii Acoustic lining shall be provided to the duct work near the AHU/TFA to minimize the fan noise being transmitted through the duct work.
- xiii It is essential to provide straightening vanes wherever there is a duct collar joint for a proper balancing of air distribution.

- xiv When there is change in duct size in a continuous run transformation duct pieces have to be used. Normal slope shall be one in seven.
- xv Elbows shall have radius ratio 1.5 and maximum aspect ratio not more than six.
- xvi Aspect ratio of rectangular duct should be within 4.
- xvii In case of shorter elbows or sharp bends multiple turning vanes has to be used.
- xviii Branch duct from a main duct (after an elbow) should be away at least 7.5 times of the elbow width.
- xix Ducts with thermal insulation shall be suspended from the roof slab using GI  
hi – tech support system with threaded rods and slotted strips.
- xx Cost of above supports shall be included in the item under duct in the BOQ.

## 8. AIR FILTERS

- i Multilevel air filtering is envisaged such as pre filter, fine filter and HEPA filter for the class 10000 application.
- ii Pre filter will be required to filter out particle size upto 10micron and fine filter will filter out 5micron particles.
- iii Filters may be made out of micro layer fiber glass and asbestos and it should be fire and moisture resistant type. This should be of cleanable type.
- iv Normal pressure drop when pre filters are clean is around 6mm.
- v The efficiency level shall be 99.9 % for 5micron particles.
- vi All filters are located inside AHU / TFA unit and considered as a single entity.
- vii Rate quoted for AHU / TFA unit shall include necessary filters as specified.
- viii HEPA filter also be located at supply side duct of AHU and should have an efficiency of 99.99% for 0.3 micron particles. Pressure drop may be around 50mm.
- ix Filters have to be fitted properly so that no leakage or by-pass may be present.



x Neoprene gaskets are used to seal the space between filter frame and filter housing.

xi Filters have to be installed only after cleaning the entire system properly.

## **9. Common Salient Features of Air Handling Systems catering to clean production areas.**

- Dedicated Double skin AHU with thermal break profile is provided.
- AHU's shall have supply air and return air plug fan with flow measuring device comprising of calibrated Nozzle and Differential Pressure Switch. Supply/Return air fan to be provided with variable speed drive.
- Separate supply & return air blowers will provide following benefits:

- Excellent differential pressure characteristics
- Quick defumigation

- Cooling coil is provided to offset the outdoor air heat and for necessary dehumidification required.
- Hot water coil is provided for winter heating & monsoon reheating.
- Fresh air is filtered through filter, followed by fine filters ie. fine filters are installed in AHU to reduce the particle load on terminally mounted HEPA filters.
- Return air is picked up through return air risers to provide vertical airflow pattern.
- The system will be capable of maintaining differential pressured automatically in addition to temperature and RH conditions.

## **Technical Overview of major HVAC Components**

### **Air Handling Unit**

Double skin with Thermal break profile AHU is proposed. AHU shall have all internal components of suitable MOC for clean room application. It shall be equipped with plug fan blower with flow measuring device comprising of Calibrated Nozzle and Differential Pressure Switch, Motor, cooling and heating coil with fins, inspection lamp, and limit switches for doors. Adequate no. of access doors (min 600 mm wide) shall be provided. Suitable sandwich insulated condensate drain pan shall be provided to ensure that no water will remain stagnant in AHU. AHU shall be provided with DP nozzles/DP ports to monitor the Clean/Dirty status of filters. AHU shall be provided with 100% capacity low leak Aluminum dampers to operate during Once Through Mode.

### **Ducting**

Aluminium sheets conforming to IS:737-1955. The ducting shall be tested for any kind of leakages. All ducting shall be applied with food grade RTV sealant on joints.

### **Insulation**

Closed cell Aluminium faced Nitrile rubber insulation shall be used for insulating Supply, Return and exhaust ducts carrying conditioned air. For exposed ducts expanded polystyrene insulation with AL cladding shall be used. Nitrile rubber will provide very good insulation properties and decent looks.

### **Terminal Filter boxes**

Double skin insulated terminal filter housing made of SS304 shall be used for housing HEPA filter. This housing shall be provided with swirl diffuser.

### **Return Air Risers**

Return air risers are proposed to be constructed in integral with modular panels. Riser shall be provided with suitable return air grille and volume control damper.

