



BHARAT HEAVY ELECTRICALS LIMITED PHONES:23774494 (EXCHANGE)

CORPORATE RESEARCH & DEVELOPMENT DIVISION

VIKASNAGAR, HYDERABAD - 500 093, INDIA

FAX : 91 40 23770698

RD:DP:MPX:F-04

ENQUIRY

To	-	Enquiry No:	Enq Date:	Due Date:	Delivery By:
	-	571105791	24-OCT-11	26-NOV-11	
	-	<p>PLEASE SUBMIT YOUR QUOTATION IN SEALED COVER SUPERSCRIBED WITH ENQUIRY NO, ENQUIRY DATE AND DUE DATE SUBJECT TO OUR TERMS AND CONDITIONS ENCLOSED, FOR THE FOLLOWING MATERIALS SO AS TO REACH US ON OR BEFORE THE DUE DATE BY 12 NOON. THE TENDERS WILL BE OPENED AT 2 PM ON THE SAME DAY</p>			
Pin					
Email :					
Attn.					

PLEASE GIVE REFERENCE OF ENQ NUMBER , ENQ .DATE AND DUE DATE IN ALL YOUR CORRESPONDENCE FOR PROMPT ACTION. IN CASE IF YOU ARE NOT MAKING THE OFFER PLEASE POST A REGRET LETTER AND RETURN THE DOCUMENTS.

SL NO	DESCRIPTION / SPECIFICATION	UNIT	QTY
1	SUPPLY , ERECTION / INSTALLATION AND COMMISSIONING OF GRID INTERACTIVE 250KWP SOLAR PHOTOVOLTAIC (SPV) INVERTER AT CORP. R&D, HYDERABAD AS PER SPECIFICATIONS ENCLOSED (TT SELLING RATE OF STATE BANK OF INDIA)	LOT	1
1	<p>COMPLETELY FILLED UP AND SIGNED VENDOR COMPLIANCE STATEMENT IS REQUIRED ALONG WITH YOUR OFFER. OTHERWISE YOUR OFFER WILL NOT BE PROCESSED FURTHER.</p> <p>a) ALL OFFERS MUST INCLUDE NAME OF CONTACT PERSON, PH / MOBILE. NO., FAX NO.; EMAIL-ID. UNSIGNED OFFERS ARE LIABLE FOR REJECTION.</p> <p>b) BEING A RESEARCH INSTITUTION RECOGNISED BY DEPT OF SCIENCE AND TECHNOLOGY, BHEL R&D CAN AVAIL CENTRAL EXCISE DUTY EXEMPTION IN TERMS OF GOVT NOTIFICATION 16/2007 - CENTRAL EXCISE DATED 1.3.2007. HENCE SUPPLIERS ARE REQUESTED TO SUBMIT THEIR BIDS WITH OUT EXCISE DUTY.</p> <p>c) TAXES & DUTIES QUOTED WILL BE TAKEN FOR COST EVALUATION & ORDER PLACEMENT AND NO CHANGE WILL BE ENTERTAINED LATER EXCEPT IN THE CASE OF CHANGES MADE BY THE GOVERNMENT. IN CASE ANY TAXES/DUTIES EXEMPTED, A SELF DECLARATION FOR THE SAME MAY BE ATTACHED TO THE OFFER. CHANGES IN TAXES AND DUTIES BECAUSE OF THE CHANGES IN TURNOVER ETC. WILL BE TO SUPPLIER'S ACCOUNT.</p> <p>d) WHEREVER VENDOR REGISTRATION FORM AND EFT DETAILS HAVE BEEN SUBMITTED EARLIER, THE SAME NEED NOT BE SUBMITTED AGAIN UNLESS THERE IS A CHANGE.</p>		
2	<p>PLEASE SUBMIT YOUR OFFER IN TWO PARTS AS PER ENCLOSED "GENERAL TERMS AND CONDITIONS OF ENQUIRY, LOADING FACTORS & CONTRACT FOR THE PURCHASE OF GOODS/ SERVICES" IN SEPARATE SEALED COVERS AS DETAILED BELOW:</p> <p>1) FIRST COVER SHALL CONTAIN A) TECHNICAL & COMMERCIAL BID, B) COMPLIANCE STATEMENT, DULY FILLED-IN, C) UN-PRICED PRICE-BID, I.E. A COPY OF PRICE-BID, WITH PRICE(S) CELLS LEFT BLANK;</p> <p>2) SECOND COVER SHALL CONTAIN PRICE BID. IF THE PRICE BID IS FOUND TO BE DIFFERENT FROM THE UN-PRICED PRICE BID IN ANY WAY, THE OFFER IS LIABLE FOR REJECTION.</p>		
3	SUPPLIERS ARE REQUESTED TO VISIT OUR WEB SITE WWW.BHEL.COM REGULARLY FOR ANY UPDATES AND ADDITIONAL INFORMATION.		



