

	PURCHASE SPECIFICATION	BDC1718-50001K	
Rudrapur	GROUP : BDC	Rev no	00

BDC1718-50001K

SPECIFICATIONS FOR SUPPLY AND INSTALLATION OF STRING INVERTER AND WEATHER MONITORING SYSTEM ALONG WITH ACCESSORIES FOR TOTAL 500 KWp ROOF TOP GRID CONNECTED SPV POWER PLANT AT CUSTOMER'S PREMISES IN KOLKATA.

[Handwritten Signature]

Signature and seal of Bidder

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1 INTRODUCTION:

This specification defines the scope of the Bidder in **supply of string inverter, weather monitoring system with all assy. installation, testing and 05 years of onsite maintenance contract for roof Top Grid connected solar power plant of total capacity 500 kWp at three no of buildings of customer's premises Kolkata.**

1.1 Site Details:

Site is located at Kolkata and well connected through road and railway.

Sr. NO	Description	Details
1	Ambient Temperature	Minimum=30 DegC Maximum=35 DegC
2	Relative Humidity	68.00%-75.00%
3	Atmospheric Condition	Humid subtropical climate
4	Latitude	22.5542° N
5	Longitude	88.3359° E

Total 500 KWp system at Three Nos of roof tops as per below mentioned capacity are to be installed:

Sl. No	Location	No of Floors	SPV Capacity kWp
1	Building-1	GF+FF+SF	200
2	Building-2	GF+FF+SF	150
3	Building-3	GF+FF+SF	150

The roof capacities as above are indicative and a minor change in capacity considering design constraint is acceptable. However total capacity of SPV system shall be minimum 500 KWp.



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2 BIDDER'S SCOPE:

System : 500 KWp System at Kolkata

- Supply and Installation of string Inverters.
- Supply and Installation of Weather monitoring system with Web Enabled Data Logging system and with 5 year services along with all accessories.
- Freight & Transit insurance FOR BHEL CFP Rudrapur.
- Onsite Maintenance warranty contract for 05 years.

List of Items for Supply & Installation for System 500 KWp System at Kolkata

Sl. No.	ITEM DESCRIPTION	Qty	SUPPLY	INST ALLATION	MAKE/ REMARKS
1.	String Inverter -50 Kwp	10 Set	✓	✓	Make; Power One Microsystems/ SMA / ABB / SCHNEIDER / Delta / Refusol / Smart Power Test reports confirming to relevant standers shall be submitted
2	Weather monitoring system with web Enabled Data Logging service	1 set.	✓	✓	Data logger should be compatible with the strng inverter used in the RTS preferable same make as of String inverter. Data logging system for entire 500KWp shall be available at single login.
3	Miscellaneous Equipment (Control cables, insulation tapes, , ferrules, Lugs, Cable Glands, cable trays, cable ties, Clamps, Safety Signs, etc.)	1 set	✓	✓	Quantities as required for project completion, Bidder has to organize without any additional cost.



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Note:

- Bidder has to procure materials as per listed make. Whenever equivalent make has to be procured prior approval has to be taken from BHEL submitting the make and technical particulars of the component.
- Inverter shall be jointly inspected by BHEL and Customer in assembled condition prior to dispatch as per approved QAP.
- Each instrument supplied with weather monitoring system shall be with all necessary cables, Assy. Etc. Calibration certificate with calibration traceability to World Radiation Reference (WRR) or World Radiation Centre (WRC) shall be furnished along with the equipment.
- All material shall be supplied to BHEL CFP Rudrapur while installation will be done at Customer's premises in Kolkata. (Please note that BHEL CFP Rudrapur will arrange to send all material at Kolkata at BHEL Cost)

2.7 Comprehensive 05 years on site Maintenance contract.

All the equipment's to be installed for commissioning of solar PV power plant and shall be under onsite Maintenance Contract for 05 (Five) years from the date of successful commissioning.

The equipments or components, or any part thereof, so found defective/damage during Comprehensive Maintenance Contract period will be forthwith repaired or replaced to the satisfaction of the BHEL.

The Down-Time of supplied system should not be more than 24 hours (01 days).



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3 Technical Specification

3.1 String Inverter :

String inverter able to cater total 500 KWp power rating shall be supplied. Individual inverter capacity shall not be less than 50 KWp. Bidder should ensure compatibility of inverter with SPV modules (250Wp, data sheet attached) system. The technical particulars of the inverter have to be submitted to BHEL for approval before procurement.

Sl. No	Technical parameter	Specification
1.	Type	Grid Connected String Inverter (transformer less).
2.	Make	Power One Microsystems/ SMA / ABB / SCHNEIDER / Delta / Refusol / Smart Power
3.0	Standards	
3.1	Efficiency Measurement	IEC 61683/ Equivalent BIS Std.
3.2	Environmental testing	IEC 60068-2 (1,2,14,30) / Equivalent BIS Std.
3.3	Interfacing with utility grid , EMC	IEC 61727, IEC 61000-6-2
3.4	Islanding Prevention Measurement	IEC 62116
3.5	MPPT	IEC 62093
3.5	Type Test certificate issuing authority (for Sl. No. 3.1 , 3.2,3.3,3.4 and 3.5)	NABL/ IEC Accredited Testing Laboratories or MNRE approved test centers.
4.0	Input DC	
4.1	Voltage range	Min 250-1000
4.2	MPP voltage range	Min 420-850
4.3	No of independent MPPT	Min 02
5.0	Output AC	
5.1	Output voltage and phase	Sine wave 3 Phase 415 V $\pm 10\%$ 50Hz AC, minimum 4 wire output RYBN or RYBN+PE
5.2	Reactive power	0.8 lagging to 0.8 leading
5.3	Total Harmonic Distortion (THD)	< 1.8 % at rated power
5.4	Power factor at rated current	0.98-1.00
5.5	Phase Load Imbalance at least 30 %	at least 30 %
5.6	Grid frequency synchronization range	+/- 3 Hz