### **Filters Proposed**

- Coarse Filter – 10 Micron – 60 - 80% efficiency (Synthetic Washable)
- Fine Filter-5 Micron – 60 - 80% efficiency (Synthetic Washable)
- Secondary Filter - 0.3 Micron - 99.995% efficiency

(The above Filtration Level & efficiency is just for broad understanding, however all the filters have different range of efficiencies at different particle sizes and therefore for exact details refer to reputed filter manufacturer's catalogue)

### **Design Responsibility**

The design of the entire HVAC System is the sole responsibility of the contractor. Therefore, Contractor is supposed to design the system and check the operating parameters, capacities of equipment etc. thoroughly before submitting the offer. The contractor will be responsible to demonstrate the system performance as per the intent.

The preliminary design calculations have been carried out to facilitate the contractor to quote. However, if contractor feels that the capacity of the system indicated is not adequate, the contractor may submit the calculations for their appraisal.

## **ELECTRICAL SYSTEM**

### **1. SCOPE**

This part covers Requirements and Specifications for the clean room components associated with proposed class 10000

clean room facility for Pilot plant R&D centre.

The installation shall be carried out in accordance with good engineering practices available, latest Indian and International standards and specific requirements covered as below:-

### **2. SPECIFIC REQUIREMENTS**

- i. Electrical contractor shall have a valid license of appropriate class depending upon the size/capacity of the installation from the Kerala state Electricity licensing Board.
- ii. Electrical contractor shall deploy a full time supervisor with valid supervisory license at site.
- iii. Contractor shall work in coordination with other agencies involved in the project.
- iv. Obtaining statutory approval from CEIG Kerala and KSEB will be an integral part of this contract. All necessary documents including the drawings for approval to be prepared by the contractor. No additional claim will be entertained for this part of the work.
- v. Any item if found necessary for the smooth completion of the job may be included separately in the offer by the bidder.
- vi. Deviations if any shall be indicated clearly as a deviation statement.

### **3. SWITCH BOARDS**

- i Switchboards shall be installed in the locations as shown in the drawings.
- ii If supplied in dismantled condition, different shipping section shall be assembled.
- iii Minimum clearance of 1.5 meters shall be maintained in front of the switchboard.
- iv If back access is required minimum clearance of 800 mm shall be provided at rear side.
- v Switchboards shall be aligned, leveled and grouted/bolted securely to prevent any displacement.
- vi Earth bus of the switchboard shall be connected to the main earthing grid.

- vii In case of an automatic switchboard Interlock and relay logic shall be ensured by giving control supply and simulating the required conditions.
- viii Uncut gland plates supplied along the switchboard shall be properly cut for glanding the cables.
- ix Feeder designation shall be clearly painted / labeled on respective feeders.
- x Minimum operating height shall be 45Cms and Maximum shall be 180Cms.

#### 4. CABLES

- i. Cables have to be generally laid through excavated trenches or cable shaft as required.
- ii. Cables shall be visually inspected before commencing the installation.
- iii. Megger test has to be carried out for each feeder cable after glanding and results shall be recorded.
- iv. Underground LT cables shall be laid at a depth not less than 80cms, where as HT cable shall be laid at a depth of 100cms.
- v. The LT power cable above 6 Sq.mm cross section area shall be of the Aluminum conductor and lower sizes shall be of copper conductor.
- vi. Sharp bends and kinks shall be avoided in the installation. Bending radius shall not be less than 12 times the diameter of the cable.
- vii. Cable shall be laid one beside the other and not on top of each other. Adequate extra lengths shall be provided near all the terminations.
- viii. Identification tags made out of Aluminum bearing cable number and size shall be provided at either ends and at every 30mts of intervals.
- ix. Cable glands shall be single compression SIBG type made out of extruded brass and cadmium plated.
- x. End termination shall be of crimping type Al or Cu depending on the conductor type. Cable glands shall have earth tag and it shall be securely connected to the earthing system

#### 5. EARTHING

- i A TNS type of earthing with separate neutral and safety earth conductor running through out to be adopted for the installation.
- ii The material for earthing shall be electrolytic grade bare copper.