BHARAT HEAVY ELECTRICALS LIMITED PHONES:23774494 (EXCHANGE)

CORPORATE RESEARCH & DEVELOPMENT DIVISION
VIKASNAGAR, HYDERABAD - 500 093, INDIA

FAX : 91 40 23770698

RD:DP:MPX:F-04

ENQUIRY

4	ORDER WILL BE PLACED ON OVERALL L1 BASIS. VENDORS SHALL QUOTE FOR ALL ITEMS. INCOMPLETE OR PARTIAL OFFERS SHALL NOT BE PROCESSED.
5	BHEL RESERVES THE RIGHT TO PROCURE ABOVE ITEMS THROUGH REVERSE AUCTION AND SUBMISSION OF AN OFFER AGAINST THIS ENQUIRY IS AN IMPLICIT AGREEMENT FOR YOUR PARTICIPATION IN REVERSE AUCTION.
6	SCOPE OF SUPPLY INCLUDES, INSTALLATION / ERECTION AND COMMISSIONING.
7	GUARANTEE CERTIFICATE REQUIRED.
8	MANUFACTURER'S TEST CERTIFICATE REQUIRED.
9	INDIAN VENDORS : DESTINATION SHALL BE BHEL R&D STORES HYDERABAD. FOREIGN VENDORS : BHEL R.O.D. OFFICE MUMBAI INDIA.
10	ALL OFFERS SHALL BE VALID FOR A PERIOD OF 90 DAYS FROM THE DAY OF OPENING TECHNICAL BIDS.
11	ALL INDIAN OFFERS SHALL BE QUOTED AS: FOR BHEL R&D STORES, HYDERABAD. ALL FOREIGN SUPPLIERS SHALL QUOTE FOR FCA NEAREST INTERNATIONAL AIRPORT/ SEA PORT ONLY.
12	a) FOR INDIAN OFFERS : OUR STANDARD PAYMENT TERMS AS "100% PAYMENT ALONG WITH TAXES BY EFT/RTGS WITHIN 30 DAYS OF RECEIPT AND ACCEPTANCE OF MATERIAL AT BHEL R&D STORES, HYDERABAD". FOR OTHER PAYMENT TERMS THERE WILL BE A LOADING ON YOUR OFFER AS MENTIONED IN OUR "LOADING FACTORS" SHEET WHICH IS ENCLOSED TO THIS ENQUIRY. b) FOR FOREIGN CURRENCY OFFERS : BHEL STANDARD PAYMENT TERMS ARE "100% INVOICE VALUE BY WIRE TRANSFER WITHIN 30 DAYS OF RECEIPT AND ACCEPTANCE OF CONSIGNMENT AT BHEL R&D STORES, HYDERABAD". FOR OTHER PAYMENT TERMS THERE WILL BE A LOADING ON YOUR OFFER AS MENTIONED IN OUR "LOADING FACTORS" SHEET WHICH IS ENCLOSED TO THIS ENQUIRY.
13	SUPPLIERS SHALL HONOR DELIVERY DATE SPECIFIED IN THEIR OFFER. IN CASE OF DELAY BEYOND SPECIFIED DELIVERY DATE A PENALTY OF 0.5% PER WEEK ON THE VALUE OF UNDELIVERED PORTION OF BASIC MATERIAL COST SUBJECTED TO A MAXIMUM OF 10% OF ORDER VALUE, SHALL BE APPLIED AS PENALTY. IN CASE OF NON ACCEPTANCE TO THIS LD CLAUSE, 10% OF BASIC MATERIAL COST WILL BE LOADED ON THE QUOTED PRICES WHILE COST COMPARISON.
14	<p>GUIDELINES REGARDING DEALING WITH INDIAN AGENTS OF FOREIGN SUPPLIERS</p> <p>1. BHEL SHALL DEAL DIRECTLY WITH FOREIGN VENDORS, WHEREVER REQUIRED, FOR PROCUREMENT OF GOODS. HOWEVER, IF THE FOREIGN PRINCIPAL DESIRES TO AVAIL OF SERVICES OF AN INDIAN AGENT, THEN THE FOREIGN PRINCIPAL SHOULD ENSURE COMPLIANCE TO REGULATORY GUIDELINES WHICH REQUIRE MANDATORY SUBMISSION OF AN AGENCY AGREEMENT.</p> <p>2. IT SHALL BE INCUMBENT ON THE INDIAN AGENT AND THE FOREIGN PRINCIPAL TO ADHERE TO THE RELEVANT GUIDELINES OF GOVERNMENT OF INDIA, ISSUED FROM TIME TO TIME.</p> <p>3. THE AGENCY AGREEMENT SHOULD SPECIFY THE PRECISE RELATIONSHIP BETWEEN THE FOREIGN OEM / FOREIGN PRINCIPAL AND THEIR INDIAN AGENT AND THEIR MUTUAL INTEREST IN THE BUSINESS. ALL SERVICES TO BE RENDERED BY AGENT / ASSOCIATE, WHETHER GENERAL IN NATURE OR IN RELATION TO THE PARTICULAR CONTRACT, MUST CLEARLY STATED BY THE FOREIGN SUPPLIER / INDIAN AGENT. ANY PAYMENT, WHICH THE AGENT / ASSOCIATE RECEIVES IN INDIA OR ABROAD FROM THE OEM, WHETHER AS COMMISSION OR AS A GENERAL RETAINER FEE SHALL BE BROUGHT OUT IN RECORD IN THE AGREEMENT AND BE MADE EXPLICIT IN ORDER TO ENSURE COMPLIANCE TO THE LAWS OF THE COUNTRY.</p> <p>4. ANY AGENCY COMMISSION TO BE PAID BY BHEL TO THE INDIAN AGENT SHALL BE IN INDIAN CURRENCY ONLY.</p> <p>5. WHENEVER INDIAN AGENTS ARE REPRESENTING ON BEHALF OF THEIR PRINCIPALS THE RELEVANT AUTHORIZATION LETTER AND AGREEMENT COPY TO BE ENCLOSED ALONG WITH THE TECHNICAL</p>



