

**WORK: Comprehensive AMC of MC, CP and Other AC equipment of
3437.5 TR**

SCOPE OF WORK

I. DESCRIPTION:

Comprehensive AMC of MC, CP and Other AC equipment totalling 3437.5 TR is mainly divided into two categories: -

- a) Breakdown Maintenance (BD maintenance)
- b) Preventive Maintenance (P Maintenance / PM)

A. BREAKDOWN MAINTENANCE:

Breakdown Maintenance of all ACs, OCs, PACs, etc. (as per the list in the Annexure II) as per the call received (Telephone, Verbal, or thru Breakdown report). Attending to breakdown maintenance calls in such a way the ACs, OCs, PACs, etc. are put back into operation in best possible minimal time. The uptime of each and every equipment/machine/plant individually should be more than 98% to avoid the penalty.

B. PREVENTIVE MAINTENANCE:

Preventive maintenance of all ACs, OCs, PACs, etc. (as per the list in the Annexure II) should be carried out **quarterly**.

Scope & Description of work

I. Scope of work for Central Plants and Package / Ductable units :

A. Preventive Maintenance (Activities to be carried out quarterly):

1. Checking the system for visual leaks at all flare fittings.
2. Carrying out leak test with soap solution in case reports indicate frequent loss / recharging of refrigerant into the system.
3. Checking operation, and recording suction & discharge pressures. In case of any abnormality, identifying and correcting the same.
4. Checking and setting of safety controls such as HP/LP cut outs, overload protections and thermostats.
5. Cleaning of pre-air filters and replacing the same if necessary.
6. Checking the alignment of V-belts in case of package /open plant and adjusting the belt tension, replace if damaged.

7. Checking lubricating oil level at the sight glass; if found below the normal level, the problem shall be analyzed and rectified.
8. Running of stand-by unit and observe for satisfactory performance and record the readings.
9. Checking and recording of all motors currents and incoming voltage.
10. Checking for any abnormal noise/vibration from moving parts such as compressors, motors, fans etc., In case of any abnormality, investigating and correcting the same.
11. Checking and rectifying any leaks from glands of water pumps.
12. Checking the incoming supply voltage.
13. Checking the cooling tower water level.
14. Checking the water level in the makeup water tank.
15. Starting and checking the running condition of cooling tower fan.
16. Starting the pump and checking the running condition, including checking the NRVs.
17. Checking the operation of controls.
18. Cleaning condensate drain tray.
19. Checking and cleaning of fan, scroll and runner blades.
20. Cleaning cooling coils by cleaning agent (CFC free).
21. Cleaning Air-cooled condenser coils with Air blower and record inlet and outlet temperatures.
22. Checking the cooling tower nozzles for proper spray and replacing the same if necessary.
23. De-scaling the condenser and replacing the condenser end shield gaskets.
24. Performing preventive maintenance schedule of all central plants and package units as per the check list.
25. Record of these shall be maintained and submitted monthly to the Engineer-in-charge.
26. Total Quarterly operations is equal to the number of central plants plus package/ductable units (136 Units: As per the Annexure II.). Quarterly maintenance is a must for each and every unit. Total no. of operations in a year: 544 Preventive Maintenance Operations.

B. Breakdown Maintenance (Activities to be carried out as per the call/intimation of end user)

1. Attending break-down of the unit when called upon, round the clock.
2. Break-downs of central plants, package/ductable ac units shall be attended and brought into normal working condition within the stipulated time.
3. Breakdown history of each equipment/unit shall be maintained by filling individual history card.
4. The satisfactory working of central plants, package/ductable units of each repaired unit shall be inspected and approved by AC in-charge.