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5.7	Grid frequency tolerance range	+/-2 or more
5.8	Grid voltage tolerance range	+/- 20%
5.9	Standby power consumption	Standby power consumption of Inverter shall not exceed 20 Watts
6.0	Efficiency	Min 94% at 100% load as per IEC 61683
7.0	Protection	
7.1	DC Side	1. Disconnection device 2. Reverse polarity protection 3. Reverse current to PV array protection over voltage, under voltage over current protection. 4. Short circuit protection: PV fuse 5. Surge protection: SPD type II
7.2	AC Side	1. Short circuit protection 2. Over voltage, under voltage over current protection over and under Grid frequency protection. 3. Anti-Islanding protection 4. AC surge protection
7.3	Ground fault / Grid Monitoring	Yes
7.4	Over Temperature protection	Yes
8.0	Display	
8.1	Display type	LCD/LED
8.2	Display parameter	Voltage, current, power, line status, grid voltage grid frequency, export power and export energy.
9.0	Communication	
9.1	Communication port	Ethernet , RS485, port for web based remote monitoring system and should match with data logger.
10.0	General	
10.1	Operating Temperature	-20 Deg. C to + 60 De. C
	Humidity	95% non-condensing.
10.2	Dimensions	Shall be provided by the Bidder.
10.3	Weight	Shall be provided by the Bidder.
10.4	Cooling	Cooling arrangement (if any) details shall be furnished by the Bidder.
10.5	Ingress protection (IP)	IP 65 or better (Out Door Installation)
10.6	Maximum altitude	Bidder to mention up to what altitude above sea

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		level inverters will work without de-rating.
10.7	Noise level	<45dBA

Note:

Bidder shall provide for installation of the string inverters. Bidder shall depute their service engineer to site during E&C of the string inverters. If Bidder engineers are not competent, Bidder has to arrange engineers from Inverter supplier during commissioning of the plant.

3.1 Weather monitoring system with web Enabled Data Logging Service-

The plant parameters shall be measured by using SCADA (DRAKER) system to monitor, maintain, and control the plan, and also to study the plant performance. The system should meet IEC 61724 standard for this provision. The plant monitoring parameter shall include.

- PV array energy production: Digital Energy Meters to log the actual of AC / DC Voltage, Current & Energy generated by the PV system shall have to be provided.
- Solar Irradiance cum weather station: An integrating **Two Pyranometer** (Class II or better) cum weather station of IP65 /67 shall be provided, with the sensors mounted in the plane of the array, those parameters are associated with solar PV plants. Readout shall be integrated with data logging, system.
 - (i) Class-II
 - (ii) Spectral Response- 0.31 to 2.8 micron.
 - (iii) Sensitivity- Approx. 9 micro-volt/w/m2
 - (iv) Time response (95%): Max 15 s
 - (v) Non linearity: $\pm 0.5\%$
 - (vi) Temperature Response: $\pm 2\%$
 - (vii) Temperature Response= Max $\pm 2\%$
 - (viii) Tilt error: $\pm 0.5\%$.
 - (ix) Zero offset thermal radiation: $\pm 7 \text{ w/m}^2$
 - (x) Zero offset temperature change $\pm 2 \text{ w/m}^2$
 - (xi) Operating temperature range: - 40 deg to +80 deg.
 - (xii) Uncertainty (95% confidence Level): Hourly- Max-3%
 - (xiii) Daily- Max-2%
 - (xiv) Non stability: Max $\pm 0.8\%$
 - (xv) Resolution: Min + / - 1 W/m2
 - (xvi) Input Power for Instrument & Peripherals: 230 VAC (If required)
 - (xvii) Output Signal: Analogue form which is compatible with the data.

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- **Temperature:** Bidder shall provide suitable nos. of RTD type temperature sensors with required weather shield as per Indian Standards, so as to individually and simultaneously measure both, ambient temperature, and module temperature. To measure module temperature, the temperature sensors shall be located on the back of representative modules and on front glass surface. Care must be taken to ensure that the temperature of the cell in front of the sensor is not substantially altered due to the presence of the sensor. Instrument shall have a range of -5°C to 60°C.
- **Anemometer and Wind Vane** - Double cup anemometer on tubular type made up of hot dipped Galvanized Iron. Velocity range up to 65 m/s, accuracy limit of 0.1 m/s. the anemometer shall have valid calibration certificates which shall be produced during one month of the installation.
- Each instrument shall be supplied with necessary cables. Calibration certificate with calibration traceability to World Radiation Reference (WRR) or World Radiation Centre (WRC) shall be furnished along with the equipment. The signal cable length shall not exceed 20m. Contractor shall provide Instrument manual in hard and soft form.
- Software should be designed such that all (i.e. AC & DC) electrical parameters (i.e. I, V, cosΦ, three energy parameters – cumulative & instant) in graphical presentation from string level, next inverter and so on.
- All data shall be recorded chronologically date wise at 15 minutes interval. The data file shall be MS Excel compatible. The data logger shall have internal reliable battery backup and data storage capacity to record all sorts of data simultaneously round the clock. All data shall be stored in a common work sheet chronologically. Representation of monitored data in graphics mode or in tabulation form. All instantaneous data can be shown in the Computer Screen.
- Provision should be made for thermal energy data from installed sensor system to be recorded in all from i.e. graphical & etc.
- Provision also should be made to down load the GHI data of MNRE for Kolkata region.
- Compare the thermal energy data available at ARCI Actual & MNRE and difference may be brought out in graphical presentation.
- Based on actual thermal data of site, electrical energy yield may be calculated for Mono & Poly crystal PV plants and compare with the actual electrical energy generated from PV solar plants The software should bring out clearly the differences of actual energy to electrical energy yield.
- If difference exists, then identification of PV string which is generating less energy should be given as warning signal or alarm to the operator to look into the actual problem for rectifying the same.
- SCADA programming should meet above criteria as per latest IEEE code / standards.
- The scope includes total required hardware (including computer (Industrial

