

7. We, ..... (indicate the name of the Bank) lastly undertake not to revoke this guarantee except with the previous consent of the Government in writing.

8. This guarantee shall be valid up to .....unless extended on demand by the Government.

Notwithstanding anything mentioned above, our liability against this guarantee is restricted to Rs.

..... (Rupees .....) and unless a claim in writing is lodged with us within six months of the date of expiry or the extended date of expiry of this guarantee all our liabilities under this guarantee shall stand discharged.

Dated the .....day of .....for.....(indicate the name of the Bank)

### ADDITIONAL CONDITION OF CONTRACT

1. The work shall be carried out as per MNRE/CPWD specifications Part-I (Internal) 2013 and latest, Part-II External 2005 & 2023, amended up to date & as per additional specifications & conditions for this work, CPWD sub - station specifications 2013 and latest, Electrical Work specification internal (Part - I 2007,2013-14 and external 1994 & latest ) and Specifications (Civil) Volume-I & Volume- II, amended up to date .
2. The department reserves the right to send such materials to the manufactures authorized test laboratory to verify the genuineness & quality of the product.
3. The contractor is advised to visit the site before quoting for this tender to apprise himself about the site environments & other condition. The contractor should see the site and understand the work requirements, the condition in regard to accessibility of site and nature of ground, working condition including stacking of materials, installations of T & P etc. conditions affecting accommodation and movement of labour etc and in case of doubt, obtain required particulars, which may in any way influence his tender, from the BSF as no claim whatsoever will be entertained for any alleged ignorance thereof Before submitting the tender, the contractor should visit the site and satisfy himself as to the conditions prevalent there
4. Time is the essence of the Contract. Any piece meal work may also require completing in odd hours in order to restore electrical supply as per requirement of department/for ongoing activities for preparation of flight. If such work arises it will be sole responsibility of contractor to get done the work in given time. The rates shall be inclusive of all such eventualities as well as of all taxes, levies, packing, transportation .handling etc .Nothing extra shall be paid. The contractor shall be responsible for getting all approvals and clearance about labour passes etc as well as all the effort in this connection should be in the preview of contractor. No claim of the contractor shall be entertained by the department for the idle labour.
5. The contractor shall be responsible for any damage done to the building of electrical installations during the execution of the work. Damage, if any shall have to be made good by the contractor at his own cost otherwise the same shall be got rectified made good at the risk & cost the contractor.
6. The work shall be carried out engineering like manner & bad workmanship shall be rejected summarily. For redoing the job, no claim of the contractor shall be entertained on this account.
7. The site shall be cleared of malba, debris caused by working at site by the electrical contractor without any extra cost to the department.
8. The contractor or his authorized representative shall sign the site order book & comply with the remarks entered therein by the representative of the department
9. The Client is not concerned with any rise or fall in the prices of any materials. The rates quoted shall include all costs, allowances, taxes/levies/cess or any other charges including any enhanced labour rates etc., which may been acted from time to time by the State and/or Central Government.
10. The contractor will ensure that all the skilled persons deployed for executing the electrical work possesses the wireman license issued by approved authorities. Consequences arising due to the default of the contractor to comply with this condition would be contractor's responsibility only.
11. The contractor will make his own arrangement for storage of his material. If issued to him departmentally, the material shall be issued to him from JE (E) 's store. The watch & ward of the materials & of the installations would be responsibility of contractor till the work is completed and handed over to the department. Nothing extra shall be paid to the contractor on this account.
12. The contractor shall make his own arrangement for carriage of materials, fittings, cables etc required for execution of work/issued to him departmentally from the site of work at his own cost. Nothing extra shall be paid on this account.

13. All the DB"s switchgears shall have identification marking on them written in white paint. Nothing extra shall be paid on this account.
14. Earth points with studs are to be provided on each of the switch boards/ DB"s
15. The drawings showing layout of the main board, allied equipment shall be got approved by the contractor from the Engineer-in-charge before fabrication & execution.
16. All hardware, fastening material viz, nuts, bolts, washers & screws etc to be used on work shall be of zinc and cadmium plated iron.
17. The contractor shall have to furnish the insulation test report, earth report, along all required details of electrical load on the prescribed Performa for the electric connection from Supply Company as reqd.
18. The contractor shall submit the completion certificate & completion plan as per clause 2.30 (Appendix F) of General specifications for Electrical works Part-I Internal 2013.
19. All concealed work & earthing shall have to be done in the presence of Engineer-in-charge or his authorized representative.
20. A list of approved make of materials to be used in the work is appended as Annexure-I. The contractor should use only the approved makes of materials in the work specified in the Annexure-I. The make of MCB DB should be same as of MCB.
21. The quoted rates shall be inclusive of all taxes such as GST, WCT, E-Cess & Cess etc. & nothing extra shall be paid on this account.
22. Only FRLS wires up to 1100V. Grade shall be used in wiring.
23. Thimbles, lugs are to be provided whenever required by the contractor without any extra cost.
24. Loop earthing wire-in place of bare copper wire green/yellow insulated copper wire to be used as per CPWD specification Part-I (Internal) 2013.
25. Proper temporary connections shall have to be provided for maintaining electrical supply to the building during the progress of work, without any extra cost with no hindrance to work of repair maintenance of Solar power plant.
26. The work will also be carried out at different locations in piece meal manner, as and when required.
27. The contractor will ensure the disbursement of wage and documentary evidence paper shall be submitted along with bill by AE (E) while submitting in Division office.
28. Nothing extra will be paid on account of Sales tax/Excise, GST/Turnover Tax or any other Taxes.
29. Any balance items, which are not explicitly spelt out here, but are required for the completeness of the work, shall also be included in bidder"s scope.
30. The Client is not concerned with any rise or fall in the prices of any materials. The rates quoted shall include all costs, allowances, taxes/levies/cess or any other charges including any enhanced labour rates etc which may be enacted from time to time by the State and/or Central Government.
31. The original test certificate of Solar PV panels/ Hybrid Inverters/ VRLA Tubular Gel Batteries / cables carried out by the manufacturer shall also be submitted by the contractor.

## SECTION-A

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### SCOPE OF WORK & TECHNICAL SPECIFICATIONS

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The Scope of work of project for Contractor includes Design, Supplying, Installation, Testing and Commissioning of 25 KWp Solar PV Plant & Alternative Lighting Arrangement, RCC framed structure for Control /Battery Room, CC Pavement up to control room for 10 BOPs of 48 Bn (125 Bn), 51 Bn, 67 Bn and 161 Bn BSF of SHQ I/NAGAR under FTR HQ BSF JAMMU as per site condition, including 5 years onsite maintenance & warranty.

## **1.0 INTRODUCTION:**

Border Security Force (BSF) through this tender intends to establish 25 KWp Solar PV Plant with minimum six-hour battery back-up for 10 BOPs of SHQ BSF I/NAGAR under FTR HQ BSF JAMMU of BSF to utilize solar energy efficiently. The aim of the project will be to utilize latest technology to harness power from sun, maintain and continuously monitor the performance of the system. Hence efficient solar panel in market is envisaged for the system.

## **2.0 PROPOSED SITE LOCATIONS:**

BOP's are located mostly in the remote border areas of 48 Bn (now 125 Bn), 51 Bn, 67 Bn(now 107 Bn) and 161 Bn BSF(82 Bn BSF) of SHQ I NAGAR under FTR HQ BSF JAMMU

Please note that site locations are at 10 BORDER BOPs of 48 Bn (125 Bn), 51 Bn, 67 Bn and 161 Bn BSF of SHQ I NAGAR under FTR HQ BSF JAMMU

## **3.0 SCOPE OF WORK & TECHNICAL SPECIFICATION:**

3.1 The bidder should note that the specifications furnished in the tender is of general nature only and it is the responsibility of the bidder to design, supply, install, commission and put in operation of the equipment and services required for the satisfactory performance of the solar PV power Plant.

