

Annexure-II

General Terms and Conditions of Contract:

1. **Operation:** The plants must be operated daily as per the requirements of respective user departments. One no. of ITI / NCVT / Equivalent in Refrigeration & Air conditioning qualified **skilled operators** with at least 2 yrs. relevant experience in the similar work. Should be deployed for operation and maintenance. Necessary records should be maintained as per format given by Engineering Services department.
2. **Working hours:** 8.30 AM to 5.00 PM Monday to Saturday. Occasionally it may be necessary to operate up to 9.00 PM.
3. **Plant:** The plant means entire air conditioning system, including compressors, Cooling coils, AHU, water pumps, Ducts, cooling towers, electrical panels, cabling from panel to AC units etc.
4. **Checking:** The plant performance must be kept under regular observation. The temperature in conditioned area and gas pressure readings must be recorded daily. If temperature / gas pressure values are not satisfactory, immediate corrective action should be initiated.
5. **Preventive maintenance:** Necessary preventive maintenance should be carried out to maintain the units / plants in good working condition. A maintenance schedule may be prepared as per recommendation of manufacturers of A/C units (or in consultation with Engineering Services department.) and the same may be followed.
6. **Breakdown maintenance:** In case of failure all efforts should be put to repair the plant/unit immediately. Repairing includes replacing parts, leak test, pressure test, refrigerant charging, oil charging, replacement of compressor, indoor units and outdoor unit etc. The break down service consists of attending to the complaint within a reasonable time (within 24 hours for minor work and 72 hours for major work), identification of fault, Working out Repairs and replacement Procedure in consultation with the Group Head Engineering Services department, completing the repairs and replacement to the satisfaction and commissioning of the equipments within the targeted time.
7. The temperature and humidity conditions in the air-conditioned areas will have to be recorded daily.
8. The Contractor shall maintain daily reports as per the format as required by the designated Engineer / Group Head Engineering Services department. The said daily reports maintained by you shall be got countersigned by designated Engineer whose instructions would be strictly followed. Monthly report covering the Preventive Maintenance and Break down Service shall be prepared and submitted to Group Head Engineering Services department. A brief monthly report form may be got approved by the Group Head Engineering Services department, for compliance.
9. **Spares and consumables:** The AMC is inclusive of spares. All necessary spares and consumables for normal operation and to attend break down should be arranged by you. Spares required often should be stocked by you in CMTI.



10. Logbook shall be maintained for each plant and the list of work carried out like servicing, Maintenance, repairs etc. shall be recorded systematically on a regular basis. The recordings in the logbook shall be got endorsed by the designated Engineer from time to time and verified by the Group Head Engineering Services department; The Logbook shall be the basic record for all purposes.
11. Cleanliness: The equipment and working area should be maintained clean. Unused materials should be stored neatly and waste materials should be disposed off appropriately.
12. Work schedule: Duration of contract is one year. Based on good performance, contract will be considered for renewal.
13. Rate: The rates quoted by you shall be inclusive of all costs for both maintenance and operation of the plants. No additional cost will be entertained.
14. Materials and tools: Items such as tools, materials, consumables, scaffolding, safety equipment etc., which may be required to carry out the work are to be arranged by you. One set of items which are frequently used may be kept permanently in Engineering Services department. A lockable storage space will be provided by us for this purpose.
15. Workmanship: The work must be carried out and supervised by qualified and experienced personnel who are covered under ESI / Insurance as per factories act.
16. Safety: The work must be attended in a safe and professional way, without causing any damage to the personnel, facilities and institute property. In case of accidents institute is not liable to pay any compensation. If any damage is caused to institute property, you have to rectify the same and expenditure for such rectification should be borne by you.
17. Payment: No advance will be paid. Payment will be quarterly. After satisfactory completion of each quarter and after submission of quarterly maintenance report, corresponding payment will be released.
18. Additional works: In case there is requirement of additional works, the same will be intimated to you by Group Head Engineering Services department, which has to be arranged by you. Payment towards such works will be made as per our rate analysis.
19. Taxes: Indicate the applicable GST for AMC.
20. Income tax: Income tax as applicable will be deducted from the payment to be made to you. Please indicate your GST no. in your bills.
21. Service provider to ensure that, all the Air-Conditioning equipments are working in good condition/satisfactorily after AMC expiry but before exiting.
22. Normally repairing and replacement works should be done at CMTI Campus. However, if it is to be taken outside CMTI campus to and fro transportation charges including any other charges like transit insurance etc. shall be borne by the contractor
23. The AMC of Sl.Nos. 1(a) in the BOQ will be discontinued from the date of starting of New A.C plant work for MNT workshop. And any payment pending will be made on prorates basis.
24. Electrical Components: If any part is burnt/damaged due to any electrical power problems or due to overheating or due to Vermin animal action it will be replaced/repared by Vendor scope only.