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type), data logger, 2X 160 GB HDD (In Raid Configuration) 4 hrs backup UPS, back up E Proms for software storing, latest detachable memory devices, and software including their licenses.

Web based Remote Monitoring system must be compatible with data logger. The system shall be provided with required accessories and **required SIM card** for wireless communication. The server shall be arranged by the bidder. The rental and other costs of the SIM cards, IP address, Server charge (storage, access charge and other charges if any), and Rental charge of data communication for remote monitoring system for a period of Five (05) years shall be in bidders scope.

Note: The data logger facility of INVERTER can be used. Overall data of each INVERTER system shall be available for analysis on single login ID.

All data of weather monitoring system including inverter is required to be bring in one central location for analysis/recording by data logger.

3.2 Miscellaneous Equipment

Miscellaneous Equipment (Control cables, insulation tapes, ferrules, Lugs, Cable Glands, cable trays, cable ties, Clamps, Safety Signs, etc.) shall be provided by the bidder. Such Items, not listed but required for completion of the Project shall deemed to have been included in the scope of the Bidder.

4 Special Terms and conditions:

4.1 Freight & Transit insurance:

Price quoted by the bidder for each system is inclusive of the freight FOR BHEL CFP Rudrapur.

The Bidder shall take Insurance for transit of materials to the site and for the installation period.

4.2 System Warranty

The bidder must ensure that the goods supplied under the contract are new, unused and of most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the contract.

The complete items supplied, workmanship for each system shall be under warranty of 60 **calendar** months from the date of successful installation. The equipments or components, or any part thereof of the Power Plant, if so found defective during warrantee period, the bidder will remain liable to repair or replace immediately under warrantee obligation to the satisfaction of the Purchaser in order to ensure trouble free operation of the Power Plant. Within the scope of warranty, the Bidder will repair or replace of any defective part of the

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Plant & Equipment supplied, Works done and services rendered under the Contract and render periodic maintenance as a preventive measure to up keep performance of the power plant and also to attend breakdown maintenance as and whenever needed.

4.3 Inspection

Inverter shall be jointly inspected by BHEL and customer in assembled condition prior to dispatch as per approved QAP.

15 days advance Intimation to be given for joint inspection to BHEL .

4.4 Testing and commissioning

The testing and commissioning for all electrical equipment at site shall be according to the procedures listed below:

- All electrical equipment shall be tested, installed and commissioned in accordance with the latest relevant standards and code of practices published by Indian Standards Institution wherever applicable and stipulations made in relevant general specifications.
- BHEL or its authorized representative reserves the right to witness tests conducted by the contractor using contractor's own calibrated instruments, testing equipment as well as qualified testing personnel.
- The results of all tests shall conform to the specification requirements as well as any specific performance data guaranteed during finalization of the contract.
- After completion of the installation at site and for the preparation of plant commissioning, the contractor shall check all the equipment and installation in accordance with the agreed standards, latest relevant code of practices of Indian Standards and specific instructions furnished by the particular equipment manufacturer as well as BHEL Engineer In-Charge.

4.5 O&M Manual and TEST CERTIFICATES

- a) 03 copy of O&M Manual along with as build drawing and project report shall be submitted within 10 days of E&C.
- b) Test certificates/Test Reports for Inverters and WMS.
- c) Equipment shall not be dispatched until BHEL issues a "Dispatch clearance" to Bidder.
- c) Warranty certificates shall be submitted for all bought-out items.

Note:

1. Installation shall be carried out on the roof of 3 different buildings at Kolkata.
2. All tools and tackles for installation of string inverter and weather monitoring system have to be organized by the bidder.

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4.6 Delivery Schedule

For Supply of BOQ and Installation: The total time period for Supply is within 45 days from the date of PO. Installation will be done within 15 days of intimation given by BHEL.