BHARAT HEAVY ELECTRICALS LIMITED PHONES:23774494 (EXCHANGE)

CORPORATE RESEARCH & DEVELOPMENT DIVISION
VIKASNAGAR, HYDERABAD - 500 093, INDIA

FAX : 91 40 23770698

RD:DP:MPX:F-04

ENQUIRY

BID TO CONSIDER THE OFFER.

AS WE ARE ENGAGED IN R&D ACTIVITY "C" FORM WILL NOT BE ISSUED

PLEASE FILL UP THE ENCLOSED VENDOR REGISTRATION FORM AND
SEND IT ALONG WITH YOUR QUOTATION. OTHERWISE YOUR
QUOTATION WILL NOT BE CONSIDERED.

Yours faithfully

for

BHARAT HEAVY ELECTRICALS LTD

NALINI THILAK

Sr Dy Gen Manager

Email: nalini@bhelrnd.co.in

Direct Phone : 91-40-23882454

Mobile : 91-9849076669

FORM No. A3-03

INVENTORY No.

SIGN. & DATE

REF. DRG. No.

REV. DATE

ALTERED

CHECKED

APPROVED

REV. DATE

ALTERED

CHECKED

APPROVED

DRAWN

ASN

CHECKED

MSN

APPROVED

CVSN

1

2

3

4

DRG. No.

2

3

4

5

6

7

8

116.8

51.9

3.0

39.5

29.5

2.5

94

3.9

5.1

X

10x270W Structure

PV ARRAY DTAILS :

PV ARRAY : 250 KWp ,

PV MODULE : 24V, 270Wp (940 modules)

PV MODULES/STRUCTURE : 10 NOS.

PV MODULES IN SERIES : 20 NOS.

