DEPARTMENT OF ELECTRICAL ENGINEERING, IIT DELHI

Minutes of the meeting of the purchase committee to purchase "Wind Turbine Emulator" to decide specifications and NIQ

Members Present: Prof. R. K. Mallik, Prof. S. Mishra, Prof. S. Prakriya, and Prof. B. K. Panigarhi

The following specifications were decided for the Wind Turbine Emulator with DC motor drive, induction generator, Battery bank, Bi-directional converter to charge or discharge the batteries and Grid connected step up transformer to be purchased under project RP02253:

Parameters	Specification
Wind Turbine Emulator	
Prime Mover DC Motor	– Fed from single phase 230 V 50 Hz AC source – 1500 RPM rated speed – 5 Hp rated power – Appropriate Gear box ratio
Generator Unit	
Generator specifications	– Induction Generator compatible with the prime mover.
Battery Bank	– Minimum 5 batteries – Each rated 12 V @ 30 Ah
Able to simulate different wind speeds at different pitch angle.	
Standard USB and RS-232 Interface or Ethernet or all of the mention interfaces.	
MPPT Tracking for different operating wind conditions	
The BATTERY BANK with BI-DIRECTIONAL CONVERTER are to be connected with the system at a common point to take care of the MPPT.	
Output Voltage	a. 1 phase 230 V AC b. 3 phase 400 V AC The configuration for 1 phase or 3 phase operation will be user defined.
Frequency	50 Hz
Switching frequency of converter and inverter	>=10 KHz
Output frequency variation	<+- 2 Hz
Output voltage ripple	2 V peak to peak (max)
Output Current ripple	0.1 A (max)
Transformer type	Isolation/grid connected transformer with tap changing

Other Requirements:

- The wind turbine, DC-DC converter(s), inverter(s) and the transformer(s) must be available as separate components so that each component may be used / removed as per requirement. The ratings of each device must be clearly specified.
- Other accessories needed should be made available.
- The emulator control and measurement devices must have necessary facilities for user interface.
- Proper cooling, protection and safety arrangements must be available with the device.
- The device should have an internal control system and options for external control as per requirement must be included.
- The wind turbine emulator supporting software is to be provided with the equipment.
- The wind turbine emulator should have facility to simulate the curves/data of any kind of wind turbine operating conditions.
- The wind emulator should have a feature of future expandability in terms of output power.
- Actual wind turbine set-up to drive the generator along with the DC drive (having features of changing the drive) is recommended.
- All wind speed sensors and measuring equipments should be provided and proper installation should be done.
- Some preloaded wind turbine characteristics and programs need to be provided with the equipment software.
- The emulator should have comprehensive database of wind turbine from various manufacturers and of different ratings and should have at least 10 years of meteorological database for accurate wind speeds and directions from across the world.
- Display and interfacing devices and ports should be provided.
- Software upgrade and auto update of recent data.
- Any other features should be clearly mentioned in the technical bid.
- All sorts of precautions and protections needed while operation should be informed beforehand.

Terms & Conditions:

1. Please submit the TECHNICAL and FINANCIAL bids in separate sealed envelopes. Mark the two envelopes clearly as "Technical Bid" and "Financial Bid". Both the sealed envelopes should be sent in a single sealed envelope, with clearly marked as "Wind Turbine Emulator". The quote should reach the following address on or before **27/10/2014** upto **5:00 PM**.

   Name : Prof. Ranjan K. Mallik
   Address : Room No. II-338
   Department of Electrical Engineering
   Indian Institute of Technology Delhi
   Hauz Khas, New Delhi-110016 (India)
2. Please quote prices at FOB/CIF New Delhi, inclusive of installation charges.
3. Quote should be in Indian Rupees as well as US Dollars and to valid for at least three months.
4. Attach all the technical literatures and list of similar installations done in India.
5. Mention the warranty period. Also mention if there are any additional prices for on-site warranty.

6. Mention if you can provide any technical support like training of IIT Delhi personnel at IIT Delhi or in your factory and providing a technical person for operation of the machine for a certain period after installation. Kindly mention about this clearly in the technical bid.
7. If the quote is being submitted by the representative of the Principals/manufacturers themselves, a valid Agency ship/Dealership Certificate authorizing the agent to quote to IIT Delhi on behalf of the Principals should be enclosed.
8. The Institute reserves the rights to accept/reject any/all quotation without assigning any reasons thereof.
9. Complete set of manuals for the operation and servicing of the equipment should be given. All circuit diagrams, other mechanical and electrical schematics must be provided to Main unit, sub systems and accessories.
10. Delivery as early as possible in weeks on receipt of Purchase Order.
11. Clearly specify the installation requirements- such as space, power, frequency, environment (temperature and humidity) etc.
12. If the items quoted are proprietary in nature, please enclose proprietary certificate from the principals stating "Certified that----------is a proprietary item of M/s --------- and no other manufacturer make these items".
13. If the bidder is Indian agent, the agency certificate should be enclosed.
14. Please produce compliance certificate for the specification.
15. Please ensure that the Indian agent has been enlisted with the Department of Expenditure, evidence may please be attached.
16. All bank charges payable in India are to buyer's account and bank charges in seller's country to seller's account.

(Principal Investigator) **(Chairman, Purchase Committee)**

Purchase Committee members:

Prof. R. K. Mallik

Prof. S. Mishra

Prof. S. Prakriya

Prof. B.K. Panigrahi