



INDRADHANUSH GAS GRID LIMITED

(Joint Venture of IOCL, ONGC, GAIL, OIL and NRL)
GUWAHATI, ASSAM

**BID DOCUMENT
FOR**

**SUPPLY INSTALLATION ,TESTING AND
COMMISSIONING OF SOLAR POWER SUPPLY SYSTEM**

**SECTION-10 & 11 UNDER NORTH EAST GAS GRID
PHASE-III OF IGGL**

OPEN DOMESTIC COMPETITIVE BIDDING

TENDER ID: VCS21000027

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VOLUME – II OF II: TECHNICAL

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Energising Quality

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PROJECT NUMBER: C221052



MR FOR SOLAR POWER SYSTEM

TOTAL SHEETS

31

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4001

INDRADHANUSH GAS GRID LIMITED

NORTH EAST GAS GRID PHASE-III OF IGGL

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ABBREVIATION

CEA	Central Electricity Authority
SEA	State Electricity Authority
BS	British Standards
IGGL	Indra Dhanush Gas Grid Limited (IGGL),
PNGRB	Petroleum and Natural Gas Regulatory Board
OISD	Oil Industry Safety Directorate
MEDB	Main Distribution Board
XLPE	Cross-Linked Polyethylene.
PVC	Poly Vinyl Chloride
NEC	National Electrical Code
UPS	Uninterruptible power systems
MOV	Motor Operated Valve
ACB	Air circuit breakers
MCB	Miniature Circuit Breaker
MCCB	Molded Case Circuit Breaker
MPCB	Motor Protection Circuit Breaker
CT/PT	Current Transformer/Potential Transformer
ELCB	Earth Leakage Circuit Breaker
PDB	Power Distribution Board
O/ILDB	Outdoor/Indoor Lighting Distribution Board
FRLS	Flame Retardant Low Smoke

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1.0 DEFINITION

Where used in this document, the following terms shall have the meanings indicated below, unless clearly indicated by the context to this order:

PROJECT	PMC Services for North East Gas Grid Phase-III OF IGGL.
OWNER	Indradhanush Gas Grid Limited
CONSULTANT	VCS Quality Services Private Limited (VCSQSPL) the party to act for and on behalf of the OWNER for the Engineering Services
VENDOR MANUFACTURER	/ Party, which manufactures and supplies equipment and services to the OWNER or to CONTRACTOR.

2.0 INTRODUCTION

VCS Quality Services Pvt. Ltd. (VCS) has been appointed as a PMC (Project Management Consultant) by IGGL for **“PMC Services for North East Gas Grid Phase-III of IGGL.”**

Indradhanush Gas Grid Limited (IGGL), a joint venture (JV) of IOCL, ONGC, GAIL, OIL and NRL has been entrusted with the responsibility to execute cross country natural gas pipeline connecting all states of the North East and Sikkim. The natural gas Pipeline grid in North East would connect Guwahati to capital cities / major cities of North East states like Itanagar, Dimapur, Kohima, Imphal, Aizawl, Agartala, Shillong, Silchar, Gangtok and Numaligarh. The grid would be connected with upcoming Barauni-Guwahati natural gas pipeline as a part of Urja- Ganga scheme. The grid would also connect to sustainable and viable indigenous gas sources in North-East.

The pipeline grid has been designed with flexibility for gas injection in either direction.

3.0 PROJECT BRIEF

Salient details of the tentative pipeline sections under VCS’s scope of work are as under:

A) Siliguri – Gangtok Pipeline (dia. 12”) – tentative length is 186 Kms.

The pipeline in this section originates from a tap off point on Barauni-Guwahati pipeline at Siliguri and traverses through plain agricultural land and forest land for initial 50 odd kilometers which includes the crossing of Teesta River. Thereafter, the pipeline traverses through hilly terrain along the new highway under construction up to Lava, which is approximately at Ch.108.000 km of this pipeline section and thereafter follows the route of NH-717A up to near Ranipool area. The total area traversed by this pipeline section thus comes out to be approximately 186 km.

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A) SILIGURI – GANGTOK PIPELINE (SGPL) DETAILS

Sr. No	Type of Station	Nos.	Location
1	Dispatch Terminal (DT / SGPL)	1	Siliguri
2	Intermediate Pigging Station (IP/SGPL/01)	1	Tentatively at Lava
3	Receipt Terminal (RT/SGPL) with/ without Tap off	1	Gangtok
4	Sectionalizing Valves (SV/SGPL/01 to SV/SGPL/08) with/without Tap off	8	Along the Siliguri-Gangtok route

B) Dimapur – Kohima-Imphal Pipeline (dia. 12”) – tentative length is 199 Kms

The proposed pipeline route traverses through plain agricultural land and forest land for initial 5 odd kilometers and then enters the ghats/hilly terrain and traverses through it till Senapati town which is approximately at Ch.155.000 km of this pipeline section (en route taking the under-construction Kohima Bypass Road) and then runs through more or less plain area till Sekmai. The total area traversed by this pipeline section thus comes out to be approximately 199 km.

Summary of various stations envisaged in the proposed North East Gas Grid Phase-III of IGGL are as under:

B) DIMAPUR – KOHIMA- IMPHAL PIPELINE (DIPL)

Sr. No	Type of Station	Nos.	Location
1	Dispatch Terminal (DT/DIPL)	1	Dimapur
2	Intermediate Pigging Station (IP/DIPL/01))	1	Tentatively at Tadubi
3	Receipt Terminal (RT/DIPL) with/ without Tap off	1	Imphal
4	Sectionalizing Valves (SV/DIPL/01 to SV/DIPL/10) with/without Tap off	10	Along the Dimapur-Kohima-Imphal route

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3.1 SOLAR POWER SYSTEM DETAILS

Sr. no.	Location	SVP SYSTEM	Charge Controller	Battery Banks	Battery Charger
1	SV (9 nos.)	2nos X 10KW = 20 KW	2nos X 20KW = 40 KW	Required	Required
2	SV + CP (9 nos.)	2nos X14 KW = 28 KW	2nos X28 KW = 56 KW	Required	Required
3	DT (1 no.)	2nos X10 KW = 20 KW	2nos X20 KW = 40 KW	NA	NA
4	IP (2 nos.)	2nos X10 KW = 20 KW	2nos X20 KW = 40 KW	NA	NA
5	RT (2 nos.)	2nos X10 KW = 20 KW	2nos X20 KW = 40 KW	NA	NA

3.2 SITE CONDITIONS

Parameters	
Max / Min. Temperature	50/-5 °C
Design Temperature	50°C
Relative Humidity	95%
Altitude above Sea level	Up to 1000 Meters
Atmospheric pollution	Designed to withstand the site conditions, dust, vapour, Industrial Gases
Hazardous Area classification	Zone-2, Gas group IIA, IIB, for
Control Room/ Solar Power system room/ D.G. Room/Guard Room/ Battery room.	Safe area

4.0 SCOPE

This document is to describe the scope of Solar Power system work which will be used for "NORTH EAST GAS GRID PHASE-III OF IGGL".

In case of conflicting requirement of tender documents, following priority shall govern in general. However, in case of conflict, it shall be referred to Client for clarifications and decision of Client shall be final and binding with or without any cost implications

- The requirements of any statutory body shall govern.
- SOR/Data Sheets
- This specification / Basis of design
- Scope of Works

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- Latest Code & Engineering Standards

This document establishes minimum requirements of Solar Power system Design Parameters and Basis for Design and Detailed Engineering of the North East Gas Grid Phase-III of IGGL Pipeline network & associated facilities covered under this project as defined briefly herein below.

The scope of specification shall provide the minimum requirements & form the basis for carrying detailed design engineering for Solar Power system power system, sizing of various Solar Power system equipment's, & their supply, installation, testing & commissioning of the Solar Power system for North East Gas Grid Phase-III of IGGL Pipeline network & associated facility. This document also provides the general guidelines for preparation of Solar Power system specification, datasheets and other relevant documents.

This section covers the details of work tendered and scope of work pertaining to Solar Power system work including supplying, fabrication, erection, inspection and testing, supplying material and consumable providing pre-commissioning and commissioning assistance to owner, clean up and restoration of site for North East Gas Grid Phase-III of IGGL DT, RT IP & SV Stations.

4.1 SCOPE OF SUPPLY

Following electrical equipment and material are in the contractor's scope of supply in this tender.

- (a) Solar Array/Panels, Anodised Al/Hot dip galvanized MS mounting structure, Junction boxes, Charge controller, DCDB, Ni-Cd Battery bank, DC-DC converter, FCBC Grid charger (unidirectional/bidirectional), interconnecting cables among - arrays, charge controller, DC-DC Converter, DCDB, Battery bank, Grid charger etc as per enclosed SOR and specification.
- (b) Offered solar PV cells & Modules shall be from existing regular manufacturer's plant/unit and have BIS certification of the Solar Photovoltaic Module. IEC/UL/CE certification is also accepted in case BIS is exempted as per the Indian Gazette order dated 13/07/2018 issued by MNRE.
- (c) A stand alone dusk-dawn solar photovoltaic street lighting system for outdoor emergency lighting as per enclosed specification and SOR.
- (d) Power conditioning unit of suitable capacity (MMPT-PCU) for the On-grid SPV system including supply of cables, JB's, Inverters, cable trays, distribution panels, electrical switchgears, inverters, metering and connecting the system to the switch gear (MCB/Distribution Board) etc.
- (e) MV power and control cable (Cu-Conductor, XLPE – insulated, PVC sheathed, armoured/unarmoured, FRLS cables as required). Solar grade cable shall be used for the Module wiring & outdoor cables.
- (f) GI pipes, GI Cable-trays and accessories, cable markers, identifier tags, GI saddles and all other associated accessories as required for cable laying.

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- (g) FLP (CMRI, PESO approved) type double-compression nickel-plated brass cable glands, tinned-copper lugs, clamping material etc. for cable termination.
- (h) Earthing including earthing pits, earth electrodes, earthing strips, grounding conductor of various sizes .
- (i) Lightning & Lighting surge protection must be provided for the SPV array and other solar system components, MPPT/PCU/Charger Input side and Output side as per IEC 62305.
- (j) Fabrication and supply of MS frames, supports, canopies and brackets for miscellaneous electrical equipment, including welding, supply of bolts, nuts etc for mounting and other necessary supplies, all inclusive of painting etc as required.
- (k) Two years operational spares as per list provided in this document.

4.2 INSTALLATION, TESTING & COMMISSIONING

- (l) Delivery to site, storage, Transportation from storage to site, Installation, earthing, testing, commissioning and performance test at site (full load test) of the complete Solar system with solar array, charge controller, FCBC Grid Charger (unidirectional/bidirectional), Ni-Cd battery banks, DC-DC Converters, PCU, Distribution boards, junction boxes, interconnecting cables etc as per enclosed specification, data sheets and SOR. Tenderer shall submit the sizing calculations for SPV array, charge controller, battery bank and Grid charger & PCU. However the rating of each subsystem shall not be less than as indicated in SOR.
- (m) Installation, earthing, testing & commissioning of the stand alone dusk-dawn solar photovoltaic street lighting system including all civil work etc as required for outdoor emergency lighting as per enclosed specification and SOR.
- (n) Installation of earthing material and lightning system, testing and commissioning of complete earthing and lightning system as per specification and requirement.
- (o) Laying, Termination, Glanding, Ferruling of all interconnecting cables between sub array JBs, Main JBs, Charge controller, Grid charger, Battery Bank and DCDB.
- (p) Suitable trench/route/cable-tray shall be made by the solar power system contractor for laying of cables from solar array to Charge controller/ PCU and PCU to Grid Power connection and required for all interconnecting cables of the system.
- (q) Interconnecting cables among modules shall be laid in PVC conduits & tied with UV resistance cable ties. Cables from JB to control room shall be laid in Cable tray/PVC pipe of suitable size.
- (r) During the installation & commissioning work all consumables including water, power, DG set of suitable rating & load bank shall be arranged by the successful Bidder.

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5.0 OTHER MISCELLANEOUS WORKS

- 5.1 Preparation of buried cable trenches, including, back filling, compacting providing of brick protection by second-class bricks, spreading of fine river sand, including all supplies.
- 5.2 Bidder scope shall also include taking permission from respective state renewal energy authority for the SPV system installation and inspection to meet their technical requirements including all works related to liaisoning with the authority & fee as required for completion of the work including liaisoning, net metering system, Inspection etc. Bidder shall provide complete on-grid system will all approvals from authorities and agreements for same.
- 5.3 The job includes repairing of all civil works damaged during installation of electrical facilities and complete solar system.
- 5.4 The scope of work under this contract shall be inclusive of breaking of walls, floors and chipping of concrete foundations necessary for the installation of equipment, materials, and making good of the same.
- 5.5 Minor modifications wherever required to be done in the owner free supplied equipment / devices to enable cable entry, termination etc.
- 5.6 Sealing of opening made in the walls / floors for cables trays, cables, bus ducts, etc. using acceptable practice and standards.
- 5.7 Supply and installation of all other accessories not specifically mentioned herein, but never the less necessary for completion of the job.