3.2 The scope of this specification shall cover study of site condition and based on that design, engineering, manufacture, shop testing, inspection at site and plant, packing & forwarding, transportation up to project site, loading & unloading, storage in safe custody, erection, carrying out preliminary tests at site, commissioning, performance testing of solar photovoltaic power plant and connecting the plant with all existing buildings at the site with associated components and handing over to the BSF all the equipment installed including 5 years maintenance & warranty from the date of Handing over and an additional warranty (by manufacturer) as specified in conditions of contract.

3.3 Each 25 KWp solar PV power plant systems shall be complete with following items:

a) Solar PV modules to achieve total capacity of 25KWp (minimum 330 Watt solar panel)- Made in India, Mono Crystalline silicon solar cells as per latest Ministry of New and Renewable Energy (MNRE) specifications/ relevant Bureau of Indian standard codes (BIS) specifications/latest edition of IEC SPECIFICATIONS. Minimum cell efficiency shall be as per latest MNRE standard. Make of module should be as per MNRE approved vendor list.

The PV modules must conform to the latest edition of any of the following IEC/ equivalent BIS Standards for PV module design qualification and type approval:

### **(A) TECHNICAL SPECIFICATION SOLAR PHOTO VOLTAIC MODULES & CELLS**

#### **Mono//Multi crystalline Silicon Solar Photo-voltaic Modules:**

- 1.1 The PV modules must confirm to the latest edition of any of the following IEC//equivalent BIS standard for PV module design qualification and type approval. Crystalline silicon terrestrial PV modules: IEC 61215 / IS 14286
- 1.2 In addition, the module must confirm to IEC 61730 part-1 requirements for construction & part-2 requirements for testing, for safety qualification or equivalent IS/BIS manufacturer should submit BIS certificate of module.
- 1.3 If PV modules to be used in a highly corrosive atmosphere (coastal areas, etc.) must qualify Salt Mist Corrosion Testing as per IEC61701/IS61701.

### **(B) OTHER DETAILS OF TECHNICAL SPECIFICATION SOLAR PHOTO VOLTAIC MODULES –**

PV modules used in solar power plants/system 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. All specifications refer to the standard Test condition (STC) above modules should be as per MNRE/IEC Norms & Tested at Test centres accredited by MNRE.

## 1.0 IDENTIFICATION AND TRACEABILITY

Each PV module must use a RF identification tag (RFID), which must contain the following information.

- (i) Name of the manufacturer of PV module
- (ii) Name of the manufacturer of solar cells
- (iii) Month and year of the manufacturer (Separately for solar cells and module)
- (iv) Country of origin (Separately for solar cells and module)
- (v) I-V curve for the module (Separately for solar cells and module)
- (vi) Peak wattage,  $I_m$ ,  $V_m$  and PF 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 9000 series. RFID shall be placed inside or outside of each solar module laminate and must be capable to withstand environmental conditions as per latest guideline of MNRE, Govt of india.

**NOTE:1. Only indigenously manufactured PV modules should be used in Solar PV power Plants under this scheme.**

## (C ) TECHNICAL SPECIFICATION OF VRLA Battery

The batteries must be conforming to the latest edition of any of the following IEC / equivalent BIS standard//MNRE guidelines for design qualification and type approval. IEC 61427 / IS 1651 / IS 133369/IS 15549. Make of batteries should be as per MNRE approved vendor list

- a) The batter bank capacity should be as specified in the tender document for solar VRLA tubular gel type.
- b) 75% of the rated capacity of the battery should be between fully charged & load cut off conditions.
- c) The minimum rating of battery voltage (V) and Ah at C/10 rate of discharge.
- d) The General specifications shall be as under.
  - (A) The battery bank shall consist of required number of deep-discharge electrochemical storage cells of 2 volts, suitably incorporated as required. Parallel connections of storage cells will be discouraged.
  - (B) The cells shall be capable of deep discharge and frequent cycling with long maintenance intervals and high columbic efficiency. Automotive or car batteries shall not be accepted.
  - (C) The nominal voltage and capacity of the storage bank shall be selected and specified by the supplier in the bid.
  - (D) The self-discharged rate of the battery bank or individual cell shall not exceed four (4) percent per month.
  - (E) The permitted maximum depth of discharge (DOD), shall be specified by the supplier in the bid. Supplier should also specify the expected life of battery bank.
  - (F) The cells include explosion proof safety vents.
  - (G) The cells shall include the required number of corrosion resistant inter cell required chemicals electrolyte packed in separate containers. Full instructions and technical details shall be provided for electrolyte filling and battery recharging at site for the first time.

- (H) The cells shall preferably be supplied in dry charged condition, complete with all required chemicals electrolyte. Full instructions and technical details shall be provided for electrolyte filling and battery recharging at site for the first time.
- (I) If the cells are supplied in uncharged conditions, then the supplier shall provide full instructions for first time charging including, but not limited to, the following:  
A check list of all items required:  
Minimum specification with possible alternatives of the required battery charger for the first time charging.
- (J) Suitable no of corrosion resistant and anti-acid proof storage racks shall be supplied to accommodate the cells tester and other accessories. The rack design shall be such that minimum space is required, without any way obstructing the maintenance requirements. For metallic racks, standard specified for control panel enclosures and other metallic shall govern.
- (K) All the connectors should be insulated except for the end portion.
- (L) All technical and other details pertaining to the storage cells shall be supplied including but not limited to the following: -
- 1) Rated voltage and ampere hour capacity of each storage cell as the rated discharge rate.
  - 2) Permitted maximum DOD.
  - 3) Self-discharge rate.
  - 4) Cycle life of the storage cell and anticipated life (In years) of the battery bank.
  - 5) Total no of storage cells in use.
  - 6) Details on cell interconnections, if any. All the connectors should be insulated except at both ends from where the connectors are connected to battery terminals. Every cell should have proper numbering marked clearly for its identification. Only pre-insulated connectors should be used.

Bidders have to design battery Ah capacity keeping the following into consideration: Plant should have two-day autonomy i.e. (Battery should accommodate two-day generation) with 6 Hrs daily battery backup, 80% Depth of discharge for the given solar capacity. Bidders have to design batteries for the solar capacity mentioned in tender. Bidders have to provide battery connectivity diagram for each package. Bidders have to provide batteries of **2-volt solar Tubular, Gel type** only. Battery bank capacity will be minimum **7.2 Vah/Wp** as per MNRE guideline. Battery bank at each BOP shall be suitable for providing minimum 6 hrs battery backup to the BOP. Design and calculation for the backup shall be approved from Comdt(Elect) FHQ before supply of material at site.

#### **D) Battery Rack**

Placement of battery should be such that maintenance of the battery could be carried out easily. The non-reactive acid proof material should be provided to cover the entire floor space covering the battery bank.

Battery rack should compulsorily be placed on the appropriate rubber pads to avoid the contact of wooden/metal racks with the floor, to protect wooden rack particularly from termite.

#### **E) POWER CONDITIONING UNIT (PCU):**

PCU should comprise of hybrid inverter, charge controller, visual display and necessary protections. Inverter shall be hybrid inverter based on PWM (pulse width modulation) technology. It must have built in meter and data logger to monitor plant performance through external computer. DSP (digital signal processing) controller is used for controlling the whole unit in quick time. Power conditioners/ Inverters including dual MPPT and protections must confirm to IEC 61683 / IS 61683, IEC 60068-2 (1, 2, 14, 30) / IEC 62109 or equivalent BIS standard, for efficiency measurement and environmental testing. In case if the charge controller is in built in the inverter, no separate IEC test is required and must additionally confirm to the relevant national/international electrical safety standard wherever applicable.

