PART B

TECHNICAL SPECIFICATIONS FOR BATTERY OPERATED HEAVY DUTY FORK LIFT TRUCK - 20 T

1.0 APPLICATION / PURPOSE :

S.No.	DESCRIPTION / SPECIFICATIONS	BIDDER's OFFER
1.1	The proposed Fork Lift Truck is meant to be employed in a Heavy Forge Shop with continuos duty cycle.	BIDDER to confirm with technical details
1.2	The equipment has to work in an environment, where the ambient temperature is of the order of 60°C and equipment will be exposed to heat-radiations from furnaces with working temperature in the order of 1200°C.	BIDDER to confirm with technical details
1.3	The truck has to handle, using its forks, hot plates, pipes and fittings from the furnaces and position the hot jobs in the Hydraulic Operated Forge/Forming Press for further operation. This sequence has to be carried out by the equipment at a fast rate. The equipment shall also be capable of quick turning in stationary position for change of direction during operation.	BIDDER to confirm with technical details
1.4	The truck also has to load raw material into the furnaces and also adjust / remove the hot jobs from the Forging / Forming Press, after pressing operation to storage area.	BIDDER to confirm with technical details

2.0 TECHNICAL SPECIFICATIONS :

S. No.	PARAMETERS	SPECIFICATION	BIDDER's OFFER [with technical details]
2.1	**CAPACITY**		
2.1.1	Maximum Weight of Job that has to be handled, using Forks	22000 kgs (50000 Lbs.) at 30" Load Center (or) 20400 kgs (45000 Lbs.) at 36" Load Center	
2.2	**DESIRED SPEEDS** – Upper Limits (Figures in brackets relate to those with load)		
2.2.1	Travel	Not less than 5 MPH [4MPH]	MPH – Miles / Hour
2.2.2	Lift	Around 24 FPM [12 FPM]	FPM – Feet / Minute
2.2.3	Lower	Around 16 FPM [20 FPM]	

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2.3	**TRUCK DIMENSIONS**		
2.3.1	Wheel Base	Around 95"	
2.3.2	Width (across wheel guard)	Around 88"	
2.3.3	Width across Frame	Around 80"	
2.3.4	Length (less Forks)	Around 160 "	
2.3.5	Over all Height (with Mast)	Around 160 "	
2.3.6	Overall Height (with Guard)	Around 140"	
2.3.7	Lift Height	Around 80"	
2.4	**TYRES**		
2.4.1	Drive Side	4 Nos. of size 36" x 16" Polyurethane	
2.4.2	Trail Side	4 Nos. of size 22" x 10" Polyurethane	
2.4.3	Turning Radius	Around 144"	
2.5	**POWER**		
2.5.1	Powersource	Battery Powered	
2.5.2	Type	EC Connector	
2.5.3	Capacity	72 Volt, 88 kWh	
2.5.4	Battery Compartment	Vendor to Specify	
2.6	**ACCESSORIES**		
2.6.1	Long Forks	4 ½" **x** 10" **x** 72" - 1 Pair 4 ½ " **x** 11" **x** 100" - 1 Pair 4 ½ " **x** 11" **x** 120" - 1 Pair	
2.6.2	Flexi Glass Heat Shield	1 Set	
2.6.3	Overhead Guard	1 No.	
2.6.4	'SCR' G.E. Controls	1 Set	
2.6.5	Follow Thru' Steering	Vendor to Specify	
2.6.6	Tiller Handle – Dual	Vendor to Specify	
2.6.7	High Pressure Lubrication system for Steering Arrangement & Gear Drives	Vendor to Specify	
2.6.8	Electric Horn & Siren for Reverse Travel	Vendor to Specify	
2.6.9	Warning Signal (Red Lamp) and Left & Right Indicators	Vendor to Specify	
2.6.10	Battery Charger with Cables & Spare Connectors	Vendor to specify details	
2.6.11	Battery Charge - Level Indicator to be provided in the Dash Board Panel	Vendor to confirm	
2.6.12	Extra charging cable from battery to charger and connectors to be provided	Vendor to confirm	

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3.0	**OPERATING CONTROLS:**		
3.1	Dual Drive, Hoist and Power Steering Controls for operation from either side of the Truck.	Vendor to confirm	
3.2	Hydraulic Power Steering for easy manoeuvring ; Indicator to show position of Steering Wheel for the Operator.		
3.3	Full width Safety Pedal and Step Down Brake Bar with 2 stage (hydraulic and mechanical) Braking System to be provided.	Vendor to confirm	
3.4	Single-Throw main line knife switch and on-off key switch to be provided.		
3.5	Electric and Brake Controls are to be interlocked to cut off power and apply brakes automatically when the Operator leaves the Truck.	Vendor to confirm	