6.0 AREA CLASSIFICATION

Hydrocarbon handling areas have been generally classified as zone 1 & 2, gas group IIA/IIB as per IS: 5572, API RP-500, OISD - 113 and IP Rules. All equipment to be installed in these areas shall be suitable for the area classification with temperature class T3 (200°C), CIMFR testing and approved by CCOE/PESO, DGMS and having BIS license.

7.0 MAKES OF EQUIPMENT AND MATERIALS

All equipment / materials supplied by the contractor shall be as per the list of approved makes enclosed with this document.

8.0 INSPECTION, TESTING & COMMISSIONING

The contractor shall carry out all the tests as enumerated in the technical specifications and as per applicable codes and standards and QAP.

9.0 DRAWINGS AND DATA SHEET

Contractor shall submit drawings and data sheet as enumerated in the technical specification of the equipment / materials to be supplied.

After the job completion, contractor shall prepare AS-BUILT drawings and documents, submit catalogues/manuals (O&M) of major brought out items like solar system, charge controller, DCDB, battery bank, DC-DC Converter, junction boxes, Grid charger

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etc. Final certified as built drawings, documents and manuals etc shall be submitted by the contractor to owner in bound volume with one set in soft copy (CD) plus five sets of prints.

10.0 DESCRIPTION OF ITEM (SUPPLY ITEMS)

For state-wise distribution of various systems refer Annexure V on page 39

10.1 Supply of Material

SI. NO.	Description of item	Unit	Qty.
Supply of Material			
1.0	1400 WATT HYBRID SPV SYSTEM FOR SV STATION WITHOUT PIDS AT NAGALAND/MANIPUR/WEST BENGAL/SIKKIM STATES (REFER SCOPE OF WORK FOR LOCATION OF THE SYSTEM)		
	<p>SYSTEM-I-SPV POWER SOURCE FOR CATHODIC PROTECTION (PCP), INSTRUMENTATION, SCADA & TELECOM System Design, Detailed Engineering, procurement of materials, Inspection/FAT (Factory acceptance test), Supply of materials, Transportation, loading/unloading, insurance, Storage at warehouse/store (hired by bidder) of complete Solar PV based Power source with three days autonomy (72 Hrs Backup) for 1400W DC load for twenty four hours operation per day operation as per tender specification, data sheet, scope of work and block diagram enclosed including commissioning spares as required at each SV station.</p> <p>The system shall include following-</p> <ul style="list-style-type: none"> (i) Solar PV array with junction boxes, Anodized AL/ Hot dipped Galvanized M-Steel structure (ii) Solar PV charge controller-MPPT type (output 96V DC) (iii) Ni-Cd (1.2V/Cell) Pocket Plate Battery Bank (96V DC) (iv) DC-DC Converter(output 24V DC & (-)48-0-(+)48V DC) and DCDBs [24V & +/- 48V] (v) Interconnecting cables among arrays, charge controller, battery bank, Grid charger, DCDBs, junction boxes etc including supply of all accessories like cable glands, cable tray, tinned-cu lugs etc as required. (vi) Earthing and lightning protection system as required to complete the system. (vii) Erection materials & Other miscellaneous work <p>Rating of SPV array, charge controller and battery bank shall be selected to meet the load requirement as specified above. However, each subsystem rating shall not be less than the value given below-</p>		
1.1	Solar PV Modules- Mono crystalline (Min 300Wp) BIS certified for SPV array Min 20KWp (2X10000 Wp) for system-I along with junction boxes as per specification and scope of work.	Set	9

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1.2	Anodized AL/ Hot dipped Galvanized M-Steel structure as per specification and scope of work for SPV array Min 20KWp (2X10000 Wp) for system-I along with all required hardware, material & anchoring material etc.	Set	9
1.3	<p>MPPT Solar Charger –</p> <ol style="list-style-type: none"> (Dual-Min-2x250A) @ 96V as per specification and scope of work with following DC_DC Converter (Dual redundant)- (85-130V DC I/P to 24V+/- 1%, 550W) (85-130V DC I/P to (-)48-0-(+)48V +/-1% DC V, 1000W (250W+850W) SMPS Modular convertor with +/- 1% accuracy), and DCDB [24V & 48V] as per specification and scope of work. DC-AC INVERTER- <p>Pure sine wave output inverter (dual redundant) for fire system having DC Input range (75-135V DC) and AC Output (230V AC +/-1%, 50 Hz +/- 1%), 500VA with over load, short circuit and over temp protection and with galvanic isolation as per specification with 04 nos of MCB output (6A) including supply of all interconnecting cables.</p>	Set	9
1.4	Ni-Cd Battery bank (Pocket Plate type) in (2x50%) arrangement, Min 253 KVAH @ 96V, (where KVAH = battery cell AH x 1.2 V x No. of cells) as per specification and scope of work for system-I.	Set	9
1.5	<p>Balance of System materials & equipment for system-I-</p> <ol style="list-style-type: none"> Interconnecting cables among arrays (solar grade), charge controller, battery bank, Grid charger, DCDBs, junction boxes etc including erection of all accessories like cable glands, cable tray, tinned-cu lugs etc as required. Earthing and lightning protection system as required to complete the system. Supply of 2 year O&M spares as per list attached in scope of work Required material for Erection work, Civil & Other miscellaneous work 	Lot	9
1.6	<p>GRID CHARGER FOR BATTERY BANK FOR SYSTEM-I (FOR 1400 WATT SYSTEM) SYSTEM-IB- GRID CHARGER FOR BATTERY BANK</p> <p>Design, Detailed Engineering, Manufacturing, Inspection/FAT (Factory acceptance test), Supply, Transportation, loading/unloading, insurance, Storage at warehouse/store (hired by bidder) of DSP based FCBC CHARGER (2x100%) to charge the battery bank from grid supply, including commissioning spares as required, as per specifications, data sheet and instruction of Engineer-in-charge required for Solar System. The charger shall operate on the single phase with the input voltage supply of 415Vac, 3 Phase with Neutral, 50 Hz 330 ~ 460 Vac, 47 ~ 53 Hz. FCBC shall consist of three single phase chargers connected in parallel fed by R-Y-B</p>	Set	9

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	phase respectively. The rating of each FCBC shall be as per the Battery bank size calculated for the solar system, shall be calculated such that it can charge fully discharged complete battery bank at C20 rating.		
2.0	2000 WATT HYBRID SPV SYSTEM FOR SV STATION WITHOUT PIDS AT NAGALAND/MANIPUR/WEST BENGAL/SIKKIM STATE (REFER SCOPE OF WORK FOR LOCATION OF THE SYSTEM)		
	<p>SYSTEM-II-SPV POWER SOURCE FOR CATHODIC PROTECTION (PCP), INSTRUMENTATION, SCADA & TELECOM</p> <p>System Design, Detailed Engineering, procurement of materials, Inspection/FAT (Factory acceptance test), Supply of materials, Transportation, loading/unloading, insurance, Storage at warehouse/store (hired by bidder) of complete Solar PV based Power source with three days autonomy (72 Hrs Backup) for 2000W DC load for twenty four hours operation per day operation as per tender specification, data sheet, scope of work and block diagram enclosed including commissioning spares as required at each SV station.</p> <p>The system shall include following-</p> <ol style="list-style-type: none"> 5) Solar PV array with junction boxes, Anodized AL/ Hot dipped Galvanized M-Steel structure 6) Solar PV charge controller-MPPT type (output 96V DC) 7) Ni-Cd (1.2V/Cell) Pocket Plate Battery Bank (96V DC) 8) DC-DC Converter(output 24V DC & (-)48-0-(+)48V DC) and DCDBs [24V & +/- 48V] 9) Interconnecting cables among arrays, charge controller, battery bank, Grid charger, DCDBs, junction boxes etc including supply of all accessories like cable glands, cable tray, tinned-cu lugs etc as required. 10) Earthing and lightning protection system as required to complete the system. 11) Erection materials & Other miscellaneous work <p>Rating of SPV array, charge controller and battery bank shall be selected to meet the load requirement as specified above.</p> <p>However, each subsystem rating shall not be less than the value given below-</p>		
2.1	Solar PV Modules- Mono crystalline (Min 300Wp) BIS certified for SPV array Min 28KWp (2X14000 Wp) for system-I along with junction boxes as per specification and scope of work.	Set	9
2.2	Anodized AL/ Hot dipped Galvanized M-Steel structure as per specification and scope of work for SPV array Min 28KWp (2X14000 Wp) for system-I along with all required hardware, material & anchoring material etc.	Set	9
2.3	MPPT Solar Charger –	Set	9

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	<p>1) (Dual-Min-2x325A) @ 96V as per specification and scope of work with following DC_DC Converter (Dual redundant)-</p> <p>2) (85-130V DC I/P to 24V+/- 1%, 550W)</p> <p>3) (85-130V DC I/P to (-)48-0-(+)48V +/-1% DC V, 1800W (300W+1500W) SMPS Modular convertor with +/- 1% accuracy), and DCDB [24V & 48V] as per specification and scope of work.</p> <p>4) DC-AC INVERTER- Pure sine wave output inverter (dual redundant) for fire system having DC Input range (75-135V DC) and AC Output (230V AC +/-1%, 50 Hz +/- 1%), 500VA with over load, short circuit and over temp protection and with galvanic isolation as per specification with 04 nos of MCB output (6A) including supply of all interconnecting cables.</p>		
2.4	Ni-Cd Battery bank (Pocket Plate type) in (2x50%) arrangement 361 KVAH @ 96V, (where KVAH = battery cell AH x 1.2 V x No. of cells) as per specification and scope of work for system-II.	Set	9
2.5	<p>Balance of System materials & equipment for system-II-</p> <p>1) Interconnecting cables among arrays (solar grade), charge controller, battery bank, Grid charger, DCDBs, junction boxes etc including erection of all accessories like cable glands, cable tray, tinned-cu lugs etc as required.</p> <p>2) Earthing and lightning protection system as required to complete the system.</p> <p>3) Supply of 2 year O&M spares as per list attached in scope of work</p> <p>4) Required material for Erection work, Civil & Other miscellaneous work</p>	Set	9
2.6	<p>GRID CHARGER FOR BATTERY BANK FOR SYSTEM-II (FOR 2000 WATT SYSTEM)SYSTEM-IIB- GRID CHARGER FOR BATTERY BANK</p> <p>Design, Detailed Engineering, Manufacturing, Inspection/FAT (Factory acceptance test), Supply, Transportation, loading/unloading, insurance, Storage at warehouse/store (hired by bidder) of DSP based FCBC CHARGER (2x100%) to charge the battery bank from grid supply, including commissioning spares as required, as per specifications, data sheet and instruction of Engineer-in-charge required for Solar System. The charger shall operate on the single phase with the input voltage supply of 415Vac, 3 Phase with Neutral, 50 Hz 330 ~ 460 Vac, 47 ~ 53 Hz. FCBC shall consist of three single phase chargers connected in parallel fed by R-Y-B phase respectively. The rating of each FCBC shall be as per the Battery bank size calculated for the solar system, shall be calculated such that it can charge fully discharged complete battery bank at C20 rating.</p>	Set	9

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3.0	OUTDOOR EMERGENCY LIGHTING		
3.1	SYSTEM-III-SPV BASED OUTDOOR EMERGENCY LIGHTING Design, Detailed Engineering, procurement of material, Inspection/FAT (Factory acceptance test), Supply, Transportation, loading/unloading, insurance, Storage at warehouse/store (hired by bidder) of Solar Street lighting system complete with GI pole and GI mounting bracket, control gear box, internal cable from fitting to junction box, and min 1x20W LED fixture (Bajaj Make/MNRE Approved or equivalent), three days battery backup with low maintenance flooded battery with box (2x75 AH), solar PV Module (2x100Wp), earthing, electronics, charger, dusk- dawn operation, GI -pole (6 Mtr, with 80 Micron Galvanization) etc including pipe inserts for cables and connecting work, civil work and commissioning spares as required, with all material and labour as per specifications, drawings and instruction of Engineer-in-charge. Work to be completed in all respects.	Set	55
4.0	ON_GRID SPV SYSTEM		
4.1	SYSTEM-IV- GRID CONNECTED SOLAR PV SYSTEM_20KWp Design, Detailed Engineering, procurement of material, Inspection/FAT (Factory acceptance test), Supply of materials, Transportation, loading/unloading, insurance, Storage at warehouse/store (hired by bidder) of complete Grid Connected 20 Kwp Solar PV system (Guaranteed generation 24000 Kwh per year) at along with Inverter (PCU/Inverter -MPPT Type with SCADA monitoring feature), Solar PV Modules (300 Wp and above) into array, Mounting Structures, required AC distribution panels, Junction boxes with surge protection units on both side, Civil foundations & erection materials, Interconnecting cables, earthing, Energy Meters & data loggers along with PC based arrangement for system performance monitoring through licensed software as per the attached specifications, PJS/Scope of work for Grid connected system.	Set	5

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10.2 Installation, Testing and Commissioning


