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Department of **Electrical Engineering**  
**Indian Institute of Technology, Madras**  
I.I.T.P.O., MADRAS – 600 036.

Ref. No.

ELE	AMIT	2017	Annual Maintenance Contract
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Date: 13/11/2017

Due Date: 01/12/2017

Under Certificate of posting

To:

o/c copy

Dear Sirs,

1. Quotations are invited in duplicate for the various items shown below/overleaf/enclosed list.
2. The Quotations duly sealed and superscribed on the envelope with the reference no. and due date, should be addressed to the undersigned so as to reach him on or before the due date stipulated above.
3. The Quotations should be valid for sixty days from the due date and period of delivery required should also be clearly indicated.
4. If the item is under DGS & D Rate contract, Rate Contract Number and the price must be mentioned. It may also please be indicated whether the supply can be made direct to us at the Rate Contract price. If so, please send copy of the R.C. (Please note that we are not Direct Demanding Officers).
5. Relevant literature pertaining to the items quoted with full specifications (and drawing, if any) should be sent along with the Quotations, wherever applicable.
6. Local Firms: Quotations should be for free delivery to this Institute. If Quotations are for Ex-Godown, delivery charges should be indicated separately.
7. Firms outside Chennai: Quotations should be F.O.R Chennai. If F.O.R consignor station, freight charge by passenger train / lorry transport must be indicated. If Ex-Godown, packing, forwarding and freight charges must be indicated.
8. The rate of Sales / General Taxes and the percentage of such other taxes legally leviable and intended to be claimed should be distinctly shown along with the price quoted. Where this is not done, claim for Sales / General Taxes will be admitted at any stage and on any ground whatsoever. The taxes leviable should take into consideration that we are entitled to have Concessional Sales Tax applicable to non-Government Educational Institutions run with no profit motive for which a commission Sales Tax certificates will be issued at the time of final settlement of the bill.
9. Goods should be supplied carriage paid and insured.
10. Goods shall not be supplied without an official supply order.
11. Payment: Every attempt will be made to make payment within 30 days from the date of receipt of bill / acceptance of goods, whichever is later.

*Specification enclosed and quotation to be sent to the below address:*

*Dr. Amitava DasGupta  
Professor,  
Department of Electrical Engineering,  
Indian Institute of Technology, Madras,  
Chennai – 600 036.*

Yours faithfully,

*Amitava DasGupta*  
HEAD / Project Co-Ordinator

# Specifications for Annual Maintenance Contract (AMC) for Clean Rooms and Utilities

We have 6 clean rooms in our Microelectronics & MEMS lab and CNNP in the Dept of Electrical Engineering, IIT Madras. The classification of the clean rooms is Class100 & Class 1000 respectively. The Clean rooms are named as Characterization clean room, ESB-126 clean room, ESB-123 Clean room, ESB-123 Extension Clean room, ESB-232 Clean room & ESB231 Class 100 Clean room. The above mentioned clean rooms needs to be periodically maintained along with AHU systems, Condensing Units, FFU, Temperature, Humidity, Chillers, Exhaust, Utilities, Wet Chemical Stations, Electrical and Mechanical Maintenance, Particle Validation of the clean rooms periodically.

## 1.Scope of Work

### General:

- a. Routine Cleaning of Condensing Units for all clean rooms to avoid tripping.
- b. Cleaning of all Pre-filters units once in 15days or as required.
- c. Routine Preventive Maintenance and Annual Maintenance for Electrical and Mechanical Services (Once in 3 months).

### Electrical:

- 1) LT panel Utility area.
- 2) All Distribution panels (EB + UPS) utility and clean room.
- 3) Clean room exhausts panels.
- 4) FFUs.
- 5) All MCBs, MCCBs, VFDs, and Electrical Starters.