II. Scope of work for Oil chillers, panel / Pendent ACs, Air Driers:

A. Preventive Maintenance (Activities to be carried out quarterly):

1. Checking and servicing each and every unit quarterly (motor oiling, coil cleaning, blower cleaning, checking for loose connections and tightening the same, minor repairs, etc.)
2. General cleaning, de-scaling both the coils, mending, minor fabrication works, replacement of damaged parts, complete painting, testing for satisfactory performance and commissioning the unit at site.
3. Removal of the unit from different locations in BHEL and shifting the same to contractor service station located in A.C. section or allotted place in BHEL (if required).
4. Total Quarterly operations is equal to the number of Oil Chillers, Panel ACs, Pendent Coolers and Air Driers (466 Units: As per Annexure II). Quarterly maintenance is a must for each and every unit. Total no. of operations in a year: 1864 Preventive Maintenance Operations.

B. Breakdown Maintenance (Activities to be carried out as per the call/intimation of end user)

1. Attending break-down of the unit when called upon, round the clock.
2. Break-downs of Oil Chillers, Panel ACs, Pendent Coolers and Air Driers shall be attended and brought into normal working condition within the stipulated time.
3. Breakdown history of each equipment/unit shall be maintained by filling individual history card.
4. The satisfactory working of each repaired unit shall be inspected and approved by AC in-charge.

Summary of Preventive Maintenance Operations.

S.No	Description	Quantity/ Units	Total TR	Frequency of PM	Total PM Operations	Gross PM Operations in the year
1	Central Plants (CP)	18	959	Quarterly	(4 Qtr x 18 units) 72	544
2	Package/ Ductable Units(Pk AC)	118	1624.5	Quarterly	(4 Qtr x 118 units) 472	

3	Oil Chillers(OC)	136	495.5	Quarterly	(4 Qtr x 136 units) 544	1864
4	Panel AC (Pa AC)	231	250.5	Quarterly	(4 Qtr x 231 units) 924	
5	Pendent AC(Pe AC)	46	46	Quarterly	(4 Qtr x 46 units) 184	
6	Air Driers(AD)	53	62	Quarterly	(4 Qtr x 53 units) 212	
	Total	602	3437.5			

Summary of Breakdown Maintenance Operations.

S.No.	Description	Quantity/Units	Total TR	No. of BD maintenance operations in the year
1	Central Plants, Package/Ductable Units	136	2583.5	12
2	Oil Chillers, Panel AC, Pendent AC & Air Driers, etc.	466	854	12

II. SKILL SET REQUIRED

Contractor has to deploy manpower in such a way that breakdown percentage for each and every equipment/machine/plant individually is maintained within 2% and meet all other requirements specified in the scope of work. The contractor should deploy his manpower at the worksite to attend the breakdown calls, Preventive maintenance for the entire duration of contract. Break-down calls directly received from users/ in-charge or his representatives during **two shifts throughout the week (Including Sundays & Holidays) and on emergencies in third shift shall be attended. The shift timings will be as per the guidelines given by HR department of BHEL.**

III. OTHERS

1. Necessary spares required for proper upkeep/maintenance of equipment as mentioned in annexure-II, are in the scope of supplier.
2. The contractor shall use OEM spares only with guarantees/validity, if any, subject to their availability in the market. Otherwise, equivalent alternatives of reputed make should be used, with approval of Engineer in charge of AC section. Sufficient stock of spares shall be maintained to rectify the break-down within the scheduled period.
3. Sufficient stock of spares inventory such as V-belts, seals, refrigerant gas, fan motors, remote units, handsets, electrical components etc. should be maintained at BHEL site. These spares should have proper entry records.
4. Records of preventive and breakdown maintenance to be submitted to the Engineer-in-charge.
5. **Payment of work shall be made to the contractor monthly on the basis of work carried out on Measurement basis.**
6. Cleaning, stacking, sorting, handling and upkeep of AC maintenance stores, work center Stores (including 5S activities) shall be carried out by contractor.