Installation, Testing and Commissioning			
1.0	<p>1400 WATT INSTALLATION, TESTING & COMMISSIONING OF SOLAR POWER SOURCE AT SV STATIONS WITHOUT PIDS AT NAGALAND/MANIPUR/SIKKIM/WESTBENGAL STATE (REFER SCOPE OF WORK FOR LOCATION OF THE SYSTEM)</p>		
	<p>SYSTEM-I-SPV POWER SOURCE FOR CATHODIC PROTECTION (PCP), INSTRUMENTATION, SCADA & TELECOM</p> <p>Loading/unloading, transportation from warehouse/store (hired by bidder) to site, Installation, testing, commissioning and performance test at site of complete Solar PV based Power source with three days autonomy for 1400W DC load for twenty four hours operation per day operation as per tender specification, data sheet, scope of work and block diagram enclosed including commissioning spares as required at each SV station.</p> <p>The system shall include following-</p> <ol style="list-style-type: none"> 1) Solar PV array with junction boxes, Anodized AL/ Hot dipped Galvanized M-Steel structure 2) Solar PV charge controller-MPPT type (output 96V DC) 3) Ni-Cd (1.2V/Cell) Pocket Plate Battery Bank (96V DC) 4) DC-DC Converter(output 24V DC & (-)48-0-(+)48V DC) and DCDBs [24V & +/- 48V] 5) Interconnecting cables among arrays, charge controller, battery bank, Grid charger, DCDBs, junction boxes etc including installation of all accessories like cable glands, cable tray, tinned-cu lugs etc as required. 6) Earthing and lightning protection system as required to complete the system. 7) Erection materials & Other miscellaneous work <p>Rating of SPV array, charge controller and battery bank shall be selected to meet the load requirement as specified above. However, each subsystem rating shall not be less than the value given below-</p>		
1.1	Solar PV Modules- Mono crystalline (Min 300Wp) BIS certified for SPV array Min 20KWp (2X10000 Wp) for system-I along with junction boxes as per specification and scope of work.	Set	9
1.2	Anodized AL/ Hot dipped Galvanized M-Steel structure as per specification and scope of work for SPV array Min 20KWp (2X10000 Wp) for system-I.	Set	9
1.3	MPPT Solar Charger - 1) (Dual-Min-2x250A) @ 96V as per specification and scope of work with following DC_DC Converter (Dual redundant)-	Set	9

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	<p>2) (85-130V DC I/P to 24V+/- 1%, 550W) 3) (85-130V DC I/P to (-)48-0-(+)48V +/-1% DC V, 1000W (250W+850W) SMPS Modular convertor with +/- 1% accuracy), and DCDB [24V & 48V] as per specification and scope of work. 4) DC-AC INVERTER-</p> <p>Pure sine wave output inverter (dual redundant) for fire system having DC Input range (75-135V DC) and AC Output (230V AC +/-1%, 50 Hz +/- 1%), 500VA with over load, short circuit and over temp protection and with galvanic isolation as per specification with 04 nos of MCB output (6A) including laying and installation of all interconnecting cables.</p>		
1.4	<p>Ni-Cd Battery bank (Pocket Plate type) in (2x50%) arrangement, Min 253 KVAH @ 96V, (where KVAH = battery cell AH x 1.2 V x No. of cells) as per specification and scope of work for system-I.</p>	Set	9
1.5	<p>Balance of System materials & equipment for system-I-</p> <p>1) Interconnecting cables among arrays (solar grade), charge controller, battery bank, Grid charger, DCDBs, junction boxes etc including erection of all accessories like cable glands, cable tray, tinned-cu lugs etc. as required. 2) Earthing and lightning protection system as required to complete the system. 3) Erection materials, Civil & Other miscellaneous work</p>	Lot	9
1.6	<p>GRID CHARGER FOR BATTERY BANK FOR SYSTEM-I (FOR 1400 WATT SYSTEM)SYSTEM-IB- GRID CHARGER FOR BATTERY BANK</p> <p>Loading/unloading, transportation from warehouse/store (hired by bidder) to site, Installation, testing, commissioning and performance test at site of DSP based FCBC CHARGER (2x100%) to charge the battery bank from grid supply, including commissioning spares as required, as per specifications, data sheet and instruction of Engineer-in-charge required for Solar System. The charger shall operate on the single phase with the input voltage supply of 415Vac, 3 Phase with Neutral, 50 Hz 330 ~ 460 Vac, 47 ~ 53 Hz. FCBC shall consist of three single phase chargers connected in parallel fed by R-Y-B phase respectively. The rating of each FCBC shall be as per the Battery bank size calculated for the solar system, shall be calculated such that it can charge fully discharged complete battery bank at C20 rating.</p>	Set	9

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2.0	<p>2000 WATT_SYSTEM-INSTALLATION, TESTING & COMMISSIONING OF SOLAR POWER SOURCE AT SV STATIONS WITHOUT PIDS AT NAGALAND/MANIPUR/WEST BENGAL/SIKKIM STATE (REFER SCOPE OF WORK FOR LOCATION OF THE SYSTEM)</p>		
	<p>SYSTEM-II-SPV POWER SOURCE FOR CATHODIC PROTECTION (PCP), INSTRUMENTATION, SCADA & TELECOM</p> <p>Loading/unloading, transportation from warehouse/store (hired by bidder) to site, Installation, testing, commissioning and performance test at site of complete Solar PV based Power source with three days autonomy for 2000W DC load for twenty four hours operation per day operation as per tender specification, data sheet, scope of work and block diagram enclosed including commissioning spares as required at each SV station. The system shall include following-</p> <ol style="list-style-type: none"> 1) Solar PV array with junction boxes, Anodized AL/ Hot dipped Galvanized M-Steel structure 2) Solar PV charge controller-MPPT type (output 96V DC) 3) Ni-Cd (1.2V/Cell) Pocket Plate Battery Bank (96V DC) 4) DC-DC Converter(output 24V DC & (-)48-0-(+)48V DC) and DCDBs [24V & +/- 48V] 5) Interconnecting cables among arrays, charge controller, battery bank, Grid charger, DCDBs, junction boxes etc including installation of all accessories like cable glands, cable tray, tinned-cu lugs etc as required. 6) Earthing and lightning protection system as required to complete the system. 7) Erection materials & Other miscellaneous work Rating of SPV array, charge controller and battery bank shall be selected to meet the load requirement as specified above. However, each subsystem rating shall not be less than the value given below- 		
2.1	Solar PV Modules- Mono crystalline (Min 300Wp) BIS certified for SPV array Min 28KWp (2X14000 Wp) for system-I along with junction boxes as per specification and scope of work.	Set	9
2.2	Anodized AL/ Hot dipped Galvanized M-Steel structure as per specification and scope of work for SPV array Min 28KWp (2X14000 Wp) for system-I.	Set	9
2.3	<p>MPPT Solar Charger -</p> <ol style="list-style-type: none"> 1) (Dual-Min-2x325A) @ 96V as per specification and scope of work with following DC_DC Converter (Dual redundant)- 2) (85-130V DC I/P to 24V+/- 1%, 550W) 3) (85-130V DC I/P to (-)48-0-(+)48V +/-1% DC V, 1800W 4) (300W+1500W) SMPS Modular convertor with +/- 1% accuracy), and DCDB [24V & 48V] as per specification and scope of work. 	Set	9

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	5) DC-AC INVERTER- Pure sine wave output inverter (dual redundant) for fire system having DC Input range (75-135V DC) and AC Output (230V AC +/-1%, 50 Hz +/- 1%), 500VA with over load, short circuit and over temp protection and with galvanic isolation as per specification with 04 nos of MCB output (6A) including laying and installation of all interconnecting cables.		
2.4	Ni-Cd Battery bank (Pocket Plate type) in (2x50%) arrangement 361 KVAH @ 96V, (where KVAH = battery cell AH x 1.2 V x No. of cells) as per specification and scope of work for system-II..	Set	9
2.5	Balance of System materials & equipment for system-II- 1) Interconnecting cables among arrays (solar grade), charge controller, battery bank, Grid charger, DCDBs, junction boxes etc. including erection of all accessories like cable glands, cable tray, tinned-cu lugs etc as required. 2) Earthing and lightning protection system as required to complete the system. 3) Erection materials, Civil & Other miscellaneous work	Set	9
2.6	GRID CHARGER FOR BATTERY BANK FOR SYSTEM-II (FOR 2000 WATT SYSTEM)SYSTEM-IIB- GRID CHARGER FOR BATTERY BANK Loading/unloading, transportation from warehouse/store (hired by bidder) to site, Installation, testing, commissioning and performance test at site of DSP based FCBC CHARGER (2x100%) to charge the battery bank from grid supply, including commissioning spares as required, as per specifications, data sheet and instruction of Engineer- in-charge required for Solar System. The charger shall operate on the single phase with the input voltage supply of 415Vac, 3 Phase with Neutral, 50 Hz 330 ~ 460 Vac, 47 ~ 53 Hz. FCBC shall consist of three single phase chargers connected in parallel fed by R-Y-B phase respectively. The rating of each FCBC shall be as per the Battery bank size calculated for the solar system, shall be calculated such that it can charge fully discharged complete battery bank at C20 rating.	Set	9
3.0	OUTDOOR EMERGENCY LIGHTING		
3.1	SYSTEM-III –SPV BASED OUTDOOR EMERGENCY LIGHTING FOR DISTRIBUTION SEE SCOPE OF WORK Loading/unloading, transportation from warehouse/store (hired by bidder) to site, Installation, testing, commissioning and performance test at site of Solar Street lighting system complete with GI pole and GI mounting bracket, control gear box, internal cable from fitting to junction box, and min 1x20W LED fixture (Bajaj Make/MNRE Approved or equivalent), three days battery backup with low maintenance flooded battery with box (2x75 AH), solar PV Module (2x100Wp), earthing, electronics, charger, dusk-dawn operation, GI -pole (6	Set	55

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	Mtr, with 80 Micron Galvanization) etc. including pipe inserts for cables and connecting work, civil work and commissioning spares as required, with all material and labour as per specifications, drawings and instruction of Engineer-in-charge. Work to be completed in all respects.		
4.0	ON_GRID SPV SYSTEM FOR DISTRIBUTION SEE SCOPE OF WORK		
4.1	SYSTEM-IV- GRID CONNECTED SOLAR PV SYSTEM_20KWp Loading/unloading, transportation from warehouse/store (hired by bidder) to site, Installation, testing, commissioning and performance test at site of the complete system of complete Grid Connected 20 Kwp Solar PV system (Guaranteed generation 24000 Kwh per year) at along with Inverter (PCU -MPPT Type), Solar PV Modules (300 Wp and above) including providing earthing, cable laying & termination, mounting arrangement for SPV module /arrays, panels, PCU, remote Scada monitoring, all civil works, net metering etc as required as specified to provide a complete operational system & meet the guaranteed particulars of specification including training to client personnel etc. Bidder scope shall also include taking permission from respective state authority for the installation & their technical requirements including all works related to liaison with the authority& fee as required for completion of the work including liaison, net metering system, Inspection from authority etc required for complete installation of the system.	Set	5
5.0	All-inclusive per month rates for maintaining the warehouse/store at site (for supplied material) during the extended period as required (payable if site is not ready even after 6 months of Contractual completion date of Supply, Installation, Testing & commissioning as per terms & condition of contract and as defined in the tender scope of work).	Months	Six months in each state
6.0	5 years comprehensive CAMC for Solar systems (all items supplied under SI 1.0-4.0) which shall cover workmanship and materials (supplied by the Bidder) for solar system. However CAMC shall start after successful completion of warranty period/ Defect Liability period as per contract. (For detail scope & payment terms refer scope of work, annexure to SCC & contract document)	LS	1

Notes:

- 1 The Vendor shall be completely responsible for the design, materials, manufacture & fabrication, testing, inspection, preparation for shipment and transport of the above equipment strictly in accordance with the MR and all attachment thereto.
- 2 Vendor shall appoint any one of the following TPIA for inspection purpose. Vendor has to propose minimum 4 nos. of below listed agencies to be approved by IGGL/Consultant
 - a) Lloyd Register of Industrial Services,
 - b) VCS Quality Services Pvt. Ltd.,
 - c) Technische Uliewarchungs Verein (TUV),
 - i) Germanischer Lloyd
 - j) Dr. Amin Controllers Private Limited
 - k) Det Norske Veritas (DNV)

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- d) AB-Vincotee ,
- e) Bureau Veritas ,
- f) SGS ,
- g) American Bureau Services ,
- h) Velosi
- l) Certification Engineer International Limited (CEIL)
- m) M/s Edlipse Engineering Global Private Limited
- n) M/s IRCLASS Systems and Solutions Private Limited
- o) Moody International
- p) Meenar Global

Apart from inspection by TPIA, inspection shall also be performed by Consultant / IGGL delegate, as set out and specified in the codes and particular documents forming this MR

11.0 JOB SPECIFICAITONS

- 11.1 Various Solar Electrical works covered under this contract like equipment erection, cabling and grounding works, etc. shall be performed in accordance with specifications attached with this tender & relevant Indian standard. (Certain clauses of specifications, which are applicable to equipment’s or system not covered under this contract, shall not be applicable).
- 11.2 Erection and commissioning of certain special equipment’s shall be performed in accordance with instructions and directions of the Engineer-in-charge at site under supervision by equipment supplier/s.
- 11.3 The equipment’s/materials to be supplied by the Bidder shall conform to the requirements of the applicable specifications enclosed in the tender document.
- 11.4 All works relating to statutory approvals of the complete installation of equipment’s / material supplied by Bidder, from competent authority like CEA, PESO, State electricity authority/Board etc., shall be in the scope of Bidder, if any.
- 11.5 All equipment’s / materials supplied by the Bidder shall be as per the list of approved makes enclosed with this document subject to submission of Certification and approvals.