5 GENERAL TERMS AND CONDITIONS:

- 1) Bidder's responsibility, right and liabilities under this project will commence from the date of acceptance of the purchase order.
- 2) The installation activity will have to be carried out in such a manner that will not cause any inconvenience to the other agencies working in the site. Any permits from the customer, if required, are to be arranged by the Bidder for his personnel.
- 3) All the materials brought to site has to have proper paper work like DC, Invoice etc. duly verified & signed by BHEL/BHEL's customer to be submitted to BHEL for payment.
- 4) Any damage to the buildings/structures/area made by Bidder's work men or by Bidder's agent will be made good by Bidder at Bidder's cost.
- 5) Bidder shall take work permit before commencement of all types of non-routine works as per the statutory procedures followed at the work place.
- 6) Bidder shall explain the job, associated hazards and precautions to his workmen.
- 7) Bidder shall ensure deployment of at least one person who should have the skill, knowledge and experience of performing the allotted task and shall be able to guide his team.
- 7) Bidder shall ensure safe procedure is followed during execution of the job.
- 8) Bidder shall ensure that his workmen wear appropriate safety Personal Protective Equipment.
- 9) Bidder shall ensure adequate supervision of the activity by his supervisor.
- 10) Bidder has to adhere to necessary legal/safety requirements and BHEL shall be kept indemnified against any untoward events taking place during the course of work.
- 11) No child labor should be employed for executing the project.
- 12) In case of items are not supplied as per BHEL scope due to reasons arising out of materials from BHEL end/Bidder's end, bidder has to complete the job at later stage without any extra charges. No overrun charges shall be paid in case of extension of project schedules.
- 13) Any miscellaneous materials that have not been mentioned specifically in the specification/tender which are required for Installation of Invertor or Weather monitoring system shall be deemed to be included in the specification and shall be supplied by the Bidder without any extra charges. Any scope of activities which are not specifically mentioned in this specification but required for the Installation of Invertor or Weather monitoring system for safe, trouble free, normal operation shall be provided at no extra cost by the Bidder, unless explicitly excluded in the specification.
- 14) The design and operational features of the equipment offered shall also comply with the provisions of latest issue of the Indian Electricity Rules and other statutory regulations.
- 15) **Statutory obligation:** Bidder is required to meet all the statutory obligations/ legal requirement with regard to workmen deployed by Bidder for the project such as ESI, PF, Minimum wage act, Work man compensation act/Accident/medical insurance, Income Tax act, Employees Insurance act etc.

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- 16) The installation should strictly conform to this specification. All the works shall be executed strictly as per the direction of BHEL engineer at site.

6 LIST OF ENCLOSURES:

Following enclosure makes the part of BDC1718-50001K.

- 6.1 SPV Module drawing- 3-988-00-004-10
- 6.2 SPV Module Data Sheet – EP-901-01-00004
- 6.3 Annexure – A includes Qualifying Criteria.
- 6.4 Annexure – B format for certificate by chartered accountant
- 6.5 Annexure – C Payment terms, bidder's information, and declaration by Bidder etc.
- 6.6 Appendix – D Vendor list

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	PURCHASE SPECIFICATION Annexure A	BDC1718-50001K	
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Annexure A

Qualifying Criteria

Sl. No	Description	Required
1	Acceptance to BDC1718-50001K, Annexure-A, B & C. Attach signed & stamped copies of each page.	Applicable
2.	The Average financial turnover of last Three year should be minimum 27 lakhs. Bidder have to submit audited balance sheet of last three financial years. In case of audited balance sheet is not available bidder to submit certified copy of CA.	Applicable
3	EMD of Rs. 88,000/-(Eighty Eight thousand Only) shall be submitted in form of cash, pay order or demand draft/ NEFT/RTGS to BHEL account in favor to BHEL along with Offer. EMD is exempted for micro & small scale enterprises (MSE) Included. Note: submit attested documentary Evidence/ Govt. Certificate etc. in support of the same along with their Techno-commercial offer. MSE suppliers can avail the intended benefits only if they submit along with the offer, attested copies of either EM – II certificate having deemed validity (Five years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or EM-II certificate along with attested copy of a CA certificate (Format enclosed as per Annexure- B) where deemed validity of EM-II certificate of five years has expired) applicable for the relevant financial year (last audited). EMD to unsuccessful bidders shall be returned after finalisation of PO. EMD to successful bidder shall be returned only after submission of PBG as per Cl. 9.	Applicable Bank Details are as follow: Bank: HDFC Bank Beneficiary Name: Bharat Heavy Electricals Limited A/C NO: 02830310000080 Account Type: Cash Credit BRANCH: Shop 1 & 2, NAINITAL ROAD RUDRAPUR, U. S. Nagar PIN CODE-263153 Tel: 05944 - 241756 / 241368 MICR CODE: 263240002 IFSC CODE: HDFC0000283



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CERTIFICATE BY CHARTERED ACCOUNTANT ON LETTER HEAD

This is to certify that M/s
.....(Hereinafter referred to as 'Company') having
its registered office at is registered under MSMED Act 2006, (Entrepreneur
Memorandum No ((Part-II) dtd Category:
(Micro/Small). (Copy enclosed).

Further verified from the Books of Accounts that the investment of the company as per the
latest audited financial year **as per MSMED Act 2006 is as follows:**

1. For Manufacturing Enterprises: Investment in plant and machinery (i.e., original cost excluding land
and building and the items specified by the Ministry of Small Industries vide its notification No.S.O.1722
(E) dated October 5, 2006:
Rs.Lacs.

2. For Service Enterprises: Investment in equipment (original cost excluding land and building
and furniture, fittings and other items not directly related to the service rendered or as may be
notified under the MSMED Act, 2006:
Rs.Lacs.

The above investment of Rs. Lacs in within permissible limit of Rs..... Lacs
forMicro / Small (Strike off which is not applicable) Category under MSMED
Act 2006.

