

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

**Tender No.:** M&S/P&S/2022/64, dt. 24.11.2022

**Name of Work:** AMC of BT (Battery Truck) and DFL (Diesel Fork Lift)

**I. Maintenance of BT (Battery Operated Trucks) and DFL (Diesel Fork Lifts) is mainly divided into two categories**

- a) Breakdown Maintenance(BD)
- b) Preventive Maintenance (PM)

Details of BT and DFL by capacity are as below (Detailed list attached)

Sl No.	Name	Qty	Vehicle Type	Capacity
1	Battery Truck (Platform, Russian make)	24	BT	2T
2	Battery Truck (Transloader)	3	BT	4T
3	Battery Truck (Jost make)	9	BT	2T
4	Battery Truck (Forklift, Russian)	5	BT	1.5T
5	Battery Truck (Jumbo)	4	BT	2T
6	Diesel Fork Lift	15	DFL	3T
7	Diesel Fork Lift	10	DFL	5T
Total	BT	45		
	DFL	25		

**A. BREAKDOWN MAINTENANCE**

1. Attend to day to day repairs on BT and DFL and give back equipment to production blocks.
2. Breakdown Maintenance of all BT and DFL as per the call received (Telephone, Verbal, or thru Breakdown report). Attending to breakdown maintenance calls in such a way the BT or/and DFL is put back into operation in best possible minimal time.
3. Breakdown vehicles will be delivered to Auto work shop, and maintenance crew will take up further activities. In 'unable to move' cases – crew will help in bringing vehicles to Auto work shop.
4. For every activity (s)/ job (s) performed, a registration number (in the form of running serial number) shall be clearly mentioned in daily log-book or online system by the supervisor/ Contractor – separately for BT and DFL

5. Critical breakdowns/ emergency requests shall be attended timely by redirecting manpower as per priority and instructions of the Engineer In-charge M&S Internal Transport (M&S Tpt.)
6. In case of urgent breakdown, the contractor shall have to retain his staff on working days, and call back on Sundays and holidays as per requirement and as and when instructed by the Engineer In-charge M&S Tpt., for completion of urgent breakdowns. However any compensation on this account shall not be paid by BHEL outside the conditions specified in the payment terms.
7. 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 M&S Tpt. in the daily report.
8. All complaints received shall be reported by the contractor to the In-charge M&S Transport and completed at the earliest.

## **B. PREVENTIVE MAINTENANCE (BT):**

Preventive maintenance of all BT to be carried out as below

### ***B.1 QUARTERLY (Two such operations in a year)***

1. General servicing of drive axle assembly
2. Alignment of rear wheels
3. Cleaning of contact points. Replace if worn out.
4. Check carbon brushes of motors and replace / repair if required.
5. Check brakes for proper functioning and adjust if required.

### ***B.2 HALF YEARLY (Two such operations in a year)***

1. Overhauling of motor /pump
2. Servicing of accelerator assembly, Limit switches, .etc
3. Repair / Replace of defective parts
4. General servicing of steering, rear axle assembly, drive axle assembly, masts, Lift jacks, reach jacks for Battery operated fork lifts (Russian make)
5. Replacement of brake liners if required
6. Changing of tyres if required
7. Overhauling of control valve assembly
8. Replacement of brake oil if required
9. Servicing of control panel.

## **C. PREVENTIVE MAINTENANCE (DFL):**

Preventive maintenance of all DFL to be carried out as below

### ***C.1 Monthly (Ten such operations in a year)***

1. Blow out radiator core and clean forklift with compressed air.
2. Check radiator for proper coolant level, fill if necessary.
3. Check Engine Crankcase oil level, fill if necessary
4. Check brake fluid reservoir fluid level, fill if necessary
5. Check fluid coupling reservoir fluid level, fill if necessary
6. Check Transmission & differential oil level, fill if necessary
7. Check hydraulic tank oil level, fill if necessary.
8. Clean grease fittings and lubricate.
9. Check and lubricate air connecting shafts and levers.
10. Check fuel, oil, water systems and all hydraulic hoses for leaks, fill/repair if any
11. Clean air cleaner, inspect hose and connections.

12. Check clutch play and adjust if required.
13. Check accelerator systems, repair if required.
14. Test of foot brake and hand brake if they are holding & releasing properly.
15. Cleaning of grease or oil on brake lining with gasoline or other grease solvent.
16. Check for any loose connection in control box, tighten if required.
17. Check battery add water and clean terminals.