**The PCU should be design in such a way that excess power produced can be exported to the grid and imported from the grid, as and when required.**

**Main features of PCU:**

Switching element	IGBT
Type of charger	MPPT
MPPT range	AS APPLICABLE
Nominal inverter/ Inverters capacity	As per design to the supply the desired power to meet load.
Output voltage	415 Volt, 3 phase (For 25 KVA/20 KW)
Battery bank nominal volt	As per design
Inverter surge rating @ 40 deg C	105% > 60 sec
Inverter output frequency	50 +/- 5%
Inverter efficiency @ 40 deg C, nominal load	<3%
Operating ambient temperature	As per latest MNRE guideline
Humidity	0 to 50 deg C
Enclosure	Free standing, IP 21
Cooling	Temperature controlled fan forced
Protections	<ol style="list-style-type: none"> <li>1. Short circuit</li> <li>2. Overload</li> <li>3. Over temperature</li> <li>4. Over voltage</li> <li>5. Surge</li> <li>6. Phase imbalance (In case of three phase output)</li> <li>7. Reverse polarity</li> </ol>
Standards	<p>To comply IEC-62109-1 IEC-62109-2, IS 16169:2014/IEC 62116:2008, IEC60068-2 (1,2,14,30), IEC 61683, IEC 61000-3-12:2011 and all latest IS/IEC standards as per latest guidelines of MNRE.(Test report to be submitted)</p> <p>Inverter manufacturer must have BIS certificate for the above mentioned Inverter.</p>

Note: Bidders should submit manufacturer authorization on non-judicial stamp paper of appropriate value for Solar panel, Battery & inverter.

If PV modules to be used in a highly corrosive atmosphere (coastal areas, etc.) must qualify Salt Mist Corrosion Testing as per IEC61701/IS61701



The amount of power they produce is roughly proportional to the intensity and the angle of the light reaching them. They are therefore required to be positioned to take maximum advantage of available sunlight within string constraints. Bidder will position the PV modules in such a manner that the maximum power is obtained with the sun's movements during the day. PV modules and associated accessories shall be suitable for continuous outdoor use and withstand with weather condition of the particular site location.

Module deployed must use a RF identification tag as per latest MNRE specifications. Protective devices against surges at the PV module shall be provided. Low voltage drop bypass diodes shall be provided.

PV Module must be tested and approved by one of the IEC authorized test centre.

Module frame shall be made of corrosion resistant materials, preferably having anodized aluminium.

#### **F) Module Mounting structures (MMS)**

MMS shall be as per site condition and shall be so designed to withstand the speed of the wind zone of that particular location (minimum design wind speed of 170 KM/ Hour), clamps and accessories, necessary civil works, as per relevant Bureau of Indian standard codes (BIS) specifications/ Ministry of New and Renewable Energy (MNRE) specifications. Each structure should have angle of inclination as per the site condition to take maximum insolation. However, to accommodate more capacity the angle inclination may be reduced until the plant meets the specified performance. It must be ensured that the design has been certified by recognized lab/Institute in this regard and submit wind loading sheet to BSF. Suitable fastening arrangement such as grouting and calming should be provided to secure the installation against the specific wind speed. The PV array structure design shall be appropriate with a factor of safety of min. 1.5. The structure shall be designed to withstand operating environmental conditions for a period of minimum 25 years.

Civil Work for Module Mounting Structure in flood prone area and other locations as per site requirement & as per the instruction of Engineer in Charge:- Foundation shall be provided considering the flood prone area and structure should be designed to save guard against the flood, with providing the RCC footing like pilling/raft footing etc. and columns to be braced with beam at top column as per structural design/site requirement. Contractor shall be totally responsible against the any damage occurs to the structure due to flood and natural climate like tornado etc. The height of the base of module shall be as per Drawing.

The total load of the structure( when installed with PV modules) on the terrace should be less than 60kg/m<sup>2</sup>, approved structural engineers should certify after the building inspection that the building on which PV plant is to be installed is able to take such loads. The total responsibility is with contractor to check and verify the same. Installation of grid structure for solar PV mounting should not tamper with the water proofing of roofs. In the event of any seepages/leakages, contractor has to rectify with standard water treatment mechanism to the satisfaction of BSF.

Array/module/panels support structure shall be fabricated using corrosion resistant hot dip galvanized with minimum thickness of coating not less than 80 micron on each side. The mounting structure steel shall be as per latest IS2062:1992 and galvanization of the mounting structure shall be in compliance of the latest IS 4759, 2629, 4736 as applicable.

Structure material shall be corrosion resistant and electrolytic ally compatible with the materials used in the module frame, its fasteners, nuts and bolts.

The ground mounting structure design must follow the existing land profile. The proper clearance between lower edge of PV panel and ground level shall be maintained for allowing proper ventilation for cooling , also ease of cleaning and maintenance of panel. The PV panel structures shall be designed in such a way that cleaning of the panels shall be carried out safely.

Each PV panel structures shall incorporate one bird repellent spike at a level higher than the panel edge. The location of the spike should be selected for minimum shadow effect. Fencing shall be required for complete solar power plant at **BOPs** All fasteners should be primarily stainless steel to resist corrosion. The support structure shall be free from corrosion when installed.

PV modules shall be secured to support structure using screw fasteners and /or metal clamps. Screw fasteners shall use existing mounting holes provided by modules manufacturer, adequately treated to resist corrosion.

Adequate spacing shall be provided between any two modules secured on PV panel for improved wind resistance.

The grid structure should be installed in manner to leave sufficient space for repair and maintenance aspect of the roof top, particularly for leakages. Structure analysis and design (STAAD) report of the same shall be approved from Comdt (Elect) FHQ before supply of material.

**G ) Junction boxes (JBs)** shall be as per equivalent BIS Standard, IP 65 (for outdoor use) and IP 54 (for indoor use)

The junction boxes are to be provided in the PV array for termination of connecting cables. The JB's shall be made of GRP/FRP/Powder Coated Aluminium /cast aluminium alloy with full dust, water & vermin proof arrangement. All wires/cables must be terminated through cables lugs. The JB's shall be such a way that the input & output terminated can be made through suitable cable glands. Copper bus bars/terminal blocks housed in the junction box with suitable termination threads conforming to IP65 standard and IEC 62208 Hinged door with EPDM rubber gasket to prevent water entry. Single /double compression cable glands. Provision of earthings. It should be placed at feet height or above for ease of accessibility.

Each Junction Box shall have High quality suitable capacity Metal Oxide varistors (MOVs)/SPDs, suitable Reverse Blocking Diodes. The Junction Boxes shall have suitable arrangement monitoring and disconnection for each of the groups. Suitable markings shall be provided on the bus bar for easy identification and the cable ferrules must be fitted at the cable termination points for identification.

**H) AC/DC DISTRIBUTION BOARD:** shall be as per equivalent BIS Standard/ latest MNRE specification. DC Distribution panel shall receive the DC output from the array field. DC DPBs shall have sheet from enclosure of dust & vermin proof conform to IP 65 protection. The bus bars shall be made of copper of desired size. Suitable capacity MCBs/MCCB shall be provided for controlling the DC power output to the PCU along with necessary surge arrestors.

**AC DISTRIBUTION PANEL BOARD:**

AC Distribution Panel Board (DPB) shall control the AC power from PCU/inverter, and should have necessary surge arrestors. **Interconnection from ACDB to mains at LT Bus bar of exiting building through proper size cable.**

All switches and the circuit breakers, connectors should conform to IEC 60947, part I, II and III/IS60947 part I, II and III.

**The changeover switches/panels, cabling work should be undertaken by the contractor as part of the project.**

All the Panel's shall be metal clad, totally enclosed, rigid, floor mounted, air-insulated, cubical type suitable for operation on three phase/single phase, 415 or 230 volts, 50 Hz.

