



**NATIONAL INSTITUTE OF TECHNOLOGY
ROURKELA – 769 008**

**Tender Notice No. 37 Dt. 11.03.2010
TENDER FOR CENTER OF EXCELLENCE IN INDUSTRIAL
ELECTRONICS AND ROBOTICS**

Sealed tenders are invited from reputed manufacturers / suppliers of equipments and software and should have expertise in design, engineering, manufacturing/ supply of all equipments, testing and commissioning of the system as a whole including all related civil, structural and electrical work for setting up a 10 kW solar plant for both utility and research purposes.

Last Date of Submission : **01.04.2010 by 12.00 Noon**
Tender opening on : **01.04.2010 at 3.30 PM**

Details of the tender specification & BOQ with all necessary details are available in our web site at <http://www.nitrkl.ac.in/tender.asp>
For any clarification please contact Prof Bidyadhar Subudhi, HOD, Electrical Engineering on Phone 91-661-2462416(O), Fax 91-661-2472926, E-mail: bidyadhar@nitrkl.ac.in. The Institute reserves the right to cancel /reject any or all quotations bids without assigning any reason thereof.

Ph:0661-2462021/2476773
Fax No.0661-2462022

Sd/-
REGISTRAR

Contd...



NATIONAL INSTITUTE OF TECHNOLOGY ROURKELA-769008, ORISSA

TENDER FOR CENTER OF EXCELLENCE IN INDUSTRIAL ELECTRONICS AND ROBOTICS (Tender Notice No. 37 Dt. 11.03.2010)

Sealed tenders are invited from reputed manufacturers / suppliers of solar power plant for design, engineering, manufacturing/ supply of all equipments, testing and commissioning of the system as a whole including all related civil, structural and electrical work for setting up a comprehensive high efficiency technically competent solar power plant. The details of specification, technical requirements, terms and conditions of bid are enclosed. Deviation if any has to be brought in on a separate sheet.

Last Date of Submission : **01.04.2010 upto 12.00 Noon**
Tender opening on : **01.04.2010 at 3.30 PM**
Date of Completion : 45 days from the date of the award of the contract.

Details of the tender specification & BOQ with all necessary details are available in our web site at <http://www.nitrkl.ac.in/tender.asp>

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Sd/-
Registrar
Ph. 91-661-2462021
2476773
Fax No.0661-2462022

A. Scope of Work

The scope of work mainly includes design, engineering, supply, installation, testing, commissioning and performance testing of equipments and softwares at NIT, Rourkela in accordance with the technical specifications attached herewith in the corresponding section of tender documents.

In addition to the above, the successful bidder will be required to provide comprehensive warranty of **three years** .

B. Bid submission procedure

Kindly send your proposal in an envelope superscribed with “**TENDER FOR CENTER OF EXCELLENCE IN INDUSTRIAL ELECTRONICS AND ROBOTICS, Dept. Of Electrical Engg., at NIT, Rourkela**” and address it to “**Head, Department of Electrical Engineering, NIT Rourkela, Orissa Pin- 769 008**”. The quotation can be sent to the Institute by speed post or hand delivered at Department of Electrical Engineering Office before the time of tender opening.

C. Detailed Technical Specifications

This section provides technical specifications of various constituents of equipments and softwares required. The products and equipments offered by the bidder must conform to these specific requirements in addition to the stipulations of applicable standards/norms. The bidder should have already supplied the equipments and softwares as a whole or partial to any of the government institutions and organizations.

PLECS Power Electronics Software (5 User)

This simulation software (PLECS) useful for fast simulation of electrical circuits within the Simulink (MATLAB) environment. It should be specially designed for Power Electronics & Electrical circuits.

The software should speed up the design and analysis of the electrical system and have the advantage of an intuitive user interface and the fast accurate simulation.

Salient features:

- Direct Integration with Simulink (MATLAB).
- Take advantage of the entire Simulink library and the vast choice of extensions to model sophisticated controls.
- Powerful schematic Editor

- Simulink look and feel
- Ideal switches which will makes easy to use, Robust and fast simulation compare to other soft wares

Overview of Library of Components:

- Library of passive components (Resistance, Inductance, capacitance,. Mutual Inductance etc.)
- Library with Electrical Sources (voltage and current) with A.C. and D.C.
- Sub circuit option to make user defined library for future use.
- A Complete Built in full, half bridge Converters(with Thyristors, Diodes,IGBT's) for both 1-phase and 3-phase
- built in full, half bridge Systems for both 1-phase and 3-phase
- built in pulse generators (2,6-pulse generators)
- Extra library with transformations (abc to dq for both static and rotating reference frames and also static to rotating reference frame conversions and vice versa)
- Extra Library with Modulators (Symmetrical PWM, Saw tooth PWM, etc.)
- A complete Library of Machines (D.C. motors, Induction motors, Salient & round rotor synchronous motors, PMSM)
- OP-Amps
- A Complete range of linearized Electronic switches (IGBT,Transistor, Diode, Thyristor, GTO's)
- Input and output ports to make an Interface between the software and Simulink (MATLAB).
- 3-phase transformers

Curriculum topics that should be covered with this software:

- Suitable for Variety of Control engineering, Electrical & Electronics Courses.
- Fundamental Power electronic and electrical circuits simulation.
- 1&3-phase Converters, Systems, Choppers, Cycloconverters

- PWM Controlled voltage source Systems
- Speed Controlling of A.C. & D.C. Motors

PROTEUS VSM Software (2 User) should have the DSPIC 33 microcontroller family with advanced simulation features and Proteus PCB (1 User) with level 3+ .

Energy modules

The energy module should be of PV type and ranging between 210- 270 Wp range and total capacity should of 10 KWp.

