المواصفات الفنية الخاصة بالمناقصة العامة

رقم المناقصة : (٢٠١٢/٢٧)

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المؤسسة العامة للاتصالات السلكية واللاسلكية

الإدارة العامة للمشتريات والمخازن

إدارة المشتريات - قسم العقود والمناقصات

Technical Specification

For

Photo Voltaic Solar power systems

المجموعه الأولى **February 2012**

1. Introduction:

This specification defines the technical and mechanical requirements for a heavy duty solar power modules, racks and Joint boxes, without charge controllers which will be procured separately.

The Photovoltaic power system consists of an array of photo voltaic solar modules, support, interconnects, accessories and installation materials to have complete solar power system for telecommunication equipments supply.

2. Environment:

The Solar power system shall be suitable for remote locations where no operation and maintenance services are available. The system shall be capable of withstanding extreme temperatures from – 10 deg C up to 65 deg C and relative humidity up to 98%. The structures should be strong and normally be capable of withstanding wind velocities up to 150 kilometers per hour.

3. Capacity:

According to B.O. Q attached:

3.1 The nominal rated capacity of each module shall be 12 Volt, 75wp.

4. Module parameters:

4.1 The tenderer shall indicate the performance data under standard test conditions of the module chosen by him. He shall also give the expected performance of the module under varying solar radiation conditions and corresponding cell junction temperatures.

4.2 The tenderer shall indicate the cell crystal structure, its estimated life cycle and annual rate of performance deterioration, depending on various conditions of the environment.

4.3 The solar cell and module shall be mechanically well protected within an aluminum frame (3.5mm) for a long term use over the entire life cycle against natural hazards such as rain, hail, storm, blowing sand, and small articles. The entire module casing should be impervious to moisture and rain water.

4.4 Each ,module shall be provided with water- proof connector box electrically protected and have enough space for easy connection with other modules in serial or in parallel.

4.5 The supplied solar modules must be of mono crystal type. Where the glass cover thickness must be at least 3.2mm.

5. Array:

5.1 The solar module racks array consisting of plural solar modules (4 module each Group/frame) should be packed, pre-connected and mounted on the array frame with ready to produce-48v DC.

5.2 The support structure should be roof mounted, light weight, heavy duty, match fully the fitting of the module frames so as to form a strong and rigid mechanical structure. It shall be easily assembled.

The tenderer shall give complete details of the framework, the materials used, installation procedures (drawings to be attached).

5.3 The frame support should be such that the tilt angle can be adjustable type (10 ~ 40°) at site and the mechanical arrangements made for it shall be indicated.

5.4 At some of the locations dust storms frequently occurs and it is likely that dust accumulates on the panel surface. Provision shall be made for likely deterioration in performance, if any, on this account, alluminum is highly preferred.

5.5 The materials used in the array and support structure should be able to withstand the prescribed environmental conditions and winds laden with salt, hydrogen sulphate and similar to other elements available in coastal areas. All parts of the system including nuts, bolts and washers should be made of corrosion resistant materials (stainless steel). Processes such as surface painting for corrosion prevention which requires periodical re-works are not acceptable. In case of steel products (other than stainless for high level degree of galvanization) alluminum highly preferred.

5.6 The tenderer shall indicate the methods employed specially details of arrangements for blocking or by-pass diodes to prevent partial loss of array output in case of any module of array is shaded in parallel or series condition respectively.

5.7 The array shall be provided with water-proof Joint-box having enough space to connect 6 groups of panels along with proper gauge (see the attached B.O.Q).

5.8 The tenderer shall provide unit price.

6. Scope of Supply:

6.1 The Tenderer shall supply photovoltaic modules of 75w main joint boxes, and interconnections, as per the attached B.O.Q.

6.2 The tenderer shall give following informations:-

i. Solar cell characteristics.

ii. Composition of solar array.

iii. Mechanical structures and dimensions of solar modules. (Drawing to be attached)

iv. Details information and drawings.

6.3 Tenderer shall supply three Soft & Hard sets of all documents for installation, testing, operation, maintenance.

6.4 The system as a whole unit and in each main part of it, should be protected against current reversion direction, lightning, sparks, earth leakage.