12.0 QUALITY ASSURANCE, INSPECTION & TESTING AT MANUFACTURER'S WORK

- 12.1 All the equipment supplied and installed by the Bidder shall be inspected by the Owner/ or their approved inspection agency (TPI) at the manufacturer's works prior to dispatch. The equipment will be inspected as per the tests pre-identified in the approved QAP to ensure conformity of the same with relevant approved drawings, data sheets, specifications, National/International standards. The TPI shall be arranged by the Bidder for the testing of the material/equipment’s at the vendor works.
- 12.2 Performance tests of any equipment’s which cannot be conducted/demonstrated either partially or wholly at the manufacturer's work, shall be conducted after erection at site in the presence of Owner & their inspection agency. In all the cases, prior approval of the approval shall be obtained.
- 12.3 In case of waiver category of items, the same shall be pre identified. For such items, the Bidder shall furnish necessary certificates, test reports etc. for Review/Approval to

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Owner/Inspection agency. The issue of Inspection Certificate/Waiver Certificate for any equipment or component thereof does absolve the Bidder from his contractual obligations towards subsequent satisfactory performance of the equipment at site. Should any equipment be found defective, in whole or part thereof after receipt at site or during erection/commissioning and testing shall be Rectified/Changed by Bidder free of cost.

12.4 Bidder shall submit test plan for the equipment's with four-week advance notice.

13.0 TESTING & COMMISSIONING AT SITE

13.1 All the equipment supplied and installed by the Bidder shall be tested and commissioned as required and no separate payments shall be made for the same. Any damage or defect noticed shall be brought to the notice of the engineer- in-charge and will be rectified without any delay and no payments shall be made for rectification.

13.2 Any work not conforming to the execution drawings, specifications or codes shall be rejected forthwith and the Bidder shall carry out the rectification at his own cost.

13.3 The Bidder shall carry out all the tests as enumerated in the technical specifications and as per applicable codes and standards.

13.4 Before the Solar Electrical system is made live, the solar Electrical bidder shall carry out suitable tests to establish to the satisfaction of engineer-in-charge that the installation of equipment's, wiring and connections have been correctly done and are in good working condition and that it will operate as intended.

13.5 All the tests shall be conducted in the presence of Owner/ Engineer-in-charge or his authorized representative unless he waives this requirement in writing. The Bidder shall arrange all testing equipment necessary to carry out the test. The tests shall be recorded on approved Performa and certified records of the tests shall be submitted to Owner/ Engineer-in-charge.

13.6 After the completion of all tests and rectification of all defects pointed out during final inspection, plant start-up trials would be commenced. During the start-up trials Bidder shall provide skilled / unskilled personnel and supervision round the clock at his cost. The number and category of workmen and duration up to which required, will be decided by the Engineer-in-charge. Any defects noticed during the start-up trial relating to the equipment supplied and work carried out by the Bidder, will be rectified by the Bidder at his own cost.

13.7 Engineer-in- charge shall have the right to get these defects rectified at the risk and cost of the Bidder if he fails to attend to these defects immediately as desired.

13.8 After the operating conditions are fully achieved in the plant and the other requirements as stated in the General Conditions of Contract are fulfilled, the Bidder would be eligible for applying for a completion certificate.

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14.0 DOCUMENTATION

14.1 Drawings and design documents

- i. The following documents shall be submitted along with the offer:
 - a) Filled up data sheets & Check lists
 - b) HSE Policy
 - c) QAP
 - d) Bar Charts & Project completion schedule
 - e) Un-priced List of two years operation and maintenance spare

- ii. The following drawings (in three sets) & documents shall be submitted for approval within 3 weeks of award of contract.
 - a) Equipment detailed design & sizing calculations along with formulae used
 - b) Solar panel & Battery Sizing calculations
 - c) Various Installation & PG Procedures
 - d) Equipment GA drawings & datasheet.
 - e) Equipment installation & erection details drawings.
 - f) Tentative Bill of Material.
 - g) Vendor Data requirement as per Annexure-1.
 - h) Quality Assurance Plan of equipment's.

- iii. After the job completion, Bidder shall prepare As-Built drawings/data sheets and documents, submit catalogues/manuals (O&M) of major brought out items. Final certified as built drawings, documents and manuals etc. shall be submitted by the Bidder to owner in bound volume with one set in soft copy (CD) plus two sets of prints to owner & one set to Consultant. Other drawings and documents shall be submitted by Bidder along with As-Built Drawings/Datasheets-
 - a) Test documents & drawings for bought out items.
 - b) Detailed commissioning report of SOLAR POWER system.

15.0 ESCALATION

The Rates quoted shall be kept firm till completion of work and no price Escalation shall be paid.

16.0 DRAWINGS, STANDARD SPECIFICATIONS AND INSTALLATION STANDARDS

- 16.1 The equipment's / materials to be supplied by the Bidder shall conform to the requirements of the applicable specifications. Also, the installation of various material / equipment shall conform to the installation standards /norms.
- 16.2 The drawings accompanying the tender documents when read with specification shall depict the electrical system of the Terminal. These are indicative of the nature of work and issued for tendering purposes only. Purpose of these drawings

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is to enable the tendered to make an offer in line with the requirements of the Owner. Construction shall be as per drawings / specifications issued / approved by the Engineer-in-charge during the course of execution of work.

- 16.3 After the job completion, Bidder shall prepare AS-BUILT drawings and documents, submit catalogues/manuals (O&M) of SOLAR POWER system.
- 16.4 Final certified as built drawings, documents and manuals etc. shall be submitted by the Bidder to owner in bound volume with one set in soft copy (CD) plus two sets of prints.
- 16.5 List of Standard Specification/Datasheet/QAP/Block diagrams/Schematic Route diagram


16.6 SCADA COMMUNICATION AND MAPPING DETAILS

Dedicated RS485 Interface port to be provided for SCADA communication apart from local diagnostic port. Modbus RTU protocol will be the communication protocol between SOLAR POWER and RTU. Below attachment mentioned parameter needs to be configured in contiguous Modbus register by SOLAR POWER vendor for SCADA as per Modbus Register Address mentioned below attachment.

18 GENERAL REQUIREMENTS

Contractor shall procure and supply all materials other than Company supplied materials, required for permanent installation of Solar Power system in sequence and at appropriate time. All equipment, materials, components etc. shall be Solar Power system for the intended service. Approved vendor list has been enclosed with the bid package for various items. For items which are not covered in the vendor list, Contractor shall obtain Company’s prior approval for the vendor. Necessary details i.e., data sheets & specifications for the items in the Contractor’s scope of supply, as required, shall be enclosed with the bid package.

- i) Preparation of Material requisition, request for quotation, bid evaluation and recommend vendors for Company’s approval. Only single offer shall be provided by the bidder fully complying to specification requirements for Company’s review and approval.
- ii) Receipt of material from vendor’s works/suppliers, warehousing, preserving the material in good condition, issue of material to construction site, reconciling / handing over surplus material to Company for Company supplied items at Company’s storage yard.
- iii) Carryout proper documentation of inspection and quality assurance programmers for bulk materials duly approved by Company. Contractor shall maintain an accurate and traceable listing of procurement records for the location, quality and character of all permanent materials in the Project.
- iv) Contractor shall immediately report to the Company of all changes which will affect material quality, and recommend any necessary corrective actions to be taken.
- v) All purchase requisitions including purchase orders shall be approved by Company.

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- vi) Compliance with vendors and supplier’s instructions and recommendations for transportation, handling, installation and commissioning
- vii) The Contractor shall also provide the following:
 - a. Major Items- Solar array, MPPT, Battery, Panel, DB, controllers, Converter. Cables,
 - b. All temporary materials required for installation/ testing/ commissioning. All consumables required for the works.
 - c. All construction equipment/machineries, tools and tackles, devices, apparatus, equipment, safety devices, etc. including ladders and scaffolding etc complete as required.
 - d. CT, PT, Isolators, switchgears (MCB, MCCB etc.)
 - e. Cable jointing Kit., Termination kit, Cable glands & lugs.
 - f. Lighting switches box plates, Junction boxes.
 - g. Consumables for erection such as lugs, ferrules, glands, etc; electrodes;
 - h. Cement, aggregates, sand, bricks, structural steel
 - i. Street lighting poles, Area lighting pole, handrail pole, fixture mounting brackets
 - j. Power sockets, convenience outlets & welding sockets etc
 - k. Structural and support steel & paint
 - l. Earthing materials (earth strip, Earth conductor, treated & non-treated earthing electrodes, earthing bus bars etc)
 - m. Cable trays & coupler plates with fittings, nut bolt & washers (ladder & perforated).
 - n. other consumables such as cable ties, cable tags, cable tiles, sand, cable markers, ferrules/shrink sleeves etc
 - o. PVC pipes, rubber mats.
 - p. GI Conduits, bends, inspection cover etc. GI pipes for cable sleeving
 - q. Safety equipment as per statutory requirements i.e. framed first aid chart, first aid box, firefighting equipment etc
 - r. Expendable materials (e.g., clothes, grease, cleaning materials, welding rods, solder, etc.)
 - s. All materials namely hardware like GI bolts, nuts, washers etc, anchor fasteners, small civil work, fixing cleats for surface run cables & conduit clamps etc
 - t. Equipment and materials, as per applicable specification, required for successful completion of the job except those specified as supplied by OWNER.
 - u. Any other material not specifically mentioned above but required for successful completion of the job.

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19 Construction

Contractor scope of work for Solar Power system items construction shall include, but not limited to the following:

All construction works shall be carried out as per "Approved for Construction" drawings, procedures, specifications and applicable codes and standards. Any changes at site shall need prior approval from the Company followed by subsequent revision of relevant drawings upon approval; Contractor shall do the follow up with the concerned authorities to get the permissions to execute the job in time. However, all statutory payments required for such permissions shall be reimbursed by Company at actuals. Contractor shall obtain permits / clearance from concerned authorities before actual commencement of the job at site including preparation and establishment of safety procedures.

- i) Contractor shall also inform all local authorities in advance and obtain all necessary approvals for works wherever encountered along the system. Contractor shall be required to carry out all the works as mentioned in the work permit;
- ii) In some areas where mechanized excavation is not possible, Contractor shall have to do manual excavation also. Contractor shall consider all these eventualities while bidding;
- iii) Providing schedules, progress reporting, organization chart at construction site, quality assurance plan and developing quality control procedures, as per requirements of the bid package;
- iv) Providing all equipment, manpower, machinery, consumables, apparatus, tools and tackles for fabrication, installation, inspection, testing, pre-commissioning and commissioning complete as required including facilities for inspection and interpretation of testing results by Company's Representative;
- v) Obtaining all necessary approvals and work permits from Company / Concerned local authorities having jurisdiction including all work permit as applicable for performing the work in existing terminal facilities.
- vi) Arrangement of adequate firefighting equipment viz. fire brigade, fire extinguisher, shielding from existing facilities, oxygen mask etc. for carrying out the work safely in existing terminals to the satisfaction of Company.
- vii) Coordination and supervising the work of sub-Contractors.
- viii) Transportation of appropriate materials to worksite, intermediate storage points, maintaining and operating an adequate material control procedure at worksite.

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- ix) Fabrication of all, structural components as per approved drawings.
- x) All associated civil, structural, Solar Power system, instrumentation; and telecom works shall be performed in accordance with relevant specifications, drawings and requirements.
- xi) Provide, maintain and operate all temporary facilities required for the construction related works and remove after completion of work.
- xii) Receiving and taking-over Company supplied free issue items from designated warehouse, loading, transportation, unloading, handling, and stacking of items at Contractor’s worksite(s)/ workshop till the materials are installed in permanent installation.
- xiii) Mobilizing and providing all equipment’s, manpower (skilled and unskilled), consumables and other resources etc. as required for the execution of complete work.
- xiv) Installation of all inline/online instruments/detectors/valves/cabinets/ systems and appurtenances etc. as per approved drawings and Project requirements.
- xv) Installation of Solar Power system cable trays (perforated type) along with cover and suitable accessories as per approved cable routing drawings and Project requirements.
- xvi) Cable laying, dressing and termination of Solar Power system cables between instruments, JB’s and cabinets are required.
- xvii) Preparation of as built drawings, documents, photographs, project records as per specification and instructions of the Company including furnishing of all Test Certificates/Inspection Reports for all materials used for permanent installation.
- xviii) All incidental and associated works and any other works not specifically listed herein but are required to be carried out to complete entire work and the associated facilities and making the entire system ready for operation.
- xix) Other miscellaneous works (civil works, co-ordination, etc.): All related civil works shall be included in the scope of the Contractor.
- xx) Preparation of buried cable trenches including excavation, back filling, compacting, providing of brick protection by second-class bricks, spreading of fine river sand, including all supplies. The job includes repairing of all civil works damaged during installation of Solar Power system equipment.