**C.2 Half yearly (Two such operations in a year)**

1. Operational check and physical inspection of forklift repair, if any observation is made.
2. Repairs to recurring problems based on analysis of breakdown records, if any
3. Check steering / power steering for proper adjustment.
4. Steering wheels should be inspected of free movement.
5. General check of drive axle and transmission, cowl assembly, masts assembly, replace defective parts if any
6. Check masts assembly for proper adjustment and lubricate.
7. Inspect lift and tilt cylinders for leaks. Repair if necessary.
8. Check tilt cylinder rod ends and anchors, adjust and tighten as necessary
9. Check tire and wheel condition, tighten hub bolts if necessary
10. Check engine exhaust pipe and muffler. Repair if necessary.
11. General check of all bearings used for various operations, if required replace
12. General check of bushes, O rings, Oil seals etc. replace if found defective.
13. Check clutch disc, cushioning disc, clutch facings and clutch springs for free length and tension, if worn out/ crack is observed replace
14. Adjust backlash between ring gear and pinion 0.2mm to 0.3mm if required
15. Check brake system for fluid leaks, check master cylinder push rod adjustment
16. Inspect brake pedal linkage for proper adjustment.
17. Check of brake shoe alignment, replace faulty part if any
18. Clean voltage and current regulator contacts
19. Check for proper functioning of cut out which connects or disconnects battery
20. General servicing of battery
21. Engine compression to be checked
22. Check steering linkage and carryout adjustments if any
23. All hydraulic pumps for delivery of rated output
24. Check control valves for their functioning
25. Differential housing
26. Check wheel cylinders and master cylinders, repair / replace worn – out parts
27. Check front & rear bearings, replace if required
28. Fuel injection pump to be calibrated
29. Self-starter and alternator brushes, brushes and filed coils to be replaced.

**II. SKILL SET REQUIRED:**

The job requires the following skills

1. Supervisors: Diploma with 1 year work experience or ITI with 3year work experience in Battery operated vehicle or Diesel fork lifts.
2. Fitters & Electrician (Skilled Worker): ITI with work 1 year experience or person with 3 year work experience in in Battery operated vehicle or Diesel fork lifts. Need to compulsorily deploy one Automobile Electrician (Automobile experience)

3. Unskilled Workers / Helpers: Able male person of 18 years and above who can read and write.

### **III. OTHERS:**

1. A daily breakdown and monthly breakdown report (including downtime data of each BT and DFL) and report of major work shall be submitted to the In-charge of M&S(Tpt.). 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 Engineer in charge. Critical breakdowns/ emergency requests shall be attended timely by redirecting manpower as per priority and instructions of the Engineer In-charge.
3. Total number of BT and DFL is as per above list. The number of equipment may vary by plus 2% and these should be covered automatically under the purview of this contract, without any increase in the price.
4. Preventive Maintenance work of the BT and DFL shall be done as per schedule and as per the Checklist provided by BHEL. PM Check sheets prepared by In-charge has to be followed and filled up while carrying out PM. Completed forms need to be submitted in-time to Supervisor in-charge.
5. 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 crane maintenance in the daily report.
6. As BHEL has been accorded with ISO-9001, ISO-14000, OHSAS 18001 and EnMS ISO-50001 and API 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 (if any) need to be adhered.
7. Contractor shall arrange his own tools for removal, dismantling, assembling and re installation of hoist/motors/gearboxes, etc. However, all spares including consumables like gear oil, electrodes, grease, cotton waste, etc., and facilities like gas cutting, welding, machining facility, repair, rewinding of motors, coils etc., shall be provided by BHEL free of cost. However, to minimize the break-down time, the contractor, shall adopt vigilant action for better parts / methods voluntarily.
8. 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.
9. Contractor shall maintain all records like breakdown forms, spares list, all other records pertaining to his work, and should be shown to Engineer in charge.
10. Medical fitness certificates of all workmen should be submitted as per HSE dept. guidelines, at the beginning of contract and every year.
11. All used/worn out/scrapped/ replaced spares/ parts shall remain the property of BHEL.
12. 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.
13. Utmost care should be taken by the contractor to repair the BT and DFL 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.
14. All the contractor's personnel shall use PPEs (Personnel Protection Equipment).

15. The contractor shall engage experienced personnel for the maintenance of BT and DFL as per the job requirement.
16. Collection of spares/ material from various stores and blocks to work place/ site shall be carried out by contractor.
17. Cleaning, stacking, sorting, handling and upkeep of M&S Transport section stores, (including 5S activities) shall be carried out by contractor.
18. Contractor has to carry out stock taking in stores on a quarterly basis and submit the updated report to In-charge of section. To be updated into computer in Inventory report.
19. Contractor shall carry out the work at his own risk, finance, human resources and supervision.
20. Payment of work shall be made to the contractor on the basis of work carried out on measurement basis after completion of respective operations, on monthly basis.
21. 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.
22. Check list need to be filled up at site itself while carrying out Preventive Maintenance and submit such filled in check list to Supervisor.
23. 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.

#### 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 5% on monthly overall basis. There will be 12 such operations in a year.

**Preventive Maintenance Operation:** Carrying out PM on all BT and DFL, as per the schedule given by in-charge M&S(Tpt.)