### Quarterly:

- a. Check visually for Tightness of all cable terminals and busbar chambers.
- b. Check for abnormal heat of panels & cables.
- c. Clean the panels.
- d. Check all the meters for functioning.
- e. Check the current and voltage at input & output.
- f. Check visually for the tightness of earth cables.
- g. Check for any abnormal sounds for MCBs and Starters.
- h. Check the air velocity and normal functioning of FFUs
  - i. Check MCBs, MCCBs, VFDs , Starters and all other Contactors for tightness & normal functioning.
- j. Check and Record all the Chiller parameters.
- k. Record all parameters.
- l. Check & ensure the cleanliness of the system.

### **Annually:**

Repeat all quarterly checks,

- a. Tighten cable joints & contacts.
- b. Check cables for any melting/deformation.
- c. Tighten control wires.
- d. Check the functioning of control circuit.
- e. Thorough cleaning of panels.
- f. Service & check the earthing connections.

### **Electromechanical:**

1. Chillers System & Pumps.
2. AHU.
3. Condenser.
4. Exhausts, blowers & pumps.
5. General Exhausts.
6. All other pumps in utility.
7. Wet chemical stations.
8. Garment storage cabinets.
9. Pass boxes.
10. Air showers.
11. Chemical storage cabinets.
12. Air Ducting.
13. Doors.

### **Quarterly:**

- a. Check for leakages in pumps, change seal if required.
- b. Check electrical connections.
- c. Check bearing failure, replace if required.
- d. Check for proper lubrication, top-up/apply if required.
- e. Check current & voltage measurements
- f. Check all mountings for any abnormal vibration.
- g. Check Chillers & Drain line pipe line for any leakages, repair if required.
- h. Check motor blower pulley/V belts for proper alignment, align/replace if required.
- i. Check & ensure the cleanliness of the system.
- j. Check chiller, compressor and blowers performance and record its mechanical parameters.
- k. Clean room parameters such as velocity of FFU, Particle counting, Lux & dB level will be recorded.

## Annually :

Repeat all the quarterly checks,

- a. Remove covers and check for any abnormalities in the equipment, if required replace.
- b. Operate the system to ensure it's for normal
- c. Check the refrigerant pressure in the compressor

## 2. On Call AMC Services :

On call AMC services will include attending to any specific complaint any time of the year, on receipt of email/written complaint from the Department.

### Note:

- Provide the list of consumables and materials that will be covered/not covered in the AMC
- **Vendor should provide a stationed Technician at IIT Madras during the AMC period.**
- Vendor should have minimum of 3 years of experience in similar Preventive or Comprehensive Maintenance of clean room Class 100, Class1000 and utilities.
- Proof of experience to be provided to substantiate the claim.
- Weekly observation report for the faults and general parameters work done should be submitted.

## **The Systems and Scope of Work covered under the Annual Maintenance Contract is given below:**

The Clean rooms and its utilities information as given below:

### **1. Characterization Clean Room**

Characterization Clean Room has an AHU of 5000cfm capacity with 4 Nos. Condensing Units of 8.5TR each. (Area: 1186sq.ft).

HVAC & Filtration systems, Wall & Ceiling Panels, Coving, Doors, Clean Room Light fitting etc.

### **2. ESB123 extension Clean Room**

ESB123 extension Clean Room has two AHUs of 4000cfm & 2000cfm capacity with 4Nos. Condensing Units of 5.5TR and 2Nos of 5.5TR each respectively for Class 1000 & Class 100 Clean Rooms. (Area : 1455 Sqft & 196 sq.ft respectively).

HVAC & Filtration systems, Wall & Ceiling Panels, Coving, Doors, Clean Room Light fitting etc.

## Utilities:

The utilities are as follows:

- Process Chillers - 5 nos.
- Process Exhaust - 1 no.
- Wet benches -5 nos.
- Chemical Storage cabinets -1nos.
- Fresh Air Blower – 1nos.
- Emergency eye wash and safety shower – 1nos.