The panels shall be designed for minimum expected ambient temperature of 45 degree Celsius, 80 percent humidity and dusty weather.

All indoor panels shall have the protection of IP54 or better. All outdoor panels shall have the protection of IP65 or better. It should conform to Indian Electricity Act and rules (till last amendment).

All the 415 AC or 230 volts devise/equipment like bus support insulators, circuit breakers, SPDs, VTs etc. mounted inside the switchgear shall be suitable for continuous operation and satisfactory performance under the following supply conditions

**I) Cables** shall be as per relevant Bureau of Indian standard codes (BIS) Std. (IEC 60227/IS 694 & IEC 60502/ IS1554 (Pt. I&II)/Ministry of New and Renewable Energy (MNRE) specifications.

All cables/wires shall be routed in a G.I. Cable tray/raceway/conduit suitably tagged and marked with proper manner by good quality ferrule or by other means so that cable easily identified.

Power Cables of adequate rating shall be required for interconnection of:

- Modules/panels within array
- Array & DCDB
- DCDB /inverter/Battery bank
- Inverter & ACDB & Interconnection of existing buildings with ACDB/SOLAR PV Plant
- Any other cable as per site requirement

The cables shall be of 1100 volt grade, copper conductor, XLPE/PVC insulated, PVC sheathed, armoured and overall PVC sheathed, strictly as per IS: 7098 (Part I & II) – 1976 or IS 1554. Colour of the outer sheath shall be Black.

Power cables size for 1.1 kV systems shall be chosen taking into account the full load current & voltage drop. The allowable voltage drop at terminal of the connected equipment shall be max. 3% at full load. The derating factors viz. group duration of temp. duration shall also be considered while choosing the conductor size.

Control cables shall be FRLS type 1100 volts grade, copper conductor, PVC insulated, PVC sheathed, armoured and overall PVC sheathed, strictly as per IS: 1554 (Part I) and other relevant standards.

The permissible voltage drop from the SPV Generator to the Charge controller shall not be more than 1% of peak power voltage of the SPV power source (generating system). In the light of this fact the cross-sectional area of the cable chosen is such that the voltage drop introduced by it shall be within 2% of the system voltage at peak power.

All connections should be properly terminated, soldered and/or sealed from outdoor and indoor elements. Relevant codes and operating manuals must be followed. Extensive wiring and terminations (connection points) for all PV components is needed along with electrical connection to lighting loads.

The cable with suitable rating from PV module to inverter to battery bank, inverter to ACDB , ACDB to panel and panel to existing building etc. shall be provided by the bidder as per the site requirement. The rate shall be inclusive in the quoted amount in the bill of quantities. Nothing extra will be paid in this regard.

## **J) LIGHTNING PROTECTION**

The SPV power plants and control room shall be provided with lightning & overvoltage protection. The main aim in this protection shall be to reduce the over voltage to a tolerable value before it reaches the PV or other sub system components. The source of over voltage can be lightning, atmosphere disturbances etc. The entire space occupying the SPV array and control room shall be suitably protected against Lightning by deploying required number of Lightning Arrestors. Lightning protected against induced high-voltages shall be provided by the use of suitable numbers of Early Streamer Emission air terminal(ESE) air terminal / conventional lightning protection and suitable maintenance free chemical earthing (Minimum 4 nos.) such that induced transients find an alternate route to earth.

### **SURGE PROTECTION**

Internal surge protection shall consist of three MOV type surge – arrestors connected from +ve and –ve terminals to earth (via Y arrangement)

## **K) EARTHING PROTECTION**

Each array structure of the PV yard shall be grounded/earthed properly as per IS:3043-1987. In addition the lightning arrester/masts shall also be earthed inside the array field. Earth Resistance shall be tested in presence of the representative of BSF as and when required after earthing by calibrated earth tester. PCU, ACDB and DCDB etc. shall also be earthed properly.

Earth resistance shall not be more than 5 ohms. It shall ensure that all the earthing points are bonded together to make them at the same potential.

## **L) Fire extinguishers, Danger Boards, rubber mat and Signage's**

Danger boards should be provided as and where necessary as per IE Act./IE rules as amended up to date. Three signage shall be provided one in each at battery cum control room, solar array area, and main entry from BOPs. Text of the signage may be finalized in consultation with Engineer-in-charge/owner.

Firefighting system for the proposed power plant for fire protection shall be consisting of the following:

- a) Portable fire extinguishers in control room for fire caused by electrical short circuit
- b) Sand bucket in control room

The installation of fire extinguishers should conform to TAC REGULATIONS AND BIS standards. The fire extinguishers shall be provided in the control room housing PCUs as well as on the roof or site where PV array have been installed.

## **M) Control room for solar plant:**

The size of control room of RCC framed Structure shall be of size 120 sq. feet (minimum), with head room of minimum 2.9 meters & plinth height shall be minimum 1.8 meter in flood prone areas & 0.9 meter in other areas from natural ground level as per drawing and cement concrete pavement 120 sqmtr as per drawing and direction of Engineer-in-charge. The flooring should be of RCC (must withstand the load of batteries and other equipment). Suitable gate must be installed in control

Provision of windows shall be also taken in room for proper ventilation. Roof of control room must be so designed to prevent water lodging.

Following test must be conducted at each site during execution:

- 1- Compressive strength test for cube and brick.
- 2- Slump Test
- 3- Sieve Analysis of fine and course aggregate.
- 4- Silt content.
- 5- Fineness Modulus

The specifications shall be as per CPWD /IS standards and as per drawing and direction of Engineer-in charge.

The control room should be complete with internal electrification (as per CPWD specifications) which include following:

- ☐☐Copper wiring with PVC conduit.
- ☐☐Exhaust fan- 2 Nos.
- ☐☐Ceiling Fan- 2 Nos.
- ☐☐LED tube light- 2 Nos.
- ☐☐LED Flood light (20 watt) -4 no. (for external illumination)
- ☐☐6/16 Amp. switch socket – 2 Nos. each
- ☐☐ Shock proof rubber mat
- ☐☐Fire Extinguisher -01

**N) Contractor shall prepare the drawings for control room and get it approved from Commandant (Elect)/SE FHQ BSF before execution.**

**m) Electrical Load wiring/cabing for Existing Building:**

Separate Electrical load wiring with PVC conduit shall be in the scope of contractor in all the existing BOPs buildings at the project site for solar PV plant supply including conduiting, wiring, switch socket, MCB distribution boards, MCBs, interconnection cables of existing buildings with Solar PV Plant complete in all respect. The wiring should be as per latest CPWD specifications. Contractor shall also repair/replace existing switch sockets, plate etc. as per site requirement. Suitable rating MCBs with distribution boards to be used for electrical protection with proper earthing. The Contractor shall make arrangement for by-pass system/Changeover switches (Manual/automatic type with interlocking arrangement , MCCBs, Panels, Equipment's, switchgears and all other accessories as per actual requirement of site) so that power supply can be transferred easily without long duration/disruption. No extra cost will be paid to the contractor for the same.

Min. Size of wire for lighting ckt. – 1.5 sq. mm FRLS copper wire

Min. Size of wire for power ckt. – 4 sq. mm FRLS copper wire

Cable- XLPE Armoured /Un armoured as per requirement of suitable size.

Switch/socket – Modular/piano type with complete plate, box as per site requirement

Distribution Boards with MCBs- Double door single phase / three phase.

**O) Levelling, Internal roads and paths including storm water drains** for SOLAR PV plant shall be in the scope of contractor. Work shall be done as per CPWD/MNRE specifications, site condition and directions of Engineer-in- charge. No extra cost shall be paid for the same.

