Solar Energy Corporation of India Limited
(A Government of India Enterprise)
CIN: U40106DL2011GOI225263

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Saket, New Delhi - 110 017

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Notice Inviting Tender

For

Design, Engineering, Supply, Construction, Erection, Testing & Commissioning of cumulative 15 MW (AC) Floating Solar PV Power Plant along with 10 years Plant O&M at different sites

At

Singareni Collieries Company Limited (SCCL), Telangana

Tender No. SECI/C&P/NIT/2020/SCCL15

Dated: 04/04/2020

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DISCLAIMER

1. Though adequate care has been taken while preparing the tender document, the bidder(s) shall satisfy themselves that the document is complete in all respect. Intimation regarding any discrepancy shall be given to the office of Employer immediately. If no intimation is received from any bidder within **10 (Ten) days from the date of issuance of Tender documents,** it shall be considered that the document is complete in all respect and has been received/ acknowledged by the bidder(s).

2. Solar Energy Corporation of India Ltd (SECI) reserves the right to modify, amend or supplement this document.

3. While this tender document has been prepared in good faith, neither SECI nor their employees or advisors make any representation or warranty, express or implied, or accept any responsibility or liability, whatsoever, in respect of any statements or omissions herein, or the accuracy, completeness or reliability of information, and shall incur no liability under any law, statute, rules or regulations as to the accuracy, reliability or completeness of this document, even if any loss or damage is caused by any act or omission on their part.

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Place: New Delhi Date: 04/04/2020

SECTION - I

INVITATION FOR BIDS (IFB)

INVITATION FOR BIDS (IFB)

FOR

DESIGN, ENGINEERING, SUPPLY, CONSTRUCTION, ERECTION, TESTING & COMMISSIONING OF 15 MW (AC) FLOATING SOLAR PV POWER PLANT HAVING 10 YEARS PLANT O&M

AT

SINGARENI COLLIERIES COMPANY LIMITED (SCCL), TELANGANA

TOTAL PROJECT CAPACITY OF 15 MW (AC) IS DIVIDED INTO 02 DIFFERENT RESERVOIRS/SITES AT SCCL AS PER BELOW TABLE:

S NO	SITE DETAILS	SITE CAPACITY (MW)	LOCATIONS
1	SITE – 1	10	STPP STORAGE RESERVOIR, SCCL
2	SITE – 2	5	DORLI OC 2 VOID (ACCUMULATED WATER), SCCL

ELIGIBILITY CONDITIONS SET FORTH IN THE TENDER DOCUMENT ARE AS PER 15 MW (AC) CUMULATIVE CAPACITY BASIS ONLY. BIDDERS ARE REQUIRED TO QUOTE ACCORDINGLY FOR THE COMPLETE CUMULATIVE CAPACITY OF 15 MW (AC). THE TOTAL CAPACITY OF 15 MW WILL BE AWARDED TO A SINGLE SUCCESSFUL BIDDER ONLY SELECTED AFTER E-RA.

HOWEVER, THERE WILL BE SEPARATE CONTRACT AGREEMENTS BASED ON SEPARATE SITES/RESERVOIRS WITH THE SAME SUCCESSFUL BIDDER. E-RA WILL BE DONE ON THE TOTAL CUMULATIVE CAPACITY OF 15 MW ONLY. THE TOTAL PRICE OF EPC AND O&M ARRIVED AFTER E-RA, WILL BE CONVERTED TO THE PER MW PRICE. BASED ON THE PER MW PRICE ARRIVED, THE PER SITE PROJECT EPC AND O&M PRICE WILL BE CALCULATED BY MULTIPLYING THE PER MW PRICE WITH THE RESPECTIVE SITE CAPACITY. IN THE SAME WAY, THE RESPECTIVE SITE O&M PRICES WILL BE CALCULATED. ACCORDINGLY, 02 DIFFERENT EPC AND O&M NOA/CONTRACT AGREEMENT WILL BE RELEASED FOR THE RESPECTIVE SITE BY THE OWNER TO THE SINGLE SUCCESSFUL BIDDER ONLY.

EMD CAN BE SUBMITTED BY THE BIDDERS JOINTLY FOR THE COMPLETE 15 MW PROJECT CAPACITY. HOWEVER, THE SUCCESSFUL BIDDER WILL BE REQUIRED TO SUBMIT RESPECTIVE SEPARATE CONTRACT PERFORMANCE SECURITIES & ADVANCE BANK GUARANTEES (IF AVAILED) FOR INDIVIDUAL SITES AS THERE WILL BE INDIVIDUAL CONTRACT AGREEMENTS WITH THE SUCCESSFUL BIDDER BASED ON SITE/RESERVOIR CAPACITY. OWNER RESERVES THE OPTION TO REDUCE ANY OF THE ABOVE-MENTIONED SITE CAPACITY FROM THE OVERALL CUMULATIVE CAPACITY BEFORE/AFTER AWARD OF CONTRACT AGREEMENT. ACCORDINGLY, THE TOTAL PROJECT PRICE WILL BE PROPORTIONATELY REDUCED & THE FINAL PROJECT PRICE ARRIVED AS SUCH AFTER REDUCTION WILL BE THE FINAL PROJECT PRICE OF THE CONTRACT AGREEMENT.

(SINGLE STAGE TWO ENVELOPE BIDDING)

Under e-Tendering

1.0 The Singareni Collieries Company Limited (SCCL) is a Government Coal mining company jointly owned by the Government of Telangana and Government of India. The Singareni coal reserves stretch across 350 Km of the Pranahita – Godavari Valley of Telangana with a proven geological reserve aggregating to whopping 8791 million tonnes. SCCL is currently operating 18 opencast and 29 underground mines in 6 districts of Telangana. While historically technology has been a critical factor in SCCL's ability to reduce environmental impacts and occupational hazards, the need to constantly increase productivity and cut costs has demanded that the company goes in for phased mechanization and adapts state-of-the-art technologies.

2.0 Singareni Collieries Company Limited (SCCL), envisages the execution of Green Energy by way of implementing Solar PV Power Plant at SCCL in the State of Telangana. This would not only be a leap towards the use of Green Energy for SCCL but also be means of self-reliant and Economical Energy which would capitalize the abundance of Solar Energy.

3.0 The selection of the Contractor for the "Tender for Design, Engineering, Supply, Construction, Erection, Testing & Commissioning of 15 MW (AC) Floating Solar PV Power Plant at different sites including 10 years plant O&M at Singareni Collieries Company Limited, Telangana, India" has been entrusted to Solar Energy Corporation of India Limited (A Government of India Enterprise) incorporated under the Companies Act, 2013, having its Registered Office at D - 3, 1st Floor, Wing - A, Prius Platinum Building, District Centre, Saket, New Delhi - 110 017 (hereinafter referred to as 'SECI' or EMPLOYER). For the purpose of all procurement activities related to the said works, SECI shall be referred to as 'SECI or Employer'.

4.0 Employer (SECI), therefore on behalf of the "Owner" Singareni Collieries Company Limited (SCCL), invites bids from eligible bidders to participate in Tender for Design, Engineering, Supply, Construction, Erection, Testing & Commissioning of 15 MW (AC) Floating Solar PV Power Plant at different sites including 10 years plant O&M at Singareni Collieries Company Limited, Telangana, India".

5.0 **VOID**

6.0 The complete Bidding Documents are available at ISN-ETS portal ***https://www.bharat-electronictender.com,*** Central Public Procurement portal (CPPP) of GoI at ***www.eprocure.gov.in*** as well as on SECI's website ***http://www.seci.co.in***. Interested bidders shall download the Bidding Documents from the portal ***https://www.bharat-electronictender.com***, as per the provisions available therein.

7.0 Interested bidders have to necessarily register themselves on the portal ***https://www.bharat-electronictender.com*** through M/s Electronic Tender.com India Pvt Ltd (ETI), New Delhi to participate in the bidding under this invitation for bids. It shall be the sole responsibility of the interested bidders to get themselves registered at the aforesaid portal for which they are required to contact M/s ETI, New Delhi to complete the registration formalities. The address

of M/s ETI is mentioned on the Bid Information Sheet. All required documents and formalities for registering on ETI are mentioned in the subsequent bidding documents.

They may obtain further information regarding this IFB from the registered office of SECI at the address given on the Bid Information Sheet from 10:00 hours to 17:00 hours on all working days till the last date of the Bid Submission.

For proper uploading of the bids on the portal namely ***https://www.bharat-electronictender.com*** *(hereinafter referred to as the 'portal')*, it shall be the sole responsibility of the bidders to apprise themselves adequately regarding all the relevant procedures and provisions as detailed in the portal as well as by contacting M/s Electronic Tender.com India Pvt Ltd (ETI), New Delhi directly, as and when required, for which contact details are also mentioned on the Bid Information Sheet. The Employer in no case shall be responsible for any issues related to timely or properly uploading/ submission of the bid in accordance with the relevant provisions of Section II - ITB of the Bidding Documents.

8.0 While submitting/ uploading the bids, the system through portal asks to key in the pass-phrase for encryption of the documents. The pass-phrase is required by Employer for opening the bids (Separate for both First Envelopes as well as Second Envelopes). **The same may be submitted on the portal as per the provisions existing for submission of the pass-phrase and as per the details given in ITB.**

In the event, SECI is unable to open the Bids with the given pass-phrase provided by the bidders, Employer on its discretion may give an option through the portal, to the bidder to open its bid as per provisions available on the portal. However, Employer shall not be responsible if bid could not be opened within reasonable time for whatsoever reason. In such a case, the bid shall be sent unopened to 'Archive' on the portal and shall not be considered at all any further.

9.0 A Single Stage Two Envelope Bidding Procedure will be adopted and will be processed as detailed in the Bidding Documents. Bidding will be conducted through the competitive bidding procedures as per the provisions of ITB/ BDS and the contract shall be executed as per the provisions of the Contract. It shall be noted that the respective rights of the Employer and the Bidder/ Contractor shall be governed by this Bidding Documents and Contract signed between the Owner and the Contractor for the package.

10.0 Bidders should submit their bid proposal online complete in all aspect on or before last date and time of Bid Submission as mentioned on ETS Portal of ISN-ETS at ***https://www.bharat-electronictender.com***, SECI website ***http://www.seci.co.in*** and as indicated in the Bid Information Sheet.

11.0 Bidder shall submit bid proposal along with non-refundable Tender Processing Fees, Earnest Money Deposit (EMD) complete in all respect as per the Bid Information Sheet. Techno-Commercial bids will be opened as per the Bid Information Sheet in offline/ online presence of authorised representatives of bidders who wish to be present offline/ online. Bid proposals received without the prescribed Tender Processing Fees and Earnest Money Deposit (EMD) will be rejected. **In the event of any date indicated is a declared Holiday, the next working day shall become operative for the respective purpose mentioned herein.**

12.0 Tender documents which include Eligibility Criteria, Technical Specifications, various Conditions of Contract, Formats etc. can be downloaded from ETS Portal of ISN-ETS at ***https://www.bharat-electronictender.com*** or from SECI website at ***http://www.seci.co.in***. **It is mandatory to download official copy of Tender Document from ISN-ETS Portal to participate in the Tender**. Any amendment(s)/ corrigendum(s)/ clarification(s) with respect to this Tender shall be uploaded on ETI site. The Bidder should regularly check for any Amendment(s)/ Corrigendum(s)/ Clarification(s) on the above mentioned ETI site. The same may also be uploaded on SECI website ***http://www.seci.co.in*** also. **However, in case of any discrepancy, the information available on ETI site shall prevail**.

13.0 The Bidder selected shall be responsible for the performance of the following scope of work (more detailed in this tender document):

(i) Design, Engineering, Supply, Construction, Erection, Testing & Commissioning of 15 MW (AC) Floating Solar PV Power Plant under different packages at Singareni Collieries Company Limited, Telangana, India".

(ii) Comprehensive operation & maintenance of the Solar PV Power Plants for 10 (Ten) years as mentioned in detailed scope of work, after successful commissioning and performance demonstration, as detailed in technical specification, including supply and storage of all mandatory spare parts, consumables, repairs/ replacement of any defective equipment, etc.

The above scope of work is indicative and the detailed scope of work is given in the Scope of Work and Technical Specification (Section - VII) of the Tender Documents.

14.0 EMD shall be enclosed in a sealed envelope and shall be submitted in the office of Employer (offline) whose mailing address is mentioned in the Bid Information Sheet.

15.0 Performance Securities as per this tender document shall be furnished by the successful bidder after issuance of Notification of Award (NOA)/ Letter of Intent (LOI)/ Letter of Award (LOA) by the Owner.

16.0 The detailed Qualifying Requirements (QR) are given in the Annexure to BDS.

17.0 The Employer shall conduct e-Reverse Auction (e-RA), if applicable as per provisions of **Instructions to Bidders (ITB)** of Tender documents.

18.0 ***Employer/ Owner reserves the right to cancel/ withdraw this invitation for bids without assigning any reason and shall bear no liability whatsoever consequent upon such a decision.***

INTERPRETATIONS

1. Words comprising the singular shall include the plural & vice versa.

2. An applicable law shall be construed as reference to such applicable law including its amendments or re-enactments from time to time.

3. A time of day shall save as otherwise provided in any agreement or document be construed as a reference to Indian Standard Time.

4. Different parts of this contract are to be taken as mutually explanatory and supplementary to each other and if there is any differences between or among the parts of this contract, they shall be interpreted in a harmonious manner so as to give effect to each part.

The table of contents and any headings or sub headings in the contract has been inserted for case of reference only & shall not affect the interpretation of this agreement.

BID INFORMATION SHEET

The brief details of the tender are as under:

(A)	**NAME OF WORK/ BRIEF SCOPE OF WORK/ JOB**	Design & engineering, procurement & supply of equipment and materials, testing at manufacturers works, multi – level inspections, packing and forwarding, supply, receipt, unloading and storage at site, associated civil works, services, permits, licences, installation and incidentals, insurance at all stages, erection, testing and commissioning of 15 MW (AC) Grid Interactive Floating Solar PV Power Plant and performance demonstration with associated equipment and materials on turnkey basis at different Premises of Singareni Collieries Company Limited, (SCCL), in Telangana State along with 10 (Ten) years comprehensive operation and maintenance from the date of commissioning or Operational Acceptance, whichever is later. 1. Design, Procurement & Supply and erection of the following, in all respect: 1.1 Floating Solar panels including Floats & module mounting structures and fasteners. 1.2 All power conditioning systems including junction boxes, Inverters/ PCU, DC and AC circuit breaker(s). 1.3 All associated electrical works and equipment required for interfacing line/ cable (i.e. transformer(s) – power and

		auxiliary, breakers, isolators, lightning arrestor(s), LT/other panels, protection system, cables, metering etc., but not limited to) as per technical specifications. 1.4 Design, supply, erection, testing & commissioning defined in scope of work/ TS as per project requirement and associated switchgear equipment and metering equipment as per technical specification and state regulations. 1.5 Construction of module mounting structure as per float conditions and other power equipment cable trenches for cable routing and earthing pits 1.6 Construction of Floating Passage for Cleaning of Solar PV Project 1.7 Construction of rain water drainage, if required 1.8 Setting up of a comprehensive Fire Protection system as per the Hazardous area classification for the site 1.9 Supply of mandatory spares & special tools and tackles 1.10 Demonstration of performance of the plant as per the requirement specified in the bidding documents. 1.11 Comprehensive operation & maintenance of the Floating SPV plant for 10 (Ten) years as mentioned in detailed scope of work from the date of commissioning or Operational Acceptance, whichever is later, as detailed in technical specification, including supply and storage of all spare parts, consumables, repairs/ replacement of any defective equipment etc 1.12 Obtaining all associated statutory and regulatory compliances and approvals for successful construction, commissioning and operation of plant 1.13 The detailed scope of work is given in Section VII: Scope of Work, specifications and Drawings of this bidding documents.
(B)	**TENDER NO. & DATE**	SECI/C&P/NIT/2020/SCCL15 dated 04/04/2020
(C)	**TYPE OF TENDER**	E-TENDER: Yes MANUAL:
(D)	**COMPLETION/ CONTRACT PERIOD**	As mentioned in Special Conditions of Contract (SCC).

(E)	**TENDER PROCESSING FEE**	<table><tr><td>APPLICABLE</td><td>Yes</td></tr><tr><td>NOT APPLICABLE</td><td></td></tr></table> **Amount: INR 25000/- (Indian Rupees Twenty-Five Thousand only) inclusive of GST @ 18%**
(F)	**EARNEST MONEY DEPOSIT (EMD)**	<table><tr><td>APPLICABLE</td><td>Yes</td></tr><tr><td>NOT APPLICABLE</td><td></td></tr></table> **Amount: INR 1,70,10,000 (Indian Rupees One crores, seventy lakhs and ten thousand only).**
(G)	**CONTRACT PERFORMANCE SECURITY**	<table><tr><td>APPLICABLE</td><td>Yes</td></tr><tr><td>NOT APPLICABLE</td><td></td></tr></table>
(H)	**DATE, TIME & VENUE OF PRE-BID MEETING & SITE VISIT**	**Pre-Bid Meeting 1100 HRS (IST) on 20/04/2020** Kind Attention.: **Solar Energy Corporation of India Limited,** D - 3, 1st Floor, Wing - A, Prius Platinum Building, District Centre Saket, New Delhi - 110 017, India Kind Attn.: General Manager (C & P) / Manager (C & P) Telephone Nos.: - 0091-(0)11-71989290/71989256 Fax No.: - 0091-(0)11-71989243 E-mail: - **contracts@seci.co.in** & GM (E&M) Solar Energy o/o GM (Material Procurement), The Singareni Collieries Co., Ltd., Kothagudem - 507119, Telangana **Site/Reservoir Visit:** Prospective Bidders are advised to visit the site/reservoir to study the actual conditions and go through the plans/ drawings connected to the present scope of work etc including power

		evacuation system and get acquainted with the same before attending Pre-bid meeting. For seeking visit of site or any clarifications bidders may contact the General Manager (E&M) Solar Energy (e-mail: gm_solar@scclmines.com). **The details regarding Site visit is mentioned in the Special conditions of contract (SCC). Bidders are required to go through the same.**
(I)	**OFFLINE & ONLINE BID-SUBMISSION DEADLINE**	**04/05/2020 up to 1400 HRS**
(J)	**OFFLINE & ONLINE BID OPENING**	**04/05/2020, 1600 HRS onwards**
(K)	**FINANCIAL BID OPENING**	To be intimated subsequent to the shortlisting of Techno Commercial Bids
(L)	**TECHNICAL QUERIES CONTACT DETAILS**	**Sh Shreedhar Singh** Additional General Manager (Projects) Solar Energy Corporation of India Limited (A Government of India Enterprise) D - 3, 1st Floor, Wing - A, Prius Platinum Building, District Centre, Saket, New Delhi - 110 017 E mail: shreedhar.singh@seci.co.in Phone: 011-71989200/ 71989293
(M)	**CONTACT DETAILS OF ETI**	M/s Electronic Tender.com (India) Pvt Ltd Registered Office: 6, Jain Mandir Road, New Delhi-110001 Corporate Office: 1001, City Court, M. G. Road, Gurugram - 122002, Haryana Contact Person: ETS Support Team Contact No.: +91-124-4229071, 4229072 Email: **support@isn-ets.com**

1.0 Bids must be submitted strictly in accordance with Clause no. 11 of ITB depending upon Type of Tender as mentioned at Clause no. (D) of Bid Information Sheet. The IFB is an integral and inseparable part of the Tender document.

2.0 Bidder(s) are advised to bid strictly as per terms and conditions of the tender documents and not to stipulate any deviations/ exceptions.

3.0 Any bidder, who meets the Qualifying Requirement and wishes to quote against this tender, may download the complete bidding document along with its amendment(s) if any from ETS Portal of ISN-ETS **(*https://www.bharat-electronictender.com*),** Central Public Procurement portal (CPPP) of GoI at **(*www.eprocure.gov.in*)** and/ or SECI website **(*www.seci.co.in*)** and submit their Bid complete in all respect as per terms & conditions of Tender Document on or before the due date of bid submission.

4.0 Clarification(s)/ Corrigendum(s) if any shall also be available on above referred websites.

5.0 For Sites/Reservoirs (Site 1 & 2), Owner will release NOA/ LOI/ LOA for LSTK (Lump Sum Turn Key)/ EPC (Engineering, Procurement & Commissioning) to the successful bidder(s) on per site basis. The NOA/ LOI/ LOA for LSTK/ EPC job shall be awarded in following respective parts as mentioned briefly below: -

(i) **First Contract (Supply & Service Part):** For providing the Design, engineering, manufacture, procure, testing/ inspection, Ex Works Supply, materials including mandatory spares and any other supplies specified in the Tender Documents & providing all services i.e., including Transportation and Insurance of all Equipments till site , Unloading, Storage, Handling at Site, Civil Works, Erection, Installation, Testing and Commissioning including Performance Testing in respect of all the Equipments supplied under the scope of Supply and any other services specified in the Contract Documents.

(ii) **Second Contract (O&M Part)**: For providing Comprehensive operation & maintenance of the Solar PV plant for 10 (Ten) years from the date of Operational Acceptance, as detailed in technical specification including supply and storage of all spare parts, consumables, repairs/ replacement of any defective equipment etc.

6.0 However, the above-mentioned contract award methodology may be modified/ changed based on specific project requirements and upon sole discretion of Owner.

SECTION - II

INSTRUCTION TO BIDDERS (ITB)

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Preamble

This part (Section - II) of the Tender Documents provides the information necessary for bidders to prepare responsive bids, in accordance with the requirements of the Employer/ Owner. It also provides information on bid submission and uploading the bid on portal ***https://www.bharat-electronictender.com***, bid opening, evaluation and on contract award. This Section (Section - II) contains provisions that are to be used unchanged unless Section - III (Bid Data Sheets) and Section - V (Special Conditions of Contract), which consists of provisions that supplement, amend, or specify in detail, information or requirements included in ITB and that are specific to each procurement, states otherwise.

However, provisions governing the performance of the Contractor, payments under the contract or matters affecting the risks, rights and obligations of the parties under the contract are not included in this section but instead under Section - IV (General Conditions of Contract) and/ or Section - V (Special Conditions of Contract).

Bidders may note that the respective rights of the Employer/ Owner and Bidders/ Contractors shall be governed by the Tender Documents and Contracts signed between the Employer/ Owner and the Contractor. The provisions of Tender Documents shall always prevail over any other documents in case of contradiction.

Further in all matters arising out of the provisions of this Tender document, the laws of the Union of India shall be the governing laws and the respective courts of Owner/Site shall have exclusive jurisdiction.

[A] - GENERAL

1 SCOPE OF BID

1.1 The Employer/ Owner, wishes to receive Bids as described in the Bidding documents/ Tender documents issued by Employer/ Owner.

1.2 SCOPE OF BID: The scope of work/ Services shall be as defined in the Tender documents.

1.3 The successful bidder will be expected to complete the entire scope of work within the period stated in Section - V, Special Conditions of Contract.

1.4 Day' means 'Calendar Day' and 'Singular' also means 'Plural'.

2 ELIGIBLE BIDDERS

2.1 The Bidder shall not be under a declaration of ineligibility by Employer for Corrupt/ Fraudulent/ Collusive/ Coercive practices, as defined in "Instructions to Bidders [ITB], Clause no. 39" (Action in case Corrupt/ Fraudulent/ Collusive/ Coercive Practices).

2.2 The Bidder (either individually or as a consortium or any of the participating members of the Consortium) shall not have been debarred by Employer/ Owner/ Ministry of New & Renewable Energy (MNRE) or any other ministries and / or any other Government Department, Agencies or CPSUs from future bidding due to “poor performance” or “corrupt and fraudulent practices” or any other reason in the past.

If the tender documents were issued inadvertently/ downloaded from website, offers submitted by such bidders shall not be considered for opening/ evaluation/ Award and will be returned to such bidders.

It is the sole responsibility of the Bidder to have informed SECI about any change in status of the declaration (if any) prior to award of contract, the same has to be informed promptly to Employer/ Owner by the bidder.

It shall be the sole responsibility of the bidder to inform Employer/ Owner in case the bidder is debarred from bidding by Employer/ Owner or Public Sector Project Management Consultant. Concealment of the facts shall tantamount to misrepresentation of facts and shall lead to action against such Bidders as per clause no. 39 of ITB.

2.3 The Bidder should not be under any liquidation court receivership or similar proceedings on due date of submission of bid.

In case there is any change in status of the declaration prior to award of contract, the same has to be promptly informed to Employer/ Owner by the bidder.

It shall be the sole responsibility of the bidder to inform Employer/ Owner in case the bidder is under any liquidation court receivership or similar proceedings on due date of submission of bid and during the course of finalization of the tender. Concealment of the facts shall

tantamount to misrepresentation of facts and shall lead to action against such Bidders as per clause no. 39 of ITB.

2.4 Bidder shall not be affiliated with an entity:

(i) that has provided consulting services related to the work to the Employer/ Owner during the preparatory stages of the work or of the project of which the works/ services forms a part of or

(ii) that has been hired (proposed to be hired) by the Employer/ Owner as an Engineer/ Consultant for the contract.

2.5 Neither the entity [appointed as the Project Management Consultant (PMC)/Consultancies for a contract] nor its affiliates/ JV's/ Subsidiaries shall be allowed to participate in the tendering process.

2.6 Pursuant to qualification criteria set forth in the bidding document, the Bidder shall furnish all necessary supporting documentary evidence to establish Bidder's claim of meeting qualification criteria as mentioned in the Annexure to BDS.

3 BIDS FROM CONSORTIUM/ JOINT VENTURE

3.1 Unless otherwise specified in the Bid Data sheet (BDS), Bids from Consortium/ Joint Venture are allowed. However, the eligibility criteria along with other terms and conditions (as mentioned in clause no. 1.4 of Annexure - A to BDS) shall be complied upon.

4 NUMBER OF BIDS PER BIDDER

4.1 Unless otherwise specified in the Bid Data sheet (BDS), a Bidder shall submit only 'one [01] Bid' in the same Bidding Process. A Bidder who submits or participates in more than 'one [01] Bid' will cause all the proposals in which the Bidder has participated to be disqualified.

5 COST OF BIDDING & TENDER PROCESSING FEE

5.1 COST OF BIDDING

The Bidder shall bear all costs associated with the preparation and submission of the Bid including but not limited to Bank charges, all courier charges including taxes & duties etc. incurred thereof. Further, Employer/ Owner will in no case, be responsible or liable for these costs, regardless of the outcome of the bidding process.

5.2 TENDER PROCESSING FEE (NON-REFUNDABLE)

5.2.1 A non- refundable Tender Processing Fee, if applicable, is to be submitted in the form of 'either through NEFT/ RTGS transfer in the account of SECI or Demand Draft/ Banker's Cheque in favour of "Solar Energy Corporation of India Limited, New Delhi" payable at New Delhi. The Tender Processing Fee is to be submitted along with the bid for the amount as mentioned in the Bid Information Sheet attached under Section - I (Invitation for Bids, IFB). Bids submitted without payment of requisite Tender Processing Fee will be treated as non-responsive and

shall be liable for rejection.

5.3 **The Tender Processing Fee and EMD is exempted for MSME Vendors registered under NSIC/ Udyog Aadhaar/DIC Category only. In order to avail the exemption in Tender Processing Fee in case of consortium/ JV, all the members should be registered as MSME Vendors under NSIC/ Udyog Aadhaar Category/DIC.**

5.4 In case of any discrepancy/ non-submission of either offline or online bid documents by the bidder, the tender processing fee will be deemed as bidder's consent for participation in the bidding process. Henceforth, the tender processing fee shall be retained by Employer and shall not be returned under any circumstances. No plea in this regard shall be entertained by the Employer/ Owner. However, EMD will be returned in this case.

5.5 In the event of a particular tender being cancelled at any stage, the tender processing fee will be refunded to the concerned bidders without any interest charges within 30 days from the date of notification of cancellation of tender. No plea in this regard shall be entertained by the Employer/ Owner. EMD will also be returned in this case

6 SITE VISIT

6.1 The Bidder is advised to visit and examine the site of works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the Bid and entering into a Contract for the required job. The costs of visiting the site shall be borne by the Bidder.

6.2 The Bidder or any of its personnel or agents shall be granted permission by the Employer/ Owner to enter upon its premises and land/Area for the purpose of such visits, but only upon the express conditions that the Bidder, its personnel and agents will release and indemnify the Employer/ Owner and its personnel, agents from and against all liabilities in respect thereof, and will be responsible for death or injury, loss or damage to property, and any other loss, damage, costs, and expenses incurred as a result of inspection.

6.3 The Bidder shall not be entitled to hold any claim against Employer/ Owner for non-compliance due to lack of any kind of pre-requisite information as it is the sole responsibility of the Bidder to obtain all the necessary information with regard to site, surrounding, working conditions, weather etc. on its own before submission of the bid.

[B] - BIDDING DOCUMENTS

7 CONTENTS OF TENDER DOCUMENTS

7.1 The contents of Tender Documents are those stated below, and should be read in conjunction

with any 'Addendum/ Corrigendum' issued in accordance with "ITB: Clause-9":

- Section-I : Invitation for Bids [IFB]
- Section-II : Instructions to Bidders [ITB]
- Section-III : Bid Data Sheets [BDS]
  Annexure to Bid Data Sheets [Qualifying Requirements]
- Section-IV : General Conditions of Contract [GCC]
- Section-V : Special Conditions of Contract [SCC]
- Section-VI : Sample Forms and Formats
- Section-VII : Scope of Work & Technical Specifications
- Section-VIII : Schedule of Rates [SOR]/ Price Schedule [PS]/ Format for Price Bid

7.2 The Bidder is expected to examine all instructions, forms, terms & conditions in the Tender Documents. The entire Tender Documents together with all its amendments, clarifications and attachments thereto, shall be considered to be read, understood and accepted by the Bidders. Failure to furnish all information required by the Tender Documents or submission of a Bid not substantially responsive to the Tender Documents in every respect will be at Bidder's risk and may result in the rejection of his Bid. However, Employer/ Owner at its sole discretion may seek clarifications from the Bidders to adjudge the exact content and facts of the Tender Documents.

8 CLARIFICATION OF TENDER DOCUMENTS

8.1 A prospective Bidder requiring any clarification(s) of the Tender Documents may notify Employer in writing by E-mail or at Employer's mailing address indicated in the Bid Information Sheet no later than 02 (Two) working days after the pre-bid meeting (in cases where pre-bid meeting is scheduled) or 15 (Fifteen) days prior to the bid closing date (in cases where pre-bid meeting is not held). Employer reserves the right to ignore the bidders request for clarification if received beyond the aforesaid period. Employer may respond in writing to the request for clarification. Employer's response including an explanation of the query, but without identifying the source of the query will be uploaded on ETS Portal of ISN-ETS ***https://www.bharat-electronictender.com*** and/ or Employer's website ***www.seci.co.in***.

8.2 Any clarification or information required by the Bidder but same not received by the Employer at clause 8.1 above is liable to be considered as "no clarification/ information required".

8.3 Clarifications sought by the bidders are to be mandatorily submitted in the SECI provided format only provided along with the Tender document. Pre-Bid queries submitted in any other format will not be considered.

9 AMENDMENT OF TENDER DOCUMENTS

9.1 At any time prior to the 'Bid Due Date', Employer/ Owner may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the Tender Documents by addenda/ corrigendum.

9.2 Any addendum/ corrigendum thus issued shall be part of the Tender Documents and shall be hosted on ETS Portal of ISN-ETS ***https://www.bharat-electronictender.com*** and/ or Employer's website ***www.seci.co.in***. Bidders have to take into account all such addendum/

corrigendum before submitting their bid.

9.3 The Employer, if consider necessary, may extend the date of submissions of Bid in order to allow the Bidders a reasonable time to furnish their most competitive bid taking into account the amendment issued thereof.

[C] - PREPARATION OF BIDS

10 LANGUAGE OF BID:

The bid prepared by the bidder and all correspondence/ drawings and documents relating to the bid exchanged by bidder and Employer/ Owner shall be written in English language alone. Any printed literature furnished by the bidder may be written in another language as long as accompanied by an ENGLISH translation duly authenticated by the Chamber of Commerce/ Certified Translator of bidder's country, in which case, for the purpose of interpretation of the bid, the ENGLISH translation shall govern.

In the event of submission of any document/ certificate by the Bidder in a language other than English, the English translation of the same duly authenticated by Chamber of Commerce/ Certified Translator of Bidder's country shall be submitted by the Bidder.

11. DOCUMENTS COMPRISING THE BID

The bid shall be submitted by the Bidder under "Single Stage - Two Envelope" procedure of bidding. Under this procedure, the bid submitted by the Bidder in two envelopes - First Envelope (also referred to as Techno - Commercial Part) and Second Envelope (also referred to as Price Part) shall comprise of the following documents:

I. Hard Copy

Hard copy of the bid shall comprise of following documents/ programmed file-Attachments to be submitted in sealed envelope, as part of First Envelope. **The envelope shall bear {the name of Tender, the Tender No. and the words 'DO NOT OPEN BEFORE' (due date & time)}**.

Contact Persons Name: Shri Sandeep Kumar

(a) Original Non-Refundable Tender Processing Fee as per clause no. 05 of ITB
(b) Original Non-Refundable Cost of Tender Document, if applicable
(c) 'Covering Letter' on Bidder's 'Letterhead' (in Original) clearly specifying the enclosed contents, as per 'Form F-0'
(d) EMD in original as per Clause 16 of ITB as per 'Form F-4' or as prescribed.
(e) Power of Attorney for authorized signatory in non-judicial stamp paper (as per 'Form F-24')
(f) Copy of Board Resolution
(g) The Pass-Phrase to decrypt the relevant Bid-Parts (for both Techno-Commercial and Financial) in separate sealed envelopes before the start date and time of the Tender Opening Event (TOE)

Bidder shall also upload the scanned copies of all the above-mentioned original documents during online Bid Submission as a part of First envelope.

"Bidder should explicitly note that no hard copies are to be submitted as a part of Second envelope".

II. Soft Copy

Soft copy of the bid shall comprise of following documents to be uploaded on the ISN-ETS portal ***https://www.bharat-electronictender.com*** as per provisions therein.

II (a) As part of First Envelope

(a) The Electronic Form of the bid for First Envelope (Techno-Commercial), as available on the ISN-ETS portal, shall be duly filled.
(b) Scanned copies of all the above-mentioned original documents during online Bid Submission as a part of First envelope and Bid Form for first envelope
(c) Certificate of Incorporation
(d) 'Bidder's General Information', as per 'Form F-1'.
(e) 'Shareholding Certificate' as per 'Form F-23'
(f) 'No Deviation Confirmation', as per 'Form F-6'
(g) 'Bidder's Declaration regarding Banning, Liquidation etc.', as per 'Form F-7'
(h) 'Bidders Experience as per 'Form F-13'
(i) E-Banking Format (as per 'Form F-19')
(j) Documents in accordance with the "Qualifying Requirements (QR)" establishing the qualification
(k) Document showing annual turnover for the financial years as required in Qualifying Requirements (QR) such as annual reports, profit and loss account, net worth etc. along with information as sought in enclosed Format F-16
(l) Tender Document. (Only First and Last Pages of Original Tender Document duly sealed and signed/ digitally signed and all pages of amendments to Tender Documents duly sealed and signed/ digitally signed by the Authorized Signatory).

II (b) As part of Second Envelope

(a) The Electronic Form of the bid for Second Envelope (Price - Part), as available on the ISN-ETS portal, shall be duly filled. “Termed as **ELECTRONIC FORM**”

(b) Main Price Bid comprising of SOR-1 & SOR-2 of the Price Schedule (available in Section - VIII, SOR), duly completed, sealed and signed/ digitally signed shall be uploaded. “Termed as **MAIN BID**”.

SOR -1 is the Schedule and Breakup of Lump sum Price (Supply, Service and NPV of O&M) of the Tender. SOR -2 comprises of the yearly Breakup of the NPV of O&M price for 10 years period.

12 SCHEDULE OF RATES (SOR)/ PRICE SCHEDULE (PS)/ BID PRICES

12.1 Unless stated otherwise in the Tender Documents, the Contract shall be for the whole works as described in Tender Documents, based on the rates and prices submitted by the Bidder and accepted by the Employer/ Owner. The prices quoted by the Bidders should indicate clearly the Goods & Service Tax (GST) components as also mentioned under the SoR.

12.2 Prices must be filled in format for "Schedule of Rates [SOR]/ Price Schedule [PS]/ Bid Prices" enclosed as part of Tender documents under Section - VIII. If quoted in separate typed sheets, such bids may be rejected.

12.3 Bidder shall quote for all the items of "SOR/ PS" after careful analysis of cost involved for the performance of the completed item considering all parts of the Tender Document. In case any activity though specifically not covered in description of item under "SOR/ PS" but is required to complete the works as per Specifications, Scope of Work/ Service, Standards, "GCC", "SCC" or any other part of Bidding Document, the prices quoted shall deemed to be inclusive of cost incurred for such activity.

12.4 All Goods & Service Tax (GST) components [applicable for both Centre and state] payable by the Contractor under the Contract, or for any other cause, shall be mentioned as per the SOR formats SOR-1 & SOR-2.

12.5 Prices quoted by the Bidder, shall remain FIRM and Fixed and valid until completion of the Contract and will not be subject to variation on any account.

12.6 In case of any variation (positive/ negative) in existing rates of taxes/ duties/ levies or a new tax/ duty/ levy is introduced or any existing tax/ duty/ levy is abolished or application of any Tax in the course of the performance of this Contract, which will/ may impact the overall pricing in connection with performance of the Contract, an equitable adjustment of the Contract Price shall be made to factor any such change by addition to the Contract Price or deduction therefrom, as the case may be. All these adjustments would be carried out by considering the base price of taxes equivalent to the amount mentioned under taxes and duties column of the SOR/ PS.

The term Change in Law shall refer to the occurrence of any of the following events pertaining to this project only after the last date of the bid submission, including (i) the enactment of any

new law; or (ii) an amendment, modification or repeal of an existing law; or (iii) any change in the rates of any Taxes including any duties and cess or introduction of any new tax made applicable for setting up the project.

However, Change in Law shall not include (i) any change in taxes on corporate income or (ii) any change in any withholding tax on income or dividends distributed to the shareholders of the Contractor, or (iii) any change on account of regulatory measures by the Appropriate Commission.

12.7 The Bidder shall quote the prices in 'figures' & words. There should not be any discrepancy between the prices indicated in figures and the price indicated in words. In case of any discrepancy, the same shall be dealt as per clause no. 30 of ITB.

12.8 Bidder need to submit the detailed break-up of Goods & Service Tax (GST) (applicable for both Central and State) in the SOR formats viz SOR-1 & SOR-2. This data is required to ascertain the

a) Computation of taxes assumed at the time of bidding.
b) The total impact due to revision in applicable tax rate or introduction of new tax, if any.

Bidders are required to ascertain the correctness of amount related to Goods & Service Tax (GST) as mentioned in the SOR/ PS as on the date of techno-commercial bid submission as it will impact the Price assessment part at the time of evaluation of price bid.

13 Goods & Service Tax (GST)

Contractor shall mandatorily obtain the registration under GST Law at Central level and/or in respective State as may be required. Further, Contractor shall mandatorily file returns under GST before their due date & comply with the requirements of the Law within timelines. Before releasing the payment to the Contractor. Owner shall not be responsible for any delay in payment release to the contractor in case the GST compliance is not fulfilled from the contractor side in any manner.

Contractor shall be responsible to comply with all the requirements of applicable provisions of GST. Contractor has to mandatorily get registered under GST at Central and relevant State(s). Contractor shall file all the returns on timely basis and upload all the Invoices and acceptance thereof as may be required under the provisions of GST. In case, it is found that Owner is not able to take CENVAT benefit of the taxes due to fault of the Contractor, Owner shall be constrained to deduct the amount from the payments to be made to the Contractor or recover the same in any other manner.

13.1 Bidders are required to submit a copy of the GST Registration Certificate or GST provisional certificate while submitting the bids wherever GST tax is applicable.

13.2 The responsibility of payment of GST lies with the Service Provider only. Contractor providing taxable service shall issue an Invoice, a Bill or as the case may be, a Challan which is signed, serially numbered and in accordance with rule GST Law. The invoice shall also contain the

following:

(a) Name, Address & Registration No. of such Person/ Contractor
(b) Name & Address of the Person/ Contractor receiving Taxable Service
(c) Description, Classification & Value of Taxable Service provided
(d) GST Amount, if any.
(e) HSN code of the Goods/Services.

Payments to Service Provider for claiming GST amount will be made provided the above formalities are fulfilled. Further, Employer/ Owner may seek copies of challan and certificate from Chartered Accountant for deposit of GST collected from Employer/ Owner.

13.3 In case CBIT (Central Board of Indirect Taxes and Customs) brings to the notice of Employer/ Owner that the contractor has not remitted the amount towards GST collected from Employer/ Owner to the government exchequer, then, that contractor may be debarred from bidding in future tenders of Employer/ Owner for given period as per the sole discretion of Employer/ Owner.

13.4 In case of statutory variation in GST during currency of the Contract, the Contractor shall submit a copy of the 'Government Notification' to evidence the rate as applicable on the date of submission of Bid and on the date of revision. Claim for payment of GST / Statutory variation in GST, should be raised within two [02] months from the date of issue of 'Government Notification' for payment of differential (in %) GST, otherwise claim in respect of above shall not be entertained for payment of arrears. The following may also be noted: -

a) Any increase in the rate of non-cenvatable GST beyond the contractual completion period shall be to contractor's account whereas any decrease in the rate shall be passed on to the Employer/ Owner.

b) The base date for the purpose of applying statutory variation shall be the last date of bid submission.

13.5 Owner will reimburse the GST to the Contractor at actuals against submission of cenvatable invoices issued in accordance with GST rules. In case of any variation in the executed quantities, the amount on which the GST is applicable shall be modified in same proportion.

13.6 Owner will reimburse the GST to the Contractor at actuals against documentary evidence subject to the ceiling amount of GST as quoted by the bidder, subject to any statutory variations. In case of any variation in the executed quantities (If directed and/ or certified by the Engineer-In-Charge) the ceiling amount on which GST is applicable will be modified on pro-rata basis.

13.7 Contractor shall ensure timely submission of correct invoice(s) with all required supporting document(s) within a period specified in NOA/ LOI/ LOA/ CA to enable Owner to avail CENVAT

(If applicable)

14 BID CURRENCIES:

Bidders must submit bid in Indian Rupees (INR) only.

15 BID VALIDITY

15.1 Bids shall be kept valid for period specified in BDS from the final 'Bid Opening Date'. A Bid valid for a shorter period may be rejected by Employer as 'non-responsive'.

15.2 In exceptional circumstances, prior to expiry of the original 'Bid Validity Period', the Employer may request the Bidders to extend the 'Period of Bid Validity' for a specified additional period. The request and the responses thereto shall be made in writing or by email. A Bidder may refuse the request without forfeiture of his 'EMD'. A Bidder agreeing to the request will not be required or permitted to modify his Bid, but will be required to extend the validity of its 'EMD' for the period of the extension and in accordance with "ITB: Clause-16" in all respects.

Note: In case of extension(s) of last due date of the Tender submission, the latest extension issued shall be considered as the final due date of Tender submission and accordingly the Tender validity should be calculated and sufficed. The validity of the Tender need to be revised by respective bidders, in case the bids are already submitted prior to the last due date of the initial Tender submission deadline.

16 EARNEST MONEY DEPOSIT (EMD)

16.1 Bids must be accompanied with **'Earnest Money Deposit (EMD)'** in the form of either through NEFT/ RTGS transfer in the account of SECI or **'Demand Draft'** or **'Banker's Cheque' [**in favour of **Solar Energy Corporation of India limited, New Delhi payable at New Delhi]** or **'Bank Guarantee' as per the format given in Form F - 4 of the bidding documents**. Bidders shall ensure that EMD, having a validity of at least 30 (Thirty) Days beyond the validity of the bid, must accompany the Bid in the format(s) made available in the Tender Document. In case of any extension in validity of bid, the EMD shall be extended suitably. The EMD shall be submitted in Indian Rupees only.

16.2 The **'EMD'** is required to protect Employer/ Owner against the risk of Bidder's conduct, which would warrant the EMD's forfeiture, pursuant to "ITB: Clause-16.7".

16.3 Employer/ Owner shall not be liable to pay any Bank charges, commission or interest etc. on the amount of 'EMD'. In case 'EMD' is in the form of a 'Bank Guarantee', the same shall be from any scheduled Bank as specified in the List of Banks enclosed at Form F-22, Section-VI of Tender documents or a branch of an International Bank situated in India and registered with 'Reserve Bank of India' as Scheduled Foreign Bank. However, in case of 'Bank Guarantee' from Banks other than the Nationalized Indian Banks, the Bank must be commercial bank

having net worth in excess of INR 500 Crores (Indian Rupees Five Hundred Crores Only).

16.4 Bid not accompanied with required amount of EMD shall be liable for rejection.

16.5 'Earnest Money Deposit' of all the unsuccessful Bidders disqualified at the stage of Techno-Commercial evaluation, E-Ra shortlisting or during/after E-Ra process will be discharged/ returned as promptly as possible, but not later than '30 [thirty] days' of their respective disqualification.

16.6 The successful bidder's (L1 bidder) 'Earnest Money Deposit' will be discharged upon the Bidder's signing the 'Contract Agreement' and furnishing the 'Performance Security duly vetted by the Bank'.

16.7 Notwithstanding anything contained herein, the 'EMD' may also be forfeited in any of the following cases:

(a) If a Bidder withdraws or varies his Bid during the 'Period of Bid Validity'
(b) If a Bidder has indulged in corrupt/ fraudulent/ collusive/ coercive practice
(c) Violates any other condition, mentioned elsewhere in the tender document including deviations or conditional bid.
(d) In the case of a successful Bidder, if the Bidder fails to:

(i) acceptance of the NOA/ LOI/ LOA.
(ii) to furnish "Performance Security.
(iii) to accept 'arithmetical corrections' as per provision of the clause 30 of ITB.

16.8 In case EMD is in the form of 'Bank Guarantee', the same must indicate the Bid Document No and the Work for which the Bidder is quoting. This is essential to have proper correlation at a later date. The 'EMD' should be in the form provided at 'Form F-4'.

Note: In case of extension(s) of last due date of the Tender submission, the latest extension issued shall be considered as the final due date of Tender submission and accordingly the Earnest Money Deposit validity and Bid validity should be calculated and sufficed. The validity of the submitted EMD and bid validity need to be revised by respective bidders, in case the bids are already submitted prior to the last due date of the initial Tender submission deadline.

17 PRE-BID MEETING

17.1 The Bidder(s) or his designated representative are invited to attend a "Pre-Bid Meeting" which will be held at address specified in Bid Information Sheet under Section - I, Invitation for Bids, IFB. It is expected that a bidder shall not depute more than 02 representatives for the meeting.

17.2 Purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

17.3 Text of the questions raised and the responses given, together with any responses prepared after the meeting, will be uploaded on SECI & ETI website against the Tender. Any modification of the Contents of Tender Documents listed in "ITB: Clause-7.1", that may

become necessary as a result of the Pre-Bid Meeting shall be made by the Employer/ Owner exclusively through the issue of an Addendum/ Corrigendum pursuant to "ITB: Clause-9", and not through the minutes of the Pre-Bid Meeting.

17.4 Non-attendance of the Pre-Bid Meeting will not be a cause for disqualification of Bidder.

18 SIGNING OF BID/TENDER DOCUMENT

18.1 The First and Last Pages of original tender documents including amendments, clarifications if any shall be typed or written in indelible ink [in the case of copies, photocopies are also acceptable] and shall be signed by a person or persons duly authorized to sign on behalf of the Bidder (as per POA) before uploading at ISN-ETS online portal. The name and position held by each person signing, must be typed or printed below the signature.

19 ZERO DEVIATION AND REJECTION CRITERIA

19.1 **ZERO DEVIATION :** Deviation to terms and conditions of Tender Documents may lead to rejection of bid. Employer/ Owner will accept bids based on terms & conditions of Tender Documents only. Bidder may note Employer/ Owner will determine the substantial responsiveness of each bid to the Tender Documents pursuant to provision contained in clause 29 of ITB. For purpose of this, a substantially responsive bid is one which conforms to all terms and conditions of the Tender Documents without deviations or reservations. Employer's/ Owner's determination of a bid's responsiveness is based on the content of the bid itself. Employer/ Owner reserves the right to raise technical and/ or commercial query(ies), if required. The response(s) to the same shall be in writing, and no change in the price(s) or substance of the bids shall be sought, offered or permitted. The substance of the bid includes but not limited to prices, completion, scope, technical specifications, etc. Bidders are requested to not to take any deviation.

19.2 **REJECTION CRITERIA:** Notwithstanding the above, deviation to the following clauses of Tender document shall lead to summarily rejection of Bid:

(a) Eligibility Criteria including General, Technical and Financial Qualifying Requirements
(b) Firm Price
(c) Tender Processing Fees and Earnest Money Deposit
(d) Tender Document Fees, if applicable
(e) Specifications & Scope of Work
(f) Schedule of Rates (SOR)/ Price Schedule (PS)
(g) Duration/ Period of Contract/ Completion schedule
(h) Period of Validity of Bid
(i) Warrantee/Guarantee/ Defect Liability Period
(j) Arbitration/ Resolution of Dispute/ Jurisdiction of Court
(k) Force Majeure & Applicable Laws
(l) Any other condition specifically mentioned in the tender document elsewhere that non-

compliance of the clause lead to rejection of bid

Note: Further, it is once again reminded not to mention any condition in the Bid which is contradictory to the terms and conditions of Tender document.

20 E-PAYMENT

Owner has initiated payments to Suppliers and Contractors electronically, and to facilitate the payments electronically through **'e-banking'**. The successful bidder should give the details of his bank account as per the bank mandate form enclosed at Format F-19 in Section-VI, Sample Forms and Formats of the Tender documents.

[D] - SUBMISSION OF BIDS

21 SUBMISSION, SEALING AND MARKING OF BIDS

21.1 Bids shall be submitted through e-tender mode in the manner specified elsewhere in tender document.

21.2 Hard Copies (Specific documents only) as mentioned in clause no. 11.I of Section - II, Instructions to Bidders (ITB) of the Tender document shall be submitted in a Sealed Covering Envelope. The Covering Envelope shall have the following Sticker

Offline Tender Document for "Tender for Design, Engineering, Supply, Construction, Erection, Testing, commissioning and O&M of 15 MW (AC) Floating Solar PV Power Plant at different sites of SCCL Telangana"	
Tender Document No.	**SECI/C&P/NIT/2020/SCCL15**
Last Date of Submission	
Bids Submitted by	**(Enter Full name and address of the Bidder)**
Authorized Signatory	**(Signature of the Authorized Signatory)** **(Name of the Authorized Signatory)** **(Stamp of the Bidder)**
Bid Submitted to	**Solar Energy Corporation of India Limited** **(A Government of India Enterprise)** **D - 3, 1st Floor, Wing - A, Prius Platinum Building** **District Center, Saket** **New Delhi - 110 017**

21.3 All the bids shall be addressed to the Employer at address specified in the Bid Information Sheet in Section - I, Invitation for Bids (IFB).

21.4 Bids submitted under the name of AGENT/ CONSULTANT/ REPRESENTATIVE/ RETAINER/ ASSOCIATE etc. on behalf of a bidder/ affiliate shall not be accepted.

22 DEADLINE FOR SUBMISSION OF BIDS

22.1 The bids must be submitted through e-tender mode not later than the date and time specified in the Bid Information Sheet in Section - I, Invitation for Bids (IFB).

22.2 The hard copies of required specific documents must be submitted through courier/ registered post/ by hand not later than the date and time specified in the Bid Information Sheet in Section - I, Invitation for Bids (IFB)/BDS

22.3 Employer/ Owner may, in exceptional circumstances and at its discretion, extend the deadline for submission of Bids (clause 9 of ITB refers). In which case all rights and obligations of Employer/ Owner and the Bidders, previously subject to the original deadline will thereafter be subject to the deadline as extended. Notice for extension of bid submission date will be uploaded on ETS Portal of ISN-ETS ***https://www.bharat-electronictender.com*** and/ or Employer's website ***www.seci.co.in***.

23 LATE BIDS

23.1 Any bids received after the notified date and time of closing of tenders will be treated as late bids.

23.2 E-tendering system shall close immediately after the deadline for submission of bid and no bids can be submitted thereafter.

23.3 Unsolicited Bids or Bids received to address other than one specifically stipulated in the tender document will not be considered for evaluation/ opening/ award if not received to the specified

destination within stipulated date & time.

24 MODIFICATION AND WITHDRAWAL OF BIDS

24.1 Modification and withdrawal of bids shall be as follows: -

The bidder may withdraw or modify its bid after bid submission but before the due date and time for submission as per tender document with the due written consent from the authorized signatory of the bidder.

24.2 The modification shall also the prepared, sealed, marked and dispatched in accordance with the provision of the clause 22 of ITB, with the outer and inner envelopes additionally marked modification or withdrawal as appropriate. A withdrawal notice may also be sent by e-mail or fax but followed by a signed confirmation copy post not later than the deadline for submission of bids. No bid shall be modified/ withdrawn after the deadline for submission of bids.

24.3 No bid shall be allowed to be withdrawn/ modified/ substitute in the interval between the deadline for submission of bids and the expiration of the period of bid validity specified by the bidder on the Bid Form. Withdrawal/ Modification/ Substitution of a bid during this interval shall result in the forfeiture of bidder's EMD pursuant to clause 16 of ITB and rejection of bid.

24.4 The latest bid hence submitted shall be considered for evaluation and all other bids shall be considered to be unconditionally withdrawn.

24.5 In case after price bid opening the lowest evaluated bidder (L1) is not awarded the job for any mistake committed by him in bidding or withdrawal of bid or modification of bid or varying any term in regard thereof leading to re-tendering, Employer shall forfeit EMD paid by the bidder and such bidders shall be debarred from participation in re-tendering of the same job(s)/ item(s). Further, such bidder will be debarred for a given period as decided by Employer/ Owner after following the due procedure.

25 EMPLOYER'S RIGHT TO ACCEPT ANY BID AND TO REJECT ANY OR ALL BIDS

Employer/ Owner reserves the right to accept or reject any Bid, and to annul the Bidding process and reject all Bids, at any time prior to award of Contract, without thereby incurring any liability to the affected Bidder or Bidders or any obligations to inform the affected Bidder or Bidders of the ground for Employer's/ Owner's action. However, Bidder if so desire may seek the reason (in writing) for rejection of their Bid to which Employer/ Owner shall respond quickly.

[E] - BID OPENING AND EVALUATION

26 BID OPENING

26.1 ***Unpriced Bid Opening:***

As the case may be, Employer will open bids, in the presence of bidders' designated representatives who choose to attend, at date, time and location stipulated in the BDS. The bidders' representatives, who are present shall sign a bid opening register evidencing their

attendance. However the presence of bidder(s) during unpriced bid opening is subjective and will depend on case to case basis against the sole discretion of Employer/ Owner.

26.2 ***Priced Bid Opening***:

26.2.1 Employer will open the price bids of those bidders who meet the qualification requirement and whose bids are determined to be technically and commercially responsive.

26.2.2 The price bids of those bidders who were not found to be techno-commercially responsive shall not be opened.

27 CONFIDENTIALITY

Information relating to the examination, clarification, evaluation, and comparison of Bids, and recommendations for the award of a Contract, shall not be disclosed to Bidders or any other persons not officially concerned with such process. Any effort by a Bidder to influence the Employer's/ Owner's processing of Bids or award decisions may result in the rejection of the Bidder's Bid and action shall be initiated as per procedure in this regard.

28 CONTACTING THE EMPLOYER/ OWNER

28.1 From the time of Bid opening to the time of award of Contract, if any Bidder wishes to contact the Employer/ Owner on any matter related to the Bid, it should do so in writing. Information relating to the examination, clarification, evaluation & recommendation for award shall not be disclosed.

28.2 Any effort by the Bidder to influence the Employer/ Owner in the Employer's 'Bid Evaluation', 'Bid Comparison', or 'Contract Award' decisions may result in the rejection of the offer/Bid and action shall be initiated as per procedure in this regard.

29 EXAMINATION OF BIDS AND DETERMINATION OF RESPONSIVENESS

29.1 The owner's determination of a bid's responsiveness is based on the content of the bid only. Prior to the detailed evaluation of Bids, the Employer will determine whether each Bid: -

(a) Meets the "Bid Evaluation Criteria" of the Bidding Documents;
(b) Is accompanied by the required 'Earnest Money Deposit' and 'Tender Processing Fees', if applicable
(c) Is substantially responsive to the requirements of the Tender Documents; and
(d) Provides any clarification and/ or substantiation that the Employer/ Owner may require to determine responsiveness pursuant to "ITB: Clause-29.2"

29.2 A substantially responsive Bid is one which conforms to all the terms, conditions and specifications of the Tender Documents without material deviations or reservations or omissions for this purpose employer defines the foregoing terms below: -

a) "Deviation" is departure from the requirement specified in the tender documents.
b) "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirement in the tender documents.
c) "Omission" is the failure to submit part or all of the information or documentation

required in the tender document.

29.3 A material deviation, reservation or omission is one that,

a) If accepted would,
   i) Affect in any substantial way the scope, quality, or performance of the job as specified in tender documents.
   ii) Limit, in any substantial way, inconsistent with the Tender Document, the Employer's rights or the bidder's obligations under the proposed Contract.

b) If rectified, would unfairly affect the competitive position of other bidders presenting substantially responsive bids.

29.4 The Employer shall examine all aspects of the bid to confirm that all requirements have been met without any material deviation, reservation or omission.

29.5 If a Bid is not substantially responsive, it may be rejected by the Employer and may not subsequently be made responsive by correction or withdrawal of the of material deviation, reservation or omission.

30 CORRECTION OF ERRORS

30.1 If there is a discrepancy between the unit price and the total price, which is obtained by multiplying the unit price and quantity specified by the Employer, or between subtotals and the total price, the unit or subtotal price shall prevail, and the quantity and the total price shall be corrected. However, in case of items quoted without indicating any quantity or the items for which the quantities are to be estimated by the Bidder, the total price quoted against such items shall prevail. If there is a discrepancy between words and figures, the amount in words will prevail.

The prices of all such item(s) against which the Bidder has not quoted rates/ amount (viz., items left blank or against which '-' is indicated) in the Price Schedules will be deemed to have been included in other item(s).

The subtotal, total price or the total bid price to be identified in Bid Form for this purpose, irrespective of the discrepancy between the amount for the same indicated in words or figures shall be rectified in line with the procedure explained above.

The Bidder should ensure that the prices furnished in various price schedules are consistent with each other. In case of any inconsistency in the prices furnished in the specified price schedules to be identified in Bid Form for this purpose, the Employer shall be entitled to consider the highest price for that particular line item for the purpose of evaluation and for the purpose of award of the Contract use the lowest of the prices in these schedules.

30.2 The amount stated in the bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors. If the bidder does not accept the corrected amount of

bid, its bid will be rejected.

31 CONVERSION TO SINGLE CURRENCY FOR COMPARISON OF BIDS

All bids submitted must be in the currency specified at clause 14 of ITB.

32 EVALUATION OF BIDS & E REVERSE AUCTION

Bid shall be evaluated as per evaluation criteria mentioned below on the total project cost including GST. The Employer shall only use the criteria and methodology indicated in the Tender documents. No other criteria/ methodology shall be permitted.

32.1 Evaluation of Techno - Commercial Part (First Envelope)

The Employer will carry out a detailed evaluation of the bids of the qualified bidders in order to determine whether the technical aspects are in accordance with the requirements set forth in the Bidding Documents. In order to reach such a determination, the Employer will examine the information supplied by the bidders, pursuant to ITB Clause 11, and other requirements in the Bidding Documents, taking into account the following factors:

a. overall completeness and compliance with the Technical Specifications of the bid. The bid that does not meet minimum acceptable standards of completeness, consistency and detail may be rejected for non-responsiveness.

b. compliance with the time schedule

c. Any other relevant technical factors that the Employer/ Owner deems necessary or prudent to take into consideration.

d. Any deviations to the commercial and contractual provisions stipulated in the Tender Documents.

e. details furnished by the bidder in response to the requirements specified in the Tender Documents.