(or)

The company has been graduated from its original category (Micro/Small) (Strike off which is not
applicable) and the date of graduation of such enterprise from its original category is
.....(dd/mm/yy) which is within the period of 3 years from the date of graduation of such enterprise
from its original category as notified vide S.O.No.3322(E) dated 01.11.2013 published in the gazette
notification dated 04.11.2013 by Ministry of MSME.

Date:
(Signature)
Name -
Membership Number -

Seal of Chartered Accountant

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Annexure C

Terms and condition-

1. **Price basis:** Firm i.e from date of PO to completion of installation.
2. **Delivery:** The total time period for Supply is within 45 days from the date of PO.
3. **Installation:** Within 15 Days of intimation given by BHEL.
4. **Term of Delivery:** FOR. BHEL CFP Rudrapur.
5. **Inspection:** Inverter shall be jointly inspected by BHEL and customer in assembled condition prior to dispatch as per approved QAP.
 - i. 15 days advance Intimation to be given for joint inspection to BHEL.
6. **Payment terms:**
 - a. 80% Payment of supply of BoS (as per BDC1718-50001K) shall be made to Bidder's account within 45 days through e-payment on submission of final bill along with PBG. Remaining 20% payment shall be made within 30 Days of Installation after submitting installation report and handing over memorandum by BHEL. Bidder shall provide its bank A/c details for making e-payment.

All payments to be made to the Contractor under the contract will be in Indian rupees only.
Payment shall be released on furnishing performance Bank Guarantee.
7. **Liquidity Damage:** An unconditional penalty of 0.5% (Half percent) in arrears per week subject to maximum of 10% of PO value for delayed period.
8. **Warranty:**

The bidder must ensure that the goods supplied under the contract are new, unused and of most recent or current models and incorporate all recent improvements in design and materials unless provided otherwise in the contract.

The complete BoS items supplied, workmanship for each system shall be under warranty of 60 **calendar** months from the date of successful installation. The equipments or components, or any part thereof of the Inverter and weather Monitoring system, if so found defective during warrantee period, the bidder will remain liable to repair or replace **within 24 Hrs** under warrantee obligation to the satisfaction of the Purchaser in order to ensure trouble free operation of the Power Plant. Within the scope of warranty, the Bidder will repair or replace of any defective part of the Plant & Equipment supplied, Works done and services rendered under the Contract and render periodic maintenance as a preventive measure to up keep performance of the power plant and also to attend breakdown maintenance as and whenever needed.
9. **PBG:** A performance bank Guarantee of 10% of PO value valid for warranty period of 05 years from the date of successful commissioning with a claim period of 6 months thereafter by the successful Tenderer shall be furnished within 10 days of successful commissioning to the Employer (BHEL). The performance Guarantee can be in the form of a Bank Guarantee (B.G) as per BHEL format, from a Nationalized/ Scheduled Bank. The Bank Guarantee towards Performance Guarantee will be released after completion of warranty period.

Note: Non acceptance/submission of any of the above requirements will render the offer for rejection.

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DECLARATION BY THE BIDDER

I/We

(Hereinafter referred to as Bidder) being desirous of participating for tender, having fully understood the scope of tender and having carefully noted all the terms and conditions, specifications etc. as mentioned in the tender document (BDC1718-50001K) do hereby declare that-

1. The Bidder is fully aware of all the requirements of the tender document (BDC1718-50001K) and agrees with all provisions of the tender document and accepts all risks, responsibilities and obligations directly or indirectly connected with the performance of the tender.
3. The Bidder is capable of executing and completing the work as required in the tender and is financially solvent and sound to execute the tendered work. The Bidder is sufficiently experienced and competent to perform the contract to the satisfaction of BHEL The Bidder gives the assurance to execute the tendered work as per specifications, terms and conditions of the tender on award of work.
4. The Bidder has no collusion with other Bidders, any employee of BHEL or with any other person or firm in the preparation of the tender.
5. The Bidder has not been influenced by any statement or promises by BHEL or any of its employees but only by the tender document.
6. The Bidder is familiar with all general and special laws, acts, ordinances, rules and regulations of the Municipal, District, State and Central Government that may affect the work, its performance or personnel employed therein.
7. The Bidder has never been debarred from similar type of work by any Government undertaking /Department. (An undertaking on Stamp paper in this regard shall have to be submitted)
8. The Bidder accepts that the earnest money may be absolutely forfeited by BHEL if the Bidder fails to sign the contract or to undertake the work within stipulated time.
9. All the information and the statements submitted with the tender are true.

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Details of Bidder

Name of the Party: _____

Address of the Party: _____

Email ID: _____

Bank A/c No: _____

Bank Name: _____

Bank Address: _____

IFS Code: _____

Contact Person (Name of a suitable qualified person who will act as project manager during execution of system & shall be single point contact for BHEL.): _____