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- xxi) The scope of work under this contract shall be inclusive of breaking of walls and floors, and chipping of concrete foundations necessary for the installation of equipment, materials, and making good of the same.
- xxii) Minor modifications wherever required to be done in the Company free supplied equipment's or devices to enable cable entry, termination, etc.
- xxiii) Sealing of openings made in the walls / floors for cable trays, cables, bus ducts, etc. suitably using acceptable practice and standards.
- xxiv) Supply and installation of all other accessories not specifically mentioned herein, but nevertheless necessary for completion of the job
- xxv) As-built drawing & document shall be provided for all work done including old systems where any integration has been done. All documentation to be provided as printed documents and computer files compatible with MS Office and AutoCAD.

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20 Annexure-I

BIDDER DATA REQUIREMENT FOR SOLAR POWER SYSTEM AND BATTERY BANK

Sl No.	Documents	With Bid	After award of Contract	
			For Review & Approval	For Records
1	List of deviations to Bid Document	√		
2	Filled up data sheets. (Attached with specifications & standard data sheets)	√		
3	Equipment storage procedure at Bidders store & site	√		
4	Catalogues for solar Modules, MPPT charge controller, FCBC Grid charger and battery bank	√		
5	Inspection & Test Plan (As per Format)	√	√	
6	List of two years operation and maintenance spare.	√	√	
7	Vendor Drawing/ Document Submission Schedule (Within 07 days after award of Contract)		√	
8	Solar array sizing, charge controller sizing, FCBC Charger, PCU and battery sizing calculations.		√	
9	G.A. drawings of, charge controller, FCBC Charger, PCU and battery.		√	
10	PVSyst Simulation reports for on grid & off- grid systems		√	
11	Complete Hybrid solar system working philosophy.		√	
12	Hybrid FCBC (Bidirectional) system working philosophy.		√	
13	Cable size selection calculation considering the voltage drop & insulation along with voltage grade, type, size and Cable schedule		√	
14	Geographical survey report required for solar system design, tilt angle calculations etc		√	
15	Geo Graphical Data of the site (Avg Insolation, Wind Flow, Solar Radiation data (Daily, Monthly & Annual Avg), Weather Conditions etc as required in the design).		√	
16	System protections provided at various stages of the system		√	
17	Schematic and Wiring diagram		√	
18	Installation Manual		√	√
19	Operating/ Maintenance Manual		√	√
20	System Schematic & Block Diagram with interlocking logic		√	
21	Installation and SAT procedures		√	
22	Installation record formats		√	
23	Bill of material		√	
24	Confirmation for Support & Availability of spares by OEM of MPPT Charger, FCBC Charger & Converter for 15 years from date of commissioning of the system	√	√	

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SCADA COMMUNICATION AND MAPPING DETAILS

Dedicated RS485 Interface port to be provided for SCADA communication apart from local diagnostic port. Modbus RTU protocol will be the communication protocol between SOLAR POWER SYSTEM and RTU. Below mentioned parameter needs to be configured in contiguous Modbus register by SOLAR POWER SYSTEM vendor for SCADA as per Modbus Register Address mentioned below.

STANDARDIZED SOLAR POWER SYSTEM PARAMETER FOR SCADA							
S NO	Terminals with Power Source as SOLAR POWER SYSTEM with Grid	Signal Type	Start Addr	Mod-bus End Addr	Read /Write	HIST. AMS REQd	Remark
SOLAR POWER SYSTEM-1 (Modbus Device Address 1)							
Analog Parameters (Two 16 bit register to map one float parameter)							
1	Solar Panel Output Voltage Part A	Serial			Read	NO	
2	Solar Panel Output Voltage Part B	Serial			Read	NO	
3	Solar Panel Output Current Part A	Serial			Read	NO	
4	Solar Panel Output Current Part B	Serial			Read	NO	
5	SOLAR POWER SYSTEM Output Power (In KW) Part A	Serial			Read	NO	
6	SOLAR POWER SYSTEM Output Power (In KW) Part B	Serial			Read	NO	
7	Battery Voltage Part A	Serial			Read	NO	
8	Battery Voltage Part B	Serial			Read	NO	
9	Battery Charging Current Part A	Serial					
10	Battery discharging Current Part A	Serial			Read	NO	
11	Battery Charging Current Part B	Serial					
12	Battery discharging Current Part B	Serial					
DIGITAL							
1	Battery-A Status (0 - None / 1 -Charging / 2 - Discharging)	Serial			Read	NO	
2	Battery-B Status (0 - None / 1 -Charging / 2 - Discharging)	Serial			Read	NO	1
3	Battery -A Voltage HIGH (0 – Normal 1 – Main's volt greater than Main's High volt reference	Serial					

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4	Battery -B Voltage HIGH (0 – Normal 1 – Main's volt greater than Main's High volt reference	Serial					
5	Battery -A Voltage LOW (0 – Main's Normal, 1 – Main's volt less then Main's)	Serial					
6	Battery -B Voltage LOW (0 – Main's Normal, 1 – Main's volt less then Main's)	Serial					
7	Charge controller/PCU A OVER TEMP (0 -Temp. Normal 1 – Temp. High)	Serial					
8	Charge controller/PCU B OVER TEMP (0 -Temp. Normal 1 – Temp. High)	Serial					
9	Battery A Current HIGH TRIP (0 – Normal 1 –MCCB Trip Due to Main's High.	Serial					
10	Battery B Current HIGH TRIP (0 – Normal 1 –MCCB Trip Due to Main's High	Serial					
11	LOW BATTERY- A TRIP (0 - Battery Voltage normal 1 – Battery Disconnected	Serial					
12	LOW BATTERY -B TRIP (0 - Battery Voltage normal 1 – Battery Disconnected)	Serial					
13	LOAD ON GRID (0 - Load is not on Grid 1 - Load is on Solar)	Serial					
14	SCC- A, O/P Voltage LOW (0 – O/P Voltage is normal 1 – O/P Voltage is Low)	Serial					
15	SCC- B, O/P Voltage LOW (0 – O/P Voltage is normal 1 – O/P Voltage is Low)	Serial					
16	SCC A,O/P current HIGH (0 – O/P current is Higher 1 – O/P Voltage is normal)	Serial					
17	SCC-B,O/P current HIGH (0 – O/P current is Higher 1 – O/P Voltage is normal)	Serial					
18	Charge controller/PCU B trip (0 - SCC is not Tripped, 1 - SCC is tripped)	Serial					
19	Charge controller/PCU A trip (0 - SCC is not Tripped, 1 - SCC is tripped)	Serial					
20	SC COMM FAIL (0- Communication between the Control Card & UI Card is OK ,1 – Communication Fail	Serial					

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	between the Control Card & UI Card.						
SOLAR POWER SYSTEM- 1 Hardwire Signals							
1	SCC/PCU Trip	Hard wire DI					
2	MCCB Trip	Hard wire DI					
3	Battery Discharge (Load on Battery)	Hard wire DI					
4	Load On Bypass	Hardwire DI					
5	Common Alarm	Hard wire DI					
SOLAR POWER SYSTEM-2							
1	SCC/PCU Trip	Hard wire DI					
2	MCCB Trip	Hard wire DI					
3	Battery Discharge (Load on Battery)	Hard wire DI					
4	Load On Bypass	Hard wire DI					
5	Common Alarm	Hard wire DI					
DC-DC Converter							
1	24V DC-DC Converter-A ON	Hard wire DI					
2	24V DC-DC Converter-B ON	Hard wire DI					
3	24V DC-DC Converter-A OFF	Hard wire DI					
4	24V DC-DC Converter-B OFF	Hard wire DI					
5	24V DC-DC Converter-A TRIP	Hard wire DI					
6	24V DC-DC Converter-B TRIP	Hard wire DI					
7	48V DC-DC Converter-A ON	Hard wire DI					
8	48V DC-DC Converter-B ON	Hard wire AI					
9	48V DC-DC Converter-A OFF	Hard wire DI					
10	48V DC-DC Converter-B OFF	Hard wire DI					
11	48V DC-DC Converter-A TRIP	Hard wire DI					
12	48V DC-DC Converter-B TRIP	Hard wire DI					
COMMUNICATION PARAMETERS FOR EACH SOLAR POWER SYSTEM – Modbus Slave Address 1 (1&2-for two SOLAR POWER SYSTEM)							
	PROTOCOL	Interface	Baud Rate	Data Bits	Parity	Stop Bit	
	MODBUS RTU	RS 485	9600	8	None	1	

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SCADA COMMUNICATION AND MAPPING DETAILS

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Analog Parameters (Two 16 bit register to map one float parameter)							
1	Solar Panel Output Voltage Part A	Serial			Read	NO	
2	Solar Panel Output Voltage Part B	Serial			Read	NO	
3	Solar Panel Output Current Part A	Serial			Read	NO	
4	Solar Panel Output Current Part B	Serial			Read	NO	
5	SOLAR POWER SYSTEM Output Power (In KW) Part A	Serial			Read	NO	
6	SOLAR POWER SYSTEM Output Power (In KW) Part B	Serial			Read	NO	
7	Battery Voltage Part A	Serial			Read	NO	
8	Battery Voltage Part B	Serial			Read	NO	
9	Battery Charging Current Part A	Serial					
10	Battery discharging Current Part A	Serial			Read	NO	
11	Battery Charging Current Part B	Serial					
12	Battery discharging Current Part B	Serial					
DIGITAL							
1	Battery-A Status (0 - None / 1 -Charging / 2 - Discharging)	Serial			Read	NO	
2	Battery-B Status (0 - None / 1 -Charging / 2 - Discharging)	Serial			Read	NO	1
3	Battery -A Voltage HIGH (0 – Normal 1 – Main's volt greater than Main's High volt reference	Serial					

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4	Battery -B Voltage HIGH (0 – Normal 1 – Main's volt greater than Main's High volt reference	Serial					
5	Battery -A Voltage LOW (0 – Main's Normal, 1 – Main's volt less then Main's)	Serial					
6	Battery -B Voltage LOW (0 – Main's Normal, 1 – Main's volt less then Main's)	Serial					
7	Charge controller/PCU A OVER TEMP (0 -Temp. Normal 1 – Temp. High)	Serial					
8	Charge controller/PCU B OVER TEMP (0 -Temp. Normal 1 – Temp. High)	Serial					
9	Battery A Current HIGH TRIP (0 – Normal 1 –MCCB Trip Due to Main's High.	Serial					
10	Battery B Current HIGH TRIP (0 – Normal 1 –MCCB Trip Due to Main's High	Serial					
11	LOW BATTERY- A TRIP (0 - Battery Voltage normal 1 – Battery Disconnected	Serial					
12	LOW BATTERY -B TRIP (0 - Battery Voltage normal 1 – Battery Disconnected)	Serial					
13	LOAD ON GRID (0 - Load is not on Grid 1 - Load is on Solar)	Serial					
14	SCC- A, O/P Voltage LOW (0 – O/P Voltage is normal 1 – O/P Voltage is Low)	Serial					
15	SCC- B, O/P Voltage LOW (0 – O/P Voltage is normal 1 – O/P Voltage is Low)	Serial					
16	SCC A,O/P current HIGH (0 – O/P current is Higher 1 – O/P Voltage is normal)	Serial					
17	SCC-B,O/P current HIGH (0 – O/P current is Higher 1 – O/P Voltage is normal)	Serial					
18	Charge controller/PCU B trip (0 - SCC is not Tripped, 1 - SCC is tripped)	Serial					
19	Charge controller/PCU A trip (0 - SCC is not Tripped, 1 - SCC is tripped)	Serial					
20	SC COMM FAIL (0- Communication between the Control Card & UI Card is OK ,1 – Communication Fail	Serial					

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	between the Control Card & UI Card.						
SOLAR POWER SYSTEM- 1 Hardwire Signals							
1	SCC/PCU Trip	Hard wire DI					
2	MCCB Trip	Hard wire DI					
3	Battery Discharge (Load on Battery)	Hard wire DI					
4	Load On Bypass	Hardwire DI					
5	Common Alarm	Hard wire DI					
SOLAR POWER SYSTEM-2							
1	SCC/PCU Trip	Hard wire DI					
2	MCCB Trip	Hard wire DI					
3	Battery Discharge (Load on Battery)	Hard wire DI					
4	Load On Bypass	Hard wire DI					
5	Common Alarm	Hard wire DI					
DC-DC Converter							
1	24V DC-DC Converter-A ON	Hard wire DI					
2	24V DC-DC Converter-B ON	Hard wire DI					
3	24V DC-DC Converter-A OFF	Hard wire DI					
4	24V DC-DC Converter-B OFF	Hard wire DI					
5	24V DC-DC Converter-A TRIP	Hard wire DI					
6	24V DC-DC Converter-B TRIP	Hard wire DI					
7	48V DC-DC Converter-A ON	Hard wire DI					
8	48V DC-DC Converter-B ON	Hard wire AI					
9	48V DC-DC Converter-A OFF	Hard wire DI					
10	48V DC-DC Converter-B OFF	Hard wire DI					
11	48V DC-DC Converter-A TRIP	Hard wire DI					
12	48V DC-DC Converter-B TRIP	Hard wire DI					
COMMUNICATION PARAMETERS FOR EACH SOLAR POWER SYSTEM – Modbus Slave Address 1 (1&2-for two SOLAR POWER SYSTEM)							
	PROTOCOL	Interface	Baud Rate	Data Bits	Parity	Stop Bit	
	MODBUS RTU	RS 485	9600	8	None	1	