**P)** Any other equipment's/ activities which are not specifically mentioned in this documents but necessary for safe and efficient operation of the SPV plant shall be executed by the contractor and no extra cost shall be paid for the same. Site Survey, Layout Planning & Drawings/Documents Before start of work contractor shall conduct survey of the site and finalize the plant location, control room location layout planning and prepare the detailed design & drawings for the complete Solar PV Plant.

The Contractor shall furnish the following drawings after Award and obtain approval from BSF.

a) General arrangement drawings and schematic drawings indicating all the specifications of hardware shall be provided to BSF before starting the installation. The installations shall be only as per the approved drawing of BSF.

b) General arrangement and dimensioned layout Schematic Drawing showing the SPV panel and protection system including battery bank design and any logical control diagram as required.

c) Control room drawings

- d) Array/Module mounting structure design calculation and drawing along with stand pro, It must be ensured that the design has been certified by recognized lab/Institute in this regard and submit wind loading sheet to BSF
- e) Item wise bill of material for complete SPV plant covering major components and associated accessories
- f) Overall layout showing SPV Plant
- g) Electrical schematic drawings with details/ specifications of components of 25 kWp solar power plant with battery bank.
- h) Manufacturer's test certificates/ warranty certificates wherever applicable.
- i) Format for reports and charts for analysis of various parameters.
- j) All safety/ fire protection items as per specifications. Danger boards, warning boards, route marker etc. also to be provided as per statutory regulations. Format for annual maintenance and preventive maintenance and the maintenance activities are required.

### 3.4 Test Reports/Certificate

Contractor shall submit the test certificate/reports for items /components from any of the NABL/IEC Accredited testing laboratories or MNRE approved test centres. The list of MNRE approved test centres will be reviewed and updated from time to time.

Type test certificates for all the tests specified for the factory built Solar PV modules, and the component parts shall be submitted by the contractor.

Contractor shall furnish copies of the test reports for approval before dispatch.

Two sets of copies of the compiled and approved test certificates shall be submitted to the BSF.

### 3.5 Maintenance and warranty

Successful bidder will have to deposit bank guarantee on account of security deposit @5% of project cost. There will be total 5 nos bank guarantee having equal value and value of each bank guarantee shall be 1% of project cost. The BGs shall be submitted by the successful bidder, after completion of work BSF shall release respective BG after completion of each year of warranty period. The validity of bank guarantee shall as below :-

- a) 1<sup>st</sup> BG of 1% value of project value for one year
- b) 2<sup>nd</sup> BG of 1% value of project value for two year
- c) 3<sup>rd</sup> BG of 1% value of project value for three year
- d) 4<sup>th</sup> BG of 1% value of project value for four year
- e) 5<sup>th</sup> BG of 1% value of project value for five year

The Standard Comprehensive Onsite Maintenance & Warranty will be valid for five years including battery bank, mechanical structures, electrical works, inverters, PV Module, charge controllers, maximum power point tracker units, distribution boards, digital meters, switch gear, and overall workmanship of SPV power plant. System must be warranted against any manufacturing / design/ installation defect.

Warranty period will start from the date of handing over of the site to BSF including testing and successfully commissioning of the work of Solar PV plant in all respect.

Warranty will be free of cost and nothing will be paid for repair/ replacement of defective parts /preventive maintenance or any other job on account of works required to execute during warranty period.

The contractor shall sign Service level Agreement (SLA) with BSF on Rs. 100/- stamp paper as per the standard format approved by BSF.

Contractor shall set up office with following maintenance team, Supervisor(Diploma/ B Tech)- 01 No, Technician/Electrician (ITI) - 02 Nos, Unskilled – 02 Nos to attend any defects within 24 hours. Original warranty certificate of equipment's (equipment's having more than 5 years warranty) shall be handed over to BSF after completion of 5 year warranty period.

3.6 The scope of supply shall also include comprehensive insurance of the products against theft/damage/defects and human beings involved against accidents up to completion of work and handing over. Storage & transportation is also in the scope of the contractor.

3.7 All the Electrical works shall be carried out as per the relevant codes and standards and as per the guidelines of prevailing Electrical inspectorate. All liaison work required for Electrical inspectorate approval shall be in the scope of the contractor and the rate quoted by the contractor shall be inclusive of the same. The contractor shall not claim any additional fee for liaison work and he shall prepare the all the necessary documents such as drawings as required for the approval & sanction order.

3.8 Firm shall show valid possession of one Four Wheeler vehicle, Bolero or equivalent (in the bidders name) and proof of machinery so as to ensure smooth maint. During 5 year maintenance period.

### **3.9 Minimum inventories of spare parts shall be kept by the successful bidders during 5 years maintenance period**

**a) SPV module - 30 Nos**

**b) Batteries - 50 Nos**

**c) Hybrid Inverter - 01 No.**

3.10 Firm shall ensure that all labour laws such as ESI & EPF are complies without fail, BSF shall not be responsible in any way for such compliances.

3.11 The civil works, if any, for the supports for SPV/ any chipping works and refinishing by plastering and painting for installation of complete system shall also be in scope of the contractor.

3.12 All the necessary co-ordination with regard to sub-contracted items shall be carried out by the Bidder. The purchaser/Engineer will communicate only with the Bidder for all matter pertaining to this contract.

3.13 The contractor shall be responsible for obtaining necessary statutory approvals / prior approvals, from Local bodies, Electrical Inspectorate, State Pollution Control Board, etc. if any as applicable. All MNRE guidelines for the material and installation should be followed by the bidders. Nothing extra shall be paid to the contractor for the same.

3.14 The total price quoted for this contract shall be all-inclusive basis and shall cover all items and service necessary for successful completion of the contract. All the fittings and accessories that might not have been mentioned specifically in the specification but are necessary for equipment's of the system, shall be deemed to be included in the specification and shall be supplied and furnished by the Contractor without any extra charge.

3.15 The power from Hybrid inverters shall be taken to a distribution panel with multifunction meters at outgoing (Ammeter, Voltmeter, PF, Energy Consumption with a logger that has communication port of RS 232 shall be provided). Necessary number of MCCB with suitable overload and short circuit rating shall be provided for incomer and outgoing.

3.16 The outgoing of the main SPV panel shall be taken through DC cable with proper protection (Through GI Raceways with suitable size) of suitable rating and shall be hooked up over existing panels/DBs. The rate for any modification of existing panel shall be inclusive of the rate quoted.

3.17 The Contractor shall also furnish 2 sets of the approved manuals of instructions at the time of inspection and taking over of the equipment. These manuals shall be properly bound in book form and contain all information, description of equipment, diagram etc., necessary to enable the customer to operate and maintain the whole system. In order to maintain the plant, Spare parts for keeping minimum stock with measuring instruments are to be provided by the contractor.

### **3.18 Pre dispatch Inspection of Material**

Pre dispatch Inspection of PV Module , Module mounting structure, Inverter, Battery, cables shall be carried out at manufacturer's works/plant by BSF representative. Contractor shall be responsible for arranging the inspection. Any test carried out at plant, the expenditure for the same shall be borne by the contractor. No extra cost shall be paid to contractor for the same.

Inspection call to be given at least 7-10 days in advance.

## **4.0 CODES AND STANDARDS**

All Equipment and accessories shall comply to requirement of standards published by latest MNRE Specifications/ Bureau of Indian Standards (BIS). In case no BIS codes exist the equipments shall meet the requirement of international standard including IEC/ IEEE for design and installation of PV system. The list of standards adopted shall be indicated in the bid. Latest CPWD specifications to be followed for Electrical works.

In addition to the above standards, the whole system must conform to the relevant National/ International electrical safety standards.

## 5.0 TOOLS AND SPARES

After completion of installation & commissioning of the power plant, necessary tools & spares are to be provided free of cost by the contractor for maintenance purpose. A list of requisite spares, Fuses, MCCBs etc along with spare set of PV modules to be indicated, shall be supplied along with the equipment.

