ಭಾರತ್ ಹೆವಿ ಎಲೆಕ್ಟ್ರಿಕಲ್ಸ್ ಲಿಮಿಟೆಡ್
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Addendum to RFQ: RCRSCPV120 dated 20.05.2015

RFQ Due Date: 10.06.2015

ITEM: PV Module Multi (295W-DCR/300W-Non DCR)

Following revision/ modifications are incorporated in the specification:

A. Purchase Specification of 295 Wp PV Modules with DCR solar cells is revised as PS 439 328 Rev 01.

All other terms and conditions of RFQ remain unchanged.

AGM (SC&PV/MM)

ITEM: 295-WATT MULTI PV MODULE

1.0 PRE-QUALIFICATION CRITERIA CHECK-LIST

Sl. No	Particulars	Bidder's confirmation
1	The offer shall be quoted only by the original Indian PV module manufacturer. Any offers received from parties other than original PV module manufacturers (India) shall be rejected.	Manufacturing Plant Location: (Complete Address & Contact Details with Email address)
2	Vendor should have a minimum of 30 MW/annum PV module automated in-house manufacturing facilities (automated tabber-stringer, laminator and framing). PV Modules shall be manufactured at the vendor's works only.	Yes / No a. Tabber-stringer Make: b. Laminator Make: c. Framing Station Make: d. EL Tester Make: e. Sun Simulator Make:
3	1. Design Qualification and Type Approval as per i) IEC 61215 – Edition 2.0 2005-04 Crystalline silicon terrestrial photovoltaic (PV) modules – Design qualification and type approval ii) IEC 61730 – 1 Edition 1.2 2013-03 Photovoltaic (PV) module safety qualification – Part 1: Requirements for construction IEC 61730 – 2 Edition 1.0 2004-10 Photovoltaic (PV) module safety qualification – Part 2: Requirements for Testing iii) IEC 61701 – Edition 2.0 2011-12 Salt mist corrosion testing of photovoltaic (PV) modules For multi crystalline PV Modules with **Indian manufactured cells (DCR Cells) from the following manufacturers:** Jupiter Solar, Tata Power, Moserbaer PV, Indo solar, Webel, XL Energy **Vendor shall procure the required cells only after BHEL approval.** Valid IEC Test Certificate to be attached with the offer and also the corresponding approved **bill of materials** (BoM) as per test report from test lab.	Yes / No
4	Vendor should have tie-up/consent from Domestic Content Requirement (DCR) Indian solar cell manufacturer and provide documentary evidence for the same from indigenous solar cell manufacturer.	Yes / No
5	Vendor should have manufactured and supplied a cumulative of 15 MW PV modules (mono or multi) during the period from April 2014 to March 2015. Details of dispatches in the mentioned period to be validated with customer Purchase Orders or customer feedback.	Yes / No
6.	Vendor should have manufactured and supplied solar PV Module built up using indigenous and/or imported solar cells of power rating 200 watts or above which must have been in successful operation for at least 6 months as on date of 25.11.14. Client certificate/and/or Letter from TRANSCO/DISCOM should be enclosed as documentary evidence. Please fill enclosed "SUB QR Format"	Yes / No

Note:

1. Pre-qualification will be carried out based on the details furnished by the vendor / purchase orders from their customers / inspection of the company / product if required by BHEL and at its sole discretion.
2. The Pre-qualification criteria are mandatory requirements and the technical bids will be considered only if all the above Pre-Qualification Criteria are met.

REVISION (01)
Sl. No 3 revised and Sl. No. 6 added to PQC Criteria
Technical Requirements revised
General Conditions revised

APPROVED BY SR		
PREPARED	ISSUED	DATE
SM	Engg	02.06.2015

2.0 TECHNICAL REQUIREMENTS

Sl. No	Item	Remarks
1	PV Module Configuration	Multi crystalline Photovoltaic Module with 72 nos. of 156-mm Multi Crystalline silicon solar cells (sourced from Indian Solar Cell Manufacturers) in 12*6 series configuration. The module outline and bill of material shall be as per vendor's approved IEC certification. BHEL shall not supply solar cells or module input materials. Please enclose complete Module overall assembly drawing with mounting holes, Data sheet with typical electrical characteristics and I-V curve, temperature coefficients for power, voltage and current
2	Power Output	295 Watts (minimum)
3	Fill Factor	0.7(Minimum)
	Bill of Materials:	
4.1	Solar cells	Three bus bar 156-mm Multi Crystalline silicon solar cells sourced from Indian Solar Cell Manufacturers as per Domestic Content Requirement (DCR).
4.2	EVA	Fast cure type
4.3	Glass	High transmission, low iron, tempered and one- side textured
4.4	Back Sheet	Color: White TUV-certified for partial discharge test for system voltage ≥ 1000 V DC
4.5	PV Module Frame	Corrosion resistant Anodized Aluminum (Corner block type) & anodizing thickness: 15 microns minimum
4.6	PV Module Frame Mounting Pitch	Mounting Pitch (centre to centre) on the Aluminum Frame shall be as per BHEL requirement. Vertical/ Length side: 1200 ± 2.0 mm Horizontal/Width side: 956 ± 2.0 mm
4.7	JB Fixing and Potting	Silicone sealant
4.8	IP65 grade Junction Box with 3 bypass diodes (15 A, 40 V), two 4 sq.mm solar cables with quick connectors (TUV certified MC4 type connector)	TUV-certified Junction Box which is mounted on the back sheet and adequately sealed for protection against possible moisture ingression. Protection: IP 65, Class II, Rated Voltage: 1000 V DC
4.9	IEC Certification	The SPV module supplied must conform to IEC 61215 – Edition 2.0 2005-04, IEC 61730 – 1 Edition 1.2 2013-03, IEC 61730 – 2 Edition 1.0 2004-10, IEC 61701 – Edition 2.0 2011-12 with multi crystalline Indian manufactured cells (DCR Cells). SPV modules must have already been tested and certified by any of the accredited certifying agencies according to above mentioned International Standards and the type test reports shall be submitted for approval.
4.10	RFID Tag pasted on the back side of Module	As per Clause 3.0 OTHER REQUIREMENTS Sl. No. (c) Page 3 of 7
4.11	Customer Approval	Price bids of BHEL / Customer approved vendors will only be considered for further processing.