- iii The end connection shall be of bolted type with suitable crimping type terminal lugs.
- iv All equipment receiving three-phase connection shall have double earthing and single-phase equipment shall have single earthing.
- v All cable glands shall be earthed using earth tag/ copper clamps and suitable size bare copper conductor.
- vi Metal Conduits shall be earthed separately near the MCB DB.
- vii All non – current carrying metal parts shall be connected to the earthing system.
- viii Wherever joints or tap off are required, that area to be properly tinned.
- ix Lap joints in the conductors shall be with 50mm overlap.
- x All hardware shall be GI.
- xi 18swg bare copper earth conductor shall be used along with 1.0 Sq.mm copper wiring circuits.
- xii 16swg bare copper earth conductor shall be used along with 1.5 Sq.mm copper wiring circuits.
- xiii 14swg bare copper earth conductor shall be used along with 2.5 Sq.mm copper wiring circuits.
- xiv 12swg bare copper earth conductor shall be used along with 4.0 Sq.mm copper wiring circuits.

## 6. MCBs, RCCBs, & MCB DBs

- i Factory assembled MCB DBs as per BOQ / SLD shall be wall mounting type.
- ii Suitable steel frame work if required shall be provided for installation where number of MCBDBs is more than one.
- iii Suitable fabricated wire ways shall be assembled between DBs on the above framework for easy wiring and cable dressing.
- iv Body earthing (Double) to the main grid shall be strictly ensured.
- v MCBs of proper rating as per SLD/wire size shall be arranged on the DIN rail.
- vi All circuits shall be neatly terminated to the corresponding terminals and proper dressing inside the DB shall be carried out.
- vii Circuit identification ferrules to be provided for each conductors of a circuit.

- viii Separate neutral and earth bus shall be provided and respective conductors of each circuit shall be connected to the above bus.
- ix Circuit identification, feeder identification and cable size shall be suitably marked on the DB after the installation.
- x ELCBs shall be of 30mA sensitivity and this shall be 4P or 2P as the case may be. Usage of higher sensitivity ELCBs are not recommended.
- xi It is recommended to use three separate RCCBs for three individual phases, this will minimize total break down in case of an earth leakage.
- xii MCB rating based on wire/conductor size shall be as follows:-

1.0/1.5 Sq.mm	–	6A
2.5 Sq. mm	-	10A
4.0 Sq. mm	-	16A
6.0 Sq. mm	-	20A

## 7. CONDUITS

- i. Unless otherwise specified all conduits for concealed and surface wiring shall be of PVC black colour (M) duty.
- ii. All accessories used shall be compatible each other.
- iii. For MS conduiting if any all joint shall be of threaded type only. Pin grip or clamp types of joints are not permitted in the installation.
- iv. Thread on conduits shall be made between 11mm to 27mm long so that threaded length matches with that of the accessories. Anti-corrosive paints shall be applied to the exposed threads.
- v. Maximum number of wires that can be drawn through a specified size of conduit is as follows:-

Cross sectional Area in Sq.mm	Size of Conduit in mm			
	20	25	32	38
1.5	5	10	14	
2.5	5	8	12	
4.0	3	8	10	
6.0	2	5	8	

- vi. Conductors carrying different supply voltage shall be drawn through separate conduits.
- vii. Only bends shall be used wherever conduits take right angle deviation and no Elbows are permitted.

- viii. Conduits shall be laid over the reinforcement bars and tied to the bars at every 60cms.
- ix. Proper joining solution shall be used for joints couplers.
- x. All unused entries in the conduiting shall be blocked with thermo coal packing so that cement mortar will not get into the conduiting during the concreting.
- xi. Fish wires shall be drawn through conduiting before concreting.
- xii. Electrically operated brick cutters shall be used for making necessary grooves in the wall for concealing the conduits. Grooves shall have sufficient depth for comfortable seating of the conduit.
- xiii. Chipping using chisels shall be avoided to maximum extend.
- xiv. Horizontal grooves shall be avoided to maximum extend.
- xv. Conduits shall be properly clamped to the grooves before plastering.
- xvi. For surface wiring, conduits shall be fixed by heavy gauge saddles to suitable wood/pvc plug duly inserted in the wall etc, with GI screws.