ANNEXURE-III

PLANT ACs MAINTENANCE SCHEDULE

1. COMPRESSOR:

a. OPEN COMPRESSOR (RECIPROCATING TYPE)

Daily:

- Cleaning
- Checking lubrication oil (level & leakage) and maintain the level by make up if any.
- Checking and recording the operating parameters

Quarterly:

- Check condition and alignment of compressor drive set of open compressor.
- Lubricate motor bearings (quarterly)
- Check operation of safety controls, shut off valves / angle valves and instruments

Yearly:

- Inspect oil for discoloration or contamination after initial charges as per manufacturers
- The Lubricating oil to be change every year preferably during winter maintenance.

Repairs: The Seal assembly, Supply and discharge valves, Items involved in stoppage of refrigerant/ oil leakages, Expansion valves can be repaired and made functional. If they are found not repairable, then need to be replaced by the contractor with new one.

Replacement of Items: The following items, if found faulty need to be replaced by the contractor with new one Suction valve spring, connecting rod, bearing inserts, main bearings, cylinder sleeves, various rings, gasket sets, O ring sets, aluminum packing set, suction disc, star washer, seal cover plate, DV disc, DV guide assembly, DV spring, valve plate, oil pump assembly, DV guide lock washer, piston pins, piston pin lock rings, Connecting rod assembly, regulating valve, oil filter, felt filters, various brass & thrust washers, loading / unloading fork with piston assembly, hydraulic relays, internal lubrication tubing, capacity control valve, belt, sight glass, etc. the cost of these items to be borne by the contractor.

2. CONDENSER / EVAPORATOR OF ALL CENTRAL CHILLING PLANTS & COOLING COILS OF AHUs

Daily: Check entering and leaving water temperatures, refrigerant pressures and all others parameters.

Monthly: Check cooling tower water being circulated for the suspended particles, algae formation, if. Find so; refill the circuit with fresh water.

Quarterly:

- Check tubes and if require, de-scaling shall be carried out by the contractor using special chemicals.
- Check pressure setting of safety control switches.
- Drain the chilled water and refill the water system with air purging
- Check for operation of safety valves.

Repairs: The following items can be repaired and made functional by the contractor. If they are found not repairable, then need to be replaced by the contractor.

· All types of valves including gate, butterfly, globe, ball, diverting, balancing, float, needle, angle, shut off valves etc.

· Welding/brazing of leakage points, minor leaks etc.

Replacement: The water box gaskets have to be replaced by the contractor, whenever head is opened for brushing / de-scaling.

3. ALL PUMPS

Daily: Check gland packing and mechanical seals for leakage

Monthly:

- Check the alignment and conditions of coupling to prevent damage to shaft and impeller
- Lubricate bearings with grease gun.
- Replace gland thread/ mechanical seal if required
- Check lubricant oil level / make up the oil (in case of oil lubricated pumps)
- Inspect shaft, shaft sleeves, bearing, bearing housing etc.
- Over hauling of all pumps. At the time of overhauling, the damaged parts need to be replaced by the contractor

Repairs: The Impeller and shaft can be repaired and made functional. If they are found not repairable, then need to be replaced by new one by the contractor.