The Specifications for the above utilities are given below:

### **2.1 Process Chillers:**

#### 1. Process Chiller (ICPCVD) – 1nos.

Make: Werner- Finley (Dimension: 1250mm Hx550mm Wx750mm D)

Cooling Capacity: 1 TR (3000Kcal/hr).

Refrigerant: R22.

Pump Flow: 20LPM @6 Bar

Tank Volume: 25 Litre

Compressor I/P Power : 2.5KW.

Rotameter Assembly Flow rates : 1lpm, 8lpm & 2 lpm.

Electrical Power: 3Phase,415V,50Hz

#### 2. Process Chiller (ICPRIE1,ICPRIE2 & DRIE) – 3nos.

Make: Werner- Finley (Dimension: 1250mm Hx550mm Wx750mm D)

Cooling Capacity: 2 TR (3000Kcal/hr).

Refrigerant: R22.

Pump Flow: 20LPM @6 Bar

Tank Volume: 50 Litres

Compressor I/P Power: 3.2KW.

Rotameter Assembly Flow rates: 11.4lpm, 1.9lpm,1lpm & 1 lpm.

Electrical Power: 3Phase, 415V,50Hz.

#### 3. Process Chiller (RIE) – 1nos.

Make: Cryo-Scientific (Dimension: 600mm Hx250mm Wx250mm D)

Cooling Capacity: 10 TR (30000Kcal/hr).

Refrigerant: R22.

Tank Capacity: 25Litres.

Pump Flow: 20LPM @6 Bar

Electrical Power: 1Phase, 230V,50Hz.

### **2.2 Process Exhaust:**

#### 1. Process Exhaust Blower ( CNNP Terrace for tools) – 1nos

Make: UHP, Mumbai.

Capacity: 3100cfm.  
Motor: Bharath Bijlee, 12.5HP, 1450rpm.  
Starter: L& T star delta starter

### **2.3 Wet Benches – 5nos**

1. Wet Bench (CNNP) - 4nos.  
Make: Nano Clean , Bangalore.  
Dimensions: 1500mmLx760mmWx2150mmH  
Exhaust Blower: 1 nos (Make: Vinech)  
Capacity: 3600cfm (850cfm/bench appox)  
Motor: ABB , 10HP, 1420rpm, Start Delta starter.
2. Wet Bench (Dry & Wet)(CNNP) - 1nos.  
Make: NanoClean , Bangalore.  
Dimensions: 1800mmLx760mmWx2150mmH  
Exhaust Blower: 1 nos (Make: Vintech)  
Capacity: 900cfm  
Motor: ABB , 5HP, 1420rpm,DOL Starter.

### **2.4. Chemical Storage Cabinet (Connected to common Exhaust) - 1 nos**

Make: Nano Clean , Bangalore  
Dimensions: 950mmLx460mmDx1570mmH.

### **2.5. Fresh Air Blower - 1nos**

Make: NanoClean , Bangalore  
Dimensions: 950mmLx460mmDx1570mm  
Exhaust Blower: 1 nos, Make: Vintech  
Capacity: 900cfm  
Motor: ABB, 2HP, 1420rpm, DOL Starter.

### **2.6. Emergency Eye Wash & Safety Shower - 1nos**

Make: Nano Clean, Bangalore,  
Dimensions: 1600mmLx900mmWx2500mmW  
Fabrication: SS316 Full construction for Rust Proof

## **3. ESB-126 Clean Room**

ESB-126 Clean Room has an AHU of 7800cfm capacity with 4 Nos. Condensing Units of 5.5TR each. (Area :326 Sqft.)  
HVAC & Filtration systems, Wall & Ceiling Panels, Coving, Doors, Clean Room Light fitting etc.

## **Utilities :**

The utilities are as follows:

- Process Chillers - 2 nos.
- Wet bench-1 no.