## 8. WIRING

- i Installation shall be divided into different circuits.
- ii Each circuits shall comprise of three conductors viz Phase, Neutral and earth.
- iii Phase and Neutral conductors shall be PVC insulated copper wire of size as specified.
- iv Earth conductor shall be generally of bare copper conductor of size as specified.
- v Earth conductor size shall be of same size that of Phase conductor.
- vi Minimum size of wiring shall be 1.5 Sq.mm.
- vii MCB rating for each circuit shall be as per wire/conductor size and specified else where.
- viii Generally circuits are classified as 'Lighting' 'Power' and 'UPS'.
- ix Each circuit shall be connected to the respective DB (Lighting/Power/UPS)

- x Maximum number of wires that can be drawn through a conduit is as specified.
- xi Colour code shall be followed as far as possible and properly ferruled with yellow colour ferrules.
- xii Wiring from MCB DB to light switch boxes/socket location shall be termed as circuit wiring.
- xiii Wiring from switchbox to light/fan point shall be termed as point wiring.
- xiv Looping of Neutral and Earth conductor is permitted in point wiring.
- xv Number of points in each circuit is depends on the capacity/rating of the circuit.
- xvi Generally all light point shall have DG back up and max demand while feeding from DG shall be restricted suitably.

## 9.LIGHT SWITCHES & BOXES

- i. This shall be generally of modular type. Metal boxes are preferred over PVC.
- ii. Switchboxes shall be recess mounted in the wall.
- iii. Required knock outs only shall be opened for conduit entry.
- iv. Extra care shall be ensured while installation so that 'plumb' and 'level' shall be properly maintained.
- v. Front edge of the switchbox shall be in line with finished surface (after plastering) of the wall.
- vi. Switch boxes shall be earthed using the earth conductor of respective circuit wiring.
- vii. Height (from FFL) of Light switches shall be 125cms or as specified in the drawings.
- viii. Switchboxes shall be generally located 15cms from the edge of any door/ window or as per the aesthetic requirement as the case may be.
- ix. Only one circuit shall be terminated in one switchbox. If more number of circuits are required at one location separate switchboxes shall be installed side by side.
- x. At least one blank space shall be provided in each switchbox.
- xi. Switches shall be provided only on the phase conductor never on a neutral conductor.



- xii. Telephone/Antenna/Data sockets shall be installed in separate switchboxes.
- xiii. Circuit identification with suitable permanent marking shall be provided on each switch box.

## 10. LUMINAIRES

- i. Type of luminaire shall be as specified in the bill of quantities. This shall be complete with suitable type of lamps and control gear.
- ii. All ballasts for the fluorescent lamps shall be Electronic (HF) type.
- iii. Only Philips/Osram make high efficiency or equivalent fluorescent lamps shall be used this shall be with 3250 lumens output for 4ft luminaires.
- iv. Surface mounting Luminaires shall be directly installed to the ceiling / wall using GI anchor fasteners
- v. Recess mounting luminaire shall be installed using suitable arrangements like suspension chains from ceiling slab and weight of the luminaire shall not be transferred to the false ceiling grid.
- vi. For installation where false ceiling is employed, it is preferred to have a common supporting system for conduits and luminaires.
- vii. Threaded type of suspension system is preferred over steel bracket
- viii. Earthing of the Luminaire body using respective earth conductor of point wiring shall be ensured.
- ix. Steel reinforced Flexible conduits with glands shall be used for wiring (between ceiling junction box and luminaire) for recess mounting type.

## 11. WIRE WAY TRUNKING

- i. Wire way trunking shall be fabricated out of 1.6mm thick CRCA sheet with proper jigs and fixtures to get consistent dimensional accuracy.
- ii. Front cover shall be of totally enclosed 'C' type channel with screwed or push fit type.
- iii. All hardware used shall be of good quality zinc passivated type.
- iv. Prior to painting this shall be properly pre-treated preferably by seven-tank process.
- v. Final finish shall be of powder coating with an approved shade.
- vi. Cable clamping provision at regular intervals of not more than 500mm shall be made inside the wire way.

- vii 25mm dia knock out conduit entries shall be provided at every 1000mm on top and bottom.
- viii This shall be installed as surface/ concealed mounting in the wall / floor.
- ix Earth continuity shall be maintained through out the wire way installation.
- x Wherever installation calls for recess mounting necessary wall/ floor chasing to be carried out.
- xi In above case proper grouting using cement plaster shall be carried out.

## FDA & SECURITY SYSTEM

### 1. SCOPE

This part covers Requirements and Specifications for the clean room components associated with proposed class 10000 clean room facility for R&D Centre HLL Lifecare Ltd.