Replacement: The Packing, mechanical seal, bush, bearing, Shaft sleeves, coupling etc. if found faulty need to be replaced with new one **by the contractor.**

Note: The repairs or replacement of damaged casing of pump will not be in the scope of contractor.

4. INSTRUMENTS & CONTROLS

- Monthly checking of operation of all controls, sensors, measuring devices, electronic control cards etc.
- Readjustment of control if necessary

Repairs: Motorized valves, flow meter with sensor & display, conductivity meter with sensor & display,

-pH meter with sensor & display, modulating valve with actuator, oxygen meter with sensor & display,

-rotameter can be repaired and made functional. If they are found beyond repairable, then need to be replaced by new one **by the contractor.**

Replacement: The items- Refrigerant level sensor, water level sensor, photo sensor, pressure transducer, thermostat, temperature controller with sensor and display, thermocouple, temperature gauge, sight glass, solenoid valves, pressure gauge, oil safety switch, HP/LP cut out, DP switch, flow switch, crank case heater, thermostatic expansion valve, thermostat (operating & antifreeze) smoke detector, air stat, safety valve, limit switch, humidistat, etc if found faulty need to be replaced with new one **by the contractor.**

5. REFRIGERANT PIPING:

Monthly: Check for leaks at the joints with soap solution test.

- Check valves for wear at the valve disc and seat.
- Check the insulation for breaks in the vapour barrier and other possible locations.

Repairs: Refrigerant piping can be repaired and made functional. If it is found beyond repairable, then need to be replaced by new one **by the contractor.**

Replacement: The items- check valves in Refrigerant piping, if found faulty need to be replaced with new one **by the contractor.**

6. WATER PIPING, VALVES & FITTINGS (MS & SS - BOTH ABOVE AND UNDER GROUND PIPINGS)

Daily: Check for leakages.

Monthly:

- Check for leaks at the joints.
- Check for leakage from valve glands.
- Clean Y-Strainers & pot strainers.

Quarterly:

- Check for the damage in insulation
- Checks for the rusting in the pipes
- Check valves for wear at the valve disc and seat
- Replace gland thread if needed.
- Cleaning of pipe header from inside by opening end cover / flange

Repairs: The following items can be repaired and made functional. If they are found beyond repairable, then need to be replaced by **new one by the contractor**.

- All types of valves including gate, globe, ball, butterfly, non-return, balancing, float, purging, needle valves etc.
- Insulation breaks in piping, tank, etc.
- Leakages in pipes, flanges, joints and fittings, valve glands / seat and pinholes in piping & storage/expansion tanks have to be repaired. If replacement of pipes, flanges, gaskets, glands/ seat and fittings are required, it will be in contractor's scope.

7. A.H.U. / CENTRIFUGAL BLOWERS / EXHAUST FANS/ BLOWER UNIT OF PACKAGE AC UNITS

Monthly:

- Check condition of drive coupling, sleeves. Belts, pedestal bearings and alignment
- Check condition of vibration isolators.
- Check proper locking of inspection doors and their leakages.
- Clean Air filters, check for proper drainage of condensate.

Quarterly:

- Inspect housing and wheel for rust and accumulation of dirt / suspended particles.
- Check fan wheel for damage and evidence of cracks of the blades
- Check bearings for wear and apply fresh lubricant
- Check and tighten mounting bolts

Repairs: Shaft, Canvass connection, belt guard, filter frame, blower can be repaired and made functional. If they are not repairable, then need to be replaced by new one **by the contractor**.

Replacements

The faulty Belt, bearing, shaft sleeves, runner / fan blade/ impeller of package unit, vibration isolator, air filters and drive packages etc. if found faulty, need to be replaced with new one **by the contractor**.

Note: Repairs or replacement of damaged housing of AHU / Centrifugal blowers / blower unit of package AC will not be in the scope of the contractor.

8. DUCT/ DAMPERS & GRILLS

- Check for any air leakage in the duct
- Check for any insulation damage for ducts.
- Check for disconnected and loose linkages

- Check for functional operation of dampers and grilles. Lubricate pins of dampers, grilles, wherever required.