6.5 Tenderer must submit with his offer samples for each type of the models, joint boxes (tenderers which will not submit samples will automatically be rejected).

6.6 The tenderer must submit along with his tender document a table contains the P.T.C spec. With his statement of compliance item by item.

6.7 Tenderer shall supply one joint box for every 12 modules (3 groups). see attached B.O.Q.

7. Packing:

The packing shall withstand without damage, air, sea and road transportation.

* * * END OF SPECIFICATION * * *

Photo Voltaic Solar Power System المعايير الفنية الأساسية للخلايا الشمسية

(فبراير 2012)

1- The nominal rated capacity of each module shall be 12 Volt, 75wp.

2- The tenderer shall indicate the performance data under standard test conditions of the module chosen by him. He shall also give the expected performance of the module under varying solar radiation conditions and corresponding cell junction temperatures.

3- The tenderer shall indicate the cell crystal structure, its estimated life cycle and annual rate of performance deterioration, depending on various conditions of the environment.

4- The solar cell and module shall be mechanically well protected within an aluminum frame (3.5mm) for a long term use over the entire life cycle against natural hazards such as rain, hail, storm, blowing sand, and small articles. The entire module casing should be impervious to moisture and rain water.

5- Each ,module shall be provided with water- proof connector box electrically protected and have enough space for easy connection with other modules in serial or in parallel.

6- The supplied solar modules must be of mono crystal type. Where the glass cover thickness must be at least 3.2mm.

7- The solar module racks array consisting of plural solar modules (4 module each Group/frame) should be packed, pre-connected and mounted on the array frame with ready to produce-48v DC.

8- The support structure should be roof mounted, light weight, heavy duty, match fully the fitting of the module frames so as to form a strong and rigid mechanical structure. It shall be easily assembled.

9- The frame support should be such that the tilt angle can be adjustable type (10 ~ 40°) at site and the mechanical arrangements made for it shall be indicated.

10- The materials used in the array and support structure should be able to withstand the prescribed environmental conditions and winds laden with salt, hydrogen sulphate and similar to other elements available in coastal areas. All parts of the system including nuts, bolts and washers should be made of corrosion resistant materials (stainless steel). Processes such as surface painting for corrosion prevention which requires periodical re-works are not acceptable. In case of steel products (other than stainless for high level degree of galvanization) aluminum highly preferred.

11- The array shall be provided with water-proof Joint-box having enough space to connect 6 groups of panels along with proper gauge (see the attached B.O.Q).

12- Tenderer must submit with his offer samples for each type of the models, joint boxes (tenderers which will not submit samples will automatically be rejected).

13- Warranty efficiency of the Solar Pannel shall be > 15 years.

14- 10% spare out of the total number of the Solar Pannel shall be quoted.

Technical Specification

For

M.P.P.T Charge Controllers

المجموعه الثانيه **February 2012**

1. Introduction:

This specification defines the technical and mechanical requirements for a heavy duty photovolataic Maximum Power Point Track (M.P.P.T) Charger controllers. This charger controllers consists of all interconnect accessories and installation materials.

2. Environment:

The photovolataic power system charger controllers shall be suitable for locations at remote places where no operation and maintenance services and attendance are available. The system shall be capable of withstanding extreme temperatures from10 deg. C up to +55 deg. C and relative humidity up to 98%.

3. Capacity:

The nominal rated capacity of the system is for delivering continuously photovolataic current to charge the battery and feed the load with the following capacity:-

- Photovolataic capacity 60A-48Vcd and load capacity upto 30A-48VDC (positive grounded).

4. A charge controller shall be designed for industrial and heavy duty use and shall be provide to monitor and control the overall working and functions of the photovolataic system. The regulation should be such as to cause minimum heat generation during charging process. It shall be flexible to be used with any system at photovolataic and batteries.

5. The controller should be provided in dual, or more inputs coming from the solar array to the controller for ease of load sharing.

6. The Tenderer shall indicate the method employed by him to dissipate the excess energy generated during the solar radiation periods.