4.0 DRIVE UNIT:

S. No.	PARAMETERS	SPECIFICATION	BIDDER's OFFER [with technical details]
4.1	**DUAL MOTORS**		
4.1.1	Horizontally mounted inside frame for maximum protection. Motors (high starting torque type) are to be series wound with class H insulation, silver cadmium welded commutator and glass banding. Motors are to be equipped with fan and precision ball bearings.	Vendor to confirm	
4.2	**DUAL DRIVES**		
4.2.1	Drive units, articulating independently around steel shafts ensuring constant floor contact for stability and safety. Design shall be to ensure elimination of over hanging forces on bearing points and to increase drive unit life	Vendor to confirm	

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4.2.2	Drive unit power shall be transmitted by two individual drive unit assemblies, each consisting of motor, gearing and brake assembly. Double reduction gears of Chromium nickel alloy steel, mounted on ball bearings to provide maximum torque for the drive wheel.	Vendor to confirm	
4.2.3	SCR-Solid State Control to provide stepless acceleration, infinitely variable speed control and smooth reversing, aiding tight quarter maneuvering and conserve battery power.	Vendor to confirm	
4.3	**STEERING**		
4.3.1	Power Steering System employing independent motor driven pump and double acting hydraulic cylinder for easy control of trail axle. Design also has to ensure road shock from being transmitted to steering controls	Vendor to confirm	
4.3.2	The Steering Unit shall articulate along the centerline of the truck assuring constant floor control.	Vendor to confirm	
4.4	**TRAIL AXLE**		
4.4.1	Dual Caster type mounted on tapered roller bearing. Articulated design to compensate for uneven floors. Twin Pairs of Trail Wheels to be mounted on roller bearings and rotate independent of each other, to minimize scuffing when wheels are turned with truck stationary.	Vendor to confirm	

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4.5	**BRAKING**		
4.5.0	A fail proof 2 STAGE Braking System has to be provided and the technical details shall be specified clearly in the offer with sketches	Vendor to Specify	
4.5.1	**SERVICE BRAKES**		
4.5.1.1	Hydraulic Power type internal expanding brakes, mounted within each drive wheel and directly over the wheel bearings. Brakes are to be hydraulically power operated by individual external brake cylinders. Each lining shall be minimum 200 sq. inches totalling 800 sq. inches for the 4 brakes.	Vendor to confirm	
4.5.2	**DUAL MECHANICAL PARKING BRAKES**		
4.5.2.1	Heavy duty external contracting shoes to operate against drums on each motor output shafts. Mechanism will be spring applied, mechanically released and automatically set for safety when the operator is not available. be minimum 80 sq. inches per brake	Vendor to confirm	
4.5.2.2	Automatic release of the brake to mechanical linkage thro' brake shoes when the operator applies foot pressure.	Vendor to confirm	
4.5.2.3	Along with Hydraulic and Mechanical breaking system Dynamic breaking system also shall be provided	Vendor to confirm	

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5.0	**HYDRAULIC COMPONENTS:**		
5.1	Steer/Brake Pump - Dual outlet motor driven vane type	Vendor to confirm	
5.2	Hoist Pump - Precision-built motor driven vane type, designed to maximum working pressure of 2500 psi	Vendor to confirm	
5.3	Hoist Unit: Multi-stage direct lift displacement type cylinders with chrome plated rods.	Vendor to confirm	
5.4	Control Valve- Precision honed spool valve to provide smooth operation and load spotting sensitivity for all functions.	Vendor to confirm	
5.5	Lowering Control Valve- to control lowering speed for preventing load dropping in the event of loss of hydraulic pressures.	Vendor to confirm	
5.6	**RELIEF VALVE**		
5.6.1	Built into control valve to protect hydraulic system against excessive pressures from overloading.	Vendor to confirm	
5.6.2	Hydraulic Reservoir to provide a large volume of oil for the system, and to reduce oil heating and to allow higher system efficiency. visual oil level gauge, heavy-duty breather filler screen and removable suction screen to be part of the system.	Vendor to confirm	

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6.0	**SPECIAL FEATURES:**		
6.1	**FRAME AND MAST**		
6.1.1	Frame and Mast shall be of thick steel side plates and rear members welded into box-type structure with heavy cross bracing and inner members supporting uprights. High carbon steel uprights are to be specially rolled and machined. Frame and uprights shall be welded as a unit structure for strength and resistance to impact and torsional loads. Fork fixing/resting plate length required is 79" for handling big size dies	Vendor to confirm	
6.1.2	Truck shall be available with straight ram, hydraulically operated split ram or forks. Forks and Ram are to be proportioned for bottom taper for maximum strength.	Vendor to confirm	
6.1.3	Swing out hinged compartment side covers for easy access to electric and hydraulic controls, steer pump and motor.	Vendor to confirm	
6.1.4	Hinged tenders for easy access to tires, wheels and universal drive shaft. Side doors for ready access to swing out drive motors.	Vendor to confirm	
6.1.5	Externally mounted wheel brake cylinders	Vendor to confirm	
6.1.6	Provision for clear visibility all around to the operator who will be standing in the control panel high from the floor. Provision shall also ensure visibility thro' mast and accurate load spotting.	Vendor to confirm	
6.2	**SAFETY**		
6.2.1	Shall meet the Safety Standards as per ANSI B 56.1 - 175 for powered industrial trucks.	Vendor to confirm	
6.2.2	Acid and water should not drain over equipments	Vendor to confirm	