## 6.0 ACCEPTANCE OF SYSTEMS AND PERFORMANCE EVALUATION

The installer must verify that the system has been installed according to the manufacturer's procedures and latest MNRE guidelines. A checkout procedure should be developed to ensure an efficient and complete installation.

## 7.0 SYSTEM DOCUMENTATION:

It is essential that the owner have complete documentation on the system. System documentation should include an owner's manual, warranty certificates, test certificates, as build drawings and copies of relevant drawings for whatever system maintenance might be required in the future.

## 8.0 INSTALLATION

Installation shall be done by the Qualified engineer who has adequate experience with installation of the PV system.

## 9.0 TIME SCHEDULE

S.No.	Deliverables	Timelines
1.	Final Architectural and Design Report (soft and 2 Hard copies)	15 days from the date of Date of commencement .
2.	Draft Final Detailed Project Report (DPR) includes detailed drawings for constructions as per NIT (soft and 2 Hard copies)	21 days from the date of Date of commencement .
3.	Final Detailed Project Report (DPR) includes detailed drawings for constructions as per NIT (soft and 3 Hard copies)	7 days from the date of comments on Draft DPR
4.	Supply of material at site	45 Days from the date of Date of commencement .
5.	Installation, testing and commissioning and handing over of the project	365 Days from the date Date of commencement .
6.	Onsite comprehensive maintenance and warranty	5 years after and handing over of the project

## 10.0 GUARANTEED TECHNICAL PARTICULARS (TO BE FILLED BY THE SUCCESSFUL BIDDER)

### SPV Module

SI No.	Description	Data filled by Bidder
1	SPV Module	
	Make	
	Total power of PV Module	
	Single PV Module power	

	Type	
	PV Module efficiency	
	Area required (square feet)	
	No. of cells in one PV module	
	DC rating of one module (Wp)	
	Connection configuration	
	Rated DC current of one module	
	Rated DC voltage of one module (Vmpp)	
	No. of PV module in one array (all in series)	
	Max. DC output voltage of Array (Volt)	
	No. of Arrays	

### HYBRID INVERTER

1.	Rating of the PCU/Inverter unit	
2.	Make	
3.	Nominal DC Input Voltage (SPV Array)	
4.	Low Voltage cut off (SPV Array)	
5.	High Voltage cut off (SPV Array)	
6.	Nominal DC Input Voltage (Battery)	
7.	Low Voltage cut off (Battery)	
8.	High Voltage cut off (Battery)	
9.	Type of Controller	
10.	Switching device	
11.	Continuous Rating	
12.	Over Load Capacity	
13.	Output wave form	
14.	Total harmonic Distortion	
15.	Output Voltage	
16.	Output Frequency	
17.	Efficiency	
18.	Cooling	
19.	Ambient temperature	
20.	Humidity range	
21.	LED / LCD Display	
22.	Protection	
23.	Enclosure	
24.	Standard	



## MOUNTING STRUCTURE

SI No.	Description	Data filled by Bidder
1	Type	
2	Material	
3	Overall dimensions	
4	Coating	
5	Wind rating .	
6	Tilt angle	
7	Foundation	
8	Number of Module structure	
9	Fixing type	

## BATTERY Bank

SI No.	Description	Data filled by Bidder
1	Make	
2	Battery type	
3	Storage Capacity	
4	Cell voltage	
5	Container	
6	Cover	
7	Efficiency	
8	Max. depth of discharge	
9	Cell cut off voltage	
10	IS Standard	
11	Accessories	
12	Design Cycle	
13	Charge Efficiency	
14	Rack	

## 11.0 LIST OF APPROVED MAKES OF EQUIPMENT AND MATERIALS

All material should be as per MNRE approved manufacturer list amended up to date

Sl. No.	Item	Make of Materials/Equipment
1	Inverter/Charge Controller/PCU	WAAREE / HBL / FUJI ELECTRIC / POWERION / OPS (OPTIMAL POWER SOLUTION)/ENERTECH/INVERGY
2	SPV PANEL	Navitaas/Citizen/Waaree / Adani / HVR / Shakti Solar/ ADM/ MNRE/ALMM approved
3	Distribution board	Legrand, ABB, schneider, Siemens or other reputed make (ISI Marked)
4	MCB,RCCB, dis-connectors	Legrand, ABB, schneider, Siemens or other reputed make (ISI Marked)
5	DC string cable- copper	Apar/ Siechemm /Lapp or other reputed make (ISI Marked)
6	DC main cable	KEI/ Polycab/ Havells / Phenolex/ RR Cable
7	DC surge protection device	ABB/CITEL/ISKRA or other reputedmake (ISI Marked)
8	660/1100voltgradestrandedPVC unsheathed wire with copper conductor	KEI/ Polycab/ Havells / Phenolex/ RR Cable
9	Modular type switches, Sockets, bell push, etc	Crabtree, Legrand Mosaic, Anchor ,MK Blenze,North west make (ISI Marked)
10	1.1kV Cu/Al Cable	Havells/Polycab/ KEI (ISI Marked)
11	ConduitsPVC/MS	BEC/AKG/ Balco or other reputed make (ISI Marked)
12	Battery	EXIDE / HBL / Racily Udyog / Waaree / Southern battery/NED
13	Fan & Exhaust fan	Usha/ Havells / Orient /CG (ISI Marked)
14	LED Light	Philips/CG/Oshram/Wipro/(ISI Marked)
15	Ordinary Portland Cement Grade 43/53	BIRLA,JK,ACC,ULTRATECH,JAYPEE, AMBUJA, SHREE
16	Reinforcement Steel	TATA , SAIL, RINL, JINDAL, JSW STEEL, SRMB
17	Wall Putty	JK/BIRLA
18	Paint/Polish/Primer/WaterProofingPaint	BERGER, ASIAN, DULUX
19	Powder Coating	AKZONOBEL, ASIAN
20	Epoxy Paint	FIBREX/BASF
21	Floor & Wall Tile(Vitrified & Ceramic)	KAJARIA, ORIENTBELL ,SOMANY
22	Construction/Water proofingChemical,Admixtures	ROFFE, FOSROC, SIKA, ULTRACON
23	Data Monitoring system	WAAREE / HBL / FUJI ELECTRIC / POWERION / OPS (OPTIMAL POWER SOLUTION)

Note:- (1). SE(Elect) FHQ BSF New Delhi can change the make and model of any item as per availability in local market and as per site requirement.

(2). Another document/test report will be asked by competent technical authority after opening of tender or during execution work will be liable to the bidder related with equipment.

**SELECTION AND QUALIFYING CRITERIA****1.0 Project Site Visit & Site Conditions**

**It is seen that the BOP's are located mostly in the remote border areas in the border areas under Jammu sector of BSF . There is no proper road connectivity to the sites at some BOPs falls under Jammu sectors. The material has to be transported through small goods carrier/Tractor. At some places material shall be unloaded and loaded again to cross the river through boat/security check/Border Fencing.**

**The BOPs which are located in flood prone areas; special care (elevated structure up to 5 feet etc.) needs to be taken, while designing the Solar PV Plant and control room.**

Intending Bidder(s) are advised to satisfy themselves before submitting their bids as to the nature of the ground and sub-soil (so far as is practicable), the form and nature of the site, the means of access to the site, the accommodation they may require and in general shall themselves obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid as it is "EPC basis" contract. A bidder(s) shall be deemed to have full knowledge of all the sites whether he inspects it or not and no extra charge consequent on any misunderstanding or otherwise shall be allowed. The bidder(s) shall be responsible for arranging and maintaining at his own cost all materials, tools & plants, water, electricity access, facilities for workers and all other services required for executing the work unless otherwise specifically provided for in the contract documents. Submission of a bid by a bidder(s) implies that he has read this notice and all other contract documents and has made himself aware of the scope and specifications of the work to be done and of conditions and rates at which stores, tools and plant, etc. will be issued to him by the Government and local conditions and other factors having a bearing on the execution of the work.