32.2 Opening of Second Envelope by Employer

The Second Envelope i.e., Price Part of only those Bidders shall be opened who are determined as having submitted substantially responsive bids and are ascertained to be qualified to satisfactorily perform the Contract, pursuant to ITB Clause 32.1. In case the bid/offer is rejected, pursuant to ITB Clause 32.1 the Second Envelope submitted by such bidders shall be sent to archive unopened and the EMD shall be returned as per the Tender provisions.

The prices and details as filled up in Electronic Form by the bidder and opened during the bid opening and recorded in the Bid Opening Statement would not be construed to determine the relative ranking amongst the Bidders, or the successful Bidder, and would not confer any right or claim whatsoever on any Bidder. The successful Bidder (also referred to as the L1 Bidder) shall be determined as per the provisions of this Section - II and considered for award of

contract as provided in ITB.

32.3 Evaluation of Financial Part (Second Envelope)

32.3.1 The Employer will examine the Price Parts (Second Envelopes) to determine whether they are complete, whether any computational errors have been made, whether the documents have been properly signed, and whether the bids are generally in order.

32.3.2 The Price Part containing any deviations and omissions from the contractual and commercial conditions and the Technical Specifications which have not been identified in the First Envelope are liable to be rejected.

32.3.3 Arithmetical errors will be rectified in line with Clause no. 30 of ITB.

32.3.5 The comparison shall also include the impact of Goods & Service Tax (GST) in line with the provisions of the Tender Documents.

32.3.6 The Employer's comparison will also include the costs resulting from application of the evaluation procedures described below:

a. The Evaluated Bid Value (EBV) shall be calculated using the following method:

i. EPC/ LSTK Contract Value i.e., Total sum of the price comprising of Ex Works Supply of all Equipments and materials including mandatory spares and any other supplies specified in the Contract Documents, providing all services i.e. Transportation for delivery at site and Insurance including unloading, storage, handling at site, Civil works, Erection, Installation, Testing and Commissioning, performance testing in respect of all the equipment's supplied and any other services specified in the Tender Documents including Goods & Service Tax as per the Technical Scope of Work.

ii. Net Present Value (NPV) of O&M Contract Price including GST for the entire period in years to be calculated at a discounting rate as mentioned in the Tender documents..

The exact format for sharing the base price and all Goods & Service Tax is attached in SOR 1& SOR 2.

SOR -1 is the Schedule and Breakup of Lump sum Price (Supply, Service and NPV of O&M) of the Tender. SOR -2 comprises of the yearly Breakup of the NPV of O&M price for 10 years period.

Bidder to mention the Total NPV of O&M amount for total 10 years in SOR-1 which should match with the Total NPV of O&M amount for total 10 years in SOR 2.

b. **Evaluated Bid Value (EBV)** = (1) EPC/ LSTK Price as quoted by the bidder + (2) O & M

Contract Price for the entire period in years on NPV basis.

Detailed Taxation Break up for this purpose is also given in the SOR-1 & SOR-2 of the SOR for the EBV calculation purpose.

Discounting Rate for NPV calculation considered is 9.36%

32.4 Evaluation of Price Bid

32.4.1 Following factors shall be considered for evaluation of Price Bids:

a) Total Evaluated Bid Values (TEBV) for all the Bidders shall be compared to determine the lowest Total Evaluated Bid Value (TEBV) as given under SOR- 1 Format of Schedule of Rates & the lowest (L1) evaluated Bid as such, will be selected for the Notification of Award (NOA) subject to the successful bidder selected after E-Ra (Clause 32.4.2).

b) The mentioned Total Evaluated Bid Value will be considered up to 2 decimal places only.

c) Bidder with Total lowest EBV shall be L-1, Bidder with Second lowest EBV shall be L-2 & so on subject to the successful bidder selected after E-Ra (Clause 32.4.2)

d) The Total Evaluated Bid Value shall be inclusive of Goods & Service Tax (GST) as quoted by the bidder. The award shall be placed Inclusive of GST with taxation bifurcation separately indicated as submitted by the successful bidder in the SOR format.

e) **Billing Break-up (BBU):**

• The successful bidder will be mandatorily required to provide the detailed Billing break up (BBU) with GST in line with SOR 1 & 2 at the time of Award of Contract Agreement. Same will form the part of Contract Agreement (CA)

• For each item of SOR 1 & 2, the BBU shall be prepared in the same SOR format (Item name, UoM, Quantity, unit Ex Works price, GST, Total price etc) and the sum of all billing break-up item prices shall be equivalent to the each respective SORs item price with discounted rate of e-Reverse auction (If applicable).

• The Contractor would be required to provide detailed Bill of Quantity (BOQ) along with the break-up of Contract Price (including taxes) and HSN code of the respective goods/services, at the time of signing of Contract Agreement which should match with the Price Quoted by the Contractor in its Price Bids and accepted by the Employer. This will be used by the Owner at the time of payment to the Contractor. Accordingly, bidders should diligently quote the taxes in the bid.

• Owner shall reimburse the amount of taxes as per the rates mentioned by Contractor in the detailed BOQ. In case of any statutory variation in GST during the currency of the Contract, same will be reimbursed to the Contractor subject to the statutory variation clause of the Bidding document, only in respect of the items/quantity which have been mentioned by the Contractor in the detailed BOQ.

• In case of imported Equipment/items purchased from third party (Bought-Out Items) are supplied to the Employer/Owner in execution of the Project, the price of such Goods shall be inclusive of all cost as well as any duties paid/payable in relation to import/purchase of such goods (viz., customs duties, GST & levies etc.) considering and taking into account the ITC as may be available under the applicable laws including GST.

• In case of any statutory variation in GST during the currency of the Contract, same will be reimbursed to the Contractor only in respect of the taxes which are levied during the direct transaction held between Owner and the Contractor. Any statutory variation applicable in respect of the items/services procurement between third party/sub-contractor and the Contractor would not be reimbursed by Owner. The successful bidder will be required to provide the detailed Billing break up (BBU) with GST in line with SOR's at the time of Award of Contract Agreement. Same will form the part of Contra t Agreement (CA)

For First contract: In case of any clarification from the GST authorities on the interpretation of applicable GST rate during the contract period, revised GST will be considered for reimbursement of taxes and also taxes will be paid on actual basis as reported in GSTR-2A.

Bidder should invoice separately for Equipments, machinery, solar panels and any other supply of goods involved in this contract mentioning their description of goods, HSN,value etc.,

For Second contract: In case of any clarification from the GST authorities on the interpretation of applicable GST rate during the contract period, revised GST will be considered for reimbursement of taxes and also taxes will be paid on actual basis as reported in GSTR-2A.

Bidder should invoice separately for components, spare parts etc., consumed for O&M service involved in this contract mentioning their description of goods, HSN, value etc.

f) SOR -1 is the Schedule and Breakup of Lump sum Price (Supply, Service and NPV of O&M) of the Tender. SOR -2 comprises of the yearly Breakup of the NPV of O&M price for 10 years period.

32.4.2 Procedure for e- Reverse Auction (e-RA):

1. The e-auctioning shall be conducted on **https://www.bharat-electronictender.com**. E-Auctioning shall be carried out on the day as intimated by SECI to the eligible bidders.

2. After financial bid evaluation, the bidders shall be shortlisted in the ascending order of price bid quoted. Keeping minimum 03 Bids eligible for e-RA, Total no of bids will be reduced by a factor 1/2 and resultant as such, will be eligible for e-RA. Decimal Nos will be corrected to next whole No & will be counted accordingly for the e-RA. If the price bid quoted is same for two or more bidders, then all the bidders with same price bid shall be considered of equal rank/ standing in the order.

   Ex: (1) No of Bids after arranging the Bids in ascending order = 3, so total No of Bids eligible for e-RA in this case = 3*1/2 = 1.5, but as the minimum 03 bids needs to be kept, so in this case 03 bids will be eligible for e-RA.

   (2) No of Bids after arranging the Bids in ascending order = 7, so total No of Bids eligible for e-RA in this case = 7*1/2 = 3.5 = 4, rounding off to the next whole No. So, in this case 04 bids will be there for e-RA

   In case of substantially low response by the bidders & the total no of responsive bids to be less than 03 (Three), SECI/Employer reserves the sole discretion & all rights of proceeding/Non-proceeding with e-RA, against the management approval.

- At least one week prior to e-RA, an advance intimation regarding the date and time of the e-RA will be sent to by email to all bidders whose technical & Financial bids have been opened and found to be qualified. However, from this advance intimation it shall not be construed by the bidders that they have been shortlisted for e-RA. Further at least two hours before the schedule start time of e-Auctioning, a system generated email for invitation for e-Auctioning will be sent to all those bidders only who have been shortlisted based on the criteria mentioned.

- Shortlisted bidders for e-Auctioning will be able to login into the ISN website of eauctioninging 15 minutes before the start time of e-auctioning.

- At the start of e-auctioning process, the bid along with the list of short-listed bidders shall be displayed with their pseudo names as their first round bid along with the NPV value of O&M quotation per year submitted and calculated as per SoR. The auctioning shall be on the EPC price quoted by the bidder only. The NPV value of O&M price Bid shall remain fixed during the entire e-RA process.

- The minimum decrement step for e-Auctioning is in the multiples of ***Rs. 10,00,000/- (INR Ten lacs only)*** in EPC Price bid (Firm value of the financial proposal as the sum of individual bid value of supply, erection and civil works including GST), i.e. each decrement shall be in multiples of Rs. Rs.10,00,000/- (INR Ten Lacs only). At the end of the e-RA, the final discount

offered by the bidder, in the form of price reduction so offered on the EPC price, shall be applied proportionately to all of the SOR Line items price (EPC Price only & not O&M) quoted by the bidder initially in the financial bid. Accordingly, the revised reduced price of all of the SOR line items of the EPC (Excluding O&M) will be derived. This proportionate price reduction will only be applicable on the EPC price, on which the e-RA has been actually conducted and the O&M prices will be kept constant during the entire process of e-RA/tendering.

- L2, L3, L4…. LN Bidders have to mandatorily apply their decrements suitably so as to beat the L1 price in the first go itself, else system will not accept their respective Bids. However, at no stage, increase in EPC price will be permissible.

- During E- Auctioning, no revision in total price for which a bidder is considered qualified after evaluation of Technical Bid is allowed.

- The initial auctioning period will be of one (01) hour with a provision of auto extension by eight minutes from the scheduled/ extended closing time if any fresh bid is received in last eight minutes of auctioning period or extended auctioning period. If no valid bid is received during last eight minutes of auctioning period or extended auctioning period, then the e-auctioning process will get closed.

3. Following information will be displayed in the bidder's bidding window:

- First round EPC and O&M price as their start price initially and thereafter last quoted EPC Price

- The O&M price (mentioned with NPV) shall remain fixed throughout the process.

- The list of last quoted EPC price (i.e. last Bid Value) along with NPV of O&M price (fixed) of all bidders with their Pseudo Identities and their time of quote.

4. Selection of Successful Bidders

The bidders shall be selected in the ascending order with lowest quoted Total Price (EPC + NPV of O&M price) (being L1).

a. The final price arrived by adding the EPC price (as a result of e-auctioning process) and the NPV of O&M price (fixed during e-auctioning).

b. The bidder with lowest sum quoted at the end of E-Auctioning will be considered L1.

c. In case of tie in Total Price (i.e. the sum of their last quoted discounted EPC price and the NPV of O&M price), among two or more bidders being the same at the end of e-Reverse Auction, they will be considered in the chronological order of their last bid with preference to the bidder who has quoted his last bid earlier than others.

d. In the above case, if the time of quote also become exactly same among the bidders at a tie, then the ranking among these bidders shall be done as follow:

- The bidder who has quoted lowest Total Price in their Price BID before commencement of E-Auction shall be considered as L-1.

- If there is also a tie among any of these bidders, then L-1 will be the bidder who has the highest average annual turnover as per the documents submitted as a part of their bid.

5. At the end of selection process, a Notification of Award (NOA) will be issued to the successful bidder (L1).

6. In all cases, SECI's decision regarding selection of bidder through E-Auctioning or other-wise based on First Round quotation or annulment of tender process shall be final and binding on all participating bidders.

32.4.3 Other Instructions

- For further instructions, the vendor should visit the home-page of the portal **https://www.bharat-electronictender** and go to the User-Guidance Centre.

- The help information provided through 'ETS User-Guidance Centre' is available in three categories –
  Users intending to Register / First-Time Users, Logged-in users of Buyer organizations, and Logged-in users of Supplier organizations. Various links (including links for User Manuals) are provided under each of the three categories.

- Important Note: It is strongly recommended that all authorized users of Supplier organizations should thoroughly peruse the information provided under the relevant links, and take appropriate action. This will prevent hiccups, and minimize teething problems during the use of ETS.

33 COMPENSATION FOR EXTENDED STAY

NOT APPLICABLE

34 PURCHASE PREFERENCE

NOT APPLICABLE

[F] - NOTIFICATION OF AWARD/ LETTER OF INTENT/ CONTRACT AGREEMENT

35 AWARD

Subject to "ITB: Clause-29", Owner will award the Contract to the successful Bidder whose Bid has been determined to be substantially responsive and has been determined as the lowest provided that bidders, is determined to be qualified to satisfactorily perform the

Contract.

36 NOTIFICATION OF AWARD/ LETTER OF INTENT/ LETTER OF ALLOCATION

36.1 Prior to the expiry of 'Period of Bid Validity', Owner will notify the successful bidder in writing, in the form of "Notification of Award (NOA)"/ “Letter of Intent (LOI)”/ “Letter of Allocation (LOA)” through e-mail/ courier/ registered post, that his Bid has been accepted. The acceptance of the notification of award will constitute the formation of the Contract.

36.2 Contract Period shall commence from the date of "Notification of Award"/ “Letter of Intent”/ “Letter of Allocation” or as mentioned in the Notification of Award/ Letter of Intent/ Letter of Allocation. The "Notification of Award"/ “Letter of Intent”/ “Letter of Allocation” will constitute the formation of a Contract, until the Contract has been effected pursuant to signing of Contract as per "ITB: Clause-37".

36.3 The of “Notification of Award (NOA)"/ “Letter of Intent (LOI)”/ “Letter of Allocation (LOA)” shall be issued to successful bidder in duplicate. The successful bidder is required to return its duplicate copy duly signed and stamped on each page including all the Appendix, Annexures as a token of acceptance.

36.4 Incase the successful bidder fails to acknowledge the acceptance of “Notification of Award (NOA)"/ “Letter of Intent (LOI)”/ “Letter of Allocation (LOA)” as mentioned above vide clause no. 36.3, same will be treated as a case of non-responsiveness & default and Employer/ Owner may take suitable action to get the project successfully executed.

36.5 In case of Non-responsive/Non acceptance to the NOA or CA or non-submission of timely Performance Security by the successful bidder, SECI at its sole discretion may take appropriate actions with the forfeiture of EMD & may annul the entire Tendering process at its sole discretion.

37 SIGNING OF CONTRACT AGREEMENT

37.1 The successful Bidder/ Contractor shall be required to execute the 'Contract Agreement' with Owner on a 'non-judicial stamp paper' of appropriate value [cost of the 'stamp-paper' shall be borne by the successful Bidder/ Contractor] and of 'state' specified in Bidding Data Sheet (BDS) only.

37.2 Incase the successful bidder fails to execute the ‘Contract Agreement’ as mentioned above vide clause no. 37.1, same will be treated as a case of non-responsiveness & default and Employer/ Owner may take suitable action to get the project successfully executed. Same shall constitute sufficient grounds for the forfeiture of EMD.

37.3 In case of Non-responsive/Non-acceptance to the NOA or CA or non-submission of timely Performance Security by the successful bidder, SECI at its sole discretion may take appropriate actions with the forfeiture of EMD & may annul the entire Tendering process at its sole discretion

38. VOID

39 PROCEDURE FOR ACTION IN CASE CORRUPT/ FRAUDULENT/ COLLUSIVE/ COERCIVE PRACTICES

39.1 Procedure for action in case Corrupt/ Fraudulent/ Collusive/ Coercive Practices is enclosed at

Annexure-I along with this ITB document.

39.2 Annexure-I deliberates in detail the all consequences pertaining to clause no. 39.

39.3 **NON-APPLICABILITY OF ARBITRATION CLAUSE IN CASE OF BANNING OF VENDORS/ SUPPLIERS/ CONTRACTORS/ BIDDERS/ CONSULTANTS INDULGED IN FRAUDULENT/ COERCIVE PRACTICES**

Notwithstanding anything contained contrary in GCC and other "CONTRACT DOCUMENTS", in case it is found that the Vendors/ Suppliers/ Contractors/ Bidders/ Consultants indulged in fraudulent/ coercive practices at the time of bidding, during execution of the contract etc., and/ or on other grounds as mentioned in Employer's/ Owner's "Procedure for action in case Corrupt/ Fraudulent/ Collusive/ Coercive Practices" (Annexure-I), the contractor/ bidder shall be banned (in terms of aforesaid procedure) from the date of issuance of such order by Employer/ Owner, to such Vendors/ Suppliers/ Contractors/ Bidders/ Consultants.

The Vendor/ Supplier/ Contractor/ Bidder/ Consultant understands and agrees that in such cases where Vendor/ Supplier/ Contractor/ Bidder/ Consultant has been banned (in terms of aforesaid procedure) from the date of issuance of such order by Employer/ Owner, such decision of Employer/ Owner shall be final and binding on such Vendor/ Supplier/ Contractor/ Bidder/ Consultant and the 'Arbitration clause' in the GCC and other "CONTRACT DOCUMENTS" shall not be applicable for any consequential issue/ dispute arising in the matter.

40 PUBLIC PROCUREMENT POLICY FOR MICRO AND SMALL ENTERPRISES (MSEs)

40.1 As per the Public Procurement Policy for Micro and Small Enterprise (MSEs) order 2012, issued vide Gazette Notification number 503, dated 23.03.2012 by Ministry of Micro, Small and Medium Enterprise of Govt. of India, and specific to this tender, MSEs must be registered with any of the following agencies/ bodies shall be exempted from Tender Processing Fees and EMD submission upon production of valid registration certificate.

(i) District Industries Centre (DIC)
(ii) National Small Industries Corporation (NSIC)
(iii) Udyog Aadhaar Memorandum

MSEs participating in the tender must submit the certificate of registration with any one of the above agencies. The registration certificate issued from any of the above agencies must be valid as on close date of the tender.

The MSEs, who have applied for registration or renewal of registration with any of the above agencies/ bodies, but have not obtained the valid certificate as on close date of the tender, are not eligible for exemption/ preference.

40.2 **In case of JV/ Consortium, in order to avail the exemption to Tender Processing Fees and Earnest Money Deposit (EMD), all the members of JV/ Consortium should be registered under any of the Categories mentioned under clause 40.1 above.**

40.3 In case the bidder is falling under above category, the bidder shall submit the documentary

evidence satisfying the same.

If the bidder does not provide the above confirmation or appropriate document or any evidence, then it will be presumed that they do not qualify for any preference admissible in the tender.

41 AHR ITEMS

NOT APPLICABLE

42 RISK OF REJECTION

Any Conditional Bid will straight away run into risk of rejection.

43 INCOME TAX & CORPORATE TAX

43.1 Income tax deduction shall be made from all payments made to the contractor as per the rules and regulations in force and in accordance with the Income Tax Act prevailing from time to time.

43.2 Corporate Tax liability, if any, shall be to the contractor's account.

43.3 TDS under GST as may be applicable shall be deducted as per law of Government of India in vogue.

43.4 **MENTIONING OF PAN NO. IN INVOICE/ BILL**

As per CBDT Notification No. 95/2015 dated 30.12.2015, mentioning of PAN no. is mandatory for procurement of goods/ services/ works/ consultancy services exceeding INR 2 Lacs per transaction.

Accordingly, supplier/ contractor/ service provider/ consultant should mention their PAN no. in their invoice/ bill for any transaction exceeding INR 2 Lacs. As provided in the notification, in case supplier/ contractor/ service provider/ consultant do not have PAN no., they have to submit declaration in Form 60 along with invoice/ bill for each transaction.

Payment of supplier/ contractor / service provider/ consultant shall be processed only after fulfilment of above requirement

44. SETTLEMENT OF DISPUTES BETWEEN GOVERNMENT DEPARTMENT AND ANOTHER AND ONE GOVERNMENT DEPARTMENT AND PUBLIC ENTERPRISE AND ONE PUBLIC ENTERPRISE AND ANOTHER

In the event of any dispute or difference relating to the interpretation and application of the provisions of the contracts, such dispute or difference shall be referred by either party for Arbitration to the sole Arbitrator in the Department of Public Enterprises to be nominated by the Secretary to the Government of India in-charge of the Department of Public Enterprises. The Arbitration and Conciliation Act, 1996 shall not be applicable to arbitrator under this clause. The award of the Arbitrator shall be binding upon the parties to the dispute, provided, however, any party aggrieved by such award may make a further reference for setting aside or revision of the award to the Law Secretary, Department of Legal Affairs, Ministry of Law & Justice, Government of India. Upon such reference the dispute shall be decided by the Law

Secretary or the Special Secretary/ Additional Secretary, when so authorized by the Law Secretary, whose decision shall bind the Parties finally and conclusively. The parties to the dispute will share equally the cost of arbitration as intimated by the Arbitrator.

45 DISPUTE RESOLUTION (PROVISION REGARDING APPLICABLE LAWS AND SETTLEMENT OF DISPUTES)

45.1 Unless otherwise specified, the matters where decision of the Engineer-in-Charge is deemed to be final and binding as provided in the Agreement and the issues/ disputes which cannot be mutually resolved within a reasonable time, all disputes shall be settled in accordance with the Conciliation Rules.

45.2 Any dispute(s)/ difference(s)/ issue(s) of any kind whatsoever between/ amongst the Parties arising under/ out of/ in connection with this contract shall be settled in accordance with the laid down rules.

45.3 In case of any dispute(s)/ difference(s)/ issue(s), a Party shall notify the other Party (ies) in writing about such a dispute(s)/ difference(s)/ issue(s) between/ amongst the Parties and that such a Party wishes to refer the dispute(s)/ difference(s)/ issue(s) to Conciliation. Such Invitation for Conciliation shall contain sufficient information as to the dispute(s)/ difference(s)/ issue(s) to enable the other Party(ies) to be fully informed as to the nature of the dispute(s)/ difference(s)/ issue(s), the amount of monetary claim, if any, and apparent cause(s) of action.

45.4 Conciliation proceedings commence when the other Party(ies) accept(s) the invitation to conciliate and confirmed in writing. If the other Party(ies) reject(s) the invitation, there will be no conciliation proceedings.

45.5 If the Party initiating conciliation does not receive a reply within thirty days from the date on which he/she sends the invitation, or within such other period of time as specified in the invitation, he/she may elect to treat this as a rejection of the invitation to conciliate. If he/she so elects, he/she shall inform the other Party(ies) accordingly.

45.6 Where Invitation for Conciliation has been furnished, the Parties shall attempt to settle such dispute(s) amicably under Part-III of the Indian Arbitration and Conciliation Act, 1996. It would be only after exhausting the option of Conciliation as an Alternate Dispute Resolution Mechanism that the Parties hereto shall go for Arbitration. For the purpose of this clause, the option of 'Conciliation' shall be deemed to have been exhausted, even in case of rejection of 'Conciliation' by any of the Parties.

45.7 The cost of Conciliation proceedings including but not limited to fees for Conciliator(s), Airfare, Local Transport, Accommodation, cost towards conference facility etc. shall be borne by the Parties equally.

45.8 The Parties shall freeze claim(s) of interest, if any, and shall not claim the same during the pendency of Conciliation proceedings. The Settlement Agreement, as and when reached/agreed upon, shall be signed between the Parties and Conciliation proceedings shall

stand terminated on the date of the Settlement Agreement.

========== X ==========

Annexure-I

PROCEDURE FOR ACTION IN CASE CORRUPT/ FRAUDULENT/ COLLUSIVE/ COERCIVE PRACTICES

A Definitions:

A.1 "Corrupt Practice" means the offering, giving, receiving or soliciting, directly or indirectly, anything of value to improperly influence the actions in selection process or in contract execution.

"Corrupt Practice" also includes any omission for misrepresentation that may mislead or attempt to mislead so that financial or other benefit may be obtained or an obligation avoided.

A.2 "Fraudulent Practice" means and include any act or omission committed by an agency or with his connivance or by his agent by misrepresenting/ submitting false documents and/ or false information or concealment of facts or to deceive in order to influence a selection process or during execution of contract/ order.

A.3 "Collusive Practice amongst bidders (prior to or after bid submission)" means a scheme or arrangement designed to establish bid prices at artificial non-competitive levels and to deprive the Employer of the benefits of free and open competition.

A.4 "Coercive practice" means impairing or harming or threatening to impair or harm directly or indirectly, any agency or its property to influence the improperly actions of an agency, obstruction of any investigation or auditing of a procurement process.

A.5 "Vendor/ Supplier/ Contractor/ Consultant/ Bidder" is herein after referred as "Agency"

A.6 "Competent Authority" shall mean the authority, who is competent to take final decision for Suspension of business dealing with an Agency/ (ies) and Banning of business dealings with Agency/ (ies) and shall be the "Committee" concerned.

A.7 "Allied Agency" shall mean all the concerns within the sphere of effective influence of banned/ suspended agencies. In determining this, the following factors may be taken into consideration:

(a) Whether the management is common;
(b) Majority interest in the management is held by the partners or directors of banned/ suspended firm.
(c) substantial or majority shares are owned by banned/ suspended agency and by virtue of this it has a controlling voice.

A.8 "Investigating Agency" shall mean any department or unit of Employer/ Owner investigating into the conduct of Agency/ party and shall include the Vigilance Department of the Employer/ Owner, Central Bureau of Investigation, State Police or any other agency set up by the Central

or state government having power to investigate.

B Actions against bidder(s) indulging in corrupt /fraudulent/ collusive/ coercive practice

B.1 Irregularities noticed during the evaluation of the bids:

If it is observed during bidding process/ bids evaluation stage that a bidder has indulged in corrupt/ fraudulent/ collusive/ coercive practice, the bid of such Bidder (s) shall be rejected and its Earnest Money Deposit (EMD) shall be forfeited.

Further, such agency shall be banned for future business with Employer/ Owner for a period specified in para B 2.2 below from the date of issue of banning order.

B.2 Irregularities noticed after award of contract

(i) **During execution of contract:**

If an agency, is found to have indulged in corrupt/ fraudulent/ collusive/ coercive practices, during execution of contract, the agency shall be banned for future business with Employer/ Owner for a period specified in para B 2.2 below from the date of issue of banning order.

The concerned order(s)/ contract(s) where corrupt/ fraudulent/ collusive practices are observed, shall be suspended with immediate effect by Engineer-in-Charge (EIC)/ Employer/ Owner whereby the supply/ work/ service and payment etc. will be suspended. The action shall be initiated for putting the agency on banning list.

After conclusion of process, the order(s)/ contract(s) where it is concluded that such irregularities have been committed shall be terminated and Contract Performance Security submitted by agency against such order(s)/ contract(s) shall also be forfeited. The amount that may have become due to the contractor on account of work already executed by him shall be payable to the contractor and this amount shall be subject to adjustment against any amounts due from the contractor under the terms of the contract.

No risk and cost provision will be enforced in such cases.

(ii) After execution of contract and during Defect liability period (DLP)/ Warranty/ Guarantee Period:

If an agency is found to have indulged in corrupt/ fraudulent/ collusive/ coercive practices, after execution of contract and during DLP/ Warranty/ Guarantee Period/O&M Period, the agency shall be banned for future business with Employer/ Owner for a period specified in para B 2.2 below from the date of issue of banning order.

Further, the Contract Performance Security submitted by agency against such

order(s)/ contract(s) shall be forfeited.

(iii) After expiry of Defect liability period (DLP)/ Warranty/ Guarantee Period

If an agency is found to have indulged in corrupt/ fraudulent/ collusive/ coercive practices, after expiry of Defect liability period (DLP)/ Warranty/ Guarantee Period, the agency shall be banned for future business with Employer/ Owner for a period specified in para B 2.2 below from the date of issue of banning order.

B.2.2 Period of Banning

Banning period shall be reckoned from the date of issuance of banning order and shall be for a period as may be decided by the Employer/ Owner based on specific case basis. However, minimum period of ban shall be 06 (Six) months from the date of issuance of banning order.

In exceptional cases where the act of vendor/ contractor is a threat to the National Security, the banning shall be for indefinite period.

C Effect of banning on other ongoing contracts/ tenders

C.1 If an agency is banned , such agency shall not be considered in ongoing tenders/ future tenders.

C.2 However, if such an agency is already executing other order(s)/ contract(s) where no corrupt/ fraudulent/ collusive/ coercive practice is found, the agency shall be allowed to continue till its completion without any further increase in scope except those incidental to original scope mentioned in the contract.

C.3 If an agency is banned during tendering and irregularity is found in the case under process:

C.3.1 after issue of the enquiry/ bid/ tender but before opening of Technical bid, the bid submitted by the agency shall be ignored.

C.3.2 after opening Technical bid but before opening the Price bid, the Price bid of the agency shall not be opened and EMD submitted by the agency shall be returned to the agency.

C.3.3 after opening of price bid, EMD made by the agency shall be returned; the offer/Bid of the agency shall be ignored & will not be further evaluated. If the agency is put on banning list for fraud/ mis-appropriation of facts committed in the same tender/ other tender where errant agency emerges as the lowest (L1), then such tender shall also be cancelled and re-invited.

D. Procedure for Suspension of Bidder

D.1 Initiation of Suspension

Action for suspension business dealing with any agency/(ies) shall be initiated by C&P

Department when

(i) Vigilance Department based on the fact of the case gathered during investigation by them recommend for specific immediate action against the agency.

(ii) Vigilance Department based on the input from Investigating agency, forward for specific immediate action against the agency.

(iii) Nonperformance of Vendor/ Supplier/ Contractor/ Consultant leading to termination of Contract/ Order.

D.2 Suspension Procedure:

D.2.1 The order of suspension would operate initially for a period not more than six months and is to be communicated to the agency and also to Vigilance Department. Period of suspension can be extended with the approval of the Competent Authority by one month at a time with a ceiling of six months pending a conclusive decision to put the agency on banning list.

D.2.2 During the period of suspension, no new business dealing may be held with the agency.

D.2.3 Period of suspension shall be accounted for in the final order passed for banning of business with the agency.

D.2.4 The decision regarding suspension of business dealings should also be communicated to the agency.

D.2.5 If a prima-facie, case is made out that the agency is guilty on the grounds which can result in banning of business dealings, proposal for issuance of suspension order and show cause notice shall be put up to the Competent Authority. The suspension order and show cause notice must include that (i) the agency is put on suspension list and (ii) why action should not be taken for banning the agency for future business from Employer/ Owner.

The competent authority to approve the suspension will be same as that for according approval for banning.

D 3 Effect of Suspension of business:

Effect of suspension on other on-going/ future tenders will be as under:

D.3.1 No enquiry/ bid/ tender shall be entertained from an agency as long as the name of agency appears in the Suspension List.

D.3.2 If an agency is put on the Suspension List during tendering:

D.3.2.1 after issue of the enquiry/ bid/ tender but before opening of Technical bid, the bid submitted

by the agency shall be ignored.

D.3.2.2 after opening Technical bid but before opening the Price bid, the Price bid of the agency shall not be opened and EMD submitted by the agency shall be returned to the agency.

D.3.3 The existing contract(s)/ order(s) under execution shall continue.

D.3.4 Tenders invited for procurement of goods, works and services shall have provision that the bidder shall submit a undertaking to the effect that (i) neither the bidder themselves nor their allied agency/(ies) are on banning list of Employer/ Owner or the Ministry of New & Renewable Energy (ii) bidder is not banned by any Government Department/ Public Sector.

Annexure-II

ADDENDUM TO INSTRUCTIONS TO BIDDERS (INSTRUCTION FOR PARTICIPATION IN E-TENDER)

1. General

Special Instructions (for e-Tendering).

Submission of Online Bids is mandatory for this Tender.

This section contains detailed instructions regarding bid submission procedure under e-tendering system (e-tender portal). Bidders are required to read the following instructions in addition to various instructions mentioned elsewhere in the bid document for e-tendering. The instructions mentioned herein related to bid submission procedure shall supersede and shall prevail over the conditions enumerated elsewhere in the bid/ tender document.

Bidders who wish to participate in e-tenders must go through the 'instructions in respect of e-Tendering essentially covering security settings required for bidder's PC/ Laptop, uploading and checking the status of digital signature in the bidder's PC/ Laptop, obtaining unique login ID and password, re-setting the password, downloading of Tender document and uploading of Offer/ Bid etc.

2. About E-Tender Portal (Web)

Solar Energy Corporation of India Limited (SECI) has adopted a secured and user friendly e-tender system enabling bidders to Search, View, Download tender document(s) directly from the ETS Portal of M/s ElectronicTender.com (India) Pvt. Limited **(*https://www.bharat-electronictender.com*)** through ISN Electronic Tender Services Private Limited (referred as ISN-ETS) (referred hereunder as "E-Tender Portal") and also enables the bidders to participate and submit online prices directly in the e-tender portal or uploading of SOR/ Price Schedule (Price Bid) in note and attachment folder, as applicable, and technical bids in secured and transparent manner maintaining absolute confidentiality and security throughout the tender evaluation process and award.

3. Pre-requisite for participation in bidding process

The following are the pre-requisite for participation in e-Tendering Process:

3.1 PC/ Laptop with Windows OS, Internet Explorer

Bidder must possess a PC/ Laptop with Windows 7 professional operating system and Internet Explorer 8 or 9 for hassle free bidding. Bidder is essentially required to effect the security settings as defined in the portal.

3.2 Internet Broadband Connectivity

The Bidder must have a high-speed internet connectivity (preferably Broadband) with internet explorer to access ISN-ETS's e-Tender Portal for downloading the Tender document and

uploading/ submitting the Bids.

3.3 A valid e-mail Id of the Organization/ Firm

3.4 E-Tendering is a new methodology for conducting Public Procurement in a transparent and secured manner. Now, the Government of India has made e-tendering mandatory. Suppliers/ Vendors will be the biggest beneficiaries of this new system of procurement. For conducting electronic tendering, SECI has decided to use the portal of M/s Electronic Tender.com (India) Pvt. Limited ***https://www.bharat-electronictender.com*** through ISN Electronic Tender Services Private Limited (referred as ISN-ETS. This portal is based on the world's most 'secure' and 'user friendly' software from Electronic Tender®. A portal built using Electronic Tender's software is also referred to as Electronic Tender System® (ETS).

Benefits to Suppliers are outlined on the Home-page of the portal.

Tender Bidding Methodology:

Sealed Bid System

Single Stage Two Envelope

Auction

The sealed bid system would be followed by an 'e-Reverse Auction'

4. Tender Bidding Methodology under Sealed Bid System of Single Stage Two Envelop:

4.1 Broad Outline of Activities from Bidder's Perspective:

4.1.1 Procure a Class III Digital Signing Certificate (DSC).
4.1.2 Register on Electronic Tender System® (ETS)
4.1.3 Create Marketing Authorities (MAs), Users and assign roles on ETS. It is mandatory to create at least one MA
4.1.4 View Notice Inviting Tender (NIT) on ETS
4.1.5 For this tender -- Assign Tender Search Code (TSC) to a MA
4.1.6 Download Official Copy of Tender Documents from ETS Note: Official copy of Tender Documents is distinct from downloading 'Free Copy of Tender Documents'. To participate in a tender, it is mandatory to procure official copy of Tender Documents for that tender.
4.1.7 Clarification to Tender Documents on ETS

a) Query to SECI (Optional)
b) View response to queries posted by SECI

4.1.8 Bid-Submission on ETS
4.1.9 Respond to SECI Post-TOE queries
4.1.10 Participate in reverse auction if invited

For participating in this tender online, the following instructions are to be read carefully. These instructions are supplemented with more detailed guidelines on the relevant screens of the ETS.

4.2 Digital Certificates

For integrity of data and authenticity/ non-repudiation of electronic records, and to be compliant

with IT Act 2000, it is necessary for each user to have a Digital Certificate (DC), also referred to as Digital Signature Certificate (DSC), of Class III, issued by a Certifying Authority (CA) licensed by Controller of Certifying Authorities (CCA) [refer ***http://www.cca.gov.in***]

4.3 Registration

To use the Electronic Tender® portal ***https://www.bharat-electronictender.com*****,** vendors need to register on the portal. Registration of each organization is to be done by one of its senior persons who will be the main person coordinating for the e-tendering activities. In ETS terminology, this person will be referred to as the Super User (SU) of that organization. For further details, please visit the website/ portal, and click on the 'Supplier Organization' link under 'Registration' (on the Home Page), and follow further instructions as given on the site. Pay Annual Registration Fee as applicable.

After successful submission of Registration details and payment of Annual Registration Fee, please contact ISN-ETS/ ETS Helpdesk (as given below), to get your registration accepted/ activated.

Important Note:

1. Interested bidders have to download official copy of the RfS/ Tender & other documents after login into the ETS Portal of ISN-ETS (***https://www.bharat-electronictender.com***). If the official copy of the documents is not downloaded from ETS Portal of ISN-ETS within the specified period of downloading of RfS/ Tender and other documents, bidder will not be able to participate in the tender.

2. To minimize teething problems during the use of ETS (including the Registration process), it is recommended that the user should peruse the instructions given under 'ETS User-Guidance Centre' located on ETS Home Page, including instructions for timely registration on ETS. The instructions relating to 'Essential Computer Security Settings for Use of ETS' and 'Important Functionality Checks' should be especially taken into cognizance.

   Please note that even after acceptance of your registration by the Service Provider, to respond to a tender you will also require time to complete activities related to your organization, such as creation of users, assigning roles to them, etc.

ETS Helpdesk
Phone +91-124-4229071, 4229072
E-mail support@isn-ets.com
Remarks 1000 hrs to 1800 hrs on all working days ie from Monday to Friday except Government Holidays.

5. Some Bidding Related Information for this Tender (Sealed Bid)

The bid shall be submitted by the Bidder under "Single Stage - Two Envelope" procedure of bidding. Under this procedure, the bid submitted by the Bidder in two envelopes - First Envelope (also referred to as Techno - Commercial Part) and Second Envelope (also referred to as Price Part) shall comprise of the following documents:

5.1 Hard Copy

Hard copy of the bid shall comprise of following documents/ programmed file-Attachments to be submitted in sealed envelope, as part of First Envelope. **The envelope shall bear {the**

name of Tender, the Tender No. and the words 'DO NOT OPEN BEFORE' (due date & time)}.

Contact Persons Name: Shri Sandeep Kumar

(d) Original Non-Refundable Tender Processing Fee as per clause no. 05 of ITB
(e) Original Non-Refundable Cost of Tender Document, if applicable
(f) 'Covering Letter' on Bidder's 'Letterhead' (in Original) clearly specifying the enclosed contents, as per 'Form F-0'
(d) EMD in original as per Clause 16 of ITB as per 'Form F-4' or as prescribed.
(e) Power of Attorney for authorized signatory in non-judicial stamp paper (as per 'Form F-24')
(f) Copy of Board Resolution
(g) The Pass-Phrase to decrypt the relevant Bid-Parts (for both Techno-Commercial and Financial) in separate sealed envelopes before the start date and time of the Tender Opening Event (TOE)

Bidder shall also upload the scanned copies of all the above-mentioned original documents during online Bid Submission as a part of First envelope.

"Bidder should explicitly note that no hard copies are to be submitted as a part of Second envelope".

II. **Soft Copy**

Soft copy of the bid shall comprise of following documents to be uploaded on the ISN portal ***https://www.bharat-electronictender.com*** as per provisions therein.

(a) As part of First Envelope

I. The Electronic Form of the bid for First Envelope (Techno-Commercial), as available on the ISN portal, shall be duly filled.

II. Scanned copies of all the above-mentioned original documents during online Bid Submission as a part of First envelope and Bid Form for first envelope

III. Certificate of Incorporation

IV. 'Bidder's General Information', as per 'Form F-1'.

V. Shareholding Certificate (as per 'Form F-23')

VI. 'No Deviation Confirmation', as per 'Form F-6'

VII. 'Bidder's Declaration regarding Banning, Liquidation etc.', as per 'Form F-7'

VIII. 'Bidders Experience as per 'Form F-13'

IX. E-Banking Format (as per 'Form F-19')

X. Documents in accordance with the "Qualifying Requirements (QR)" establishing the qualification

XI. Document showing annual turnover for the financial years as required in Qualifying Requirements (QR) such as annual reports, profit and loss account, net worth etc. along with information as sought in enclosed Format F-16

XII. Tender Document. (Only First and Last Pages of Original Tender Document duly sealed and signed/ digitally signed and all pages of amendments and clarifications to Tender Documents duly sealed and signed/ digitally signed by the Authorized Signatory).

(A) <u>As part of Second Envelope</u>

(a) The Electronic Form of the bid for Second Envelope (Price - Part), as available on the ISN portal, shall be duly filled. "Termed as **ELECTRONIC FORM**"

(b) Main Price Bid of financial bid comprising of SOR-1 and SOR-2 of the Price Schedule (available in Section - VIII, SOR), duly Completed, sealed and signed/ digitally signed shall be uploaded. "Termed as **MAIN BID**"

5.3 Special Note on Security and Transparency of Bids

Security related functionality has been rigorously implemented in ETS in a multidimensional manner. Starting with 'Acceptance of Registration by the Service Provider', provision for security has been made at various stages in Electronic Tender's software. Specifically, for Bid Submission, some security related aspects are outlined below:

As part of the Electronic Encrypted® functionality, the contents of both the 'Electronic Forms®' and the 'Main-Bid' are securely encrypted using a Pass-Phrase created by the Bidder himself. Unlike a 'password', a Pass-Phrase can be a multi-word sentence with spaces between words (e.g. I love this World). A Pass-Phrase is easier to remember, and more difficult to break. It is mandatory that a separate Pass-Phrase be created for each Bid-Part. This method of bid-encryption does not have the security and data-integrity related vulnerabilities which are inherent in e-tendering systems which use Public-Key of the specified officer of a Buyer organization for bid-encryption. Bid-encryption in ETS is such that the Bids cannot be decrypted before the Public Online Tender Opening Event (TOE), even if there is connivance between the concerned tender-opening officers of the Buyer organization and the personnel of e-tendering service provider.

<u>CAUTION:</u> All bidders must fill Electronic Form for each bid-part sincerely and carefully, and avoid any discrepancy between information given in the Electronic Form and the corresponding Main-Bid.

If any variation is noted between the price mentioned in the Electronic Form and the Main Bid (Refer Clause No. 5.2 B for the definitions of Electronic Form and Main Bid),

the price mentioned in the Main Bid shall prevail.

In case of any discrepancy between the values mentioned in figures and in words, the value mentioned in words will prevail.

The bidder shall make sure that the Pass-Phrase to decrypt the relevant Bid-Part is submitted into the 'Time Locked Electronic Key Box (EKB)' after the deadline of Bid Submission and before the commencement of the Online TOE of Technical Bid. The process of submission of this Pass-Phrase in the 'Time Locked Electronic Key Box' is done in a secure manner by first encrypting this Pass-Phrase with the designated keys provided by the Employer.

Additionally, the bidder shall make sure that the Pass-Phrase to decrypt the relevant Bid-Part is submitted to Employer in a sealed envelope before the start date and time of the Tender Opening Event (TOE).

5.4 Other Instructions

For further instructions, the vendor should visit the home-page of the portal ***https://www.bharat-electronictender.com***, and go to the User-Guidance Centre

The help information provided through 'ETS User-Guidance Centre' is available in three categories – Users intending to Register/ First-Time Users, Logged-in users of Buyer organizations, and Logged-in users of Supplier organizations. Various links (including links for User Manuals) are provided under each of the three categories.

Important Note: It is strongly recommended that all authorized users of Supplier organizations should thoroughly peruse the information provided under the relevant links, and take appropriate action. This will prevent hiccups, and minimize teething problems during the use of ETS.

5.5 Seven CRITICAL DO'S AND DON'TS FOR BIDDERS

Specifically, for Supplier organizations, the following 'Seven KEY INSTRUCTIONS for BIDDERS' must be assiduously adhered to:

1. Obtain individual Digital Signing Certificate (DSC or DC) of Class III well in advance of your tender submission deadline on ETS.

2. Register your organization on ETS well in advance of the important deadlines for your first tender on ETS viz 'Date and Time of Closure of Procurement of Tender Documents' and 'Last Date and Time of Receipt of Bids'. Please note that even after acceptance of your registration by the Service Provider, to respond to a tender you will also require time to complete activities related to your organization, such as creation of -- Marketing Authority (MA) [ie a department within the Supplier/ Bidder Organization responsible for responding to tenders], users for one or more such MAs, assigning roles to them, etc. It is mandatory to create at least one MA. This unique feature of creating an MA enhances security and accountability within the Supplier/ Bidder Organization.

3. Get your organization's concerned executives trained on ETS well in advance of your first tender submission deadline on ETS

4. For responding to any particular tender, the tender (ie its Tender Search Code or TSC) has to be assigned to an MA. Further, an 'Official Copy of Tender Documents' should be procured/

downloaded before the expiry of Date and Time of Closure of Procurement of Tender Documents. Note: Official copy of Tender Documents is distinct from downloading 'Free Copy of Tender Documents'. Official copy of Tender Documents is the equivalent of procuring physical copy of Tender Documents with official receipt in the paper-based manual tendering system.

5. Submit your bids well in advance of tender submission deadline on ETS (There could be last minute problems due to internet timeout, breakdown, etc)

6. It is the responsibility of each bidder to remember and securely store the Pass-Phrase for each Bid-Part submitted by that bidder. The bidders are required to submit correct, valid and operative Pass-Phrase to decrypt either Technical Bid Part or Financial Bid Part in a separate sealed envelope before due date and time of submission of bid. In the event, the bids are not opened with the pass-phrase submitted by bidder, Employer may ask for re-submission/ clarification for correct pass-phrase. If bidder fails to submit correct pass-phrase immediately as requested by Employer, the Tender Processing Fee and Tender Document Fee, if applicable, shall be forfeited and bid shall not be opened, and EMD shall be refunded. No request on this account shall be entertained by Employer/ Owner.

7. ETS will make your bid available for opening during the Online Public Tender Opening Event (TOE) 'ONLY IF' the status pertaining Overall Bid-Submission is 'COMPLETE'. For the purpose of record, the bidder can generate and save a copy of 'Final Submission Receipt'. This receipt can be generated from 'Bid-Submission Overview Page' only if the status pertaining overall Bid-Submission' is 'COMPLETE'

5.6 NOTE:

While the first three instructions mentioned above are especially relevant to first-time users of ETS, the fourth, fifth, sixth *and seventh* ***instructions are relevant at all times.***

6. Content of Bid

6.1 Un-Priced Bid

The Un-Priced Bid (i.e. Part I - Technical Bid, refer ITB of tender for details) to be uploaded using Link "TECHNICAL DOCUMENT". ***Bidders are advised to not upload duly filled Schedule of Rates (SOR)/ Price Schedule (PS) at this link.***

Before the bid is uploaded, the bid comprising of all relevant documents mentioned in the tender document should be digitally signed in accordance with the Indian IT Act 2000. If any modifications are required to be made to a document thereafter the modified documents shall be again digitally signed before uploading.

Bidders are required to upload all Tender forms and supporting documents which form part of the bid/ tender in the Collaboration Folder (C-Folder) under tender document of e-tender portal.

Uploading the documents relevant to bid before the bid submission date and time is the sole responsibility of the bidder.

The complete bid (each page) shall be continuously numbered in sequence, from start till end i.e. 1, 2, 3… n. The bid shall be uploaded along with proper index and indicating page numbers against each category of documents. A sample is suggested as under:

Sub-folder in C-Folder	Documents	Page nos. (for ref.)
1. INDEX	Index	1 to a
2. TENDER DOC	Tender Document, Corrigendum etc.	a+1 to b
3. B.E.C	BEC documents (including order, completion/ execution certificate, balance sheet, etc.)	b+1 to c
4. UN-PRICED COMMERCIAL	Un-priced Commercial offer/bid	c+1 to d
5. EMD/POA	Scanned copy of EMD/POA	d+1 to e
6. FORMATS	Formats of tender duly filed-in, signed and stamped and other	e+1 to f
7. TENDER FEE	Scanned copy of Tender Fee/ Integrity Pact (I.P.)	f+1 to f
8. OTHERS	Any other document	g+1 to n

The above shall ensure that there are no missing documents and traceability of relevant section is ensured.

Note:

i) Bidder may save/ store the bid documents in the PC/ Laptop before submitting the bid into in e-tender portal.
ii) Bidder is required to fill up the price(s)/ rate(s) strictly in the Schedule of Rate (SOR)/ Price Schedule (PS) attached with the tender.

Inadvertently, if a document is uploaded in Collaboration Folder (C Folder) by the bidders, such document can be deleted by the bidder and can be replaced by a digitally signed new/ modified document prior to due date & time.

Un-priced techno-commercial bid document should be placed in the private area earmarked in the C-folder of Tender Document in e-tender portal.

6.2 Price Bid

The Price Bid (i.e. Part II - Price Bid, refer ITB for details) to be uploaded using Link given under ISN portals & and NOT using link “TECHNICAL DOCUMENT”. ***Bidders are advised not to upload any other documents and same shall be ignored***. For detailed instructions, refer tender document and instructions as given above.

Employer/ Owner shall not be responsible for any failure on the part of the bidder in submission of Priced Bid.

Instructions mentioned under “PRICE BID [Online]” shall be applicable in case Bidders have been asked to quote their prices on-line directly in the ISN’s e-tender portal in addition to uploading of scanned copy of SOR/ PS or only the on-line price submission in the portal, as the case may be.

7 Submission of documents

Bidders are requested to upload small sized documents preferably (upto 10 MB) at a time to facilitate easy uploading into e-tender portal. Employer/ Owner shall not be responsible in case

of failure of the bidder to upload documents/ bids within specified time of tender submission.

8 Last date for submission of bids

System does not allow for submission or modification of bids beyond the deadline for bid submission. However, if the bidder for some reason intends to change the bid already entered, he may change/ revise the same on or before the last date and time of submission. The system time displayed on ISN's e-tender webpage shall be final and binding on the bidders for all purposes pertaining to various events of the subject tender and no other time shall be taken into cognizance.

Bidders are advised in their own interest to ensure that bids are uploaded in e-tender system well before the closing date and time of bid.

9 Internet connectivity

If bidders are unable to access ISN's e-tender portal or Bid Documents, the bidders may please check whether they are using proxy to connect to internet or their PC is behind any firewall and may contact their system administrator to enable connectivity. Please note that Port SSL/ 443 should be enabled on proxy/firewall for HTTPS connectivity. Dial-up/ Broad and internet connectivity without Proxy settings is another option.

Additional DO'S AND DON'TS FOR BIDDERS Participating in e-ReverseAuction

1. Get your organization's concerned executives trained for e-Reverse Auction related processes on ETS well in advance of the start of e-Reverse Auction.

2. For responding to any particular e-Reverse Auction, the e-Reverse Auction (ie its Reverse Auction Search Code or RASC) has to be assigned to an MA.

3. It is important for each bidder to thoroughly read the 'rules and related criterion' for the e-Reverse Auction as defined by the Buyer organization.

4. If applicable for an e-Reverse Auction (such as in case of a Direct e-Reverse Auction which is not preceded by a sealed-bid stage), pay your EMD on ETS well in advance of the start of e-Reverse Auction bidding.

5. If applicable for an e-Reverse Auction (such as in case of a Direct e-Reverse Auction which is not preceded by a sealed-bid stage), pay the Bid Processing Fee well in advance of the start of e-Reverse Auction bidding.

6. It is important to digitally-sign your 'Final bid' after the end of e-Reverse Auction bidding event.

SECTION - III

BID DATA SHEETS (BDS)

BID DATA SHEETS (BDS)

The following bid specific data for the Plant and Equipment to be procured shall amend and/ or supplement the provisions in the Section - II, Instruction to Bidders (ITB)

Sl. No.	ITB Clause Ref. No.	Bid Data Details
1.	**SCOPE OF BID** (ITB 1.1)	**The Employer is:** **Solar Energy Corporation of India Limited,** D - 3, 1st Floor, Wing - A, Prius Platinum Building, District Centre Saket, New Delhi - 110 017, India Kind Attn.: General Manager (C & P) / Manager (C & P) Telephone Nos.: - 0091-(0)11-71989290/71989256 Fax No.: - 0091-(0)11-71989243 E-mail: - **contracts@seci.co.in** **The Owner is:** The Singareni Collieries Co., Ltd., Kothagudem - 507119, Telangana Kind Attn: GM (E&M) Solar Energy Telephone Nos.: - +91 9491145093 E mail: gm_solar@scclmines.com
2.	**BIDS FROM CONSORTIUM/ JOINT VENTURE** (ITB 3.0)	**Replace the existing clause by the following:** Bids from Consortium/ Joint Venture are **ALLOWED**
3.	**NUMBER OF BIDS PER BIDDER** (ITB 4.0)	**Replace the existing clause by the following:** Bidder shall submit only **'one [01] Bid'** per bidder in the Bidding Process. A Bidder who submits or participates in more than 'one [01] Bid' will cause all the proposals in which the Bidder has participated to be disqualified.
4.	**TENDER PROCESSING FEE (NON-REFUNDABLE)** (ITB 5.3)	**Replace the existing clause by the following:** The Tender Processing Fee and EMD is exempted for MSME Vendors registered under NSIC/ Udyog Aadhaar/DIC Category only.

Sl. No.	ITB Clause Ref. No.	Bid Data Details
5.	**GOODS & SERVICE TAX (GST)** (ITB 13.0)	**Add the following to the existing clause:** **Tax retention clause**: The supplier shall upload his Tax Invoice in the GSTN as per the provisions of the GST Act i.e., by 10th of the month subsequent to the month in which "Time of Supply" arises. In respect of orders where the entire order quantity is executed through a single Tax Invoice and if the "Tax Invoice" is not uploaded within the time limits prescribed under GST Act, the amount of tax contained in the Invoice will be withheld by SCCL till such time the invoice is uploaded in the GSTN Portal. In respect of orders where the entire order quantity is executed in phased manner through multiple invoices or where staggered payment is made, if the "Tax Invoice" is not uploaded within the time limits prescribed under GST Act, the tax amount will be withheld from the payment made against subsequent Invoice till such time the invoice is uploaded. The final payment is subject to compliance of all formalities under GST by the supplier.
6.	**BID VALIDITY** (ITB 15.1)	**Replace the existing clause by the following:** The bid validity period shall be **180 (One Hundred and Eighty Days)** from the date of opening of Techno-Commercial Bid (Envelope-I).
7.	**EARNEST MONEY DEPOSIT (EMD)** (ITB 16)	**Replace the existing clause by the following:** 16.7 Forfeiture of the EMD of any bidder is upon SCCL discretion and the EMD forfeited amount shall be refunded to SCCL. Notwithstanding anything contained herein, the 'EMD' may also be forfeited in any of the following cases.: (a) If a Bidder withdraws or varies his Bid during the 'Period of Bid Validity' (b) If a Bidder has indulged in corrupt/ fraudulent/ collusive/ coercive practice (c) If the Bidder modifies bids during the period of bid validity (after last date of submission). (d) Violates any other condition, mentioned elsewhere in the tender document, which may lead to forfeiture of EMD. (e) In the case of a successful Bidder, if the Bidder fails to: (i) acknowledge receipt the NOA/ LOI/ LOA within 15 (Fifteen) days from issuance of

Sl. No.	ITB Clause Ref. No.	Bid Data Details
		same. (ii) to furnish "Performance Security in accordanc with the tender document." (iii) to accept 'arithmetical corrections' as per provision of the clause 30 of ITB. 16.9 **MSMEs (Micro, Small and Medium Enterprises) registered under NSIC/ Udyog Aadhar/DIC Only are exempted from submission of EMD.**
8.	**ZERO DEVIATION & REJECTION CRITERIA** (ITB 19.1 & 19.2)	Clause No 19.1, Zero deviation & Clause No 19.2, Rejection Criteria should be read in conjunction to each other & both clauses points mentioned should complement each other.
9.	**DEADLINE FOR SUBMISSION OF BIDS** (ITB 22.2)	**Add following to the existing clause:** For hard copies of bid submission purpose, the address of the Employer is: **Solar Energy Corporation of India Limited**, D - 3, 1st Floor, Wing - A, Prius Platinum Building, District Centre Saket, New Delhi - 110 017 Kind Attn.: General Manager (C & P) / Manager (C & P) Telephone Nos.: - 0091-(0)11-71989256/ 71989290 Fax No.: - 0091-(0)11-71989243 E-mail: - **contracts@seci.co.in**
10.	**BID OPENING** (ITB 26.1)	**Add following to the existing clause:** The bid opening shall take place at: **Solar Energy Corporation of India Limited**, D - 3, 1st Floor, Wing - A, Prius Platinum Building, District Centre Saket, New Delhi - 110 017
11.	**AWARD** (ITB 35)	**Replace the existing clause by the following:** Subject to "ITB: Clause-29", For Sites/Reservoirs (Site 1 & 2), Owner, Singareni Collieries Company Limited (SCCL) will award the Contract Agreement (CA) on respective site basis to the successful Bidder, whose Bid has been determined to be substantially responsive and has been determined as the lowest (L1) provided that bidder is determined to be qualified to satisfactorily perform the Contract Technically.

Sl. No.	ITB Clause Ref. No.	Bid Data Details
12.	**NOTIFICATION OF AWARD/ LETTER OF INTENT/ LETTER OF ALLOCATION** (ITB 36.1)	**Add following to the existing clause** Prior to the expiry of 'Period of Bid Validity', For Sites/Reservoirs (Site 1 & 2), Owner, Singareni Collieries Company Limited (SCCL) will notify the successful bidder in writing, in the form of "Notification of Award (NOA)"/ “Letter of Intent (LOI)”/ “Letter of Allocation (LOA)” on respective site basis through e-mail/ courier/ registered post, that his Bid has been accepted. The notification of award will constitute the formation of the Contract
13.	**SIGNING OF CONTRACT AGREEMENT** (ITB 37.1)	**Add following to the existing clause** State of which stamp paper is required for Contract Agreement: **Telangana**
14.	**SETTLEMENT OF DISPUTES BETWEEN GOVERNMENT DEPARTMENT AND ANOTHER AND ONE GOVERNMENT DEPARTMENT AND PUBLIC ENTERPRISE AND ONE PUBLIC ENTERPRISE AND ANOTHER** (ITB 44)	**Replace the existing clause by the following:** **ARBITRATION**: Normally all disputes should be settled by negotiations between the Company and the concerned parties. In case any dispute / difference is not settled through negotiations, the respective parties can seek remedy through Arbitration only by invoking the same within 120 days of raising of dispute. No disputes shall be referred to civil courts other than through Arbitration. (a) In case of any dispute Sole Arbitrator shall be appointed from the list of 3 judicial officers maintained by SCCL duly following the provisions of Arbitration and conciliation act 1996 as amended from time to time. The list of such names shall be forwarded to the party as and when the party requests for resolving the dispute. Such Judicial Officer as chosen by the party will be appointed by the Chairman & Managing Director to adjudicate the dispute as a Sole Arbitrator. The Arbitrator so appointed shall conduct the proceedings in accordance with the Arbitration & Conciliation Act, 1996 as amended from time to time and pass a reasoned award. Both the parties should bear the cost of the arbitration equally. (b) If the Sole Arbitrator appointed by the Chairman & Managing Director of the Singareni Collieries Company Limited is unable to continue as an Arbitrator for any reasons to be recorded in writing and the Chairman& Managing Director of Singareni Collieries Company Limited thinks fit for appointment of a new Arbitrator in the place of existing Arbitrator, he is having a power to do so. Such new Arbitrator shall be appointed following the same procedure as contemplated in (a) above.

