

Technical Specifications for Lithium Iron Phosphate (LiFePO₄/LFP) Batteries 400Ah GROUP (A) - (11 set)

The bidder shall furnish the following specifications with the documentary proof as an essential part of technical bid in the sealed envelope super-scribed as "Technical Bid":

1- Introduction :

- This specifications define the technical requirements of batteries which will be used as a backup power source in telecommunication equipment in Yemen mobile Company.
- One group of batteries or two groups should be connect to the output terminals of Rectifier/ charger to provide D.C power supply for BTS Equipment without break when the power off.
- (Battery Set) means the total group of cells which gives the total 48V required.

2- Sites conditions :

- at altitudes varying from sea level up to 2500 meters
- Applicable operating temperature range: -20⁰C to 70⁰C.
- Ideal operating temperature range : +25⁰C to 40⁰C
- The relative humidity up to 98% .

The tenderer should take into account any derating involved and the apparent capacity required in quoting for the nominal capacities at the different ambient conditions.

3- General specification:

- **The type of batteries shall be**
 - Lithium Iron Phosphate (LiFePO₄) Type.
 - Indoor which equipped with BMS (Battery Management System) to monitor conditions of battery such as cell and pack voltage, ambient and cell temperature, cell resistance, current sensing, Active cell balancing for maximum efficiency and performance. The BMS must be able to connect to an internet-enabled computer for easy online monitoring of each cell's performance.
 - Maintenance free.
 - Deep-Cycle Rechargeable, Sealed.
 - Monoblock cell voltage (3.25V/cell).

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- **A set of batteries consist of**
 - 16 cells/group
 - **Total nominal output voltage of 48 – 54 Volts DC.**
- **The capacity of batteries must be**
 - **400 Ah @ C₁₀ to 2.5V per cell above.**
- **Design life of batteries must be**
 - At least 10 years on 25 °C.
 - Cycle life must be ≥ 2500 in 80% DOD (Depth of discharge).
- The self-discharge rate of the battery shall be less than 3% per month.
- A weight of cell should not be less than 13Kg.
- The efficiency of battery should be not less than 96%.
- **The date of manufacture should be not more than three months before delivery (Very Important).**
- The battery bank supplies the full or partial load when the mains power source fails or when the load exceeds the design capacity of the charger regulator. The battery is charged automatically when the main power source is restored or when the load current returns to a level below the capacity of the charger regulator.

4- Physical Requirements :

- The battery shall be supplied complete with connectors between cells and at the main positive and negative terminals. The connectors shall be of robust construction of adequate size to minimize voltage drop and be made of flexible insulated copper conductor cable. The inter-connectors and terminals shall be fully insulated.
- The container of battery cell shall be from high quality, strong material, and the cover shall be securely fixed to the container.
- The cells, when shipped, shall be fully charged, ready to be installed at site and should give a capacity of not less than 90% of rated value when tested at site at any time up to 6 months of its receipt.
- Batteries shall be from a high quality, strong metal material and the height of battery enclosure should not exceed 140cm or according to the manufacturers design.

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5- Information to be supplied with the offer:

LiFePO ₄ Battery				
	Item	Unit	Requirement	Bidder's Specifications
1	Model	-----	Specify	
2	Manufacture	-----	Specify	
3	Country of origin	-----	Specify	
4	Standard	-----	Specify	
5	Date of manufacturing	-----	Specify	
6	Type of batteries	-----	Lithium Iron Phosphate (LiFePO ₄)	
7	Rated capacity @ C ₁₀ to 2.5V at 25C°	Ah	Specify	
8	Nominal voltage per cell	V	3.25V	
9	Operating Voltage	V	48 - 54	
10	Nominal Voltage	V	51.2	
11	Total Energy	KWh	Specify	
12	No of cells per set	Cell	16	
13	No of poles per cell	-----	Specify	
14	Expectancy life @25C°	Years	≥10	
15	Efficiency of batteries	%	96	
16	Relative humidity	%	98	
17	Ambient temperature	C°	-20 - 70	
18	Storage Temperature	C°	Specify	
19	Dimensions of cell (L×W×H)	Cm	Specify	
20	Dimensions of enclosure (L×W×H)	Cm	Specify	
21	Total weight with enclosure (sealed and fully charged)	Kg	Specify	
22	Cycle life of battery at 80% DOD@C ₁₀	-----	Specify	
23	Cycle life of battery at 100% DOD@C ₁₀	-----	Specify	
24	Maximum recharge time	h	Specify	
25	Cycle life with DOD characteristics	must be attached all technical data & curves		
26	Charge and discharge characteristics	must be attached all technical data & curves		
27	Charge voltage/cell	V	Specify	
28	Minimum discharge voltage/cell	V	Specify	