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CAMC Annual Maintenance of the Solar PV system (Comprehensive Annual Maintenance Contract-CAMC)

Complete Solar system is to be maintained for a period of five years after the expiry of warranty/DLP period as per the details given below:

- After expiry of warranty period/DLP, Cost of all spares, consumables, equipment, instruments & services, to take care of maintenance (Preventive & Breakdown), including all statutory taxes and duties including entry tax, service tax etc. has to be borne by the Vendor during the CAMC period. In case of failure to attend within 3 days, these will be attended through alternate agency at vendor's risk and cost.
- Four Nos. normal visits (once in three months) per annum for carrying out regular maintenance work, for checking the operation of system and do preventive maintenance and Four No. emergency visits per annum (as & when required) are included in scope of C.A.M.C (Annual Maintenance Contract) at each location. M/s IGGL will have the right to reschedule the visits and adjust the total no. of regular and emergency visits. Each Visit shall conclude only after the deliverables are achieved as per the approved check list/work specified by IGGL before start of the visit.
- During warrantee and CAMC period, any replacement of parts/rectification shall form an integral part of the contract and agreed contract price. Since the equipment is under warranty and CAMC obligations, no extra payment towards replacement of components, parts etc shall be allowed.
- The effective date of Annual Maintenance Contract shall be from the date of successful completion of warranty period/DLP as per contract and on request from the purchaser. During regular maintenance / breakdown visits any replacement/consumable required will be provided by the Vendor.
- The vendor's service engineer will check and service supplied Solar System, PV Panels, FCBC, Solar Charger Controllers, converters, DBs, Inverters & Battery Bank and all its associated electronics & magnetic, installed under this contract and its accessories and maintain them in good working condition. Any consumables required for servicing the equipment shall be arranged by the Vendor at no extra cost to IGGL during CAMC.
- Vendor shall ensure availability of consumables and critical spares for smooth working of complete solar systems during CAMC. The vendor should do proper spares management by carrying out periodical testing of the spares, safeguards against obsolescence, any up gradation, timely replenishment, etc.
- IGGL can terminate the annual maintenance contract by giving one months' notice in advance to the vendor for CAMC.
- In case the Bidder does not undertake the CAMC contract later when awarded or does not abide by the terms of the contract for supply of spares as well as the CAMC contract, then IGGL reserves the right to encash the performance bank guarantee available with them besides blacklisting and putting the Bidder on holiday list of IGGL for a period of five years.

- Any software upgrades required shall be included in the scope of the Bidder during annual maintenance. The Bidder shall seek permission from the Project / Terminal incharge before loading the new version of the software in the clients / server. The data backup shall be taken before upgrading the software. If during CAMC /Warranty period a new version of Software is released by the Vendor/ OEM, the same is to be updated at the location without any additional charges.
- If new OS, say Windows 10 or above is introduced by IGGL for the automation system, the UPS system shall be integrated with the same within a reasonable time period and without any cost implication to IGGL.
- The vendor shall ensure availability of spares for the supplied UPS System, rectifiers, converters and all its associated electronics, for a minimum period of 15 years after warranty period. In the event of non-availability of spares due to fast obsolescence of hardware and software, the vendor shall arrange to upgrade/ replace the equipment's with equivalent or higher hardware and software at no additional cost till end of CAMC period for the items supplied by the Vendor.
- The Vendor must note that all commissioning spares and the spares / consumables during warranty and comprehensive CAMC shall be supplied by the vendor free of cost.
- For payment terms and penalty clauses refer the annexure to SCC-Payment Terms (Annexure-5 to SCC).
- Bids will be evaluated taking into account the charges towards CAMC for 5 years. However IGGL reserves the right to award the CAMC contract & these items subsequently at the end of the warranty period or earlier.
- For all Windows OS & other Microsoft product, the security/ functionality patches which are mandatory in nature shall be upgraded /installed in all machines during project execution, system stabilization, warranty & CAMC. Vendor shall carry out such updates in coordination with IGGL. Using IGGL's software deployment/ upgrade infrastructure.
- CAMC shall include all the materials, items and services supplied by the Bidder including the Battery bank.
- **During the CAMC period bidder scope shall also include the regular checking of the Battery bank, top up with water/electrolyte and its preventive maintenance per visit and annual capacity test of the bank and replacement of the faulty battery cell as per the capacity test reports.**

Battery cell replacement shall be carried out by M/s IGGL as per the capacity test report.

Prices of replacement of the all faulty other parts/system other than Battery is included in the CAMC.

Sl no	Parameter	Scope	Time line	Penalty
a	Fault in PV System, charger , FCBC, battery etc.	To ensure that the PV System, charger , FCBC, battery etc.are working properly and all the instruments/ items in the system are in good working condition	Within 2 working days of reporting	<i>Penalty of Rs 10000/- per day will be imposed for delay in execution of job.</i>

Contractor to maintain at least one maintenance office for each awarded part / parts having complete operation and maintenance spare parts, all types of tools and tackles, furniture etc necessary for performance of job. Storage facility shall also be maintain be contractor. At maintenance office contractor to deploy one technician and one helper during the AMC period of five years. A record book for maintenance, fault log, attendance etc. shall be maintained.



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ANNEXURE-IV

SCHEDULE FOR 2 YEARS SOLAR POWER SYSTEM O&M SPARES

Sl. No.	Item Description	Unit	Quantity			
			WestBengal	Sikkim	Manipur	Nagaland
1	Solar Module	Nos	1	1	1	1
2	FCBC Cards* (1400W)	Set	1	1	1	1
3	FCBC Cards* (2000W)	Set	1	1	1	1
4	SCC Cards* (1400W)	Set	1	1	1	1
5	SCC Cards* (2000W)	Set	1	1	1	1
6	DC-DC Converter cards* (1400W)	Set	1	1	1	1
7	DC-DC Converter cards* (2000W)	Set	1	1	1	1
8	MCB's & MCCB's* (1400W system)	Set	1	1	1	1
9	MCB's & MCCB's* (2000W System)	Set	1	1	1	1
10	Fuse of all ratings** (1400W system)	Set	1	1	1	1
11	Fuse of all ratings** (2000W System)	Set	1	1	1	1
12	Push buttons, toggles, switches, Rotary switches	Set	1	1	1	1
13	Indicating Lamps	Set	1	1	1	1
14	Battery Cell Solar Street Light System	Nos	2	2	2	2
15	Relay -10% with min1 NO of each type of relay	Set	1	1	1	1
16	Contactors(AC & DC Aux.)	Set	1	1	1	1
17	IGBT 1 no Of each rating& type	Set	1	1	1	1

Notes:

1) * 1 Set=One of card of each rating & type

(2) ** 1 Set= 10% of each rating (minimum one number)

(Prices of 02 years O&M spares are deemed to be inclusive of total prices quoted by the Bidder for the complete solar system package.)



ANNEXURE V

STATE WISE DISTRIBUTION OF SUPPLY, INSTALLATION, TESTING & COMMISSIONING AND CAMC FOR VARIOUS ITEMS

Sl. No.	Item Description	Unit	State Wise Quantity				Total Quantity
			Nagaland	Manipur	West Bengal	Sikkim	
1	1400 WATT HYBRID SPV SYSTEM 1400 WATT OF SOLAR POWER SOURCE AT SV STATIONS	Sets	3	2	3	1	9
2	2000 WATT HYBRID SPV SYSTEM OF SOLAR POWER SOURCE AT SV STATIONS	Sets	3	2	3	1	9
3	Outdoor emergency lighting	Sets	14	14	19	8	55
4	Grid connected solar pv system_ 20KWp	Sets	0	2	2	1	5
5	All inclusive per month rates for maintaining the warehouse/store at site (for supplied material) during the extended period as required (payable if site is not ready even after 6 months of Contractual completion date of Supply, Installation, Testing & commissioning as per terms & condition of contract and as defined in the tender scope of work).	Months	6	6	6	6	24
6	5 years comprehensive AMC (CAMC) for Solar systems (all items supplied under sl 1 to 4) which shall cover workmanship and materials (supplied by the Bidder) for solar system. However CAMC shall start after successful completion of warranty period/ Defect Liability period as per contract. (For detail scope & payment terms refer scope of work, annexure to SCC & contract document)	LS	0.18	0.34	0.35	0.13	1.00







Energising Quality

VCS Quality Services Pvt Ltd

STANDARD DATA SHEET FOR SOLAR ELECTRIC POWER SYSTEM

VCS-DS-EL-4006

					
02	04.04.2022	SP	RD	AA	HK
01	14.09.2020	MG	VV	AD	SK
00	14.11.2017	MG	RD	AD	SK
Rev	Date	Prepared By	Checked By	Approved By	Authorized By

UNCONTROLLED COPY	:	If printed
CONTROLLED COPY	:	If in soft and signed



Energising Quality

**STANDARD DATA SHEET
FOR
SOLAR ELECTRIC POWER SYSTEM**

Doc number: VCS-DS-EL-4006

Rev : 02

Rev.	Revision Date	Prepared by	Checked by	Approved by	Authorized by	Revision Description	
00	14.11.2017	MG	RD	AD	SK		
01	14.09.2020	MG	VV	AD	SK		
02	04.04.2022	SP	RD	AA	HK		



**STANDARD DATA SHEET
FOR
SOLAR ELECTRIC POWER SYSTEM**

Doc number:	VCS-DS-EL-4006
Rev :	02

GENERAL INFORMATION

Applicable To:	Purchase	As Built	Vendor shall complete Data Sheet with information not otherwise provided by Buyer.
Client:	_____		
Facility:	_____	Tag Number:	_____
Location:	_____	Manufacturer/Model No.:	_____
Service:	_____		

[TECHNICAL DATA SHEET]


(ANNEXURE -1)


1.0 SOLAR SYSTEM


1.1	Type	Solar Photovoltaic (SPV)
1.2	System/Application	Cathodic Protection (-48 V-0-+48V DC), Instrumentation (24V DC), SCADA (24 V DC) & Telecom (-48 V DC), F A & CO2 flooding system (24 V DC)
1.3	Daily load demand of system	As per SOR
1.4	System rating (KWp)	As Per SOR
1.5	Earthing system	Two wire isolated system (No system Earthing provided for PV system), For -48V supply as per requirement
1.6	Battery Back up	72 Hrs (3 Days Autonomy) on running load
1.7	Location	Verious loation for Pipeline
1.8	Wind Velocity	Min 55 m/s or as Per Site Condition/Survey data. It may be ensured that the design has been certified by a recognized Lab/ Institution in this regard and submit wind loading calculation sheet.
1.9	Ambient Temperature	Max. 50 deg C, Min 2 deg C

2.0 SOLAR PANEL STANDARD DATA SHEET

	Module output Watts (Wp)	≥415 Wp
2.2	Insolation data	As per site condition, However average insolation value shall not be higher than 5.2 kWh/Sq.M/Day
2.3	Number of no sun days	03 days
2.4	Nominal voltage of solar array	96V DC
2.5	PV Array mounting	Structure mounting on roof/ground(2x50%)
2.6	De-rating Factors to be considered A) Solar array- (Module deterioration x dust deposit x Module mismatch x line resistance of cable x Array wiring x panel orientation x Rise in temp. x Charge controller eff.) B) Ageing factor C) DC-DC converter efficiency D) Battery Efficiency	0.7 0.8 0.8 0.9
2.7	Solar module framing material	Withstand up to Min 55 m/s wind velocity and Temp Range as specified.
2.8	Material of Lightning	As per manufacturer/GI (hot dip)
2.9	Degree of protection of Solar Array and junction box	IP65
2.1	Supporting structure	Anodized AL/Hot dipped Galvanized MS
2.11	Expected life span	20 years @ 80% of initial power rating
2.12	Structure Design	The mounting structure steel shall be as per latest IS 2062: 1992 and galvanization of the mounting structure shall be in compliance of latest IS 4759. Structural material shall be corrosion resistant and electrolytically compatible with the materials used in the module frame, its fasteners, nuts and bolts. Necessary protection towards rusting need to be provided either by coating or anodization.
2.13	Fasteners	The fasteners used should be made up of stainless steel