Sl. No.	ITB Clause Ref. No.	Bid Data Details
		(c) As and when such new Arbitrator is appointed, he can either continue the arbitration proceedings from the stage where the earlier Arbitrator discontinued his proceedings or alternatively the new Arbitrator may start proceedings de novo if the circumstances warrant him to do so. (d) Failing to invoke Arbitration Clause within 120 days of dispute (from the date of the raising of the dispute). it is deemed that there is no dispute between the parties. No disputes shall be entertained in any form and on any matter pertaining to contract after expiry of 120 days of the period. (e) The expenses payable to the Sole Arbitrator shall be governed by the Arbitration & Conciliation Act, 1996 as amended from time to time and shall be borne equally by both parties to the dispute.

ANNEXURE TO BID DATA SHEET (BDS) QUALIFYING REQUIREMENTS

QUALIFYING REQUIREMENTS (QR)

Qualification of the bidder(s) will be based on their meeting the minimum eligibility criteria specified below regarding the Bidder's General Standards, Technical Experience and Financial eligibility as demonstrated by the Bidder's responses in the corresponding Bid documents. The bid can be submitted by an individual Company or by a Joint Venture/Consortium of not more than 03 (Three) companies. (Specific requirements for Joint Ventures/Consortium are given below).

1.1 GENERAL ELIGIBILITY CONDITIONS

The Bidder should be a body incorporated in India under the Companies Act, 2013. Government owned Enterprises who are registered and incorporated in India, Limited Liability Companies engaged in the business of Power/Infrastructure are also eligible except those companies against whom sanction for conducting business is imposed by the Government of India or SECI.

A foreign Bidder/company can also participate on standalone basis or in the way of consortium/JV (If allowed). In case of a foreign company participating on standalone basis and its selection as successful Bidder, it has to form an Indian Company registered under the Companies Act, 2013 as its subsidiary company with at least 76% (Seventy Six Percent) shareholding in the subsidiary company within 30 days from the date of issue of LoI, failing which the Owner, SCCL may review & take an appropriate decision in this regard before the issue of Contract Agreement (CA). In case a Foreign Company is selected as the successful Bidder, it shall comply with all applicable laws and provisions including but not limited to laws and provisions of Foreign Direct Investment in India.

Limited Liability Partnerships, Proprietorships, Partnerships, NGOs, Charitable Trusts, and Educational Societies are not allowed to participate in the bidding process (either individually or in Joint Venture/ Consortium).

The Bid Processing Fees and EMD are exempted for MSME Vendors/ Developers registered under NSIC/ DIC/ Udyog Aadhaar Category only. As the Proprietorships, Partnerships, NGOs, Charitable Trusts, Educational Societies in any form are not allowed to participate in the tendering process, hence any Proprietorships, Partnerships, NGOs, Charitable Trusts, Educational Societies MSME vendor will also not be eligible to participate in the bidding process (either individually or in Joint Venture/ Consortium)

1.2 TECHNICAL ELIGIBILITY CONDITIONS

Bidders can participate through <u>any one</u> of the below mentioned qualifying routes. The Bidder shall be considered meeting Technical Eligibility criteria either from Route I or Route II.

Route I

IA. The bidder should have experience in EPC execution of Ground mounted Solar Projects on Turnkey basis including Design, Supply (Supply of Modules & Inverters can be inclusive or exclusive in the bidder's scope in the past experience), Installation and Commissioning of Grid connected Solar PV Power Plant of cumulative Capacity not less than **8 (Eight) MW** in last seven Financial years as on last date of bid submission. However, such Grid connected Solar PV Power Plant capacity must have been in satisfactory operation for at least six (06) months prior to the last date of bid submission.

AND

IB. Out of the above, the bidder should have experience in EPC execution of Ground mounted Solar Projects on Turnkey basis including Design, supply (Supply of Modules & Inverters can be inclusive or exclusive in the bidder's scope in the past experience), installation & commissioning of at least **02 (Two)** Grid connected Solar PV Power Plant Projects having an individual capacity of **02 (Two) MW or above** in last seven Financial years last date of bid submission. However, such Grid connected Solar PV Power Plant capacity must have been in satisfactory operation for at least six (06) months prior to the last date of bid submission.

OR

Route II

IIA. The bidder should have experience in execution of Ground mounted Solar Projects as a Developer of Grid-connected Solar PV Power Plant(s) of cumulative Capacity not less than **8 (Eight) MW** in last seven Financial years as on last date of bid submission. However, such Grid connected Solar PV Power Plant capacity must have been in satisfactory operation for at least six (06) months prior to the last date of bid submission.

AND

IIB. Out of the above, the bidder should have experience in execution of Ground mounted Solar Projects as a Developer of at least **02 (Two)** Grid connected Solar PV Power Plant Projects having an individual capacity of **02 (Two) MW** in last seven Financial years and till last date of bid submission. However, such Grid connected Solar PV Power Plant capacity must have been in satisfactory operation for at least six (06) months prior to the last date of bid submission.

The list of projects commissioned at least 6 months prior to the last date of Bid Submission, indicating whether the project is grid connected, along with a scanned copy of the Commissioning certificate and Work order / Contract / Agreement/LOI from the Client (or Owner) shall be submitted in support of Clause 1.2 above.

The Performance Certificate must have been issued for a minimum duration of 06 (Six) months from the date of commissioning. The Performance Certificate/Joint meter reading (JMR) reports shall have been issued by any state/ central owned agencies or state power departments or authorized representative of Power offtaker (Discom/Private Power purchaser).

1.3 FINANCIAL ELIGIBILITY CONDITIONS

The Minimum Average Annual Turnover (MAAT) of the bidder in the last three financial years (i.e. FY 2016-17,2017-18 & 2018-19) should be **INR 34,02,00,000/- (Indian Rupees Thirty-Four Crores & Two Lacs only).** ***MAAT shall mean Revenue from Operations as incorporated in the profit & loss account excluding other income, e.g. sale of fixed assets.*** This must be the individual Company's turnover and not that of any group of Companies. A summarized sheet of average turnover, certified by a practicing Chartered Accountant/Statutory Auditor should be compulsorily enclosed along with corresponding annual accounts.

AND

The net worth for the last financial year should be positive. "Net Worth" of the Bidder shall be calculated as per the Companies Act, 2013.

AND

The bidder should have a minimum Working Capital of **INR 21,26,25,000/- (Indian Rupees Twenty-one crores, Twenty-six Lacs & Twenty-five thousand only)** as per the last audited financial statement. If the bidder's working capital is inadequate, the bidder should supplement this with a letter from the bidder's bank, having net worth not less than INR 500 Crores, confirming availability of the line of credit for more than or equal **INR 21,26,25,000/- (Indian Rupees Twenty-one crores, twenty-six Lacs & Twenty-five thousand only)** to meet the working Capital requirement of this particular Project**.**

For participation as an EPC Bidder under Route I:

In case the bidder is a subsidiary of a holding company, financial eligibility criteria referred to in the clause above, shall be of that subsidiary company only (i.e. excluding its holding company). A job executed by a Bidder for its own plant/ projects cannot be considered as experience for the purpose of meeting the Eligibility Conditions of the tender. Also, the jobs executed for Subsidiary/ Fellow subsidiary/ Holding company will not be considered as experience for the purpose of meeting Eligibility Conditions.

1.3.1 **For participation as an EPC Bidder under Route I**: In case the bidder is a subsidiary of a holding company, financial eligibility criteria referred to in clause 1.3 above shall be of that subsidiary company only (i.e. excluding its holding company).

1.3.2 The Bidder will provide a copy each of audited annual report of previous three financial years for ascertaining their turnover and Net Worth for the purpose of verification.

1.3.3 The derivation of Net Worth" of the Bidder shall be calculated as per Company Act 2013.

1.3.4 Other income (as per the Companies Act, 2013 including amendment/ clarifications), shall not be considered for arriving at annual turnover.

1.3.5 A scanned copy of Certificate of Incorporation of the Bidder shall be furnished in the bid (through online mode).

1.3.6 Bidders shall furnish documentary evidence as per the prescribed format (online as well as offline), duly certified by the Authorized Signatory and the Statutory Auditor / Practicing Chartered Accountant of the Bidding Company in support of their financial eligibility.

The Bidder shall furnish the following documentary evidences along with the Bid in support of meeting of above-mentioned Financial Eligibility Criteria:

(i) "Details of Financial capability of Bidder" as per format F-16 duly signed and stamped by a Chartered Accountant (format attached).

(ii) Audited financial results i.e. Annual Report including Audited Balance Sheet and Profit & Loss Account Statement for immediate three preceding financial years to meet the above Financial Eligibility Criteria. In case of tenders having the submission deadline up to 30th September of the relevant financial year and audited financial results of immediate 3 preceding financial years being not available, the bidder has an option to submit the audited financial results of three years immediately prior to relevant financial year. In case the bid submission deadline is after 30th September of the relevant financial year, bidder has to compulsorily submit the audited financial results of immediately preceding three financial years.

1.4 JOINT VENTURE & CONSORTIUM CONDITIONS:

In case the bid is submitted by a Joint venture (JV) or Consortium of two or more companies as partners, they must meet the following requirements: -

1.4.1 There can be a maximum of 03 (Three) partners in a JV/Consortium. The Lead partner of the JV/Consortium shall meet individually not less than 50% of minimum Financial Eligibility Conditions (MAAT & Working Capital) given at para 1.3 above. However, all the JV/Consortium partners must meet collectively 100% Financial Eligibility Conditions given at para 1.3 above.

1.4.2 All the partners of the JV/Consortium must meet collectively 100% of Technical Eligibility Conditions given at para 1.2 above.

1.4.3 The Joint Venture/Consortium must collectively satisfy the Criteria of clauses 1.2 & 1.3 above (Routes I & II) for which purpose, the relevant figure of average annual turnover and liquid assets/ credit facilities for each of the partners of the JV/Consortium shall be added together to arrive at total eligibility of the Joint Venture/Consortium. The net worth of each Partner of JV/Consortium should be positive**.**

1.4.4 A Joint Venture (JV), may or may not be incorporated as a Registered Company.

1.4.5 A Joint Venture (JV), if incorporated as a Registered Company, is required to submit EMD and Performance Security in the name of Joint Venture only. In case of Consortium or a JV has not formed a Registered Company, the EMD and Performance Security shall be submitted in the name of Lead Partner only.

1.4.6 A JV is required to submit Form of Undertaking by the JV Partners (F - 17) and Form of Power of Attorney (F - 17A) as per prescribed formats enclosed in Section - VI (Sample Forms and Formats).

A Consortium is required to submit Form of Undertaking by the Consortium Partners (F - 18) and Form of Power of Attorney (F - 18A) as per prescribed formats enclosed in Section - VI (Sample Forms and Formats).

1.4.7 JV/ Consortium is also required to declare detailed scope of work to be executed by each partner of JV.

1.4.8 The Employer may assess the capacity and capability of the bidder, to ascertain that the bidder can successfully execute the scope of work covered under the package within stipulated completion period. This assessment shall inter-alia include (i) document verification, (ii) bidder's work/manufacturing facilities visit, (iii) manufacturing capacity, details of works executed, works in hand, anticipated in future & the balance capacity available for the present scope of work, (iv) details of plant and machinery, manufacturing and testing facilities, manpower and financial resources, (v) details of quality systems in place, (vi) past experience and performance, (vii) customer feedback, (viii) banker's feedback etc.

1.4.9 In order to avail the benefits of exemptions in JV/ Consortium, all the partners of JV/ Consortium must be MSME Vendors/ Developers registered under NSIC/ Udyog Aadhaar/DIC Category only.

Employer/ Owner reserves the right to waive minor deviations if they do not materially affect the capability of the Bidder to perform the contract.

SECTION - IV

GENERAL CONDITIONS OF CONTRACT (GCC)

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Preamble

This Section (Section - IV) of the Bidding Documents [named as General Conditions of Contract (GCC)] provides the performance of the Contractor, payments under the contract or matters affecting the risks, rights and obligations of the parties under the contract. This Section contains provisions that are to be used unchanged unless Section - V [named as Special Conditions of Contract (SCC)] states otherwise as any changes in GCC or any complementary information that may be needed has been shown in SCC. If there is a conflict between the provisions of Section - IV & Section - V, the provisions of Section - V shall prevail.

Bidders may note that the respective rights of the Employer/ Owner and Bidders/ Contractors shall be governed by this Tender Documents and Contracts (to be) signed between the Employer/ Owner and the Contractor for the respective package(s). The provisions of this Tender Documents shall always prevail over any other documents in case of contradiction.

Further in all matters arising out of the provisions of this Section - IV and the Section - V of the Tender Documents, the laws of the Union of India shall be the governing laws and courts of the State of the Project Owner shall have exclusive jurisdiction.

[A] DEFINITIONS

1. Definition of Terms:

1.1 In this **TENDER** (as here-in-after defined) the following words and expressions shall have the meanings hereby assigned to them except where the context otherwise required.

1.1.1 **ADJUDICATOR** means the person or persons named as such in the SCC to make a decision on or to settle any dispute or difference between the Owner and the Contractor.

1.1.2 **AFFILIATE** shall mean a company that either directly or indirectly

a. controls or
b. is controlled by or
c. is under common control with a Bidding Company

"Control" means ownership, directly or indirectly, of more than 50% (fifty percent) of the voting shares of such Company or right to appoint majority Directors.

1.1.3 **AFFECTED PARTY** means Owner or the Contractor whose performance has been affected by an event of Force Majeure

1.1.4 **APPLICABLE LAW** means any statute, law, regulation, ordinance, notification, rule, regulation, judgment, order, decree, bye-law, approval, directive, guideline, policy, requirement or other governmental restriction or any similar form of decision of, or determination by, or any interpretation or administration having the force of law in the Republic of India and the State Government, by any Government Authority or instrumentality thereof, whether in effect as of the date of this Contract or thereafter**.**

1.1.5 **APPROVED** shall mean approved in writing including subsequent written confirmation of previous verbal approval and "APPROVAL" means approval in writing including as aforesaid.

1.1.6 **APPOINTING AUTHORITY** for the purpose of arbitration shall be the any person so designated by the Owner.

1.1.7 **ARBITRATOR** means the person or persons appointed by agreement between the Owner and the Contractor to make a decision on or to settle any dispute or difference between the Owner and the Contractor referred to him or her by the parties.

1.1.8 **B.I.S.** means specifications of Bureau of Indian Standards (BIS).

1.1.9 **BID** means the Techno Commercial proposal together with Price Bid submitted by the Bidder along with all documents/ credentials/ attachments/ annexure etc., in response to the Tender, in accordance with the terms and conditions hereof.

1.1.10 **BIDDER** means Bidding Company submitting the Bid. Any reference to the Bidder includes Bidding Company including its successors, executors and permitted assigns as the context may require.

1.1.11 **CEA** means the Central Electricity Authority.

1.1.12 **CHARTERED ACCOUNTANT** means a person practicing in India or a firm whereof all the partners practicing in India as a Chartered Accountant(s) within the meaning of the Chartered Accountants Act, 1949.

1.1.13 **COLLABORATOR** means the firms/ corporations who has provided technological support to the manufacturer for the detailed Design/establishing production line for the specific Equipment.

1.1.14 **COMPANY** means a body incorporated in India under the Indian Companies Act, 1956 or Companies Act, 2013 including any amendment thereto.

1.1.15 **CONTRACT** shall mean the Agreement between the Owner and the Contractor for the execution of the works including therein all Contract documents.

1.1.16 **CONTRACTOR** means the person or the persons, Company or Corporation whose Tender has been accepted by the Employer and includes the Contractor's legal representatives his/ her successors and permitted assigns.

1.1.17 **CONTRACT DOCUMENTS** mean collectively the Tender Documents, Designs, Drawings, Specification, Schedule of Quantities and Rates, Notification of Award/ Letter of Intent/ Letter of Acceptance and agreed variations if any, and such other documents constituting the Tender and acceptance thereof.

1.1.18 **CONTRACTOR'S EQUIPMENT** means all plant, facilities, equipment, machinery, tools, apparatus, appliances or things of every kind required in or for installation, completion and maintenance of Facilities that are to be provided by the Contractor, but does not include Plant and Equipment, or other things intended to form or forming part of the Facilities.

1.1.19 **CONTRACT PRICE/CONTRACT VALUE/PROJECT VALUE** means the firm value of the final quoted price, as a result of e- RA (if applicable), by the successful bidder specified in its financial proposal as the sum of individual contract value of Supply & Services (Supply of goods, F&I, Design, installation, Civil Works etc) as mentioned under the different work heads specified in the financial proposal including all the applicable taxes/ Goods & Service taxes.

1.1.20 **CONTRACTOR'S REPRESENTATIVE** means any person nominated by the Contractor and approved by the Employer to perform the duties delegated by the Contractor.

1.1.21 **CONSULTANT** means Techno-Commercial experts who are the consulting engineer to the Employer/ Owner for this project.

1.1.22 **COMMISSIONING** means a project shall be considered commissioned if all equipment as per rated capacity, mentioned under the scope of contract, has been installed and energy has flown into grid.

1.1.23 **COMPLETION OF FACILITIES** means that the Facilities (or a specific part thereof where specific parts are specified in the SCC) have been completed operationally and structurally and put in a tight and clean condition, and that all work in respect of Pre-commissioning of the Facilities or such specific part thereof has been completed; and Commissioning along with Operational Acceptance has been attained as per Technical Specifications.

1.1.24 **CHANGE ORDER** means an order given in writing by the Engineer-in-Charge/Project Manager to effect additions to or deletion from and alteration in the works.

1.1.25 **DAY** means a day of 24 hours from midnight to midnight irrespective of the number of hours worked in that day.

1.1.26 **DEFECT LIABILITY PERIOD** in relation to scope of work means 12 (Twelve) months from the date of Operational acceptance during which the Contractor stands responsible for rectifying all defects/ rejection that may appear in the works executed by the Contractor in pursuance of the Contract and includes warranties against Manufacturing/ Fabrication/ Erection/ Construction defects covering all

materials plants, equipment, components and the like supplied by the Contractor, works executed against workmanship defects.

1.1.27 **DRAWINGS** shall include maps, plans and tracings, supporting documents, specifications or prints or sketches thereof with any modifications approved in writing by the Engineer-in-Charge/Project Manager and such other drawing as may, from time to time, be furnished by the Contractor.

1.1.28 **EARNEST MONEY DEPOSIT (EMD)** means the unconditional and irrevocable Tender Security in the form of Demand Draft/ Banker's Cheque/ Bank Guarantee to be submitted along with the Bid by the Bidder as prescribed in the Tender document.

1.1.29 **EMPLOYER** means the Company/ Corporation/ Government Entity, named in the **BDS/ SCC**, who is responsible for getting the Project/Facilities implemented. The Employer may be Owner himself or an agency appointed by the Owner and shall include the legal successors or permitted assigns of the Employer.

1.1.30 **ENGINEER-IN-CHARGE (EIC)/PROJECT MANAGER** shall mean the person designated from time to time by the Employer and shall include those who are expressly authorized by him to act for and on his behalf for operation of this Contract.

1.1.31 **EFFECTIVE DATE** means the date of issuance of Notification of Award/ Letter of Intent/Letter of Award (LOA) from which the Time for Completion shall be determined or any other specific date as provided in the Notice to Proceed (NTP), in case the NTP is applicable.

1.1.32 **FACILITIES** mean the Plant and Equipment to be supplied and installed, as well as all the installation services including all infrastructure as mentioned in scope of works to be carried out by the Contractor under the Contract.

1.1.33 **FINAL ACCEPTANCE/FINAL COMPLETION** means acceptance of Facilities by the Employer at the end of one year from the date of Operational Acceptance and upon demonstration of minimum annual parameters as specified in the technical specifications and completion of works under the punch list which certifies the Contractor's fulfilment of the Contract in respect of Functional and Plant Performance Guarantees of the Facilities.

1.1.34 **GUARANTEE TEST(S)** means the test(s) specified in the Technical Specifications to be carried out to ascertain whether the Facilities or a specified part thereof is able to attain the Functional Guarantees specified in the Technical Specifications during/ after successful Commissioning followed by Trial - Operation.

1.1.35 **GOODS & SERVICE TAX (GST)** is an indirect tax throughout India to replace taxes levied by the central and state governments. Goods & Services Tax is a comprehensive, multi-stage, destination-based tax that will be levied on every value addition.

1.1.36 **IEC** means specifications of International Electro-Technical Commission.

1.1.37 **INSTALLATION SERVICES** means all those services ancillary to the supply of the Plant and Equipment for the Facilities, to be provided by the Contractor under the Contract; e.g., transportation and provision of marine or other similar insurance (s), inspection, expediting, site preparation works (including the provision and use of Contractor's Equipment and the supply of all structural and construction materials required), installation including civil and allied works etc., testing, pre-commissioning, commissioning, operations, maintenance, the provision of operations and maintenance manuals, training of Employer's Personnel etc..

1.1.38 **MWp** means Mega-Watt Peak.

1.1.39 **kWh** shall mean Kilo-Watt-hour.

1.1.40 **LANGUAGE FOR DRAWINGS AND INSTRUCTION** All the drawings, titles, notes, instruction, dimensions, etc. shall be in English Language only.

1.1.41 **MNRE** means Ministry of New and Renewable Energy, Government of India.

1.1.42 **MOBILIZATION** shall mean establishment of sufficiently adequate infrastructure by the Contractor at Site comprising of construction equipment, aids, tools tackles including setting of site offices with facilities such as power, water, communication etc. establishing manpower organization comprising of Resident Engineers, Supervising Personnel and an adequate strength of skilled, semi-skilled and un-skilled workers, who with the so established infrastructure shall be in a position to commence execution of work at site(s), in accordance with the agreed Time Schedule of Completion of Work. Mobilization shall be considered to have been achieved, if the Contractor is able to establish infrastructure as per Time Schedule, where so warranted in accordance with agreed schedule of work implementation to the satisfaction of Engineer-in-Charge/Project Manager.

1.1.43 **NET-WORTH** shall have same meaning as defined in Company Act 2013 and Amendment, if any.

1.1.44 **NOTICE IN WRITING OR WRITTEN NOTICE** shall mean a notice in written, typed or printed characters sent (unless delivered personally or otherwise proved to have been received by the addressee) by Email/registered post to the latest known private or business address or registered office of the addressee and shall be deemed to have been received in the ordinary course of post it would have been delivered.

1.1.45 **NOTIFICATION OF AWARD (NOA)/LETTER OF INTENT (LOI)/LETTER OF AWARD (LOA)** means the official notice issued vide Letter/ E-mail by the Employer/Owner notifying the Contractor that his bid has been awarded.

1.1.46 **NTP** means Notice to Proceed subsequent to the placement of LOA/NOA/LOI. NTP will be issued by the owner within a maximum time frame of 90 days from the date of LOA/NOA/LOI, failing which the LOA/NOA/LO shall stand withdrawn without creating any further liability on either party. In such case EMD/PBG, as applicable submitted by the contractor shall be released.

1.1.47 **OPERATIONAL ACCEPTANCE** means the acceptance of the Plant Facilities (or any part of the Facilities where the Contract provides for acceptance of the Facilities in parts) by the Employer/Owner, which certifies the Contractor's fulfilment of the Contract in respect of meeting Plant Functional and Performance Guarantees of the Facilities and completion of works.

1.1.48 **O & M** means comprehensive Operation & Maintenance of Commissioned Project/ Work/ Facilities under the contract.

1.1.49 **OWNER** means the Company/ Corporation/ Government Entity, named in the **BDS/ SCC**, who has decided to set up the Facilities under his ownership at the his designated location and shall include the legal successors or permitted assigns of the Owner.

1.1.50 **PARENT COMPANY** means a company that holds more than Fifty Percent (50%) of the paid-up equity capital directly or indirectly in the Bidding Company as the case may be.

1.1.51 **PLANT AND EQUIPMENT** means permanent plant, equipment, machinery, apparatus, articles and things of all kinds to be provided and incorporated in the Facilities by the Contractor under the Contract (including the spare parts to be supplied by the Contractor) but does not include Contractor's Equipment.

1.1.52 **PRE-COMMISSIONING** means the testing, checking and other requirements specified in the Technical Specifications that are to be carried out by the Contractor in preparation for Commissioning.

1.1.53 **SCC** means the Special Conditions of Contract.

1.1.54 **SECI** means Solar Energy Corporation of India Limited, New Delhi (A Government of India Enterprise) under MNRE.

1.1.55 **SITE** means the land and other places upon which the Facilities are to be installed, and such other land or places as specified in the SCC of the Contract as forming part of the Site.

1.1.56 **SPECIFICATION** shall mean all directions the various Technical Specifications, provisions attached and referred to the Tender Documents which pertain to the method and manner of performing the work or works to the quantities and qualities of the work or works and the materials to be furnished under the Contract for the work or works, as may be amplified or modified by the Employer or Engineer-in-Charge/Project Manager during the performance of Contract in order to provide the unforeseen conditions or in the best interests of the work or works. It shall also include the latest edition of relevant Standard Specifications including all addenda/ corrigenda published before entering into Contract.

1.1.57 **SUB-CONTRACTOR** including vendors, means any person to whom execution of any part of the Facilities, including preparation of any design or supply of any Plant and Equipment, is sub-contracted directly or indirectly by the Contractor, and includes its legal successors or permitted assigns.

1.1.58 **TEMPORARY WORKS** shall mean all temporary works of every kind required in or about the execution, completion or maintenance of site works.

1.1.59 **TENDER/TENDER DOCUMENT/ BIDDING DOCUMENT** means the entire set of documents vide which Employer invite bids for Projects/ Works/ Facilities that are submitted within a finite deadline by the Bidder.

1.1.60 **TIME FOR COMPLETION** means the time within which Completion of the Facilities is to be attained in accordance with the specifications, as a whole (or of a part of the Facilities where a separate Time for Completion of such part has been prescribed) as specified in the SCC of the tender document

1.1.61 **WEEK** means a period of any consecutive seven days.

1.1.62 **WORKING DAY** means any day which is not declared to be holiday or rest day by the Employer/ Owner.

[B] GENERAL INFORMATIONS

2. General Information

2.1.a Location of Site

The proposed location of Project site(s) is/ are defined in the Scope of work under Technical specifications & also defined under the Special conditions of contract (SCC).

2.1.b Access by Road

Contractor, if necessary, shall build other temporary access roads to the actual site of construction for his own work at his own cost. The Contractor shall be required to permit the use of the roads so constructed by him for vehicles of any other parties who may be engaged on the project site. The Contractor shall also facilitate the construction of any permanent roads should the construction

thereof starts while he is engaged on this work. He shall make allowance in his Tender for any inconvenience he anticipates on such account. Non-availability of access roads, railway siding and railway wagons for the use of the Contractor shall in no case condone any delay in the execution of work nor be the cause for any claim for compensation against the Employer/ Owner.

2.2 Scope of Work

The scope of work is defined in the Section - VII, Scope of Work and Technical Specifications (TS) of the Tender document. In addition, the Contractor shall provide all necessary materials, equipment, labour etc. for the execution and maintenance of the work till completion unless otherwise mentioned in the Tender Document.

2.3 Construction Water Supply

Contractor will have to make his own arrangements for supply of water to his labour camps and for works. The water quality should be suitable for use in civil construction work. All pumping installations, pipe network and distribution system will have to be carried out by the Contractor at his own risk and cost. Alternatively, the Employer/ Owner at his discretion may endeavor to provide water to the Contractor at the Employer's/ Owner's source of supply provided the Contractor makes his own arrangement for the water meter which shall be in custody of the Employer/ Owner and other pipe networks from source of supply, so as not to interfere with the layout and progress of the other construction works. In such case, a separate accounting shall be maintained for billing purpose on monthly basis. However, the Owner does not guarantee the supply of water and this does not relieve the Contractor of his responsibility in making his own arrangement and for the timely completion of the various works as stipulated.

2.4 Construction Power Supply

2.4.1 Contractor has to arrange for the construction power supply of their own. However, subject to availability, Employer/ Owner may provide access to the nearest available point in his location for supply power at only one point, from where the Contractor will make his own arrangement for temporary distribution through a temporary energy meter (sealed by Employer/ Owner). All the works will be done as per the applicable regulations with information to the Engineer-in-Charge/Project Manager. The temporary line will be removed forthwith after the completion of work or if there is any hindrance caused to the other works due to the alignment of these lines, the Contractor will re-route or remove the temporary lines at his own cost. The Contractor at his own cost will also provide suitable electric meters, fuses, switches, etc. for purposes of payment to the Employer/ Owner which should be in the custody and control of the Employer/ Owner. The cost of power supply shall be payable to the Employer/ Owner by the Contractor. The Employer/ Owner shall not, however, guarantee the supply of electricity nor have any liability in respect thereof. No claim for compensation for any failure or short supply of electricity will be admissible.

2.4.2 It shall be the responsibility of the Contractor to provide and maintain the complete installation on the load side of the supply with due regard to safety requirement at site. All cabling, equipment, installations etc. shall comply in all respects with the latest statutory requirements and safety provisions i.e., as per the Central/ State Electricity Acts and Rules etc. The Contractor will ensure that his equipment and Electrical Wiring etc., are installed, modified, maintained by a licensed Electrician/ Supervisor.

2.4.3 At all times, IEA regulations shall be followed failing which the Employer/ Owner has a right to disconnect the power supply without any reference to the Contractor. No claim shall be entertained for such disconnection. Power supply will be reconnected only after production of fresh certificate from authorized electrical supervisors.

2.4.4 The Employer/ Owner is not liable for any loss or damage to the Contractor's equipment as a result of variation in voltage or frequency or interruption in power supply or other loss to the Contractor arising therefrom.

2.4.5 The Contractor will have to provide and install his own lights and power meters which will be governed as per Central/ State /UT Government Electricity Rules.

2.4.6 In case of damage of any of the Employer's/ Owner's equipment on account of fault, intentional or unintentional on the part of the Contractor, the Employer/ Owner reserves the right to recover the cost of such damage from the Contractor's bill.

2.5 Land for Contractor's Field Office, Godown and Workshop

The Employer/ Owner will, at his own discretion and convenience and for the duration of the execution of the work make available near the site, land for construction of Contractor's Temporary Field Office, godowns, workshops and assembly yard required for the execution of the Contract. The Contractor shall at his own cost construct all these temporary buildings and provide suitable water supply and sanitary arrangement. On completion of the works undertaken by the Contractor, he shall remove all temporary works erected by him and have the Site cleaned as directed by Engineer-in-Charge/Project Manager. If the Contractor shall fail to comply with these requirements, the Employer/Owner may, at the expenses of the Contractor remove such surplus and rubbish materials and dispose off the same as he deems fit and get the site cleared as aforesaid; and Contractor shall forthwith pay the amount of all expenses so incurred and shall have no claim in respect of any such surplus materials disposed off as aforesaid. But the Employer/ Owner reserves the right to ask the Contractor any time during the pendency of the Contract to vacate the land by giving 07 (Seven) day notice on security reasons or on national interest or otherwise. The Contractor shall put up temporary structures as required by them for their office, fabrication shop and construction stores only in the area allocated to them on the project site by the Employer/ Owner or his authorized representative. No tea stalls/ canteens should be put up or allowed to be put up by any Contractor in the allotted land or complex area without written permission of the Employer/ Owner. No unauthorized buildings, constructions or structures should be put up by the Contractor anywhere on the project site. For uninterrupted fabrication work, the Contractor shall put up temporary covered structures at his cost within Area in the location allocated to them in the project site by the Employer/ Owner or his authorized representative. No person except for authorized watchman shall be allowed to stay in the plant area/ Contractor's area after completion of the day's job without prior written intimation to Engineer-in-Charge/Project Manager.

2.6 Land for Residential Accommodation

No Land shall be made available for residential accommodation for staff and labour of Contractor.

[C] ADDITIONAL GENERAL INSTRUCTIONS TO BIDDERS

3. Documents

3.1 Corrections and Erasures: All correction(s) and alteration(s) in the entries of Tender paper shall be signed in full by the bidder with date. No erasure or over writing is permissible.

3.2 Witness: Witness and sureties shall be persons of status and property and their names, occupation and address shall be stated below their signature.

3.3 Details of Experience: The bidder should furnish, along with his Tender, details of previous experience in having successfully completed in the recent past works of this nature, together with the names of Employers/ Owners, location of sites and value of Contract, date of commencement and completion of work, delays if any, reasons of delay and other details along with documentary evidence(s).

3.4 Liability of Government of India: It is expressly understood and agreed by and between bidder or/ Contractor and Employer/ Owner that, Employer/ Owner is entering into this agreement solely on its own behalf. In particular, it is expressly understood and agreed that the Government of India

has no liabilities, obligations or rights hereunder. It is expressly understood and agreed that Employer/ Owner is an independent legal entity with power and authority to enter into Contracts solely on its own behalf under the applicable Laws of India and general principles of Contract Law. It is further understood and agreed that the Government of India is not and shall not be liable for any acts, omissions, commissions, breaches or other wrongs arising out of the Contract. Accordingly, bidder/ Contractor hereby expressly waives, releases and foregoes any and all actions or claims, including cross claims, impleader claims or counter claims against the Government of India arising out of this Contract and covenants not to sue to Government of India as to any manner, claim, cause of action or thing whatsoever arising of or under this agreement.

4. Transfer of Tender Documents

4.1 Transfer of Tender Documents purchased by one intending bidder to another is not permissible.

5. Right of Employer/Owner to Accept or Reject Tender

5.1 The right to accept the Tender will rest with the Employer/ Owner. The Employer/ Owner, however, does not bind himself to accept the lowest Tender, and reserves to itself the authority to reject any or all the Tenders received without assigning any reason whatsoever. At the option of the Employer/ Owner, the work for which the Tender had been invited, may be awarded to one Contractor or split between more than one bidders, in which case the award will be made for only that part of the work, in respect of which the bid has been accepted. The quoted rates should hold good for such eventualities. Tenders in which any of the particulars and prescribed information are missing or are incomplete in any respect and/ or the prescribed conditions are not fulfilled are liable to be rejected. The Tender containing uncalled for remarks or any additional conditions are liable to be rejected. Canvassing in connection with Tenders is strictly prohibited and Tenders submitted by the Tenderers who resort to canvassing will be liable to rejection.

6. Time Schedule & Progress Reporting

6.1 The work shall be executed strictly as per the Time Schedule specified in Section - V, Special Conditions of Contract (SCC). The period of construction given in Time Schedule includes the time required for mobilization as well as testing, rectifications if any, retesting and completion in all respects to the entire satisfaction of the Engineer-in- Charge.

6.2 A joint program of execution of the work will be prepared by the Contractor based on priority requirement of this project & submitted to the Engineer in charge. This program will take into account the time of completion mentioned above and the time allowed for the priority works by the Engineer-in- Charge.

6.3 Monthly/ Weekly construction program will be drawn up by the Engineer-in- Charge jointly with the Contractor, based on availability of work fronts and the joint construction program as per above. The Contractor shall scrupulously adhere to these targets/ programs by deploying adequate personnel, construction tools and tackles and he shall also supply himself all materials of his scope of supply in good time to achieve the targets/ programs. In all matters concerning the extent of targets set out in the weekly and monthly programs and the degree of achievements the decision of the Engineer-in- Charge will be final and binding on the Contractor.

6.4 The Contractor shall monitor progress of all the activities specified in the work schedule referred in GCC above and submit the progress report to the Project Manager as per the Contract Co-ordination procedure.

6.6 If at any time the Contractor's actual progress falls behind the scheduled program, or it becomes apparent that it will so fall behind, the Contractor shall, at the request of the Employer or the Project Manager/ EIC, prepare and submit to the Project Manager/ EIC a revised program, taking into account the prevailing circumstances, and shall notify the Project Manager/ EIC, of the steps being

taken to expedite progress so as to attain Completion of the Facilities within the Time for Completion. If any extension thereof entitled under GCC Clause, or any extended period as may otherwise be agreed upon between the Employer and the Contractor, Contractor shall submit the revised plan for completion of Facility accordingly.

6.7 Maintenance of Records of Progress Review Meeting

The Contractor shall be required to attend all site progress review meetings organized by the 'Project Manager/ EIC' or his authorized representative. The deliberations in the meetings shall inter-alia include the program, progress of work (including details of manpower, material, tools and plants deployed by the Contractor vis-à-vis agreed schedule), inputs to be provided by Employer, delays, if any and recovery program, specific hindrances to work and work instructions by Employer. The minutes of the meetings shall be recorded with the 'Project Manager/ EIC' or his authorized representative.

7. Conflict of Interest and Bidder's Responsibility

7.1 A bidder shall not have a Conflict of Interest. All bidders found to have Conflict of Interest shall be disqualified. A bidder may be considered to have a Conflict of Interest with one or more parties in this bidding process, if:

(a) They have a controlling partner in common; or
(b) They receive or have received any direct or indirect subsidy from any of them; or
(c) They have the same legal representative for the purposes of this bid; or
(d) They have a relationship with each other, directly or through common third parties, that puts them in a position to have access to information about or influence on the bid of another bidder, or influence the decision of the Employer/ Owner regarding this bidding process; or
(e) A bidder submits more than one bid in this bidding process, either individually [including bid submitted as an agent/ authorized representative on behalf of one or more bidders or through license - licensor route, wherever permitted as per the provision of the Qualification Requirement for the bidders in the Annexure to Bid Data Sheet (BDS)] or as a partner in a Joint Venture/ Consortium, except for alternative offers permitted under Tender. This will result in the disqualification of all such bids; or
(f) A bidder or any of its Affiliates participated as a consultant in the preparation of the Design or Technical Specification or Detailed Project Report (DPR) of the Plant and Installation of services*/ goods and related services** that are the subject of the bid; or
(g) A bidder or any of its Affiliate has been hired (or is proposed to be hired) by the Employer/ Owner as a Project Manager for the Contract

Unquote:

* Applicable for Supply & Installation Contracts
** Applicable for Supply & Supply cum Supervision of Installation Contracts

7.2 The intending bidder shall be deemed to have visited the Site and familiarized himself before submitting the Tender. Non-familiarity with the site conditions will not be considered a reason either for extra claims or for not carrying out the works in strict conformity with the Drawings and Specifications or for any delay in performance.

8. Retired Government or Company Officers

8.1 No Engineer of Gazetted rank or other Gazetted Officer employed in Engineering or Administrative duties in an Engineering Department of the States/ UT/ Central Government or of the Employer/ Owner is allowed to work as a Contractor for a period of two years after his retirement from Government Service, or from the employment of the Employer/ Owner. The Contract, if awarded, is

liable to be cancelled if either the Contractor or any of his employees is found at any time to be such a person, who has not obtained the permission of the State/ Central Government before submission of Tender, or engagement in the Contractor's service as the case may be.

9. Representatives and Field Management & Controlling

9.1 Project Manager / Engineer- In –Charge (EIC):

If the Project Manager/ EIC is not named in the Contract, then within seven (7) days of the Effective Date, the Employer shall appoint and notify the Contractor in writing of the name of the Project Manager/ EIC. The Employer may from time to time appoint some other person as the Project Manager/ EIC in place of the person previously so appointed and shall give a notice of the name of such other person to the Contractor without delay. The Employer shall take reasonable care, unless unavoidable to see that no such appointment is made at such a time or in such a manner as to impede the progress of work on the Facilities. The Project Manager/EIC shall represent and act for the Employer at all times during the currency of the Contract.

All notices, instructions, information and other communications given by the Contractor to the Employer under the Contract shall be given to the Project Manager/ EIC, except as herein otherwise provided.

9.2 Contractor's Representative & Construction Manager

If the Contractor's Representative is not named in the Contract, then within seven (07) days of the Effective Date, the Contractor shall appoint the Contractor's Representative and shall request the Employer in writing. If the Employer objects to the appointment within seven (07) days giving the reason therefor, then the Contractor shall appoint a replacement within seven (07) days of such objection, and the foregoing provisions of this GCC clause shall apply thereto.

9.3 The Contractor's Representative shall represent and act for the Contractor at all times during the tenure of the Contract and shall give to the Project Manager/ EIC all the Contractor's notices, instructions, information and all other communications under the Contract.

9.4 All notices, instructions, information and all other communications given by the Owner/ Employer or the Project Manager/ EIC to the Contractor under the Contract shall be given to the Contractor's Representative or, in its absence, its deputy, except as herein otherwise provided.

9.5 The Contractor shall not revoke the appointment of the Contractor's Representative without the Employer consent, which shall not be unreasonably withheld. If the Employer consents thereto, the Contractor shall appoint some other person as the Contractor's Representative, pursuant to the procedure set out in GCC Clauses.

9.6 The Contractor's Representative may, subject to the approval of the Employer (which shall not be unreasonably withheld), at any time delegate to any person any of the powers, functions and authorities vested in him or her. Any such delegation may be revoked at any time. Any such delegation or revocation shall be subject to a prior notice and shall specify the powers, functions and authorities thereby delegated or revoked. No such delegation or revocation shall take effect unless and until a copy thereof has been delivered to the Project Manager/EIC.

9.7 Any act or exercise by any person of powers, functions and authorities so delegated to him or her in accordance with this GCC Clause shall be deemed to be an act or exercise by the Contractor's Representative.

9.8 Notwithstanding anything stated in GCC Clause above, for the purpose of execution of contract, the Employer and the Contractor shall finalize and agree to a Contract Co-ordination Procedure and all

the communication under the Contract shall be in accordance with such Contract Co-ordination Procedure.

9.9 From the commencement of installation of the Facilities at the Site until Final Acceptance, the Contractor's Representative shall appoint a suitable person as the construction manager (hereinafter referred to as "the Construction Manager"). The Construction Manager shall supervise all work done at the Site by the Contractor and shall be present at the Site throughout normal working hours except when on leave, sick or absent for reasons connected with the proper Performance of the Contract. Whenever the Construction Manager is absent from the Site, a suitable person shall be appointed to act as his or her deputy.

9.10 The Employer may object to any Contractor's representative or person employed by the Contractor in the execution of the Contract who, in the reasonable opinion of the Employer, may behave inappropriately, may be in- competent or negligent, or may commit a serious breach of the Site regulations and safety.

9.11 If any representative or person employed by the Contractor is removed in accordance with GCC Clause above, the Contractor shall, where required, promptly appoint a replacement. The Engineer-in-Charge/Project Manager may also authorize his representatives to assist in performing his duties and functions.

9.13 **Hindrance Register**

The Contractor may also maintain a Hindrance Register where reasons along with documentary evidence for delay/ fault may be recorded from time to time and at the time of occurrence of the hindrance and get it duly certified by the Project Manager or his authorized representative.

10. Note to Schedule of Rates

10.1 The Schedule of Rates should be read in conjunction with Section - VIII of the Tender documents.

10.2 The bidder shall be deemed to have studied the Drawings (if any), Specifications and details of work to be done within Time Schedule and to have acquainted himself of the condition prevailing at site.

10.3 Rates must be filled in the Schedule of Rates of original Tender Documents. If quoted in separate typed sheets no variation in item description or specification shall be accepted.

11. Policy for Tenders under Consideration

11.1 Only Those Tenders which are complete in all respects and are strictly in accordance with the Terms and Conditions and Technical Specifications of Tender Document, shall be considered for evaluation. Such Tenders shall be deemed to be under consideration immediately after opening of Tender and until such time an official intimation of acceptance/ rejection of Tender is made by Employer to the Bidder.

11.2 Zero Deviation: Bidders to note that this is a Zero Deviation Tender. Employer will appreciate submission of bids based on the terms and conditions in the enclosed General Conditions of Contract (GCC), Special Conditions of Contract (SCC), Instructions to Bidders (ITB), Scope of Work, technical specifications etc. to avoid wastage of time and money in seeking clarifications on technical/ commercial aspects of the bids. Bidder may note that no technical and commercial clarifications will be sought for after the receipt of the bids. In case of any deviation/ nonconformity observed in the bid, it will be liable for rejection.

12. Clarification of Tender Document

12.1 Verbal clarification and information given by Employer or its representatives shall not in any way be binding on Employer.

13. Local Conditions

13.1 The site is being offered to the bidders for Project on "**as is where is**" basis assuming that bidders have acquainted themselves appropriately with all the local site conditions & no plea will be entertained before/after the award of contract on this ground. It will be imperative on each bidder to acquaint himself of all local site conditions and factors which may have any effect on the execution of work covered under the Tender Document. In their own interest, the bidder(s) is/ are requested to familiarize themselves with the Indian Income Tax Act 1961, Indian Companies Act 1956, and Indian Customs Act 1962, GST Act and other related Acts and Laws and Regulations of India with their latest amendments, as applicable. Employer shall not entertain any requests for clarifications from the bidder regarding such local conditions.

13.2 It must be understood and agreed that such factors have properly been investigated and considered while submitting the Tender. Any claim for financial or Forex or any other adjustments to Value of Contract, on lack of clarity of such factors shall not be entertained.

14. Extension of Time for Commissioning

14.1 The time for Project commissioning as specified in the SCC is firm & final binding till the final commissioning of the Plant facilities. The Time(s) for Commissioning specified in the SCC shall be extended if the Contractor is delayed or impeded in the Performance of any of its obligations under the Contract due to delay in fulfilment of obligations by the Owner or by the reason of any of occurrence of Force Majeure as provided in the Tender for Force Majeure.

14.2 The Contractor shall at all times use its reasonable efforts to minimize any delay in the Performance of its obligations under the Contract.

[D] GENERAL OBLIGATIONS

15.1 Priority of Contract Documents

Several documents forming the Contract are to be taken as mutually explanatory of one another, but in case of ambiguities or discrepancies the same shall be explained and adjusted by the Engineer-in-Charge/Project Manager who shall thereupon issue to the Contractor instructions thereon and in such event, unless otherwise provided in the Contract, the priority of the documents forming the Contract shall be as follows:

a) Contract Agreement and the appendices, along with the amendments, if any thereto
b) Notification of award (NoA)/Letter of Intent (LOI) /Letter of Award (LOA)/Notice to proceed (NTP)
c) Special Conditions of Contract
d) General Conditions of Contract
e) BDS & ITB
f) Special Technical Conditions on Technical Specifications
g) Technical Specifications and Drawings
h) Price Schedules submitted by the Contractor
i) Other completed Bidding forms submitted with the Bid
j) Any other documents forming part of the Employer's Requirements

In the event of any ambiguity or conflict between the Contract Documents listed above, the order of precedence shall be the order in which the Contract Documents are listed above. For eg. Contract agreement have precedence over NOA.

15.2 Headings and Marginal Notes

All headings and marginal notes to the clauses of these General Conditions of Contract or to the Specifications or to any other Tender Document are solely for the purpose of giving a concise indication and not a summary of the contents thereof, and they shall never be deemed to be part thereof or be used in the interpretation or construction thereof the Contract.

15.3 Singular and Plural

In Contract Documents unless otherwise stated specifically, the singular shall include the plural and vice versa wherever the context so requires.

15.4 Interpretation

Words implying 'Persons' shall include relevant Corporate Companies/ Registered Associations/ Body of Individuals/ Firm of Partnership' as the case may be.

16 Special Conditions of Contract (SCC)

16.1 Special Conditions of Contract shall be read in conjunction with the General Conditions of Contract, Specification of Work, Drawings and any other documents forming part of this Contract wherever the context so requires.

16.2 Notwithstanding the sub-division of the documents into these separate sections and volumes every part of each shall be deemed to be supplementary to and complementary of every other part and shall be read with and into the Contract so far as it may be practicable to do so.

16.3 Where any portion of the General Condition of Contract is repugnant to or at variance with any provisions of the Special Conditions of Contract, unless a different intention appears the provisions of the Special Conditions of Contract shall be deemed to over-ride the provisions of the General Conditions of Contract and shall to the extent of such repugnancy, or variations, prevail.

16.4 Wherever it is mentioned in the specifications that the Contractor shall perform certain Work or provide certain facilities, it is understood that the Contractor shall do so at his cost and the Value of Contract shall be deemed to have included cost of such performance and provisions, so mentioned.

16.5 The materials, design and workmanship shall satisfy the relevant Indian Standards, the Job Specifications contained herein and Codes referred to. Where the job specification stipulate requirements in addition to those contained in the standard codes and specifications, these additional requirements shall also be satisfied.

17 Contractor to obtain his own Information

17.1 The Contractor in fixing his cost shall for all purpose whatsoever reason may be, deemed to have himself independently obtained all necessary information for the purpose of preparing his tender and his tender as accepted shall be deemed to have taken into account all contingencies as may arise due to such information or lack of same. The correctness of the details, given in the Tender Document to help the Contractor to make up the tender is not guaranteed. The Contractor shall be deemed to have examined the Contract Documents, to have generally obtained his own information in all matters whatsoever that might affect the carrying out of the works at the scheduled rates and to have satisfied himself to the sufficiency of his offer.

Any error in description of quantity or omission therefrom shall not vitiate the Contract or release the Contractor from executing the work comprised in the Contract according to Drawings and Specifications at the scheduled rates. He is deemed to have known the scope, nature and magnitude

of the Works and the requirements of materials and labour involved etc., and as to what all works he has to complete in accordance with the Contract documents whatever be the defects, omissions or errors that may be found in the Documents. The Contractor shall be deemed to have visited surroundings, to have satisfied himself to the nature of all existing structures, if any, and also as to the nature and the conditions of the Railways, Roads, Bridges and Culverts, means of transport and communication, whether by land, water or air, and as to possible interruptions thereto and the access and egress from the site, to have made enquiries, examined and satisfied himself as to the sites for obtaining sand, stones, bricks and other materials, the sites for disposal of surplus materials, the available accommodation as to whatever required, depots and such other buildings as may be necessary for executing and completing the works, to have made local independent enquiries as to the sub-soil, subsoil water and variations thereof, storms, prevailing winds, climatic conditions and all other similar matters effecting these works.

He is deemed to have acquainted himself as to his liability of payment of Government Taxes, duties and other charges, levies etc. Any neglect or omission or failure on the part of the Contractor in obtaining necessary and reliable information upon the foregoing or any other matters affecting the Contract shall not relieve him from any risks or liabilities or the entire responsibility from completion of the works at the scheduled rates and times in strict accordance with the Contract. It is, therefore, expected that should the Contractor have any doubt as to the meaning of any portion of the tender Document he shall set forth the particulars thereof in writing to Employer before bid submission.

The Employer may provide such clarification as may be necessary in writing to Contract, such clarifications as provided by Employer shall form part of tender Documents. No verbal agreement or inference from conversation with any effect or employee of the Employer either before, during or after the execution of the Contract Agreement shall in any way affect or modify and of the terms or obligations herein contained. Any change in layout due to site conditions or technological requirement shall be binding on the Contractor and no extra claim on this account shall be entertained.

18 Time of Performance

18.1 Time for Mobilization

The work covered by this Tender shall be commenced immediately upon issuance of the NOA/ LOI/LOA/NTP (whichever is later) and be completed on or before the dates as mentioned in the Time Schedule of Completion of Work under Section - V, Special Conditions of Contract (SCC). The Contractor should bear in mind that time is the essence of this contract agreement. Request for revision of construction time after tenders are submitted will not receive any consideration. The mobilization period is included within the overall Completion Schedule, not over and above the completion time to any additional work or any other reasons.

18.2 Time Schedule of Construction

18.2.1 The general time schedule of construction is given in the Section - V, Special Conditions of Contract (SCC) of the Tender Documents. Contractor should prepare a detailed monthly or weekly construction program. The Work shall be executed strictly as per the Time Schedule given in the Tender Documents. The period of construction given includes the time required for mobilization testing, rectifications, if any, retesting and completion in all respects in accordance with Contract Document.

18.2.2 The Contractor shall submit a detailed Bar chart in MS Projects consisting of adequate number of activities covering various key phases of the Work such as Design, Procurement, Manufacturing, Shipment and Field Erection activities. This network shall also indicate the intermediate milestones and interface facilities to be provided by the Employer, if any and the dates by which such facilities are needed.

19. Force Majeure

19.1 A 'Force Majeure' means any event or circumstance or combination of events those stated below that wholly or partly prevents or unavoidably delays an Affected Party in the performance of its obligations under this Agreement, but only if and to the extent that such events or circumstances are not within the reasonable control, directly or indirectly, of the Affected Party and could not have been avoided if the Affected Party had taken reasonable care or complied with Prudent Utility Practices:

- Act of God, including, but not limited to lightning, fire not caused by Contractors' negligence and explosion (to the extent originating from a source external to the site), earthquake (above 7.0 magnitude on Richter Scale), volcanic eruption, landslide, unprecedented flood, cyclone, typhoon or tornado;

- Any act of war (whether declared or undeclared), invasion, armed conflict or act of foreign enemy, blockade, embargo, revolution, riot, insurrection, terrorist or military action, quarantine;

- Radioactive contamination or ionizing radiation originating from a source in India or resulting from another Force Majeure Event mentioned above.

19.2 Force Majeure Exclusions

Force Majeure shall not include (i) any event or circumstance which is within the reasonable control of the Parties and (ii) the following conditions, except to the extent that they are consequences of an event of Force Majeure:

- Unavailability, late delivery, or changes in cost of the plant, machinery, equipment, materials, spare parts or consumables for the Power Project;
- Delay in the performance of any Contractor, sub-Contractor or their agents;
- Non-performance resulting from normal wear and tear typically experienced in power generation materials and equipment;
- Strikes at the facilities of the Contractor / Affected Party;
- Insufficiency of finances or funds or the agreement becoming onerous to perform; and
- Non-performance caused by, or connected with, the Affected Party's:
  - Negligent or intentional acts, errors or omissions;
  - Failure to comply with an Indian Law; or
  - Breach of, or default under this Contract Agreement.
- Normal rainy seasons and monsoon
- Any Transport strikes not directly affecting the delivery of goods from manufacturer to site

19.3 In the event of either party being rendered unable by Force Majeure to perform any obligation required to be performed by them under this Contract, relative obligation of the party affected by such Force Majeure shall be treated as suspended during the period which the Force Majeure clause last.

19.4 Upon occurrence of such causes, the party alleging that it has been rendered unable as aforesaid, thereby, shall notify the other party in writing by registered notice within 48 (forty eight) hours of the alleged beginning thereof giving full particulars and satisfactory evidence in support of its claim. Further, within 7 (seven) days, the Contractor will furnish a detailed Contingency Plan to overcome the effects of the incident and bring the project on its schedule after cessation of the effect of Force Majeure.

19.5 The Affected Party shall give notice to the other Party of (i) the cessation of the relevant event of Force Majeure; and (ii) the cessation of the effects of such event of Force Majeure on the performance of its rights or obligations under this Agreement, as soon as practicable after becoming aware of each of these cessations.

19.6 Time for Performance of the relative obligation suspended by the force majeure shall stand extended by the period for which such Force Majeure clause lasts.

19.7 If works are suspended by Force Majeure conditions lasting for more than two months, the Employer/Owner shall have the option of cancelling this Contract in whole or part thereof, at its discretion.

19.8 The Contractor will not be entitled to claim any compensation for Force Majeure conditions and shall take appropriate steps to insure its men and materials utilized by it under the Contract.

20. Liquidated Damages (LD)

20.1 Subject to Force Majeure Clause, if the Contractor fails to comply with the Time for Completion /successful commissioning of Plant facilities in accordance with SCC Clause then the Contractor shall pay to the Owner a sum equivalent to half percent (0.5%) per week of the Contract Price for the whole of the facilities as liquidated damages for such default and not as a penalty, without prejudice to the Owner's other remedies under the Contract subject to the maximum limit of five percent (05%) of Contract Price for the whole of the facilities. The Owner may, without prejudice to any other method of recovery, deduct the amount of such damages from any amount due or to become due to the Contractor. The payment or deduction of such damages shall not relieve the Contractor from his obligation to complete the Works, or from any other of his obligations and liabilities under the Contract. Once the maximum limit is reached, Owner may consider the termination of contract and/or shall have the discretion of getting executed the work from the Contractor with the maximum limit of Liquidated damages. Any such recovery on account of the Liquidated damages can be done from the running bills of the Contractor by Owner.

20.2 The Owner shall at its sole discretion upon reaching the maximum LD limit , as an alternative to the Liquidated Damages at its option, get work executed from elsewhere at the risk and cost of the Contractor irrespective of the fact whether the scope of Contract is identical to the original scope of Contract and in case the Owner chooses the alternative course as mentioned, it will be entitled to recover compensation/ damages from the Contractor irrespective of maximum limit prescribed under Clause 20.1.

20.3 The Owner may by giving (01) one-month notice to the Contractor cancel the Contract without prejudice to the Owner's right under Clauses 20.1 and 20.2 or any other provisions contained in the Contract to determine the Contract and claim damages from the Contractor.

21. Rights of the Owner to forfeit Contract Performance Security

21.1 Whenever any claim against the Contractor for the payment of a sum of money arises out of or under the Contract, the Contractor shall pay to the Owner on demand any balance remaining due.to the Owner & Owner shall be entitled to recover such sum by appropriating in part or whole from the Contract Performance Security of the Contractor. In the event of the security being insufficient or if no security has been taken from the Contractor, then the balance or the total sum recoverable, as the case may be shall be deducted from any sum then due or which at any time thereafter may become due to the Contractor.

22. Failure by the Contractor to comply with the provisions of the Contract

22.1 If the Contractor refuses or fails to execute the Work or any separate part thereof with such diligence as will ensure its completion within the time specified in the Contract/O&M Contract or extension thereof or fails to perform any of his obligation under the Contract/O&M Contract or in any manner

commits a breach of any of the provisions of the Contract/O&M Contract it shall be open to the Employer/ Owner at its option by written notice to the Contractor:

a) To determine the event in which the Contract/O&M Contract shall stand terminated and shall cease to be in force and effect on and from the date appointed by the Owner on that behalf, whereupon the Contractor shall stop forthwith any of the Contractor's work then in progress, except such work as the Owner may, in writing, require to be done to safeguard any property or work, or installations from damage, and the Owner, for its part, may take over the work remaining unfinished by the Contractor and complete the same through a fresh Contractor or by other means, at the risk and cost of the Contractor, and any of his sureties if any, shall be liable to the Owner for any excess cost occasioned by such work having to be so taken over and completed by the Owner over and above the cost as specified in the schedule of rates.

b) The Contractor and any of his sureties are liable to the Owner for any excess cost over and above the cost at the rates specified in the Schedule of Rates, occasioned by such works having been taken over and completed by the Owner.

22.2 In such events of Clause 22.1(a) or (b) above.

a) The whole or part of the Contract Performance Security furnished by the Contractor is liable to be forfeited without prejudice to the right of the Owner to recover from the Contractor the excess cost referred to in the Clause aforesaid, the Owner shall also have the right of taking possession and utilizing in completing the works or any part thereof, such as materials, equipment and plants available at work site belonging to the Contractor as may be necessary and the Contractor shall not be entitled for any compensation for use or damage to such materials, equipment and plant.

b) The amount that may have become due to the Contractor on account of work already executed by him shall not be payable to him until after the expiry of 06 (Six) calendar months (Without Interest) reckoned from the date of termination of Contract or from the taking over of the Work or part thereof by the Owner as the case may be, during which period the responsibility for faulty materials or workmanship in respect of such work shall, under the Contract, rest exclusively with the Contractor. This amount shall be subject to deduction of any amounts due from the Contract to the Owner under the terms of the Contract authorized or required to be reserved or retained by the Owner.

22.3 Before determining the Contract as per Clause 22.1(a) or (b) provided in the judgement of the Owner, the default or defaults committed by the Contractor is/ are curable and can be cured by the Contractor if an opportunity given to him, then the Owner may issue Notice in writing calling the Contractor to cure the default within such time specified in the Notice.

22.4 The Owner shall also have the right to proceed or take action as per 22.1(a) or (b) above, in the event that the Contractor becomes bankrupt, insolvent, compounds with his creditors, assigns the Contract in favor of his creditors or any other person or persons, or being a company or a corporation goes into voluntary liquidation, provided that in the said events it shall not be necessary for the Owner to give any prior notice to the Contractor.

23. Contractor remains liable to pay compensation if

23.1 In any case in which any of the powers conferred upon the Owner by Clause 22.0 thereof shall have become action not taken under clause 22 exercisable and the same had not been exercised, the non-exercise thereof shall not constitute a waiver of any of the conditions hereof and such powers shall notwithstanding be exercisable in the event of any further case of default by the Contractor for which by any clause or clauses hereof he is declared liable to pay compensation amounting to the whole of his Contract Performance Security, and the liability of the Contractor for past and future compensation shall remain unaffected.