Phone No of
Contact Person: _____

Signature and seal of Bidder

LIST OF APPROVED VENDOR

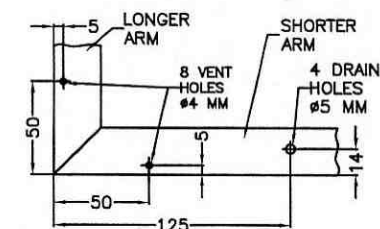
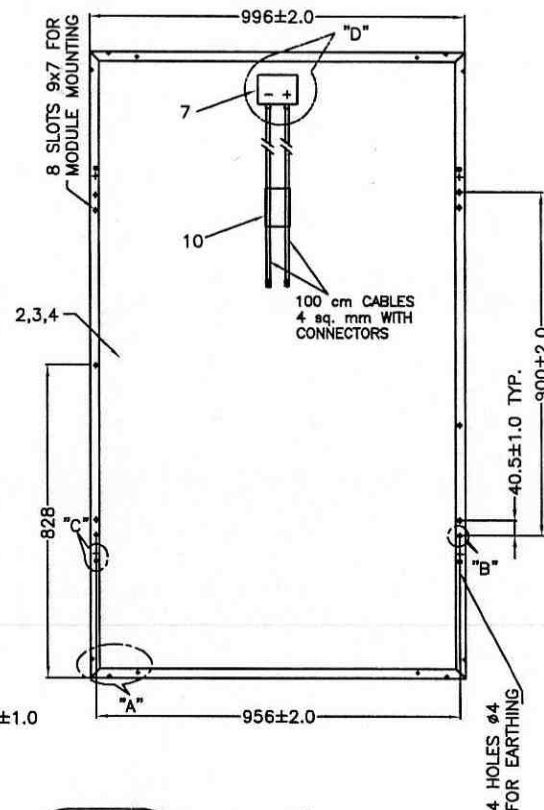
<u>LIST OF APPROVED MAKE/MANUFACTURER</u>			<u>APPENDIX 'D'</u>
S. NO	DESCRIPTION		MAKE/MANUFACTURER
1	2		3
1.	SILICONE BASED WATER PROOF TREATMENT.	:	M/S WACKER METROARK CHEMICAL PVT LTD/ M/S DE-RUST CHEMICAL CORPORATION OF INDIA
2.	APP POLYMERIC MEMBRANE		M/S STP LTD/ M/S TEXA INDIA LTD. / MK PETRO PRODUCT (INDIA) PVT LTD. / PIDILITE / M/S IWL INDIA/HYDROSTOP
3.	APP MODIFIED MEMBRANE	:	M/S IWL INDIA LTD / M/S STP LTD / DR. FIXIT/ TAKDAN (HYDROSTOP)
4.	WATER PROOFING FOR CEMENTITIOUS SURFACE IS-2645		ACROCRETE & ACROCOTE, CICO, FOSROC, MYK LATICRETE, HI TECH, PIDILITE, SIKA, BASF INDIA LTD
5.	CERAMIC TILES (ANTISKID & GLAZED) , VITRIFIED TILES		HR JOHNSON TILES / SOMANY / ASIAN / KAJARIA / VARMORA GRANITO PVT LTD (31 JUL 2016) / SWASTIK CERAON LTD
6.	ANY TYPE TILES ADHESIVE AND GROUTING		PIDILITE INDUSTRIES LTD / SOMANY CERAMIC LIMITED
7.	HIGH GLOSS SYNTHETIC ENAMEL	:	SHALIMAR PAINTS (SUPERLAC SATIN FINISH) / ASIAN PAINTS (APCOMIN SYNTHETIC ENAMEL) / BERGER(LUXOL) / ICI(DULAX SUPER GLOSS 5 IN 1)
8.	SYNTHETIC ENAMEL PAINT 1ST QUALITY ONLY	:	ICI PAINT (DULUX), ASIAN PAINT (APCOLITE), SHALIMAR PAINTS (SUPERLAC), GOODLASS NEROLAC PAINTS (NEROLAC), JENSON & NICHOLSON PAINTS LTD (BOROLAC), BERGER PAINTS (LUXOL).
9.	ACRYLIC DISTEMPER/OIL BOUND DISTEMPER	:	ASIAN PAINTS (TRACTOR UNO), BERGER (JADOO), ICI(SUPER COTE INTERIOR EMULSION),
10.	CEMENT BASE PAINT	:	SNOWCEM PLUS, DURACEM , SUPER ACROCEM CEMPLUS BY TATA PIGMENT, BERGER (XTRCE M-76 SUPERIOR CEMENT PAINT), ASIAN PAINT (GUTUCAM)
11.	PLASTIC EMULSION PAINT	:	BERGER (LUXOL SILK SPLENDER), ICI(DULUX VELVET TOUCH)
12.	PVC INSULATED CABLES ISI MARKED	:	NICCO / FINOLEX / HAVELLS / HPL / RR KABEL LTD. / KEI INDUSTRIES
13.	SWITCHES, SWITCH SOCKETS, SOCKETS, BUZZER, REGULATOR & ALLIED ITEMS	:	ANCHOR/ LEGRAND/HAVELLS/ CRABTREE