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29	Internal resistance	mΩ	Specify	
30	Maximum charge current	A	Specify	
31	Maximum discharge current	A	Specify	
32	Temperature effects on performance and capacity (curve or table)	must be attached all technical data & curves		
33	Self-discharge rate per month	%	< 3	
34	Relationship curves between remaining capacity and storage with different capacity at different temperature.	must be attached all curves		
35	Relationship curves between OCV and DOD.	must be attached all curves		
36	Type of connectors between cells	-----	Specify	
37	Installation circuit & block diagram	must be attached		
38	List contain all accessories & installation materials	must be attached		
39	Installation guide, operation manual, and maintenance manual	must be attached all technical data		
40	Tables attached by tenderer	-----		
41	Type of Enclosure	-----	Indoor	
42	BMS (Battery Management System) availability with display	-----	Specify	
43	BMS ability to measure capacity, current, resistance, temperature	-----	Specify	
44	BMS measurement accuracy	± digit	Specify	
45	Protection Type	-----	Specify	
46	Warranty period	months	18 after installation	

6- Materials for Complete Installation :

- a) The tenderer shall supply all the following Documentations, for all sets:
- Installation guide for the set.
 - Operation and maintenance instructions for the set.
 - Technical specification, testing data, Installation circuit and block diagrams.
- b) The tenderer shall provide List for all accessories and installation materials which used.

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7- Standards Compliance: The quoted product should meet out International Industry standards, and should meet Universal Codes and standards for Batteries.

All pages of the original Tender Document are to be signed and enclosed with the Technical Bid without cutting.

8- Warranty

The supplier shall warrant that the batteries are free of manufacturing and design defects. If any failure due to manufacturing /design defect is noticed within 18 months from the date of receipt at site (installation), the failed one shall be replaced by the tenderer.

9- Packing & Transportation:

The equipment shall be packed suitably to withstand sea and road transportation without any damage. If any damage occurs due to miss packing or transportation, the miss one must be replaced / repaired by the supplier free of charge.

10- Acceptance test certificates from the factory must be attached (Very important)..

Notes:

- 1- The bidder must attach all tables and figures which demonstrate the performance of the batteries.
- 2- The bidder must provide (One Test device) for each set of the batteries for measurement purposes such as (Capacity-internal resistance ...etc.).
- 3- The bidder must provide tools with each (11) set of the batteries such as (screwdriver, proper insulated wrench, etc.).
- 4- The bidder must ensure that serial numbers of the batteries in each set must be serialized and on a specified date.
- 5- The bidder must ensure that the serial numbers and date of manufacturing are stamped on the each battery cell body and are not removable.
- 6- The bidder must attach a list of the quantities of batteries containing the number, serial numbers and date of manufacturing from the factory, upon delivery.

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Group (A) LiFePO₄ (400Ah)

Capacity for 10hrs (C ₁₀)	Type of cell	Height of cell(mm)	Width of cell (mm)	Length of Cell (mm)	Weigh of Cell (kg)	Weigh of enclosure (kg)

Permissible intensities cells at 25 C° in operation.

Minimum Voltage	Discharge times				
	100hr	10hr	5hr	3hr	1hr
400Ah					
3.04V					
2.992V					
2.928V					
2.88V					
2.8V					
2.72V					
2.64V					
2.56V					

Sealed type cells for a daily depth of discharge rate as shown below are operated in accordance with the manufacturer's instructions:

Discharge rate%	Discharge time (hr.)	Cell life in cycles
0%	0 hours	
10%	1 hours	
10%	2 hours	
10%	3 hours	
30%	1 hours	
30%	2 hours	
30%	3 hours	
30%	4 hours	
30%	5 hours	
80%	1 hours	
80%	2 hours	
80%	4 hours	
80%	6 hours	
80%	8 hours	