- a. Public Procurement (Preference to Make in India), Order 2017 & latest will be followed strictly and liable to the bidder.**

Please note that site locations are at "Providing, installation, testing and commissioning of 25 KWp off grid solar power plant at 10 BOPs of SHQ BSF I Nagar, under FTR HQ Jammu".

## FORM "D"

**FORMAT FOR UNDERSTANDING THE PROJECT SITE**

*(on Bidder Letter Head)*

To

**SUPERINTENDING ENGINEER (Elect)**

**ENGG. DTE FHQ BSF**

**New Delhi -110003**

**Subject: Undertaking of the Site Visit for --- (Name of the work / project)**

Sir,

I/we hereby certify that I/we have examined & inspected the sites & its surrounding satisfactorily, where the project is to be executed as per the scope of works. I/ We are well aware about the following

- a) Location of all proposed site and its allied works.
- b) Site clearance and no cutting off the matured trees.
- c) Topography and contouring of the land where the project is to be executed to understand the cutting & filling during the construction and about depth of column/ foundation below the plinth beam.
- d) Nature of the ground & sub-soil of the site and accessibility to the site.
- e) Existing surrounding road level to finalize solar plant location as per standard norms.
- f) Location of Existing Sewer line & Water pipe line network to connect the proposed building and allied works to make the building functional.
- g) Location of existing buildings, Electric Sub-Station/D.G and proposed solar plant to supply the electricity for the existing buildings and allied works to make the building functional.
- h) Law and order condition at site.
- i) Rules and regulations of Security Agencies/ BSF authorities at BOPs for executing works by external agencies.
- j) Availability of water and construction Material.

I / We hereby submit our BID considering above all facts gathered during site visit and each & every aspect have been considered in the Quoted cost of the project since **it is Engineering, Procurement and Construction (EPC) Contract**. I / We hereby confirm that no extra/additional cost shall be claimed on above aspects.

Yours faithfully, Date:

(Signature, name and designation  
of the Authorized signatory)

**Name and seal of Bidder**

**FORMAT FOR NO DEVIATION CERTIFICATE**

[To be submitted on Bidder's Letter Head]

To,

**SUPERINTENDING ENGINEER (Elect)****ENGG. DTE FHQ BSF****New Delhi -110003****Subject: No Deviation Certificate for -----(name of Work /Project)**

Dear Sir,

With reference to above this is to confirm that as per Tender conditions we have visited site before submission of our Offer and noted the job content and site condition etc. We also confirm that we have not changed/modified the above tender document and in case of observance of the same at any stage it shall be treated as null and void.

We hereby also confirm that we have not taken any deviation from Tender Clause together with other reference as enumerated in the above referred Notice Inviting tender and we hereby convey our unconditional acceptance to all terms & conditions as stipulated in the Tender Document.

In the event of observance of any deviation in any part of our offer at a later date whether implicit or explicit, the deviations shall stand null and void.

Thanking you,

Yours faithfully, Date:

(Signature, name and designation  
of the Authorized signatory)

Place:

**Name and seal of Bidder**

## 2.0 ADDITIONAL CONDITIONS

1. It is mandatory for the bidders to attend Pre-bid meeting if any
2. All deputed Staff/ Manpower/Engineers at different BOPs of BSF should possess valid police verification document, valid IDs/Aadhar Card as per requirement of BSF.
3. Due to sensitivity of sites and security reasons of BOPs, work shall be executed in day time only (till 5 PM). Manpower shall not be allowed to stay at BOPs .Labour huts / staff residence shall be arranged by contractor at his cost.
4. The contractor shall himself arrange the required Water facility, electricity for construction/ personal purposes at BOPs at his cost.
5. Load/light wiring, fixing/replacement of switches/ sockets, distribution board with MCB etc. of existing buildings at BOP's shall be in Contractor's Scope. Nothing extra shall be paid to contractor for the same.
6. Suitable change-over switches shall be provided for Grid supply/ DG set/ Solar Power at BOPs.
7. The Standard Comprehensive Onsite Maintenance and Warranty will be valid for five years including Battery bank from the date of taking over of installation of Solar Plant including repair and replacement of defective parts including batteries. Warranty will be free of cost and nothing will be paid for repair/maintenance or any other job on account of works required to execute during Maintenance and Warranty period.
8. Contractor shall appoint state wise maintenance team and attend any defects within 24 hours
9. Contractor shall sign Service Level Agreement (SLA) with BSF on Rs. 100/- stamp paper as per the standard format approved by BSF.
10. Insurance of all the equipment's installed at site shall be in the Contractor's Scope.
11. Phone, photography, camera not allowed at BOPs.
12. The Contractor shall be responsible for consequential effects arising out during the inspection done by the Chief Technical Examiner Cell, Central Vigilance Commission or by the Building Works Committee or third party authorized by BSF or any statutory committee or by any duly authorized representative of BSF, during the progress or any time after the construction and development of project up to the defect liability period, and will take appropriate action for rectification of defective work. Rectification of defective works or replacement of sub-standard materials or articles, as pointed out by the Chief Technical Cell, Central Vigilance Commission, Building Works Committee or authorized representative of BSF or third party authorized by BSF or any statutory committee, will be carried out or replaced by the Contractor at his own risk and cost. BSF will not pay any extra amount for such rectification or replacement.
13. Handing Over of the Project: Contractor will hand over the project to Owner /Client after successful completion of each component of the project in all respect and complete satisfaction of Engineer-In-charge. The partial handing over of project components shall not be considered. Contractor shall also provide necessary Completion Certificate. The onsite maintenance and warranty period will be five years after such handing over.
14. The Contractor shall render all help and assistance in documenting the total sequence of this project by way of photography, slides, audio-video recording etc. nothing extra shall be payable to the agency on this account.
15. Contractor shall arrange water electricity food and lodging at his own cost for workers employed at site, his technical staff and site staff.
16. The work will be commenced by the Contractor only after the approval of drawings from the concerned local authorities including fire fighting's department or any other department as per statutory requirement.

17. The Contractor shall be solely responsible to follow the general clauses of the contract including labour regulations, registration of contractor, obtaining labour license from labour department, safety precautions, etc. and all other statutory provisions related to labour/works as per the prevailing General Clauses of Contract amended from time to time. The Contractor shall stick to the schedule of all activities and carry out it with mutually agreed time frame.

18. Rates and amount Quoted by contractor shall be firm and fixed for entire contract period as well as extended period for completion of the works. No escalation shall be applicable on this contract.

19. Unless otherwise provided in the schedule of quantities the rates tendered by the contractor shall be all inclusive and shall apply to all heights lifts, leads and depths of the structure and nothing extra shall be payable on this account.

20. The contractor shall make his own arrangements for obtaining electric connection and water Connection/arrangement (if required) and make necessary payments directly to the department concerned. No dispute in this regard shall be entertained.

21. Some restrictions may be imposed by the security staff etc. on the working and for movement for labour materials etc. The contractor shall be bound to follow all such restrictions / instructions and nothing extra shall be payable on this account. Labours are not allowed to stay at site after 6 P.M.

22. (a) The Project work will be carried out in the manner complying in all respects with the requirements of relevant bye laws of the local body under the jurisdiction of which the work is to be executed or as directed by the Engineer in charge and nothing extra will be paid on this account.

(b) The contractor shall comply with proper and legal orders and directions of the local or public authority or municipality and abide by their rule and regulations and pay all fees and charges which he may be liable.

23. The contractor shall give a performance test of the entire installation (s) as per standing specification before the work is finally accepted and nothing extra whatsoever shall be payable to the contractor for the test.