- Check louvers for any damage and cleaning shall be followed

Repair:

- Repairing in the duct as per standard practice like riveting the joints, provided felt or gasket in the joints, patch work in the duct, insulation of the duct etc. If insulation of the duct gets damaged, the contractor shall rectify/ replace insulation for proper functioning.

- Canvass / damper / grills

Note: Repairs or replacement of damaged housing of dampers and grills will not be in the scope of the contractor.

9. COOLING TOWER:

Daily:

- Cleaning
- Check for operation of float valve, quick fill valve, equalizer connection

Monthly:

- Check cooling water being circulated for the suspended particles, algae formation, if. Find so; refill the circuit with fresh water.

- Check cooling water being circulated for the hardness as in PPM. If it is more than 8 ppm, blow down water partially and make up with fresh soft water.

- Drain the water and clean the sump of cooling tower

- Clean pot strainer/Y-strainer

- Check the condition of fills, if required, clean the fills with detergent/ suitable cleaning agents.

- Check for operation of shut off valves.

- Check for belt tension, oil level in the gearbox assembly.

Repairs:

The following items can be repaired and made functional. If they are found not repairable, then need to be replaced new one **by the contractor**.

- Water line leakage.

- All types of valves including float valve, quick fill valve, drain valve, etc.

- Gear box, strainer, eliminators

- Repairs of FRP panel / basin.

Replacement

The following item, if found faulty, need to be replaced with new one **by the contractor**.

- Bearings, Blades of fan, fills, eliminators, nozzle, distribution channels.

NOTE: Repairs or replacement of damaged housing of cooling tower will not be in the scope of contractor.

10. ELECTRICAL MAINTENANCE:

a. **MOTOR (COMPRESSOR, PUMP, AHU, BLOWER, COOLING TOWER, DAMPER, ETC.)**

Daily:

- Cleaning of motor

Quarterly:

- Lubricate bearings.

- Check for proper glanding & tightness of connections

- remove dust dirt and grease, which may cause Flashing.
- Inspect visually the starter windings and measure insulation resistance.
- Inspect coil condition in the slots, condition of wedges and movement and evidence of coil looseness
- Inspect coil condition in the end winding, coil surface, distortion and insulation swelling
- Inspect rotor for cracked bars and rings for correction to bars
- Check air gap uniformity and record as indication of bearing wear

Repairs: The Rewinding of motor, Rotor & stator can be repaired and made functional. If they are found not repairable, then need to be replaced **by the contractor.**
Electronic operated Damper unit If they are found not repairable, then need to be replaced **by the contractor.**

Replacements: Bearings, Shaft sleeves, Cooling fan, Gland, Terminal box, Glands, Studs & Lugging, if found faulty, need to be replaced with new one **by the contractor.**

Note: Repairs or replacement of damaged casing of motor will not be in the scope of contractor.

b. ELECTRICAL PANELS AND THEIR CABLING & WIRING:

Daily:

- Check for any tripping, chattering in the electrical parts, abnormal noise, overheating in the panels
- Check whether indication lamps are working
- All circuit boards for healthy contact minor repairs/services/cleaning etc.

Monthly:

- Check for the proper working of all ammeters, voltmeters, Hour meters, KWh meters, overload relays, contactors malfunction etc.
- Clean the panels from inside with the help of the blower/ vacuum cleaners (Quarterly)
- Check all the cables for overheating, tightness of the glands, lugs & crimping.
- Check the fuse-link & fuse holders.
- Check the control wiring of the panel along with the controls for the proper functioning and tripping at the preset parameters.

- Check and maintain the soft starter, Microprocessors panel of Screw chiller packages.

- Check and maintain variable speed drives for RF cooling pumps

- Check the operation of ACB, MCCB, MCB, Isolators, SFU and servicing of the same.

Repairs: ACB, MCCB, isolators, Contactors, Bus bar, Cable termination with glands, Various electronic cards like AO, AI, DO, DI, AM & motherboards can be repaired and made functional. If they are found not repairable, then need to be replaced by the contractor.