24. Contract Performance Security

Against the EPC/ LSTK Contract and Operation & maintenance contract of the project, within 30 (Thirty) days from the issuance of the Notification of Award/ Letter of Intent/Letter of Award (LOA) from Owner, the successful bidder shall furnish an unconditional and irrevocable Contract Performance Security in accordance with Special Conditions of the Contract. The Contract Performance Security shall be in the form of either Banker's Cheque or Demand Draft or Bank Guarantee and shall be in the currency of the Contract and will be issued in the name of the Owner as specified in the BDS/SCC. The Contract Performance Security shall be for an amount equal to specified in Special Conditions of Contract (SCC) towards faithful performance of the contractual obligations, performance of equipment and shall cover entire Contract. The validity of Contract Performance Security shall be in conjunction with the provisions mentioned under Section - V, Special Conditions of Contract (SCC).

Bank Guarantee towards Contract Performance Security shall be from any scheduled bank as specified in the List of Banks enclosed at Form F-22, Section - VI, Sample Forms and Formats of Tender documents or a branch of an International Bank situated in India and registered with Reserve Bank of India as scheduled foreign bank in case of Indian bidder. However, in case of Bank Guarantees from Banks other than the Nationalized Indian banks, the Bank must be a commercial Bank having net worth in excess of INR 500 Crores and a declaration to this effect should be made by such commercial bank either in the Bank Guarantee itself or separately on its letterhead. This Bank Guarantee shall be valid for a period in conjunction with the provisions mentioned under Section - V, Special Conditions of Contract (SCC).

The Contract Performance Security may also be submitted in the form of 'crossed payee accounts only' Demand Draft/ Banker's Cheque in favor of as mentioned in the BDS/SCC**.**

In case of default or failure of the successful bidder to comply with the requirements of this article shall constitute sufficient grounds for the cancellation of the award and forfeiture of the EMD.

In case of default or failure of the Contractor to comply with the requirements of any of the Obligations covered under this Tender Document and/ or Contract Agreement shall constitute sufficient grounds for forfeiture of the Contract Performance Security.

The Contract Performance Security has to cover the entire contract value including extra works/ services also. As long as the Contract Performance Security submitted at the time of award takes care of the extra works/ services executed and total executed value are within the awarded contract price, there is no need for additional Contract Performance Security. As soon as the total executed value exceeds the ceiling of awarded contract price by more than 0.5%, the Contractor shall furnish additional Contract Performance Security on proportionate basis of the percentage as defined in the Special Conditions of Contract (SCC) for the additional amount in excess to the original contract value.

Further, any delay beyond 30 (Thirty) days shall attract interest @ 1.25% per month on the total Contract Performance Security amount, calculated on pro-rata basis accordingly. Owner at its sole discretion may cancel the NOA/ LOI/LOA & forfeit 100% of EMD, in case Contract Performance Security is not submitted within 45 (Forty-five) days from issuance of NOA/ LOI/LOA. However, total project completion period shall remain same. Part Security shall not be accepted. The Zero Date shall be counted from the date of LOA or NTP whichever is later.

If the Contractor/ Sub-Contractor or their employees or the Contractor's agents and representatives shall damage, break, deface or destroy any property belonging to the Employer or others during the

execution of the Contract, the same shall be made good by the Contractor at his own expenses and in default thereof, the Engineer-in-Charge may cause the same to be made good by other agencies and recover expenses from the Contractor (for which the certificate of the Engineer-in-Charge shall be final).

All compensation or other sums of money payable by the Contractor to the Owner under terms of this Contract may be deducted from or paid by the encashment of a sufficient part of his Contract Performance Security or from any sums which may be due or may become due to the Contractor by the Owner of any account whatsoever and in the event of his Contract Performance Security being reduced by reasons of any such deductions or sale of aforesaid, the Contractor shall within 10 (Ten) days thereafter make good in cash, bank drafts as aforesaid any sum or sums which may have been deducted from or realized by encashment of his Contract Performance Security, or any part thereof. No interest shall be payable by the Owner for sum deposited as Contract Performance Security.

25. Termination of contract

25.1 **Termination of Contract in Case of Liquidation/ Bankruptcy etc**.

If the Contractor dissolves his company or becomes bankrupt or insolvent or cause or suffer any receiver to be appointed of his business of any assets thereof compounded with his Creditors, or being a corporation commence to be wound up, not being a member's voluntary winding up for the purpose of amalgamation or reconstruction, or carry on its business under a Receiver for the benefits of its Creditors , Owner shall be at liberty :- To terminate the contract forthwith upon coming to know of the happening of any such event as aforesaid by notice in writing to the Contractor or to give the Receiver or liquidator or other person, the option of carrying out the contract subject to his providing a guarantee up to an amount to be agreed upon by Owner for due and faithful performance of the contract.

25.2 **Termination of Contract for Non-Performance and Subsequently Putting the Contractor on Banning List:**

In case of termination of Contract herein set forth (under clause 22.0) except under conditions of Force Majeure and termination after expiry of contract, the Contractor shall be put under Banning List [i.e. neither any enquiry will be issued to the party by Employer/ Owner against any type of tender nor their offer will be considered by Employer/ Owner against any ongoing tender(s) where contract between Employer/ Owner and that particular Contractor (as a bidder) has not been finalized] for a period as decided by the Employer/ Owner to such Contractor**.**

25.3 **Termination for Convenience**

25.3.1 The Owner may, by written notice sent to the Contractor, terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for the Owner's convenience, the extent to which performance of work under the Contract is terminated, and the date upon which such termination becomes effective.

25.3.2 The Owner shall only pay for the following:

a) Goods that are complete and ready for shipment (based on monthly progress report from the Contractor) within thirty (30) days after the date of notice of termination, shall be purchased by the Owner at the Contract terms and prices.

b) Goods that are in-transit or delivered at site as on the date of delivery of termination notice to Contractor

c) Services that have been rendered at site until the date of delivery of termination notice to Contractor

d) It is clarified that payment under point no. a) and b) shall be made only after receipt of goods at site.

26. Members of the Employer/ Owner not individually Liable

26.1 No Director, or official or employee of the Employer/ Owner shall in any way be personally bound or liable for the acts or obligations under the Contract or answerable for any default or omission in the observance or performance of any of the acts, matters or things which are herein contained.

27. Employer/Owner not bound by Personal Representations

27.1 The Contractor shall not be entitled to any increase on the price or any other right or claim whatsoever by reason of any representation, explanation statement or alleged representation, promise or guarantees given or alleged to have been given to him by any person.

28. Contractor's office at Site

28.1 The Contractor shall provide and maintain an office at the site for the accommodation of his agent and staff (With meeting room) and such office shall be open at all reasonable hours to receive instructions, notice or other communications.

29. Contractor's Subordinate Staff and their Conduct

29.1 The Contractor, on or after award of the Work shall name and depute a qualified Engineer having sufficient experience in carrying out work of similar nature, to whom the equipment, materials, if any, shall be issued and instructions for works given. The Contractor shall also provide sufficient and qualified staff to superintend the execution of the Work, competent sub-agents, foremen and leading hands including those specially qualified by previous experience to supervise the types of works contained in the Contract in such manner as will ensure work of the best quality, expeditious working. Whenever in the opinion of the Engineer-in-Charge/Project Manager additional properly qualified supervisory staff is considered necessary, they shall be employed by the Contractor without additional charge on accounts thereof. The Contractor shall ensure that Sub-Contractors, if any, shall provide competent and efficient supervision, over the work entrusted to them.

29.2 If and whenever any of the Contractor's or Sub-Contractor's agents, sub-agents, assistants, foremen, or other employees be guilty of any misconduct or be incompetent or insufficiently qualified or negligent in the performance of their duties, it is undesirable for administrative or any other reason for such person or persons to be employed in the works, the Contractor, shall at once remove such person or persons from employment thereon. Any person or persons so removed from the works shall not again be employed in connection with the Works. Any person so removed from the Work shall be immediately replaced at the expense of the Contractor by a qualified and competent substitute. Should the Contractor be requested to repatriate any person removed from the works he shall do so and shall bear all costs in connection herewith.

29.3 The Contractor shall be responsible for the proper behavior of all the staff, foremen, workmen, and others, and shall exercise a proper degree of control over them and in particular and without prejudice to the said generality, the Contractor shall be bound to prohibit and prevent any employees from trespassing or acting in any way detrimental or prejudicial to the interest of the community or of the properties or occupiers of land and properties in the neighborhood and in the event of such employee so trespassing, the Contractor shall be responsible therefore and relieve the Owner of all consequent claims or actions for damages or injury or any other grounds whatsoever. The Contractor shall be liable for any liability to Owner on account of deployment of Contractor's staff etc. or incidental or arising out of the execution of Contract. The Contractor shall be liable for all acts or omissions on the part of his staff, Foremen and Workmen and others in his employment, including

misfeasance or negligence of whatever kind in the course of their work or during their employment, which are connected directly or indirectly with the Contract.

29.4 If and when required by the Owner and Contractor's personnel entering upon the Owner's premises shall be properly identified by badges or gate passes which must be worn at all times on Owner's premises. Contractor may be required to obtain daily entry passes for his Staff/ Employees to work within operating areas. These being safety requirements, no relaxations on this account shall be given to Contractor.

29.5 Contractor shall at all times provide Employer/ SECI access to site and office during construction/ O&M periods and also provide them with any data/ information sought for.

30. Sub-letting of Works

30.1 Sub-contracting other than for labour contract/engagement of labour, shall be permitted with the information to the Employer. However, sub-contracting for 100% of the contract on back to back basis shall not be permitted. Any part of the Contract nor any share or interest therein shall in any manner or degree be transferred, assigned or sublet by the Contractor directly or indirectly to any person, firm or corporation whatsoever without the consent in writing, of the Employer except as provided for in the succeeding Clause.

i) **Sub-Contracts for Temporary Works etc**.

The Employer may give written consent to Sub-Contract for the execution of any part of the Work at the site, being entered in to by Contractor provided each individual Sub-contract is informed to the Engineer-in-Charge/Project Manager.

ii) **List of Sub-Contractors to be supplied**

The Contractor shall furnish to the Engineer-in-Charge/Project Manager list of all Sub-Contractors or other persons or firms engaged by the Contractor and working at the Site during the previous month with particulars of the general nature of the Subcontract or works done by them.

iii) **Contractor's Liability not Limited by Sub-Contractors**

Notwithstanding any sub-letting with such approval as aforesaid and notwithstanding that the Engineer-in-Charge/Project Manager shall have received copies of any Subcontracts, the Contractor shall be and shall remain solely responsible for the quality, proper and expeditious execution of the Contract in all respects as if such sub-letting or Subcontracting had not taken place, and as if such work had been done directly by the Contractor. The Contractor shall bear all responsibility for any act or omission on the part of sub-Contractors in regard to work to be performed under the Contract.

iv) **No Remedy for Action Taken under this Clause**

No action taken by the Owner under the clause shall relieve the Contractor of any of his liabilities under the Contract or give rise to any right or compensation, extension of time or otherwise failing which the Owner shall have the right to remove such Sub-Contractor(s) from the site.

vi) **Termination/ Cancellation of Contract**

Owner is nowhere liable for the communication, acts and deeds and performance of the sub-Contractor as engaged by the principal Contractor. Principal Contractor solely is responsible and liable for the entire execution of project and performance of contract.

Subject to poor performance and prolonged delay of the project on account of inefficient sub-letting of the project work, Owner may take a final decision to terminate the contract of the principal Contractor which will be binding and non-revertible and henceforth no plea in this regard shall be entertained.

vii) Subject to the provisions of the Contract, the Contractor shall be solely responsible for the manner in which the Contract is performed. All employees, representatives or Sub-Contractors engaged by the Contractor in connection with the Performance of the Contract shall be under the complete control of the Contractor and shall not be deemed to be employees of the Owner. Nothing contained in the Contract or in any subcontract awarded by the Contractor shall be construed to create any contractual relationship between any such employees, representatives or Sub-Contractors and the Owner.

viii) Under no circumstances the sub-Contractor shall claim or shall put any binding to the Owner and at all times the sub-Contractor must be managed by the Contractor. The Owner shall not be responsible for any claims at any time by the Contractor in relation to the sub-Contractor.

ix) No relaxation, forbearance, delay or indulgence by either party in enforcing any of the terms and conditions of the Contract or the granting of time by either party to the other shall prejudice, affect or restrict the rights of that party under the Contract, nor shall any waiver by either party of any breach of Contract operate as waiver of any subsequent or continuing breach of Contract.

x) Any waiver of a party's rights, powers or remedies under the Contract must be in writing, must be dated and signed by an authorized representative of the party granting such waiver, and must specify the right and the extent to which it is being waived.

xi) The Contractor shall be solely responsible for ensuring that his sub-Contractors fulfil and comply with the statutory requirements of Labour and other Laws.

31. Power of Entry

31.1 If the Contractor shall not commence the Work in the manner previously described in the Contract documents or if he shall at any time in the opinion of the Engineer-in-Charge/Project Manager:

i) fail to carry out the Work in conformity with the Contract documents, or
ii) fail to carry out the Work in accordance with the Time Schedule, or
iii) substantially suspend the Work for a period of minimum 14 (Fourteen) days without authority from the Engineer-in-Charge/Project Manager, or
iv) fail to supply sufficient or suitable construction plant, temporary works, labour, materials or things, or
v) Commit, suffer, or permit any other breach of any of the provisions of the Contract on his part to be performed or observed or persist in any of the above-mentioned breaches of the Contract for 14 (Fourteen) days, after notice in writing shall have been given to the Contractor by the Engineer-in-Charge/Project Manager requiring such breach to be remedied, or
vi) if the Contractor abandon the Work, or
vii) If the Contractor during the continuance of the Contract shall become bankrupt, make any arrangement or composition with his creditors or go into liquidation whether compulsory or voluntary not being merely a voluntary liquidation for the purpose of amalgamation or reconstruction

then in any such case, the Owner shall have the power to enter upon site and take possession thereof and of the materials, temporary Work, construction plant, and stock thereon, and to revoke the Contractor's license to use the same, and to complete the Work by his agents, other Contractors or workmen or to sublet the same upon any terms and to such other person, firm or corporation as the Owner in his absolute discretion may think proper to employ and for the purpose aforesaid to use or authorize the use of any materials, temporary work, Construction Plant, and stock as aforesaid, without making payment or allowance to the Contractor for the said materials other than

such as may be certified in writing by the Engineer-in-Charge/Project Manager to be reasonable, and without making any payment or allowance to the Contractor for the use of the temporary said works, construction plant and stock or being liable for any loss or damage thereto, and if the Owner shall by reason of his taking possession of the Work or of the Work being completed by other Contractor (due account being taken of any such extra work or works which may or be omitted) then the amount of such excess shall be deducted from any money which may be due for work done by the Contractor under the Contract and not paid for.

Any deficiency shall forthwith be made good and paid to the Owner by the Contractor and the Owner shall have power to sell in such manner and for such price as he may think fit all or any of the construction plant, materials etc. constructed by or belonging to Contractor and to recoup and retain the said deficiency or any part thereof out of proceeds of the sale.

32. Contractor's responsibility

32.1 Contractor’s responsibility

32.1.1 The Contractor shall grade/level the land identified for development of the mentioned Solar power Plant along with the design, procure, manufacture (including associated purchases and/or subcontracting), install, commission and complete the Facilities, carry out the Guarantee tests with due care and diligence in accordance with the Contract along with interconnecting transmission system including Right of Way for Transmission Line and the comprehensive O&M of the complete facilities for the period as defined under the tender document . It is Contractor’s responsibility to coordinate with state/central agencies in order to get any permission whatsoever, required for successful development & operation of Plant till its desired life.

32.1.2 The Contractor shall acquire, on behalf of Owner, in the Owner’s name, all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the Country/State where the Site is located that are necessary for the setting up of the Plant & operation of Plant till its desired life as mentioned under the Contract, including, but not limited to, entry permits for all imported Owner’s/Employer’s Equipment (if any). In this regard, any document required from Owner/ Employer shall be intimated at least 10 days prior to submission. Contractor has to ensure safe keeping of the documents and diligent use. It is the responsibility of the Contractor to safe keep and return all the original approvals, permits, licenses, certificates and other relevant document generated as a result of the setting up of project and comprehensive O&M process to the Owner.

32.1.3 In the matter of connectivity of Plant to DISCOM’s substation, the Owner will take the necessary connectivity permission, however, all the other permissions and clearances as deemed required by the State Agency/DISCOM for Bay allocation, technical/regulatory compliance for interconnection, ROW etc are to be taken by the Contractor. Statutory fees pertaining to such shall be reimbursed by the Owner on production of the documentary evidence/Demand note over and above the contract value. Further, Contractor shall also facilitate Owner in getting the required permissions/agreements as required for the energy accounting by State agencies/DISCOM.

32.1.4 The Contractor shall acquire in its name all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the country where the Site is located that are necessary for the Performance of the Contract, including, but not limited to, the right of way for the access to site and for erection of transmission lines as applicable, visas for the Contractor’s and Sub-Contractor’s personnel and entry permits for all imported Contractor’s Equipment. The Contractor shall acquire all other permits, approvals and/or licenses that are not the responsibility of the Owner and that are necessary for the Performance of the Contract.

32.1.5 Contractor shall also seek for any exemption applicable for the project as per the orders released from GOI time to time in appropriate Formats including all the required attachments. In this regard, Contractor shall be responsible to take all necessary certificates as a proof of exemptions on behalf of Owner. However, all the documents required from Owner, as needed for the process, will be

provided by Owner. The demand of such documents shall be made to the Owner in at least 10 days advance.

32.1.6 The Contractor shall comply with all laws in force at the place, where the Facilities are installed and where the Installation Services are carried out. The laws will include all national, provincial, municipal labour or other laws that affect the Performance of the Contract and binding upon the Contractor. The Contractor shall indemnify and hold harmless the Employer/Owner from and against any and all liabilities, damages, claims, fines, penalties and expenses of whatever nature arising or resulting from the violation of such laws by the Contractor or its personnel, including the SubContractors and their personnel.

32.1.7 Any plant, material, spares & spares inventory and services that will be incorporated in or be required for the facilities.

32.1.8 Unless otherwise specified in the Contract or agreed upon by the Owner and the Contractor, the Contractor shall provide/ deploy sufficient, properly qualified operating and maintenance personnel; shall supply and make available all raw materials, spares, tools and tackles and other materials and facilities; and shall perform all work and services of whatsoever nature, to properly carry out Pre-commissioning, Commissioning and Guarantee Tests, all in accordance with the provisions of "Scope of Works and Supply by the Owner/Employer" to the Contract Agreement at or before the time specified in the program furnished by the Contractor and in the manner thereupon specified or as otherwise agreed upon by the Owner/ Employer and the Contractor.

33. Other Agencies at Site

33.1 The Contractor shall have to execute the Work in such place and conditions where other agencies may also be engaged for other works such as site grading, filling, and levelling, electrical and mechanical engineering works, etc. No claim shall be entertained due to Work being executed in the above circumstances. The Contractor shall allow such agencies to use the facilities like roads, etc constructed by the Contractor in order that they are able to carry out their respective scope of works unhindered

34. Notice

34.1 To the Contractor

Any notice hereunder may be served on the Contractor or his duly authorized representative at the job site or may be served.

Any communication sent shall be confirmed within two (2) days after receipt. Any communication sent by facsimile or e-mail shall be deemed to have been delivered on date of its dispatch and personal delivery deemed to have been delivered on date of delivery. Either party may change its postal, facsimile or e-mail address or addresses for receipt of such notices by ten (10) days' notice to the other party in writing.

34.2 To the Employer/Owner

Any notice to be given to the Employer/Owner under the terms of the Contractor shall be served by sending the same by mail to or delivering the same at the offices of Employer/ Owner at the mentioned address in the Tender document.

35. Right of Various Interests

35.1 **i)** The Owner reserves the right to distribute the work between more than one agency(ies). The Contractor shall cooperate and afford other agency(ies) reasonable opportunity for access to the Work for the carriage and storage of materials and execution of their works.

ii) Wherever the work being done by any department of the Employer/ Owner or by other agency(ies) employed by the Employer/ Owner is contingent upon Work covered by this Contract, the respective rights of the various interests involved shall be determined jointly to secure the completion of the various portions of the work in general harmony.

36. Patents and Royalties

36.1 The copyright in all drawings, documents and other materials containing data and information furnished to the Owner/ Employer by the Contractor herein shall remain vested in the Contractor or, if they are furnished to the Owner/ Employer directly or through the Contractor by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party. The Owner/ Employer shall however be free to reproduce all drawings, documents, specification and other material furnished to the Owner/ Employer for the purpose of the contract including, if required, for operation and maintenance of the facilities.

The Contractor shall indemnify the Owner/ Employer against third party claims of infringement of patent, trademark or industrial design rights arising from use of goods or any part thereof in India.

The Contractor, if licensed under any patent covering equipment, machinery, materials or compositions of matter to be used or supplied or methods and process to be practiced or employed in the performance of this Contract, agrees to pay all royalties and license fees which may be due with respect thereto. If any equipment, machinery, materials, composition of matters, be used or supplied or methods and processes to be practiced or employed in the performance of this Contract, is covered by a patent under which the Contractor is not licensed then the Contractor before supplying or using the equipment, machinery materials, composition method or processes shall obtain such licenses and pay such royalties and license fees as may be necessary for performance of this Contract. In the event the Contractor fails to pay any such royalty or obtain any such license, any suit for infringement of such patents which is brought against the Contractor or the Employer/ Owner as a result such failure will be defended by the Contractor at his own expense and the Contractor will pay any damages and costs awarded in such suit. The Contractor shall promptly notify the Employer/ Owner if the Contractor has acquired the knowledge of any plant under which a suit for infringement could be reasonably brought because of the use by the Owner of any equipment, machinery, materials, process, methods to be supplied hereunder. The Contractor agrees to and does hereby grant to Employer/ Owner, together with the right to extend the same to any of the subsidiaries of the Employer/ Owner as irrevocable, royalty free license to use in any country, any invention made by the Contractor or his employee in or as result of the performance of the Work under the Contract.

36.2 All charges on account of royalty, toilage, rent or any other levy on materials obtained for the work or temporary work or part thereof (excluding materials provided by the Employer/ Owner, if any) shall be borne by the Contractor.

36.3 The Contractor shall not sell or otherwise dispose of or remove except for the purpose of this Contract, the sand, stone, clay, ballast, earth, rock or other substances, or materials obtained from any excavation made for the purpose of the Work or any building or produce upon the site at the time of delivery of the possession thereof, but all such substances, materials, buildings and produce shall be the property of the Owner provided that the Contractor use the same for the purpose of the work.

36.4 The copyright in all drawings, documents and other materials containing data and information furnished to the Employer/Owner by the Contractor herein shall remain vested in the Contractor or, if they are furnished to the Employer/Owner directly or through the Contractor by any third party,

including suppliers of materials, the copyright in such materials shall remain vested in such third party. The Employer/Owner shall however be free to reproduce all drawings, documents, specification and other material furnished to the Employer/Owner for the purpose of the contract including, if required, for operation and maintenance of the facilities.

36.5 The Employer/Owner and the Contractor shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Sub-Contractor(s) such documents, data and other information it receives from the Employer/Owner to the extent required for the Sub-Contractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Sub-Contractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this clause.

36.6 The Employer/Owner shall not use such documents, data and other information received from the Contractor for any purpose other than the operation and maintenance of the Facilities. Similarly, the Contractor shall not use such documents, data and other information received from the Employer/Owner for any purpose other than the design, procurement of Plant and Equipment, construction or such other work and services as are required for the Performance of the Contract.

- The obligation of a party under GCC Sub-Clauses 36.5 and 36.6 above, however, shall not apply to that information which
- Now or hereafter becomes available in the public domain through no fault of that party
- Can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party hereto.
- Otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.
- The above provisions of this Clause shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Facilities or any part thereof.
- The provisions of this clause shall survive termination, for whatever reason, of the Contract.

37. Liens

37.1 If, at any time there should be evidence or any lien or claim for which the Owner might have become liable and which is chargeable to the Contractor, the Owner shall have the right to retain out of any payment then due or thereafter to become due an amount sufficient to completely indemnify the Owner against such lien or claim and if such lien or claim be valid, the Owner may pay and discharge the same and deduct the amount so paid from any money which may be or may become due and payable to the Contractor. If any lien or claim remain unsettled after all payments are made, the Contractor shall refund or pay to the Owner all money that the latter may be compelled to pay in discharging such lien or claim including all costs and reasonable expenses. Owner reserves the right to do the same.

37.2 The Owner shall have lien on all materials, equipment including those brought by the Contractor for the purpose of erection, testing and commissioning of the Work.

37.3 The final payment shall not become due until the Contractor delivers the complete release or waiver of all liens arising or which may arise out of his agreement or receipt in full or certification by the Contractor that all invoices for labour, materials, services have been paid in lien thereof and if required in any case an affidavit that so far as the Contractor has knowledge or information the releases and receipts include all the labour and material for which a lien could be filled.

37.4 Contractor will indemnify and hold the Employer/ Owner harmless, for a period of 02 (Two) years after the issue of Final Acceptance from all liens and other encumbrances against the Employer/ Owner on account of debts or claims alleged to be due from the Contractor or his Sub-Contractor to any person including Sub-Contractor and on behalf of Employer/ Owner will defend at his own expense, any claim or litigation brought against the Employer/ Owner or the Contractor in connection therewith. Contractor shall defend or contest at his own expense any fresh claim or litigation by any person including his Sub-Contractor, till its satisfactory settlement even after the expiry of 02 (Two) years from the date of issue of Final Acceptance.

38. Delays by Employer/ Owner or his Authorized representatives

38.1 In case the Contractor's performance is delayed due to any act or omission on the part of the Employer/ Owner or his authorized representatives, then the Contractor may be given due extension of time for the completion of the Work after proper due diligence by Employer/ Owner, to the extent such omission on the part of the Employer/ Owner has caused delay in the Contractor's performance of his Work.

38.2 No adjustment in Contract Price shall be allowed for reasons of such delays and extensions granted except as provided in Tender Document, where the Employer/ Owner reserves the right to seek indulgence of Contractor to maintain the agreed Time Schedule of Completion. In such an event the Contractor shall be obliged for working by Contractor's personnel for additional time beyond stipulated working hours as also Sundays and Holidays and achieve the completion date/interim targets.

39. Payment if the Contract is Terminated

39.1 If the Contract shall be terminated as per the provisions of the Tender/ Contract, the Contractor shall be paid by the Owner in so far as such amounts or items shall not have already been covered by payments of amounts made to the Contractor for the Work executed prior to the date of termination at the cost provided for in the Contract and in addition to the following:

a) The amount payable in respect of any preliminary items, so far as the Work or service comprised therein has been carried out or performed and an appropriate portion as certified by Engineer-in-Charge of any such items or service comprised in which has been partially carried out or performed.
b) Any other expenses which the Contractor has expended for performing the Work under the Contract subject to being duly recommended by Engineer-in-Charge/Project Manager and approved by Employer/ Owner for payment, based on documentary evidence of his having incurred such expenses.

39.2 The Contractor will be further required to transfer the title, Guarantee/Warrantee of the Material/Products/Spares of the works & Projects including but not limited to PV Modules, Power Conditioning Units (PCU)/ Inverters, Transformers, Batteries (If applicable) etc and provide the following in the manner and as directed by the Employer/ Owner.

a) Any and all completed works.
b) Such partially completed Work including drawings, information and Contract rights as the Contractor has specially performed, produced or acquired for the performance of the Contractor.

40. No Waiver of Rights

40.1 Neither the inspection by the Employer/ Owner or any of their officials, Employees or representatives nor any order by the Employer/ Owner for payment of money or any payment for or acceptance of the whole or any part of the Work by the Employer/ Owner nor any extension of time, nor any possession taken by Owner shall operate as a waiver of any provision of the Contract, or of any power herein reserved to the Employer/ Owner, or any right to damages herein provided, nor shall any waiver of any breach in the Contract be held to be a waiver of any other subsequent breach.

41. Certificate not to Affect Right of Employer and Liability of Contractor

41.1 No interim payment certificate(s) issued by the Employer/ Owner, nor any sum paid on account by the Employer/ Owner, nor any extension of time for execution of the work granted by Employer/ Owner shall affect or prejudice the rights of the Employer/ Owner against the Contractor or relieve the Contractor of his obligations for the due performance of the Contract, or be interpreted as approval of the Work done or of the equipment supplied and no certificate shall create liability for the Employer/ Owner to pay for alterations, amendments, variations or additional works not ordered, in writing, by Employer/ Owner or discharge the liability of the Contractor for the payment of damages whether due, ascertained, or certified or not or any sum against the payment of which he is bound to indemnify the Employer/ Owner.

42. Language and Measures

42.1 All documents pertaining to the Contract including Specifications, Schedules, Notices, Correspondence, Operating and Maintenance Instructions, Drawings or any other writing shall be written in English language only. The SI System of measurement shall be used in the Contract unless otherwise specified. Any literature/standard required for the execution of the project work will be provided by the Contractor in the English language only.

43. Guarantee Tests & Operational Acceptance and Transfer of Title

43.1 **Functional Guarantees**

43.1.1 The Contractor guarantees that during the Guarantee Test, the Facilities and all parts thereof shall attain the Functional Guarantees specified under Technical Specifications, subject to and upon the conditions therein specified. Respective compensation in case of the Non-achievement of the same is mentioned in the SCC of the tender document.

43.1.2 If, for reasons attributable to the Contractor, the guaranteed level of the Functional Guarantees specified under Technical Specifications are not met either in whole or in part, the Contractor shall, within a mutually agreed time, at its cost and expense make such changes, modifications and/ or additions to the Plant or any part thereof as may be necessary to meet such Guarantees. The Contractor shall notify the Employer/Owner upon completion of the necessary changes, modifications and/or additions, and shall seek the Employer's/Owner's consent to repeat the Guarantee Test. If the level of the specified Functional Guarantee parameters, as demonstrated even during repeat of the Guarantee Test(s), are outside the acceptable shortfall limit, the Employer//Owner may at its option, either

- Reject the Equipment and advise immediate replacement to suit the provisions of Technical Specification without any additional cost or;
- Reject the Equipment and recover the payments already made, or;
- Terminate the Contract and recover the payments already made, or;
- Accept the equipment after levy of liquidated damages in accordance with the provisions specified.

43.2 **Plant Performance Guarantee Test**

The Plant Performance Guarantee (as mentioned in TS) Test shall be conducted by the Contractor after Commissioning of the Facilities to ascertain whether the Facilities or the relevant part(s) can attain the Functional Guarantees specified in the Contract Documents. The Contractor's and Project Manager's advisory personnel shall attend the Guarantee Test. The detailed procedure for Performance Guarantee Test shall be carried out as per procedure laid down in Technical Specifications.

43.3 **Operational Acceptance**

43.3.1 Operational Acceptance shall occur in respect of the Facilities when:

a) The Plant Performance Guarantee in accordance with the procedure specified in "Technical Specifications" has been successfully completed and the Functional Guarantees are met.

b) Completion of the Facilities have been achieved as per Technical Specifications

43.3.2 The milestone payment linked with successful Operation acceptance shall be released subjected to following:

a) All "As- Built" Drawings and documents are submitted.
b) Detailed Engineering Document with detailed specification, schematic drawing, circuit drawing, cable routing plans and test results, manuals for all deliverable items, Operation, Maintenance & Safety Instruction Manual and other information about the project are submitted
c) Bill of material of the installed Facility is submitted.
d) Inventory of recommended and mandatory spares including special tools and tackles at project Site are provided
e) All the required approvals and NOC's as required, are submitted
f) List of deviation from the approved drawings with reason for deviation is submitted
g) List of punch points, duly signed, is provided.
h) Settlement of liquidity damages against delay and performance (Liquidity Damages)
i) Certificates of final levels as set out for various works
j) Certificates of tests performed for various Works.
k) Material appropriation, Statement for the materials issued by the Owner, if applicable for the Work and list of surplus materials returned to the Owner's store duly supported by necessary documents.
l) Warranty certificates for each equipment are handed over to Owner' and 'Statutory approvals/ permits/ NOC are handed over to Owner'

43.3.3 At any time after the events set out in GCC Sub- Clause 43.3.1 have occurred, the Contractor may give a notice to the Project Manager/EIC requesting the issue of an Operational Acceptance Certificate in the form acceptable to the Employer in respect of the Facilities or the part thereof specified in such notice as at the date of such notice.

43.3.4 The Owner shall, after consultation with the Project Manager/EIC, and within thirty (30) days after receipt of the Contractor's notice, issue an Operational Acceptance.

43.3.5 If within thirty (30) days after receipt of the Contractor's notice, the Project Manager fails to issue the Operational Acceptance or fails to inform the Contractor in writing of the justifiable reasons why the Owner has not issued the Operational Acceptance, the Facilities shall be deemed to have been accepted as at the date of the Contractor's said notice.

43.3.6 The start date of the Comprehensive Operation and Maintenance shall be reckoned from the date mentioned in the Operational Acceptance Certificate.

43.4 Final Acceptance

43.4.1 Final Acceptance shall occur in respect of the Facilities when:

a) The plant has achieved the Operational acceptance; and
b) Handing over – Taking over of Plant should have been completed; and
c) Successful demonstration of the performance guarantees
d) Contractor has provided the list of recommended spares with detailed specification, source and price for further procurement; and
e) The Contractor has paid the liquidated damages, if any, as specified in SCC thereto;
f) Account reconciliation and NCR/ Punch list closure.

43.4.2 At any time after the events set out in GCC Sub – Clause 43.4.1 have occurred, the Contractor may give a notice to the Project Manager/EIC requesting the issue of Final Acceptance in the form acceptable to the Employer in respect of the Facilities or the part thereof specified in such notice as at the date of such notice.

43.4.3 The Employer shall, after consultation with the Project Manager/EIC, and within thirty (30) days after receipt of the Contractor's notice, issue Final Acceptance.

43.4.4 If within thirty (30) days after receipt of the Contractor's notice, the Owner fails to issue the Final Acceptance or fails to inform the Contractor in writing of the justifiable reasons why the Owner has not issued the Final Acceptance, the Facilities shall be deemed to have been accepted as at the date of the Contractor's said notice.

43.4.5 The O&M contract period may further be extended for a period as per mutually agreed terms and conditions.

43.4.6 In case the Owner wishes to extend the O&M period beyond the agreed period under this contract, he shall intimate Contractor at least 6 months prior to the completion period. The Contractor may accept the offer as per the terms and conditions to be mutually agreed with the Owner.

44. Release of Confidential Information

44.1 The Contractor shall not communicate or use in advertising, publicity, sales releases or in any other medium, photographs, or other reproduction of the Work under this Contract or description of the site dimensions, quantity, quality or other information, concerning the Work unless prior written permission has been obtained from the Employer/ Owner.

44.2 The Owner/ Employer and the Contractor shall keep confidential and shall not, without the written consent of the other party hereto, divulge to any third party any documents, data or other information furnished directly or indirectly by the other party hereto in connection with the Contract, whether such information has been furnished prior to, during or following termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Sub Contractor(s) such documents, data and other information it receives from the Employer/Owner to the extent required for the Sub Contractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Sub Contractor(s) an undertaking of confidentiality similar to that imposed on the Contractor.

44.3 The Owner/ Employer shall not use such documents, data and other information received from the Contractor for any purpose other than the operation and maintenance of the Facilities. Similarly, the Contractor shall not use such documents, data and other information received from the Owner/ Employer for any purpose other than the design, procurement of Plant and Equipment, construction or such other work and services as are required for the Performance of the Contract.

44.4 The obligation of a party above, however, shall not apply to that information which

- Now or hereafter enters the public domain through no fault of that party
- Can be proven to have been possessed by that party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other party hereto.
- Otherwise lawfully becomes available to that party from a third party that has no obligation of confidentiality.

44.5 The above provisions of this GCC shall not in any way modify any undertaking of confidentiality given by either of the parties hereto prior to the date of the Contract in respect of the Facilities or any part thereof.

44.6 The provisions of this GCC Clause 44 shall survive termination, for whatever reason, of the Contract.

45. Operation & Maintenance

45.1 The Operation and Maintenance shall be comprehensive. The maintenance service provided shall ensure project functioning of the Solar PV system as a whole and Power Evacuation System to the extent covered in the Contract. All preventive / routine maintenance and breakdown / corrective maintenance required for ensuring maximum uptime shall have to be provided. Accordingly, the Comprehensive Operation & Maintenance shall have two distinct components as described below:

45.2 Preventive / Routine Maintenance:

This shall be done by the Contractor regularly and shall include activities such as cleaning and checking the health of the Solar PV system, cleaning of module surface, tightening of all electrical connections, and any other activity including the associated civil works, as mentioned in TS, wear and tear that may be required for proper functioning of the Solar PV system as a whole. Necessary maintenance activities, Preventive and Routine for Transformers and associated switch gears and transmission line also shall be included.

45.3 Breakdown / Corrective maintenance:

Whenever a fault occurs, the Contractor has to attend to rectify the fault & the fault must be rectified within the 72 hours from the time of occurrence of fault. The Contractor must maintain all the records pertaining to all such faults and necessary measures taken.

The date of Comprehensive Operation & Maintenance Contract period shall begin from the date of Operational acceptance. However, operation of the Power Plant means operation of system as per TS and workmanship in order to keep the project trouble free covering the O&M period. The Contractor must demonstrate the committed CUF at the end of every year in accordance with commitment made in line with the Performance guarantees.

45.4 Serviceability Level Agreement (SLA)

45.4.1 Contractor shall make efforts to maintain 100 % serviceability of complete Plant including all other associated infrastructure developed by the Contractor during execution of project as its scope of work & the respective report of the same shall be submitted to the Owner.

45.4.2 Contractor shall maintain a Complaint log book, which shall include the timing of logging of complaint including unique Complaint number, time of closure of complaint & it's Root Cause Analysis.

45.4.3 Contractor will be responsible for maintaining the Insurance Policy for the complete Plant and Facilities during the O&M period also. He shall maintain seamless insurance cover during Construction and O&M phases. Copy of policies shall be given to the Owner.

45.4.4 Such rectification work carried out by Owner doesn't exempts/relieves Contractor from its responsibility towards subsequent operation, maintenance, repair & replacement of such component/ infrastructure of the Plant or meeting the performance parameters of the Plant.

45.4.5 O&M Routine & Manpower: Contractor shall provide Preventive / Routine Maintenance schedule based on Original Equipment manufacturer and good engineering practices. The team deployed for the O&M must have the sufficient experience of executing the similar tasks.

However, Contractor shall engage additional manpower as and when need arise.

45.5 Bidder is requested to provide the list of all the spares required to maintain the facility for O&M period. Contractor agrees to supply such spare parts, as recommended or otherwise required for the effective and hassle-free operation and maintenance of the Facilities. However, the Contractor, with its previous experience, is to provide a list of spares including specifications, supplier details

and indicative price, as recommended by him and OEM. The Contractor shall keep and maintain the inventory of such spares for the hassle-free operation during the complete O&M period without additional cost to Owner. Also, at the end of penultimate year of the O&M contract, Contractor shall supply a list of all recommended spares as per the operational requirement of the plant and with reference to the mean time between failures (MTBF), along with detailed specifications, supplier details and tentative cost for future purchase. The price of such spare parts shall include the breakup of taxes and duties as applicable towards purchase and supply of spare parts. Owner, at its discretion, will purchase the spare as required for future operation. However, the Contractor shall replenish the mandatory spares at his cost prior to the completion of the O&M period.

46. Completion of Contract

46.1 Unless otherwise terminated under the provisions of any other relevant clause, this Contract shall be deemed to have been completed at the expiration of the Period of Liability/ Validity of the Contract as provided under Section - V, Special Conditions of Contract (SCC).

47. Pre - Commissioning & Commissioning

47.1 As soon as installation of the Facilities has, in the opinion of the Contractor, been completed as specified in the Technical Specifications, excluding items not materially affecting the operation or safety of the Facilities, the Contractor shall so notify the Project Manager/ EIC in writing to witness the pre- commissioning of the facility.

47.2 If the Project Manager/EIC is satisfied that the Facilities have reached Completion, the Project Manager/EIC shall, within seven (7) days after receipt of the Contractor's notice, arrange to witness the pre – commissioning of the Facilities.

47.3 If the Project Manager/EIC notifies the Contractor of any defects and/or deficiencies, the Contractor shall then correct such defects and/or deficiencies and shall repeat the procedure described in GCC Sub- Clause 47.1.

47.4 If the Project Manager/EIC is still not so satisfied, then it shall notify the Contractor in writing of any defects and/or deficiencies within seven (7) days after receipt of the Contractor's repeat notice, and the above procedure shall be repeated.

47.5 As soon as all works in respect of Pre-commissioning are completed and, in the opinion of the Contractor, the Facilities are ready for Commissioning, the Contractor shall so notify the Project Manager in writing. The Contractor shall commence Commissioning of the facilities as per the GCC Sub – Clause 47.6.

47.6 Commissioning of the Facilities shall be completed by the Contractor as per procedures detailed in the Technical Specifications and in the presence of the Project Manager/ EIC and Owner.

47.7 If the Project Manager/EIC fails to inform the Contractor of any defects and/or deficiencies within fourteen (14) days after receipt of the Contractor's notice under GCC Sub-Clause 47.1 or within seven (7) days after receipt of the Contractor's repeated notice under GCC Sub-Clause 47.3, then the Facilities shall be deemed to have taking up the date of the Contractor's notice or repeated notice, accepted for commissioning, as the case may be.

47.8 As soon as possible after Commissioning, the Contractor shall complete all outstanding minor items so that the Facilities are fully in accordance with the requirements of the Contract, failing which the Employer will undertake such completion and deduct the costs thereof from any monies owing to the Contractor.

47.9 As soon as possible after Commissioning, the Contractor shall make the facility ready for the performance test (PR test) and inform the Project Manager/EIC at least 7 (seven) days prior to the start of the performance test as per the procedure mentioned in the Technical Specifications.

47.10 Upon successful Operational Acceptance of the Facilities as per GCC sub clause 43.3 , the Contractor shall be responsible for the care and custody of the Facilities, together with the risk of loss or damage thereto, and shall thereafter take over the Facilities or the relevant part thereof for the agreed duration of comprehensive operation and maintenance as stipulated and mutually agreed terms and conditions.

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[E] PERFORMANCE OF WORK

48. Execution of Work

48.1 All the Works shall be executed in strict conformity with the provisions of the Contract Documents and with such explanatory detailed drawings, specification and instructions as may be furnished from time to time by the Contractor whether mentioned in the Contract or not. The Contractor shall be responsible for ensuring that works throughout are executed in the most substantial, proper and workmanlike manner with the quality of material and workmanship in strict accordance with the Specifications. The Contractor shall provide all necessary materials, equipment, labour etc. for execution and maintenance of Work till completion unless otherwise mentioned in the Contract.

48.2 All materials shall be brand new & of the best quality and workmanship capable of satisfactory operation under the operating and climatic conditions as has been specified. Unless otherwise specified, they shall conform in all respect to the latest edition of the relevant IS codes specification wherever Indian specifications apply or IEC codes or equivalent internationally accepted standard.

48.3 The Contractor shall supply & deliver all equipment and materials for installation at site. The Contractor shall arrange for transportation, loading & unloading, local sifting, EAR insurance and safe storage of materials at project site at his own cost & risk.

48.4 If the Contractor offers equipment manufactured in accordance with other international well recognized standards (mentioned above), he shall, in that case, supply a copy in English of the Standard Specification adopted and shall clearly mention in what respect such standard specification differs from Indian Standard Specifications. The Plant, equipment, and materials offered by the Contractor should comply with one consistent set of Standards only to make the system compatible and work in harmony as far as possible, except if mentioned otherwise.

49. Void

50. Work in Monsoon and Dewatering

50.1 Unless otherwise specified elsewhere in the tender, the execution of the Work may entail working in the monsoon also. The Contractor must maintain a minimum labour force as may be required for the job and plan and execute the construction and erection according to the prescribed schedule. No extra rate will be considered for such work in monsoon.

50.2 During monsoon and other period, it shall be the responsibility of the Contractor to keep the construction work site free from water logging at his own cost.

51. Change in Laws and Regulations

51.1 If, after the date seven (7) days prior to the date of Bid submission, in the country where the Site is located, any law, regulation, ordinance, order or by-law having the force of law is enacted, promulgated, abrogated or changed (which shall be deemed to include any change in interpretation or application by the competent authorities) that subsequently affects the costs and expenses of the Contractor and/or the Time for Completion, the Contract Price shall be correspondingly increased or decreased, and/or the Time for Completion shall be reasonably adjusted to the extent that the Contractor has thereby been affected in the Performance of any of its obligations under the Contract. Contractor shall promptly and within 15 days of such enactment coming into force, forward relevant supporting documents to Owner

However, these adjustments would be restricted to direct transactions between the Owner and the Contractor. This adjustment shall not be applicable on procurement of raw materials, intermediary components etc. by the Contractor and shall also not be applicable on bought out items dispatched directly from sub- vendor works to site.

Notwithstanding the foregoing, such additional or reduced costs shall not be separately paid or credited if the same has already been accounted for in the price adjustment provisions where applicable.

52. General Conditions for Construction and Erection Work

52.1 Overtime work is permitted in cases of need and the Owner will not compensate the same. Shift working at 2 or 3 shifts per day may become necessary and the Contractor should take this aspect into consideration for formulating his rates. No extra claims will be entertained by the Owner on this account.

52.2 The Contractor must arrange for the placement of workers in such a way that the delayed completion of the Work or any part thereof for any reason whatsoever will not affect their proper employment. The Owner will not entertain any claim for idle time payment whatsoever.

52.3 The Contractor shall submit to the Owner/ Employer progress reports at regular intervals regarding the state and progress of Work. The details and format of the report will be mutually agreed after the award of Contract. The Contractor shall provide display boards showing progress and labour strengths at worksite. Updated project schedule in MS Projects shall also be furnished by Contractor as per agreed interval

53. Design and Engineering

53.1 The Work covered under this Contract having to be executed by the Contractor on a lump-sum firm price quoted by him, the Owner will not accept any proposals for changes in Value of Contract or extension in time on account of any such changes which may arise to the Contractor's scope of Work as a result of detailed Engineering and thereafter during the execution of Work.

53.2 **Specifications and Drawings**

53.2.1 The Contractor shall execute the basic and detailed design and engineering work in compliance with the provisions of the Contract, or where not so specified, in accordance with good and sound engineering practice.

53.2.1 The Contractor shall be responsible for any discrepancies, errors or omissions in the specifications, drawings and other technical documents that it has prepared, whether such specifications, drawings and other documents have been approved by the Project Manager/ EIC or not, provided that such discrepancies, errors or omissions are not because of inaccurate information furnished in writing to the Contractor by or on behalf of the Owner/ Employer.

53.3 **Codes and Standards**

53.3.1 Wherever references are made in the Contract to codes and standards in accordance with which the Contract shall be executed, the edition or the revised version of such codes and standards current at the date of bid submission shall apply unless otherwise specified.

53.3.2 Approval / Review of Technical Documents by Project Manager

The Contractor shall prepare list of documents and drawings i.e. Master drawing list (MDL) as per technical specifications and furnish to the Project Manager/EIC for review & Approval of the same within 14 days from the Zero date.

53.3.3 Within ten (10) working days after receipt by the Project Manager of any document requiring the Project Manager's approval, the Project Manager shall either return one copy thereof to the Contractor with its approval endorsed thereon or shall notify the Contractor in writing of its disapproval thereof and the reasons therefor and the modifications that the Project Manager proposes.

53.3.4 The Project Manager shall not disapprove any document, except on the grounds that the document does not comply with some specified provision of the Contract or that it is contrary to good engineering practice.

53.3.5 If the Project Manager disapproves the document, the Contractor shall modify the document and resubmit it for the Project Manager's approval. If the Project Manager approves the document subject to modification(s), the Contractor shall make the required modification(s), and upon resubmission with the required modifications the document shall be approved.

53.3.6 The procedure for submission of the documents by the Contractor and their approval by the Project Manager shall be as per the Contract Co-ordination procedure.

53.3.7 If any dispute or difference occurs between the Employer and the Contractor in connection with or arising out of the disapproval by the Project Manager of any document and/or any modification(s) thereto that cannot be settled between the parties within a reasonable period, then such dispute or difference may be settled in accordance with GCC Clause (Settlement of Dispute) hereof. If such dispute or difference is referred as per GCC clause, the Project Manager shall give instructions as to whether and if so, how, Performance of the Contract is to proceed. The Contractor shall proceed with the Contract in accordance with the Project Manager's instructions, provided that if the Arbitration upholds the Contractor's view on the dispute, then the Contractor shall be reimbursed by the Owner for any additional costs incurred by reason of such instructions and shall be relieved of such responsibility or liability in connection with the dispute and the execution of the instructions as the Arbitration shall decide, and the Time for Completion shall be extended accordingly.

53.3.8 The Project Manager's approval, with or without modification of the document furnished by the Contractor, shall not relieve the Contractor of any responsibility or liability imposed upon it by any provisions of the Contract except to the extent that any subsequent failure results from modifications required by the Project Manager.

53.3.9 The Contractor shall not depart from any approved document unless the Contractor has first submitted to the Project Manager an amended document and obtained the Project Manager's approval thereof, pursuant to the provisions of this GCC Clause.

53.3.10 If the Project Manager requests any change in any already approved document and/or in any document based thereon, generally shall be taken care by the Contractor if the change is not causing any major financial impact.

54. Drawings to be Supplied by the Owner/Employer

54.1 The drawings attached with tender, if any, are only for the general guidance to the Contractor to enable him to visualize the type of work contemplated and scope of work involved. The Contractor will be deemed to have studied the Drawings and formed an idea about the Work involved.

54.2 The Contractor shall be deemed to have gone through the Drawings supplied to him thoroughly and carefully and in conjunction with all other connected drawings and bring to the notice of the Engineer-in-Charge/ Project Manager discrepancies, if any, therein before actually carrying out the Work.

54.3 Copies of all detailed working drawings relating to the Work shall be kept at the Contractor's office on the site and shall be made available to the Engineer-in-Charge/Project Manager at any time during the Contract. The drawings and other documents issued by the Employer/ Owner shall be returned to the Employer/ Owner on completion of the Work.

55. Drawings to be Supplied by the Contractor

55.1 The drawings/ data which are to be furnished by the Contractor shall be furnished within the specified time.

55.2 Where approval/ review of drawings before manufacture/ construction/ fabrication has been specified, it shall be Contractor's responsibility to have these drawings prepared as per the TS and get it approved before proceeding with manufacture/ construction/ fabrication as the case may be. Any change that may have become necessary in these drawings during the execution of the work shall have to be carried out by the Contractor at no extra cost. All as built drawings shall bear the certification stamp duly signed by both the Contractor and Engineer-in-Charge/Project Manager.

55.3 The Drawings submitted by the Contractor shall be reviewed by the Engineer-in-Charge/Project Manager as far as practicable within 10 (Ten) working days. The Contractor shall incorporate any modifications and/ or corrections as highlighted/notified and submit the drawings for approval. Any delays arising out of failure by the Contractor to rectify the drawing in good time shall not alter the Contract Completion Time.

55.4 All GA & GFC drawings shall be provided in soft as well as Hard form in appropriate format/size to Employer for review & approval.

All as built drawings showing all corrections, adjustments & deviations, if any, etc shall be furnished by the Contractor in 04 (Four) Hard Copies & a soft copy for record purpose to the Employer/ Owner immediately after the operational acceptance.

56. Setting out Works

56.1 The Contractor shall provide, fix and be responsible for the maintenance of all stakes, templates, level marks, profiles and other similar things and shall take all necessary precautions to prevent their removal or disturbance and shall be responsible for the consequence of such removal or disturbance should the same take place and for their efficient and timely reinstatement. The Contractor shall also be responsible for the maintenance of all existing survey marks, boundary marks, distance marks and center line marks, either existing or supplied and fixed by the Contractor. Contractor shall carry out Geotech investigation at site at his own cost and design the foundations accordingly. A copy of the investigation report shall also be forwarded to Employer and Owner

56.2 Before beginning the Works, the Contractor shall at his own cost, provide all necessary reference and level posts, pegs, bamboos, flags, ranging rods, strings and other materials for proper layout of the works in accordance with the schemes for bearing marks as required. The center, longitudinal

or face lines and cross lines shall be marked by means of small masonry pillars. Each pillar shall have distinct mark at the center to enable theodolite to be set over it.

56.3 Pillars bearing geodetic marks located at the sites of units of Works under construction should be protected and fenced by the Contractor.

56.4 On completion of Work, the Contractor must submit the geodetic documents according to which the Work was carried out.

57. Geological Discoveries

All fossils, coins, articles of value or antiquity and structures and other remains or things of geological or archaeological interest discovered on the site where the services are performed, be deem to be the absolute property of the Owner. The Contractor shall take reasonable precautions to prevent the personnel or any other persons from removing or damaging any such article or thing and shall immediately upon the discovery thereof and, before removal, acquaint the Owner of such discovery any carry out, at the expense of the Owner, the Owner's orders as to the disposal of the same.

58. Materials to be Supplied by Contractor

58.1 **Plant and Equipment**

The Contractor shall procure and transport all the Plant and Equipment in an expeditious and orderly manner to the Site to achieve completion of activities as per schedule to enable commissioning of the Project by the scheduled commissioning date. Contractor shall deliver supplies at site in accordance to its erection sequence. Owner may hold payment against supplies in case same is delivered more than 03 (Three) months before its erection requirement (except for imported items)

58.2 **Transportation**

The Contractor shall ensure that all the plant and equipment required to complete the Facility at site, are procured and dispatched. The Contractor shall at its own risk and expense transport all the Plant and Equipment and the Contractor's Equipment to the Site by the mode of transport that the Contractor judges most suitable under all the circumstances. Contractor shall be responsible to assess in advance suitability of access roads, bridges, culverts, etc for transportation of ODC shipments, if any and arrange to transport them accordingly.

58.3 **Packing and Marking**

The Contractor shall be responsible for securely protecting and packing the plant & equipment as per prescribed standards in force to withstand the journey and ensuring safety of materials and also arrival of materials at destination in original condition and good for contemplated use. Packing case size & weight shall take into consideration the remoteness of the goods final destination and absence of heavy material handling facilities at all points in transit.

Packing lists of materials shall be provided in each package to facilitate checking up of the contents at the destination.

In order to import any items, associated with the Solar PV Power Project, from abroad or from any other state in India, Contractor shall have to arrange any clearance, permission, if required at his own risk, from any Government (Government of State & Government of India) or any Government (Government of State & Government of India) controlled organization for transportation of materials from manufacturing shop to delivery at Site. Contractor shall take necessary insurances to ensure safe transit & consequential risks. All packing material is the property of the Owner and shall be immediately taken into the safe storage.

58.4 **Storage of Equipment**

The plant and equipment thus procured under the scope of the contract must be kept in safe custody till put under operation, essentially free from water contact. All the spares, as required for the trouble-free comprehensive O&M of Plant, must be kept under secure storage during O&M period. Contractor has to ensure the appropriate and proper storage arrangement prior to the arrival of the equipment including containers, temporary structures, sheds, platforms etc at its own cost.

The Contractor shall procure and provide within the Value of Contract the whole of the materials required for the construction including steels, cement and other building materials, tools, tackles, construction plant and equipment for the completion and maintenance of the Work except the materials which will be issued by the Owner and shall make his own arrangement for procuring such materials and for the transport thereof. The Owner may give necessary recommendation to the respective authority if so desired by the Contractor but assumes no further responsibility of any nature. The Owner will insist on the procurement of materials which bear ISI stamp and/ or which are supplied by reputed suppliers.

58.5 The Contractor shall properly store all materials either issued to him or brought by him to the Site to prevent damages due to rain, wind, direct exposure to sun, etc. as also from theft, pilferage, etc. for proper and speedy execution of his works. The Contractor shall maintain sufficient stocks of all materials required by him including commissioning spares.

59. Stores Supplied by the Owner

59.1 If the Specification of the Work provides for the use of any material of special description to be supplied from the Owner's stores or it is required that the Contractor shall use certain stores to be provided by the Owner, such materials and stores, there for as hereinafter mentioned being so far as practicable for the convenience of the Contractor, but not so as in any way to control the meaning or effect of the Contract, the Contractor shall be bound to purchase and shall be supplied such materials and stores as are from time to time required to be used by him for the purpose of the Contract only. After the completion of the Work, however, the Contractor has to account for the full quantity of materials supplied to him as per relevant clauses in this document.

59.2 All materials so supplied to the Contractor shall remain the absolute property of the Owner and shall not be removed on any account from the Site of the Work and shall be at all times open for inspection to the Engineer-in-Charge/Project Manager. Any such materials remaining unused at the time of the completion or termination of the Contract shall be returned to the Owner's stores or at a place as directed by the Engineer-in-Charge/Project Manager in perfectly good condition at Contractor's cost.

59.3 Owner, at his sole discretion and upon request from Contractor, may provide appropriate space for storage outside the site on chargeable basis mutually agreeable to both parties. However, the transportation of equipment from store to site shall be arranged by the Contractor at his cost and risk

60. Conditions for Issue of Materials

60.1 **i)** Materials specified as to be issued by the Owner will be supplied to the Contractor by the Owner form his stores. It shall be responsibility of the Contractor to take delivery of the materials and arrange for its loading, transport and unloading at the Site of Work at his own cost. The materials shall be issued between the working hours and as per the rules of the Owner as framed from time to time. Once the material is issued or taken over by the Contractor, then the same will be his own liability to store, use & maintain.

ii) The Contractor shall bear all incidental charges for the storage and safe custody of materials at site after these have been issued to him.

iii) Materials specified as to be issued by the Owner shall be issued in standard sizes as obtained from the manufacturers.

iv) The Contractor shall construct suitable godowns at the Site of Work for storing the materials safe against damage by rain, dampness, fire, theft etc. He shall also employ necessary watch and ward along with proper illumination establishment for the purpose.

v) It shall be duty of the Contractor to inspect the materials supplied to him at the time of taking delivery and satisfy himself that they are in good condition. After the materials have been delivered by the Owner, it shall be the responsibility of the Contractor to keep them in good condition and if the materials are damaged or lost, at any time, they shall be repaired and/ or replaced by him at his own cost.

vi) The Owner shall not be liable for delay in supply or non-supply of any materials which the Owner has undertaken to supply where such failure or delay is due to natural calamities, act of enemies, transport and procurement difficulties and any circumstances beyond the control of the Owner. In no case, the Contractor shall be entitled to claim any compensation or loss suffered by him on this account.

vii) It shall be responsibility of the Contractor to arrange in time all materials required for the Work other than those to be supplied by the Owner. If, however, in the opinion of the Engineer-in-Charge/Project Manager the execution of the Work is likely to be delayed due to the Contractor's inability to make arrangements for supply of materials which normally he has to arrange for, the Engineer-in-Charge/Project Manager shall have the right at his own discretion to issue such materials, if available with the Owner or procure the materials from the market or as elsewhere and the Contractor will be bound to take such materials at the rates decided by the Engineer-in-Charge/Project Manager. This, however, does not in any way absolve the Contractor from responsibility of making arrangements for the supply of such materials in part or in full, should such a situation occur nor shall such action by Owner constitute a reason for the delay in the execution of the Work.

viii) The Contractor shall, if desired by the Engineer-in-Charge/Project Manager, be required to execute an Indemnity Bond in the prescribed form for safe custody and accounting of all materials issued by the Owner.

ix) The Contractor shall furnish to the Engineer-in-Charge/Project Manager sufficiently in advance a statement showing his requirement of the quantities of the materials to be supplied by the Owner and the time when the same will be required by him for the works, so as to enable the Engineer-in-Charge/Project Manager to make necessary arrangements for procurement and supply of the material.

x) Account of the materials issued by the Owner shall be maintained by Contractor indicating the daily receipt, consumption and balance in hand. This account shall be maintained in a manner prescribed by the Engineer-in-Charge/Project Manager along with all connected papers viz. requisitions, issues, etc., and shall be always available for inspection in the Contractor's office at Site.

xi) The Contractor should see that only the required quantities of materials are got issued. The Contractor shall not be entitled to cartage and incidental charges for returning the surplus materials, if any, to the stores wherefrom they were issued.

xii) Materials/ Equipment(s) supplied by Employer/ Owner shall not be utilized for any purpose(s) than issued for.