**Note:**

- Cause of Breakdown is not assignable to contractor or his workmen in carrying out maintenance. (Eg. Time taken in procuring spare) is not counted in breakdown time.

#### V. PENALTY CLAUSE:

1. As this contract is Works Contract, Supplier's Performance is measured based on Break down percentage of Battery Trucks (BT) and DFL.

Parameter	Criteria	Penalty
a) Breakdown percentage of all BT (Overall bd percentage) calculated on monthly basis	Should be less than 5%	<p>≤ 5% - No penalty</p> <p><b>&gt;5percent</b> - for every increase of BD percentage by 0.1%, Penalty of 0.1% will be increased up to max of 10% of overall contract value + on top of base penalty of 5%</p>

<b>b) Preventive Maintenance(BT)</b> Carrying out Quarterly and Half yearly. (There will be 2 Quarterly and 2 Half yearly PMs)	Must complete for all Battery trucks (45 nos.)	Penalty for non-completion of PM is – 5 times of PM cost of battery truck per month.
<b>c) Breakdown percentage</b> of all DFL (Overall bd percentage) calculated on monthly basis	Should be less than 5%	5% - No penalty 6% - 5% of monthly cost of BD 7% - 6% of monthly cost of BD .....etc.  <b>Note:</b> for every increase of BD percentage by 1%, Penalty of 1% will be increased up to max of 10% of overall contract value
<b>d) Preventive Maintenance (DFL)</b> Carrying out monthly and Half yearly. (There will be 10 monthly and 2 Half yearly PMs)	Must complete for all DFL.	Penalty for non-completion of PM is – 50% of PM cost of operation

2. Non completion of preventive Maintenance as per schedule 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 The left out BT/ DFL shall automatically be kept as pending BT/ DFL 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, break down percentage or Penalty.
4. Contractor should deploy manpower within 10 days(max) on receipt of work order/ PO. Otherwise EMD will be forfeited.

**Example of Penalty Calculations:**

Estimated cost of AMC of BT and DFL : 31 lakhs per year (approximately 55:45 ratio)  
Estimated cost of AMC of BT : 17 lakhs per year  
Estimated cost of AMC of DFL : 13 lakhs per year

Penalty calculation - for Works contract on BT						
		Division of cost for PM and BD		30:70		
		Estimated cost		1700000		
S.No.	No. of BT	Type of Ope	No. of PM available in a year	Total ope	Cost of Ope	Total cost
1	53	PM-Quarterly	2	106	2406	255000
2	53	PM- Half Yearly	2	106	2406	255000
			Total PM ope/yr	212		510000
1	53	BD		12	99167	1190000
						1700000
Penalty calculation - for Works contract on DFL						
		Division of cost for PM and BD		30:70		
		Estimated cost		1300000		
S.No.	No. of BT	Type of Ope	No. of PM available in a year	Total ope	Cost of Ope	Total cost
1	25	PM-Monthly	10	250	1300	325000
2	25	PM- Half Yearly	2	50	1300	65000
			Total PM ope/yr	300		390000
1	25	BD		12	75833	910000
						1300000
		Estimated cost - AMC of BT and DFL		3000000		

Contract Value (assuming) - It is divided between BT and DFL in the ratio of 55:45  
 Cost between PM and BD is divided - 30: 70 ratio.

BT Breakdown maintenance cost (70%) : 11.9 L

BT Preventive maintenance cost (30%) : 5.1 L

DFL Breakdown maintenance cost (70%) : 9.1 L

DFL Preventive maintenance cost (30%) : 3.9 L

a) If 'Breakdown percentage' is more than 5% in a particular month, Penalty will be 5% of value of one ope(BD) – for BT

If BD percentage is 5% : No penalty

If BD percentage is 6% : 5% of BD value of contract for that ope(BD)

: 5% of 99167 = Rs4958/-

... etc.

After 5%, 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 PM is not done for two BT in specified time,  
PM cost of each BT: Rs2833/-  
Penalty =  $0.5 * 2 * 2833 = Rs2833/-$  penalty will be applied
- c) If 'Breakdown percentage' is more than 5% in a particular month, Penalty will be 5% of value of one ope(BD) – for DFL
- |                        |   |
|------------------------|---|
| If BD percentage is 5% | : No penalty                                  |
| If BD percentage is 6% | : 5% of BD value of contract for that ope(BD) |
|                        | : 5% of 75883 = Rs3794/-                      |
- ... etc.

After 5%, 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.

- d) If PM is not done for two DFL in specified time,  
PM cost of each DFL: Rs1300/-  
Penalty =  $0.5 * 2 * 1300 = Rs1300/-$  penalty will be applied

Note: Penalty for two consecutive months may lead to cancellation of contract, which is decided by Contract executing engineer. Hence vigilant action maintaining equipment in good running condition and within allowable breakdown percentage is essential for contractor.