 Energising Quality	STANDARD DATA SHEET FOR SOLAR ELECTRIC POWER SYSTEM		Doc number:	VCS-DS-EL-4006
			Rev :	02
3.0 SOLAR CHARGE CONTROLLER-MPPT Charger				
3.1	Type of charge Controller	Parallel Redundant (2x100%), Automatic changeover through static switch, MPPT type FCBC (Automatic & Manual Float cum Boost Charging) type		
3.2	Enclosure degree of protection	IP 31		
3.3	Mounting	Wall / floor		
3.4	Cable entry	From Bottom		
3.5	Rating (Amp)/KW	As per design calculation		
3.6	Charger I/O	a) Transducer for telemetering battery voltage & current, load Voltage & current, solar array Voltage & current (4-20 mA Output) Compatible I/o for SCADA system b) Potential free contact & static switch- For deep discharge of battery banks (up to 70%) for annunciation through SCADA c) status of charging of battery banks from Solar charge controller or grid charger through SCADA d) Alarm for banks voltage becomes 88V DC (Adjustable). e) Interlocking logic between solar charger controller & FCBC Grid charger to enable automatic changeover as specification.		
4.0 415V 3x1 Ph FCBC CHARGER (Refer Charger Data sheet for more details)				
4.1	Type of charger	DSP controlled PWM, FCBC (Automatic Float cum Boost Charging) type		
4.2	Rating	As per design calculation @ C10 rating		
4.3	Arrangement	As per drawing		
4.4	Charger I/O	Potential free contact for charger 'ON' and available power supply Feedback for SCADA system and other as per charger specification a) Grid Supply of individual phases b) Charger ON/OFF c) I/P Current (R,Y,B) d) I/P Voltage (R,Y,B) e) O/P Current f) O/P Voltage g) Charger Fail		
4.5	Output Voltage	96V DC/ As per design		
4.6	Enclosure protection	IP 42		
4.7	Mounting	Floor		
4.8	Cable entry	From Bottom		
4.9	Efficiency	>90% @ 100% load		
4.10.	Remote monitoring for all operating data of charger along with alarms on serial communication	RS485-ModBus protocol		
5.0 BATTERY BANK				
5.1	Make	As per approved vendor		
5.2	Type	Ni-Cd type battery banks		
5.3	Mode of arrangement	2x50% (Provision made to isolate individual bank from Charge controller/grid charger for preventive maintenance) & Charging of individual battery bank from individual charger.		
5.4	AH Rating	As per SOR/Project requirements/Calculation		
5.5	Self discharge of battery	<3% per month at 20 deg C <6% per month at 30 deg C		
5.6	Battery Sizing: i) Battery end cell voltage(Min) ii) Battery De-rating factor to be considered: Aging Temp. Correction DOD (Depth of discharge) iii)DC-DC conversion efficiency iv) Battery stand formation	1.1 V/Cell (As Calculated/ As per Manufacturer Standard) 0.8 As per min. site temp (0 deg C) 70% 80% Battery stands in double row/ double tier formation		
5.7	Charge efficiency	>95% up to 70% state of charge		

 Energising Quality	STANDARD DATA SHEET FOR SOLAR ELECTRIC POWER SYSTEM		Doc number:	VCS-DS-EL-4006
			Rev :	02
6.0 DCDB				
6.1	Type	Non draw-out type, Fixed type, Front operation & maintenance type with Voltmeter and Ammeter.		
6.2	Degree of protection	IP 31		
6.3	Mounting	Wall mounted/Floor Mounted		
6.4	Cable entry	From bottom		
A	DCDB (With suitable MCCB's & MCB's):-96V +/-10%			
i	No. of I/C feeder (DC MCCB -DP 32/63/100/160 A) -	As per SLD		
ii	No. of O/G feeders (DC MCB -DP 6/10/16A)	As per SLD		
iii	20% Spare Feeder to be provided			
B	DCDB (With suitable MCCB's & MCB's):-48V +/-10%			
i	No. of I/C feeder (DC MCCB -DP 32/63/100/160 A) -	As per SLD		
ii	No. of O/G feeders (DC MCB -DP 6/10/16A)	As per SLD		
iii	20% Spare Feeder to be provided			
C	DCDB (With suitable MCCB's & MCB's)-24 V +/-10%			
i	No. of I/C feeder (DC MCCB -DP 32/63/100/160 A) -	As per SLD		
ii	No. of O/G feeders (DC MCB -DP 6/10/16A)	As per SLD		
iii	20% Spare Feeder to be provided			
7	PCU (MPPT-Inverter)			
7.1	Switching Device	SCR/IGBT/MOSFET		
7.2	Applicable standards	Applicable IEC/BIS		
7.3	Control	DSP type, Dual MPPTPCU/inverter shall be capable of complete automatic operation including wake-up, synchronization & shutdown		
7.4	AC Output Voltage	415V AC +/- 2% (Range 320-480V), Pure sine wave		
7.5	Operating voltage range	AC +/-20%		
7.6	Output Frequency	50 Hz		
7.7	Operating frequency range	47-53 Hz		
7.8	Enclosure Protection	IP-65 for Outdoor IP-42 for Indoor		
7.9	Full Load THD	< 3%		
7.10.	Power factor (adjustable)	Pf +/-0.8 to+/-0.98		
7.11	Efficiency			
7.12	Peak Efficiency	Min 98%		
7.13	EURO Efficiency	Min 97%		

 STANDARD DATA SHEET FOR SOLAR ELECTRIC POWER SYSTEM		Doc number:	VCS-DS-EL-4006
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7.14	No Load Loss	Less than 1% of rated power	
7.15	Remote Monitoring	Built-in meter and data logger to monitor plant performance through external computer/Laptop shall be provided	
7.16	Display/User interface	LCD/LED	
8	JUNCTION BOXES		
8.1	Type	FRP/Thermo Plastic, Dust vermin and water proof IP65 Sub array JB's than Main JB with facility for test point for quick fault location	
8.2	Degree of protection	IP65	
8.3	Mode of arrangement	Sub array JB's than Main JB with facility for test point for quick fault location	
9	DC-DC CONVERTER (24V & 48V)		
9.1	Type	Each convertor shall be parallel redundant (2x100%) with Galvanic Isolation	
9.2	Input Voltage	85-135V DC (As per design)	
9.3	Output voltage	24V DC & (+)48V-0V-(-) 48V	
9.4	Accuracy	Out put DC +/-1%	
9.5	Efficiency	Out put DC>90%	
10	SOLAR STREET LIGHTING SYSTEM		
10.1	Type	Stand alone, Dusk-Dawn type	
10.2	PV Module	>150 Wp(minimum)	
10.3	Lamp	20 W LED (As per SOR)	
10.4	Voltage	50-60 V DC	
10.5	Battery Rating	150 Ah (3 Day Autonomy) (2x75AH arrangement)	
10.6	Battery Type	Tubular Low maintenance type LI-Ion/LFP/ SMF for solar application	
10.7	Indications	Green LED-Charging in progress Red LED- For deep discharge	
11	CABLE AND ACCESSORIES		
11.1	Interconnecting Cables Type	Cu- conductor XLPE Insulated, PVC sheathed, armoured/unarmoured FRLS type	
11.2	Cable gland type	Double compression type	
11.3	Lugs-type	Tinned Cu	
12	SPACE AVAILABLE FOR MOUNTING OF SOLAR ARRAY IN EACH EXISTING TERMINAL		
12.1	On Building top	X-----X-----X--	
12.2	On ground	X-----X-----X--	
12.3	Total plot size	X-----X-----X--	



Energising Quality

**STANDARD DATA SHEET
FOR
SOLAR ELECTRIC POWER SYSTEM**

Doc number:

VCS-DS-EL-4006

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02

**TECHNICAL DATA FOR SPV POWER SUPPLY SYSTEM
(To be submitted up by the successful bidder)**

ANNEXURE -II

1	SOLAR ARRAY	
1.1	Manufacturer's Ref. No./ Model No.	*
1.2	Size of solar system	Sizing calculation after award of bid
1.3	No. of Solar panel/array	(2X50%) Sizing calculation after award of bid
1.4	Applicable codes/standards	*
1.5	Steady state output volt	*
1.6	Mode of Arrangement	*
1.7	Peak power output of each module(Pmax, Watts)	*
1.8	Current at Pmax (Imax)	*
1.9	Voltage at Pmax (Vmax)	*
1.10.	Short circuit current (Isc)	*
1.11	Open circuit voltage (Voc)	*
1.12	Dimensions (in mm)	*
1.13	Degree of protection of the panel	*
1.14	Tilt factor	*
1.15	Loss factor	*
1.16	Efficiency at 100% load	*
1.17	Type of control circuit	*
1.19	Total space requirement of the Arrays (Sq-m)	*
2	CHARGE CONTROLLER-MPPT	
2.1	Rating (Amp.) / Kw	Sizing calculation after award of bid
2.2	No. of Charge controller	(2X100%) Sizing calculation after award of bid
2.3	Output voltage under float/boost charging condition	*
2.4	Type / Mode Refer Block Diag. (Attached with tender)	MPPT/ DSP type PWM Charger**



**STANDARD DATA SHEET
FOR
SOLAR ELECTRIC POWER SYSTEM**

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3	GRID CHARGER (415V, 3 x 1Ph)	
3.1	Rating (Amp.)/KW	Sizing calculation after award of bid
3.2	Output volt under float/boost charging condition	*
3.3	Type/Mode	*
3.4	Interlocking with SPV charge controller	*
4	BATTERY	
4.1	Make	*
4.2	Type (Enclose catalogue)	Ni-Cd
4.3	Type of construction	*
4.4	AH rating	Sizing calculation after award of bid
4.5	Battery charge eff.	*
4.6	Mode of arrangement	2X50%
4.7	Nominal cell voltage	1.2 V / Cell
4.8	End cell volt. At specified discharge rate (V/ cell)	1.1 or *
4.9	No. of cells	*
4.1	Recommended Float charging voltage per cell	*
4.11	Maximum Float charging voltage per cell	*
4.12	Recommended Boost charging voltage per cell	*
4.13	Maximum Boost charging voltage per cell	*
4.14	Accessories for battery	Included.
4.15	Dimension of battery bank stand (WXDXH)	*



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**STANDARD DATA SHEET
FOR
SOLAR ELECTRIC POWER SYSTEM**

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5	INDICATIONS AND ALARM	*
	METERING & INDICATION-	
	i) Voltage and Current from Solar Array. ii) Load Voltage and current iii) Battery current and voltage with indication of status - "in charge" or "discharge".	
5.1	iv) Solar array Voltage and Current. v) Annunciation for battery deep discharge of battery. vi) Indication for charging of battery from solar charge controller or grid charger	*
5.2	Confirmation on Remote Monitoring of the solar system through SCADA as per specification (Protocol shall be ModBus).	*
6	DIMENSIONS FOR EACH SYSTEM	
6.1	Solar Array	*
6.2	Battery Bank	*
6.3	Charge Controller/PCU	*
6.4	3x1Ph Grid Charger-FCBC	*
7.0.	MPPT/ PCU/Inverter	
7.1	Manufacturer Name	*
7.2	Model No.	*
7.3	Rating	*
7.4	Peak Eff.	*
7.5	Euro Eff.	*
7.6	Degree of Protection	*
7.7	Remote Monitoring	*
7.8	Make of Laptop with software supplied with the PCU/MPPT	*
7.9	Nos. of MPPT/PCU	*



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**STANDARD DATA SHEET
FOR
SOLAR ELECTRIC POWER SYSTEM**

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VCS-DS-EL-4006

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**TECHNICAL DATA FOR SOLAR STREET LIGHTING SYSTEM
(To be submitted up by the successful bidder)**

ANNEXURE – III

1	SOLAR MODULE	
1.1	Peak Power (Wp)	*
1.2	Peak Voltage	*
1.3	Peak Current	*
1.4	Open Circuit Voltage	*
1.5	Short Circuit Current	*
1.6	Nominal Voltage	*
2	BATTERY	
2.1	Make	*
2.2	Type (SMF/LI-ION/LFP)	*
2.3	Ah rating	*
2.4	System Autonomy	*
2.5	Nominal Voltage	*
2.6	Depth of discharge	*
3	LUMINARY ASSEMBLY	
3.1	Type of lamp	*
3.2	Luminous Efficiency	*
4	DIMENSIONS: (Enclose Catalogue)	*



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**STANDARD DATA SHEET
FOR
SOLAR ELECTRIC POWER SYSTEM**

Doc number:

VCS-DS-EL-4006

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CHECK LIST (To be submitted by the Bidder) ANNEXURE – IV

S.NO	Description	Remark
1	Deviation from specification	Offer may be rejected if there is any deviation
2	Solar Array sizing calculation enclosed	After award
3	Charger sizing calculation enclosed (both solar and grid charger)	After award
4	Battery sizing calculation enclosed	After award
5	PCU Model no. & Rating	After award
6	PCU Sizing calculation	After award
7	List of spares, tools & tackles for PCU system.	Yes/No
8	Solar Array, Battery catalogue enclosed	Yes/No
9	Confirmation for Inspection of Solar Array, charge controller, PCU and battery as per Specification/QAP.	Yes/No
10	Confirmation for Remote monitoring of the parameters through SCADA system (Hook-up with Owner's SCADA system through RS232/485) and automatic changeover between grid charger & solar Charger	Yes/No
11	Confirmation that Solar System Offered can be accommodated in plot area (Refer enclosed plot plan).	Yes/No
12	Confirmation on Dimension of Solar Array, Charge Controller, 3Ph Charger and Battery Bank as per the available space and can be accommodated in the available space in electrical room	Yes/No
13	Unpriced schedule of rate (SOR) enclosed.	Yes/No
14	Confirmation on submission of design on PVSyst. Bidder shall have valid Licence for the same. (Submit the details along with Bid)	Yes/No
15	Guaranteed Energy Generation For 20 Years for 80% (year-wise) of Load On-grid system.	Yes/No
NOTES:		
	*	Data to be filled by supplier with its bid in the supplier data column, those data shall be in accordance with standard specification
	**	Subject to Approval



Energising Quality

VCS Quality Services Pvt Ltd

**STANDARD SPECIFICATION
FOR
BATTERY CHARGER
VCS-DS-EL-4007**

Rev	Date	Prepared By	Checked By	Approved By	Authorized By
02	04.04.2022	SP	RD	AA	HK
01	14.09.2020	MG	VV	AD	SK
00	14.11.2017	MG	RD	AD	SK

UNCONTROLLED COPY	:	If printed
CONTROLLED COPY	:	If in soft and signed



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STANDARD DATA SHEET FOR BATTERY CHARGER

Doc number: VCS-DS-EL-4007

Rev : 02

Blank header area for additional information.