Replacements: Fuse links, ACB, MCCB, MCB, overload relay, single phase preventer, push buttons, indicating lamps, voltmeter, ammeter, kWh meter, no volt coils, selector switches, solenoid valves, fuse holders, relays, timer, limit switches, cooling fans, capacitors, etc.

Note: Repairs or replacement of damaged body of the panel will not be in the scope of the contractor.

11. GENERAL TERMS & CONDITIONS, APPLICABLE TO ALL PLANTS:

1. It is to be noted that any damage occurs due to faulty operation or maintenance of the contractor in the plant, the contractor has to carry out necessary repair with the supply of parts, consumables within minimum possible downtime and made functional. If they are found not

repairable, then the same needs to be replaced **with new one without any extra cost.** This will be applicable to all equipments, instruments and controls covered in the scope of contractor as well as those equipments, instruments and controls which are part of the plant but not covered **in the scope of contractor.**

2. Notwithstanding as to what is specifically stated under PLANT MAINTENACE SCHEDULE, it shall be responsibility of the successful tenderer to attend to all the preventive & routine maintenance and repairs and breakdown services including replacement of necessary parts and components

ANNEXURE-IV

DX-TYPE AIRCONDITIONING UNITS/ AIR COOLED PACKAGE AC/ DUCTABLE AC:

Quarterly:

- Check proper locking of inspection doors/cover and their leakages.
- Clean Air filters, check for proper drainage of condensate.
- Cleaning of air filters.
- Cleaning of Cooling Coil and Condenser with nylon wire brush, water wash and air blower.
- Inspect blower fan motor drive, check tension of V-Belt, bearings, alignments, vibration isolator, electrical connections etc.
- Lubrication, wherever necessary
- Check Electrical wiring in all respect for smooth operation of the unit.
- Check the operation of all controls.
- Check operating parameters like Room temperature, SA/RA temperature, current, voltage etc. and maintain the record.

Repairs and Replacements:

- Repairs or Replacements will be applicable whenever required, as mentioned under compressor, evaporator & condenser, instruments and controls, refrigerant pipes, drain piping, blowers, AHU, electrical maintenance, gas charging etc. All such repair or replacement **in the contractor's scope.**

ANNEXURE - V:

Comprehensive Maintenance Contract schedule for Split AC's is as follows:-

- 1) **COMPRESSOR:** If compressor fails, the same/Equivalent will be replaced by the contractor.
- 2) **Fan Motor:** If burn within contract period it should be rewinding with over oiling, replacement of shaft & Bush or Bearing.
- 3) **Electrical Components:** If any part is burnt due to any electrical power or due to overheating, it will be replaced by branded one.
- 4) **Gas Charging:** During the period of AMC if the unit has gas shortage it is to be topped up or if there is leakage then the unit is to be tested with Nitrogen & Vacuumised & then Gas charging to be done.
- 5) **Condenser and evaporator coil:** If it fails it has to be repaired or replaced by contractor.
- 6) **Indoor blower motor:** If motor winding is burnt within contract period it is should be rewinded & overhauled & shaft, bearings ,bushing ,washers etc., to be replaced if found defective.

SERVICING OF SPLIT TYPE AIR-CONDITIONERS (Monthly)

The following works are to be carried out every month:

- Cleaning of filters, intake and exhaust screen and replacing them if required.
- Lubricating the fan motor and other mechanical parts such as hinges, levers for exhaust and ventilating parts

SERVICING OF SPLIT TYPE AIR-CONDITIONERS (Quarterly)

The following works are to be carried out every 3 months:

- Cleaning the unit in general.
- Checking of all electrical connections and ensuring to the functional working of all electrical components.
- Checking for noise and vibration.
- Checking grill temperature, current and recording the same.
- Checking of all damper accretions, lubricating and repairing the same.
- Checking and clearing of condense drain.
- Cleaning of the condenser, cooling coil, blower and condenser fans with air pressure & water.
- Condenser cleaning with echo friendly chemical if it is necessary.