1	2	3
14.	MCB/ ELCB / RCCB/ DB/ ISOLATORS	L&T(HAGER)/ SIEMENS/ ABB, LEGRAND LINE)
15.	MCCB	L&T / ABB / SIEMENS/ LEGRAND
16.	SWITCH FUSE UNIT, STARTERS, CHANGEOVER SWITCH, CONTACTORS, RELAYS, TIMERS, AUTOMATION	: ABB / L & T / LEGRAND / SIEMENS
17.	LUMINARIES (FTL, CFL, LED, HPSV, METAL HALIDE, AVIATION OBSTRUCTION LIGHT ETC)	: PHILIPS/ CROMPTON GREAVES/ BAJAJ/ HAVELLS/ SURYA ROSHNI LTD /INDOASIAN/HAVELLS
18.	ENERGY METER (TAMPER PROOF)	: SIEMENS / L & T / HPL INDIA LTD (13 OCT 2017) / HAVELLS
	(A) LT PANEL FOR SS HAVING TRANSFORMER CAPACITY 750 KVA AND ABOVE.	: MILE STONE / ADVANCE / UNILEC / L&T
	(B) FOR LT OTHER THAN (A) ABOVE PANELS	: MILE STONE / ADVANCE / UNILEC / L&T
	(C) FOR OUTER FEEDER PILLAR BOX	: MILE STONE / ADVANCE / UNILEC / L&T
19.	DISC, PIN, SHACKLE LOOP PORCELAIN INSULATOR	: BHEL, JAIPURIA BROTHERS, PACTIL, SOUTHERN INSULATORS
20.	ACSR CONDUCTOR	: ALIND / INDIAN ALUMINIUM LTD/ BHARAT CONDUCTORS
21.	LIGHTING CONDUCTOR /LIGHTING ARRESTERS	: OBLUM, ELPRO, AREVA (T&D),BHEL,
22.	INSULATING MATS AS PER IS 15652:2006	: PREMIUM POLYFILM/SUNTEX INSULATION/SAFE VOLT/PADMINI INDUSTRIES/ JAIPURIA BROS
23.	ALTERNATOR	: KIRLOSKAR ELECTRIC / CROMPTON GREAVES / BHARAT BIJLEE/ SIEMENS/ALSTOM.
24.	HT XLPE CABLE	: GLOSTER / ASIAN CABLES (RPG)/ CCI (TROPODOUR)/ HAVELLS/ KEI INDUSTRIES
25.	LT XLPE CABLE	: HPL INDIA LTD. / HAVELLS INDIA LTD/ GLOSTER INDIA LTD/ KEI INDUSTRIES
26.	CABLE JOINT KIT -	: RAYCHEM/ DENSON/ BIRLA 3M
27.	VOLT METER, AMP METER & FREQUENCY METER (DIGITAL TYPE)	: HAVELLS INDIA LTD/ HPL INDIA LTD. / L& T / AE
28.	SELECTOR SWITCH, SINGLE PHASE PREVENTERS, PHASE SEQUENCE CORRECTOR, PHASE INDICATOR	: SIEMENS/ABB / BCH / L&T
29.	PRESTRESSED CONCRETE CABLE COVER	: MEHTAB TILES /BR PRECAST / ANJALI
30.	SEALING COMPOUND & JOINT FILLER	: STP LIMITED/ SHALIMAR (TAR)/ M. K. PETRO PRODUCTS (INDIA) PVT. LTD/CICO/BASF/DR FIXED
31.	CONSTRUCTION CHEMICALS(ADMIXTURE, FLOOR HARDENER, GROUTS, SEALENTS ETC)	: MYK SCHOMBURG, SIKa, FOSROC, M.C. BACHEMIE, PIDILITE(DR FIXIT), M/S WACKER METROARK CHEMICAL PVT LTD, M/S DE-RUST CHEMICAL CORPORATION OF INDIA., BASF INDIA LTD.

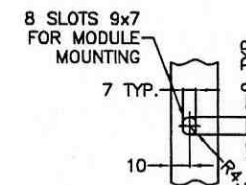
1	2	3
32.	INTEGRAL WATER PROOF COMPOUND	: WATER SEAL, MYK LATICRETE, STP NO 1, PEDILITE (DR FIXIT), ACCO PROOF, FOSROC, CICO. BENGAL BITUMEN, SIKA, BASF INDIA LTD, BLUE SEAL/ROOF CON.
33.	PRESTRESSED CONCRETE POLE	: NEELACHAL/CONCRETE FABRICS/ CEMENT FABRICS/PERTO ENGINEERS
34.	DWC PIPE	: ALOM POLY EXTRUSION/ REX POLY EXTRUSION (ELEDTEX)
35.	POLYCARBONATE PANEL BOARD	: HENSEL/EMITTER
36.	PACKAGE SUB STATION	: ABB/ SIMENS /BHEL /ANDREW YULE
37.	HT SWITCH GEAR	: BHEL/ABB/AREVA (T&D)/SIMENS
38.	TRANSFORMER	: CROMPTON GREVES/ BHEL/ ABB/ SIMENS
39.	AERIAL BUNCHED CABLE	: HAVELS/ KEI INDUSTRIES/ GLOSTER/ ASCON (RPG)/ CCI
40.	LT FEEDER PILLAR BOX	: L&T / MILE STONE/ ADVANCE/ UNILEC
41.	BITUMEN	(i) M/S INDIA OIL CORPORATION LTD. (ii) M/S BHARAT PETROLIUM CORPORATION LTD. (iii) M/S HINDUSTHAN PETROLIUM CORPORATION LTD.
42.	SOLAR PRODUCTS	: M/S JACKSON ENGINEERS LIMITED/ M/S THERMAX LIMITED/ M/S SU-KAM POWER SYSTEM LTD./ M/S POWER-ONE MICRO SYSTEM (P) LTD
43.	INVERTER	: POWER OWN MICRO SYSTEMS/SMA/ABB/SMART POWER/REFUSOL/DELTA/SCHNIEDER ELECTRIC
44.	TRANSFORMER	: ABB/SCHNIEDER ELECTRIC ASCOTT TRANSFORMER/VOLTECH/SCHNEIDER ELECTRIC
45.	SWITCH GEAR	: SCHNEIDER ELECTRIC/MEGAWIN/ABB/BHEL/SEIMENS/ L&T
46.	DC DISCONNECT	: SCHNEIDER ELECTRIC
47.	SCADA	: DRAKER
48.	PVC INSULATED CABLES ISI MARKED	: NICCO / FINOLEX / HAVELLS / HPL / RR KABEL LTD. / KEI/HARSH/MESCAB