61. Material Procured with Assistance of Owner/ Return of Surplus

61.1 Notwithstanding anything contained to the contrary in any or all the clauses of this Contract where any materials for the execution of the Contract are procured with the assistance of the Owner either by issue from Owner's stock or purchases made under order or permits or licenses issued by Government, the Contractor shall hold the said materials as trustee for the Owner and use such materials economically and solely for the purpose of the Contract and not dispose them off without the permission of the Owner and return, if required by the Engineer-in-Charge/Project Manager, shall determine having due regard to the condition of the materials.

62. Materials obtained from Dismantling

62.1 If the Contractor in the course of execution of the Work is called upon to dismantle any part for reasons other than those stipulated in Clauses 67 and 70 hereunder, the materials obtained in the Work of dismantling etc., will be considered as the Owner's property and will be disposed off to the best advantage of the Owner.

63. Articles of Value Found

63.1 All gold, silver and other minerals of any description and all precious stones, coins, treasure relics, antiquities and other similar things which shall be found in, under or upon the Site, shall be the property of the Owner and the Contractor shall duly preserve the same and shall from time to time deliver the same to such person or persons indicated by the Owner.

64. Discrepancies between Instructions

64.1 Should any discrepancy occur between the various instructions furnished to the Contractor, his representative or staff or any doubt arises as to the meaning of any such instructions or should there be any misunderstanding between the Contractor's staff and the Engineer-in-Charge/Project Manager's staff, the Contractor shall refer the matter immediately in writing to the Engineer-in-Charge/Project Manager whose decision thereon shall be final and conclusive and no claim for losses alleged to have been caused by such discrepancies between instructions, doubts, or misunderstanding shall in any event be admissible.

65. Action where no Specification is Issued

65.1 In case of any class of Work for which there is no Specification supplied by the Employer/ Owner as mentioned in the Tender Documents such Work shall be carried out in accordance with Indian Standard Specifications and if the Indian Standard Specifications do not cover the same, the Work should be carried out as per standard Engineering Practice subject to the approval of the Engineer-in-Charge/Project Manager.

66. Inspection of Works

66.1 The Engineer-in-Charge/Project Manager will have full power and authority to inspect the Work at any time wherever in progress either on the Site or at the Contractor's premises/ workshops wherever situated, premises/ workshops of any person, firm or corporation where Work in connection with the Contract may be in hand or where materials are being or are to be supplied, and the Contractor shall afford or procure for the Engineer-in-Charge/Project Manager every facility and assistance to carry out such inspection. The Contractor shall, at all time during the usual working hours and at all other time at which reasonable notice of the intention of the Engineer-in-Charge/Project Manager or his representative to visit the Work shall have been given to the Contractor, either himself be present or receive orders and instructions, or have a responsible representative duly accredited in writing, present for the purpose. Orders given to the Contractor's representative shall be considered to have the same force as if they had been given to the Contractor himself. The Contractor shall give not less than 15 (Fifteen) day notice in writing to the Engineer-in-Charge/Project Manager for carrying out the inspection , Domestic or Overseas) so as

to reach out for the inspection by the concerned officials and/or measurement of any work in order that the same may be inspected and measured. Employer/Owner at his own discretion may or may not attend the scheduled inspection calls as arranged by the contractor on account of pre-occupation and other site exigencies.

In the event of breach of above the same shall be uncovered at Contractor's expense for carrying out such measurement or inspection.

66.2 The Contractor is to provide at all time during the progress of the Work and the maintenance period, proper means of access with ladders, gangways etc. to move and adopt as directed for inspection or measurements of the Work by the Engineer-in-Charge/Project Manager.

66.3 The Contractor shall make available to the Engineer-in-Charge/Project Manager free of cost all necessary instruments and assistance in checking or setting out of Work and in the checking of any Work made by the Contractor for the purpose of setting out and taking measurements of Work.

67. Tests for Quality of Work

67.1 All workmanship shall be of the respective kinds described in the Contract Documents and in accordance with the instructions of the Engineer-in-Charge/Project Manager and shall be subjected from time to time to such test as the Engineer-in-Charge/Project Manager may direct at the place of manufacture or fabrication or on the site or at all or any such places.

The cost of inspection/ pre-dispatch inspection/ in-stage inspection (Exclusive of Employer/ Owners representatives TA/DA) shall be borne by Contractor. Such pre-dispatch inspection(s) at the manufacturer's facility shall be carried out in the presence of the Employer/Owner or their authorized representatives, for such items as is specified by the Engineer-in-Charge/Project Manager. Travel expenses for the representatives of Employer/Owner for such inspections shall be borne by the Employer/Owner respectively.

However, in case re-inspection is necessitated on account of non-acceptance of item(s) due to failure on Factory Acceptance Test(s), the cost of associated travel and accommodation for the revisit shall be borne by the Contractor. A minimum of 07 (Days) notice shall be given by the Contractor for witnessing such inspection at the works

The Contractor shall provide assistance, instruments, labour and materials as are normally required for examining, measuring and testing any workmanship as may be selected and required by the Engineer-in-Charge/Project Manager and keep all stage inspection/ material TC readily available for the Inspector.

67.2 All the tests that will be necessary in connection with the execution of the Work as decided by the Engineer-in-Charge/Project Manager shall be carried out at the field-testing laboratory of the Owner by paying the charges as decided by the Owner from time to time. In case of non-availability of testing facility with the Owner, the required test shall be carried out at the cost of Contractor at Government or any other accredited testing laboratory.

67.3 If any tests are required to be carried out in conjunction with the Work or materials or workmanship not supplied by the Contractor, such tests shall be carried out by the Contractor and cost of such tests shall be reimbursed by the Owner.

67.4 The PV modules/ inverters/ cables and other Balance of system equipment deployed in the solar PV power Plant shall have valid test certificates for their qualification as per above specified IEC/ IS Standards by one of the NABL Accredited /Govt approved Test Centers in India. In case of module types/ equipment for which such Test facilities may not exist in India, test certificates from reputed ILAC Member body accredited Labs abroad (with proof of accreditation) will be acceptable.

68. Samples for Approval

68.1 In case of requirement, the Contractor shall furnish to the Engineer-in-Charge/Project Manager for approval, when requested or if required by the specifications, adequate samples of all materials and finished to be used in the Work. Such samples shall be submitted before the Work is commenced and in ample time to permit tests and examinations thereof. All materials furnished and finishes applied in actual Work shall be fully equal to the approved samples.

69. Action and Compensation in case of Poor/Non-compliant Work

69.1 If, against documentary proofs, is established that any work has been executed with unsound, imperfect or unskilled workmanship, or with materials of any inferior description, or that any materials or articles provided by the Contractor for the execution of the Work are unsound, or of a quality inferior to that contracted for, or otherwise not in accordance with the Contract, the Contractor shall on demand in writing from the Engineer-in-Charge/Project Manager or his authorized representative specifying the Work, materials or articles complained of notwithstanding that the same may have been inadvertently passed, certified and paid for, forthwith rectify or remove and reconstruct the Work so specified and provide other proper and suitable materials or articles at his own cost. In the case of any such failure the Engineer-in-Charge/Project Manager may on expiry of notice period rectify or remove and re-execute the Work or remove and replaced with others, the materials or articles complained of to as the case may be at the risk and expense in all respects of the Contractor. The decision of the Engineer-in-Charge/Project Manager as to any question arising under this clause shall be final and conclusive. No additional time for Project completion shall be granted for undertaking such replacement/ rectification works by Contractor.

70. Suspension of Works

70.1 **i)** Subject to the provisions of sub-para (ii) of this clause, the Contractor shall, if ordered in writing by the Engineer-in-Charge/Project Manager, or his representative, temporarily suspend the Works or any part thereof for such written order, proceed with the Work therein ordered to be suspended until, he shall have received a written order to proceed therewith. The Contractor shall not be entitled to claim compensation for any loss or damage sustained by him by reason of temporary suspension of the Works aforesaid. However, suitable time extension may be considered at the sole discretion of the owner.

ii) In case of suspensions of entire Work, ordered in writing by Engineer-in-Charge/Project Manager, for a period of more than 03 (Three) months, the Contractor shall have the option to terminate the Contract.

71. Owner may do Part of Work

71.1 Upon failure of the Contractor to comply with any instructions given in accordance with the provisions of this Contract the Owner has the alternative right, instead of assuming charge of entire Work, to place additional labour force, tools, equipment and materials on such parts of the Work, as the Owner may designate or also engage another Contractor to carry out the Work. In such cases, the Owner shall deduct from the amount which otherwise might become due to the Contractor, the cost of such work and material with 110% (Hundred & Ten Percent) of the actual cost of works and materials.

72. Possession prior to Completion

72.1 The Engineer-in-Charge/Project Manager shall have the right to take possession of or use any completed or partially completed Work or part of the Work. Such possession or use shall not be deemed to be an acceptance of any work completed in accordance with the Contract Agreement. If such prior possession or use by the Engineer-in-Charge/Project Manager delays the progress of

Work, equitable adjustment in the time of completion will be made and the Contract Agreement shall be deemed to be modified accordingly.

73. Defects Liability Period

[12 (Twelve) Months Period of Liability from the date of Operational Acceptance]

73.1 The Contractor must warrant that the Facilities shall be free from defects in the design, engineering, materials and workmanship of the Plant and Equipment supplied and of the work executed.

73.2 If it shall appear to the Project Manager that any supplies have been executed with unsound, imperfect or unskilled workmanship, or with materials of any inferior description, or that any materials or articles provided by the Contractor for the execution of Contractor are unsound or otherwise not in accordance with the Contract, the Contractor shall on demand in writing inform the Project Manager or its authorized representative specifying the item, materials or articles complained of, notwithstanding that the same may have been inadvertently passed, certified and paid for. The Contractor shall forthwith rectify or remove and replace that item so specified and provide other proper and suitable materials or articles at its own charge and cost, and in the event of failure to do so within a period to be specified by the Project Manager in its demand aforesaid, the Project Manager may on expiry of notice period rectify or remove and re-execute the time or remove and replace with others, the materials or articles complained of as the case may be at the risk and expense in all respects of the Contractor. The decisions of the Project Manager in this regard shall be final and binding.

73.3 The Contractor shall also be undertaking the operation and maintenance of the Facility and consequently shall be required to rectify any defects that emerge during the operation of the Facilities for the entire term of this Contract.

73.4 The Defect Liability Period shall be of twelve (12) months from the date of Operation Acceptance, during which the Contractor must repair any defect identified by the Project Manager / EIC after commissioning of the Plant. All the expenses to repair the defects shall be borne by the Contractor and no additional cost charged to the Owner.

73.5 If during the Defect Liability Period any defect should be found in the design, engineering, materials and workmanship of the Plant and Equipment supplied or of the work executed by the Contractor, the Contractor shall promptly, in consultation and agreement with the Owner regarding appropriate remedying of the defects, and at its cost, repair, replace or otherwise make good (as the Contractor shall, at its discretion, determine) such defect as well as any damage to the Facilities caused by such defect.

73.6 Furthermore, without prejudice to the generality of the foregoing, it is clarified that the Contractor shall also be responsible for the repair, replacement or making good of any defect, or of any damage to the Facilities arising out of or resulting from any of the following causes:

- Improper operation or maintenance of the Facilities by the Contractor during operation and maintenance of the Facility; and
- Operation of the Facilities outside specifications of the Facilities.

73.7 The Contractor may, with the consent of the Owner, remove any Plant and Equipment or any part of the Facilities that are defective from the Site, if the nature of the defect and/or any damage to the Facilities caused by the defect is such that repairs cannot be expeditiously carried out at the Site.

73.8 If the repair, replacement or making good is of such a nature that it may affect the efficiency of the Facilities or any part thereof, the Owner may give to the Contractor a notice requiring that tests of the defective part of the Facilities shall be made by the Contractor immediately upon completion of such remedial work, whereupon the Contractor shall carry out such tests.

73.9 If such part fails the tests, the Contractor shall carry out further repair, replacement or making good (as the case may be) until that part of the Facilities passes such tests. The tests, in character, shall in any case be not inferior to what has already been agreed upon by the Owner and the Contractor for the original equipment/part of the Facilities.

73.10 If the Contractor fails to commence the work necessary to remedy such defect or any damage to the Facilities caused by such defect within a reasonable time (which shall in no event be considered to be less than seven (7) days), the Owner may, following a notice to the Contractor, proceed to do such work, and the costs incurred by the Owner in connection therewith shall be paid to the Owner by the Contractor or may be deducted by the Owner from any monies due to the Contractor or claimed under the Performance Guarantee, without prejudice to other rights, which the Owner may have against the Contractor in respect of such defects.

73.11 If the Facilities or any part thereof cannot be used by reason of such defect and/or making good of such defect, the Defect Liability Period of the Facilities or such part, as the case may be, shall be extended by a period equal to the period during which the Facilities or such part cannot be used by the Owner because of any of the aforesaid reasons. Upon correction of the defects in the Facilities or any part thereof by repair/replacement, such repair/replacement shall have the defect liability period of twelve (12) months from such replacement.

73.12 In addition, the Contractor shall also provide an extended warranty for any such component of the Facilities and for the period of time. Such obligation shall be in addition to the defect liability specified.

73.13 Latent defect liability: Notwithstanding, the defect liability period of 12 months above, the plant shall carry a latent defect liability of 5 years from date of operational acceptance towards any design/ manufacturing defects in the equipment supplied by the Contractor

73.14 The Contractor's liability under this contract for any reason, what so ever, shall be limited to the total Contract Price (Including GST etc)

73.15 Limitation of Liability

Notwithstanding anything contrary contained herein, the aggregate total liability of Contractor under the Agreement or otherwise shall be limited to **100% of Agreement/ Contract Value** except in case of Patent Infringement liability. However, neither party shall be liable to the other party for any indirect and consequential damages, loss of profits or loss of production.

73.16 Guarantee/ Warranty

As enumerated in Clause no. 73 (Defect Liability Period) of GCC, the overall DLP should stand valid for a period of 12 (Twelve) Months from the date of Operational Acceptance. However, Contractor needs to ensure following Guarantees/ Warrantees to the best possible extent for the successful execution of the Contract. Subsequently, necessary Guarantee/ Warranty Certificate shall be produced by the Contractor prior to Operational Acceptance of the Facility.

Guarantee/ Warranty as defined under Section VII, Scope of work and Technical specifications will prevail in this clause. Contractor should guarantee the Plant facility for the workmanship for a period of 05 (Five) years from the date of Operational Acceptance.

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

73.16.2 The Contractor shall transfer the warranty/ guarantees of the equipment as such from the OEM/ supplier in the name of the Owner. The period of the warranty / guarantee for each equipment shall be as per the "Technical Specifications"

73.16.3 During the period of Warranty / Guarantee the Contractor shall remain liable to replace any defective parts, that becomes defective in the plant, of its own manufacture or that of its sub-Contractors, under the conditions provided for by the Contract under and arising solely from faulty design, materials or workmanship & faulty operation/repair, provided such defective parts are not repairable at Site. After replacement, the Contractor is allowed to take back the defective parts to its works at his expenses.

73.16.4 At the end of warranty/ guarantee period, the Contractor's liability shall cease subjected to fulfillment of its liability under GCC Clause 73.16 (Defect Liability Period). In respect of goods not mentioned for the warranty/ guarantee in "Technical Specifications", the Owner shall be entitled to the benefit of such guarantee given to the Contractor by the original Supplier or manufacturer of such goods eg Performance guarantee for 25 yrs for modules, etc.

73.16.5 During the Comprehensive Operation & Maintenance period, the Contractor shall be responsible for any defects in the work due to faulty workmanship or due to use of sub-standard materials in the work. Any defects in the work during the guarantee period shall therefore, be rectified by the Contractor without any extra cost to the Owner within a reasonable time as may be considered from the date of receipt of such intimation from the Owner failing which the Owner reserves the right to take up rectification work at the risk and cost of the Contractor.

74. Care of Works

74.0 From the commencement to completion of the Work & till the completion of O&M period (If applicable), the Contractor shall take full responsibility for the care for all works including all temporary works and in case any damages, loss or injury shall happen to the Work or to any part thereof or to any temporary works from any cause whatsoever, shall at his own cost repair and make good the same so that at completion the Work shall be in good order and in conformity in every respects with the requirement of the Contract and the Engineer-in- Charge's instructions. Also damage to external property of Third Parties.

74.1 Defects Prior to Taking Over

If at any time, before the Work is taken over, the Engineer-in-Charge/Project Manager shall:

a) Decide that any works done or materials used by the Contractor or by any Sub-Contractor is defective or not in accordance with the Contract, or that the works or any portion thereof are defective, or do not fulfill the requirements of Contract (all such matters being hereinafter, called `Defects' in this clause), and

b) As soon as reasonably practicable, gives to the Contractor notice in writing of the said decision, specifying particulars of the defects alleged to exist or to have occurred, then the Contractor shall at his own expenses and with all speed make good the defects so specified.

In case, Contractor shall fail to do so, the Owner may take, at the cost of the Contractor, such steps as may take in all circumstances, be reasonable to make good such defects. The expenditure so incurred by the Owner will be recovered from the amount due to the Contractor. The decision taken by the Owner in this regard towards the amount to be recovered from the Contractor will be final and binding on the Contractor. As soon as the Work has been completed in accordance with the Contract (except in minor respects that do not affect their use for the purpose for which they are intended and have passed the tests on completion, the Owner shall be deemed to have taken over the Work on the date so certified.

74.2 Defects after Taking Over (If applicable)

In order that the Contractor could obtain a Completion he shall make good, with all possible speed, any defect arising from the defective materials supplied by the Contractor or workmanship or any act or omission of the Contract or that may have been noticed or developed, after the works has been taken over, the period allowed for carrying out such Work will be normally 01 (One) Month. If any defect be not remedied within a reasonable time, the Owner may proceed to do the Work at Contractor's risk and expense and deduct from the final bill such amount as may be decided by the Owner. If by reason of any default on the part of the Contractor a Completion has not been obtained in respect of any portion of the Work within 01 (One) Month after the date fixed by the Contract for the completion of the Work, the Owner shall be at liberty to use the Work or any portion thereof in respect of which a completion has not been obtained, provided that the Work or the portion thereof so used as aforesaid shall be afforded reasonable opportunity for completing these works for the Completion .

75. Guarantee/ Transfer of Guarantee

For the major Material/Products/Spares of the works & Projects including but not limited to PV Modules, Power Conditioning Units (PCU)/ Inverters, Transformers, Batteries (If applicable) etc the Contractor shall invariably engage OEMs/Sub-Contractors who are specialists in the field and OEM's/OPM's/firms of repute and such a OEM/OPM/Sub-Contractor shall furnish guarantees/warranties for their workmanship to the Owner directly in the name of Owner only without any deviation. The Contractor shall give the guarantee/warrantee to the Owner directly For other minor Material/Products/Spares also.

In case of the contract termination/cancellation and wherein the title of Guarantee/Warrantee for the major Material/Products/Spares of the works & Projects including but not limited to PV Modules, Power Conditioning Units (PCU)/ Inverters, Transformers, Batteries (If applicable) is in the name of the Contractor, then all such Guarantee/Warrantees for all such major products/material/spares will have to be mandatorily transferred in the name of Owner as soon as the contract is terminated/cancelled & no plea/deviation from the Contractor side will be entertained in this regard.

For works like water-proofing, acid and alkali resisting materials, pre-construction soil treatment against termite or any other specialized works etc. the Contractor shall invariably engage Sub-Contractors who are specialists in the field and firms of repute and such a Sub-Contractor shall furnish guarantees for their workmanship to the Owner, through the Contractor. In case such a Sub-Contractor is not prepared to furnish a guarantee to the Owner, the Contractor shall give that guarantee to the Owner directly.

76. Installation and Training of Employer's/ Owner's Personnel

76.1 **Tools & Tackles**

The Contractor shall provide technically suitable tools and tackles for installation & erection of Plant & Machineries conforming to relevant BIS safety and technical standards for proper execution of work. The Owner, in no way, shall be responsible for supply of any tools and tackles for implementation of the work and also to carry out operation & maintenance activities.

76.2 **Setting up/Supervision/Labor**

76.2.1 **Bench Mark:**

The Contractor shall be responsible for the true and proper setting-up of the Facilities in relation to bench marks, reference marks which are mutually agreed upon by the Contractor and Owner.

If, at any time during the progress of installation of the Facilities, any error shall appear in the position, level or alignment of the Facilities, the Contractor shall forthwith notify the Project Manager of such error and, at its own expense, immediately rectify such error.

76.2.2 Contractor's Supervision:

The Contractor shall give or provide all necessary supervision during the installation of the Facilities, and the Construction Manager or its deputy shall be constantly on the Site to provide full-time supervision of the installation. The Contractor shall provide and employ only technical personnel who are skilled and experienced in their respective fields and supervisory staff who are competent to adequately supervise the work at hand.

76.2.3 Labour:

The Contractor shall provide and employ on Site in the installation of the Facilities such skilled, semi-skilled and unskilled labor as is necessary for proper and timely execution of the Contract. The Contractor is encouraged to use local labor that has the necessary skills.

Unless otherwise provided in the Contract, the Contractor shall be responsible for the recruitment, transportation, accommodation, sanitation, first aid facility and catering of all labor, local or expatriate, required for the execution of the Contract and for all payments in connection therewith.

The Contractor shall be responsible for obtaining all necessary permit(s) and/or visa(s) from the appropriate authorities for the engagement and entry of all labour and personnel to be employed by Contractor on the Site including that of his sub-Contractors.

The Contractor shall at all times during the progress of the Contract use its best endeavors to prevent any unlawful, riotous or disorderly conduct or behavior by or amongst its employees and the labour of its SubContractors.

The Contractor shall, in all dealings with its labour and the labour of its SubContractors currently employed on or connected with the Contract, pay due regard to all recognized festivals, official holidays, religious or other customs and all local laws and regulations pertaining to the employment of labor.

The Contractor shall keep the Owner indemnify, during construction as well as during O&M period, in respect of compliance with the statutory provisions in respect to the labor employed at site.

Upon completion of the construction activities/ O&M activities, the Contractor shall obtain no – objection certificate (NOC) from local/ statutory bodies in respect to the fulfillment of all compliance and submit a copy to the Owner prior to the final settlement

76.3 **Contractor's Equipment**

76.3.1 All equipment brought by the Contractor onto the Site shall be deemed to be intended to be used exclusively for the execution of the Contract. The Contractor shall not remove the same from the Site without the Project Manager's consent that such Contractor's Equipment is no longer required for the execution of the Contract.

All the necessary approvals with due taxes, insurance and license, as required for the use of equipment at site, are to be taken by the Contractor.

The equipment should be in a good operating condition for safe use at site. The operator shall be competent to operate. It is advised to keep adequate spares, consumables, etc to reduce the breakdown time.

76.3.2 Unless otherwise specified in the Contract, upon completion of the Facilities, the Contractor shall remove from the Site all Equipment brought by the Contractor onto the Site.

76.4 **Site Regulations and Safety**

Contractor shall submit the EHS policy for the site to the Project Manager/EIC within 14 (fourteen) days from effective date and shall abide by the rules and regulations of the EHS policy.

The Contractor shall have to provide necessary and adequate safety measures including personal protective equipment and precautions to avoid any accident, which may cause damage to any equipment / material or injury to workmen. The Owner shall not be liable for any such accidents during the performance of the contract.

The Contractor, if required, will provide necessary safety training to workmen. Also, Contractor shall engage sufficient security guards to protect Facility from any theft and unauthorized access to site during the entire construction and O&M periods.

76.5 **Site Clearance**

76.5.1 Site Clearance in Course of Performance

In the course of carrying out the Contract, the Contractor shall keep the Site reasonably free from all unnecessary obstruction, store or remove any surplus materials, clear away any wreckage, packaging material, rubbish & debris and temporary installations from the Site, and remove any Contractor's Equipment no longer required for execution of the Contract with due approval of the Owner.

76.5.2 Site Clearance after Completion

After Completion of all parts of the Facilities, the Contractor shall clear away and remove all wreckage, packaging material, rubbish & debris and temporary works & installations of any kind from the Site with due approval of the Owner and shall leave the Site and Facilities clean and safe.

76.5.3 **Disposal of Scrap**

The term 'Scrap' shall refer to scrap/ waste/ remnants arising out of the unpacking of equipment, construction debris, breakage of modules, fabrication of structural steel work and piping work at the project site in the course of execution of the contract and shall also include any wastage of cables during the termination process while installing the cables.

The Contractor shall with the agreement of the Owner promptly remove from the site any 'Scrap' generated during Performance of any activities at site in pursuance of the Contract.

The disposal of such Scrap shall vest with the Contractor for the items supplied by the Contractor and issued by Owner under this contract for installation and construction without any additional cost to the Owner. The removal of scrap shall be subject to the due approval of Owner & Contractor producing the necessary clearance from the relevant authorities, if required by the law, in respect of disposal of the scrap. The liability for the payment of the applicable GST shall be that of the Contractor.

The Contractor shall also indemnify to keep the Owner harmless from any act of omission or negligence on the part of the Contractor in following the statutory requirements with regard to removal/disposal of scrap. The undertaking shall be furnished by Contractor as per Format enclosed in the Section VI of Forms & Formats. Further, in case the laws require the Owner to take prior permission of the relevant Authorities before handing over the scrap to the Contractor, the same shall be obtained by the Contractor on behalf of the Owner.

In case, the scrap is generated against the free issue material supplied by the Owner, the Contractor shall maintain a separate record of same and intimate Owner before its disposal thereafter. After due approval from Owner, the scrap should be disposed of and its value shall be remitted to the Owner.

76.5.4 **Watch & Ward and Lighting**

The Contractor shall provide and maintain at its own expense all lighting, fencing, watch and ward wherever necessary for the proper execution and the protection of the Facilities, or for the safety of the Owners and occupiers of adjacent property and for the safety of the public during the entire construction and O&M period.

76.6 **Training**

The period and the nature of training for the individual personnel shall be agreed upon mutually between the Contractor and the Owner. These personnel shall be given special training at the shops, where the equipment will be manufactured and/ or in their collaborator's works and where possible, in any other plant where equipment manufactured by the Contractor or his collaborators is under installation or test to enable those personnel to become familiar with the equipment being furnished by the Contractor. Owner shall bear the cost of Boarding, Lodging & Travel only for the said personnels.

The Contractor undertakes to provide training to Personnel selected and sent by the Owner at the works of the Contractor without any cost to the Owner.

77. Replacement of Defective Parts and Materials

77.1 If during the progress of the Work, Owner shall decide and inform in writing to the Contractor, that the Contractor has manufactured any plant or part of the plant unsound or imperfect or has furnished plant inferior to the quality specified, the Contractor on receiving details of such defects or deficiencies shall at his own expenses within 07 (Seven) days of his receiving the notice, or otherwise within such time as may be reasonably necessary for making it good, proceed to alter, re-construct or remove such work and furnish fresh equipment's up to the standards of the specifications.

In case the Contractor fails to do so, Owner may on giving the Contractor 07 (Seven) day notice in writing of his intentions to do so, proceed to remove the portion of the Work so complained of and at the cost of Contractor's, perform all such works or furnish all such equipment's provided that nothing in the clause shall be deemed to deprive the Owner of or affect any rights under the Contract, the Owner may otherwise have in respect of such defects and deficiencies.

78. Indemnity

78.1 If any action is brought before a Court, Tribunal or any other Authority against the Employer/ Owner or an officer or agent of the Employer/ Owner, for the failure, omission or neglect on the part of the Contractor to perform any acts, matters, covenants or things under the Contract, or damage or injury or death caused by the alleged omission or negligence on the part of the Contractor, his agents, representatives or his Sub-Contractor's, or in connection with any claim based on lawful demands

of Sub-Contractor's workmen suppliers or employees, the Contractor, shall in such cases indemnify and keep the Employer/ Owner and/ or their representatives harmless from all losses, damages, expenses or decrees arising out of such action.

79. Construction Aids, Equipment, Tools & Tackles

79.1 Contractor shall be solely responsible for making available for executing the Work, all requisite Construction Equipments, Special Aids, Barges, Cranes and the like, all Tools, Tackles and Testing Equipment and Appliances, including imports & insurance of such equipment etc. as required. In case of import of the same the rates applicable for levying of Custom Duty on such Equipment, Tools & Tackles and the duty drawback applicable thereon shall be ascertained by the Contractor from the concerned authorities of Government of India. It shall be clearly understood that Owner shall not in any way be responsible for arranging to obtain Custom Clearance and/ or payment of any duties and/ or duty draw backs, license etc. for such equipment's so imported by the Contractor and the Contractor shall be fully responsible for Goods and Service Tax (GST) and documentation with regard to the same. Bidder in his own interest may contact, for any clarifications in the matter, concerned agencies/ Dept./ Ministries of Govt. of India. All clarifications so obtained and interpretations thereof shall be solely the responsibility of the Contractor.

[F] CERTIFICATES AND PAYMENTS

80. Schedule of Rates and Payments

80.1 Contractor's Remuneration

For EPC/ Lumpsum Turnkey Contracts, the billing procedure will follow as per the prescribed payment terms as defined in Special Conditions of Contract (SCC).The price to be paid by the Owner to Contractor for the whole of the Work to be done and for the performance of all the obligations undertaken by the Contractor under the Contract Documents shall be ascertained by the application of the respective Schedule of Rates (the inclusive nature of which is more particularly defined by way of application but not of limitation, with the succeeding Clause of this clause) and payment to be made accordingly for the Work actually executed and approved by the Engineer-in-Charge/Project Manager. The sum so ascertained shall (excepting only as and to the extent expressly provided herein) constitute the sole and inclusive remuneration of the Contractor under the Contract and no further or other payment whatsoever shall be or become due or payable to the Contractor under the Contract.

80.2 Schedule of Rates to be Inclusive

The prices quoted by the Contractor shall remain firm till the contract period and shall not be subject to escalation. Schedule of Rates shall be deemed to include and cover all costs, expenses and liabilities of every description and all risks of every kind to be taken in executing, completing and handing over the Work to the Owner by the Contractor. The Contractor shall be deemed to have known the nature, scope, magnitude and the extent of the Work and materials required though the Contract Document may not fully and precisely furnish them. Bidders in the Schedule of Rates should cover all costs as he may consider necessary to cover the cost of any works and materials as may be reasonable and necessary to complete the Work. Generality of this present provision shall not be deemed to cut down or limit in any way because in certain cases it may and in other cases it may not be expressly stated that the Contractor shall do or perform a work or supply articles or perform services at his own cost or without addition of payment or without extra charge or words to the same effect or that it may be stated or not stated that the same are included in and covered by the Schedule of Rates.

80.3 Schedule of Rates to Cover Construction Equipments, Materials, Labour etc.

Without in any way limiting the provisions of the preceding Clause the Schedule of Rates shall be deemed to include and cover the cost of all construction equipment, temporary Work (except as provided for herein), pumps, materials, labour, insurance, fuel, consumables, stores and appliances to be supplied by the Contractor and all other matters in connection with each item in the Schedule of Rates and the execution of the Work or any portion thereof finished, complete in every respect and maintained as shown or described in the Contract Documents or as may be ordered in writing during the continuance of the Contract.

80.4 Schedule of Rates to Cover Royalties, Rents and Claims

The Schedule of Rates (i.e., Contract Value) shall be deemed to include and cover the cost of all Royalties and Fees for the articles and processes, protected by letters, patent or otherwise incorporated in or used in connection with the Work, also all Royalties, Rents and other payments in connection with obtaining materials of whatsoever kind for the Work and shall include an Indemnity to the Employer/ Owner which the Contractor hereby gives against all actions, proceedings, claims, damages, costs and expenses arising from the incorporation in or use on the Work of any such articles, processes or materials, other municipal or local Board Charges, if levied on materials, equipment or machineries to be brought to site for use on Work shall be borne by the Contractor.

80.5 Schedule of Rates to Cover GST/Applicable taxes

No exemption or reduction of Duties, Goods & Service Tax (GST) on Works Contract quay or any port dues, transport charges, stamp duties or Central or State Government or Local Body or Municipal Taxes or from or of any other body, whatsoever, will be granted or obtained, all of which expenses shall be deemed to be included in and covered by the Schedule of Rates. The Contractor shall also obtain and pay for all permits or other privileges necessary to complete the Work.

80.6 Schedule of Rates to Cover Risks of Delay

The Schedule of Rates shall be deemed to include and cover the risk of all possibilities of delay and interference with the Contractor's conduct of Work which occur from any causes including orders of the Employer/ Owner in the exercise of his power and on account of extension of time granted due to various reasons and for all other possible or probable causes of delay.

80.7 Schedule of Rates Cannot be Altered

(a) For Engineering, Procurement and Commissioning (EPC) Contracts or Lumpsum Turnkey (LSTK) Contracts, the total Project/ Contract Value stands to be fixed inclusive of entire items, Materials, Spares, Consumables, Services, Erection and all quoted and unquoted items/ Services in the Bill of Quantity (BOQ) of the Tender/ Contract. Contract Value of such EPC Contracts comprises of all the related costs required for successful execution of the work. The final payment outlay or total cost of the project will be limited to the total value of the EPC Contract and O & M Contract. Any kind of variations related to Total Contract Value shall be to Contractor’s account. The payment will be made according to the Work carried out, for which purpose an item wise, or work wise Schedule of Rates shall be furnished, suitable for evaluating the value of Work done and preparing running account bill.

(b) If applicable, For Item Rate Contracts, no alteration will be allowed in the Schedule of Rates by reason of works or any part of them being modified, altered, extended, diminished or committed. The Schedule of Rates are fully inclusive of rates which have been fixed by the Contractor and agreed to by the Employer/Owner and cannot be altered.

Based on the mechanism of Tender as described in the Special Conditions of Contract (SCC), the methodologies described above shall prevail. However, payment for any additional work

which is not covered in the Schedule of Rates, shall only be released on issuance of change order.

81. Procedure for Measurement and Billing

81.1 Billing Procedure

Following procedures shall be adopted for billing of works executed by the Contractor.

81.1.1 For EPC/ Lumpsum Turnkey Contracts, the billing procedure will follow as per the prescribed payment terms as defined in Special Conditions of Contract (SCC).

81.1.2 If applicable, For Item Rate Contracts, all measurements shall be recorded in sextuplicate on standard measurement sheets in duly approved formats for scrutiny and passing by Employer/ Owner. Employer/ Owner shall scrutinize and check the measurements recorded on the sheets and shall certify correctness of the same on the measurement sheets.

81.1.3 Engineer-in-Charge/Project Manager shall pass the bills after carrying out the comprehensive checks in accordance with the terms and conditions of the Contracts, within 21 (Twenty-one) days of submission of the bills along with all necessary enclosures and documents, complete in all respects and send the same to the Owner to effect payment to the Contractor as per the defined payment terms.

81.1.4 Owner shall make all endeavor to make payments of undisputed amount of the bills submitted based on the joint measurements within 30 (Thirty) days from the date of certification by the Engineer-in-Charge/Project Manager. Any disputed claims/amounts will be mutually settled and paid accordingly.

81.1.5 Measurements shall be recorded as per the methods of measurement spelt out in Contract Document.

81.2 Secured Advance on Material

Unless otherwise provided in the SCC of the tender, no ‘Secured Advance' on security of materials brought to site for execution of contracted items(s) shall be paid to the Contractor whatsoever.

81.3 Dispute in Mode of Measurement

In case of any dispute as to the mode of measurement not covered by the Contract to be adopted for any item of Work, mode of measurement as per latest Indian Standard Specifications shall be followed.

81.4 Rounding-Off of Amounts

In calculating the amount of each item due to the Contractor in every certificate prepared for payment, sum of less than 50 paise shall be omitted and the total amount on each certificate shall be rounded off to the nearest rupees, i.e., sum of less than 50 paise shall be omitted and sums of 50 paise and more up to one rupee shall be reckoned as one rupee.

82. Lumpsum in Tender

82.1 The payment against any Lumpsum item shall be made only on completion of that item (Excluding Milestones linked payment structure) as per the provision of the Contract after certification by Engineer-in-Charge/Project Manager.

83. Running Account Payments to be regarded as Advance

83.1 All running account payments shall be regarded as payment by way of advance against the final payment only and not as payments for Work actually done and completed and shall not preclude the requiring of bad, unsound and imperfect or unskilled work to be removed and taken away and reconstructed or re-erected or be considered as an admission of the due performance of the Contract, or any part thereof, in this respect, or of the occurring of any claim by the Contractor, nor shall it conclude, determine or affect in any way the powers of the Employer/ Owner under these conditions or any of them as to the final settlement and adjustment of the accounts or otherwise, or in any other way vary or affect the Contract.

The final bill shall be submitted by the Contractor within 01 (One) Month of the date of the final acceptance of the Work; otherwise, the Engineer-in-Charge/Project Manager's measurement and of total amount payable for the Work accordingly shall be final and binding on all parties

84. Notice of Claims for Additional Payments

84.1 Should the Contractor consider that he is entitled to any extra payment for any extra/ additional Works or Material change in original Specifications carried out by him in respect of Work he shall forthwith give notice in writing to the Engineer-in-Charge/Project Manager that he claims extra payment. Such notice shall be given to the Engineer-in-Charge/Project Manager upon which Contractor bases such claims and such notice shall contain full particulars of the nature of such claim with full details of amount claimed. Irrespective of any provision in the Contract to the contrary, the Contractor must intimate his intention to lodge claim on the Owner within 10 (Ten) days of the commencement of happening of the event and quantify the claim within 30 (Thirty) days, failing which the Contractor will lose his right to claim any compensation /reimbursement/ damages etc. or refer the matter to arbitration. Separate bills shall be raised for the extra claim.

84.2 Engineer-in-Charge/Project Manager shall review such claims within a reasonably period of time and cause to discharge these in a manner considered appropriate after due deliberations thereon. However, Contractor shall be obliged to carry on with the Work during the period in which his claims are under consideration by the Owner, irrespective of the outcome of such claims, where additional payments for Works considered extra are justifiable in accordance with the Contract provisions,

Owner shall arrange to release the same in the same manner as for normal Work payments. Such of the extra works so admitted by Owner shall be governed by all the terms, conditions, stipulations and specifications as are applicable for the Contract. Settlement of all extra claims shall be taken up after Project commissioning.

85 Payment of Contractor's Bill

85.1 Payment due to the Contractor shall be made by the Owner either by e-Banking or by Account Payee Cheque forwarding the same to registered office or the notified office of the Contractor. In no case, will Owner be responsible if the cheque is mislaid or misappropriated by unauthorized person/ persons. In all cases, the Contractor shall present his bill duly pre-receipted on proper revenue stamp & payment shall be made in Indian Currency only.

85.2 In general payment of final bill shall be made to Contractor within 60 days of the submission of bill on joint measurements, after completion of all the obligations under the Contract against the final completion.

86 Receipt for Payment

86.1 Receipt for payment made on account of work when executed by a company, must be signed by a person holding due power of attorney in this respect on behalf of the Contractor, except when the

Contractor's are described in their tender as a limited company in which case the receipts must be signed in the name of the company by one of its principal officers or by some other person having authority to give effectual receipt for the company.

87. Handing Over – Taking Over

87.1 Subsequent to Operational Acceptance of the Facilities by the Employer and within 15 (Fifteen) days of the commencement of the O&M period, the Contractor shall furnish an Indemnity Bond/ undertaking as per "Sample Forms and Formats" which is to be executed by the Contractor for the plant handed over by Owner for performance of its O&M Contract (Entire Solar Photo Voltaic Plant).

The Facility shall be taken over by the Owner upon successful Operational Acceptance in accordance with GCC Clause 43.3 (Operational Acceptance).

Immediately after taking over of complete facilities (s), the Facilities will be handed over to the Contractor for Comprehensive Operation & Maintenance for a period as mentioned in the Contract document.

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88. Final Decision and Final Acceptance

88.1 Upon expiry of the period of liability & the Works have been duly maintained by the Contractor during monsoon or such period as hereinbefore provided in Clause 73 & 74 and that the Contractor has in all respect duly made-up any subsidence and performed all his obligations under the Contract, the Owner give a final acceptance to that effect and the Contractor shall not be considered to have fulfilled the whole of his obligations under Contract until Final acceptance shall have been given by the Owner notwithstanding any previous entry upon the Work and taking possession, working or using of the same or any part thereof by the Owner.

89. Certificate and Payments on Evidence of Completion

89.1 Except the Final Acceptance, no other payments on general account shall be taken to be an admission by the Owner of the due performance of the Contract or any part thereof or of occupancy or validity of any claim by the Contractor.

90. Deductions from the Contract Price

90.1 All costs, damages or expenses which Owner may have paid or incurred, which under the provisions of the Contract, the Contractor is liable/ will be liable, will be claimed by the Owner. All such claims shall be billed by the Owner to the Contractor regularly as and when they fall due. Such claims shall be paid by the Contractor within 15 (Fifteen) days of the receipt of the corresponding bills and if not paid by the Contractor within the said period, the Owner may, then, deduct the amount from any moneys due including Contract Performance Security or becoming due to the Contractor under the Contract or may be recovered by actions of law or otherwise, if the Contractor fails to satisfy the Owner of such claims.

[G] TAXES AND INSURANCE

91. Goods & Service Tax (GST)/Taxes

91.1 The Contractor agrees to and does hereby accept full and exclusive liability for the payment of any and GST/all Taxes. now in force or hereafter imposed, increased, modified, from time to time in respect of Works and materials and all contributions and taxes for unemployment compensation,

insurance and old age pensions, PF, ESI etc or annuities now in force or hereafter imposed by any Central or State Government authorities which are imposed with respect to or covered by the wages, salaries or other compensations paid to the persons employed by the Contractor and the Contractor shall be responsible for the compliance of all Sub-Contractors, with all applicable Central, State, Municipal and local law and regulation and requirement of any Central, State or local Government agency or authority.

Contractor further agrees to defend, indemnify and hold Employer/ Owner harmless from any liability or penalty which may be imposed by the Central, State or Local authorities by reason or any violation by Contractor or Sub-Contractor of such laws, suits or proceedings that may be brought against the Employer/ Owner arising under, growing out of, or by reason of the work provided for by this Contract, by third parties, or by Central or State Government authority or any administrative sub-division thereof. Tax deductions will be made as per the rules and regulations in force in accordance with acts prevailing from time to time.

92. Goods & Service Tax (GST)

92.1 Bidder should quote all-inclusive prices including the liability of GST (in line with the given SOR Format) whether on the works contract as a whole or in respect of bought out components used by the Contractor in execution of the Contract. Owner/Employer shall not be responsible for any such liability of the Contractor in respect of this Contract.

93. Statutory Variations

93.1 Goods & Service Tax (GST) [applicable for both Centre and state] and other levies [if any] payable by the Contractor under the Contract, or for any other cause, shall be included in the rates/ prices and the total bid-price submitted by the Bidder. Applicable rate of GST shall be indicated in Agreed SOR formats.

93.2 In case of any variation (positive/ negative) in existing rates of GST/taxes or a new tax/ duty/ levy is introduced or any existing tax/ duty/ levy is abolished or application of any Tax in the course of the performance of this Contract, which will/ may impact the overall pricing in connection with performance of the Contract, an equitable adjustment of the Contract Price shall be made to factor any such change by addition to the Contract Price or deduction therefrom, as the case may be.

All these adjustments would be carried out by considering the base price of GST/taxes equivalent to the amount mentioned under GST/taxes column of the SOR/ PS.

93.3 However, any increase in the rate of these taxes, duties and levies beyond the contractual completion period shall be to Contractor's account and any decrease shall be passed on to Owner.

94. Insurance

94.1 During the Contract period including O&M period, i.e., during Construction & O&M period, all insurance related expenses shall be borne by the Contractor. The goods supplied under the Contract shall be fully insured against the loss or damage incidental to manufacture or acquisition, transportation, storage and delivery in such a manner that Owner shall not incur any financial loss, as long as the plant continues to remain under the custody of the Contractor. During O&M period also (after the Construction period is over), the insurances shall be in the scope of the Contractor.

94.2 In case of any loss or damage or pilferage or theft or fire accident or combination of the said incidents etc. under the coverage of insurance, the Contractor shall lodge the claim as per rules of insurance. Any FIR required to be lodged to local Police Station shall be the responsibility of the Contractor.

94.3 The Contractor shall arrange to supply/ rectify/ recover the materials without waiting for settlement of the insurance claim and even if the claim is unsettled for timely completion of the project. The final financial settlement with the insurance company shall rest upon the Contractor.

94.4 In case of any delay of the project attributable to the Contractor, the Contractor himself in consultation with Owner/Employer shall take the extension of insurance. Any financial implications shall be borne by the Contractor.

94.5 The Contractor should arrange for providing insurance coverage to its workmen under Workmen's Compensation Act or similar Rules and Acts as applicable during execution of work for covering risk against any mishap to its workmen. The Contractor shall also undertake a Third-Party Insurance and shall at all times keep Owner indemnified against any Third-Party claims and shall arrange to settle them at the earliest. The Owner/ Employer will not be liable for any such loss or mishap.

94.6 All other insurance like In – transit insurance (Marine/ Cargo/ others as applicable), Construction All Risk, Erection All Risk, workmen compensation ,fire, third party liability, insurance against theft, Contractor's Equipments, machinery breakdown policy & his vehicles and others as required for the Construction and O&M of the Plant and to indemnify the Owner/ equipment/ material and resources shall be borne by the Contractor.

94.7 Owner shall be named as co – insured under all insurance policies taken out by the Contractor, except for the workmen compensation, third party liability and Owner's liability insurances. All insurers' rights of subrogation against such co – insured for losses or claims arising out of the performance of the contract shall be waived under such policies.

94.8 All the insurance cover taken for the construction and O&M period shall be seamless in nature & preferably taken from the same insurance company.

94.9 The insurance is to be suitably taken for the activity/ act which is required to cover all the risks associated to the activity / act. The Contractor shall be responsible to take suitable insurance till the completion of the O&M contract and indemnify the Employer/Owner from all associated risks whatsoever.

94.10 The Contractor shall be responsible to take suitable insurance(s) and claim management during and till the completion of the O&M contract and indemnify the Owner from all associated risks whatsoever.

94.11 Employees State Insurance (ESI) Act

The Contractor agrees to and does hereby accept full and exclusive liability for the compliance with all obligations imposed by the Employee State Insurance Act 1948 and the Contractor further agrees to defend, indemnify and hold Employer/ Owner harmless for any liability or penalty which may be imposed by the Central, State or Local authority by reason of any asserted violation by Contractor or Sub-Contractor of the Employees' State Insurance Act, 1948, and also from all claims, suits or proceeding that may be brought against the Employer/ Owner arising under, growing out of or by reasons of the work provided for by this Contractor, by third parties or by Central or State Government authority or any political sub- division thereof.

The Contractor agrees to fill in with the Employee's State Insurance Corporation, the Declaration Forms, and all forms which may be required in respect of the Contractor's or Sub-Contractor's employees, who are employed in the Work provided for or those covered by ESI from time to time under the Agreement. The Contractor shall deduct and secure the agreement of the Sub-Contractor to deduct the Employee's contribution as per the first schedule of the Employee's State Insurance Act from wages and affix the Employees Contribution Card at wages payment intervals.

The Contractor shall remit and secure the agreement of Sub-Contractor to remit to the Employee's State Insurance Corporation Account, the Employee's contribution as required by the Act. The Contractor agrees to maintain all cards and Records as required under the Act in respect of employees and payments and the Contractor shall secure the agreement of the Sub-Contractor to maintain such records. Any expenses incurred for the contributions, making contributions or maintaining records shall be to the Contractor's or Sub-Contractor's account.

94.11 Workmen Compensation and Employer's/Owner's Liability Insurance

Insurance shall be effected for all the Contractor's employees engaged in the performance of this Contract. If any of the work is sublet, the Contractor shall require the Sub-Contractor to provide workman's Compensation and Owner's liability insurance for the latter's employees if such Employees are not covered under the Contractor's Insurance.

94.12 Accident or Injury to Workmen

The Employer/ Owner shall not be liable for or in respect of any damages or compensation payable at law in respect or in consequence of any accident or injury to any workman or other person in the Employment of the Contractor or any Sub-Contractor and the Contractor shall indemnify and keep indemnified the Employer/ Owner against all such damages and compensation (save and except and aforesaid) and against all claims, demands, proceeding, costs, charges and expenses, whatsoever in respect or in relation thereto.

94.13 Transit Insurance

In respect of all items to be transported by the Contractor to the Site of Work and any consequential risks, the cost of transit insurance shall be borne by the Contractor and the quoted price shall be inclusive of this cost.

94.14 Comprehensive Automobile Insurance

This insurance shall be in such a form as to protect the Contractor against all claims for injuries, disability, disease and death to members of public including Employer's/ Owner's men and damage to the property of others arising from the use of motor vehicles during on or off the site operations, irrespective of the Employership of such vehicles.

94.15 Comprehensive General Liability Insurance

a) This insurance shall protect the Contractor against all claims arising from injuries, disabilities, disease or death of member of public or damage to property of others due to any act or omission on the part of the Contractor, his agents, his employees, his representatives and Sub-Contractor's or from riots, strikes and civil commotion.

b) Contractor shall take suitable Group Personal Accident Insurance Cover for taking care of injury, damage or any other risks in respect of his Engineers and other Supervisory staff who are not covered under Employees State Insurance Act.

c) The policy shall cover third party liability. The third party (liability shall cover the loss/ disablement of human life (person not belonging to the Contractor) and also cover the risk of damage to others materials/ equipment/ properties during construction, erection and commissioning at site & during O&M period.

The value of third-party liability for compensation for loss of human life or partial/ full disablement shall be of required statutory value but not less than INR 02 (Two) Lakhs per death, INR 1.5 (One and Half) Lakhs per full disablement and INR 1 (One) Lakh per partial disablement and shall

nevertheless cover such compensation as may be awarded by Court by Law in India and cover for damage to others equipment/ property as approved by the Purchaser. However, third party risk shall be maximum to INR 10 (Ten) Lakhs for death.

d) The Contractor shall also arrange suitable insurance to cover damage, loss, accidents, risks etc., in respect of all his plant, equipment and machinery, erection tools & tackles and all other temporary attachments brought by him at site to execute the work.

e) The Contractor shall take out insurance policy in the joint name of Owner and Contractor from one or more nationalized insurance company from any branch office at Project site.

f) Any such insurance requirements as are hereby established as the minimum policies and coverages which Contractor must secure and keep in force must be complied with, Contractor shall at all times be free to obtain additional or increased coverages at Contractor's sole expenses.

viii) **ANY OTHER INSURANCE REQUIRED UNDER LAW OR REGULATIONS OR BY OWNER:**

Contractor shall also carry and maintain any and all other insurance(s) which he may be required under any law or regulation from time to time without any extra cost to Owner. He shall also carry and maintain any other insurance which may be required by the Owner.

95 Damage to Property or to any Person or any Third Party

95.1 Contractor shall be responsible for making good to any loss or any damage to structures and properties belonging to the Owner or being executed or procured or being procured by the Owner or of other agencies within in the premises of all the work of the Owner, if such loss or damage is due to fault and/ or the negligence or willful acts or omission of the Contractor, his employees, agents, representatives or Sub-Contractors.

95.2 The Contractor shall take sufficient care in moving his plants, equipment and materials from one place to another so that they do not cause any damage to any person or to the property of the Employer/ Owner or any third party including overhead and underground cables and in the event of any damage resulting to the property of the Owner or of a third party during the movement of the aforesaid plant, equipment or materials the cost of such damages including eventual loss of production, operation or services in any plant or establishment as estimated by the Employer/ Owner or ascertained or demanded by the third party shall be borne by the Contractor. Third party liability risk shall be INR 1 (One) Lakh for single accident and limited to INR 10 (Ten) Lakhs.

95.3 The Contractor shall indemnify and keep the Employer/ Owner harmless of all claims for damages to property other than Employer's/ Owner's property arising under or by reason of this agreement, if such claims result from the fault and/ or negligence or willful acts or omission of the Contractor, his employees, agents, representative of Sub-Contractor.

[H] LABOUR LAWS

96. Labour Laws & Indemnity Bond

i) No labour below the age of 18 (Eighteen) Years shall be employed on the Work.

ii) The Contractor shall at his expense comply with all labour laws and keep the Employer/ Owner indemnified in respect thereof.

iii) The Contractor shall employ labour in sufficient numbers either directly or through Sub-Contractor's to maintain the required rate of progress and of quality to ensure workmanship of the degree specified in the Contract.

iv) The Contractor shall indemnify the Employer/ Owner against any payments to be made under and for the observance of the provisions of the aforesaid labour compliances without prejudice to his right to obtain indemnity from his Sub-Contractor's.

v) The Contractor shall also indemnify to keep the Owner/ Employer harmless from any act of omission or negligence on the part of the Labour Laws compliance in following the statutory requirements with regard to Labour laws. Against the signing of the contract, The Indemnity Bond shall be furnished by Contractor as per Format enclosed under Forms and Formats for the labour law compliance.

vi) Upon completion of the construction activities/ O&M activities, the Contractor shall obtain no – objection certificate (NOC) from local/ statutory bodies in respect to the fulfillment of all compliance related to labour law and submit a copy to the Employer/Owner prior to the final settlement

97. Void

98. Contractor to Indemnify the Employer/ Owner

98.1 The Contractor shall indemnify the Employer/ Owner and every member, office and employee of the Employer/ Owner, also the Engineer-in-Charge/Project Manager and his staff against all actions, proceedings, claims, demands, costs and expenses whatsoever arising out of or in connection with the matters referred to in Clause 95 and elsewhere and all actions, proceedings, claims, demands, costs and expenses which may be made against the Employer/ Owner for or in respect of or arising out of any failure by the Contractor in the performance of his obligations under the Contract Document.

The Employer/ Owner shall not be liable for or in respect of or arising out of any failure by the Contractor in the performance of his obligations under the Contract Document. The Employer/ Owner shall not be liable for or in respect of any demand or compensation payable by law in respect or in consequence of any accident or injury to any workmen or other person. In the employment of the Contractor or his Sub-Contractor the Contractor shall indemnify and keep indemnified the Employer/ Owner against all such damages and compensations and against all claims, damages, proceedings, costs, charges and expenses whatsoever in respect thereof or in relation thereto.

98.2 **Payment of Claims and Damages**

Should the Employer/ Owner have to pay any money in respect of such claims or demands as aforesaid the amount so paid and the costs incurred by the Employer/ Owner shall be charged to and paid by the Contractor and the Contractor shall not be at liberty to dispute or question the right of the Employer/ Owner to make such payments notwithstanding the same, may have been made without the consent or authority or in law or otherwise to the contrary.

98.3 In every case in which by virtue of the provisions of Section 12, Sub-section (i) of workmen's compensation Act, 1923 or other applicable provision of Workmen Compensation Act or any other Act, the Employer/ Owner is obliged to pay compensation to a workman employed by the Contractor in execution of the Work, the Employer/ Owner will recover from the Contractor the amount of the compensation so paid, and without prejudice to the rights of Employer/ Owner under Section 12, Sub- section (2) of the said Act, Employer/ Owner shall be at liberty to recover such amount or any part thereof by deducting it from the Contract Performance Security or from any sum due to the

Contractor whether under this Contract or otherwise. The Employer/ Owner shall not be bound to contest any claim made under Section 12, Sub-section **(i)** of the said act, except on the written request of the Contractor and upon his giving to the Employer/ Owner full security for all costs for which the Employer/ Owner might become liable in consequence of contesting such claim.

99. Health and Sanitary Arrangements for Workers

99.1 In respect of all labour directly or indirectly employed in the Works for the performance of the Contractor's part of this agreement, the Contractor shall comply with or cause to be complied with all the rules and regulations of the local sanitary and other authorities or as framed by the Owner from time to time for the protection of health and sanitary arrangements for all workers.

99.2 The Contractor shall provide in the labour colony all amenities such as electricity, water and other sanitary and health arrangements. The Contractor shall also provide necessary surface transportation to the place of work and back to the colony for their personnel accommodated in the labour colony.

[I] APPLICABLE LAWS & SETTLEMENT OF DISPUTES

100. Arbitration

Normally all disputes should be settled by negotiations between the Owner and the concerned parties.

In case any dispute / difference is not settled through negotiations, the respective parties can seek remedy through Arbitration only by invoking the same within 120 days of raising of dispute. No disputes shall be referred to civil courts other than through Arbitration.

The issues/ disputes which cannot be mutually resolved through negotiations within the time stipulated above, all such disputes shall be referred to arbitration by Sole Arbitrator.

Owner shall suggest a panel of three independent and distinguished persons to the Contractor/ Supplier (as the case may be) to select any one among them to act as the Sole Arbitrator. In the event of failure of the other parties to select the Sole Arbitrator within 30 (Thirty) Days from the receipt of the communication suggesting the panel of arbitrators, the right of selection of the sole arbitrator by the other party shall stand forfeited and Owner shall have discretion to proceed with the appointment of the Sole Arbitrator. The decision of Owner on the appointment of the sole arbitrator shall be final and binding on the parties. The award of sole arbitrator shall be final and binding on the parties and unless directed/ awarded otherwise by the sole arbitrator, the cost of arbitration proceedings shall be shared equally by the parties.

The Arbitration proceedings shall be in English language and venue shall be the State of the Owner as specified in the BDS/SCC. Subject to the above, the provisions of (Indian) Arbitration & Conciliation Act 1996 and the Rules framed there under shall be applicable. All matter relating to this contract are subject to the exclusive jurisdiction of the court situated in the state of the Owner as specified in the BDS/SCC.

Above mentioned Arbitration clause will be applicable for the Disputes where the amount of claim is less than or equal to INR 1Crore (Indian Rupees One Crore only). For the cases of disputes where the amount of claim is more than INR 1 Crore (Indian Rupees One Crore), such disputes will be settled through commercial Courts established under the Commercial Courts, Commercial Division and Commercial Appellate divisions of High Courts act, 2015.Before going to the commercial court

for settlement, such disputes be first referred to conciliation for settlement and in case of failure in conciliation, disputes be referred to the commercial courts for adjudication. In cases of funded packages, the aforesaid changes shall be implemented after concurrence of the funding agency.

FOR THE SETTLEMENT OF DISPUTES BETWEEN GOVERNMENT DEPARTMENT AND ANOTHER AND ONE GOVERNMENT DEPARTMENT AND PUBLIC ENTERPRISE AND ONE PUBLIC ENTERPRISE AND ANOTHER THE ARBITRATION SHALL BE AS FOLLOWS:

In the event of any dispute or difference between the parties hereto, such dispute or difference shall be resolved amicably by mutual consultation or through the good offices of empowered agencies of the Government.

If such resolution is not possible, then, the unresolved dispute or difference shall be referred to arbitration of an arbitrator to be nominated by Secretary, Department of Legal Affairs ("Law Secretary") in terms of the Office Memorandum No.55/3/1/75-CF, dated the 19th December 1975 issued by the Cabinet Secretariat (Department of Cabinet Affairs), as modified from time to time.

The Arbitration Act 1940 (10 of 1940) shall not be applicable to the arbitration under this clause. The award of the Arbitrator shall be binding upon parties to the dispute. Provided, however, any party aggrieved by such award may make a further reference for setting aside or revision of the award to Law Secretary whose decision shall bind the parties finally and conclusively.

101. Jurisdiction

101.1 The Contract shall be governed by and constructed according to the laws in force in INDIA. The Contractor hereby submits to the jurisdiction of the Courts situated at "**State of the Owner of the Project as defined in the BDS/SCC**" for the purposes of disputes, actions and proceedings arising out of the Contract, the courts at "**State of the Owner of the Project"** only will have the jurisdiction to hear and decide such disputed, actions and proceedings.

[J] SAFETY CODES

102. General

102.1 Contractor shall adhere to safe construction practice and guard against hazardous, and unsafe working conditions and shall comply with Safety rules as set forth herein.

