

Bharat Heavy Electricals Limited
Ramachandrapuram : : Hyderabad – 502032
M&S – DIVISION
SCOPE OF WORK (ANNEXURE-I)

Tender No.: M&S/P&S/2022/93, dt. 29.03.2023

Name of Work: AMC of Cassette/Split/Window ACs, Walk In Coolers Totaling 1009.5 TR Capacity, 7 Evaporative Coolers, 163 Refrigerators and 154 Water Coolers in BHEL Hyderabad.

WORK DESCRIPTION: Carrying out Breakdown maintenance and Preventive maintenance of Window AC-72no's, Split AC-451 no's, Cassette AC- 85 no's, Walk-in coolers-3 no's, Evaporative coolers-7 no's, Refrigerator's-163 no's, Water coolers- 154 no's installed in HPEP, R.C. Puram, Hyderabad Factory and Township, in such a way that during Contract period, it needs to be ensured trouble free operation of these equipment and attending to complaints in a timely manner. Detailed list of AC's, Water Coolers and scope of work is enclosed. (**Spares and consumables will be provided by BHEL for breakdown as well as preventive maintenance**)

MAINTENANCE OF AC AND WATER COOLERS

I. Maintenance of AC and WATER COOLERS 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 and water coolers (mentioned in the 'List of ACs and water coolers') as per the call received (Telephone, Verbal, or through Breakdown report). Attending to breakdown maintenance calls in such a way the ACs and water coolers are put back into operation in best possible minimal time.

B. PREVENTIVE MAINTENANCE:

Preventive maintenance of all ACs and water coolers mentioned below in the 'List of ACs and water coolers with required frequency.

List of AC's and Water Coolers				
S.NO	DESCRIPTION	Quantity	Capacity in TR	Frequency of Preventive Maintenance
1	Window AC's	72	107	(once in 6 months) Each AC unit – 2 servicings in a year
2	Split AC's	451	687.5	(once in 6 months) Each AC unit – 2 servicings in a year

3	Cassette AC's	85	206	(once in 6 months) Each AC unit – 2 servicings in a year
4	Walk in coolers	3	9	(once in 6 months) Each AC unit – 2 servicings in a year
	Total Capacity		1009.5 TR	
5	Evaporative Coolers	7	20000 CFM each	(once in 6 months) Each unit – 2 servicings in a year
6	Refrigerators	163	180/190 ltr each	(once in 6 months) Each Refrigerator – 2 servicings in a year
7	Water Coolers	154	40/80-141 nos, 150/150-13 nos	(Two times in a month) Cleaning of Each coolers - 24 servicings in a year

B1. Window AC: -

- *Cleaning of Air Filters
- *Cleaning of condensate water drain tray
- *Cleaning of condenser and evaporator Coils with water (or) Air
- *Condenser and Blower Fan motor oiling and lubrication
- *Checking the wiring for loose connections and rectification
- *Checking of Thermostat setting and necessary adjustments
- *General System Check up

B2. Split, Cassette AC and Walk in coolers: -

- *Cleaning of Air Filters
- *Cleaning of condensate water drain pipe
- *Cleaning of condenser and evaporator Coils with water (or) Air
- *Condenser and Blower Fan motor oiling and lubrication
- *Checking the wiring for loose connections and rectification
- *Checking of Remote and repair if required, for walk in coolers check digital thermostat.
- *Note down Suction and discharge pressures, if required Charge the refrigerant gas
- *Insulation foam for liquid and vapor lines checking
- *General System Check up

B3. Evaporative Coolers: -

- * Evaporative Cooler Pads Cleaning with Air & Water
- * Water Tank Cleaning
- * AHU Blower Motor Bearing greasing
- * Water pumps removal and greasing
- * Water pipe holes cleaning
- * Belt Alignment and checking the condition of belt
- * Electrical Contacts cleaning and Electronic timer checking
- * General System Check up

B4. Refrigerators:-

- *Cleaning of Refrigerator inside and outside with water
- *Cleaning of outer surface with clean cloth
- *Checking of Thermostat and defrost if required
- *Checking of wiring and lights inside refrigerator and replace if required

B5. Water Coolers:-

* Draining out water in tank –Switch off Power supply to unit. Open the lock of unit and drain out water from water tank through drain hole located on backside of unit. Open dummy and put a pipe to drain water away from unit.

* Cleaning Inside (Cleaning of Tank) – With clean cloth, remove any sediment which is deposited at the bottom of tank. After removal of sediment, clean tank with water jet. Ensure no visual sediment/dirt is present at bottom and sides of tank.

* If any sediment is noticed, repeat procedure mentioned at step no 2).

Caution: Do not use metallic brush, sharp metal edge, etc. while cleaning inside of tank.

*Cleaning Outside (Wiping) – First use soap water to clean side panels (outer). Then clean with normal water. Finally clean with damp cloth. Ensure side panels are clean and neat and no soap water residue is left on outer panels.

* Float Mechanism - Ensure float ball is working properly. (Press float ball – water will come. Float ball horizontal position – water will stop)

* Lock Nut - Ensure that lock nut provided on the float level be fixed firmly.