7. The Capacity of the controller should be at least within the requested capacity or more.

8. The following information shall be furnished:-

i. capacity of charge controller
ii. measures to prevent over charging (such as automatic disconnection/reconnection of charging circuit)/battery low voltage load disconnect etc)
iii. tracking of battery temperature, battery voltage and array output
iv. temperature compensation arrangements
v. all voltage and current measures of all sides of the system
vi. all protection system offered by the controller
vii. all remote and telemetry observing and controlling offered by the controller and also the parameters, can be modified at site (the methods of modifications shall be included.
viii. according to batteries specifications to be installed, we should be able to change max charging current, disconnection/reconnection of charging current.

9. Functions:

9.1 The charge controller shall have at least the following functions:-

i. ON and OFF control for over charging of battery.
ii. Indication of above status.
iii. Protection for excessive current.
iv. ON and OFF control for over discharge of battery (automatically).
v. Indication of above status.
vi. Alarm for low battery voltage.
vii. Indication for battery voltage.
viii. Indication of solar array open voltage.
ix. Indications of solar output current.
x. Indication of load current.
xi. Low voltage disconnect.

9.2 In case of charge controller for open lead acid batteries, it shall be provided with battery temperature sensor which shall correct the set points for battery charge and discharge suitably.

10. system Alarms & Protection:

10.1 A comprehensive fail-safe alarm system shall be provided to cover all the important functions of the total power system.

10.2 The following protections shall be provided:-

i. Battery Low Voltage:-

- alarm corresponding to nominal cell voltage of 1.8v (adjustable at site by +/-0.1v)
- battery auto-cutoff corresponding to cell voltage of 1.75 (adjustable by +/-0.05v)

ii. Battery High Voltages:-
- alarm at terminal voltage corresponding to 2.45v per cell (adjustable to +/-0.1v at site)
- input feed auto-cutoff at terminal voltage corresponding to 2.55v per cell (adjustable to +/-0.05v at site)

iii. D.C Out (Load Point) Voltages:
- regulation of D.C. output voltage
- alarm if the voltage is out of range of -46.8 and -56v

iv. Load Current Limited:-
- Provision shall be made to limit the load current to within 110% of nominal value.

v. The circuit boards and components conformally coated for corrosion protection and the entire charge controller shall be within weather-proof and corrosion proof enclosures for outdoor use.

11. Protection and interconnect the parts of the system:

11.1 Protection for all system for reverse current follow.

11.2 Protection for all system of lightning and any power sparks.

11.3 Earthing terminals for all devices of the system.

11.4 Fuses terminal boxes for arrays input to the controller, the battery input and output, and for the load terminals.

11.5 Surge protector shall be provided.

11.6 Lightning arrestors should be provided in the charge controller.

11.7 Positive grounded should be provided inside the charge controller (built in).

12. Scope of Supply:

12.1 The Tenderer shall supply charge controllers with cct breakers with fuses for P.V array, batteries & loads, protection devices and all other charger controller installation materials including connectors.

12.2 The Tenderer shall give following informations:-

i. Charger controllers drawings and circuit diagrams.
ii. Specify the mechanical dimensions of charger controllers (Width,height,depth,weight).
iii. Full and detail technical specification with all alarms, measurements, protection and features.

12.3 Full technical literature shall be submitted along with the tender documents.

12.4 He shall supply three sets of all documents for installation, testing, operation, maintenance and for acceptance tests.

12.5 Informations, drawings and other aids required for the repair of printed circuit boards shall be provided.

12.6 The charger controller unit and in each main part of it, should be protected against current reversion direction, lightning, sparks, earth leakage. Lightning should be protected using gas-tub devices.

12.7 Tenderer shall submit with his offer sample unit for the offered charge controller.

13. Installation and Training:

13.1 Tenderer shall install one of the offered chargers at PTC workshop.

13.2 Tenderer shall train PTC stuff the following:

- General deception of charger controllers.
- Charger controller Readings & Indications.
- How to maintain charger controllers and solving any problems.

14. Warranty:

Manufactory should commit to repair any faulty controller during a period of two year.

15. Packing:

The packing shall withstand without damage, air, sea and road transportation.