3.0 OTHER REQUIREMENTS

a. SPV module shall perform satisfactorily with ambient temperatures between -10°C & +85°C and shall withstand gust up to 150 Km/h on the surface of the panel. Each and every SPV module shall be checked for conformity with IEC standards and no negative power tolerance shall be accepted.

b. The interconnected cells shall be laminated in vacuum to withstand adverse environmental conditions.

c. Each PV module deployed must use a Radio Frequency identification (RFID) tag for traceability. The RFID shall be on the backside of the laminate, but must be able to withstand harsh environmental conditions during the module lifetime. The following information must be written in the RFID used on the each module

i. Name of the manufacturer - PV module
ii. Name of the manufacturer - Solar Cells
iii. Month & year of the manufacture (separate for solar cells and modules)
iv. Country of origin (separately for solar cells and module)
v. I-V curve for the module
vi. Wattage, Im, Vm and FF for the module
vii. Unique Serial No. and Model No. of the module
viii. Date and year of obtaining IEC PV module qualification certificate
ix. Name of the test lab issuing IEC certificate
x. Other relevant information on traceability of solar cells and module as per ISO 9001.

d. RATING STICKERS

All individual modules shall be provided with Rating Sticker label at the back of module which shall provide the information given below for identification. They shall be clearly visible and shall not be hidden by equipment wiring. Type of labels and fixing of labels shall be such that they are not likely to peel off/ fall off during the life of the panel.

1. Manufacturer's Name
2. Model Number
3. Overall Dimensions (W x L x D)
4. Weight (kg)
5. Maximum Power (Pmax) , Voltage (Vmp), Current (Imp)
6. Short Circuit Current (Isc), Open Circuit Voltage (Voc)
7. Main System Voltage
8. Relevant standards, Certification lab. name
9. Warnings, if any

4.0 FUNCTIONAL REQUIREMENTS

Sl No.	Item	Description
1	Product warranty	5 Years from the date of supply against manufacturing defects Free replacement against defects.
2	Product performance (power) warranty	Each Solar PV modules used in solar power plants/ systems must be warranted for their output peak watt capacity, which should not be less than 90% at the end of 10 years and 80% at the end of 25 years from the completion of the trial run. Free replacement against non-performance.
3	Grouping of PV Modules	PV Modules shall be grouped in power output bands (as per our instructions at PO placement) color sticker (20mm * 10 mm approx.) to be affixed on the module frames and outside packing box accordingly.
4	Packing	Modules to be packed in suitable carton box. Modules of the same group (colour band) to be packed in a box. Same colour code sticker (100*100 mm) shall be affixed on the carton box. The carton box should display the manufacturer's name, number of modules, Serial number, Power Output, etc.
5	**Quality Assurance**	
5.1	Pre-dispatch inspection by BHEL/Customer at Vendor's works	BHEL/Customer shall carry out Pre-dispatch inspection (Visual and Electrical) of every lot at vendor's works.
5.2	Performance of SPV module at STC	1) Test Report: 295 Wp (minimum). Shall be inspected/ verified at vendor's works under STC by BHEL/Customer. 2) Sun simulator should be calibrated by a reference PV Module to be tested by MNRE/UL India/TUV Rheinland India/other reputed test lab as per IEC guidelines. Sampling Plan for Inspection by BHEL/Customer at Vendor's works General Inspection Level II and AQL 1.5% as per IS 2500 Part 1
5.3	Visual Characteristics	Each PV module shall be free from the following visual defects: Cell breakage/cracks, Air bubbles or de-lamination, Cells overlapping one another or cells touching the edge frame, scratches on the frame and/or glass, Excessive or uneven glue marks on glass or frame, Inconsistent cell colors. The module shall be complete in all respects. Sampling Plan for Inspection by BHEL/Customer at Vendor's works General Inspection Level II and AQL 1.5% as per IS 2500 Part 1
5.4	IR-HV-IR test	Check the insulation between the shorted terminals of junction box and aluminum frame at 1000 V DC before and after HV test. Test Module to withstand High Voltage of 3000V dc as per IEC 61215.Apply 3000 V DC for 1 minute between the shorted terminals of junction box and aluminum frame. There should not be any di-electric break down. Sampling Plan for Inspection by BHEL/Customer at Vendor's works Special Inspection Level S-2 and AQL 1.5% as per IS 2500 Part 1