* Safety - Lock the unit / tank for safety. Switch ON the Water cooler and make sure it is working.

* Cleaning Confirmation - Need to take signature with stamp on the report, from the user in respective dept.

* Tagging – Put the signature and date on the tag (indicating cleaning) attached to unit.

* Frequency of cleaning – Carry out above procedure of cleaning once in 15 days.

B.6 SKILL SET REQUIRED:-

The job requires the following skills

1. Engineers: Engineering degree with 1 year work experience in AC maintenance or Diploma with 5 Year work experience in AC maintenance (or) ITI with 10 year experience in AC maintenance.
2. Supervisors: Diploma with 1 year work experience or ITI with 3year work experience in AC maintenance.
3. AC Technicians & Electrician (Skilled Worker): ITI with 3 years' work experience or with 5 year work experience in AC maintenance.
4. Unskilled Workers / Helpers: Able male person of 18 years and above who can read and write.

II. OTHERS: -

1. A daily breakdown and monthly breakdown report (including downtime data of each AC and WATER COOLER) and report of major work shall be submitted to the In-charge of section after Endorsement from concerned block maintenance In-charge. For every complaint received a Registration number (in the form of running serial number) shall be clearly mentioned in daily log-book or online system by the supervisor of Vendor.

2. 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.
3. Emergency breakdown during the third shift of all working days and second shift of Sundays shall also be attended, for which skeleton staff shall be available in the factory premises.
4. Total number of AC equipment (Window, Split, Cassette, Walk in coolers, 211 Refrigerators, 11 Evaporative coolers, 160 water coolers) may vary by plus 10% and these should be covered automatically under the purview of this contract, without any increase in the price.
5. Preventive Maintenance work of the AC Equipment shall be done twice in a year as per the Checklist provided by BHEL. Water Coolers cleaning to be carried out once in 15 days. PM Check sheets prepared by BHEL-AC incharge has to be followed and filled up while carrying out PM. Completed forms need to be submitted in-time to Supervisor in-charge.
6. When repair/ maintenance/ modification work gets completed, the actual time (in hours), material consumed, total down time and other information shall be reported to the Engineer In-charge AC maintenance in the daily report.
7. The AC, Water Coolers shall be periodically cleaned as part of Preventive Maintenance and other works like painting, relocation, re installation etc. should be carried out as and when assigned by Engineer / In-charge of AC Maintenance department.
8. 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.
9. Contractor shall arrange his own tools for removal, dismantling, assembling and re-installation of ACs and Water Coolers, etc. However, certain consumables like grease, cotton waste and facilities like brazing shall be provided by BHEL free of cost at ground level. However, to minimize the break-down time, the contractor, shall adopt vigilant action for better parts / methods voluntarily.
10. Contractor shall supply tools, tackles and necessary measuring instruments (Eg. Multimeter) to his employees for smooth working on day to day basis. However in special circumstances tools and other measuring instruments if available and if can be spared may be provided by us free of cost by BHEL on returnable basis.
11. Contractor shall maintain all records like breakdown forms, spares list, all other records pertaining to his work, and should be shown to AC Engineer in charge.
12. For working at heights, Work Permit System as prescribed by BHEL-Safety dept. shall be Followed and records maintained, to meet HSE audits / guidelines.
13. Medical fitness certificates of all workmen (fit to work at ground and heights) should be submitted as per HSE dept. guidelines.
14. No foreign/used or unused/scrapped/broken parts shall be left on the ACs, so that likely accidents due to their falling are avoided.
15. All used/worn out/scrapped/ replaced spares/ parts shall remain the property of BHEL.

16. 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.
17. Utmost care should be taken by the contractor to repair the AC and water coolers in a proper way and with quality workmanship so as to adhere to the safety requirements as per the latest revision of Factories Act and Telangana state rules.
18. All the contractor's personnel shall use PPEs (Personnel Protection Equipment).
19. The contractor shall engage experienced personnel for the maintenance of ACs as per the job requirement as indicated below.
20. Collection of spares/ material from various stores and blocks to work place/ site shall be carried out by contractor.
21. Cleaning, stacking, sorting, handling and upkeep of AC maintenance stores, work center Stores (including 5S activities) shall be carried out by contractor.
22. Contractor has to carry out stock taking in all stores (Electrical store, Mechanical store) on a quarterly basis and submit the updated report to In-charge of AC section. To be updated into computer in Inventory report.
23. Salvaging/repair work of AC spares & other AC items shall be carried out by contractor.
24. Drawing for major assemblies & component shall be prepared by the drawing section of BHEL or shall be arranged by Dept. However in case of emergency and for small jobs, hand sketch shall be prepared by the contractor.
25. Contractor shall carry out the work at his own risk, finance, human resources and supervision.
26. Payment of work shall be made to the contractor on the basis of work carried out on Measurement basis.
27. Contractor shall have supervision on the conduct of his employees. Any violation of safety norms and misconduct by any of his employees/contractor may result in cancellation of Gate pass of that employee/contractor.
28. Parties may visit BHEL site for actual site conditions, and all other relevant details related to ACs and water coolers.
29. Contractor should take feedback from supervisor on work performed, taking corrective/Preventive measures and reporting status to Engineer/ In-charge AC maintenance.
30. 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.
31. 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.
32. 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.
33. Contractor should ensure minimum manpower at BHEL site for hassle-free operations.