TOTAL NO OF SERIES STRING : 47 NOS

NOTE :

CONSIDERING SHADOW FREE ZONE AND PROVISION FOR PATHWAY ie 5m

ALL AROUND ARRAY, OVER ALL DIMENSION WOULD BE APPROXIMATELY 117mX40m

ALL DIMENSIONS ARE IN METRES

PRODUCT : SPV POWER PLANT

CUSTOMER: BHEL ,R&D-HYD

BHARAT HEAVY ELECTRICALS LIMITED.

ELECTRONICS DIVISION, BANGALORE

TITLE:

TYPICAL 250 KW PV ARRAY LAYOUT

No. OF SHEETS

01

SHEET No.

01

REV

00

WBS. No.

DRG. No.

3-SK-R&D-250K-01

FORM No. A3-03

A3 SIZE

ANNEXURE – I

DETAILED SPECIFICATIONS for 250 kWp GRID INTERACTIVE SOLAR PHOTOVOLTAIC INVERTER

BHEL R&D is setting up a 250 kWp SPV Power Plant at R&D campus , Vikasnagar, Hyderabad-93. The configuration of the SPV plant is as given below:-

(Please refer to the enclosed Drawing “Typical 250 kW PV array layout , No:3-SK-R&D-250K-01, Rev 00)

S. No.	SPV Plant Module Specifications	Qty.
1	No of SPV modules	940
2	SPV module Specs: (Power output = 270 Wp, $V_{OC} = 44$ V DC; $I_{sc} = 8.44$ A DC ; $V_{mpp} = 35.08$ V DC; $I_{mpp} = 7.66$ A DC)	.
3	No. of SPV modules in a string	20 .
4	No. of Strings	47 .
5	No of Sub-arrays (4 nos of sub-array consisting of 10 strings in parallel and 5 th sub-array consisting of 7 strings in parallel)	5
6	No. of DC inputs to Inverter	5 .

It is required to supply a grid interactive Inverter for the above SPV plant. The scope of supply and specifications for the Inverter are as given below:

1.0 SCOPE OF SUPPLY:

S. No.	Item Description	Qty.
1	Grid Interactive Solar Photovoltaic Inverter	1 No.
2	Environmental Sensors	1 Set

2.0 SPECIFICATIONS FOR SPV INVERTER:

S. No.	Parameter	Description
1.0	INPUT	
1	Maximum DC Voltage for a string	880 V DC
2	Maximum DC Current for sub-array	84.4 Amps DC
3	MPP voltage range	450 to 700 volts DC
4	No. of DC inputs	5 Nos to Inverter through 5 pairs of cables of 95 mm ² each (Provision for proper termination of these cables should be made)
2.0	OUTPUT	
1	Output Voltage	<p>Nominal voltage of 415 (line) V AC, 3 Phase, 4 wire, grid tracking</p> <p>The Inverter output should be provided through an isolation transformer of utility frequency.</p> <p>The inverter output will be connected to a Substation transformer (415 V / 6.6 kV) through 240 mm² cables. Provision for terminating 240 mm² cables should be provided</p>
2	Output Frequency	50 Hz
3	Output Power	250 kWp @ Unity Power Factor
4	Grid Specifications	<p>Nominal voltage is 415 (Line) volts, 50 Hz, 3 phase, 4 wire;</p> <p>Tolerance on nominal voltage is: +15% and -20%</p> <p>Tolerance on nominal frequency is +/- 3 Hz</p>
5	Waveform	Should be DSP/Microcontroller generated PWM, Sinewave output
6	Voltage THD	< 3 %
7	Maximum Efficiency	> 96% ; The vendor shall specify the conversion efficiency at different loads say 25%, 50%, 75% and 100% in his offer.