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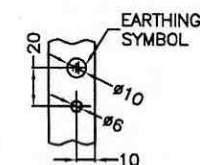
Technical drawing of a rectangular frame assembly. The overall dimensions are 1656 ± 3.0 (height) and 996 ± 2.0 (width). The drawing shows a grid of 12 columns and 12 rows of rectangular cells. Labels 1, 5, 6, 9, and 11 point to various components of the frame. A small detail 'F' is shown in the bottom-left corner, and a dimension 'm' is indicated for the bottom-left corner area.



DETAIL - "A"



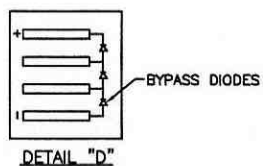
DETAIL - "B"



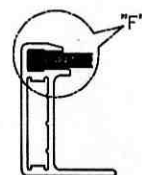
DETAIL - "C"

NOTE : REFER DATA SHEET NO. EP-901-01-0004

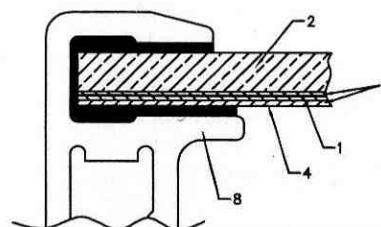
11	RFID TAG
10	MODULE RATING STICKER
9	PV MODULE SL. NO. STICKER
8	ANODISED ALUMINUM FRAME (Coating Thk. : 18+/- 3 Microns)
7	JUNCTION BOX -- IP 65 WITH CABLES & CONNECTORS
6	BUS BAR
5	INTERCONNECTS
4	BACK SHEET
3	EVA SHEET
2	HIGH TRANSMISSION TEMPERED GLASS
1	60 Nos. OF 156 mm MULTI CRYSTALLINE SILICON SOLAR CELLS CONNECTED IN SERIES
PART	DESCRIPTION



DETAIL "D"



DETAIL - "E"



DETAIL - "F"

REV.	DATE	ALTERED CHECKED APPROVED	REV.	DATE	ALTERED CHECKED APPROVED	REV.	DATE	ALTERED CHECKED APPROVED
						00	FIRST ISSUE	

DEPT.	SPV
CODE	901

FOR UNSPECIFIED-
TOLERANCES
REFER ED 0230499



SCALE
1 : 10

	WEIGHT(Kg)
--	------------

REF. TO ASSY. DRG.	
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ITEM NO.	No. OF ITEM
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TITLE	SOLAR PHOTOVOLTAIC MODULE (SPV)
	156mm Multi Solar Cell (Corner Block Type)

DRAWING NO.	
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3 988 00 004 10

REV	00
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SHEET NO. 01

NO. OF SHEETS	01
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A4-10

**PRODUCT STANDARD
ELECTROPORCELAINS DIVISION**

EP – 901 – 01 - 00004

REV. 00

PAGE 01 OF 01

**TECHNICAL SPECIFICATION FOR SPV MODULE L20220P
(MULTI - 20 V, 250 WATTS)**

1. PV MODULE TYPE NO. : L20220P
2. CONFIGURATION : SINGLE GLASS LAMINATED TYPE WITH
60 NOS. OF 156-mm MULTI CRYSTALLINE
SILICON SOLAR CELLS (10*6) IN SERIES
CONFIGURATION.
3. OVERALL SIZE : 1656 (±3) * 996 (±2) * 50 (±1) mm
4. WEIGHT : 20 Kg. (Typ.)
5. PV MODULE FRAME MATERIAL : ANODISED ALUMINIUM FRAME (COATING
THICKNESS 18 ± 3 MICRONS)
6. JUNCTION BOX : IP65 GRADE JUNCTION BOX WITH CABLES
AND CONNECTORS
7. RFID Tag : As per MNRE Guidelines

8. TYPICAL ELECTRICAL CHARACTERISTICS:

Type No.	Voc (V)	Isc (A)	Vmp (V)	Imp (A)	Pmax (Wp) Min.	Module Efficiency (%)	Fill Factor (FF) Min.
L20220P-250	36	8.50	29.0	8.33	250	15.2	≥ 0.70

NOTE:

- Electrical specifications mentioned above are at Standard Test Conditions of 100 mW/sq.cm solar insolation (AM 1.5) and at 25 deg. C temperature.
- Measurement repeatability of peak power output: ±3%.
- Refer Drawing no. : 3-988-00-004-10

Abbreviation:

OPEN CIRCUIT VOLTAGE (Voc), SHORT CIRCUIT CURRENT (Isc)
VOLTAGE AT PEAK POWER POINT (Vmp)
CURRENT AT PEAK POWER POINT (Imp)
PEAK POWER OUTPUT (P max.)

REVISION (00): FIRST ISSUE

REVIEWED BY:

APPROVED BY:

NAR Sd/-

CNP Sd/-

PREPARED

ISSUED

DATE

RKP Sd/-

SPV ENGG.

01.05.2017

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