The installation shall be carried out in accordance with good engineering practices available, latest Indian and International standards and specific requirements covered as below:-

### 2. CONTROL PANEL

- |                           |   |   |
|---------------------------|---|---|
| i. Type                   | : | Conventional, Modular.  |
| ii. Number of Zones       | : | 2 with future expandable.   |
| iii. Number of devices    | : | Minimum 20 per zone.  |
| iv. Wiring                | : | Class A with 2 wire.  |
| v. System Voltage         | : | 12 / 24 V DC  |
| vi. Nominal current       | : | 300mA (aprox)   |
| vii. Cabinet Construction | : | 2mm CRCA Sheet steel.   |
|                           | : | Hinged door with glazed window.   |
|                           | : | Locking facility for the door.  |
|                           | : | Suitable for wall mounting.   |
| viii. Paint Finish        | : | Fire Red.   |
| ix. Ingress protection    | : | Not less than IP 54.  |
| x. Devices supported      | : | Ionization type.  |
|                           | : | Photoelectric type.   |
|                           | : | Rate of rise type Heat detector.  |
|                           | : | Break Glass Unit.   |
| xi. Alarm Indications     |   |   |
| Fire                      | : | Flashing red LEDs in the zone.  |
| System Fault              | : | Steady yellow LED in the zone.  |
| Charger ON                | : | White LED.  |
| System ON                 | : | Green LED.  |
| Fuse Blown                | : | Red LED.  |
| xii. Fault Indications    | : | Open Loop.  |
|                           | : | Short Circuit.  |
|                           | : | Ground fault.   |
|                           | : | Battery low.  |
| xiii. Audio alert         | : | 92dbA Hooter.   |
|                           | : | Distinct alarm tone for detector tripping & activating manual call point. |

- xiv. Control Buttons : Acknowledge.  
: Silence.  
: Reset.  
: Walk Test  
: Zone disable.
- xv. Alarm Verification : By auto resetting the tripped detector & monitoring the adjacent detector.
- xvi. Loop supervision : Using resistance monitoring.
- xvii. Power Source : 230V AC with DC power supply.
- xviii. Power Back up : Built in SMF Battery.
- xix. Back up time : 72 Hrs with 5min Alarm.
- xx. Battery Charger : Built in Constant voltage charger.
- xxi. Output relay contacts : Min 4 N/O & N/C (Potential free)
- xxii. Contact rating : 230V / 5Amps AC.
- xxiii. Other Features : Suitable for interconnecting with existing FDA panel at site.  
: DIP switch programmable.  
: One man walk test facility.  
: Clean Me Feature is desirable.
- xxiv. Internal wiring : All wiring with 660V grade Copper.  
: Wiring shall be neatly bunched.  
: End termination shall be with cu lugs.  
: Ferruling & Terminal blocks to provide.

## 2. DETECTORS

- i. Type : Ionization type.  
: Photoelectric type.  
: Rate of rise Heat Detectors.
- ii. Nominal Voltage : 24 V DC
- iii. Sensitivity : 0.67 to 3.77 obsc /ft.
- iv. Temperature : 0 to 45 Deg. C
- v. Humidity : 0 to 90 % non condensing.
- vi. Drift Compensation : Automatic about 1% / Ft.
- vii. Diagnostics : Self.
- viii. Reset time : 1Sec.
- ix. Standby current : 70 micro A. (aprox)
- x. LED Flash interval : about 10 Sec.
- xi. Alarm LED view : 360 Degree

- xii. Insect screen : 0.508mm
- xiii. Temp. Rate of rise : >105 Deg F & 15 Deg F / Min.
- xiv. Air Velocity : Suitable for up to 1500 FPM.
- xv. Shade : Off white.
- xvi. Protections : Against Transient surges.
- : Polarity reversal.
- : EMI & RF suppression.
- xvii. General Requirement : Hermetically sealed solid state.
- : Plug in type with Common base.
- : Suitable for ceiling mounting.
- : Field replaceable sensing chamber.
- : Removable insect screen & Cover.
- : Shield against dust & insect.
- : Flashing LED while system healthy.
- : Steady glowing LED at Alarm.
- : Clean Me feature is desirable.