The technical specifications should be

- Module efficiency :13.8%
- Certification : IEC/UL
- Suitability for grid connected system : Module output Multi contact plug
- Power warranty:10 year warranty on 90% of the min. output
- Type of solar PV cell : Multi-Crystalline
- MNRE Certified

Ground based module mounting structure for energy module

The module mounting structure must be designed for holding suitable number of modules in series.

The frames and leg assemblies of the array structures must be made of Mild Steel hot dip galvanized

of suitable sections of Angle, Channel, tubes or any other sections confirming to IS: 2062 for steel structure to meet the design criteria. All nuts & bolts considered for fastening modules with this structure are should be of very good quality of Stainless Steel. The array structure must be designed in such a way that it should occupy minimum space without sacrificing the output from SPV panels at the same time.

Junction Boxes

These junction boxes should be enclosed in IP 55 rated Thermo-fiber housing, making it ideal for long-term use in PV systems. In addition, the direct connection between the strings and the spring clamp connectors must ensures a durable and safe installation.

Cables & Connectors

Cables should be extremely robust and resist high mechanical load and abrasion. It should have high temperature resistance and excellent weatherproofing characteristics. The

connectors with high current capacity and easy mode of assembly must be used for the connections of the power plant cables. These wires should be insulated with a special grade PVC compound.

The technical specifications should be

Parameters	Specifications
Standard	IS 1554/694-1990
Working voltage	Up to 1100 V
Temperature range	-15°C to +70°C
Color code	Suitable black, red, blue, etc
Sizes	Suitable sizes
Marking	Sizes & makes

Compatible , efficient Power Electronics system

The system should be 1 phase/ 3 phase and packed with innovative, cutting-edge technology. Their optimized efficiency factor should cover the entire performance spectrum and the high technical availability factor has been achieved by proven long-life components and the latest control procedures. Central unit should use higher system voltages to reach very high plant efficiency.

The design of the technical parameters should be optimized with regard to the operating time of the system. With a wide range of input voltages from 24V-440V, the system must allow the largest possible range of module connection possibilities.

The technical specifications should be

OPERATING PARAMETERS	INFORMATION
Output Voltage	System should follow grid within +10% -20% of nominal voltage Voltage window should be adjustable via system set points
Output Frequency	Grid synchronised operation Synchronisation window should be adjustable via system set points. Maximum Range: $\pm 3\text{Hz}$
Waveform	Sine wave
Sine wave	40x4 LCD panel with keypad displaying: Supply Voltage Supply Frequency Output Voltage Output Current Output Power summation Input Current Input Voltage

	Input Ah Accumulated output KWhrs Temperature Solar radiation
THD(Total Harmonic Distortion)	Less than 3%
RFI(Radio frequency interference)	Designed to minimise both conducted & radiated RFI emissions
Efficiency	Maximum 94%
Internal Protection System	Over / Under Voltage Over / Under Frequency Grid loss protection Incorrect phase rotation Unbalanced phase voltages Islanding protection Circuit breakers
Earthing Provisions	AC bypassing to earth on system and DC inputs
Control Type	Voltage source, microprocessor assisted output regulation
Power Control	Maximum Power Point Tracking
System Control	Automatic Power sensing, shutdown for low insolation. Power up when power output to grid available. Automatic recovery 90s after utility supply within parameters.
ENVIRONMENTAL	
Operating Temperature Range	5-50 degrees Celsius
Humidity	0-90% non condensing
Enclosure	Rated for IP30

Technical Specifications of the system should be

Parameters	Specifications
Input Data	
Max. PV-power (recommended) PPV	10KVA
DC- voltage range, MPPT UDC	96-440 V
Max. permissible DC voltage VDC, max	440 V
Max. permissible DC current IDC, max	2 x 15 A
Number of DC ports / connection point	Circuit Breaker
Output Data	
Nominal AC power PAC	10KVA
Operating voltage grid +/- 10 %	220-240 /415V
Operating frequency grid	FAC 50 Hz /50Hz < 3 %
Voltage ripple PV voltage UPP	< 3 % at nominal power
Size and Weight	
Width / Height / Depth [mm] W/H/D	470/445/180

Storage Unit

Storage unit must conform to the Specifications of the following

- IEC / EN 60896-21 & 22
- IEC 61427
- BS 6290 part IV
- IEEE 1188, 1189 Specification
- EUROBAT Guide 1999 – Classified as “Long Life”
- Tubular Gel /VRLA Gel
- Low maintenance
- Antimony - free alloy
- High pressure die-cast spine grids
- Excellent thermal management
- Ready to install
- Versatile in mounting

PVSYST (1 User) – Suitable for system design and simulation.

D. FINANCE BID:

The price should be kept firm till the completion of work. Your price is deemed to include all tools and tackles required to execute the entire work. The scope and specification mentioned above shall constitute a single tender only. The lowest bidder after totaling of all quoted components shall be declared as the L1 and shall be awarded with the contract.

Note:

The prices quoted above should be FOR Site basis inclusive of insurance, all applicable taxes and duties. Tax components are to be mentioned clearly. (No claim for any Taxes will be entertained later)

1. This schedule should be referred in conjunction with other tender documents and the quote should be complete in all respects, for entire scope of work.
2. If the vendor is located outside the state of Orissa the applicable entry tax levied will be @ 2% which is payable only under reimbursement basis, the original receipt must be presented for claim otherwise 2 % will be deducted from the bill amount to be deposited at commercial tax office.
3. For any clarification please contact: **Prof Bidyadhar Subudhi, HOD, Electrical Engineering on Phone 91-661-2462416 (O) /Fax 91-661-2472926/ E-mail ID bidyadhar@nitrrkl.ac.in**