Sl No.	Item	Description
5.5	Incoming material checks, in-process checks	Checks on bought out items and In-process checks shall be carried out as per internal standards of the manufacturer
5.6	Reliability Tests	Insulation, Robustness of Terminations and Mechanical Load test as per IEC 61215 Sampling Plan for Inspection by BHEL/Customer at Vendor's works Robustness of terminations on 1 sample per offered lot Mechanical load test on 1 sample per offered lot

Sl. No.	Particulars	**Bidder's Confirmation** Please indicate deviations, if any.
1.	**Confirmation to BHEL Specification PS- 439-328 in totality**	

Note: 1. Any deviation from the above specifications shall be clearly brought out by the supplier.
2. Documents required are to be attached along with the offer.

Signature of Tenderer with stamp

5.0 GENERAL CONDITIONS

1. PV Modules shall be manufactured at the vendor's works only.
2. Traceability process / documents to trace the procurement of DCR solar cells
3. Price bids of BHEL / Customer approved vendors will only be considered for further processing. Necessary documentation to be provided on BHEL requirement.
4. Vendor shall procure the required cells only after BHEL approval.
5. Manufacturing clearance shall be given only after approval of manufacturing quality plan, approval of drawings and datasheet and after sample PV Module approval.
6. Vendor shall ensure that their solar cell sub-supplier is following all process and documentation for traceability of the DCR cells manufactured by them in India.
7. Any additional tests/type tests required by BHEL/BHEL's customer shall be complied and borne by the vendor.

Details to be furnished along with the technical offer

1. Valid IEC Test Certificate and Bill of material
2. A clause wise deviation, if any, has to be brought out clearly. If there are no deviations, the vendor has to positively certify compliance to the specifications in toto.
3. The complete technical information and catalogue shall be given. The bidder shall provide sample solar PV module electrical characteristics including current-voltage (I-V) performance curves and temperature coefficients of power, voltage and current.
4. Reference list of customers to be furnished.
5. List of Manufacturing Equipment available
6. List of Testing Equipment available
7. Manufacturing Process Flow Chart
8. Details of Outsourced Manufacturing Processes (if any)
9. Internal Quality Plan followed by manufacturer
10. A copy of typical routine / sample test certificate
11. Traceability documents for DCR/Indian solar cells

6.0 IEC TYPE TEST APPROVED BILL-OF-MATERIAL/ SUPPLIER LIST

Sl. No.	Item	Sub-Vendor Name (to be mentioned by PV Module supplier)
1.	Solar Cells	Jupiter Solar, Tata Power, Moserbaer PV, Indo solar, Webel, XL Energy
2.	Front Glass	
3.	Fast cure EVA sheet	
4.	Back sheet	
5.	Interconnect & Busbars	
6.	Junction Box (4 terminals, 3 diodes)	
7.	Al. Frames	
8.	Frame Sealing, JB Potting	

Note:

1. Vendors shall source the above mentioned materials only from the approved Bill of Material corresponding to the Indian solar cell/DCR approved IEC test certificate.

2. Sample PV Module approval required from BHEL before bulk manufacturing and supply.

ANNEX-1

FORMATS FOR SUB QR

DEVELOPMENT OF 250 MW SOLAR PV PLANT IN ANANTAPUR DISTRICT (AP)

A) LIST OF SOLAR PLANTS OF CUMULATIVE CAPACITY 1 MW FOR WHICH SOLAR PV MODULES HAVE BEEN SUPPLIED DURING ANY ONE FINANCIAL YEAR.

NAME OF BIDDER/ CONTRACTOR

SLNO	FINANCIAL YEAR	PROJECT LOCATION , CAPACITY, NAME OF CLIENT	DATE OF AWARD	APPROX CONTRACT VALUE	KWp / MWp of MODULES SUPPLIED DURING THE FINANCIAL YEAR

Agency should enclosed client certificate/and/or copy of Letter of Award in respect of above

B) LIST OF SOLAR PLANTS IN SUCCESSFUL OPERATION USING THE SUPPLIED PV MODULES OF 200 Wp or above USING INDIGENOUS OR IMPORTED CELLS.IN OPERATION FOR AT LEAST 6 MONTHS

NAME OF BIDDER/ CONTRACTOR

SLNO	PROJECT LOCATION , CAPACITY, NAME OF CLIENT	DATE OF AWARD	APPROX CONTRACT VALUE	(>) 200 Wp MODULES SUPPLIED (Y/N)	DATE OF COMMISSIONING OF THE PROJECT

Agency should enclosed client certificate/and/or Letter from TRANSCO/DISCOM IN RESPECT OF ABOVE