Any hazardous material used during construction or used as part of the plant has to be taken back by the supplier for recycling or dumping purpose after its operating / working life, so that it may not affect the environment or any living being. Contractor have to comply with State Pollution Board regulation.

103. Safety Regulations

103.1 **i)** In respect of all labour, directly employed in the Work for the performance of Contractor's part of this agreement, the Contractor shall at his own expense arrange for all the safety provisions as per safety codes of C.P.W.D., Indian Standards Institution. The Electricity Act, The Mines Act and such other acts as applicable.

ii) The Contractor shall observe and abide by all fire and safety regulations of the Owner. Before starting construction, Contractor shall consult with Owner's safety Engineers or Engineer-in-

Charge/Project Manager and must make good to the satisfaction of the Employer/ Owner any loss or damage due to fire to any portion of the work done or to be done under this agreement or to any of the Employer's/Owner's existing property.

104. First Aid and Industrial Injuries

104.1 **i)** Contractor shall maintain first aid facilities for its employees and those of its Sub-Contractor.

ii) Contractor shall make arrangements for Ambulance Service, on requirement basis and for the treatment of industrial injuries. Names of those providing these services shall be furnished to Employer/ Owner prior to start of construction and their telephone numbers shall be prominently posted in Contractor's Site Office.

ii) All critical industrial injuries shall be reported promptly to Employer/ Owner, and a copy of Contractor's report covering each personal injury requiring the attention of a physician shall be furnished to the Employer/ Owner.

105. General Rules

105.1 Site is a Nonsmoking zone area. Hence, smoking within the battery area is strictly prohibited.

106. Contractor's Barricades

106.1 **i)** Contractor shall erect and maintain barricades required in connection with his operation to guard or protect: -

a) Excavations
b) Hoisting Areas.
c) Areas adjudged hazardous by Contractor's or Employer's/ Owner's inspectors.
d) Employer's/ Owner's existing property subject to damage by Contractor's Operations.
e) Rail Road unloading spots

ii) Contractor's employees and those of his Sub-Contractor's shall become acquainted with Employer's/ Owner's barricading practice and shall respect the provisions thereof.

iii) Barricades and hazardous areas adjacent to, but not located in normal routes of travel shall be marked by red flasher lanterns at nights.

107. Working at Height

107.1 **i)** Scaffolding or staging more than 4 meters above the ground or floor, swing suspended from an overhead support or erected with stationary support shall have a guard rail properly attached, bolted, braced and otherwise retarded at least one meter high above the floor or platform of such scaffolding or staging and extending along the entire length of the outside and ends thereof with only such openings as may be necessary for the delivery of materials. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure.

ii) Working platform, gangway and stairway should be so constructed that they should not sag unduly or unequally and if the height of platform of the gangway or the stairway is more than 4 meters above the ground level or floor level, they should be closely boarded, should have adequate width and should be suitably fastened as in ii) above.

iii) Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent the fall of persons or materials by providing suitable fencing of railing whose minimum heights shall be 1 meter.

iv) While working at the substation and for construction of transmission line Towers and their subsequent maintenance, experienced manpower should be deployed with appropriate protection Equipments, such as insulating gloves, fall arrestor etc.

108. Excavation and Trenching

108.1 All trenches 1.5 Meters or more in depth, shall at all times be supplied with at least one ladder for each 50 Meters length or fraction thereof. Ladder shall be extended from bottom of the trenches to at least 1 meter above the surface of the ground. The sides of the trenches which are 1.5 Meters in depth shall be stepped back to give suitable slope or securely held by timber bracing, so as to avoid the danger of sides to collapse. The excavated materials shall not be placed within 1.5 Meters of the edge of the trench or half of the trench width whichever is more. Cutting shall be done from top to bottom. Under no circumstances undermining or under-cutting shall be done.

109. Demolition/ General Safety

109.1 **i)** Before any demolition work is commenced and also during the progress of the demolition work

a) All roads and open areas adjacent to the work site shall either be closed or suitably protected.

b) No electric cable or apparatus which is liable to be a source of danger shall remain electrically charged.

c) All practical steps shall be taken to prevent danger to persons employed from risk of fire or explosion or flooding. No floor, roof or other part of the building shall be so overloaded with debris or materials as to render it unsafe.

ii) All necessary personal safety equipment as considered adequate should be kept available for the use of the persons employed on the Site and maintained in condition suitable for immediate use, and the Contractor shall take adequate steps to ensure proper use of equipment by those concerned.

a) Workers employed on mixing asphaltic materials, cement and lime mortars shall be provided with protective footwear and protective gloves.

b) Those engaged in white washing and mixing or stacking or cement bags or any material which are injurious to the eyes be provided with protective goggles.

c) Those engaged in welding and cutting works shall be provided with protective face & eye shield, hand gloves, etc.

d) Stone breakers shall be provided with protective goggles and protective clothing and seated at sufficiently safe intervals.

e) When workers are employed in sewers and manholes, which are in use, the CONTRACTOR shall ensure that the manhole covers are opened and are ventilated at least for an hour before the workers are allowed to get into the manholes, and the manholes so opened shall be cordoned off with suitable railing and provided with warning signals or board to prevent accident to the public.

f) The CONTRACTOR shall not employ men below the age of 18 years and women on the work of painting with products containing lead in any form. Wherever men above the age of 18 years are employed on the work of lead painting, the following precautions should be taken.

1) No paint containing lead or lead product shall be used except in the form of paste or readymade paint.

2) Suitable face masks should be supplied for use by the workers when paint is applied in the form of spray or a surface having lead paint dry rubbed and scrapped.
3) Overalls shall be supplied by the Contractor to the workmen and adequate facilities shall be provided to enable the working painters to wash them during and on cessation of work.

iii) When the work is done near any place where there is risk of drowning, all necessary safety equipment should be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision should be made for prompt first aid treatment of all injuries likely to be sustained during the course of the work.

iv) Use of hoisting machines and tackles including their attachments, anchorage and supports shall conform to the following standards or conditions:

a) These shall be of good mechanical construction, sound materials and adequate strength and free from latent defect and shall be kept in good working order.

b) Every rope used in hoisting or lowering materials or as means of suspension shall be of durable quality and adequate strength and free from patent defects.

c) Every crane driver or hoisting appliance operator shall be properly qualified and no person under the age of 21 years should be in charge of any hoisting machine including any scaffolding, winch or give signals to the operator.

d) In case of every hoisting machine and of every chain ring hook, shackle, swivel, and pulley block used in hoisting or lowering or as means of suspension, the safe working load shall be ascertained by adequate means. Every hoisting machine and all gears referred to above shall be plainly marked with the safe working load of the conditions under which it is applicable and the same shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond safe working load except for the purpose of testing.

e) As regards Contractor's machines, the Contractor shall notify the safe working load of the machine to the Engineer-in-Charge/Project Manager whenever he brings any machinery to Site of Work and get it verified by the Engineer concerned.

v) Motors, gears, transmission lines, electric wiring and other dangerous parts of hoisting appliances should be provided with efficient safeguards. Hoisting appliances should be provided with such means as to reduce to minimum the accidental descent of the load, adequate precautions should be taken to reduce the minimum risk of any part or parts of a suspended load becoming accidentally displaced. When workers are employed on electrical installations which are already energized, insulating mats, wearing apparel, such as gloves, sleeves, and boots as may be necessary should be provided. The workers shall not wear any rings, watches and carry keys or other materials which are good conductors of electricity.

vi) All scaffolds, ladders and other safety devices mentioned or described herein shall be maintained in safe conditions and no scaffolds, ladder or equipment shall be altered or removed while it is in use. Adequate washing facilities should be provided at or near places of work.

vii) These safety provisions should be brought to the notice of all concerned by displaying on a notice board at a prominent place at the work-spot. The person responsible for compliance of the safety code shall be named therein by the Contractor.

viii) To ensure effective enforcement of the rules and regulations relating to safety precautions, the arrangements made by the Contractor shall be open to inspection by the Engineer-in-Charge/Project Manager or safety Engineer of the Owner.

ix) Notwithstanding the above clauses there is nothing in these to exempt the Contractor for the operations of any other Act or rules in force in the Republic of India. The work throughout including any temporary works shall be carried out in such a manner as not to interfere in any way whatsoever with the traffic on any roads or footpath at the site or in the vicinity thereto or any existing works whether the property of the Administration or of a third party.

In addition to the above, the Contractor shall abide by the safety code provision as per C.P.W.D. Safety code and Indian Standard Safety Code from time to time.

110. Care in Handling Inflammable Gas

110.1 The Contractor has to ensure all precautionary measures and exercise utmost care in handling the inflammable gas cylinder/ inflammable liquids/ paints etc. as required under the law and/ or as advised by the fire Authorities of the Owner or Administration.

111. Temporary Combustible Structures

111.1 Temporary combustible structures will not be built near or around work site.

112. Precautions against Fire

112.1 The Contractor will have to provide portable Fire Extinguishers, Fire Buckets and drums at worksite as per specifications & standards. They will have to ensure all precautionary measures and exercise utmost care in handling the inflammable gas cylinders/ inflammable liquid/ paints etc. as advised by Engineer-in-Charge/Project Manager. Temporary combustible structure will not be built near or around the work-site.

113. Explosives

113.1 Explosives shall not be stored or used on the Work or on the Site by the Contractor without the permission of the Engineer-in-Charge/Project Manager in writing and then only in the manner and to the extent to which such permission is given. When explosives are required for the Work they will be stored in a special magazine to be provided at the cost of the Contractor in accordance with the Explosives Rules. The Contractor shall obtain the necessary license for the storage and the use of explosives and all operations in which or for which explosives are employed shall be at sole risk and responsibility of the Contractor and the Contractor shall indemnify the Employer/Owner against any loss or damage resulting directly or indirectly therefrom. Only licensed persons shall be engaged for handling and working with explosives.

114. Preservation of Place

114.1 The Contractor shall take requisite precautions and use his best endeavors to prevent any riotous or unlawful behavior by or amongst his worker and others employed or the works and for the preservation of peace and protection of the inhabitants and security of property in the neighborhood of the Work. In the event of the Owner requiring the maintenance of a Special Police Force at or in the vicinity of the site during the tenure of works, the expenses thereof shall be borne by the Contractor and if paid by the Owner shall be recoverable from the Contractor.

115. Outbreak of Infectious Diseases

115.1 The Contractor shall remove from his camp such labour and their facilities who refuse protective inoculation and vaccination when called upon to do. Should Cholera, Plague or other infectious diseases break out the Contractor shall burn the huts, beddings, clothes and other belongings or used by the infected parties and promptly erect new huts on healthy sites as failing which the work may be done by the Owner and the cost thereof recovered from the Contractor.

116. Use of Intoxicants

116.1 The unauthorized sale of spirits or other intoxicants, beverages upon the work in any of the buildings, encampments or tenements owned, occupied by or within the control of the Contractor or any of his employee is forbidden and the Contractor shall exercise his influence and authority to the utmost extent to secure strict compliance with this condition.

In addition to the above, the Contractor shall abide by the safety code provision as per C.P.W.D. safety code, Indian Standard Code & OHSAS 18001 framed from time to time.

SECTION - V

SPECIAL CONDITIONS OF CONTRACT (SCC)

SPECIAL CONDITIONS OF CONTRACT (SCC)

The following Special Conditions of Contract (SCC) shall supplement the General Conditions of Contract (GCC). Wherever there is a conflict, the provisions herein shall prevail over those in the GCC. The corresponding Clause number(s) of the GCC is/ are indicated in parentheses.

SCC No.	GCC Clause Ref. No. (If Applicable)	Details/ Description/ Special Conditions
1.	Definitions (GCC clause 1)	**The Employer is:** **Solar Energy Corporation of India Limited,** D - 3, 1st Floor, Wing - A, Prius Platinum Building, District Centre Saket, New Delhi - 110 017 Kind Attn.: General Manager (C & P) / Manager (C & P) Telephone Nos.: - 0091-(0)11-71989256/ 71989290 Fax No.: - 0091-(0)11-71989243 E-mail: - **contracts@seci.co.in** **The Owner is:** The Singareni Collieries Co., Ltd., Kothagudem - 507119, Telangana Kind Attn: GM (E&M) Solar Energy Telephone Nos.: - +91 9491145093 E mail: gm_solar@scclmines.com
2.		**The Engineer-in-Charge**: "**Shall be intimated to the successful bidder"**
3.		**The Time for Commissioning for the cumulative capacity of 15 MW floating Solar PV Power Plant at 02 different sites/reservoirs along with other associated equipment as per this tender document in total shall be 12 (Twelve) Months from the Date of the Notification of Award NOA/LOA/LOI** Further Contractor is also to provide Operation & Maintenance Contract of the Solar Photo Voltaic Plant for a period of 10 (Ten) years from the date of Operational Acceptance of the Plant.

S. No.	Stage	Reference from D
3.1	Issue of NOA/ LOA/ LOI (as applicable)	Zero Date (D)
3.1	Commissioning of the Plant as stated under this Tender Document.	**D + 12 Months**

SCC No.	GCC Clause Ref. No. (If Applicable)	Details/ Description/ Special Conditions
4	Definitions (GCC clause 1)	**Add following definition to the existing clause regarding the definitions:** **Floating Solar Power Plant** means a solar power production installation mounted on a structure that floats on a body of water, typically an artificial basin/lake/pond/reservoir**.**
5	Location of Site (GCC clause 2.1.a)	**Add following to the existing clause regarding the Site Visit:** a. The proposed solar powered plants are to set up at various areas of SCCL. b. Prospective Bidders are advised to visit the site/reservoir to study the actual conditions and go through the plans/ drawings connected to the present scope of work including power evacuation system, including ground conditions, availability of power/water etc and get acquainted with the same before attending Pre-bid meeting. For seeking visit of site or any clarifications bidders may contact the General Manager (E&M) Solar Energy/ (e-mail: gm_solar@scclmines.com). c. The Bidder at the Bidder's own responsibility, cost and risk shall inspect and examine the site and its surrounding, and shall satisfy themselves fully before submitting bids as to the form and nature of the site, the geological conditions decisive for the success of the project, the means of access to the site, the loading and unloading facilities etc. In general, the Bidders shall themselves obtain all necessary information as to risks, contingencies and other circumstances susceptible to influence or affect their bids. d. Although certain information is provided in Scope of work of this tender document, it should be checked by the Bidders, any neglect or failure to obtain or confirm such information will not relieve the Bidders from any liability or responsibilities to carry out the works according to the contract. SCCL will assist the Bidders in obtaining the data required but will not assume responsibility either for the data obtained or for their completeness. e. Bidders shall acquaint themselves on their own responsibility with laws and regulations in India under which the work is to be performed including those which may influence, in general or in detail, design, supply, transportation, erection, operation of the equipment and requirement of manpower. Any failure or neglect to do so will not absolve the potential Contractor from his contractual obligation. f. It is specially emphasized that it shall be the responsibility of the Bidders to have themselves familiarized with the prevailing conditions and that no claim relating thereto for additional

SCC No.	GCC Clause Ref. No. (If Applicable)	Details/ Description/ Special Conditions
		payment or adjustment of a Contract price will be acceptable after the submission of their Bid. g. It shall be deemed that the tenderer has visited the site/area and got fully acquainted with the working conditions and other prevalent conditions and fluctuations thereto whether he visits the site/area or not and has taken all the factors into account while quoting his rates. h. Prospective Bidders are advised to carefully read the Tender documents along with Annexures, understand them in the proper perspective and then fill the Technical Bid Format, Commercial Bid Format and Price Bid Format (SOR).
6.	Contract Performance Security (GCC clause 24)	**<u>Add following to the existing clause:</u>** Against EPC/ LSTK & O&M Contract of the project, within 30 (Thirty) days from the issuance of the Notification of Award/ Letter of Intent/Letter of Award, the successful bidder shall furnish unconditional and irrevocable individual Bank Guarantees for respective sites (Site 1 & 2) issued by any Public-Sector Banks (SBI & Associates and Nationalized banks) in the fashion as mentioned below. However, where value of BG is Rs.5 lakhs and above, the BG should be obtained from the bank branches situated at Hyderabad / Kothagudem or operative and payable at bank branches situated at Hyderabad/ Kothagudem. The Contract Performance Security shall be in the form of Bank Guarantee only and shall be in the currency of the Contract and will be issued individually for all the sites/reservoir (Site 1 & 2) in the name of the Owner as **"Singareni Collieries Company Limited, Telangana**, **Kothagudem, Telanagana State**" The Contract Performance Security against this Contract need to be furnished in 02 (Two) different stages as mentioned below: 1. First Stage (Supply and Services): The value of the Contract Performance Security shall be 10% of the Contract Value (i.e., total sum of the Supply & Service Contract). This Performance security will be valid for a total period of 75 Months (12 Months Project commissioning period) + first half of the prescribed O & M Period, i.e. 60 Months + 03 Months additional) from the date of its issuance. The successful bidder can submit Contract Performance Security with initial validity of one year and the same may be extended every year till completion of the total 75 months period. 2. Second Stage (O&M): The Performance security shall be furnished 30 days prior to the completion of first stage Performance Security & it shall be equivalent to the 5% of the Contract Value (i.e., total sum of the Supply & Service Contract).

SCC No.	GCC Clause Ref. No. (If Applicable)	Details/ Description/ Special Conditions
		This Performance security will be valid for a total period of 63 Months (Second half of the prescribed O & M Period, i.e. 60 Months + 03 Months additional) from the date of its issuance. The successful bidder can submit Contract Performance Security with initial validity of one year and the same may be extended every year till completion of the total 63 months period. 3. Contractor needs to furnish the revised Contract Performance Security amounting to 5% (under Second Stage) of the total Contract Value as mentioned above within the validity period of the Contract Performance Security submitted at First Stage. 4. In case the Contractor fails to furnish the Contract Performance Security mentioned under the Second Stage within the indicated time period as mentioned above, Owner at their sole discretion will forfeit the Contract Performance Security furnished at First Stage. 5. The Contract Performance Security shall be towards faithful performance of the contractual obligations and performance of equipment. 6. In case of any default or failure of the Contractor to comply with the requirements of any of the Obligations covered under this Tender Document and/ or Contract Agreement shall constitute sufficient grounds for forfeiture of the entire Contract Performance Security, in such cases, the liability on account of GST will be borne by the contractor. 7. Further, any delay beyond 30 (Thirty) days shall attract delay charges @ 1.25% per month on the total Contract Performance Security amount, calculated on pro-rata basis accordingly. However, total project completion period shall remain same. Part Security shall not be accepted. Further, Owner at its sole discretion may cancel the Contract Agreement/ NOA & forfeit 100% of EMD inclusive of GST, in case Contract Performance Security is not submitted within 45 (Forty-Five) days from issuance of NOA/LOA/LOI. **Contract Performance Security submitted shall be released to the Contractor without any interest not later than 75 (Seventy-Five) days after the successful completion of the complete O&M period (10 Years) subject to the approval and acceptance of the O&M period deliverables.**
7.	Functional Guarantees (GCC clause 43.1.1)	**<u>Add following to the existing clause:</u>** 1. During the Operational Acceptance after providing 03 chances for the PR demonstration, any shortfall in the Performance Ratio (PR) as determined through the PR Test Procedure specified in Section VII, Scope of Work and Technical

SCC No.	GCC Clause Ref. No. (If Applicable)	Details/ Description/ Special Conditions
		Specifications, & "**PERFORMANCE GUARANTEE TEST PROCEDURE",** will attract imposition of penalty. For every 1% shortfall in PR below the committed PR value, a penalty of 1% of the total Contract Value (i.e., total sum of all the Supply, Service and absolute value of O & M Contract) shall be levied. In case the Contract Performance Security has already been encashed on account of any default/delays, the penalty amount will be recovered from any due payments to the contractor. In case the Plant PR Shortfall is more than 5% than the specified PR value, then the total plant will be accepted on as-is basis & the total Contract Performance Security submitted by the contractor will be forfeited & payments linked to operational acceptance will not be made. 2.In case the Project fails to generate any power continuously for 1 month any time during the O&M period, apart from the force majeure and grid outages as certified by competent authority, it shall be considered as "an event of Contractor's default". In the case of default, the entire Contract Performance Security will be forfeited & the Owner may terminate the O&M contract. 3.Liquidated damages during O&M period against breakdown of other Infrastructure of Plant which doesn't affect the generation of power, directly such as but not limited to civil infrastructure, water supply system/network, other Infrastructure developed by the Contractor as a Scope of Work for the Project (Section-VII: Scope of Works & Technical Specifications) shall be penalized @ Rs.1000/day, per incident of breakdown reported beyond 07 Days of such reporting. Cumulative value of such penalty shall be limited to 50% of yearly O&M cost. 4.The Liquidated Damages as specified on account of delays and on account of deviations in Functional Guarantees as above shall be assessed and levied independent of each other.
8.	**Conditions for Issue of Materials** (GCC clause 60)	No material will be issued to the contractor by the owner, SCCL for this Project.
9	**Training** (GCC clause 76.6)	The contractor shall provide training (free of cost) to the personnel of SECI/Nominated person of SECI for 50 (Fifty) man-days at his works/or at the mutually agreed designated place/ or at site for erection, testing, commissioning and O&M of the Project. Expenses towards travel, lodging, and boarding for the personnel shall be borne by SECI. Such training may include Class Room & hands on experience etc as mutually agreed
10.	Schedule of Rates & Payments	**Add following to the existing clause:**

SCC No.	GCC Clause Ref. No. (If Applicable)	Details/ Description/ Special Conditions
	(GCC clause 80.1)	All payment shall be made against invoices raised in line with the approved billing break up under individual heads of Supply, Services and Civil works. Following general payment terms will be followed for all of the respective 02 Site/reservoir Contracts (Site 1 & 2) & payments will be released on individual site basis **A.** The payment for the Supply Portion of the First Contract (Supply & Services Contract) shall be made as per the following terms and conditions: i) Interest bearing adjustable initial advance (OPTIONAL) of 10% of the Contract Value (i.e., total sum of all the Supply Contract) shall be released to successful bidder upon receipt of unconditional acceptance of NOA, detailed Performa invoice of contractor and against submission of unconditional & irrevocable Advance Bank Guarantee (ABG) with a validity period up to date of final commissioning total amounting to 110% of total advance amount. The ABG needs to be submitted in addition to the Contract Performance Security. The annual interest rate shall be calculated based on SBI one-year MCLR + 3.5% as applicable. Successful bidder will be required to submit the individual ABGs on individual site basis for claiming the advance amount. ii) Seventy percent (70%) payments shall be paid on Pro rata basis against supply, receipt and acceptance of Materials at site on submission of documents (except Advance Bank Guarantee) indicated under clause i) above, Contractor's detailed invoice & packing list identifying contents of each shipment, evidence of dispatch (GR/ LR copy), Manufacturer's/ Contractor's Guarantee certificate of Quality, submission of the certificate by the Executing Agency's authorized representative that the item(s) have been received and MDCC (Material Dispatch Clearance Certificate) issued by Employer's authorized representative in original. (a) If Successful Bidder has opted for advance then, Ten percent (10%) (full amount of advance) shall be adjusted while making payments of this installment. Also, up-to-date accrued interest shall also be recovered. (iii) Twenty percent (20%) payments shall be paid against successful erection, testing and commissioning of materials at site and Operational Acceptance of the Facility (Part/Complete facility). pursuant to successful Guarantee Tests and demonstration of Performance Ratio (PR) including submission of all as-built drawings and documents. (iv) Final Ten percent (10%) payment of Supplies shall be paid after CUF demonstration on completion of first year of O&M of the complete Facility pursuant to submission of all requisite documentation. However, this Payment may also be released after demonstration of PR and submission of all requisite documentation on the submission of additional Bank Guarantee of equivalent amount. This BG shall be valid up to demonstration of CUF for the

SCC No.	GCC Clause Ref. No. (If Applicable)	Details/ Description/ Special Conditions
		successful first year of Operation. However, in case of delay, the BG shall be extended suitably. The supplier shall upload his Tax Invoice in the GSTN as per the provisions of the GST Act i.e., by 10th of the month subsequent to the month in which "Time of Supply" arises. In respect of orders where the entire order quantity is executed through a single Tax Invoice and if the "Tax Invoice" is not uploaded within the time limits prescribed under GST Act, the amount of tax contained in the Invoice will be withheld by SCCL till such time the invoice is uploaded in the GSTN Portal. In respect of orders where the entire order quantity is executed in phased manner through multiple invoices or where staggered payment is made, if the "Tax Invoice" is not uploaded within the time limits prescribed under GST Act, the tax amount will be withheld from the payment made against subsequent Invoice till such time the invoice is uploaded. The final payment is subject to compliance of all formalities under GST by the supplier. **B.** The payment for the Service Portion of the First Contract (Supply & Services Contract) shall be made as per the following terms and conditions. No Initial Advance Payment shall be made against the Service Portion Part. i) For Freight and Insurance Portion, the payment shall be made in line with Supply Portion of the First Contract, as described in point A (ii) of this clause, without releasing any initial advance. The complete payment of the freight will be done along with the respective deliveries of the supply portion at site. ii) For Erection, Testing and Commissioning Portion, the payment shall be made as detailed below: - (a) Eighty Percent (80%) of the total price of Design, Engineering, Erection, Testing and Commissioning shall be paid on pro-rata basis on completion of installation of equipment on certification by the Engineer-In-Charge/ Project Manager for the quantum of work completed after successful clearance of quality check points involved in the quantum of work billed. (b) Ten Percent (10%) of the total price of Design, Engineering, Erection, Testing and Commissioning shall be paid on Operational Acceptance of the Facility (Part/Complete facility). pursuant to successful integration with existing internal grid system, Guarantee Tests and demonstration of PR. (c) Final Ten percent (10%) payments shall be paid after CUF demonstration after first year of O&M of the complete Facility pursuant to submission of all requisite documentation. However, this Payment may also be released after successful Guarantee Tests and demonstration of PR and submission of all requisite documentation

SCC No.	GCC Clause Ref. No. (If Applicable)	Details/ Description/ Special Conditions
		on the submission of additional Bank Guarantee of equivalent amount. The BG shall be valid up to demonstration of CUF for the successful first year of Operation. However, in case of delay, the BG shall be extended suitably. iii) For Civil & Allied works portion, of the 1st contract, the payment shall be made as detailed below: (a) Eighty Percent (80%) of the total price of Civil Works shall be paid progressively on certification by the Project Manager/ Engineer In - Charge for the quantum of work completed/ Milestones achieved after successful clearance of quality check points involved in the quantum of work. (b) Ten Percent (10%) of the total price of Civil Works shall be paid on completion of all the civil works. (c) Final Ten (10%) of the total price of Civil Works shall be paid after CUF demonstration after first year of O&M of the complete Facility pursuant to completion of all the civil works including finishing and debris removal. However, this Payment may also be released after completion of all the civil works including finishing and debris removal on submission of Bank Guarantee of equivalent amount. The BG shall be valid up to demonstration of CUF for the successful first year of Operation. However, in case of delay, the BG shall be extended suitably. **C.** For the Second Contract (related to Operation & Maintenance Part), the payment shall be made as detailed below: - (a) Operation and Maintenance of the entire Project payment will be released on quarterly basis at the end of every quarter for each year till 10 (Ten) years. (i) Year 1 : OM -1 (ii) Year 2 : OM -2 (iii) Year 3 : OM -3 (iv) Year 4 : OM -4 (v) Year 5 : OM -5 (vi) Year 6 : OM -6 (vii) Year 7 : OM -7 (viii) Year 8 : OM -8 (ix) Year 9 : OM -9 (x) Year 10 : OM -10 In case of any default, Non-Performance or breach of contractual conditions of the O&M contract during the O&M period, the penalties/deductions, if applicable will be liable to be deducted from the Quarterly O&M payments first & then from the Contract Performance Security. **D.** All the payment shall be released from Owner's Head Office, Telangana upon submission of Original Documents like MDCC,

SCC No.	GCC Clause Ref. No. (If Applicable)	Details/ Description/ Special Conditions
		delivery challan, warranty certificate, LR, WCC, MRN, commissioning certificate, handing over certificate, Insurance, PF, ESI, etc as required and mentioned against each Milestone payment, duly certified by the authorized representative of the Employer/Owner.
11	Schedule of Rates to Cover GST/Applicable taxes (GCC clause 80.5)	**Replace the existing clause by following**: Contractor may seek exemption applicable for the project related to the Concessional Custom Duty Certificate in line with the orders released from GOI. In this regard, Contractor shall be eligible to request all necessary certificates as a proof of exemptions from the owner. The demand of such documents shall be made to the Owner in at least 10 days advance. However, any such applicable exemption or reduction on Custom Duties, Goods & Service Tax (GST) on Works Contract quay or any port dues, transport charges, stamp duties or Central or State Government or Local Body or Municipal Taxes or from or of any other body, whatsoever, shall be deemed to be included in and covered by the Schedule of Rates at the time of bid submission. Hence, it is deemed understood that any such exemption benefit has already been passed on to Project owner during the bidding stage itself, as any such price reduction on account of any exemption is already a part of the submitted bid.
12.	Arbitration (GCC clause 100)	**Replace the existing clause by following:** **Normally all disputes should be settled by negotiations between the Company and the concerned parties.** **In case any dispute / difference is not settled through negotiations, the respective parties can seek remedy through Arbitration only by invoking the same within 120 days of raising of dispute. No disputes shall be referred to civil courts other than through Arbitration.** (a) In case of any dispute Sole Arbitrator shall be appointed from the list of 3 judicial officers maintained by SCCL duly following the provisions of Arbitration and conciliation act 1996 as amended from time to time. The list of such names shall be forwarded to the party as and when the party requests for resolving the dispute. Such Judicial Officer as chosen by the party will be appointed by the Chairman & Managing Director to adjudicate the dispute as a Sole Arbitrator. The Arbitrator so appointed shall conduct the proceedings in accordance with the Arbitration & Conciliation Act, 1996 as amended from time to time and pass a reasoned award.

SCC No.	GCC Clause Ref. No. (If Applicable)	Details/ Description/ Special Conditions
		Both the parties should bear the cost of the arbitration equally. (b) If the Sole Arbitrator appointed by the Chairman & Managing Director of the Singareni Collieries Company Limited is unable to continue as an Arbitrator for any reasons to be recorded in writing and the Chairman & Managing Director of Singareni Collieries Company Limited thinks fit for appointment of a new Arbitrator in the place of existing Arbitrator, he is having a power to do so. Such new Arbitrator shall be appointed following the same procedure as contemplated in (a) above. (c) As and when such new Arbitrator is appointed, he can either continue the arbitration proceedings from the stage where the earlier Arbitrator discontinued his proceedings or alternatively the new Arbitrator may start proceedings de novo if the circumstances warrant him to do so. (d) Failing to invoke Arbitration Clause within 120 days of dispute (from the date of the raising of the dispute). it is deemed that there is no dispute between the parties. No disputes shall be entertained in any form and on any matter pertaining to contract after expiry of 120 days of the period. (e) The expenses payable to the Sole Arbitrator shall be governed by the Arbitration & Conciliation Act, 1996 as amended from time to time and shall be borne equally by both parties to the dispute.

SECTION - VI

SAMPLE FORMS

&

FORMATS

Preamble

This Section (Section - VI) of the Bidding Documents [named as Sample Forms and Procedures (FP)] provides proforma to be used by the bidders at the time of their bid preparation and by the Contractor subsequent to the award of Contract.

The Bidder shall complete, sign and submit with its bid the relevant FORMS to be used unamended, in accordance with the requirements included in the Bidding Documents.

The Bidder shall provide the EMD, in the form included hereafter acceptable to the Employer, pursuant to the provisions in the instructions to Bidders.

The Performance Security (ies) and Bank Guarantee for Advance Payment forms should not be completed by the bidders at the time of their bid preparation. Only the successful Bidder will be required to provide the Performance Security(ies) and Bank Guarantee for Advance Payment, according to one of the forms indicated herein acceptable to the Employer and pursuant to the provisions of the General and Special Conditions of Contract, respectively.

Depending on specific facts and circumstances related to the Bid/ Tender and the contract, the text of the Forms herein may need to be modified to some extent. The Employer reserves the right to make such modifications in conformity with such specific facts and circumstances and rectify and consequent discrepancies, if any. However, modifications, if any, to the text of the Forms that may be required in the opinion of the Bidder/ Contractor shall be effected only if the same is approved by the Employer. The Employer's decision in this regard shall be final and binding.

LIST OF FORMS & FORMAT	
Form No.	**Description**
F-0	COVERING LETTER
F-1	BIDDER'S GENERAL INFORMATION
F-2	FORMAT FOR INDEMNITY BOND TO BE EXECUTED BY THE CONTRACTOR FOR THE REMOVAL / DISPOSAL OF SCRAP/DISPOSAL OF SURPLUS MATERIAL – IF APPLICABLE
F-3	INDEMNITY BOND TO BE EXECUTED BY THE CONTRACTOR FOR THE PLANT HANDED OVER FOR PERFORMANCE OF ITS O&M CONTRACT (ENTIRE SOLAR PHOTO VOLTAIC PLANT) – DURING HANDOVER
F-4	PROFORMA OF "BANK GUARANTEE" FOR "EARNEST MONEY DEPOSIT (EMD)"
F-5	INDEMNITY BOND
F-6	NO DEVIATION CONFIRMATION
F-7	DECLARATION REGARDING BANNING AND LIQUIDATION, COURT RECEIVERSHIP ETC.
F-9	PROFORMA OF "BANK GUARANTEE" FOR "CONTRACT PERFORMANCE SECURITY"
F-13	BIDDER'S EXPERIENCE
F-16	FORMAT OF CHARTERED ACCOUNTANT CERTIFICATE FOR FINANCIAL CAPABILITY OF THE BIDDER
F-17	FORMAT FOR JOINT VENTURE AGREEMENT
F-17A	FORMAT FOR POWER OF ATTORNEY FOR JOINT VENTURE AGREEMENT
F-18	FORMAT FOR CONSORTIUM AGREEMENT
F-18A	FORMAT FOR POWER OF ATTORNEY FOR CONSORTIUM AGREEMENT
F-19	E-BANKING FORMAT
F-20	PROFORMA OF "BANK GUARANTEE" FOR "ADVANCE PAYMENT"
F-22	LIST OF BANKS
F-23	SHAREHOLDING CERTIFICATE
F-24	POWER OF ATTORNEY FOR BIDDING COMPANY

Form F-0

COVERING LETTER

(The Covering Letter should be submitted on the Letter Head of the Bidding Company)

Ref.No. _____ Date: _____

From: _____ *(Insert name and address of Bidding Company*)
_____
_____
Tel.#:
Fax#:
E-mail address#

To

Solar Energy Corporation of India Limited
(A Government of India Enterprise)
D - 3, 1st Floor, Wing - A, Prius Platinum Building
District Centre, Saket, New Delhi - 110 017

Sub: Bid for "Tender for Design, Engineering, Supply, Construction, Erection, Testing & Commissioning of 15 MW (AC) Floating Solar PV Power Plant at different sites/reservoirs including 10 years plant O&M at Singareni Collieries Company Limited, Telangana, India"

Dear Sir / Madam,

1. We, the undersigned…. [insert name of the 'Bidder'] having read, examined and understood in detail the tender Document for "Tender for Design, Engineering, Supply, Construction, Erection, Testing & Commissioning of 15 MW (AC) Floating Solar PV Power Plant at different sites including 10 years plant O&M at Singareni Collieries Company Limited, Telangana, India"" hereby submit our Bid comprising of Techno Commercial Bid and Price Bid. We confirm that neither we nor any of our Parent Company/ Affiliat / Ultimate Parent Company has submitted Bid other than this Bid directly or indirectly in response to the aforesaid tender.

2. We give our unconditional acceptance to the tender, dated…… and tender documents attached thereto, issued by Solar Energy Corporation of India Limited, as amended. As a token of our acceptance to the tender documents, the same have been initialled by us and enclosed to the Bid. We shall ensure that we execute such tender documents as per the provisions of the tender and provisions of such tender documents shall be binding on us.

3. Bid Capacity

   We have bid for the Total capacity of 15 MW (AC).

4. Bid Processing Fees

   We have enclosed a Bid Processing Fees of INR……. (*Insert Amount*), in the form of Demand Draft/ Banker's Cheque no……. *(Insert reference of the DD/ Banker's Cheque*) dated…… (*Insert date of DD/ banker's cheque*) from ……. (*Insert name of Bank providing DD/ banker's cheque*) and valid up to and including ……. in terms of Clause …… of this tender.

5. Earnest Money Deposit

   We have enclosed an Earnest Money Deposit of INR……. (*Insert Amount*), in the form of bank guarantee no……. (*Insert reference of the bank guarantee*) dated…… (*Insert date of bank guarantee*) as per Format F-4 from ……. (*Insert name of Bank providing BG*) and valid up to and including ……. in terms of Clause …… of this tender. The offered quantum of power by us is ____ MWp. (Insert total capacity offered).

6. We have submitted our Price Bid strictly as per this tender, without any deviations, conditions and without mentioning any assumptions or notes for the Price Bid in the said format(s).

7. In case we are a Successful Bidder, we shall furnish a declaration at the time of commissioning of the Project to the affect that neither we have availed nor we shall avail in future any Incentive other than received from SECI for implementation of the project.

8. Acceptance

   We hereby unconditionally and irrevocably agree and accept that the decision made by Solar Energy Corporation of India Limited in respect of any matter regarding or arising out of the tender shall be binding on us. We hereby expressly waive any and all claims in respect of Bid process.

   We confirm that there are no litigations or disputes against us, which materially affect our ability to fulfil our obligations with regard to execution of projects of capacity offered by us.

9. Familiarity with Relevant Indian Laws & Regulations

   We confirm that we have studied the provisions of the relevant Indian laws and regulations as required to enable us to submit this Bid and execute the tender documents, in the event of our selection as Successful Bidder. We further undertake and agree that all such factors as mentioned in tender have been fully examined and considered while submitting the Bid.

10. Contact Person

    Details of the contact person are furnished as under:

    Name : ……

    Designation : ……...

Company : …….

Address : …….

Phone Nos. : …….

Fax Nos. : …….

E-mail address : …….

11. We are enclosing herewith the Envelope-I (Covering Letter, Processing Fees, EMD etc through Offline and Online, Techno-Commercial documents through online as per clause no. 11.I of Section - II, ITB) and Envelope II (Price Bids) (through online) containing duly signed formats, each one duly sealed separately, in one original as desired by you in the tender for your consideration as per clause no. 11.0 of Section - II, ITB.

    It is confirmed that our Bid is consistent with all the requirements of submission as stated in the tender and subsequent communications from Solar Energy Corporation of India Limited. The information submitted in our Bid is complete, strictly as per the requirements stipulated in the tender and is correct to the best of our knowledge and understanding. We would be solely responsible for any errors or omissions in our Bid. We confirm that all the terms and conditions of our Bid are valid for acceptance for a period as specified in BDS from the date of opening of "Techno-Commercial/ Un-priced Bid". We confirm that we have not taken any deviation so as to be deemed non-responsive.

Dated the_____day of_____, 20….

Thanking you,

We remain,

Yours faithfully,

Name, Designation and Signature of Authorized Person in whose name Power of Attorney/ Board Resolution/ Declaration. Copy of Power of Attorney/ Board Resolution/ Declaration should be enclosed along with Covering Letter.

Form F-1

BIDDER'S GENERAL INFORMATION

(To be submitted on the Letter Head of the Bidding Company)

Sr. No.	Description	Remarks
1	Name of the Bidder *(Incase of JV/ Consortium, name of all the members to be indicated and lead member to be identified)*	
2	Status of the Firm	
3	Mailing Address of Registered Office	
4	Mailing Address of Operation Office	
5	E-mail	
6	Web site	
7	Authorized Contact Person(s) with Name, Designation, Address and Mobile Phone No., E-mail address / Fax No. to whom all references shall be made	
8	Year of Incorporation	
9	Number of Years in Operation	
10	ISO Certifiation Yes/No	
11	Name of the Banker	
12	Branch Details of Bank	
13	Type of Account with Account Number	
14	IFSC Code	
15	Permanent Account Number (PAN) of the Bidder	*(Copy of PAN Card to be enclosed)*
16	Whether the Vendor is registered/ Likely to be registered under GST	Yes or No :

		If Yes, then customer will be treated as registered customer & he will have to provide further details as stated on the below left hand side
17	GST ID (Proof to be submitted – GST No acknowledgement OR Email from GoI)	
18	GSTN Address	

Sr. No.	Description	Remarks
19	PF Registration Number with Details	*(Copy of Registration to be enclosed)*
20	ESI Registration Number with Details	*(Copy of Registration to be enclosed)*
21	Have the Bidder/ Company ever been debarred by any Govt. Dept./ Undertaking for undertaking any work	Yes/No *(If answer is YES, please provide details)*
22	Reference of any document information attached by the Bidder other than specified in the tender.	
23	Whether the Bidder wishes to form a Project Company for execution of work	Yes/No
24	Bidding company is listed in India	Yes/No
25	Whether company is MSME as on the bidding date	Yes/No

(Signature of Authorized Signatory)

With Stamp

Form F-2

Indemnity Bond to be executed by The Contractor for The Removal / Disposal of Scrap/Disposal of Surplus Material

(TO BE EXECUTED ON STAMP PAPER OF APPROPRIATE VALUE)

INDEMNITY BOND

This INDEMNITY BOND executed this …… day of ……. 20…... by ….....(Name of Company)……..., a Company registered under the Companies Act, 1956/2013 Concern and having its registered office(s) at ……..(Office Address)……, hereinafter called the Indemnifier(s)/ Contractor(s) (which expression shall, unless excluded by or repugnant to the context, be deemed to mean and include its successors, administrators and executors).

IN FAVOUR OF

M/s ……., having its registered office at……..(hereinafter referred to as "…..") .

1. M/s……. has awarded the Contractor(s), contract for execution of work ("Scope of Work") as mentioned in the NOA/contract agreement no…….. dated ....., entered into between M/s and Contractor(s), relating to ……(Name & Address of Project/Station)…… (hereinafter called 'the Project').

2. The Indemnifier(s) for the purpose of execution of its Scope of Work had from time to time procured and stored ……..(Details of Material)……. at the Project Site.

3. After completion of the Scope of Work by Indemnifier(s), it has been identified that scrap …… (Details of Scrap Material & its Quantity)……..and/or surplus …… (Details of Surplus Material & its Quantity)…….. belonging to Indemnifier(s) is lying at the said Project Site.

4. Now, the scrap …… (Details of Scrap Material & its Quantity)……..and/or surplus …… (Details of Surplus Material & its Quantity)…….. belonging to the Indemnifier(s), requires to be removed by Indemnifier(s) from the Project Site.

NOW THEREFORE THIS INDEMNITY BOND WITNESSETH AS UNDER:

1. That Indemnifier(s) by way of this indemnity requests M/s……. to issue approval in favour of Indemnifier(s) for removal of scrap ……(Details of Scrap Material & its Quantity)……..and/or surplus ……(Details of Surplus Material & its Quantity)…….. belonging to Indemnifier(s), from the project.

2. That the Indemnifier(s) shall ensure clearing of its scrap …… (Details of Scrap Material & its Quantity)……..and/or surplus …… (Details of Surplus Material & its Quantity)…….. by itself, as aforesaid.

3. That Indemnifier(s) in consideration of the premises above, for itself and its respective, executors, administrators and assigns, jointly and severally agree and undertake from time to time and at all times hereafter to indemnify M/s….. and keep M/s…….. indemnified from and against all claims, demands, actions, liabilities and expenses which may be made or taken against or incurred by M/s….. by reason of the issue of necessary approval by M/s…….. and permitting Indemnifier(s) to remove scrap ……(Details of Scrap Material & its Quantity)……..and/or surplus ……(Details of Surplus Material & its Quantity)…….. belonging to Indemnifier(s), from the project.

4. That Indemnifier(s) undertakes to indemnify and keep M/s….. harmless from any act of omission or negligence on the part of the Contractor in following the statutory requirements with regard to removal/disposal of scrap and surplus belonging to Indemnifier(s), from the Project Site aforesaid, by the Indemnifier(s). Further, in case the laws require M/s…… to take prior permission of the relevant Authorities before handing over the scrap and/or surplus to the Indemnifier, the same shall be obtained by the Indemnifier on behalf of M/s……..

IN WITNESS WHEREOF, the Indemnifier(s), through its authorized representative, has executed these presents on the Day, Month and Year first mentioned above at

……(Name of the Place)……

Witness:

Indemnifier

1. ……
2. ……

(Authorised Signatory)

Form F-3

INDEMNITY BOND TO BE EXECUTED BY THE CONTRACTOR FOR THE PLANT HANDED OVER FOR PERFORMANCE OF ITS O&M CONTRACT (ENTIRE SOLAR PHOTO VOLTAIC PLANT)

(TO BE EXECUTED ON STAMP PAPER OF APPROPRIATE VALUE)

INDEMNITY BOND

THIS INDEMNITY BOND IS made this..... day of ..... 20..... by ..... a Company registered under the Companies Act, 1956/2013 concern having its Registered Office at..... ..... (hereinafter called as "Contractor" or "Obligor" which expression shall include its successors) in favour of M/s…., a Company incorporated under the Companies Act, 1956 having its Registered Office at …… and its Project at .....(hereinafter called "M/s….." which expression shall include its successors and assigns) :

WHEREAS M/s….. has awarded to the Contractor a Contract for ..... vide its Letter of NOA/Contract Agreement No..... dated and its Amendment No..... (Applicable when amendments have been issued) (hereinafter called the "Contract") in terms of which M/s…. is required to hand over various Equipment and facilities provided under Supply & Service Contract , herein after called "Solar Photo Voltaic Plant" to the Contractor for execution of the Contract.

AND WHEREAS, The Contractor is required to execute an Indemnity Bond in favour of M/s….. for the Solar Photo Voltaic Plant handed over to it by M/s….. for the purpose of Performance of the Contract/O&M portion of the Contract.

NOW, THEREFORE, this Indemnify Bond witnesseth as follows:

1. That in consideration of Solar Photo Voltaic Plant as mentioned in the Contract, Valued at Rs.....#..... (Rupees.....) handed over to the Contractor for the purpose of Performance of the Contract, the Contractor hereby undertakes to indemnify and shall keep M/s… indemnified, for the full value of the Solar Photo Voltaic Plant. The Contractor hereby acknowledges actual receipt of the Solar Photo Voltaic Plant as detailed in the Schedule appended hereto. The Contractor shall hold such Solar Photo Voltaic Plant in trust as a "Trustee" for and on behalf of M/s…..

2. That the Contractor is obliged and shall remain absolutely responsible for the safe O&M/protection and custody of the Solar Photo Voltaic Project against all risks whatsoever till completion of O&M Contract in accordance with the terms of the Contract and is taken over by M/s….. The Contractor undertakes to keep M/s……. harmless against any loss or damage that may be caused to the Solar Photo Voltaic Plant.

3. The Contractor undertakes that the Solar Photo Voltaic Plant shall be used exclusively for the Performance/execution of the Contract strictly in accordance with its terms and conditions and no part of the Solar Photo Voltaic Plant shall be utilised for any other work or purpose whatsoever. It is clearly understood by the Contractor that no-observance of the obligations under this Indemnify Bond by the Contractor shall inter-alia constitute a criminal breach of trust on the part of the Contractor for all intents and purposes including legal/penal consequences.

4. That M/s…. is and shall remain the exclusive owner of the Solar Photo Voltaic Plant free from all encumbrances, charges or liens of any kind, whatsoever. The Solar Photo Voltaic Plant shall at all times be open to inspection and checking by Engineer-in-Charge/Engineer or other employees /agents authorised by him in this regard. Further, M/s… shall always be free at all times to take possession of the Solar Photo Voltaic Plant in whatever form the Solar Photo Voltaic Plant may be, if in its opinion, the Solar Photo Voltaic Plant are likely to be endangered, mis-utilised or converted to uses other than those specified in the Contract, by any acts of omission of commission on the part of the Contractor or any other person or on account of any reason whatsoever and the Contractor binds itself and undertakes to comply with the directions of demand of M/s… to return the Solar Photo Voltaic Plant without any demur or reservation.

5. That this Indemnify Bond is irrevocable. If at any time any loss or damage occurs to the Solar Photo Voltaic Plant or the same or any part thereof is mis- utilised in any manner whatsoever, then the Contractor hereby agrees that the decision of the Engineer-in-

Charge/Engineer of M/s…. as to assessment of loss or damage to the Solar Photo Voltaic Plant shall be final and binding on the Contractor. The Contractor binds itself and undertakes to replace the lost and/or damaged Solar Photo Voltaic Plant at its own cost and / or shall pay the amount of loss to M/s…. without any demur, reservation or protest. This is without prejudice to any other right or remedy that may be available to M/s…. against the Contractor under the Contract and under this Indemnify Bond.

6. NOW THE CONDITION of this Bond is that if the Contractor shall duly and punctually comply with the terms of and conditions of this Bond to the satisfaction of M/s…, THEN, the above Bond shall be void, but otherwise, it shall remain in full force and virtue.

IN WITNESS WHEREOF, the Contractor has hereunto set its hand through its authorised representative under the common seal of the Company, the day, month and year first above mentioned

SCHEDULE

Particulars of the Equipment / Facilities handed-over	Quantity	Value	Other details, (if any)	Signature of Attorney in token of receipt

WITNESS

For and on behalf of

M/s. .....

I. 1. Signature ---------- Name ----------

2. Name ---------- Signature ----------

3. Address ---------- Designation ----------

Authorised representative*

II. 1. Signature ----------

2. Name ---------- Common Seal

(In case of Company)

3. Address ----------

* Indemnity Bonds are to be executed by the authorised persons and (i) In case of contracting Company under common seal of the Company of (ii) having the power of attorney issued under common seal of the company with authority to execute Indemnity Bonds, (iii) In case (ii) the original Power of Attorney if it is specifically for our contract or a Photostat copy of the Power of Attorney if it is a General Power of Attorney and such documents should be attached to Indemnity Bond.

The value shall be sum of Supply and Erection Contract value.

Form F-4

PROFORMA OF BANK GUARANTEE FOR EARNEST MONEY DEPOSIT (EMD)

(To be on non-judicial stamp paper of appropriate value as per Stamp Act relevant to place of execution.)

Ref._____ Bank Guarantee No._____

Date:_____

In consideration of the -----[Insert name of the Bidder] (hereinafter referred to as 'Bidder') submitting the response to NIT inter alia for selection of the Project in response to the NIT No._____dated ____ issued by Solar Energy Corporation of India Limited (hereinafter referred to as SECI) and SECI considering such response to the NIT of ……[*insert the name of the Bidder*] as per the terms of the NIT, the _____ [***insert name & address of bank***] hereby agrees unequivocally, irrevocably and unconditionally to pay to SECI at [*Insert Name of the Place from the address of SECI]* forthwith on demand in writing from SECI *or* any Officer authorized by it in this behalf, any amount upto and not exceeding Rupees ------[*Insert amount]*only, on behalf of M/s. _____ [*Insert name of the Bidder*] .

This guarantee shall be valid and binding on this Bank up to and including _____[*insert date of validity in accordance with NIT]* and shall not be terminable by notice or any change in the constitution of the Bank or the term of contract or by any other reasons whatsoever and our liability hereunder shall not be impaired or discharged by any extension of time or variations or alternations made, given, or agreed with or without our knowledge or consent, by or between parties to the respective agreement.

Our liability under this Guarantee is restricted to Rs._____ (Rs. _____ only). Our Guarantee shall remain in force until _____ *[insert date of validity in accordance with NIT]*. SECI shall be entitled to invoke this Guarantee till _____ [*Insert date which is 30 days after the date in the preceding sentence*].

The Guarantor Bank hereby agrees and acknowledges that the SECI shall have a right to invoke this BANK GUARANTEE in part or in full, as it may deem fit.

The Guarantor Bank hereby expressly agrees that it shall not require any proof in addition to the written demand by SECI, made in any format, raised at the above-mentioned address of the Guarantor Bank, in order to make the said payment to SECI.

The Guarantor Bank shall make payment hereunder on first demand without restriction or conditions and notwithstanding any objection by ---------- [*Insert name of the Bidder*] and/or any other person.

The Guarantor Bank shall not require SECI to justify the invocation of this BANK GUARANTEE, nor shall the Guarantor Bank have any recourse against SECI in respect of any payment made hereunder.

This BANK GUARANTEE shall be interpreted in accordance with the laws of India and the courts at Delhi shall have exclusive jurisdiction.

The Guarantor Bank represents that this BANK GUARANTEE has been established in such form and with such content that it is fully enforceable in accordance with its terms as against the Guarantor Bank in the manner provided herein.

This BANK GUARANTEE shall not be affected in any manner by reason of merger, amalgamation, restructuring or any other change in the constitution of the Guarantor Bank.

This BANK GUARANTEE shall be a primary obligation of the Guarantor Bank and accordingly SECI shall not be obliged before enforcing this BANK GUARANTEE to take any action in any court or arbitral proceedings against the Bidder, to make any claim against or any demand on the Bidder or to give any notice to the Bidder or to enforce any security held by SECI or to exercise, levy or enforce any distress, diligence or other process against the Bidder.

Notwithstanding anything contained hereinabove, our liability under this Guarantee is restricted to Rs. _____ (Rs. _____ only) and it shall remain in force until _____ [*Date to be inserted on the basis of this NIT*] with an additional claim period of thirty (30) days thereafter. We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only if SECI serves upon us a written claim or demand.

Signature _____

Name_____

Power of Attorney No._____

For

_____[Insert Name of the Bank]__

Banker's Stamp and Full Address.

Dated this ____ day of ____, 20__

Bank Contact Details & E Mail ID is to be provided

Form F-5

(TO BE EXECUTED ON STAMP PAPER OF APPROPRIATE VALUE)

INDEMNITY BOND

THIS INDEMNITY BOND IS made this..... day of ..... 20..... by **M/s. ……..**, a Company registered under the Companies Act, 1956/ having its Registered Office at ……..(hereinafter called as "Contractor" or "Obligor" which expression shall include its successors) in favour of M/s ……., a Company incorporated under the Companies Act, 1956/2013 having its Registered Office at …….. and their authorised representatives/Employer i.e., Solar Energy Corporation of India Limited (SECI) and its Project at ……hereinafter called "……." which expression shall include its successors and assigns) :

WHEREAS ……/ SECI has awarded to the Contractor a Contract …….. vide its NOA No ……Dated ……. & Contract Agreement No……dated……executed on _____ (hereinafter called the "Contract").

NOW, THEREFORE, this Indemnify Bond witnesseth as follows:

1. That in consideration of Solar Photo Voltaic Plant as mentioned in the Contract, total valued at Rs. …… (Rupees …… only), valued as a summation of the referred contracts and handed over to the Contractor for the purpose of Performance of the Contract (s), the Contractor hereby undertakes to indemnify and shall keep M/s…… and their authorized representatives/Employer i.e., SECI, indemnified, for the full value of the Solar Photo Voltaic Plant during the tenure of this contract or its extension if agreed to.

2. Contractor confirm that they are aware of all the contractual obligations regarding payment to all personnel and labours including that of the sub – vendors & sub –contractors of Contractor, involved in this project., as well as various contractual, statutory and non – statutory obligations as per legal requirements and have complied with the obligations to the best of information and knowledge.

3. Contractor also confirms, that they are in compliance of all the provisions and requirements, including but not limited to, the following acts/ laws/ provisions and other applicable statutory and non-statutory regulations:

    a. Contract Labor (Regulation & Abolition) Act 1970
    b. Wages Act 1936
    c. Minimum Wages Act 1948
    d. Employer's Liability Act 1938
    e. Workmen's Compensation Act 1923
    f. Industrial Dispute Act 1947
    g. Maturity Benefit Act 1961
    h. Mines Act 1952
    i. Employees State Insurance Act 1948.

4. Contractor, hereby confirm, that in the event any contractual or statutory obligation is found to be deficient in compliance or found non-complied, Contractor will indemnify M/s……../ SECI and take necessary actions to comply with the same within the permissible time period.

5. Contractor also confirm, should there be any charges or penalty, of any kind imposed on M/s…. or its authorized representatives i.e., SECI, for non-compliance of legal or statutory requirements by Contractor during its tenure of the contract, Contractor agrees to indemnify M/s…….. and SECI against all damages, libel or suit, in full for the same on raising such a demand by M/s……/ SECI and promises to pay the same within 30 days.

6. We do further undertake that this above stated warranty is inclusive of materials and labour.

7. That the Contractor is obliged and shall remain absolutely responsible for the safe O&M/ protection and custody of the Solar Photo Voltaic Project against all risks whatsoever till completion of O&M Contract in accordance with the terms of the Contract. The Contractor undertakes to keep M/s……. and SECI harmless against any loss or damage that may be caused to the Solar Photo Voltaic Plant.

IN WITNESS WHEREOF, the Contractor has hereunto set its hand through its authorised representative under the common seal of the Company, the day, month and year first above mentioned

For Jakson Engineers Limited

(_____)

Designation: Director

Name:

Date:

(Authorized Representative of JEL)

Form F-6

NO DEVIATION CONFIRMATION

(To be submitted on the Letter Head of the Bidding Company)

Ref.No. _____ Date: _____

From: _____ (*Insert name and address of Bidding Company*)
_____
_____
Tel.#:
Fax#:
E-mail address#

To

Solar Energy Corporation of India Limited
(A Government of India Enterprise)
D - 3, 1st Floor, Wing - A, Prius Platinum Building
District Centre, Saket, New Delhi - 110 017

Sub: Bid for the "Tender for Design, Engineering, Supply, Construction, Erection, Testing & Commissioning of 15 MW (AC) Floating Solar PV Power Plant at different sites including 10 years plant O&M at Singareni Collieries Company Limited, Telangana, India".

Dear Sir / Madam,

We understand that any 'deviation/ exception' in any form may result in rejection of bid. We, therefore, certify that we have not taken any 'exception/ deviation' anywhere in the bid and we agree that if any 'deviation/ exception' is mentioned or noticed, our bid may be rejected.

Place:
Date:

[Signature of Authorized Signatory of Bidder]
Name:
Designation:
Seal:

Form F-7

DECLARATION REGARDING BANNING, LIQUIDATION, COURT RECEIVERSHIP ETC.

(To be submitted on the Letter Head of the Bidding Company)

Ref.No. _____ Date: _____

From: _____ (*Insert name and address of Bidding Company*)

_____

_____

Tel.#:
Fax#:
E-mail address#

To

Solar Energy Corporation of India Limited
(A Government of India Enterprise)
D - 3, 1st Floor, Wing - A, Prius Platinum Building
District Centre, Saket, New Delhi - 110 017

Sub: Bid for the "Tender for Design, Engineering, Supply, Construction, Erection, Testing & Commissioning of 15 MW (AC) Floating Solar PV Power Plant at different sites including 10 years plant O&M at Singareni Collieries Company Limited, Telangana, India".

Dear Sir / Madam,

We hereby confirm that we are not on Banning List by Employer/ Owner or Public Sector Project Management Consultant due to "poor performance" or "corrupt and fraudulent practices" or any other reason or banned by Government department/ Public Sector on due date of submission of bid.

Further, we confirm that neither we nor our allied agency/(ies) (as defined in the Procedure for Action in case of Corrupt/ Fraudulent/ Collusive/ Coercive Practices) are on banning list of Employer/ Owner or the Ministry of New & Renewable Energy.

We also confirm that we are not under any liquidation, court receivership or similar proceedings or 'bankruptcy'.

In case it comes to the notice of Employer/ Owner that we have given wrong declaration in this regard, the same shall be dealt as 'fraudulent practices' and action shall be initiated as per the Procedure for action in case of Corrupt/Fraudulent/Collusive/Coercive Practices.

Further, we also confirm that in case there is any change in status of the declaration prior to award of contract, the same will be promptly informed to Employer/ Owner by us.

Place:
Date:

[Signature of Authorized Signatory of Bidder]
Name:
Designation:
Seal:

Form F-9

PROFORMA OF BANK GUARANTEE FOR EARNEST MONEY DEPOSIT (EMD)

(To be on non-judicial stamp paper of appropriate value as per Stamp Act relevant to place of execution.)