7. Record of replacement of spares (such as compressors, fan motors etc.) and gas filling to be maintained and get signed by the Engineer in-charge monthly.
8. Necessary tools and measuring instruments to upkeep all the A.C. equipment is under the contractor's scope.
9. **Risk Purchase:** BHEL reserve the right to terminate this agreement from elsewhere at the risk and cost of the Lessor (Contractor), either the whole or part of the Equipment in case the Tenderer has failed to bring back the equipment under AMC within the stipulated period. The Contractor would be liable to compensate the BHEL for any loss, which the BHEL may sustain by reason of such contract. This clause will be operative only during the contract tenure.
10. The contractor shall hand over all the units in working condition to the satisfaction of the in-charge at the end of the contract period. Otherwise, maintenance charges for the total idle period or repair cost of the unit (s) whichever is greater shall be recovered from the contractor.
11. The contractor shall adhere to the priority fixed by the Block Maintenance / AC In-Charge for taking urgent repair work. Critical AC/ emergency requests shall be attended timely by redirecting manpower as per priority and instructions of the Engineer-In-charge AC Maintenance.
12. As BHEL has been accorded with ISO-9001, ISO-14000 and OHSAS 18001 certification, the Contractor shall carry out qualitative work to meet these standards. Necessary documentation / paper work shall also be maintained. Future standards acquired by BHEL (Eg. EnMS ISO-50001, etc.) need to be adhered to.
13. For working at heights, Work Permit System as prescribed by BHEL-Safety dept. shall be followed and records maintained, to meet HSE audits / guidelines
14. Medical fitness certificates of all workmen (fit to work at ground and heights) should be submitted as per HSE dept. guidelines.
15. No foreign/used or unused/scrapped/broken parts shall be left on the ACs, so that likely accidents due to their falling are avoided.
16. All used/worn out/scrapped/ replaced spares/ parts shall remain the property of BHEL.
17. The contractor and their employees will observe all the laws/enactments, rules and Regulations of BHEL and also the statutory and legal requirements of Central and State government.
18. Parties may visit the site for actual site conditions, and all other relevant details related to Equipment.
19. All major breakdowns shall be attended at BHEL works only.
20. Responsibility of the units vests with the contractor from the time the units are removed from their location till they are commissioned at their locations after repairs (including transportation, servicing and returning to its location).
21. Random workshop inspection will be done by BHEL, R.C.Puram representatives.
22. **FORCE MAJEURE CLAUSE:** The contractor shall not be liable for any breach or non-performance or delay in carrying out any of the obligation contained in this contract including the servicing/repairing of units as a result of strike/s, lockout/s industrial labour disturbance/s, fire/accidental damage/s, restriction imposed by the Government, riot, war or any condition arising from similar cause/s.
23. Any increase in quantity of ACs / chiller / plant ACs, etc. on account of new installations during the period of contract shall be borne by the vendor. This comes into force only after completion of warranty by OEM. No separate payment shall be paid by BHEL.
24. **The general conditions of contract of BHEL (enclosed) shall also apply to this work order to the extent they are not inconsistent with any of the conditions stipulated herein.**
25. Refrigeration gases consumption shall not be more than 20 kg/month on average.
26. The contractor shall use OEM spares only with guarantees / validity, if any, subject to their availability in the market. Otherwise, equivalent alternatives of reputed make should be used. Sufficient stock of spares shall be maintained to rectify the break-down within scheduled period.

27. All replacements for failed compressors shall be accompanied by a certificate from the Original Compressor Manufacturer to the effect that the said compressor has been repaired at their authorized service centre. Further, a warranty of not less than 12 months on all such replacements shall be provided.
28. All charges on account of octroi, terminal or sales tax, excise and other duties, royalty etc., including transportation of materials/equipment brought to or from site for execution of works shall be borne by the contractor.
29. All the information (About AC Equipment, check sheets, Data on ACs, etc.) is the sole property of BHEL and no such information is taken out by contractor or his workmen.
30. Reasonable size room with telephone facility will be provided within the Factory premises to service staff for attending breakdowns/ complaints. The office space shall not be utilized for residential purpose by the Contractor's staff.
31. BHEL reserves the right to cancel the tender at any stage of tendering till signing of agreement without assigning any reason(s) thereof. The tender cost in that event shall not be refunded.
32. Any point not covered in the agreement, if comes up, will be mutually solved in the best interest of the work.
33. At the end of contract period, contract can be extended on mutually agreed terms and conditions.