### 3. CCTV CAMERA

- i. Type : CCD Color.
- : 1/3" Dome type.
- ii. Voltage : 12V DC
- iii. Capture angle : 70 Deg solid angle.
- iv. Capture Distance : 10 meters.
- v. Resolution : Minimum 380 TV lines.
- vi. Illumination : 0.05 Lux.
- vii. Panning angle : 360 Deg. Manual.
- viii. Mounting : Ceiling mounting type.
- ix. Power supply : Yes.

#### 4. CCTV CAMERA CONTROLLER

- i. Type : DVR Card compatible  
: with Pentium Desktop.
- ii. Number of channel : 8 Channels.
- iii. Recording speed : 120 fps max image display.
- iv. Recording Method : Time set up.
- v. Compression : MJPEG coded.
- vi. Interface : PCI BUS.

#### 5. INSTALLATION

- i. Conduiting shall be surface type and shall be 16G black enameled MS for the FDA system. Minimum size shall be 20mm.
- ii. Only threaded type of installation shall be carried out. Thread sealing compound shall be used.
- iii. No elbows are permitted but long radius bends.
- iv. Fire red shade shall be applied for FDA conduiting.
- v. Wiring shall be of flame retardant low smoke type, 660volts grade, PVC insulated shielded, flexible twin core with multistrand copper conductor.
- vi. Cross sectional area shall be not less than 1.5 Sq.mm. – for FDA system.
- vii. All passive components shall be interconnected using above conductor to form a closed loop.
- viii. Power supply for the hooter shall be through a separate network originating from the control panel.
- ix. Photoelectric type smoke detectors are proposed below false ceiling.
- x. Ionization type above false ceiling.
- xi. Rate of rise type detectors are for the auto clave area.
- xii. Response indicators shall be provided for the detectors above false ceiling.
- xiii. This shall be located in the false ceiling to merge with reflected ceiling layout.

xiv. Type 'A' wiring to be adopted in which return wire through a separate conduit shall be brought back to the FDA control panel.

xv. This return wiring shall be at least 30cms from loop conduiting.

xvi. All testing as per relevant standard shall be carried out.

## APPROVED LIST OF VENDORS

SI No.	Items	Acceptable Makes
1.	Cement 53 Grade	L&T / ACC
2.	M Sand	Pobs
3.	Floor / Wall Tiles	Johnson / Kajaria
4.	Stainless Steel Sheet	SAIL
5.	Epoxy	BASF
6.	EPS	Beardsell
7.	Aluminium Foil	INDAL / JINDAL
<b>8.</b>	<b>Air Handling Units</b>	
a.	Casing (Double Skin)	Suvidha Saiver / Zeco / Citizen/ Clivet / Blue Star.
b.	Casing (Single Skin)	Zeco / Air Flow / Blue Star.
c.	Cooling Coil	Coil Co. / Zeco/ Citizen/ Suvidha Saiver / Blue Star.
d.	Fan	Nicotra/ Comefri/ Kruger/ Ziehl-Abegg/ Gebhardt / Blue Star.
<b>9.</b>	<b>Fan Coil Units</b>	
a.	Casing	Coil Co./ Zeco/ Caryaire
b.	Cooling Coil	Coil Co./ Caryaire/ Zeco
c.	Motor	GE (Maintenance Free)/ Siemens
<b>10.</b>	<b>Strip Heater</b>	
a.	Strip Heater	Daspass/ Escorts
<b>11.</b>	<b>Propeller Fans</b>	
a.	Propeller / Inline Fans	Alstom/ Kruger/ Ostberg / System Air
<b>12.</b>	<b>Controls</b>	
a.	3 Way Motorised Valve for	



- b. Thermostat for FCU/ AHU Honey Well/ Siemens/ Danfoss
- c. Humidistat Honey Well/ Danfoss/ Siemens
- d. Pressure Gauge(Dial) Waree/ General Instruments
- e. Temperature Gauge (Dial) Waree / General Instruments
- f. Thermometer (Mercury in Glass) Emerald /Zeal.
- g. Magnehelic Gauges DWYER / Waree.
- h. Automatic Air Vents Anergy Instruments

**13. Grilles**

- a. Grilles/ Fire Dampers / Diffusers Caryaire/ Ravi Star/ Airflow/ S.A.Air System
- b. SS Grilles / Diffusers S.A Air Systems / Kleanair

**14. Aluminium Sheets**

Jindal/TATA/ SAIL.