### **3.1 Process Chiller (EBL) – 2nos.**

Make: Vander Heijden (Dimension: 600mm Hx250mm Wx250mm D)  
Cooling Capacity: 10 TR (30000Kcal/hr).

### **3.2 Wet Bench (Dry & Wet- EBL) - 1nos.**

Make: MarkAir , Chennai.  
Dimensions: 1500mmLx860mmWx2025mmH  
Exhaust Blower: 1 nos  
Capacity: 900cfm  
Motor: ABB , 2HP, 1420rpm

## **4. ESB123 Clean Room**

ESB123 Clean Room has an AHUs of 9600cfm capacity with 4Nos. Condensing Units of 5.5TR each respectively. (Area: 326sq.ft)  
HVAC & Filtration systems, Wall & Ceiling Panels, Coving, Doors, Clean Room Light fitting etc.

## **Utilities: \_**

The utilities are as follows:

- Process Chillers - 2 nos.
- Process Exhaust - 2 nos.

### **4.1 Process Chiller (SVCS Furnaces) – 1nos.**

Make: Werner- Finley (Dimension: 1500mm Hx650mm Wx950mm D)  
Cooling Capacity: 5 TR (15000Kcal/hr).  
Refrigerant: R407C.  
Pump Flow: 50LPM @8 Bar  
Rated Flow rate: 50LPM@2Bar  
Electrical Power: 3Phase, 415V,50Hz.

### **4.2 Process Chiller (FIRST NANO LPCVD) – 1nos.**

Make: Werner- Finley (Dimension: 1500mm Hx650mm Wx950mm D)  
Cooling Capacity: 10 TR (30000Kcal/hr).  
Refrigerant: R407C.  
Pump Flow: 36LPM @4 Bar  
Rated Flow rate: 100LPM@2Bar  
Electrical Power: 3Phase, 415V,50Hz.

#### **4.3 Process Exhaust – 2nos:**

1. Process Exhaust Blower (SVCS Furnaces) – 1nos  
Make: UHP, Mumbai.  
Capacity: 1000cfm.  
Motor: Bharath Bijlee, 3HP, 2830rpm.  
Starter: L& T DOL starter.
2. Process Exhaust Blower (LPCVD Furnaces) – 1nos  
Make: UHP, Mumbai.  
Capacity: 4000cfm.  
Motor: Bharath Bijlee, 12.5HP, 1450rpm.  
Starter: L& T start delta starter.

#### **5. ESB 232 Clean Room**

ESB 232 Clean Room has an AHUs of 5000cfm capacity with 4Nos. Condensing Units of 5.5TR each respectively. (Area: 340sq.ft)  
HVAC & Filtration systems, Wall & Ceiling Panels, Coving, Doors, Clean Room Light fitting etc.

#### **6. ESB Class 100 Clean Room**

ESB Class 100 Clean Room has an AHUs of 5000cfm capacity with 4Nos. Condensing Units of 5.5TR each respectively. (Area : 340sq.ft)  
HVAC & Filtration systems, Wall & Ceiling Panels, Coving, Doors, Clean Room Light fitting etc.

#### **Utilities:**

##### **6.1. Tube Washer (ESB231) – 1nos**

Make: Nanoclean, Bangalore.  
Dimensions: 2960mmLx1245mmWx1970mmH.  
Exhaust Blower: 1 nos  
Capacity: 900cfm  
Motor: 2HP, 1420rpm, DOL Starter

##### **7. Wet Bench (CSD216) - 2nos.**

Make: NanoClean , Bangalore.  
Dimensions: 1500mmLx860mmWx2025mmH  
Exhaust Blower : 2 nos (Make: Vintech)  
Capacity: 900cfm each.  
Motor: Primo, 1HP, 1395rpm, DOL Starter -2nos

##### **8. Chemical Storage Cabinet(CSD216) (Connected to common Exhaust) - 1 nos**

Make: Nano Clean, Bangalore  
Dimensions: 950mmLx460mmDx1570mmH.