IV. DEFINITION OF ONE OPERATION:

BD Maintenance Operation: Carrying out Breakdown maintenance as and when necessary in such a way that BD is maintained less than 2% for each and every equipment/machine/plant on monthly overall basis. The operations are as per the table attached earlier.

P Maintenance Operation: Carrying out PM (Central Plants- 18 units, Package/Ductable Units-118 units, Oil Chillers, Panel ACs, Pendent ACs, etc.- 466 units) once in 3 months. The operations are as per the table attached earlier.

V. PENALTY CLAUSE:

1. As this contract is Works Contract, Supplier's Performance is measured based on Break down Percentage of Equipment. The overall penalty including the breakdown and preventive maintenance penalty shall not exceed 10% of overall contract value. The breakup of Penalty Clause is:

- A) Breakdown of all Central ACs, Package ACs, Oil Chillers, Panel ACs, Pendent ACs, etc. calculated on quarterly basis. Days will be calculated as BHEL working days excluding Sundays and Holidays.

It Should be less than 2% for each and every equipment/machine/plant.

Calculation of breakdown percentage= (No. of extra days over and above the days allowed for closing breakdown for that equipment/machine/pant)*100/(Total no. of days in that quarter).

For example: From 2% to <3%: 5% of the cost of Breakdown Maintenance Operations for that equipment group.

From 3% to <4%: 6% of the cost of Breakdown Maintenance Operations for that equipment group.

From 4% to <5%: 7% of the cost of Breakdown Maintenance Operations for that equipment group.

And similarly it increases.

B) Max Number of days allowed for closing Break down.

Note: Type of breakdown (Major or others) is decided by M&S executive in consultation with Contractor Engineer/Supervisor.

Major Breakdown: up to 6 working days (for completion)

Medium breakdown: 2 working days to 5 working days (for completion)

Minor Breakdown: less than 2 days (for completion)

Day: 24 hours from the time of intimation from the end user.

C) Preventive Maintenance Penalty:

Carrying out PM as per the table above.

Four such operations needs to be completed in a year for each and every equipment/machine/plant, as per the schedule given by Engineer-In-Charge/AC.

No preventive maintenance, no pay. Additionally, a penalty of 5% of total preventive maintenance cost (quarter value) of that group of ACs. Quarter value will be obtained by calculating total PM cost divided by 4.

2. Non completion of preventive Maintenance as per schedule and Breakdown maintenance as per requirement for the reason attributable to contractor will attract non-refundable penalties. However, the contractor has to complete the left out Preventive Maintenance in the next quarter or as directed by Engineer In-Charge AC Maintenance. The left out AC Equipment shall automatically be kept as pending unit in the next quarter or as per the direction of Engineer In-charge. Preventive Maintenance schedule and the afore said penalty clause shall be applicable on it.

3. Breakdown time for the reason not attributable to contractor (Eg. Force Majeure clause etc.) Will not be included while calculating break down time, break down percentage or Penalty.

4. The contractor has to submit in writing the reasons for the cause of penalty.

5. After three penalties BHEL reserves the right to continue/discontinue the contract.

EXAMPLE OF PENALTY CALCULATION: -

a) Preventive Maintenance Penalty illustration:

If 'Preventive Maintenance' is not done in the quarter for OCs, PAC, Pendent ACs, Penalty will be 5% of value of one quarter of those type of AC.

For example if the Value of one quarter for preventive maintenance of OCs, Pendent ACs, and Pendent ACs, etc is Rs.: - 13,890/-

Penalty will be - 5% of Rs. 13,890/- = Rs 694.50/-

b) Breakdown Maintenance Penalty illustration:

If 'Breakdown percentage' is more than 2% in a quarter, Penalty will be 5% of value of one quarter.

For example if the value of one quarter for Central & Package AC Breakdown Maintenance is Rs. 2,10,000/-

Penalty will be - 5% of Rs. 2,10,000/- = Rs. 10,500/-