Rev.	Revision Date	Prepared by	Checked by	Approved by	Authorized by	Revision Description	
00	14.11.2017	MG	RD	AD	SK		
01	14.09.2020	MG	VV	AD	SK		
02	04.04.2022	VV	RD	AA	HK		

Blank footer area for additional information.



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STANDARD DATA SHEET FOR BATTERY CHARGER

Doc number:	VCS-DS-EL-4007
Rev :	02

GENERAL INFORMATION

Applicable To: Proposal Purchase As Built Vendor shall complete Data Sheet with information not otherwise provided by Buyer.

Client: _____

Facility: _____ Tag Number: _____

Location: _____ Manufacturer/Model No.: _____

Service: _____

[TECHNICAL DATA SHEET]

1	Service	
2	Application	
3	Tag no.	
4	Make / model no. & country of origin	*
5	Location / installation	Indoor Outdoor
6	Site / environment conditions	
7	Area classification	
8	Type	
9	a). Charger rating	
	b). Connected load	
	c). Charging time	
10	Battery details	*
	a). Float/trickle charging current	*
	b). Boost charging current A	*
	c). Boost charging voltage V	*
	d). Boost charging time (hr)	*
	e). Type of battery	
	f). Battery capacity & number of cell	
11	Input details	
	a). Voltage V	
	b). Frequency Hz	
	c). Fault level KA	
	d). Supply variation	
	e). Ac input current during boost charging	
12	Output details	
12.1	Rated voltage V	*
12.2	Float charger	*
	a). Voltage range V	*
	b). Current range A	
	c). Method of voltage control	*
12.3	Boost charger	*
	a). Voltage range V	*
	b). Current range A	*
	c). Method of voltage control	*
13	Voltage regulation from full load to no load	
14	Harmonic content at rated load	
15	Efficiency	20% load
	a). Float charger %	*
	b). Boost charger %	*



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STANDARD DATA SHEET FOR BATTERY CHARGER


Doc number:	VCS-DS-EL-4007
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16	Power factor	20% load	
	a). Float charger %	*	
	b). Boost charger %	*	
17	Type and make of components	*	
	a). Rectifier	*	
	b). MCCB / MCB	*	
	c). Indicating instruments	*	
	d). Annunciators	*	
	e). Push buttons	*	
	f). Indicating lamps	Required	Not required
18	Annunciators requirement	*	
19	No. Of annunciator points		
20	Construction details		
	a). Mounting type	Floor	wall frame
	b). Type of cooling	Top	Bottom Side
	c). Cable entry	Front	Rear
	d). Access		
	e). Enclosure degree of protection and temperature class		
	f). Bus - bar material	*	
	g). Continuous current rating of bus bar A	*	
	h). Short circuit withstand capacity KA	Yes	No
21	Provision provided for remote annunciator		
22	Glands	*	
	a). Type	*	
	b). Number		
	c). Cable size sq.mm	*	
	d). Supply required	Yes	No
23	OVERALL DIMENSION (LxWxH) MM	*	
24	Weight kg	*	
25	Earth bus terminal and size	*	
26	Heat output from panel W	*	
27	Space heater	Required	Not required
	a). Voltage, rating & qty. Details of space heater	*	
28	Panel illumination	Required	Not required
	a). Voltage, rating & qty. Details of lamp	*	
29	Painting	*	
30	Colour shade of finish coat	*	
31	Whether erection, testing and commissioning in vendor's scope	Yes	No
32	Additional information / requirements		
33	Reference codes		

NOTES:

*	Data to be filled by supplier with its bid in the supplier data column, those data shall be in accordance with standard specification
#	Data to be defined during detailed engineering
# #	Data to be verified by supplier

**QUALITY ASSURANCE PLAN
FOR SOLAR SYSTEM
REQUIREMENT**

 Energising Quality	CONTRACTOR		QUALITY ASSURANCE PLAN FOR SOLAR SYSTEM EQUIPMENT	CLIENT:	M/s IGGL
	ORDER NO. & DATE			PROJECT:	M/s Indradhanush Gas Grid Limited
	SUB-CONTRACTOR			PACKAGE NO.	Section 10-11
	DOC. NO. & DATE:-	C221052-SPS-EI-QAP-4001		PACKAGE NAME	SOLAR POWER SYSTEM

INSTRUCTIONS FOR FILLING UP : 1. QAP shall be submitted for each of the equipment separately with break up of assembly/sub-assembly & part/component or for group of equipment having same specification. 2. Use numerical codes as indicated for extent of inspection & tests and submission of test certificates & documents. Additional codes & description for extent of inspection & tests may be added as applicable for the plant and equipment 3. Separate identification number with quantity for equipment shall be indicated wherever equipment having same specifications belonging to different facilities are grouped together. 4. Weight in tonnes (T) must be indicated under column 5 for each item. Estimated weights may be indicated wherever actual weights are not available.	CODES FOR EXTENT OF INSPECTION, TESTS, TEST CERTIFICATES & DOCUMENTS: <table border="0" style="width: 100%;"> <tr> <td style="width: 25%;">Code Description</td> <td style="width: 25%;">Code Description</td> <td style="width: 25%;">Code Description</td> <td style="width: 25%;">DOCUMENTS:</td> </tr> <tr> <td>1. Visual</td> <td>12. Routine test as per relevant IS other standard</td> <td>23. Short time rating</td> <td>D1. Approved GA drawings</td> </tr> <tr> <td>2. Dimensional</td> <td>13. Type test as per relevant IS/ other standard</td> <td>24. Operational & functional check</td> <td>D2. Approved single line/ schematic diagram</td> </tr> <tr> <td>3. Fitment & Alignment</td> <td>14. Impulse Test</td> <td>25. Over Speed Test</td> <td>D3. Approved data sheet</td> </tr> <tr> <td>4. Physical Test (Sample)</td> <td>15. Partial Discharge Test</td> <td>26. Flame Proof Test</td> <td>D4. Approved bill of materials</td> </tr> <tr> <td>5. Chemical Test (Sample)</td> <td>16. Heat run test/temp rise.</td> <td>27. Clearance and creepage Distance</td> <td>D5. Unpriced P.O. copy</td> </tr> <tr> <td>6. Ultrasonic Test</td> <td>17. Enclosure Protection Test</td> <td>28. Acceptance Test</td> <td>D6. Calibration Certificate of all measuring instruments and gauges a)</td> </tr> <tr> <td>7. Magnetic Particle Test (MPT)</td> <td>18. Calibration</td> <td>29. Harmonics measurement</td> <td></td> </tr> <tr> <td>8. Radiography Test</td> <td>19. Noise & Vibration</td> <td></td> <td></td> </tr> <tr> <td>9. Dye Penetration Test</td> <td>20. Test certificates for bought out components</td> <td></td> <td></td> </tr> <tr> <td>10. Measurement of IR Value Before HV Test</td> <td>21. Tank Pressure Test</td> <td></td> <td></td> </tr> <tr> <td>b) After HV Test</td> <td>22. Paint shade verification</td> <td></td> <td></td> </tr> <tr> <td>11. High Voltage test/Dielectric test</td> <td></td> <td></td> <td></td> </tr> </table>	Code Description	Code Description	Code Description	DOCUMENTS:	1. Visual	12. Routine test as per relevant IS other standard	23. Short time rating	D1. Approved GA drawings	2. Dimensional	13. Type test as per relevant IS/ other standard	24. Operational & functional check	D2. Approved single line/ schematic diagram	3. Fitment & Alignment	14. Impulse Test	25. Over Speed Test	D3. Approved data sheet	4. Physical Test (Sample)	15. Partial Discharge Test	26. Flame Proof Test	D4. Approved bill of materials	5. Chemical Test (Sample)	16. Heat run test/temp rise.	27. Clearance and creepage Distance	D5. Unpriced P.O. copy	6. Ultrasonic Test	17. Enclosure Protection Test	28. Acceptance Test	D6. Calibration Certificate of all measuring instruments and gauges a)	7. Magnetic Particle Test (MPT)	18. Calibration	29. Harmonics measurement		8. Radiography Test	19. Noise & Vibration			9. Dye Penetration Test	20. Test certificates for bought out components			10. Measurement of IR Value Before HV Test	21. Tank Pressure Test			b) After HV Test	22. Paint shade verification			11. High Voltage test/Dielectric test			
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ABBREVIATIONS USED : CONTR : CONTRACTOR MFR : MANUFACTURER																																																					

EQUIPMENT DETAILS							INSPECTION AND TESTS						Test Certificates & documents to be submitted to VCS / IGGL	Acceptance Criteria Standards /IS/ BS/ASME/ Norms and Documents	REMARKS / SAMPLING PLAN
Sl. No.	Description (With equipment heading, place of use, and Brief Specifications)	Identification No.	Quantity		Manufacturer's Name and Address	Expected schedule of Final Inspection	Raw Material and inprocess stage inspection			Final Inspection/Test by					
			No/M	T			MFR	CONTR	VCS	MFR	CONTR/ TPI	VCS			
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1.0	LT Power and Control Cable		Mtr				-	-	-	1,10,11, 12,13, 28	1,2,10,11, 12, 28	IWC*	12,13,28 D3, D5, D6,	I.S., Data Sheet, Specifications & Test Certificate	12, 13 Document to be reviewed by VCS
2.0	Solar Array/Module with complete hardware (JBS, Mounting Structure etc)		Nos.				1,2,3,4, 24, 27	-	-	1,2,3,12, 13, 29	1,2,3,12, 28, 29	1,2,3,12, 28, 29	D1, D2, D3, D4, D5, D6, 20, 12,13,17,29	Tech. Specification, Approved Drawings, BIS 14286 & Applicable IS & IEC standards	12, 13 Document to be reviewed by VCS
3.0	Solar charge controller, Grid Charger (FCBC), PCU, Inverter, DCDB & DC-DC Converter		Set				1,2,3,4, 24, 27			1,2,3,12, 16, 22, 23,24,27	1,2,3,12, 16, 22, 23,24,27	1,2,3,12, 16*, 22, 23,24,27,	D1, D2, D3, D4, D5, D6, 20, 12,13	Tech. Specification, Approved Drawings & Data Sheets applicable IS & IEC standards	(*) 12 hour heat run test 12, 13 Document to be reviewed by VCS
4.0	Battery Set-Solar system		Set				1,2,3,4, 24,27	-	-	1,2,3,12, 13	1,2,28	1,2,28	D1, D3, D4, D5, D6, 12,13,20	Tech. Specification, Approved Drawings & Data Sheets Test certificates applicable IS & IEC standards	12, 13 Document to be reviewed by VCS
5.0	Solar Street light system		Nos.				1,2,3,12, 24	-	-	1,2,3,12, 24	1,2,3,12, 24	IWC*	D1, D3, D4, D5, D6, 12,13,20	Tech. Specification, Approved Drawings & Data Sheets Test certificates	

For Manufacturer (Stamp & Signature)	For CONTR (Stamp & Signature)	For VCS (Stamp & Signature)	Q.A.P. NO. C221052-SPS-EI-QAP-4001
			SHEET 1 OF 1 REV-0

*IWC- Inspection will not be conducted by VCS, Inspection waiver certificate based on thr TPI inspection report.



LIST OF RECOMMENDED VENDORS FOR BOUGHT OUT ITEMS

TOTAL SHEETS

59

DOCUMENT NO

VCS-00-00-VL-0001

LIST OF RECOMMENDED VENDORS FOR BOUGHT OUT ITEMS

05	07-07-2022	Issued as Standard	Mahesh Chand	Anjum Afroz	Hashim Khan
04	03-06-2022	Issued for Vendor's	Mahesh Chand	Anjum Afroz	Hashim Khan
REV	DATE	DESCRIPTION	PREP	CHK	APPR