24. The work shall be carried out in accordance with the drawings approved, by the Engineer-in-Charge.

25. The contractor shall bear all incidental charges for cartage, storage and safe custody of materials.

26. The contractor shall have to make approaches to the site, if so required and keep them in good condition for transportation of labour and materials as well as inspection of works by the Engineer in charge. Nothing extra shall be paid on this account.

27. No payment will be made to the contractor for damage caused by any accidents, rains, or other natural calamities during the execution of the works and no such claim on this account will be entertained.

28. Various factory made materials shall be procured from reputed and MNRE approved manufacturers or their authorized dealers. List of such approved manufacturers is available at Annexure VII. For the items / materials not appearing in the list the decision of Engineer in charge shall be final and binding.

29. The contractor shall take instruction from the Engineer in charge for stacking of materials at any place..

30. The material shall conform to the quality and make as per attached list in Annexure VII. However for the items not appearing in the list preference shall be given to those articles which bear ISI certification marks. In case articles bearing ISI certification marks are not available the quality of sample brought by the Contractor shall be judged by the standard laid down in the relevant ISI specification/CPWD/MNRE specification. All materials and articles brought by the contractor to the site for use shall conform to the samples approved, which shall be preserved till the completion of the work. However, such articles which bear ISI mark but stand banned by CPWD/MNRE will not be used. Notwithstanding the case of materials of "Preferred Make" as given in Annexure VII, provisions of Clause 10A of the General Conditions of Contract for Central PWD works shall be applicable on the materials of "Preferred Make" also.

31. It must be ensure that all materials to be used in work bear BIS certification mark. In cases where BIS certification system is available for a particular material/product but not even a single producer has so far approached BIS for certification the material can be used subject to the condition that it should confirm to CPWD specification/MNRE

Specifications and relevant BIS codes. In such case written approval of the Engineer-In-Charge may be obtained before use of such material in the work.

32. The final approval of the brand to be used shall be as per the direction of Engineer-in-Charge. The brand used shall be one of the brands in case specified in the list of preferred make / materials annexure-VII.

33. In case of non-availability of material of the brands specified in the list of approved materials an equivalent brand may be used after getting written approval of BSF giving details to indicate that the brand proposed to be used is equivalent to the brands mentioned in the agreement.

**34. Removal of rejected/sub-standard materials.**

The following procedure shall be followed for the removal of rejected/sub-standard materials from the site of work:

(i) Whenever any material brought by the contractor to the site of work is rejected, entry thereof should invariably be made in the Site Order Book under the signature of the Engineer-In-Charge, giving the approximate quantity of such materials.

(ii) As soon as the material is removed, a certificate to that effect shall be recorded by the Engineer-In-Charge against the original entry, giving, the date of removal and mode of removal, i.e., whether by truck, carts, or by manual labour. If the removal is by truck, the registration number of the truck should be recorded.

(iii) When it is not possible for the Engineer-In-Charge to be present at the site of work at the time of actual removal of the rejected/sub-standard materials from the site, the required certificate should be recorded by the Authorized Representative of BSF, and the Engineer-In-Charge should countersign the certificate recorded by the Authorized Representative.

35. The contractor has to take permission from the BSF & local authorities etc. if required for work during night hours. No claim / hindrance on this account shall be considered if work is not allowed during night time.

36. Once the Project is completed and the contractor shall be responsible to attend defect pointed out by BSF and then hand over the Project to the client.

37. The contractor will open an onsite office where maintenance staffs are easily available to attend the fault within time limit.

38. Payment condition :- No payment shall be made against supply of the material, part completion of work, the measurement shall be verified from the BSF Engineers and thereafter 100% payment shall be made after statutory deduction.

39. BOPs are in remote area at Indo-Bangladesh and Indo-Pakistan Border. Successful bidder should be aware about the roads and pathway to access to BOPs. It may be noted that BOPs are in heavy rainfall reasons and will be cut-off from main the main roads for approx 6 months during the year. It is the bidders responsibility to ensure that work may not stop at site during this time. No extension shall be given on account of rainy season.

40. As the BOPs are on Indo-Bangladesh, Indo- Pakistan Border working after 6 PM is not allowed. It is the responsibility of the firm to ensure that all works are completed within stipulated completion period. No extension or concession shall be granted on this account.

**For & on behalf of Tenderer**



**SCHEDULE OF QTY**

**Name of Work:** Providing, installation, testing and commissioning of 25 KWp off grid solar power plant at 10 BOPs of SHQ BSF I NAGAR, under FTR HQ Jammu..

S. No	Description of Item	Qty	Unit	Rate	Amount
1	Providing, installation, testing and commissioning of off-grid ( with the provision to charge from main power source) Solar Photovoltaic Power Plant conforming to MNRE specifications as amended, consisting of Mono Crystalline silicon solar cells, necessary protections, earthing, mounted on RCC structure of suitable strength with following components complete as required as per Appdx "A" The rates quoted should be inclusive of all taxes, transportation charges , loading/unloading at site etc as reqd:-	10	set		
	a) Solar Photovoltaic Module of capacity 350 Wp or above, manufactured in India, conforming to IS 14286/IEC 61215, IEC 61730-Part-1, IEC 61730-Part-2. Solar Photovoltaic Module conversion efficiency shall not be less than 16.5%. 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.				
	b) Hybrid Power Conditioning Unit (PCU) of 350-800 V DC Input voltage range and 400 V AC, three phase, 4 wire, 50Hz +/- 2.5 Hz, output voltage suitable to generate AC Power with efficiency not less than 97%, total harmonic distortion less than 3% and suitable for ambient temperature from 0 to 50 degree C.				
	c) Data Monitoring System complete with accessories.				
	d) Fixing of Array junction box & Main junction box with IP 65 protection and termination arrangement for incoming and outgoing cable along with glands, lugs and other accessories etc. as required.				
	e) Lightning and surge voltage protection.				
	f) Connections & Interconnections by supplying & fixing required size XLPE insulated copper conductor 1.1 kV grade armoured power and control cables between solar modules, main power cable to grid supply PCU unit along with supplying & fixing of necessary channel/conduit lugs and other accessories etc. as required.				
	g) Battery bank of required capacity of solar plant, VRLA 2 volts 750/800 AH - 120 no's batteries. (Total battery bank capacity 1,80,000/- VAH) / <b>Full load battery backup must be up to 06 hrs</b> as per MNRE standards, along-with battery rack and interconnections.				

	h) Cost for construction of RCC structure as required for Battery bank / Control room shall be of size 150 sq. feet (minimum), with head room of minimum 2.9 meters & plinth height shall be minimum 1.8 meter (minimum) from natural ground level as per drawing to be approved by Engineer-in-charge. The flooring should be of RCC (must withstand the load of batteries and other equipment). Steel gate, window-02 nos (minimum) , opening for exhaust must be installed in control room. Roof of control room must be so designed to prevent water lodging and providing approach path of cement concrete from battery room to solar panels (120 sq MTR) of 40 MTR etc. complete as per Scope of Work & Technical Specifications.				
				Total	

Commandant/Superintending engineer (Elect)  
FHQ BSF New Delhi

**Tentative Proposed location of 25KWp Solar Power Plant**

S/No.	Sector HQ	BN HQ	BOP Name
1.	SHQ BSF I NAGAR	51 BN	Kandral
2.			Suresh
3.			Malluchak
4.		67 Bn (Now 107 BN)	Karol Krishna
5.			Faquir
6.			Satpaul
7.		125 BN	6 R
8.			Whaleback
9.		161 Bn (Now 82 BN)	Khora
10.			Tapan

**Note: - Any location changed during execution will be liable to the bidder no extra payment will be made to the contractor/ firm.**

Commandant/Superintending engineer (Elect)  
FHQ BSF New Delhi