III. 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% on monthly overall basis. There will be 12 such Operations in a year.

P Maintenance Operation: Carrying out PM on Window AC-72 nos, Split AC-451 nos, Cassette AC- 85 nos, Walk in coolers-3 nos, Evaporative coolers-7 nos, Refrigerator-163 nos once in 6 months i.e. 2 operations per year, and cleaning of Water coolers- 154 nos once in 15 days i.e. 24 operations per year, as per the schedule given by BHEL. (Refer Table 1).

Note: -

Overall L1 value will be considered for awardal of work.

IV. PENALTY CLAUSE:

As this contract is Works Contract, Supplier's Performance is measured based on Break down Percentage of AC's and Water Coolers.

Parameter	Criteria	Penalty
A)Breakdown of all ACs and Water coolers calculated on monthly basis	Should be less than 2%	5% of contract value as penalty will be applied. After 2% - for every increase of BD percentage by 1%, Penalty of 1% will be increased up to max of 10% of overall contract value
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.	Major Breakdown – < 4 days Medium breakdown – 1 to < 3 days Minor Breakdown – Same day or less than 1 day.	% of contract value per day * No of days delayed * No. of AC Units
C)Preventive Maintenance Penalty: Carrying out PM in 6 months Covering Window AC-72 no's, Split AC-451 no's, Cassette AC- 85 no's, Walk in coolers-3 no's, Evaporative coolers-7 no's, Refrigerator's-163 no's and Cleaning of water coolers- 154 no's for every 15 days.	Two such operations need to be completed in a year, as per the schedule given by AC engineer for Window - 72 no's, Split AC-451 no's, Cassette AC- 85 no's, Walk in coolers-3 no's, Evaporative coolers-7 no's, Refrigerator's-163 no's and Cleaning of water coolers-154 no's and 24 operations for water coolers-154 no's.	

1. Major Break down:- Replacement of Compressors, Identification of leaks in AC Units and Gas Charging, Repair of PCB Boards etc.

Medium Break down: - Fan motors repair, Capacitors replacement etc.

Minor Break down: Fan blades, taps in water coolers replacement etc.

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 month or as directed by Engineer In-Charge AC Maintenance. The left out AC Equipment shall automatically be kept as pending unit in the next month or in the month 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. non availability of spare) Will not be included while calculating break down time or Penalty.

4. Contractor should deploy manpower within 10 days (max) on receipt of work order/ PO. Otherwise EMD will be forfeited.

Estimation based on LPO(N018X00476) for Maintenance of AC's and Water Coolers:

S · N O	TYPE OF AC EQUIPME NT (CATEGOR Y)	Qty.	Total Capacity in Tonnes of Refrigerat ion	Prevent ive mainte nance operati ons per year	PM Cost for each operati on	Total PM Cost per year in Rs.	Breakd own mainte nance operati ons per year	BDM Cost for each operatio n	Total BDM Cost per year in Rs.	Total Cost per Year (Only Labour)= (PM+BDM) COST
1	Water Coolers	154	40/80-141 nos, 150/150- 13 nos	3696	12.50	46200	12	5845.00	70140	116340
2	Evaporativ e Coolers	7	20000 CFM each	14	752.10	10529.4	12	2630.00	31560	42089
3	Refrigerat ors	163	180/190 ltr	326	55.00	17930	12	3937.00	47244	65174
4	Window AC's	72	107 TR	214	101.60	21742.4	12	3388.00	40656	62398
5	Walk in coolers	3	9 TR	18	111.60	2008.8	12	391.00	4692	6701
6	Split AC's	451	687.5 TR	1375	111.60	153450	12	30992.00	371904	525354
7	Cassette AC's	85	206 TR	412	111.60	45979.2	12	8976.00	107712	153691
										Rs.9,71,748/-

Example of Penalty Calculation:-

Contract Value: 9.72 Lakhs

Breakdown maintenance cost (69.3%) : 6.74 Lakhs

Preventive maintenance cost (30.7%) : 2.99 Lakhs

No. of working days in a year: 302

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

Value of one month for window AC – Rs.1,812/-

Penalty will be - 5% of Rs.1,812 = Rs91/-

After 2%, for every increase of BD by 1%, penalty of 1% will be increased, up to max of 10% of value of overall cost of Contract.

b) If 4 Split AC's are having major breakdown and took 6 days (exceeding by 2 days) to close the issue.

Penalty - 2% of contract value (BD) per day X No of days delayed X No. of Split AC's

= $(2/100) \times (3.72 \text{ L}/302) \times 2 \text{ days} \times 4 \text{ (No. of split AC)}$

= Rs.197/-

c) If PM is not done for Two (2) Evaporative coolers in specified time,

PM cost of each evaporative cooler = Rs.752.10/-

Penalty – $2 \times (10\%) \times 752.1 = \text{Rs. } 150.4/-$ penalty will be applied.