* * * END OF SPECIFICATION * * *

M.P.P.T Change Controllers المعايير الفنية الأساسية لمنظمات الخلايا الشمسية

(فبراير 2012)

1- The nominal rated capacity of the system is for delivering continuously photovoltaic current to charge the battery and feed the load with the following capacity:-
- Photovoltaic capacity 60A-48Vcd and load capacity upto 30A-48VDC (positive grounded).

2- The following information shall be furnished:-
i. capacity of charge controller
ii. measures to prevent over charging (such as automatic disconnection/reconnection of charging circuit)/battery low voltage load disconnect etc)
iii. tracking of battery temperature, battery voltage and array output
iv. temperature compensation arrangements
v. all voltage and current measures of all sides of the system
vi. all protection system offered by the controller
vii. all remote and telemetry observing and controlling offered by the controller and also the parameters, can be modified at site (the methods of modifications shall be included.
viii. according to batteries specifications to be installed, we should be able to change max charging current, disconnection/reconnection of charging current.
ix. Charge Controllers type must be of Maximum Power Point Track (M.P.P.T) technology.

3- Functions:

3.1 The charge controller shall have at least the following functions:-
i. ON and OFF control for over charging of battery.
ii. Indication of above status.
iii. Protection for excessive current.
iv. ON and OFF control for over discharge of battery (automatically).
v. Indication of above status.
vi. Alarm for low battery voltage.
vii. Indication for battery voltage.
viii. Indication of solar array open voltage.

ix. Indications of solar output current.
x. Indication of load current.
xi. Low voltage disconnect.

4- The following protections shall be provided:-

i. Battery Low Voltage:-

- alarm corresponding to nominal cell voltage of 1.8v (adjustable at site by +/-0.1v)
- battery auto-cutoff corresponding to cell voltage of 1.75 (adjustable by +/-0.05v)

ii. Battery High Voltages:-

- alarm at terminal voltage corresponding to 2.45v per cell (adjustable to +/-0.1v at site)
- input feed auto-cutoff at terminal voltage corresponding to 2.55v per cell (adjustable to +/-0.05v at site)

iii. D.C Out (Load Point) Voltages:

- regulation of D.C. output voltage
- alarm if the voltage is out of range of -46.8 and -56v

iv. Load Current Limited:-

- Provision shall be made to limit the load current to within 110% of nominal value.

5- Protection and interconnect the parts of the system:

- Protection for all system for reverse current follow.
- Protection for all system of lightning and any power sparks.
- Earthing terminals for all devices of the system.
- Surge protector shall be provided.
- Lightning arrestors should be provided in the charge controller.
- Positive grounded should be provided inside the charge controller (built in).

6- The Tenderer shall supply charge controllers with cct breakers with fuses for P.V array, batteries & loads, protection devices and all other charger controller installation materials including connectors.

7- 10% spare out of the total Charge Controllers shall be quoted.

Bill of Quantities Schedule
Photovoltaic Solar Power Systems & Charger Controllers

SNo.	Item	Type	Qty	Remarks	Approximate Unit Price ($) with supplementary equipment	Approximate Total Price ($)
A- المجموعة (أ): الخلايا الشمسية						
1-	Solar module, support structure (frames, support & foot angles...etc), accessories, installation materials consisting of: nuts, bolts, washers,...etc. Those materials must be of rust-free and stainless steel type.	75 watt	984 modules	As per specification		
2-	Joint box.	6 input 10Amp 6mm gauge, 1 output 60 Amp, 25mm gauge	82 (PCS)	Joint box for 3 groups (12 module)		
3-	Interconnection cable between module.	4mm cables		Standard length (4 module each frame), cable resist. Temp. up to 90°C		
4-	Electrical cable from module to joint box.	6mm (4 meter length from module to joint box)				
	TOTAL					
B- المجموعة (ب): المنظمات الشمسية						
	MPPT charger controller -48V/60A (+ve ground) (150V input - 30A load minimum).	Wall mounted	50			
C-	Local training (in Yemen) for one week for installation, operation and maintenance.		15 persons at least			
	GRAND TOTAL					