Ref._____ Bank Guarantee No._____

Date:_____

In consideration of the -----[Insert name of the Bidder] (hereinafter referred to as 'Bidder') submitting the response to NIT inter alia for selection of the Project in response to the NIT No._____dated ____ issued by Solar Energy Corporation of India Limited (hereinafter referred to as SECI) and SECI considering such response to the NIT of ……[*insert the name of the Bidder*] as per the terms of the NIT, the _____ [***insert name & address of bank***] hereby agrees unequivocally, irrevocably and unconditionally to pay to SECI at [*Insert Name of the Place from the address of SECI]* forthwith on demand in writing from SECI *or* any Officer authorized by it in this behalf, any amount upto and not exceeding Rupees ------[*Insert amount]*only, on behalf of M/s. _____ [*Insert name of the Bidder*] .

This guarantee shall be valid and binding on this Bank up to and including _____[*insert date of validity in accordance with NIT]* and shall not be terminable by notice or any change in the constitution of the Bank or the term of contract or by any other reasons whatsoever and our liability hereunder shall not be impaired or discharged by any extension of time or variations or alternations made, given, or agreed with or without our knowledge or consent, by or between parties to the respective agreement.

Our liability under this Guarantee is restricted to Rs._____ (Rs. _____ only). Our Guarantee shall remain in force until _____ *[insert date of validity in accordance with NIT]*. SECI shall be entitled to invoke this Guarantee till _____ [*Insert date which is 30 days after the date in the preceding sentence*].

The Guarantor Bank hereby agrees and acknowledges that the SECI shall have a right to invoke this BANK GUARANTEE in part or in full, as it may deem fit.

The Guarantor Bank hereby expressly agrees that it shall not require any proof in addition to the written demand by SECI, made in any format, raised at the above-mentioned address of the Guarantor Bank, in order to make the said payment to SECI.

The Guarantor Bank shall make payment hereunder on first demand without restriction or conditions and notwithstanding any objection by ---------- [*Insert name of the Bidder*] and/or any other person.

The Guarantor Bank shall not require SECI to justify the invocation of this BANK GUARANTEE, nor shall the Guarantor Bank have any recourse against SECI in respect of any payment made hereunder.

This BANK GUARANTEE shall be interpreted in accordance with the laws of India and the courts at Delhi shall have exclusive jurisdiction.

The Guarantor Bank represents that this BANK GUARANTEE has been established in such form and with such content that it is fully enforceable in accordance with its terms as against the Guarantor Bank in the manner provided herein.

This BANK GUARANTEE shall not be affected in any manner by reason of merger, amalgamation, restructuring or any other change in the constitution of the Guarantor Bank.

This BANK GUARANTEE shall be a primary obligation of the Guarantor Bank and accordingly SECI shall not be obliged before enforcing this BANK GUARANTEE to take any action in any court or arbitral proceedings against the Bidder, to make any claim against or any demand on the Bidder or to give any notice to the Bidder or to enforce any security held by SECI or to exercise, levy or enforce any distress, diligence or other process against the Bidder.

Notwithstanding anything contained hereinabove, our liability under this Guarantee is restricted to Rs. _____ (Rs. _____ only) and it shall remain in force until _____ [*Date to be inserted on the basis of this NIT*] with an additional claim period of thirty (30) days thereafter. We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only if SECI serves upon us a written claim or demand.

Signature _____

Name_____

Power of Attorney No._____

For

_____[Insert Name of the Bank]__

Banker's Stamp and Full Address.

Dated this ____ day of ____, 20__

Bank Contact Details & E Mail ID is to be provided

Form F-13

BIDDER'S EXPERIENCE

(To be submitted on the Letter Head of the Bidding Company)

Ref.No. _____ Date: _____

From: _____ (*Insert name and address of Bidding Company*)

_____

_____

Tel.#:

Fax#:

E-mail address#

To

Solar Energy Corporation of India Limited
(A Government of India Enterprise)
D - 3, 1st Floor, Wing - A, Prius Platinum Building
District Centre, Saket, New Delhi - 110 017

Sub: Bid for "Tender for Design, Engineering, Supply, Construction, Erection, Testing & Commissioning of 15 MW (AC) Floating Solar PV Power Plant at different sites ncluding 10 years plant O&M at Singareni Collieries Company Limited, Telangana, India"".

Dear Sir / Madam,

Sl. No	Description of the Services	LOA /WO No. and date	Full Postal Address & phone nos. of Client. *Name, designation and address of Engineer/ Officer-in-Charge (for cases other than purchase)*	Value of Contract/ Order (*Specify* Currency Amount)	Date of Commencement of Services	Scheduled Completion Time (Months)	Date of Actual Completion	Reasons for delay in execution, if any
(1)	(2)	(3)	(5)	(6)	(7)	(8)	(9)	(10)

Place:
Date:

[Signature of Authorized Signatory of Bidder]
Name:
Designation:
Seal

Form F-16

FORMAT OF CHARTERED ACCOUNTANT CERTIFICATE FOR FINANCIAL CAPABILITY OF THE BIDDER

(To be submitted on the Letter Head of the Chartered Accountant)

Ref.No. _____ Date: _____

To

Solar Energy Corporation of India Limited
(A Government of India Enterprise)
D - 3, 1st Floor, Wing - A, Prius Platinum Building
District Centre, Saket, New Delhi - 110 017

Sub: Bid for "Tender for Design, Engineering, Supply, Construction, Erection, Testing & Commissioning of 15 MW (AC) Floating Solar PV Power Plant at different sites including 10 years plant O&M at Singareni Collieries Company Limited, Telangana, India"".

Dear Sir / Madam,

We have verified the Annual Accounts and other relevant records of M/s…… (Name of the bidder) and certify the following

Further, we certify that the Financially Evaluated Entity (ies) had an Annual Turnover

A. ANNUAL TURNOVER OF LAST 3 YEARS:

Year	Amount (Currency)
Year 1:	
Year 2:	
Year 3:	

And

Net worth (strike out whichever is not applicable) of INR……Crore computed as per instructions provided in this tender based on unconsolidated audited annual accounts as per last FY.

B. FINANCIAL DATA FOR LAST AUDITED FINANCIAL YEAR:

Description	Year _____
	Amount (Currency)
1. Current Assets	
2. Current Liabilities	
3. Working Capital (Current Assets-Current liabilities)	
4. Net Worth (As mentioned under Annexure to BDS)	

Yours faithfully

(Signature and stamp (on each page) of Authorized Signatory of Bidding Company.

Name: …….

Date: …….

Place: …….

Signature and stamp (on each page) of Chartered Accountant/Statutory Auditors of Bidding Company.

Name: …….

Date: …….

Place: …….

Notes:

Audited consolidated annual accounts of the Bidder may also be used for the purpose of financial criteria provided the Bidder has at least 50% equity in each company whose accounts are merged in the audited consolidated accounts and provided further that the financial capability of such companies (of which accounts are being merged in the consolidated accounts) shall not be considered again for the purpose of evaluation of the Bid.

Form F-17

FORMAT FOR JOINT VENTURE AGREEMENT

(*To be stamped in accordance with Stamp Act, the Non-Judicial Stamp Paper of Appropriate Value should be in the name of the Joint Venture***)**

THIS JOINT DEED OF UNDERTAKING executed on this……. day of……. Two Thousand and……..... by …… a company incorporated under the laws of …… and having its Registered Office at .....(hereinafter called the "Party No.1" which expression shall include its successors & executors) and M/s……a company incorporated under the laws of …… and having its Registered Office at …… (hereinafter called the "Party No.2" which expression shall include its successors & executors) and M/s.. . ... a Company incorporated under the laws of ……. and having its Registered Office at ……. (hereinafter called the "Party No.3" which expression shall include its successors & executors) for the purpose of making a bid and entering into a contract [hereinafter called the "Contract" {in case of award)] against the Tender No……. for …… *(insert name of the package alongwith project name)* …… of Solar Energy Corporation of India Limited, a Company incorporated under the Companies Act of 2013 having its registered office at D-3, 1st Floor, Wing-A, Prius Platinum Building, District Centre, Saket, New Delhi-110017 (hereinafter called the "Employer").

WHEREAS the Party No.1, Party No.2 and Party No.3 have entered into an Agreement dated.....

AND WHEREAS the Employer invited bids as per the above-mentioned Specification for the design, manufacture, supply, erection, testing and commissioning including O & M of Equipment/ Materials stipulated in the Tender Documents under …… *(insert name of the package alongwith project name)* ……

AND WHEREAS Clause 2, Section-ITB and BDS (documents establishing the Qualification of Bidder) & Qualification Criteria in Annexure to BDS forming part of the Tender Documents, inter-alia stipulates that an Undertaking of two or more qualified manufacturers as partners, meeting the requirements of Qualification Criteria in Annexure to BDS, as applicable may bid, provided, the Joint Venture fulfills all other requirements under Qualification Criteria in Annexure to BDS and in such a case, the Bid Forms shall be signed by all the partners so as to legally bind all the Partners of the Joint Venture, who will be jointly and severally liable to perform the Contract and all obligations hereunder.

The above clause further states that this Undertaking shall be attached to the bid and the Contract Performance Security will be as per the format F-9 enclosed with the Tender Documents without any restrictions or liability for either party.

AND WHEREAS the bid is being submitted to the Employer vide proposal No……. dated ……..... by Party No.1 based on this Undertaking between all the parties; under these presents and the bid in accordance with the requirements of Clause 2, Section-ITB and BDS (documents establishing the Qualification of Bidder) & Qualification Criteria in Annexure to BDS, has been signed by all the parties.

NOW THIS UNDERTAKING WITNESSETH AS UNDER:

In consideration of the above premises and agreements all the parties of this Deed of Undertaking do hereby declare and undertake:

1. In requirement of the award of the Contract by the Employer to the Joint Venture Partners, we, the Parties do hereby undertake that M/s…… the Party No.1, shall act as Lead Partner and further declare and confirm that we the parties to the Joint Venture shall jointly and severally be bound unto

the Employer for the successful performance of the Contract and shall be fully responsible for the design, manufacture, supply and successful performance of the equipment in accordance with the Contract:

2. In case of any breach or default of the said Contract by any of the parties to the Joint Venture, the party(ies) do hereby undertake to be fully responsible for the successful performance of the Contract and to carry out all the obligations and responsibilities under the Contract in accordance with the requirements of the Contract.

3. Further, if the Employer suffers any loss or damage on account of any breach in the Contract or any shortfall in the performance of the equipment in meeting the performances guaranteed as per the specification in terms of the Contract, the Party(ies) of these presents undertake to promptly make good such loss or damages caused to the Employer, on its demand without any demur. It shall not be necessary or obligatory for the Employer to proceed against Lead Partner to these presents before proceeding against or dealing with the other Party(ies), the Employer can proceed against any of the parties who shall be jointly and severally liable for the performance and all other liabilities/ obligations under the Contract to the Employer.

4. The financial liability of the Parties of this Deed of Undertaking to the Employer, with respect to any of the claims rising out of the performance or non-performance of the obligations set forth in this Deed of Undertaking, read in conjunction with the relevant conditions of the Contract shall, however not be limited in any way so as to restrict or limit the liabilities or obligations of any of the Parties of this Deed of Undertaking.

5. It is expressly understood and agreed between the Parties to this Undertaking that the responsibilities and obligations of each of the Parties shall be as delineated in Appendix - I *(to be suitably appended by the Parties alongwith this Undertaking in its bid)* to this Deed of Undertaking. It is further undertaken by the parties that the above sharing of responsibilities and obligations shall not in any way be a limitation of joint and several responsibilities of the Parties under the Contract.

6. It is also understood that this Undertaking is provided for the purposes of undertaking joint and several liabilities of the partners to the Joint Venture for submission of the bid and performance of the Contract and that this Undertaking shall not be deemed to give rise to any additional liabilities or obligations, in any manner or any law, on any of the Parties to this Undertaking or on the Joint Venture, other than the express provisions of the Contract.

7. This Undertaking shall be construed and interpreted in accordance with the provisions of the Contract.

8. In case of an award of a Contract, we the parties to this Deed of Undertaking do hereby agree that we shall be jointly and severally responsible for furnishing a Contract Performance Security from a bank in favour of the Employer in the currency/ currencies of the Contract.

9. It is further agreed that this Deed of Undertaking shall be irrevocable and shall form an integral part of the bid and shall continue to be enforceable till the Employer discharges the same or upon the completion of the Contract in accordance with its provisions, whichever is earlier. It shall be effective from the date first mentioned above for all purposes and intents.

IN WITNESS, WHEREOF, the Parties to this Deed of Undertaking have through their authorised representatives executed these presents and affixed Common Seals of their companies, on the day, month and year first mentioned above.

Common Seal of …….
has been affixed in my/ our
presence pursuant to Board of
Director's Resolution dated …….

Name ……..

Designation …….

Signature …….

For Lead Partner (Party No.-1)
For and on behalf of M/s
……..

(Signature of the authorized representative)

WITNESS :

I. ……

II. ……

Common Seal of …….
has been affixed in my/our
presence pursuant to Board of
Director's Resolution dated …….

Name ……..

Designation …….

Signature …….

For Party No.-2
For and on behalf of M/s……..

(Signature of the authorized representative)

WITNESS :

I. ……

II. ……

Common Seal of …….
has been affixed in my/ our
presence pursuant to Board of
Director's Resolution dated …….

Name ……..

Designation …….

Signature …….

For Party No.-3
For and on behalf of M/s.
……..

(Signature of the authorized representative)

WITNESS :

I. ……

II. ……

Note:

1. For the purpose of executing the Joint Deed of Undertaking, the non-judicial stamp papers of appropriate value shall be purchased in the name of Joint Venture.

2. The Undertaking shall be signed on all the pages by the authorised representatives of each of the partners and should invariably be witnessed.

Form F-17A

FORMAT FOR POWER OF ATTORNEY FOR JOINT VENTURE AGREEMENT

(*To be stamped in accordance with Stamp Act, the Non-Judicial Stamp Paper of Appropriate Value should be in the name of the Joint Venture***)**

KNOW ALL MEN BY THESE PRESENTS THAT WE, the Partners whose details are given hereunder ..... have formed a Joint Venture under the laws of ..... and having our Registered Office(s)/ Head Office(s) at ..... (hereinafter called the 'Joint Venture' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators and assigns) acting through M/s ..... being the Partner in-charge do hereby constitute, nominate and appoint M/s..... a Company incorporated under the laws of .....…….. and having its Registered/ Head Office at ..... as our duly constituted lawful Attorney (hereinafter called "Attorney" or "Authorised Representative" or "Partner In-charge") to exercise all or any of the powers for and on behalf of the Joint Venture in regard to Tender No..... Package ..... the bids for which have been invited by Solar Energy Corporation of India Limited, D-3, 1st Floor, Wing-A, Prius Platinum Building, District Centre, Saket, New Delhi-110017 (hereinafter called the 'Employer') to undertake the following acts:

i) To submit proposal and participate in the aforesaid Bid Specification of the Employer on behalf of the "Joint Venture".

ii) To negotiate with the Employer the terms and conditions for award of the Contract pursuant to the aforesaid Bid and to sign the Contract with the Employer for and on behalf of the "Joint Venture".

iii) To do any other act or submit any document related to the above.

iv) To receive, accept and execute the Contract for and on behalf of the "Joint Venture".

It is clearly understood that the Partner In-charge (Lead Partner) shall ensure performance of the Contract(s) and if one or more Partner fail to perform their respective portions of the Contract(s), the same shall be deemed to be a default by all the Partners.

It is expressly understood that this Power of Attorney shall remain valid binding and irrevocable till completion of the Defect Liability Period in terms of the Contract.

The Joint Venture hereby agrees and undertakes to ratify and confirm all the whatsoever the said Attorney/ Authorised Representatives/ Partner in-charge quotes in the bid, negotiates and signs the Contract with the Employer and/or proposes to act on behalf of the Joint Venture by virtue of this Power of Attorney and the same shall bind the Joint Venture as if done by itself.

IN WITNESS, THEREOF the Partners Constituting the Joint Venture as aforesaid have executed these presents on this ..... day of ……..... under the Common Seal(s) of their Companies.

for and on behalf of the

Partners of Joint Venture

.....

.....

.....

The Common Seal of the above Partners of the Joint Venture:

The Common Seal has been affixed there unto in the presence of:

WITNESS

1. Signature.....

   Name .....

   Designation .....

   Occupation .....

2. Signature.....

   Name .....

   Designation .....

   Occupation .....

Note:

1. For the purpose of executing the Agreement, the non-judicial stamp papers of appropriate value shall be purchased in the name of Joint Venture.

2. The Agreement shall be signed on all the pages by the authorised representatives of each of the partners and should invariably be witnessed.

Form F-18

FORMAT FOR CONSORTIUM AGREEMENT

(*To be stamped in accordance with Stamp Act, the Non-Judicial Stamp Paper of Appropriate Value should be in the name of the Consortium***)**

THIS JOINT DEED OF UNDERTAKING executed on this……. day of……. Two Thousand and……..... by …… a company incorporated under the laws of …… and having its Registered Office at .....(hereinafter called the "Party No.1" which expression shall include its successors & executors) and M/s……a company incorporated under the laws of …… and having its Registered Office at …… (hereinafter called the "Party No.2" which expression shall include its successors & executors) and M/s.. . ... a Company incorporated under the laws of ……. and having its Registered Office at ……. (hereinafter called the "Party No.3" which expression shall include its successors & executors) for the purpose of making a bid and entering into a contract [hereinafter called the "Contract" {in case of award)] against the Tender No……. for …… *(insert name of the package alongwith project name)* …… of Solar Energy Corporation of India Limited, a Company incorporated under the Companies Act of 2013 having its registered office at D-3, 1st Floor, Wing-A, Prius Platinum Building, District Centre, Saket, New Delhi-110017 (hereinafter called the "Employer").

WHEREAS the Party No.1, Party No.2 and Party No.3 have entered into an Agreement dated.....

AND WHEREAS the Employer invited bids as per the above-mentioned Specification for the design, manufacture, supply, erection, testing and commissioning including O & M of Equipment/ Materials stipulated in the Tender Documents under …… *(insert name of the package alongwith project name)* ……

AND WHEREAS Clause 2, Section-ITB and BDS (documents establishing the Qualification of Bidder) & Qualification Criteria in Annexure to BDS forming part of the Tender Documents, inter-alia stipulates that an Undertaking of two or more qualified manufacturers as partners, meeting the requirements of Qualification Criteria in Annexure to BDS, as applicable may bid, provided, the Consortium fulfills all other requirements under Qualification Criteria in Annexure to BDS and in such a case, the Bid Forms shall be signed by all the partners so as to legally bind all the Partners of the Consortium, who will be jointly and severally liable to perform the Contract and all obligations hereunder.

The above clause further states that this Undertaking shall be attached to the bid and the Contract Performance Security will be as per the format F-9 enclosed with the Tender Documents without any restrictions or liability for either party.

AND WHEREAS the bid is being submitted to the Employer vide proposal No……. dated ……..... by Party No.1 based on this Undertaking between all the parties; under these presents and the bid in accordance with the requirements of Clause 2, Section-ITB and BDS (documents establishing the Qualification of Bidder) & Qualification Criteria in Annexure to BDS, has been signed by all the parties.

NOW THIS UNDERTAKING WITNESSETH AS UNDER:

In consideration of the above premises and agreements all the parties of this Deed of Undertaking do hereby declare and undertake:

1. In requirement of the award of the Contract by the Employer to the Consortium Partners, we, the Parties do hereby undertake that M/s…… the Party No.1, shall act as Lead Partner and further

declare and confirm that we the parties to the Consortium shall jointly and severally be bound unto the Employer for the successful performance of the Contract and shall be fully responsible for the design, manufacture, supply and successful performance of the equipment in accordance with the Contract:

2. In case of any breach or default of the said Contract by any of the parties to the Consortium, the party(ies) do hereby undertake to be fully responsible for the successful performance of the Contract and to carry out all the obligations and responsibilities under the Contract in accordance with the requirements of the Contract.

3. Further, if the Employer suffers any loss or damage on account of any breach in the Contract or any shortfall in the performance of the equipment in meeting the performances guaranteed as per the specification in terms of the Contract, the Party(ies) of these presents undertake to promptly make good such loss or damages caused to the Employer, on its demand without any demur. It shall not be necessary or obligatory for the Employer to proceed against Lead Partner to these presents before proceeding against or dealing with the other Party(ies), the Employer can proceed against any of the parties who shall be jointly and severally liable for the performance and all other liabilities/ obligations under the Contract to the Employer.

4. The financial liability of the Parties of this Deed of Undertaking to the Employer, with respect to any of the claims rising out of the performance or non-performance of the obligations set forth in this Deed of Undertaking, read in conjunction with the relevant conditions of the Contract shall, however not be limited in any way so as to restrict or limit the liabilities or obligations of any of the Parties of this Deed of Undertaking.

5. It is expressly understood and agreed between the Parties to this Undertaking that the responsibilities and obligations of each of the Parties shall be as delineated in Appendix - I *(to be suitably appended by the Parties alongwith this Undertaking in its bid)* to this Deed of Undertaking. It is further undertaken by the parties that the above sharing of responsibilities and obligations shall not in any way be a limitation of joint and several responsibilities of the Parties under the Contract.

6. It is also understood that this Undertaking is provided for the purposes of undertaking joint and several liabilities of the partners to the Consortium for submission of the bid and performance of the Contract and that this Undertaking shall not be deemed to give rise to any additional liabilities or obligations, in any manner or any law, on any of the Parties to this Undertaking or on the Consortium, other than the express provisions of the Contract.

7. This Undertaking shall be construed and interpreted in accordance with the provisions of the Contract.

8. In case of an award of a Contract, we the parties to this Deed of Undertaking do hereby agree that we shall be jointly and severally responsible for furnishing a Contract Performance Security from a bank in favour of the Employer in the currency/ currencies of the Contract.

9. It is further agreed that this Deed of Undertaking shall be irrevocable and shall form an integral part of the bid and shall continue to be enforceable till the Employer discharges the same or upon the completion of the Contract in accordance with its provisions, whichever is earlier. It shall be effective from the date first mentioned above for all purposes and intents.

IN WITNESS, WHEREOF, the Parties to this Deed of Undertaking have through their authorized representatives executed these presents and affixed Common Seals of their companies, on the day, month and year first mentioned above.

Common Seal of …….
has been affixed in my/ our
presence pursuant to Board of
Director's Resolution dated …….

Name ……..

Designation …….

Signature …….

WITNESS :

I. ……

II. ……

For Lead Partner (Party No.-1)
For and on behalf of M/s
……..

(Signature of the authorized representative)

Common Seal of …….
has been affixed in my/our
presence pursuant to Board of
Director's Resolution dated …….

Name ……..

Designation …….

Signature …….

WITNESS :

I. ……

II. ……

For Party No.-2
For and on behalf of M/s……..

(Signature of the authorized representative)

Common Seal of …….
has been affixed in my/ our
presence pursuant to Board of
Director's Resolution dated …….

Name ……..

Designation …….

Signature …….

WITNESS :

I. ……

For Party No.-3
For and on behalf of M/s.
……..

(Signature of the authorized representative)

II. ……

Note:

1. For the purpose of executing the Joint Deed of Undertaking, the non-judicial stamp papers of appropriate value shall be purchased in the name of Consortium.

2. The Undertaking shall be signed on all the pages by the authorized representatives of each of the partners and should invariably be witnessed.

Form F-18A

FORMAT FOR POWER OF ATTORNEY OF CONSORTIUM AGREEMENT

(*To be stamped in accordance with Stamp Act, the Non-Judicial Stamp Paper of Appropriate Value should be in the name of the Consortium***)**

KNOW ALL MEN BY THESE PRESENTS THAT WE, the Partners whose details are given hereunder ..... have formed a Consortium under the laws of ..... and having our Registered Office(s)/ Head Office(s) at ..... (hereinafter called the 'Consortium' which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators and assigns) acting through M/s ..... being the Partner in-charge do hereby constitute, nominate and appoint M/s..... a Company incorporated under the laws of .....…….... and having its Registered/ Head Office at ..... as our duly constituted lawful Attorney (hereinafter called "Attorney" or "Authorised Representative" or "Partner In-charge") to exercise all or any of the powers for and on behalf of the Consortium in regard to Tender No..... Package ..... the bids for which have been invited by Solar Energy Corporation of India Limited, D-3, 1st Floor, Wing-A, Prius Platinum Building, District Centre, Saket, New Delhi-110017 (hereinafter called the 'Employer') to undertake the following acts:

i) To submit proposal and participate in the aforesaid Bid Specification of the Employer on behalf of the "Consortium".

ii) To negotiate with the Employer the terms and conditions for award of the Contract pursuant to the aforesaid Bid and to sign the Contract with the Employer for and on behalf of the "Consortium".

iii) To do any other act or submit any document related to the above.

iv) To receive, accept and execute the Contract for and on behalf of the "Consortium".

It is clearly understood that the Partner In-charge (Lead Partner) shall ensure performance of the Contract(s) and if one or more Partner fail to perform their respective portions of the Contract(s), the same shall be deemed to be a default by all the Partners.

It is expressly understood that this Power of Attorney shall remain valid binding and irrevocable till completion of the Defect Liability Period in terms of the Contract.

The Consortium hereby agrees and undertakes to ratify and confirm all the whatsoever the said Attorney/ Authorized Representatives/ Partner in-charge quotes in the bid, negotiates and signs the Contract with the Employer and/or proposes to act on behalf of the Consortium by virtue of this Power of Attorney and the same shall bind the Consortium as if done by itself.

IN WITNESS, THEREOF the Partners Constituting the Consortium as aforesaid have executed these presents on this ..... day of ……..... under the Common Seal(s) of their Companies.

for and on behalf of the
Partners of Consortium

.....

.....

.....

The Common Seal of the above Partners of the Consortium:

The Common Seal has been affixed there unto in the presence of:

WITNESS

1. Signature.....

   Name .....

   Designation .....

   Occupation .....

2. Signature.....

   Name .....

   Designation .....

   Occupation .....

Note:

1. For the purpose of executing the Agreement, the non-judicial stamp papers of appropriate value shall be purchased in the name of Consortium.

2. The Agreement shall be signed on all the pages by the authorized representatives of each of the partners and should invariably be witnessed.

Form F-19

e-BANKING FORMAT

(To be submitted on the Letter Head of the Bidder)

1. Bidder/ Customer Name :

2. Bidder/ Customer Code :

3. Bidder/ Customer Address :

4. Bidder/ Customer E-mail ID :

5. Particulars of Bank Account
   a) Name of Bank :
   b) Name of Branch :
   c) Branch Code :
   d) Address :
   e) Telephone Number :
   f) Type of Account :
   g) Account Number :
   h) RTGS IFSC Code :
   i) NEFT IFSC Code :
   j) 9 digit MICR code :

I/ We hereby authorize Solar Energy Corporation of India Limited to release any amount due to me/ us in the bank account as mentioned above. I/ We hereby declare that the particulars given above are correct and complete. If the transaction is delayed or lost because of incomplete or incorrect information, we would not hold the Solar Energy Corporation of India Limited responsible.

(Signature of Vendor/ Customer)

BANK CERTIFICATE

We certify that ---------- has an Account no. ---------- with us and we confirm that the details given above are correct as per our records.

Bank stamp

Date

(Signature of authorized officer of bank)

Form F-20

PROFORMA OF BANK GUARANTEE FOR ADVANCE PAYMENT

(*To be stamped in accordance with Stamp Act, the Non-Judicial Stamp Paper of Appropriate Value should be in the name of the issuing Bank***)**

Bank Guarantee No.: .....
Date: .....

NOA/ Contract No.....

…….. *[Name of Contract]* ……..

To:

Solar Energy Corporation of India Limited
(A Government of India Enterprise)
D - 3, 1st Floor, Wing - A, Prius Platinum Building
District Centre, Saket, New Delhi - 110 017

Dear Sir / Madam,

We refer to the Contract ("the Contract") signed on .....*(insert date of the Contract)* …..... between you and M/s ..... *(Name of Contractor)* .....,

(or)

vide notification of award issued on ……. *(insert date of the notification of award)* …. by you to M/s ..... *(Name of Contractor)* ..... having its Principal place of business at ……..... *(Address of Contractor)* ..... and Registered Office at ……..... *(Registered address of Contractor)* ..... ("the Contractor") concerning ……..... *(Indicate brief scope of work)* ..... for the complete execution of the …… *(insert name of Package alongwith name of the Project)* …….

Whereas, in accordance with the terms of the said Contract, the Owner has agreed to pay or cause to be paid to the Contractor an interest bearing Advance Payment against furnishing of an irrevocable bank guarantee for an amount of …… (*Amount in figures and words*) ……which is equal to 110% of the amount of Advance Payment.

By this letter, we, the undersigned, …… *(insert name & address of the issuing bank)* ……, a Bank (which expression shall include its successors, administrators, executors and assigns) organized under the laws of ..... and having its Registered/ Head Office at ……. *(insert address of registered office of the bank)* ……..... do hereby irrevocably guarantee repayment of ……. *(Amount of the bank guarantee in figures and words)* …… upon the first demand of the Employer without cavil or argument in the event that the Contractor fails to commence or fulfill its obligations under the terms of the said Contract for reasons whatsoever.

Provided always that the Bank's obligation shall be limited to the amount of this Bank guarantee or an amount equal to the outstanding balance of the Advance Payment and the accrued interest on the Advance Payment, taking into account such amounts, which have been repaid by the Contractor from time to time in accordance with the terms of payment of the said Contract, as certified by you.

This Guarantee shall remain in full force from the date upon which the said Advance Payment is received by the Contractor up to sixty (60) days beyond the date on which the entire Advance Payment along with the accrued interest if any due thereon has been fully adjusted in terms of the Contract i.e., up to sixty (60) days beyond the date of Completion of the Facilities under the Contract. This Guarantee may be extended from time to time, as may be desired by M/s Solar Energy Corporation of India Limited on whose behalf this Guarantee has been issued.

Any claims to be made under this Guarantee must be received by the Bank during its period of validity, i.e. upto sixty (60) days beyond the date of Completion of the Facilities by the Employer i.e. upto and inclusive of ……. *(dd/mm/yy)*.

Notwithstanding anything contained herein:

1. Our liability under this Bank Guarantee shall not exceed _____ (*value in figures*) _____ [_____ (*value in words*) _____].

2. This Bank Guarantee shall be valid upto _____ *(validity date)* _____.

3. We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only & only if we receive a written claim or demand on or before _____ (*validity date*) _____.

For and on behalf of the Bank

[*Signature of the authorised signatory(ies)*]
Signature_____

Name_____

Designation_____

POA Number_____

Contact Number(s): Tel._____Mobile_____

Fax Number_____

email _____

Common Seal of the Bank_____
Witness:
Signature_____

Name_____

Address_____

Contact Number(s): Tel._____Mobile_____

email _____

Note:

1. For the purpose of executing the Bank Guarantee, the non-judicial stamp papers of appropriate value shall be purchased in the name of Bank who issues the 'Bank Guarantee'.

2. The Bank Guarantee shall be signed on all the pages by the Bank Authorities indicating their POA nos. and should invariably be witnessed.

Form F-22

LIST OF BANKS

(*For Reference Purpose*)

SBI AND ASSOCIATES	OTHER PUBLIC SECTOR BANKS
1. State Bank of India	1. IDBI Bank Limited
2. State Bank of Indore	**FOREIGN BANKS**
	1. Bank of America NA
	2. Bank of Tokyo Mitsubishi UFJ Ltd.
	3. BNP Paribas
	4. Calyon Bank
	5. Citi Bank N.A.
NATIONALISED BANKS	6. Deutsche Bank A.G
1. Allahabad Bank	7. The HongKong and Shanghai Banking Corpn. (HSBC) Ltd.
2. Andhra Bank	8. Standard Chartered Bank
3. Bank of India	9. Societe Generale
4. Bank of Maharashtra	10. Barclays Bank
5. Canara Bank	11. Royal Bank of Scotland (RBS)
6. Central Bank of India	12. Bank of Nova Scotia
7. Corporation Bank	13. Development Bank of Singapore (DBS)
8. Dena Bank	14. Credit Agricole Corporate and Investment Bank
9. Indian Bank	**SCHEDULED PRIVATE BANKS**
10. Indian Overseas Bank	1. Federal Bank Limited
11. Oriental Bank of Commerce	2. Kotak Mahindra Bank Limited
12. Punjab National Bank	3. Axis Bank Limited
13. Punjab & Sind Bank	4. ICICI Bank Limited
14. Syndicate Bank	5. HDFC Bank Limited
15. Union Bank of India	6. Yes Bank Limited
16. United Bank of India	7. IDFC Bank Limited
17. UCO Bank	8. IndusInd Bank
18. Vijaya Bank	9. Karur Vysya Bank
19. Bank of Baroda	10. South Indian Bank
	11. RBL

Form F-23

SHAREHOLDING CERTIFICATE

(To be submitted on the Letter Head of the Bidder)

Name of the Equity Holder	Type and Number of Shares Owned	% of Equity Holding	Extent of Voting Rights

Yours faithfully

(Signature and Stamp of Authorized Signatory of Bidder)

Name: ……

Date: ……

Place: ……

(Signature and Stamp of Company Secretary/ Director/ Chartered Accountant)

Form F-24

POWER OF ATTORNEY FOR BIDDING COMPANY

(*To be stamped in accordance with Stamp Act, the Non-Judicial Stamp Paper of Appropriate Value should be in the name of the Bidder***)**

Know all men by these presents, We …… (name and address of the registered office of the Bidding Company as applicable) do hereby constitute, appoint and authorize Mr./Ms. …… (name & residential address) who is presently employed with us and holding the position of …… as our true and lawful attorney, to do in our name and on our behalf, all such acts, deeds and things necessary in connection with or incidental to submission of our Bid for …… (insert details of Tender) in response to the Tender No …… dated …….. issued by Solar Energy Corporation of India Limited (SECI), New Delhi including signing and submission of the Bid and all other documents related to the Bid, including but not limited to undertakings, letters, certificates, acceptances, clarifications, guarantees or any other document which the SECI may require us to submit. The aforesaid Attorney is further authorized for making representations to the Solar Energy Corporation of India Limited, New Delhi and providing information/ responses to SECI, New Delhi representing us in all matters before SECI, New Delhi and generally dealing with SECI, New Delhi in all matters in connection with Bid till the completion of the bidding process as per the terms of the above mentioned Tender.

We hereby agree to ratify all acts, deeds and things done by our said attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid attorney shall be binding on us and shall always be deemed to have been done by us.

All the terms used herein but not defined shall have the meaning ascribed to such terms under the Tender.

Signed by the within named

…….. (Insert the name of the executant company)

through the hand of

Mr. ……

duly authorized by the Board to issue such Power of Attorney

Dated this …… day of ……
Accepted

……..
Signature of Attorney
(Name, designation and address of the Attorney)

Attested
……
(Signature of the executant)
(Name, designation and address of the executant)

……
Signature and stamp of Notary of the place of execution

Common seal of …… has been affixed in my/ our presence pursuant to Board of Director's Resolution dated……

WITNESS

1. **……..**
(Signature)

Name……

Designation ……

2. **……..**
(Signature)

Name……

Designation ……

Notes:

The mode of execution of the power of attorney should be in accordance with the procedure, if any, laid down by the applicable law and the charter documents of the executant(s) and the same should be under common seal of the executant affixed in accordance with the applicable procedure. Further, the person whose signatures are to be provided on the power of attorney shall be duly authorized by the executant(s) in this regard.

The person authorized under this Power of Attorney, in the case of the Bidding Company/ Lead Member being a public company, or a private company which is a subsidiary of a public company, in terms of the Companies Act, 1956, with a paid-up share capital of more than Indian Rupees Five Crores, should be the Managing Director/ Whole Time Director/ Manager appointed under section 269 of the Companies Act, 1956. In all other cases the person authorized should be a director duly authorized by a board resolution duly passed by the Company.

Also, wherever required, the executant(s) should submit for verification the extract of the chartered documents and documents such as a Board resolution/ power of attorney, in favour of the person executing this power of attorney for delegation of power hereunder on behalf of the executant(s).

SECTION - VII

A. SCOPE OF WORKS

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1 Project Particulars

Particulars	STPP Storage Reservoir	Dorli OC 2 Void (Accumulated water)
Design and Engineering		
Proposed AC capacity (MW)	10	5
Minimum DC Capacity (MWp)	13	6.5
Technology	Mono-crystalline / Multi-crystalline / Thin film	
Origin of manufacturer	Cells and Modules to be manufactured in India	
O&M period	10 years	
Design life of PV Power plant	25 years	
Site Location and Land Details (Please refer SECTION – VII, C. Special Technical Conditions for details)		
Site coordinates	**Refer Annexure E:** Project Location	
Village	Chennur Mandal	Dorli OC2
District	Mancherial	Kumuram Bheem Asifabad
State	Telangana	Telangana
Type of Land	Govt. Land	Govt. Land
Owner of Project	Singareni Colleiries Company Limited	
Owner of Land	Singareni Colleiries Company Limited	
Electrical Interconnection Details		
Substation Details	132/33 KV TSTRANSCO substation located at Chennur(Kistampet)	132/33 KV TSTRANSCO Substation located at Asifabad
Distance to connecting substation (approx.)	10000 m	3000 m (To be connected to the 33 kV evacuation line of the proposed

		10 MW solar plant at Dorli OC1 OB Dump)
Access		
Nearest Urban Area	Mancherial (40km)	Bellampalli/Sirpur Kagaznagar(20km)
Nearest Railway Station	Mancherial (40km)	Bellampalli/Sirpur Kagaznagar(20km)
Nearest Domestic Airport	RGIA, Hyderabad	RGIA, Hyderabad
Performance Parameters		
Performance Ratio (PR)	80%	80%
Capacity Utilization Factor (CUF)	22.8%	22.8%
Other Details		
Construction Water	To be arranged by Bidder	
Construction Power	To be arranged by Bidder	

2 Brief Scope of Works

Scope of Supply & Work includes all design & engineering, procurement & supply of equipment and materials, testing at manufacturers works, multi – level inspections, packing and forwarding, supply, receipt, unloading and storage at site, associated civil works, services, permits, licences, installation and incidentals, insurance at all stages, erection, testing and commissioning of (10 MW + 5 MW)15 MW (AC) Floating Solar Photovoltaic Power Plant and performance demonstration with associated equipment and materials on turnkey basis at 2 locations for SCCL, Telangana and 10 (ten) years comprehensive operation and maintenance from the date of Operational Acceptance.

The details of Project location and reservoir are provided below:

Site1: STPP 10 MW:

Sr. No.	Description	Data
1	Name of Dam	STPP Storage Reservoir

2	Co-ordinate	Enclosed : Annexure E
3	Owner of Dam	2x600MW STPP, SCCL
4	Type of Dam-Multi purpose/Irrigation/Power generation	This storage reservoir is used for raw water supply to thermal power generating plant
5	Storage capacity	Maximum - 25 Lakh cum with bed level - 146.5mtrs & FRL - 154mtrs
6	Full reservoir Level (FRL)	154mtrs RL
7	Minimum Drawdown Level (MDDL)	150mtrs RL (Reservoir becomes two chambers with separating wall whose top RL is 152mtrs)
8	Depth at water at FRL and MDDL	At FRL : 154mtr -146.5mtr = 7.5mtrs ; At MDDL : 150mtr - 146.5mtr = 3.5mtrs
9	Water Spread Area at FRL and MDDL	At FRL : 90acres ; At MDDL : 65acres
10	Source of water	Godavari & Pranahita Rivers
11	Silt Level / Sedimentation report (If any)	Silt Level - 147mtrs RL / Clear water (free from sediments & suspended matter) will be received in the reservoir since water is drawn through infiltration galleries provided at river bed
12	Water Spread Area at MDDL	65 acres
13	Flood occurrence in past years	Not Applicable
14	Site visit date	Not Applicable
15	Possible Floating Solar PV (FSPV) Power Plant location	On the storage reservoir
16	Water flow velocity at tentative project location	As the reservoir is storage type, water will be standstill
17	Substation-Consumption/Generation details	Not Applicable
18	Power Evacuation facility details	132/33 KV TSTRANSCO substation located at Chennur(Kistampet)
19	Bay details	132/33 KV TSTRANSCO substation located at Chennur(Kistampet)
20	Statutory approvals required for setting up of the project.	Grid Connectivity approval is already obtained from TSNPDCL

21	Water body approvals , agreement and charges, if any	This storage reservoir is existing in SCCL own land & within the premises of 2x600MW Singareni Thermal Power Plant

Site 2: DORLI OC2 5 MW:

Sr. No.	Description	Data
1	Name of Dam	Dorli OC -2 Void (Acccumulated water)
2	Co-ordinate	Enclosed : Annexure E 1
3	Owner of Dam	GM, BPA Area
4	Type of Dam-Multi purpose/Irrigation/Power generation	The rain water is being accumulated in the OC void
5	Storage capacity	Maximum - 26 Lakh cum with bed level : 923.62 mtrs & FRL 955.82 mtrs
6	Full reservoir Level (FRL)	960 mtrs RL
7	Minimum Drawdown Level (MDDL)	950mtrs RL
8	Depth at water at FRL and MDDL	At FRL : 955.82 mtr - 923.62mtr = 32.2 mtrs ; At MDDL : 950 mtr -923.62 mtr = 26.38 mtrs;
9	Water Spread Area at FRL and MDDL	At FRL : 40acres ; At MDDL : 30 acres
10	Source of water	Rain water
11	Silt Level / Sedimentation report (If any)	Silt Level – 930 mtrs RL / Clear water (sediments & suspended matter will be received in the reservoir since water is flown into the reservoir from OB High walls of DORLI OC 2 mine
12	Water Spread Area at MDDL	30 acres
13	Flood occurrence in past years	Not Applicable
14	Site visit date	Not Applicable
15	Possible Floating Solar PV (FSPV) Power Plant location	On the accumulated water bed
16	Water flow velocity at tentative project location	As the reservoir is storage type, water will be standstill

17	Substation-Consumption/Generation details	Not Applicable
18	Power Evacuation facility details	132/33 KV TSTRANSCO substation located at Asifabad
19	Bay details	132/33 KV TSTRANSCO substation located at Asifabad
20	Statutory approvals required for setting up of the project.	Grid Connectivity approval from TSNPDCL. SCCL has applied for grid connectivity approval.
21	Water body approvals , agreement and charges, if any	This storage reservoir is existing in SCCL own land & within the premises of Dorli OC 2 Open cast mine

Note: *All works shall be executed as per Technical specifications given in Vol.- VII B.*

3 Design and Engineering

3.1 Contractor shall prepare the detailed design basis report (DBR) along with relevant standards (with respective clause description), PERT Chart and MDL. Contractor shall submit a copy of the same to Employer for review and approval prior to detail engineering.

3.2 All documents and drawings shall be submitted to the Employer both in soft as well as hard copies (5 nos.) for review and approval. Every drawing shall also be submitted in '*.dwg' format. In case of design calculations done in spread sheet, editable (working) soft copy of the spread sheet shall also be submitted along with 'pdf' copies during every submission. The Employer shall return, as suitable, either soft or hard copies to the Contractor with category of approval marked thereon. The drawings/documents shall be approved in any one of the following categories based on nature of the comments/ type of drawing or document.

- Category-I: Approved
- Category-II: Approved subject to incorporation of comments. Re-submit for approval after incorporation of comments
- Category-III: Not approved. Re-submit for approval after incorporation of comments
- Category-IV: Kept for record/ reference

- Category-IV (R): Re-submit for record/ reference after incorporation of comments

(**Note**: Approval of document neither relieves the Vendor/ Contractor of his contractual obligations and responsibilities for correctness of design, drawings, dimensions, quality & specifications of materials, weights, quantities, assembly fits, systems/ performance requirement and conformity of supplies with Technical Specifications, Indian statutory laws as may be applicable, nor does it limit the Employer/ Purchaser's rights under the contract)

3.3 Submission of basic design data, design documents, drawings and engineering information including GTP and test reports to Employer or its authorized representative for review and approval in hard copy and soft copy from time to time as per project schedule. The documents typically include, but not limited to, the following:

- Solar insolation data and basis for generation
- Detailed technical specifications (GTP) of all the equipment
- General arrangement and assembly drawings of all major equipment
- Schematic diagram for entire electrical system (DC, AC and auxiliary systems)
- GTP & G.A. drawings for all types of structures/ components, Floats, Anchoring mechanisms, 33 kV switchgears & other interfacing panels
- Test reports (for type, routine and acceptance tests)
- Relay setting charts
- Design calculations and sheets (licensed software as well as design templates)
- Shadow analysis
- Concrete mix design report for different grades of concrete to be used for construction
- Bathymetric survey report including topographical survey data in digital format (Excel file) and Contour plan of the area.
- Array/ Plant Layout
- GA, & detail drawings for architectural, civil, structural and RCC works for the entire project which shall include various buildings and facilities like office cum master control room (MCR), roads, Foundation and plinth for Open installations for LCR/ ICR (as applicable), Weather protection canopy/ shed over open equipment installations, Transformer foundations, Storm water drainage, Sewerage, Water supply & module washing system networks, Security room & watchman cabin(s), Fire protection system, Boundary & transformer yard fencing, MMS structure & foundation works etc.

- Transmission line drawings and erection plans as per DISCOM/ STU guidelines
- Quality assurance plans for manufacturing (MQP), Standard Operating procedure (SOP) and field activities (FQP)
- Detailed site EHS plan, fire safety & evacuation plan and disaster management plan.
- Detailed risk assessment and mitigation plan.
- O&M Instruction's and maintenance manuals for major equipment
- As-built drawings / documents and deviation list from good for construction (GFC) drawings/documents

3.4 Estimation of the plant generation based on Solar Radiation and other climatic conditions prevailing at site.

3.5 Design of associated civil, structural, electrical & mechanical auxiliary and plumbing systems includes preparation of single line diagrams and installation drawings, manuals, electrical layouts, erection key diagrams, electrical and physical clearance diagrams, design calculations for civil, structural, RCC and plumbing & sanitary works, roads and drainage etc. including analysis & design input file, Earth- mat, Bus Bar & Spacers indoor and outdoor lighting/ illumination etc., GTP and GA drawings for the major equipment including transmission line. Design basis & calculation sheets, and other relevant drawings and documents not covered above but required for engineering of all facilities within the periphery shall be provided under this contract.

3.6 All drawings shall be fully corrected to match with the actual "As – Built" site conditions and submitted to Employer after commissioning of the project for record purpose. All as-built drawings must include the Good for Construction deviation list.

4 Procurement and Supply

The equipment and materials for Grid Interactive Floating Solar PV Power Plant with associated system shall include but not limited to the transit insurance, receipt, unloading, storage, erection, testing and commissioning of all supplied material for the following:

4.1 Adequate capacity of solar PV modules with minimum DC capacity as mentioned in Clause 1 of Scope of Works

4.2 Float Platform along with anchoring and mooring system for mounting PV modules of FSPV plant

4.3 Array Junction boxes, distribution boxes and Fuse boxes with string monitoring

capabilities: MCBs/ isolators, Surge Arrestors and with proper lugs, glands, ferrules, terminations and mounting structures.

4.4 Solar cables along with lugs, glands, ferrules, straight/Y-connectors, cable ties and other materials required proper cable termination at both the ends

4.5 DC Cables (SCB to PCU) along with lugs, glands, and other materials required proper cable termination at both the ends

4.6 Power Conditioning Units (PCU) with SCADA compatibility, common AC power evacuation panel with bus bars and circuit breakers LT & HT Power Interfacing Panels, Plant Monitoring Desk, AC & DC Distribution boards and UPS for emergency power supply along with required batteries

4.7 Step – up transformers (inverter duty) in relevance with state grid code and inverter manufacturer requirements.

4.8 Power Transformer in relevance with technical specifications provided in this document and state grid code requirements.

4.9 Auxiliary transformer (s) along with cables and accessories for plant internal consumption.

4.10 Relay and protection system along with battery system.

4.11 LT Power and Control Cables including end terminations and other required accessories for both AC & DC power

4.12 Internal 415V interconnection & Indoor feeder panels to cater auxiliary needs of plant

4.13 Indoor panels / outdoor structures having incoming and outgoing feeders with VCBs, CTs, PTs, Bus bars, cables terminals kits and Bus coupler having Main and transfer Bus. Each bay shall consist of VCB, CT, Isolators with earth switch, LAs and PT's etc.

4.14 ABT meters (Main, Check and standby) with all necessary metering rated CT's and PT's at the plant take off point as well as at the substation as per CEA Metering Regulation 2006 as amended time to time and state metering code.

4.15 Providing necessary communication and Data Acquisition System to transfer real time data to SLDC, Vidyut soudha, TSTRANSCO, Hyderabad as per the specifications of SLDC wing and as per grid connectivity approving authority.

4.16 Control and Communication cables including end terminations and other required accessories

4.17 Supervisory Control and Data Acquisition (SCADA) system for remote monitoring/control of plant facilities

4.18 Auxiliary supply system including auxiliary transformers, ACDB panels, cables and related accessories for plant internal consumption (to be drawn from Plant Facilities

and not imported from grid)

4.19 Uninterrupted Power Supply (UPS) with battery bank of sufficient capacity for critical loads as specified

4.20 HDPE pipes, cable conduits, cable trays and accessories/trenches.

4.21 Earth strip/cables, earth electrodes, earth enhancing compound and all other associated materials for complete earthing of the plant as per the relevant standards

4.22 Lightning Protection System for entire plant area

4.23 LED luminaries with diffuser for indoor and outdoor illumination (on-shore), lighting poles, distribution boxes and power supply cables along with required conduits, fittings, etc.

4.24 Weather monitoring station shall include but not be limited to the following (each site):

- Pyranometers - One in Horizontal Plane for GHI and one for each tilt angle of the PV Module array - Minimum 2 (Two) Nos.
- Ultrasonic Anemometer (wind speed and direction) – 1 (one) no.
- Temperature Sensor (ambient and module surface) – 4 (six) nos.
- Power source to the all sensors wherever required
- Data Logger

4.25 CCTV cameras with monitoring station along with mounting poles, power supply cables, communication cables, conduits, fittings, etc.

4.26 Fire detection and fire protection system in buildings/containers, transformer yard and switchyard

4.27 Testing instruments as specified

4.28 Supply of storage container of area sufficient enough for storing spare PV Modules, cable drums etc.

4.29 Construction of suitable structures for termination of transmission line for taking off from plant end and termination at Substation end.

4.30 Design & construction of Transmission line/ cable at required voltage level from plant take off point to the designated substation including right of way (ROW) and construction of bay at designated substation as per DISCOM/TRANSCO requirements/procedures.

4.31 Any re-arrangement/ replacement of substation equipment/ materials, including bay construction, if required, at the evacuating substation necessary for evacuation of power from the Plant.

4.32 All safety equipment including PPE, mats etc. for safe working environment

4.33 Materials and accessories, which are required for satisfactory and trouble-free operation and maintenance of the above equipment like module cleaning system, supply of spares for all equipment, supply of tools and tackles etc.,

4.34 Any other equipment / material, not mentioned but required to complete the Solar Power Plant facilities in all respect

5 Installation, Testing and Commissioning

The scope of installation, testing and commissioning for the plant facilities shall include, but not limited, to the following.

5.1 Installation of PV Modules on Float Structure and interconnection of PV Modules

5.2 Installation of PV Modules on Module Mounting Structures and interconnection of PV Modules

5.3 Laying of solar cables through HDPE conduits with proper sealing from PV Modules to SCB/Inverters along with termination at both the ends, as applicable.

5.4 Installation of SCB/Inverters on float system/on-shore, as applicable

5.5 Laying of DC cables (one run per inverter as spare) from SCB to PCU along with termination at both the ends, as applicable.

5.6 Installation, Testing and Commissioning of Power Conditioning Units & AC Combiner boxes (if applicable)

5.7 Laying of 33 kV AC cables from Compact Sub-station to 33 kV switchgear panels at Interconnection Point along with termination at both the ends

5.8 Installation, Testing and Commissioning of ABT meters with all necessary metering rated CTs and PTs at interconnecting substation as per CEA Metering Regulation 2006 as amended time to time and state metering code

5.9 Installation, Testing and Commissioning of auxiliary power supply system consisting of auxiliary transformers, AC distribution boards, AC LT cables and related accessories

5.10 Installation, Testing and Commissioning of Uninterrupted Power Supply (UPS) with battery bank.

5.11 Installation, Testing and Commissioning of SCADA hardware, software and suitable communication system for interfacing SCB, PCU, Transformers, HT Panel, fire alarm panel, WMS with SCADA.

5.12 Installation, Testing and Commissioning of telemetry for data transmission from the plant to SLDC/RLDC along with communication system as required by SLDC/RLDC.

5.13 Earthing of PV Modules, Module Mounting Structures, SCB, PCU, switchgear panels and all other electrical equipment

5.14 Installation of lightning protection system for entire plant facilities

5.15 Installation of indoor & outdoor illumination (off-shore and on-shore) system including all required accessories and laying of power supply cables

5.16 Installation, Testing and Commissioning of Weather Monitoring Station along with laying of required power supply and communication cables.

5.17 Installation of CCTV cameras on strategic locations including all required accessories, laying of power/communication cables and installation of monitoring station

5.18 Installation of fire detection and fire protection system for buildings/containers, transformer yard and switchyard

5.19 Pre-commissioning checks and tests for all equipment

5.20 Synchronization and Commissioning of plant

5.21 Any other works related to installation, testing and commissioning not mentioned but required to complete the Solar Power Plant facilities in all respect

6 Civil Works

6.1 Conducting hydrographic survey of the reservoirs proposed for FSPV plants

6.2 Conducting topographical survey and geo-technical investigation of on-shore portion of the plant area including submission of contour drawings and survey report.

6.3 Earthwork for site levelling & grading including dozing and rolling off the ground as required to make it fairly flat and well compacted for construction of control rooms and switch yard etc.

6.4 General clearing of plant site and TL corridor by cutting of any vegetation & shrubs including disposal of waste material

6.5 Construction of perimeter fence (barbed wire) and main gate for plant area on-shore (applicable for equipment and switchyard placed on-shore)

6.6 Construction of floating fence around the floating platform of PV array

6.7 Foundation and erection of portable cabin/PEB (Main Control Room) if required.

6.8 Foundation and erection of portable cabin/PEB (storage container) of area sufficient enough for storing spare PV Modules, cable drums etc.

6.9 One security room shall be provided at Main Gate (on-shore switchyard) with a Bio-toilet facility including daily cleaning and maintenance as per manufacturer's recommendations.

6.10 Suitable arrangement for water shall be ensured to cater day-to-day requirement of drinking water and permanent water supply for module cleaning and other needs of the power plant during entire O&M period.

6.11 Erection of polyethylene water tanks, plumbing network for drinking water and cleaning of PV Modules

6.12 Construction of floating system, anchoring and mooring system for FSPV plants

6.13 Construction of foundation for Module Mounting Structure (MMS)

6.14 Construction of mounting structure for String Combiner Box

6.15 Foundation and construction of plinth for PCU containers and Compact Sub-Station

6.16 Construction of foundation and/or mounting structure for Weather Monitoring Station (on-shore) and associated civil works

6.17 Foundation for Lighting poles, CCTV poles and other equipment

6.18 All approvals, for equipment, items and works, which are not otherwise specifically mentioned in this document but are required for successful completion of the work in all aspects, including construction, commissioning, O&M of Solar PV Power Plant and guaranteed performance are deemed to be included in the scope of the contractor.

7 Statutory Approvals

7.1 Obtaining statutory approvals /clearances/ compliances on behalf of the Employer from various Government Departments, not limited to, the following: -

- Pollution control board clearance, if required
- Mining Department, if required
- Forest Department, if required
- All other approval as and when, as necessary for setting up of a solar power plant including CEIG/ CEA, connectivity, power evacuation, Railways, Port Trust authorities etc. as per the suggested guidelines

7.1.1 All statutory approvals/permissions and/or No Objection Certificates (NoC) etc. from the DISCOM for obtaining connectivity at the substation as per Project Particulars provided above.

7.1.2 All other statutory approvals and permissions and their respective compliances, not mentioned specifically but are required to carry out hassle free Construction and O&M of the plant.

7.1.3 Adequate and seamless insurance coverage during EPC and O&M period to mitigate all risks related to construction and O&M of the plant to indemnify the Employer.

7.2 The Contractor shall comply with the provision of all relevant acts of Central or State Governments including payment of Wages Act 1936, Minimum Wages Act 1948, Employer's Liability Act 1938, Workmen's Compensation Act 1923, Industrial Dispute

Act 1947, Maturity Benefit Act 1961, Mines Act 1952, Employees State Insurance Act 1948, Contract Labour (Regulations & Abolishment) Act 1970, Electricity Act 2003, Grid Code, Metering Code, MNRE guidelines or any modification thereof or any other law relating whereto and rules made there under or amended from time to time.

8 Operation and Maintenance

8.1 Total Operation & Maintenance of the SPV Plant shall be with the Contractor, after operational acceptance of the plant till final acceptance or culmination of the O&M period, shall include deployment of engineering personnel, technicians and security personnel.

8.2 To provide a detailed training plan for all O&M procedures to Employer's nominated staff, which shall have prior approval from the Employer.

8.3 Employ and coordinate the training of contractors' personnel who will be qualified and experienced to operate and monitor the facility and to coordinate operations of the facility with the grid system.

8.4 Discharge obligations relating to retirement/ Superannuating benefits to employees or any other benefit accruing to them in the nature of compensation, profit in lieu / in addition to salary, etc. for the period of service with the contractor, irrespective continuance of employees with the project as employees of Contractor, after conclusion of O&M period.

8.5 To maintain accurate and up-to-date operating logs, records and monthly Operation & Maintenance reports at the facility. Contractor shall keep the measured daily data at regular intervals and provide the same to Employer in electronic form, compatible in CSV format. The right to use the data shall remain with the Employer.

8.6 Contractor shall prepare and send Forecasting and Scheduling generation reports as per extant regulations (SERC/CERC) for Forecasting, Scheduling, Deviation Settlement Mechanism and related matters. The scope under this Clause shall also include establishing and maintaining forecasting tools and appointment of QCA/Aggregator, if required. % Error (Deviation) shall be calculated as per the said regulations and DSM Charges in case of deviation beyond the permissible limits shall be borne by the Contractor.

8.7 Procurement of spare parts, overhaul parts, tools & tackles, equipment, consumables, etc. required for smooth operation and maintenance of the plant as per prudent/ standard utility practices, OEM recommendations and warranty clauses for the entire O&M period

8.8 To upkeep all administrative offices, equipment rooms, roads, vehicular parking, tool room, stores room, equipment, clean, green and in workable conditions.

8.9 To carry out periodic overhauls or maintenance required as per the recommendations of the original equipment manufacturer (OEM) and to furnish all such periodic maintenance schedules at the time of plant commissioning/ start of O&M contract.

8.10 Handover the system to maintain an inventory of spare parts, tools, equipment, consumables and supplies for the facility's operation along-with required details of recommended spares list with all associated information regarding replacement records, supplier details, tentative cost, storage details, specifications on the basis of replacement frequency and mean time between failures (MTBF) and mean time to restore (MTTR) at the culmination of penultimate year under O&M period.

8.11 Availability of vehicles for Employer/ his authorized representative staff during construction and O&M period as per requirement may be ensured, failing which Employer shall have full right for alternate arrangement at the risk & cost of the contractor.

8.12 The contractor shall be responsible for all the required activities for the successful running, committed energy generation & maintenance of the Solar Photovoltaic Power Plant covering:

- Deputation of qualified and experienced engineers and technicians at the facility.
- Deputation of Security personnel for the complete security of plant.
- Successful running of Solar Power Plant for committed energy generation.
- Co-ordination with STU/SLDC/other statutory organizations as per the requirement on behalf of Employer for Joint Metering Report (JMR), furnishing generations schedules as per requirement, revising schedules as necessary and complying with grid requirements.
- Monitoring, controlling, troubleshooting maintaining of logs & records, registers.
- Furnishing generation data monthly to Employer by 1st week of every month for the previous month to enable Employer raise commercial bills on consumers.
- Periodic cleaning of solar modules as approved by the Employer and water quality as per the recommendations of OEM
- Replacement of Modules, Invertors/PCU's and other equipment as and when required during the O&M period without additional cost to Employer

8.13 Continuous monitoring the performance of the Solar Power Plant and regular maintenance of the whole system including Modules, PCU's, transformers, overhead

line, outdoor/indoor panels/ kiosks etc. are necessary for extracting and maintaining the maximum energy output from the Solar Power Plant.