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6.3	**PAINTING SCHEME:**		
6.3.1	Two coats of Tractor Orange paint to be applied	Vendor to confirm	
7.0	**GENERAL NOTES**		
7.1	**SPARES (to be recommended by the vendor)**		
7.1.1	Itemized break-up of mechanical, hydraulic, electrical and electronic spares used on the machine in sufficient quantity as per recommendation of Vendor for 2 years of trouble free operation on three shifts continuous running basis should be offered by vendor. The list to include following, in addition to other recommended spares: (Unit Price of each item of spare should be offered)	Vendor to specify	
7.1.2	Essential Spares 1.Traction motors-----2 nos. 2.Steering pump motor-1no 3.Hoist motor-1no 4.Steering pump assy--1 no 5.Hydraulic pump (Hoist and tilting)--1 no 6.Contactor assembly-5nos 7.Stationary contact tips----5 nos 8.Moving contact tips--5 nos	Vendor to confirm	
7.1.3	All types of spares for total machine and accessories should be available for at least ten years after supply of the machine. If machine or control is likely to become obsolete in this period, the vendor should inform BHEL sufficiently in advance and provide drawings of parts / details of spares & suppliers to enable BHEL to procure these in advance, if required	Vendor to confirm	
7.1.4	Vendor to confirm that complete list of spares for machine and accessories, along with item part no / specification / type / model, and name & address of the spare supplier shall be furnished along with documentation to be supplied with the machine	Vendor to confirm	

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7.2	Offer shall indicate the list of standard accessories that will be supplied along with the machine	Vendor to confirm	
7.3	Other special accessories shall be quoted separately as optional items	Vendor to confirm	
7.4	All controls and other operating systems shall be located in a convenient place for easy operation	Vendor to confirm	
7.5	Hydraulic elements shall be of Vickers/Rexroth make	Vendor to confirm	
7.6	All motors shall be from M/s Siemens/ ABB or any other reputed make conforming to IEC standard.	Vendor to confirm	
7.7	All electrical devices like contactors, relays and limit switches, push buttons etc. shall be from Siemens / Alstom/Cuttler Hammer / Telemechanique.	Vendor to confirm	
7.8	All components/ devices/ terminals are to be incorporated with ferrules.	Vendor to confirm	
7.9	The battery charger shall be suitable for an electric input through a 415V with fluctuation of ± 10%, 50 Hz ± 3%, 3 Phase AC, 3 wire system	Vendor to confirm	
7.10	**DOCUMENTATION:**		
	The following Documents in English shall be supplied		
7.10.1	a) Operation & Maintenance Manuals (Maintenance manual shall include all Electrical & Hydraulic Circuits with BOM) **CD Media: 1 No** **Hard copy Original: 3 Nos.**	Vendor to confirm	
7.10.2	b) Detailed spare parts specification for the electrical, electronics, mechanical, hydraulics (and pneumatic if any) to be furnished for items made by the supplier and for the items bought out and assembled by the supplier. **Hard copy Original: 3 Nos.**	Vendor to confirm	

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7.11	**TRAINING**		
7.11.1	The supplier shall train Two BHEL's Engineers in Operation and Maintenance of the Machine at supplier's works for a period of 5 working days. (Quote should be on man days basis)	Vendor to confirm	
7.11.2	The supplier shall impart training to BHEL's Machine Operators and Maintenance crew in Operation and Maintenance (Mechanical, Electrical/ Electronics and CNC System) after the commissioning of the Machine at BHEL works for not less than 10 working days.	Vendor to confirm	
7.12	**ACCEPTANCE & COMMISSIONING**		
7.12.1	The Machine shall be offered for inspection by BHEL Engineers and prove out trials for the maximum lifting capacity at supplier's works before despatch.	Vendor to confirm	
7.12.2	The supplier shall depute his engineer(s) for supervising the commissioning of the machine at BHEL. (Quote should be on man days basis)	Vendor to confirm	
7.13	**GUARANTEE TERMS**		
7.13.1	Performance Guarantee for a minimum period of 24 months (for the machine in total and sub-systems or bought-out items in particular) from the date of acceptance of the machine.	Vendor to confirm	