Society for Innovation and Development
INDIAN INSTITUTE OF SCIENCE
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IISc/SID/SSCU-AKS
12th, June 2017

Sub: Tender notification for engineering, fabricating and supply of 500 W- 5 h Soluble Lead Acid Redox Flow battery (SLRFB) system.
Revised and due date further extended to 5.00PM of 21th July, 2017

Indian Institute of Science, Bangalore is required to engineer and fabricate a 500 W - 5 h SLRFB system which need to be tested at IISc Bangalore and supplied and demonstrated at NTPC, NETRA, Greater Noida, New Delhi. We will be providing the required technical specifications for the engineering and fabrication of the SLRFB system. Any further assistance during fabrication will also be provided but it is subject to terms and conditions. Battery manufacturers with acceptable record of business and sufficient infrastructure facilities for developing such batteries are only need to reply. Financial quotations in sealed covers super-scribed as **"Financial bid for SLRFB system"** and addressed to Prof. A.K. Shukla, Solid State and Structural Chemistry Unit, Indian Institute of Science, Bangalore 560012 with proof of business records and sufficient infrastructure facilities, may be sent before 5.00 PM 21th July 2017. The following information may be provided with quotation.

1. Detailed specification of the quotation indicating the basic price Ex-WORKS
2. Validity of the quotation (minimum 90 days):
3. Payment Terms:
4. Taxes / Duties etc:
5. Catalogue /Manual requirement: YES/NO
6. Place of Shipment
7. Mode of shipment:
8. Delivery Schedule on receipt of Purchase Order:

NOTE:

- Warranty / Guarantee period should be indicated clearly
- Partial shipment not permitted

Technical specifications of the 500 W - 5 h SLRFB system

- The 500 W - 5 h SLRFB is need to be fabricated as two units of 250 W – 5 h SLRFB stacks and then connect them in parallel
- Each unit of 250 W – 5 h SLRFB stack need to have 12 cells in series. The overall dimensions of each stack is about 70 cm (w) x 115 cm (h) x 44 cm (d)
- Each stack of 250 W – 5 h SLRFB need to have a monopolar anode, a monopolar cathode, 11 bipolar electrode frames,12 electrolyte separator frame, independent current collectors, gaskets for sealing and end plates.
- The end plates are need to be provided with inlets and outlets and connected to manifold for pumping electrolyte/water/other liquids. The cathode end plate is also need to be provided with an inlet and outlet for pumping air.
- The two units of stacks are need to be provided with common manifolds. PVC pipes of 20 mm dia. and PVC connectors, on/off valves may be used for manifolds.
- Chemical resistant pump for circulating electrolyte/water/etc. It may be a a seal-less magnetic drive pump with inlet/outlet size 18mm (3/4") with 30lps flow rate for about 5 mts head and single phase with the power rating of 0.16HP and full load current of about 0.2A.
- An acid flow meter
- A dc Air pump with power rating of about 10 W with working voltage of 16 V-10 V
- The SLRFB system is need to have a power electronic control unit for its operation. The electronic control unit with required power electronics is need to designed for (a) charging and discharging the SLRFB, (b) deliver power liquid pump, (c) an air pump and (d) battery management system (BMS) and (e) Any other system for the completeness of the battery. Features of the electronic controller unit with BMS are as follows:
  1. Control for switch on/off (SW1) from the mains with LED display.
  2. Control to switch (SW2) on the electrolyte pump with LED display. There is should be controller for operating the pump using the mains power and power from the SLRFB. A standby battery of 12V/20Ah is need to be provided to

operate the liquid pump for short duration of about 0-1h for start up and management purposes.

3. Control to check the flow of the electrolyte. Control to switch (SW3) off when there is no flow of electrolyte. Protection against power failure is need to be provided.
4. Digital Panel to show the flow rate of the electrolyte.
5. Automated and controlled charging and discharging system for the SLRFB taking feedback from the voltage/SoC and having both the boost / float modes
6. Control to switch (SW4) on the charging of the SLRFB.
7. Power electronics and electrical circuits to convert AC power to DC power for charging the battery. Charging voltage range is 0 - 30V. Charging current range is 0 - 120 A..
8. Control (SW4) to increase/decrease charging current and set it at the desired value.
9. Digital Display panel to show charging current and voltage with two decimal accuracy.
10. Control (SW5) to begin discharge at desired power output from the SLRFB (Variable load 50 - 500 W)
11. Electrical load for discharge the battery at variable load upto 500 W. (Like 100 W LED bulbs 5 Nos.)
12. Battery management system (BMS) for Data acquisition during charge/discharge for current and voltage with respect to time with a high accuracy. Stack voltages and two individual Stack voltages, all 24 individual cell voltages are need to be monitored by the BMS. Suitable software to transfer the data to a computer
13. Control to measure and monitor the battery/electrolyte temperature. Circuit breaker to stop charge/discharge beyond certain temperature limit. (Typically Room temperature to about 50 ^{o}C).
14. A conventional battery (VRLA) to start the electrolyte pump during start of the discharge.
15. Once the OCV reach certain value a circuit to deliver the power from the SLRFB to electrolyte pump and take control (SW2) for the rest of the discharge period.

16. Control to stop the discharge when cut-off voltage is reached.
17. Switch the air pump by drawing power from the SLRFB after the cut-off voltage.
18. Mass flow controller for air with digital display.
19. Digital panel to show the voltage of the Pb/air battery.
20. Electronic load and control to discharge the Pb/air battery at the desired current range (0 - 10A), Voltage of the battery may be in the range 8V to 3V.
21. Output voltage of the battery to be maintained at 12 V with DC to DC converter.