S. No.	Parameter	Description
3.0	PROTECTION	Inverter should get disconnected from utility grid
1	Over/under voltage; Over/under current at Input	Through Fuses and/ or Circuit breakers/Contactors etc. at Input
	Over/under voltage; Over/under current at output	Through Fuses and/ or Circuit breakers/Contactors etc. at output of Inverter as per specified utility grid tolerance.
2	Over/Under frequency at output	As per specified utility grid tolerance
2	Ground fault detection	To be provided along with audio/visual alarm
3	Insulation monitoring of the PV Array	To be provided along with audio/visual alarm
4	IGBT stack Heat sink over temperature	To be provided along with audio/visual alarm
5	Cooling fan failure (if cooling fan is provided for Inverter stack)	To be provided along with audio/visual alarm
6	Prevention of DC Power injection into the grid.	Inverter output should be through an isolation transformer of utility grid frequency.
7	Surge protection	Surge Protection Devices (SPD) should be provided at input/output of the inverter . The make of the SPDs should be : Phoienix / Obo Betterman / equivalent
8	Provision for Earthing.	Should be provided
9	Protection against islanding of grid	Inverter should automatically get disconnected from grid and should get connected to the grid as per IEEE 1547/UL 1741/or equivalent Indian standards



S. No.	Parameter	Description
4.0	OTHER FEATURES	
1	Modes of operation	Inverter should automatically enter into Sleep mode, standby mode, wake up mode, export mode etc. depending on the operating conditions.
2	Self Diagnostics	A self diagnostic system check should occur on start up.
3	Local display	<p>Indication for Inverter status (online or offline); Inverter ok; system fault etc. shall be provided;</p> <p>Instantaneous values of the following parameters shall be displayed:</p> <p>PV voltage ,PV current , PV Power output, Solar KWh</p> <p>AC voltage (all three phases), AC current (all three phases), AC Power summation output, Exported kWh; Hours run</p> <p>AC output frequency, Power factor</p> <p>Solar radiation, Wind speed, PV module surface temperature, Ambient temp etc</p>
4	Local control	<p>It shall be possible to switch off / or isolate the Inverter MANUALLY from DC side and AC side in case of an emergency.</p> <p>It shall also be possible to test the Inverter in off-grid mode.</p> <p>To facilitate testing in off-grid mode , provision shall be made for setting and adjusting the nominal voltage and frequency from local control panel over its range of operation.</p>

S. No.	Parameter	Description
4.0	OTHER FEATURES	
5	Remote Display	It shall be possible to display all the parameters mentioned at 4.3 through local LAN/Internet on a PC
6	Remote control	It shall be possible to switch off the Inverter remotely through a PC
7	Data logging	<p>The following parameters are to be logged:</p> <p>PV voltage ,PV current , PV Power output, Solar KWh</p> <p>AC voltage , AC current , AC Power output , Exported kWh; Hours run</p> <p>AC output frequency, Power factor</p> <p>Solar radiation, Wind speed, PV module surface temperature, Ambient temp etc</p> <p>Adjustable logging with preset interval</p> <p>Storage capacity for 3 years at 10 minute interval</p> <p>Time and date stamped log entries with provision for data to export as CSV files for MS Excel</p> <p>Fault and event logging with time stamp.</p>
8	Applicable standards	<p>a. Inverter shall confirm to IEC 60068-2 standards for environmental testing.</p> <p>b. Inverter shall conform to IEC 62093 for MPPT Control.</p>



S. No.	Parameter	Description
4.0	OTHER FEATURES	
9	Instruments for SPV Plant Field environmental monitoring.	For measuring solar radiation, wind velocity/direction, module temperature, ambient temperature etc
5.0	INVERTER OPERATING ENVIRONMENT	
1	Environment temperature	0 to 40 Deg. C
2	Humidity	95%, Non-condensing
3	Enclosure	In-door application, IP20
6.0	ANNUAL MAINTENANCE CHARGES	Supplier should quote for AMC

Note :

1. The make of the Inverter should be from reputed manufacturers like **ABB, SIEMENS, SMA, CONERGY, SATCON, XANTREX, KACO, EMERSON, ELTEK VALLERE.**
2. For all bought-out items, Supplier shall submit necessary technical document(s) like catalogs, drawing(s), manuals for operation, maintenance & testing (wherever applicable) from Original Equipment Manufacturer (OEM).



3.0 INSPECTION & TESTING:

1. Vendor shall furnish Test Plan for demonstrating MPPT feature, Protection against Islanding of the grid and for the efficiency of the Inverter for approval by BHEL. Tests shall be carried out by the vendor and will be witnessed by BHEL.
2. Arranging all necessary tools and tackles including consumables needed for the Erection/Installation Work are in Supplier's scope.
3. **During inspection to comply with BHEL specifications, if Supplier carries out any changes, Such changes shall NOT be treated as EXTRA WORK.**