**15. Pipes**

- a. GI Jindal/TATA
- b. M.S upto 150 mm Jindal/TATA
- c. M.S.200 & above Jindal/TATA/SAIL

**16. Valves**

- a. Butterfly Valves Audco/Honeywell/Advance/SKS
- b. Non Return Valave Advance/Honeywell/Danfoss
- c. Balancing Valaves\* Oven Trop/Flowcon K / TA  
Hydronics/Danfoss/Advance/Honeywell

\*[Water balancing to be carried out with Computerized Balancing Instrument (CBI)]

- d. Automatic Balancing Valve Flowcon/ T A Hydronics/ Danfoss/

- e. GM Gate Valve GG/Leader
- f. Ball Valve BDK / AUDCO/GG/AUTOMATRIX

**17. Insulation**

- a. Expanded Polystyrene Thermolloyd/Beardsell/Coolline
- c. Polyurethane Foam Malanpur/Lloyd
- d. Polyethylene Foam Trocellen / Thermobreak
- e. Aluminium Tape Johnson /Birla 3M
- f. Nitrile Rubber Armaflex / K-Flex

**18. Air Washer Zeco/Caryaire/Roots Cooling Systems**

**19. Motors Siemens/Bharat Bijee/Kirloskar**

- 20. Filters(Pre&Fine)  
Thermadyne/Pyramid/Airtech/Chempharm/AAF
- 21. Filters(HEPA)  
Chempharm/Thermadyne/Airtech/Pyramid/AAF
- 22. Minipleat HEPA Filters Pyramid/Trox/AAF
- 23. Duct Dampers Caryaire/Ravistar/Airflow
- 24. HEPA Filter Box M.K.Precision / Kleanair / Thermadyne
- 25. Risers M.K.Precision / Kleanair
- 26. Control Cables RR/Finolex/Havells/LAP
- 27. Power Cables Universal/Gloster/Nicco/Finolex/RR/RPG/LAP
- 28. Electric Panel Enclosure Fabricated as per Tender Specification
- 29. Push Button Starter Siemens
- 30. Auxiliary Relays/Contactors  
/Starters/Switch Gears Siemens
- 31. Line Type Fuse GE/Siemens/GANESH
- 32. Timer Siemens/Schneider

33.	Terminal Block	Connectwell/Wago
a.	Voltmeter/Ammeter	Automatic Electric/Meco/Rishab
b.	Indicating Lamps	Siemens/Teknik/Culter/Hammer/Jaibalaji
c.	Selector Switches	Siemens/Kaycee
d.	ACB	Siemens
e.	MCCB	Siemens
f.	Contactors	Siemens
g.	Over Load Relays	Siemens
h.	MPCB	Siemens / Allen Bradley
i.	MCB/MCBDB	Legrand/ABB/SCHNEIDER/SIEMENS
34.	Decorative Switches	Legrand
35.	Industrial Plung & Socket	Legrand/HPL
36.	Luminaire&Lamps	Philips
37.	FDA Control Panel	Honeywell/Hochiki
38.	Detectors	Honeywell/Hochiki
39.	CCTV Camera	Sony/Samsang
40.	DVR Card	Samsung/Sony
41.	Speaker	Ahuja/Philips
42.	Current Transformer	Kappa/Automatic Electric/Pragathi
43.	Energy Meters	Enercon/Automatic electric
44.	Cable Gland	Denson/Comex/HEX
45.	Lug	Dowells/Jaison/Multi
46.	Cooling Tower	Bell/Paharpur/Mihir/Advance
47.	Pump	IIT Bell&Gossett/Ground foss/Armstrong
48.	Anchor, Fasteners	Hilti/Fisher
49.	Expansion Bellows	Dunlop/Resistoflex

50.	Filter Cleaning Station	Air Tech/Pilani Envirotech/Whirlwing/S A Air System
51.	Sound Attenuators	Trox
52.	Return Air Motorised Dampers	Caryaire/Ravistar/Airflow
53.	Fresh Air intake louvers	Caryaire/Ravistar/Airflow
54.	Variable Frequency Drive	Allen Bradley
55.	Air Cooled Chiller	Carrier /Bluestar /York
56.	SS sheet / panel	SAIL
57.	Conduit	BHARATH/VIP
58.	Switches	Legrand.
59.	Door Closure	DORMA.
61.	Electro Magnetic Door Interlocks	ELTECH/DORMA.