8.14 Preventive and corrective O&M of the Solar Photovoltaic Power Plant including supply of spares, consumables, wear and tear, overhauling, replacement of damaged modules, invertors, PCU's and insurance covering all risks (Fire & allied perils, earth quake, terrorists, burglary and others) as required.

8.15 The period of Operation and Maintenance will be deemed to commence from the date of completion of performance demonstration/Operational acceptance and successively the complete Solar Photovoltaic Power Plant to be handed over to the O&M contractor for operation and maintenance of the same. O&M contract shall further be extended on the mutually agreed terms and conditions for the mutually agreed period.

8.16 All the equipment required for Testing, Commissioning and O&M for the healthy operation of the Plant must be calibrated, time to time, from the NABL accredited labs and the certificate of calibration must be provided prior to its deployment.

8.17 The Contractor shall ensure that all safety measures are taken at the site to avoid accidents to his or his sub-contractor or Employer's Workmen. This will include procurement of all safety gadgets during Construction and O&M period including but not limited to, rubber mats of appropriate grade, PPE, rubber gloves and suitable shoes etc.

9 Operation and Performance Monitoring

9.1 Operation part consists of deputing necessary manpower necessary to operate the Solar Photovoltaic Power Plant at the full capacity. Operation procedures such as preparation to starting, running, routine operations with safety precautions, monitoring etc., shall be carried out as per the manufacturer's instructions to have trouble free operation of the complete system.

9.2 Daily work of the operation and maintenance in the Solar Photovoltaic Power Plant involves periodic cleaning of Modules including periodic tilt angle change as and when required, logging the voltage, current, power factor, power and energy output of the Plant at different levels. The operator shall also note down time/ failures, interruption in supply and tripping of different relays, reason for such tripping, duration of such interruption etc. The other task of the operators is to check battery voltage-specific gravity and temperature. The operator shall record monthly energy output, down time, etc. in a log book.

9.3 Earth resistance of Plant as well as individual earth pit is to be measured and recorded

every month. If the earth resistance is high suitable action is to be taken to bring down the same.

9.4 A maintenance record is to be maintained by the operator/ O&M-in-charge to record the regular maintenance work carried out as well as any breakdown maintenance along with the reasons for the breakdowns and steps taken to attend the breakdown, duration of the breakdown etc.

9.5 The Preventive Maintenance Schedules will be drawn such that some of the jobs other than breakdown, which may require comparatively long stoppage of the Power Plant, shall be carried out preferably during the non-sunny days or evenings. Prior information shall be provided to the Employer for such preventive maintenance prior to start.

9.6 The Contractor will attend to any breakdown jobs immediately for repair/ replacement/ adjustments and complete at the earliest working round the clock. During breakdowns (not attributable to normal wear and tear) in O&M period, the Contractor shall immediately report the accidents, if any, to the Employer showing the circumstances under which it happened and the extent of damage and/or injury caused.

9.7 The contractor shall at his own expense provide all amenities to his workmen as per applicable laws and rules.

9.8 If negligence / mal operation of the contractor's operator results in failure of equipment, such equipment should be repaired/replaced by the contractor free of cost.

10 Security Services

10.1 The contractor has to arrange proper security system including deputation of security personnel at his own cost for the check vigil for the Solar Power Plant for the complete scope of works including complete O&M period.

10.2 The security staff may be organized to work on suitable shift system; proper checking & recording of all incoming & outgoing materials vehicles shall be maintained. Any occurrence of unlawful activities shall be informed to Employer immediately. A monthly report shall be sent to Employer on the security aspects and scheduling of security personnel at site.

10.3 Any other activities required for completion of project, but not specified in the above shall be in the scope of contractor. The Contractor must provide the BOM of the plant as per the design during the time of submission of design basis report. The detailed technical specifications of major equipment to be followed strictly and are described in the technical specification section.

SECTION - VII

B. TECHNICAL SPECIFICATIONS

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DISCLAMIER:

The specifications mentioned for all the equipment which include Solar modules, PCU, combiner boxes, DC cables, module mounting structures, transformer, CT, PT, LT/ HT cables, interfacing panels, switch gears & other associated equipment etc., to complete the power generation and evacuation to the designated substation, in the present bidding documents are for the **reference** only. It is subject to revise/ alter as per the design/ planning/ good engineering practices etc., to be carried out by the selected bidder, to the satisfaction of the Employer or its authorized representatives. It is advised that the bidders must satisfy himself with the prevailing site conditions before design/ plan. The design must be optimized as per the site conditions and directed to achieve the maximum output from the installed capacity at all times. Moreover, the components not separately mentioned, but are required to complete the plant for operation is also included in the scope of bidder and shall be vetted by the Employer or its authorised representatives.

Place:

(Signature)

Date: Name and Designation of bidder

A Design Philosophy

1 The main objective of the design philosophy is to construct the plant with in-built Quality and appropriate redundancy to achieve high availability and reliability with minimum maintenance efforts. In order to achieve this, the following principles shall be adopted while designing the system.

1.1 Adequate capacity of SPV modules, PCUs, Junction boxes etc. to ensure generation of power as per design estimates. This will be done by applying liberal de-rating factors for the array and recognizing the efficiency parameters of PCUs, transformers, conductor losses, system losses, site conditions etc.

1.2 Use of equipment and systems with proven design and performance that have high availability track records under similar service conditions.

1.3 Selection of the equipment and adoption of a plant layout to ensure ease of maintenance.

1.4 Strict compliance with approved and proven quality assurance (QA) systems and procedures during different stages of the project, starting from sizing, selection of make, shipment, storage (at site), during erection, testing and commissioning.

1.5 Proper monitoring of synchronization and recording, to ensure availability of power to the grid.

1.6 The plant Data Acquisition and control system should be designed to ensure high availability and reliability of the plant to assist the operators in the safe and efficient operation of the plant with minimum effort.

1.7 It should also provide the analysis of the historical data and help in the plant maintenance people to take up the plant and equipment on predictive maintenance.

1.8 System design shall have intelligent protection mechanism which may include very fast responsive microprocessor-based relays etc., so that any disturbance from the grid will not cause any damage to the equipment of the Solar Power Plant.

2 The basic and detailed engineering of the plant shall aim at achieving high standards of operational performance especially considering following:

2.1 SPV power plant should be designed to operate satisfactorily in synchronization with the grid within permissible limits of high voltage and frequency fluctuation conditions. It is also extremely important to safeguard the system during major disturbances, internal and external surge conditions while ensuring safe operation of the plant.

2.2 Module Mounting Structures shall be designed for stability under design wind load

conditions specified in this document while optimizing energy generation.

2.3 Shadow free plant layout to ensure minimum losses in generation during the day time.

2.4 Higher system voltage and lower current options to be followed to minimise ohmic losses.

2.5 Selection of PCUs with proven reliability and minimum downtime. Ready availability of requisite spares.

2.6 Careful logging of operational data / historical information from the Data Monitoring Systems, and periodical analysis of the same to identify any abnormal or slowly deteriorating conditions.

2.7 The designed array capacity at STC shall be suitably determined to meet the proposed guaranteed generation output at the point of interconnection by the contractor in his bid. The contractor shall take care of first year degradation also by installing additional DC capacity as the CUF calculations will not factor the first-year degradation of the modules.

2.8 Each component offered by the bidder shall be of established reliability. The minimum target reliability of each equipment shall be established by the bidder considering its mean time between failures and mean time to restore, such that the availability of complete system is assured. Bidder's recommendation of the spares shall be on the basis of established reliability.

2.9 Bidder shall design the plant and equipment in order to have sustained life of 25 years with minimum maintenance efforts.

2.10 The work execution planning for supply, erection, commissioning and all other allied works for SPV Power Plant shall be such that it is completed within stipulated time from the date of order/ LOI/ NTP.

3 The specifications provided with this bid document are functional ones; any design provided in this document is only meant as an example. The Contractor must submit a detailed design philosophy document for the project to meet the functional requirements based upon their own design in-line with the above. The bidders are advised to visit the site and satisfy themselves before bidding.

4 Approval of drawings and documents prepared by the Contractor:

All documents and drawings shall be submitted to the Employer both in soft as well as hard copies (3 nos.) for review and approval. Every drawing shall also be submitted in '*.dwg' format. In case of design calculations done in spread sheet, editable (working)

soft copy of the spread sheet shall also be submitted along with 'pdf' copies during every submission. The Employer shall return, as suitable, either soft or hard copies to the Contractor with category of approval marked thereon. The drawings/documents shall be approved in any one of the following categories based on nature of the comments/ type of drawing or document.

Category-I:	Approved
Category-II	Approved subject to incorporation of comments. Re-submit for approval after incorporation of comments
Category-III	Not approved. Re-submit for approval after incorporation of comments
Category-IV	Kept for record/ reference
Category-IVR	Re-submit for record/ reference after incorporation of comments

Note: Approval of document neither relieves the Vendor/ Contractor of his contractual obligations and responsibilities for correctness of design, drawings, dimensions, quality & specifications of materials, weights, quantities, assembly fits, systems/ performance requirement and conformity of supplies with Technical Specifications, Indian statutory laws as may be applicable, nor does it limit the Employer/ Purchaser's rights under the contract)

The Contractor shall submit complete Master Document & Drawing list (MDL) to the Employer within 2 weeks after issue of LOA,. The MDL shall list all the Drawings & Documents envisaged for submission/ approval from the Employer and shall also have all the required information like drawing no (both vendor and Employer's drawing no), title, scheduled date of submission, actual date of submission and approval. The category of approval shall be decided mutually between Contractor and the Employer at the time of finalization of the MDL which shall be the basis for drawing & document approval process during project execution.

The construction shall be done only as per drawings approved under Category – I, II & IV.

B Electrical System

1 Photovoltaic Modules

1.1 Standards and Codes

Photovoltaic Modules shall comply with the specified edition of the following standards and codes or equivalent Indian Standards, wherever applicable.

Standard	Description
IEC 61215-1 Ed.1	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Test requirements
IEC 61215-1-1 Ed.1	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules (with 4000 hours Damp Heat Test and 400 Thermal cycles)
IEC 61730-1 Ed.2	Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction
IEC 61730-2 Ed.2	Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing
IEC 61701 Ed.2	Salt mist corrosion testing of photovoltaic (PV) modules – Severity 1
IEC 62716 Ed.1	Photovoltaic (PV) modules - Ammonia corrosion testing
IEC TS 62804-1 Ed.1	Photovoltaic (PV) modules - Test methods for the detection of potential-induced degradation - Part 1: Crystalline silicon under conditions of 85^{o}C/85% RH for minimum 192 hours.
As per the Solar Photovoltaics, Systems, Devices and Components Goods (Requirements for Compulsory Registration) Order, 2017, PV Modules used in the grid connected solar power projects shall be registered with BIS and bear the Standard Mark as notified by the Bureau of Indian Standards. Further, PV Modules should have been included in the ALMM list as per MNRE Approved Models and Manufacturers of Solar Photovoltaic Modules (Requirements for Compulsory Registration) Order, 2019.	

1.2 Technical Requirements

Parameter	Specification

Cell type	Mono-crystalline or Multi-crystalline or Thin film
Module Efficiency	≥ 17% for Mono-crystalline ≥ 16.5% for Multi-crystalline ≥ 16.5% for Thin film
Rated power at STC	No negative tolerance is allowed
Temperature co-efficient of power	Not less than -0.43%/°C for crystalline Si Not less than -0.32%/°C for thin film
Lamination (in case of Thin Film Modules)	Glass-Glass with Anodized aluminium frame
Application Class as per IEC 61730	Class A
Origin	Cells and Modules shall be domestically manufactured

1.3 Component Specifications

1.3.1 The PV Modules glass panel shall be:

(i) For PV Modules with backsheet, toughened low iron glass with minimum thickness of 3.2 mm for multi or mono-crystalline modules.

(ii) In case of glass-glass Modules, glass thickness on each side shall be minimum of 2 mm. It shall be laminated using a laminator with symmetrical structure, i.e. heating plates on both sides.

(iii) The glass used shall have transmittance of above 90%.

1.3.2 The back sheet used in the PV modules shall be of three-layered structure durable for humid – hot conditions with properties of moisture barrier, elongation retention and UV resistance. The back sheet shall have the following properties.

Parameter	**Value**
Material thickness	≥ 300 micron
Water vapour transmission rate	< 2 g/m^2/day
Partial discharge test voltage	≥ 1000 V / 1500 V
Elongation at break	> 100%
Adhesion strength with encapsulant	> 40 N/cm
Interlayer adhesion strength	> 4 N/cm

The Employer reserves the right to conduct Pressure Cooker (PC) test/ Highly Accelerated Stress Test (HAST) to confirm the durability of the back sheet in accelerated conditions.

1.3.3 The encapsulant used for the PV modules should be UV stable and PID resistant in nature. No yellowing of the encapsulant with prolonged exposure shall occur. The encapsulant shall have the following properties.

Parameter	**Value**
Gel content	> 75%
Volume resistivity	> 1×10^{14} Ω.cm
Peeling strength with glass	> 60 N/cm

1.3.4 The sealant used for edge sealing of PV modules shall have excellent moisture ingress protection with good electrical insulation (Break down voltage >15 kV/mm) and with good adhesion strength. Edge tapes for sealing are not allowed.

1.3.5 The material used for junction box shall be UV resistant to avoid degradation during module life. The degree of protection of the junction box shall be at least IP 67. Minimum three number of bypass diodes and two number of IEC 62852/EN 50521 certified MC4 compatible connectors with appropriate length of IEC 62930/EN 50618 certified 4 sq.mm copper cable shall be provided. The cable length shall be in accordance with the PV Module wiring strategy and adequate to ensure that the cable bending radius standard is not exceeded.

1.3.6 Each PV Module shall be provided a bar code which is embedded inside the module lamination and must be able to withstand harsh environmental conditions. The bar code data base shall contain the following information. Bar code scanner and database of all the modules containing the following information shall also be provided.

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

ISO 9000 series.

1.4 Warranty

1.4.1 PV modules must be warranted with linear degradation rate of power output except for first year (up to 3% including LID) and shall guarantee minimum 80% of the initial rated power output at the end of 25 years.

1.4.2 The modules shall be warranted for minimum of 10 years against all material/ manufacturing defects and workmanship.

1.4.3 The above warranties shall be backed by third party insurance.

1.5 Approval

1.5.1 The Contractor shall provide Guaranteed Technical Particular (GTP) datasheet and Bill of Materials (BOM) of the module that is submitted for approval along with the datasheets of each component. The component datasheet shall contain all the information to substantiate the compliance for component specifications mentioned above.

1.5.2 The Contractor shall also provide test certificates corresponding to the standards mentioned above along with complete test reports for the proposed module. The tests should have been conducted at a test laboratory compliant with ISO 17025 for testing and calibration and accredited by an ILAC/IECEE member signatory. Laboratory accreditation certificate or weblink along with scope of accreditation shall also be submitted.

1.5.3 The BOM proposed shall be the subset of Constructional Data Form (CDF)'s of all the test reports.

1.5.4 The Contractor shall submit a detailed Manufacturing Quality Plan (MQP) for the PV Module with list of checks/tests performed during incoming material inspection, production, pre-dispatch and package.

1.5.5 The Contractor shall obtain the approval of the proposed module make & model prior to manufacturing/ inspection call.

1.6 Manufacturing and Inspection

1.6.1 The Contractor shall inform the module manufacturing schedule to the Employer at least 7 (seven) working days before the start of proposed schedule.

1.6.2 The Employer shall perform material inspection at the Manufacturer's factory before the start of proposed manufacturing schedule. Proof of procurement of components as per the approved BOM mentioning manufacturer name, manufacturing date and

relevant test certificate shall be submitted during material inspection for verification.

1.6.3 The Manufacturing shall start only after the clearance by the Employer after the material inspection.

1.6.4 The cells used for module making shall be free from all defects like edge chipping, breakages, printing defects, discoloration of top surface etc. Only Class A solar cell shall be used.

1.6.5 The modules shall be uniformly laminated without any lamination defects.

1.6.6 Current binning of modules shall be employed to limit current mismatch of modules. Different colour codes shall be provided on the modules as well as pallet for identification of different bins. Maximum three nos. of bins will be allowed for each Module rating.

1.6.7 Pre-dispatch inspection of modules shall be performed as per the inspection protocol attached in Annexure – A.

1.7 Transportation, Handling, Storage and Installation

1.7.1 Transportation, handling, storage and installation of modules shall be in accordance with the manufacturer manual so as not to breach warranty conditions. The Standard Operating Procedure (SOP) for the same shall be shared by the Contractor prior to dispatch for approval.

1.7.2 It is required to construct a temporary platform (graded) while keeping the modules at least above the highest flood level. If the contractor scheduled/ planned to mount the modules immediately after the receipt at site, then the module shall be kept in common storage area with proper arrangement.

1.7.3 The stacked modules, in any case, shall be stacked as per the manufacturer's recommendation only and shall be covered with tarpaulin sheet.

2 String Combiner Box

2.1 Standards and Codes

Standard/Code	Description
IEC 60529	Enclosure Ingress Protection
IEC 62262	Enclosure Impact Protection
IEC 60269	Fuse
IEC 61643-11	Surge Protection Device
IEC 62852 or EN 50521	Solar cable connector

IEC 60695-2-11	Fire hazard testing

2.2 Construction

2.2.1 SCB enclosure shall be made of UV resistant, fire retardant, thermoplastic material. Enclosure degree of protection shall be at least IP 67 and mechanical impact resistance shall be at least IK 08.

2.2.2 Not more than two strings can be connected in parallel to a single input of SCB. One spare input terminal along with connector shall be provided for each SCB.

2.2.3 Every SCB input shall be provided with fuses on both positive and negative side. In case of negative grounded system, fuse at positive side only is acceptable. The rating of the fuses shall be selected such that it protects the modules from reverse current overload. The fuses shall be 'gPV' type conforming to IEC 60269-6.

2.2.4 DC switch disconnector of suitable rating shall be provided at SCB output to disconnect both positive and negative side simultaneously.

2.2.5 Type-II surge protective device (SPD) conforming to IEC 61643-11 shall be connected between positive/negative bus and earth.

2.2.6 Resistance Temperature Detector (RTD) type or semiconductor type temperature sensor shall be provided to monitor the cabinet temperature.

2.2.7 MC4 connector conforming to IEC 62852 or EN 50521 shall be provided at each SCB input. Cable gland of suitable size for DC cables shall be provided at the SCB output.

2.2.8 UV resistant printed cable ferrules for solar cables & communication cables and punched/ embossed aluminium tags for DC cables shall be provided at cable termination points for identification.

2.2.9 Wireless communication interface shall be provided to communicate the data to SCADA. The following parameters shall be measured/ monitored and made available at SCADA.

(i) String current
(ii) Bus voltage
(iii) Output current
(iv) Cabinet temperature
(v) DC disconnector switch ON/OFF status
(vi) SPD operating status

2.3 Warranty

The SCB unit shall be warranted for minimum of 5 (five) years against all material/ manufacturing defects and workmanship.

2.4 Tests

Routine tests and acceptance tests for the assembled unit shall be as per the Quality Assurance Plan (QAP) approved by the Employer.

3 Power Conditioning Unit

3.1 Standards and Codes

Power Conditioning Unit (PCU) shall comply with the specified edition of the following standards and codes.

Standard	Description
IEC 61683 Ed.1	Photovoltaic systems - Power conditioners - Procedure for measuring efficiency
IEC 62109-1 Ed.1	Safety of power converters for use in photovoltaic power systems - Part 1: General requirements
IEC 62109-2 Ed.1	Safety of power converters for use in photovoltaic power systems - Part 2: Particular requirements for inverters
IEC 61000-6-2 Ed.2	Electromagnetic compatibility (EMC) - Part 6-2: Generic standards - Immunity standard for industrial environments
IEC 61000-6-4 Ed.2.1	Electromagnetic compatibility (EMC) - Part 6-4: Generic standards - Emission standard for industrial environments
IEC 62116 Ed.2	Utility-interconnected photovoltaic inverters - Test procedure of islanding prevention measures
IEC 60068-2-1:2007	Environmental testing - Part 2-1: Tests - Test A: Cold
IEC 60068-2-2:2007	Environmental testing - Part 2-2: Tests - Test B: Dry heat
IEC 60068-2-14:2009	Environmental testing - Part 2-14: Tests - Test N: Change of temperature
IEC 60068-2-30:2005	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)
IEC 60068-2-52:2017	Environmental testing - Part 2-52: Tests - Test Kb: Salt mist, cyclic (sodium chloride solution) Severity level 1
CEA Technical Standards for Connectivity to the Grid Regulations 2007 with 2013 Amendment	
As per the Solar Photovoltaics, Systems, Devices and Components Goods (Requirements for Compulsory Registration) Order, 2017, Inverters used in the grid connected solar power projects shall be registered with BIS and bear the Standard	

Mark as notified by the Bureau of Indian Standards.

3.2 Technical Requirements

Parameter	**Specification**
Rated AC power	As per design
Maximum input voltage	1000 V / 1500 V
Rated AC output voltage	As per design
Tolerance on rated AC output voltage	+/-10%
Rated frequency	50 Hz
Operating frequency range	47.5 Hz to 52 Hz
Power factor control range	0.9 lag to 0.9 lead
European efficiency	Minimum 98%
Maximum loss in Sleep Mode	0.05% of rated AC power
Total Harmonic Distortion	Less than 3% at 100% load
Degree of protection	IP 20 (Indoor)/IP 54 (Outdoor)

3.2.1 The rated/ name plate AC capacity of the PCU shall be AC power output of the PCU at 50°C.

3.2.2 Maximum power point tracker (MPPT) shall be integrated in the PCU to maximize energy drawn from the Solar PV array. The MPPT voltage window shall be sufficient enough to accommodate the output voltage of the PV array at extreme temperatures prevailing at site.

3.2.3 The PCU output shall always follow the grid in terms of voltage and frequency. The operating voltage and frequency range of the PCU shall be sufficient enough to accommodate the allowable grid voltage and frequency variations.

3.3 Construction

3.3.1 Power Conditioning Unit (PCU) shall consist of an electronic three phase inverter along with associated control, protection, filtering, measurement and data logging devices.

3.3.2 Every DC input terminal of PCU shall be provided with fuse of appropriate rating. The combined DC feeder shall have suitably rated isolators for safe start up and shut down of the system. One spare DC input terminal shall be provided for each PCU.

3.3.3 Type-II surge protective device (SPD) conforming to IEC 61643-11 shall be provided

on both DC and AC side of PCU.

3.3.4 AC relay shall be provided at the output of PCU for protection and isolation.

3.3.5 The PCU shall be tropicalized and the design shall be compatible with conditions prevailing at site. Suitable number of exhaust fan shall be provided for cooling keeping in mind the extreme climatic condition of the site as per the recommendations of OEM to achieve desired performance and life expectancy.

3.3.6 All the conducting parts of the PCU that are not intended to carry current shall be bonded together and connected to dedicated earth pits through protective conductor of appropriate size. DC negative terminal shall be grounded. In case DC negative grounding is not possible, appropriate anti-PID device shall be provided.

3.3.7 Dedicated communication interface shall be provided to monitor the PCU from SCADA.

3.3.8 PCU front panel shall be provided with LCD/ LED to display all the relevant parameters related to PCU operation and fault conditions. It shall include, but not limited to, the following parameters.

(i) DC input power
(ii) DC input voltage
(iii) DC input voltage
(iv) DC input current
(v) AC output power
(vi) AC output voltage (all the 3 phases and line)
(vii) AC output current (all the 3 phases and line)
(viii) Frequency
(ix) Power Factor

3.4 Operating Modes

Operating modes of PCU shall include, but not limited to, the following modes. These operating modes and conditions for transition are indicative only. The Contractor shall provide the detailed flow chart indicating the various operating modes and conditions for transition during detailed engineering.

3.4.1 Standby Mode

The PCU shall continuously monitor the input DC voltage and remain on Standby Mode until it reaches the pre-set value.

3.4.2 MPPT Mode

When the input DC voltage is above the pre-set value and AC grid connection conditions are fulfilled, the PCU shall enter into MPPT mode.

3.4.3 Sleep Mode

When the AC output power/DC input voltage decreases below the pre-set value for pre-set time delay, the PCU shall switch into Sleep Mode.

3.5 Protection Features

The PCU shall include appropriate self-protective and self-diagnostic feature to protect itself and the PV array from damage in the event of PCU component failure or from parameters beyond the PCU's safe operating range due to internal or external causes. The self-protective features shall not allow signals from the PCU front panel to cause the PCU to be operated in a manner which may be unsafe or damaging. Faults due to malfunctioning within the PCU, including commutation failure, shall be cleared by the PCU protective devices.

The PCU shall provide protection against the following type of faults, among others.

(i) DC/AC over current
(ii) DC/AC over voltage
(iii) DC reverse polarity
(iv) DC earth fault
(v) AC under voltage
(vi) AC under frequency/over frequency
(vii) Islanding
(viii) Over temperature
(ix) Lightning surges

3.6 Grid Support Functions

3.6.1 Active power regulation

The PCU shall be able to limit the active power exported to the grid based on the set point provided through PCU front control panel. The PCU shall also be able to automatically the limit the active power after an increase in grid frequency above a pre-set value. The ramp rate shall be adjustable during operation and start-up after fault. The applicability of the requirement shall be as per CEA regulation and compliance.

3.6.2 Reactive power control

The PCU shall be able to inject /absorb reactive power to/ from the grid based on the set point provided through PCU front control panel. The same shall be performed automatically with adjustable ramp rate based on dynamic changes in grid voltage or reactive power reference.

3.6.3 Voltage Ride Through

The PCU shall remain connected to the grid during temporary dip or rise in grid voltage as per the LVRT and HVRT requirements of CEA Technical Standards for Connectivity to the Grid Regulations. The PCU shall also be able to inject reactive power during the period of voltage dip.

3.7 Warranty

The complete Power Conditioning Unit shall be warranted for minimum of 5 (five) years against all material/ manufacturing defects and workmanship.

3.8 Tests

3.8.1 Type Tests

The type test certificates as per the standards mentioned above should be from any of the ILAC/IECEE member signatory accredited Test Centres. Laboratory accreditation certificate or weblink along with scope of accreditation shall also be submitted. It is the responsibility of the Contractor to substantiate the compliance for CEA Regulations using test reports.

3.8.2 Routine Tests

Routine tests and acceptance tests shall be as per the Quality Assurance Plan (QAP) approved by the Employer.

4 Solar and DC Cables

4.1 Standards and Codes

Cable	From	To	Conductor/ Insulation	Voltage Rating	Applicable Standard
Solar Cable*	Module	SCB	Copper/ XLPO	1.1 kV DC/ 1.5 kV DC	IEC 62930/ EN 50618
DC Cable	SCB	PCU	Copper / XLPE	1.1 kV DC/ 1.5 kV DC	IS 7098
* Cable used for module interconnection shall also be referred as solar cable.					

4.2 Both solar and DC cables shall be marine grade cables complying with relevant

standards.

4.3 Solar cable outer sheath shall be flame retardant, UV resistant and black in colour. Solar cable with positive polarity should have marking of red line on black outer sheath.

4.4 DC cables shall be single core, armoured, Flame Retardant Low smoke (FRLS), PVC outer sheath conforming to IS 7098.

4.5 In addition to manufacturer's identification on cables as per relevant standard, following marking shall also be provided over outer sheath.

(i) Cable size and voltage grade
(ii) Word 'FRNC/ FRLS' (as applicable) at every metre
(iii) Sequential marking of length of the cable in metres at every metre

4.6 Cables shall be sized based on the following considerations:

(i) Rated current of module
(ii) The average voltage drop in the cables (Modules to Inverter) shall be limited to 1.5 % of the rated voltage. The Contractor shall provide voltage drop calculations in excel sheet.
(iii) Short circuit withstand capability.
(iv) De-rating factors according to laying pattern
(v) De-rating factors according to laying pattern

4.7 Warranty

The cables (Solar and DC) shall be warranted for minimum of 5 (five) year against all material/ manufacturing defects and workmanship.

4.8 Tests

Type tests, Routine test and acceptance tests requirements shall be as per IEC 62930/EN 50618 for solar cables and IS 7098 for DC cables.

4.9 Installation

4.9.1 Cable installation shall be as per IS 1255.

4.9.2 Only terminal cable joints shall be accepted. No cable joint to join two cable ends shall be accepted.

4.9.3 Solar cables shall be provided with UV resistant printed ferrules and DC cables shall be provided with punched/ embossed aluminium tags. The marking shall be done with good quality letter and numbers of proper size so that the cables can be identified easily.

4.9.4 Cable terminations shall be made with properly crimped lugs and passed through

cable glands at the entry & exit point of the cubicles. Bimetallic lugs shall be used for connecting Cu bus bar and Al cables or vice-versa.

4.9.5 Solar/DC cables shall be laid on the waterbed from PV Modules/SCB to inverter, if placed on shore. There shall be one spare run of cable per inverter.

4.9.6 Solar cables shall be aesthetically tied to Module Mounting Structure using UV resistant cable-ties suitable for water-based applications.

4.10 Cable Sealing System

4.10.1 Cable sealing system: Modular multi-diameter cable sealing system consisting of frames, blocks and accessories shall be installed where the underground and over ground cables enter or leave LCR/MCR enclosures/Buildings. Cable sealing system shall consist of multi-diameter type peel-able blocks of different sizes to suit the various cables. It should be simple, easy and quick to assemble & re-assemble the cable sealing system. Solid blocks shall not be used on frame. Frames & stay-plate material shall be of galvanized steel and for compression, single piece wedge with galvanized steel bolts shall be used. 30% spare blocks on the frame shall be provided for expansion in future. Cable sealing system should have been tested for fire/ water /smoke tightness

5 Inverter Transformer and Auxiliary Transformer

5.1 Standards and Codes

Inverter transformer shall comply with the latest edition of the following standards and codes including amendments.

Standard	**Description**
IS 2026, IEC 60076	Specification of Power Transformers
IS 11171, IEC 60076-11	Dry-Type Power Transformers
IS 2099, IEC 60137	Bushings for alternate voltage above 1000 V
IS 3639	Fittings and Accessories for Power Transformers
IS 12063	Degree of protection provided by enclosures
CBIP publication no. 295	
CEAR 2010 regulations and other statutory regulations with any latest amendments	

5.2 Technical Requirements

Parameters	**Inverter Transformer**	**Auxiliary Transformer**

VA Rating	As per system design requirement	
Voltage Ratio	33 kV / Inverter output voltage	As per system design
Duty, Service & Application	Continuous Solar Inverter application and converter Duty (Outdoor)	Continuous application (Outdoor/Indoor)
Winding	As per system design requirement	2
Frequency	50 Hz	50Hz
Nos. of Phase	3	3
Vector Group & Neutral earthing	As per system/inverter manufacturer requirement	Dyn11
Cooling	ONAN	ONAN/ AN
Tap Changer	OCTC, No. of steps shall be as per system requirement	
Impedance at 75°C	As per Inverter Manufacturer requirement	As per system requirement
Permissible Temperature rise over an ambient of 50°C (irrespective of tap)		
Top Oil	50°C	As per IS/IEC
Winding	55°C	As per IS/IEC
SC withstand time (thermal)	2 second	2 second
Short Circuit Apparent power	As per system requirement	
Termination	As per system requirement	
Bushing rating, Insulation class (Winding & bushing)	36 kV – porcelain bushings 1.1 kV – epoxy bushings	As per the system requirement
Noise level	As per NEMA TR-1	
Loading Capability	Continuous operation at rated MVA on any tap with voltage variation of +/-3%, also transformer shall be capable of being loaded in accordance with IEC 60076-7	

Flux density	Not to exceed 1.9 Wb/sq.m. at any tap position with combined frequency and voltage variation from rated V/f ratio by 10% corresponding to the tap. Transformer shall also withstand following over fluxing conditions due to combined voltage and frequency fluctuations: a) 110% for continuous rating b) 125% for at least one minute c) 140% for at least five seconds. Bidder shall furnish over fluxing characteristic up to 150%
Air Clearance	As per CBIP

5.3 Construction

5.3.1 The transformer shall be provided with conventional single compartment conservator with prismatic toughened glass oil gauge. The top of the conservator shall be connected to the atmosphere through indicating type cobalt free silica gel breather with transparent enclosure. Silica gel shall be isolated from atmosphere by an oil seal. Inverter transformers shall be provided with Magnetic Oil Gauge (MOG) with low oil level alarm contact.

5.3.2 It is the responsibility of the Contractor to ensure that the inverter transformer comply with all the requirements of inverter provided by the inverter manufacturer.

5.3.3 Inverter Transformer shall be designed for at least 5% total harmonic distortion (THD) to withstand distortion generated by the inverter as well as possible outside harmonics from the network and to follow the guide lines of TSERC.

5.3.4 The transformer shall be suitable for continuous operation with a frequency variation of ± 2.5% from nominal frequency of 50 Hz without exceeding the specified temperature rise.

5.3.5 Inverter Transformer shall have shield winding between LV & HV windings. Each LV winding must be capable of handling non-sinusoidal voltage with voltage gradient as specified by the inverter manufacturer. Also, shield winding shall be taken out from tank through shield bushing and the same shall be brought down to the bottom of the tank using copper flat and support insulator for independent grounding.

5.3.6 Neutral bushing of Inverter duty transformer shall be brought outside the tank for the testing purpose. It shall be covered with MS sheet and a sticker “For testing purpose only. Do not earth”. Neutral bushing of auxiliary transformer shall be brought outside the tank for earthing.

5.3.7 Transformer shall have 150 mm dial type Oil Temperature Indicator (OTI) and Winding Temperature Indicator (WTI) with alarm and trip contacts. All indicators shall have accuracy of 1.5%. For inverter transformers, WTI shall be provided for all the windings.

5.3.8 The radiators shall be detachable type, mounted on the tank with shut off valve at each point of connection to the tank, lifts, along with drain plug/ valve at the bottom and air release plug at the top.

5.3.9 Marshalling Box shall be of sheet steel, dust and vermin proof provided with proper lighting and thermostatically controlled space heaters. The degree of protection shall be IP 55. Marshalling Box of all transformers shall be preferably Tank Mounted. One dummy terminal block in between each trip wire terminal shall be provided. At least 10% spare terminals shall be provided on each panel. The gasket used shall be of neoprene rubber. Wiring scheme (TB details) shall be engraved in a stainless-steel plate with viewable font size and the same shall be fixed inside the Marshalling Box door.

5.3.10 Buchholz relay, double float type with alarm and trip contacts, along with suitable gas collecting arrangement shall be provided.

5.3.11 Inverter transformer shall be provided with spring operated Pressure Relief Device (with trip contacts) with suitable discharge arrangement for oil. For Auxiliary transformers, diaphragm type explosion vent shall be provided.

5.3.12 Filter valve at top the tank and drain cum sampling valve at bottom of the tank shall be provided.

5.3.13 All external surface of the transformer shall be painted with two coats of epoxy-based paint of colour shade RAL 7032. Internal surface of cable boxes and marshalling box shall be painted with epoxy enamel white paint. The minimum dry film thickness (DFT) shall be 100 microns.

5.3.14 LV and HV cable box shall be provided with disconnecting chamber to facilitate the movement of transformer without disturbing cable box and termination.

5.3.15 Air release plug, bi-directional wheel/skids, cover lifting eyes, transformer lifting lugs, jacking pads, towing holes, core and winding lifting lugs, inspection cover, rating plate, valve schedule plate, accessories and terminal marking plates, two nos. of earthing terminals shall be provided.

5.3.16 Rain hoods to be provided on Buchholz, MOG & PRD. Entry points of wires shall be suitably sealed.

5.3.17 The accessories listed above are indicative only. Accessories which are not mentioned above but required for satisfactory operation of the transformers are deemed to be included in the contract without extra charges.

5.3.18 Fire-protection for inverter transformer shall be provided in accordance with relevant CEA regulations as amended time to time.

5.4 Dry Type Auxiliary Transformer

5.4.1 Transformer shall be cast resin encapsulated dry type transformer, made of cold rolled grain-oriented silicon steel laminations of M4 grade or better. Winding conductor shall be electrolytic grade Copper/Aluminium and insulation shall be Class F or better.

5.4.2 The transformers shall be housed in a metal protective housing, having a degree of protection of IP-23 suitable for indoor installation. The enclosure shall be provided with suitable hardware and accessories required for satisfactory operation of the transformer per the relevant standard.

5.5 Warranty

The transformer shall be warranted for minimum of 5 (five) years against all material/ manufacturing defects and workmanship.

5.6 Testing and Inspection

5.6.1 Type Tests and Special Tests

The following type test and special test reports shall be submitted during detailed engineering. The tests should have been conducted on the similar transformer by NABL accredited laboratory.

5.6.1.1 Type Tests

(i) Lightning impulse (Full & Chopped Wave) test on windings as per IEC 60076-3

(ii) Temperature Rise test at a tap corresponding to maximum losses as per IEC 60076-2

5.6.1.2 Special Tests

(i) Measurement of acoustic noise level as per NEMA TR-1

(ii) Short-circuit withstand test as per IEC 60076-5

In case the contractor is not able to submit the test reports during detailed engineering, the contractor shall submit the reports of type/special tests either conducted by NABL accredited laboratory or witnessed by Employer.

5.6.2 Routine Tests

Each completed transformer shall be subjected to following routine tests as per the latest edition of IEC 60076 unless specified otherwise.

(i) Measurement of winding resistance at each tap
(ii) Measurement of voltage ratio between HV and LV windings at each tap
(iii) Check of vector group
(iv) Measurement of no-load loss and no-load current
(v) Measurement of short-circuit impedance and load loss
(vi) Magnetic balance test as per CBIP manual publication no. 295
(vii) Applied voltage test
(viii) Induced voltage withstand test
(ix) Measurement of insulation resistance
(x) Partial discharge measurement
(xi) Marshalling box functional test
(xii) IR Measurement on wiring of marshalling box

5.6.3 Tests at Site

After erection at site all transformer(s) shall be subjected to the following tests.

(i) Measurement of voltage ratio
(ii) Check of vector group
(iii) Magnetic balance test
(iv) Measurement of insulation resistance

In case the equipment is not found as per the requirements of the Technical Specifications of NIT, all expenses incurred during site testing will be to the Contractor's account and the equipment shall be replaced by him at free of cost.

6 LT Switchgear

The LT switchgear specifications mentioned in this section are applicable for auxiliary supply distribution panel, AC combiner box and LT switchgear panels in case of string inverter configuration.

6.1 Standards and Codes

All equipment provided under LT switchgear shall comply with latest revisions and amendments of the relevant IEC standards and IS codes. In particular, the switchgear shall comply with the following standards and codes.

Standard/Code	Description
IEC 61439-1	Low-voltage switchgear and control gear assemblies - Part 1: General rules
IEC 61439-2	Low-voltage switchgear and control gear assemblies - Part 2: Power switchgear and control gear assemblies
IEC 60947-1	Low-voltage switchgear and control gear - Part 1: General rules
IEC 60947-2	Low-Voltage Switchgear and Control gear: Circuit Breakers
IEC 60947-3	Low voltage switchgear and control gear: Part 3 Switches, disconnectors, switch-disconnectors and fuse combination units
IEC 60947-4-1	Low-voltage switchgear and control gear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters
IEC 60947-5-1	Low-voltage switchgear and control gear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices
IEC 62052-11	Electricity metering equipment (a.c.) - General requirements, tests and test conditions - Part 11: Metering equipment
IS 694	Polyvinyl chloride insulated unsheathed-and sheathed cables/ cords with rigid and flexible conductor for rated voltages - up to and including 450/750V
IEC 61869	Instrument Transformers
IS 3043	Code of practice for earthing
IEC 60255	Measuring relays and protection equipment - Part 1: Common requirements

6.2 Technical Parameters

System Details	
Rated system voltage	415 V ± 10%, 3 Phase, 4 wire, Neutral Solidly Earthed
Rated frequency	50 Hz ± 5%
System fault current	As per system requirement
Air Circuit Breaker (ACB)	
Type	Air break
Rated Current	As per system requirement
Operating Duty	O – 0.3sec – CO – 3min – CO

Rated Ultimate Short-Circuit Breaking Capacity & Rated Service Short-Circuit Breaking Capacity	As per system fault current
Rated Short-Circuit Making Capacity	As per rated ultimate short-circuit breaking capacity
Moulded case circuit breaker (MCCB)	
Release	Thermal-Magnetic/Microprocessor
Rated current	As per system requirement
Poles	4 poles
Rated insulation level	690 V
Rated Ultimate Short-Circuit Breaking Capacity & Rated Service Short-Circuit Breaking Capacity	As per system fault current
Rated Short-Circuit Making Capacity	As per rated ultimate short-circuit breaking capacity
Utilization category	A
Current transformer (CT)	
Type	Cast Resin Bar Primary
Voltage class and frequency	650 V, 50 Hz
CT Secondary Current	1 A
Class of insulation	Class F
Accuracy class & burden	
a) For Protection	5P20, 5 VA PS Class for REF and core balance CT (CBCT)
b) For Metering	Class 0.5, 5 VA (min)
Minimum primary earth fault current to be detected by CBCT	1 A
Instrument Security Factor for metering CT	5
Digital Multifunctional Meter (MFM)	
Accuracy class	0.5 class
Communication with SCADA	RS485 communication with Modbus RTU

6.3 Constructional Details

6.3.1 The panel shall be metal enclosed, free standing, floor mounted, modular type with

compartmentalized construction having degree of protection of IP 2X (Indoor) and IP54 (outdoor) as per IS/IEC 60529. All doors and covers shall be provided with neoprene gaskets to prevent entry of vermin and dust.

6.3.2 All switches, push buttons etc. shall be operated front and shall be flush/semi-flush mounted.

6.3.3 The panel shall be fabricated from 2 mm CRCA sheet steel for frame & load bearing surfaces. Partitions may be fabricated from 1.6 mm CRCA if no components are mounted on them.

6.3.4 Cable entries shall be from bottom. The opening of cable entry shall be covered by 3mm thick gland plates with proper sealing to avoid water and rodent entry.

6.3.5 Earthing bus bar of suitable cross section shall be provided throughout the length of panel.

6.3.6 The panel shall be duly wired with suitable size of 1.1kV, PVC insulated cable and terminals shall be brought out for cable connections. 10% spare terminals subjected to minimum one of each rating shall be provided on each distribution switchgear. All wire shall have ferrules as per wiring diagram.

6.3.7 The panel shall be painted with 2 coats of primer after pre-treatment and 2 coats of Polyurethane / epoxy paint with shade as decided by the Owner.

6.3.8 The panel shall be of dead front construction suitable for front operated and back maintained functioning.

6.3.9 240 V, 5 A, 3 pin industrial socket-outlet with ON/OFF switch shall be provided in each panel.

6.3.10 Each panel shall be provided with LED lamp rated for 240 V, 50 Hz, single phase AC supply for interior illumination controlled by door switch.

6.3.11 Suitable lifting hooks shall be provided for each panel.

6.3.12 Each switchgear panel shall be provided with thermostatically controlled space heaters to prevent condensation within the enclosure. The space heater shall be connected to 240 V, 50 Hz, single phase AC supply through suitable switch and fuse.

6.3.13 Earth leakage relay with Core balance CTs (CBCT) shall be provided on main incoming feeders having phase CT ratio more than 50/1A. CBCT's shall be circular window type with window size based on the overall diameter of the cables, to be finalized during detailed engineering.

6.4 Air Circuit Breaker

6.4.1 The circuit breaker shall be three pole, air break, horizontal draw-out type.

6.4.2 The circuit breaker shall have three positions, i.e. SERVICE, TEST and ISOLATED.

6.4.3 The circuit breaker operating mechanism shall be based on motor operated spring charging and it shall be re-strike free, trip free both electrically and mechanically, with anti-pumping feature.

6.4.4 The rated control voltage of the spring charging motor shall be 110 VDC/230 VAC. Closing coil shall operate at all values of voltages between 85% and 110% of rated voltage. Opening coil shall operate correctly under all operating conditions of the circuit breaker up to the rated breaking capacity and at all values of supply voltage between 70% and 110% of rated voltage.

6.4.5 The spring charging motor shall have adequate thermal rating such that continuous sequence of the closing and opening operations is possible as long as power supply is available to the motor. It shall also be possible to charge the spring manually and close the breaker in the event of failure of motor / control supply to motor. Operating handle shall be provided for charging the operating mechanism. After failure of control supply to the motor, one open-close-open operation shall be possible with the energy contained in the operating mechanism.

6.4.6 The motor rating shall be such that it requires not more than 30 seconds for full charging of the closing spring. Closing action of the circuit breaker shall compress the opening spring ready for tripping. When closing springs are discharged after closing the breaker, they shall be automatically charged for the next operation.

6.4.7 Mechanical indicators shall be provided to indicate OPEN/CLOSE, SERVICE/TEST positions of the circuit breaker and CHARGED/ DISCHARGED positions of the closing spring. An operation counter shall also be provided.

6.4.8 The circuit breaker shall be provided with microprocessor based front adjustable protection release for overload, short circuit and earth fault.

6.4.9 Mechanical/Electrical interlocks shall be provided to prevent mal-operation and in particular to ensure the following.

(i) It shall be possible to close the circuit breaker only if it is in SERVICE or TEST position.

(ii) It shall be possible to open the door only when the breaker is in TEST position.

(iii) Movement of the circuit breaker between SERVICE and TEST positions shall be possible only if the breaker is OFF.

(iv) Racking in the circuit breaker from TEST to SERVICE position shall be

possible only if door is closed.

6.4.10 Telescopic trolley or suitable arrangement shall be provided for maintenance of circuit breaker. The trolley shall be such that the top most breaker module can be withdrawn on the trolley and can be lowered for maintenance purpose. The telescopic trolley shall be such that all type, size and rating of breaker can be withdrawn/inserted.

6.4.11 The circuit breaker shall have suitable provision for integration with SCADA.

6.5 Instrument Transformers

6.5.1 Instrument transformers shall be completely encapsulated cast resin type, suitable for continuous operation at the ambient temperature prevailing inside the switchgear enclosure, when the switchgear is operating at its rated load and the outside ambient temperature is 50°C.

6.5.2 Polarity marks shall indelibly be marked on each instrument transformer and at the lead terminals at the associated terminal block.

6.5.3 HRC fuses of suitable rating shall be provided on primary side of voltage transformers. For secondary side, four pole Miniature Circuit Breakers (MCB) shall be provided.

6.5.4 For auxiliary supply switchgear, earth leakage relay with Core balance CTs (CBCT) shall be provided on main incoming feeders having phase CT ratio more than 50/1A. CBCT's shall be circular window type with window size based on the overall diameter of the cables, to be finalized during detailed engineering.

6.6 Bus bar

6.6.1 Bus bar shall be made of copper or aluminium with uniform cross section throughout their length. They shall be adequately supported on insulators to withstand electrical and mechanical stresses due to specified short circuit current.

6.6.2 All bus bars joints shall be thoroughly cleaned and anti-oxide grease shall be applied. Plain and spring washers shall be provided to ensure good contacts at the joints and taps. Wherever aluminium to copper connections are required, suitable bimetallic connectors or clamps shall be used.

6.6.3 Bus bars shall be provided with heat shrinkable sleeves of suitable insulation class throughout their length with proper colour coding. All bus bar joints and taps shall be shrouded.

6.6.4 Bus bar support insulators shall be made of non-hygroscopic, arc and track resistant, high strength material suitable to withstand stresses due to over voltage and short circuit current.

6.6.5 The Contractor shall submit busbar sizing calculation for specified continuous and short time current ratings during detailed engineering.

6.7 Earthing

6.7.1 An earth bus made of copper or aluminium shall be provided throughout the length of the panel. It shall be bolted to the framework of each panel and brazed to each breaker earthing contact bar.

6.7.2 The earth bus shall have sufficient cross section to carry maximum fault current without exceeding the allowable temperature rise.

6.7.3 All non-current carrying conductors of the panel shall be connected to the earth bus. All joints to the earth bus shall be made through at least two bolts. Hinged doors shall be earthed through flexible earthing braid of adequate cross section. Suitable provision shall be provided at each end of the earth bus for connection with Owner's Earth conductor.

6.7.4 Positive earthing of the carriage and breaker frame shall be maintained when it is in the connected position and in all other positions whilst the auxiliary circuits are not totally disconnected.

6.7.5 All metallic cases of relays, instruments and other panel mounted equipment shall be connected to earth bus by independent copper wires of size not less than 2.5 sq. mm with green colour insulation.

6.7.6 Instrument transformer secondary neutral point shall be earthed at one place only on the terminal block. Such earthing shall be made through links so that earthing of one circuit may be removed without disturbing the earthing of other circuits.

6.8 Multi-Function Meter

6.8.1 Digital, flush mounting type Multi-Function Meter (MFM) of 0.5 accuracy class shall be provided. It shall have provision for integration with SCADA.

6.8.2 MFM shall have provision to display the following parameters.

(i) Line and phase voltages
(ii) Line and phase currents
(iii) Active power, Reactive power, Apparent power
(iv) Frequency
(v) Power factor
(vi) Total Harmonic Distortion (THD)

6.9 Wiring and Terminal blocks

6.9.1 All internal wiring shall be done with 650 V grade, 1.5 sq.mm. PVC insulated stranded flexible copper wire. For CT secondary circuits, 2.5 sq.mm copper wire shall be used.

6.9.2 Wire terminations shall be made with solderless crimping type tinned copper lugs, which shall firmly grip the conductor. Insulation sleeves shall be provided at all the wire terminations.

6.9.3 Printed identification ferrules, marked to correspond with panel wiring diagram shall be provided at both ends of each wire. The ferrules shall be firmly located on each wire so that they cannot move or turn freely on the wire. Wire identification shall be done in accordance with IS 11353.

6.9.4 The Contractor shall be solely responsible for the completeness and correctness of the internal wiring and for the proper functioning of the connected equipment.

6.9.5 All internal wiring to be connected to the external equipment shall terminate on terminal blocks. Terminal blocks shall be rated for 650 V, 10 A and made of non-inflammable material.

6.9.6 CT and VT secondary circuits shall be terminated on stud type, disconnecting terminal blocks.

6.9.7 At least 10% spare terminals shall be provided on each panel and these spare terminals shall be distributed on all terminal blocks.

6.10 Warranty

LT switchgear panels shall be warranted for minimum of 5 (five) year against all material/ manufacturing defects and workmanship.

6.11 Testing and Inspection

6.11.1 Type Tests

The switchgear panel shall be of type tested design. Type test reports as per the following standards shall be submitted during detailed engineering. The tests should have been conducted on the similar equipment by NABL accredited laboratory.

Equipment	**Standard**
Switchgear Panel	Relevant parts of IEC 61439
Air Circuit Breaker	IEC 60947-2
Moulded Case Circuit Breaker	IEC 60947-2
Current Transformer	Relevant parts of IEC 61869
Voltage Transformer	Relevant parts of IEC 61869

In case the contractor is not able to submit the test reports during detailed engineering, the contractor shall submit the reports of type/special tests either conducted by NABL accredited laboratory or witnessed by Employer.

6.11.2 Routine Tests

Routine tests and acceptance tests shall be as per the Quality Assurance Plan (QAP) approved by the Employer.

7 HT Switchgear

7.1 Standards and Codes

All equipment provided under HT switchgear shall comply with latest editions and amendments of the relevant IEC standards and IS codes. In particular, the switchgear shall comply with the following standards and codes.

Standard/Code	Description
IS/IEC 62271-1	High Voltage Switchgear and Control gear - Part 1: Common Specifications
IS/IEC 62271-100	High Voltage Switchgear and Control gear - Part 100: AC Circuit Breakers
IS/IEC 62271-102	High Voltage Switchgear and Control gear - Part 102: AC Disconnectors and Earthing Switches
IS/IEC 62271-200	High Voltage Switchgear and Control gear - Part 200: AC Metal Enclosed Switchgear and Control gear for Rated Voltages Above 1 kV and Up to and Including 52 kV
IEC 61869	Instrument Transformers
IS 3231	Electrical relays for power systems protection
IEC 60255	Measuring relays and protection equipment
IEC 61850	Communication networks and systems for power utility automation
IEC 61131-3	Programmable controllers - Part 3: Programming languages
IS 9385	High voltage fuses
IS 9431	Indoor post insulators of organic material for systems with nominal voltages greater than 1000 V up to and including 300 kV

IEC 60099-4	Surge arresters - Part 4: Metal-oxide surge arresters without gaps for A.C. systems
IS 3070-3	Lightning Arresters for Alternating Current Systems - Part 3: Metal Oxide Lightning Arresters Without Gaps
IEC 62052-11	Electricity metering equipment (A.C.) - General requirements, tests and test conditions - Part 11: Metering equipment
IEC 62053	Electricity metering equipment (A.C.) - Particular requirements
IS 14697	AC Static Transformer Operated Watthour and Var-hour Meters, Class 0.2S and 0.5S

7.2 Technical Parameters

Parameter	**Specification**
System Parameters	
Highest system voltage	33 kV
Rated system voltage	36 kV
Rated frequency	50 Hz
Number of phases	3
Power frequency withstand voltage	70 kV (r.m.s.)
Lightning impulse withstand voltage	170 kV (peak)
System fault current	As per system requirement
Circuit Breaker	
Type	Vacuum type
Operating duty cycle	O – 0.3sec – CO – 3min – CO
Short circuit breaking current	As per system requirement
Short circuit making current	2.5 times S.C. breaking current
Re-strike performance class	C2
Mechanical endurance class	M1
Current Transformer	
Accuracy class	0.2 for metering (0.2s for metering at outgoing feeder), 5P20 for protection
Rated VA burden	As per requirement
Insulation class	Class F
Voltage Transformer	

Accuracy class	0.2 for metering, 3P for protection
Rated VA burden	As per requirement
Insulation class	Class F

7.3 Switchgear Panel

7.3.1 The switchgear panel shall be free standing, floor mounted, single front, single tier fully compartmentalized, metal enclosed construction. Each panel shall have separate compartments for circuit breaker, bus bars, cable termination and auxiliary circuit.

7.3.2 The circuit breakers shall be mounted on horizontally withdrawable trucks with locking facility in SERVICE and TEST positions.

7.3.3 The panel enclosure shall be constructed with CRCA steel/Aluzinc sheet. The thickness of load bearing members shall be minimum 3 mm and that of non-load bearing members shall be minimum 2 mm.

7.3.4 All surfaces shall be painted with two coats of epoxy-based paint of colour shade RAL 7032. The minimum dry film thickness (DFT) shall be 100 micron.

7.3.5 The circuit breaker and auxiliary circuit compartments provided on the front side shall have separate concealed hinged doors. Cable and bus bar compartments provided on the rear side shall have separate bolted covers. All doors and covers shall be provided with neoprene/synthetic rubber gaskets to prevent entry of vermin and dust.

7.3.6 Pressure relief device shall be provided in each high voltage compartment of a panel to safely vent the gases in the event of internal arc. Seal-off bushing arrangement shall be provided between the breaker compartment and bus bar/cable compartments to prevent transfer of arc from one compartment to other.

7.3.7 Automatic safety shutters shall be provided to cover up the fixed high voltage contacts on bus bar and cable sides when the truck is moved to TEST position.

7.3.8 Degree of protection shall not be less than IP 5X for auxiliary circuit compartment. However, for remaining compartments it shall not be less than IP 4X.

7.3.9 Mechanical /Electrical interlocks shall be provided to prevent mal-operation and in particular to ensure the following.

(i) The breaker shall be operated only if it is in SERVICE or TEST position.

(ii) Movement of the breaker truck between SERVICE and TEST positions shall be possible only if the breaker is OFF.

(iii) It shall be possible to open the door only when the breaker is in TEST position.

7.3.10 Panel shall be provided with local bus-bar protection

7.3.11 Each switchgear panel shall be provided with thermostatically controlled space heaters, separately for breaker, cable and bus bar compartments, to prevent condensation within the compartment. The space heater shall be connected to 240 V, 50 Hz, single phase AC supply through suitable switch and fuse.

7.3.12 240 V, 5 A, SPN industrial socket-outlet with ON/OFF switch shall be provided in each panel.

7.3.13 Each panel shall be provided with LED lamp rated for 240 V, 50 Hz, single phase AC supply for interior illumination controlled by door switch.

7.3.14 Gapless, metal-oxide surge arrestors shall be provided between line and earth in cable compartment of the switchgear panel.

7.3.15 Suitable lifting hooks shall be provided for each panel.

7.4 Circuit Breakers

7.4.1 Circuit breakers shall be of vacuum type. It shall comprise of three separate identical single pole units operated through the common shaft and shall be fully interchangeable both electrically and mechanically.

7.4.2 The circuit breaker operating mechanism shall be based on motor operated spring charging and it shall be re-strike free, trip free both electrically and mechanically, with anti-pumping feature.

7.4.3 The rated control voltage of the spring charging motor shall be 110 VDC/230 VAC. Closing coil shall operate at all values of voltages between 85% and 110% of rated voltage. Opening coil shall operate correctly under all operating conditions of the circuit breaker up to the rated breaking capacity and at all values of supply voltage between 70% and 110% of rated voltage.

7.4.4 The spring charging motor shall have adequate thermal rating such that continuous sequence of the closing and opening operations is possible as long as power supply is available to the motor. It shall also be possible to charge the spring manually and close the breaker in the event of failure of motor / control supply to motor. Operating handle shall be provided for charging the operating mechanism. After failure of control supply to the motor, one open-close-open operation shall be possible with the energy contained in the operating mechanism.

7.4.5 The motor rating shall be such that it requires not more than 30 seconds for full charging of the closing spring. Closing action of the circuit breaker shall compress

the opening spring ready for tripping. When closing springs are discharged after closing the breaker, they shall be automatically charged for the next operation.

7.4.6 Mechanical indicators shall be provided to indicate OPEN/CLOSED positions of the circuit breaker and CHARGED/ DISCHARGED positions of the closing spring. An operation counter shall also be provided. These indicators and counter shall be visible from the panel front door without opening it.

7.5 Relays

7.5.1 All relays shall be microprocessor based numerical type. However, auxiliary relays can be static or electromechanical type. The relays shall be flush mounted on panel front with connections from the inside.

7.5.2 Auxiliary voltage of the relays shall be 110 VDC and the relays shall be capable of operating continuously between 80 – 120% of auxiliary voltage.

7.5.3 All numerical relays shall have adequate number of freely configurable, optically isolated, Binary Inputs (BI) and potential free Binary Outputs (BO).

7.5.4 All numerical relays shall have minimum four no. of current inputs, three for phase current and one for earth current, suitable for CT secondary current of 1A. The current inputs shall be compatible with both residual connected CT and Core Balance CT (CBCT). In addition, numerical relay in main outgoing feeder shall have three no. of voltage inputs for Under Voltage/Over Voltage protection.

7.5.5 All I/O's shall have galvanic isolation. Analog inputs shall be protected against switching surges and harmonics.

7.5.6 Making, breaking and continuous capacity of the relay contacts shall be adequate enough for the circuits in which they are used.

7.5.7 The numerical relay shall have the following protection functions with at least two independent protection setting groups. The protection functions shall be selectable from any of the IEC characteristic curves.

(i) Definite time (DT) phase over current protection
(ii) Inverse Definite Minimum Time (IDMT) phase over current protection
(iii) Definite time (DT) earth fault current protection
(iv) Inverse Definite Minimum Time (IDMT) earth fault current protection
(v) Under Voltage protection
(vi) Over Voltage protection

7.5.8 Transformer feeder protection relay shall have provision for the following protection

functions.

(i) Buchholz alarm & trip

(ii) Oil Temperature Indicator (OTI) alarm & trip

(iii) Winding Temperature Indicator (WTI) alarm & trip

(iv) Pressure Relief Valve (PRV) trip

(v) Magnetic Oil Gauge (MOG) alarm

7.5.9 All numerical relays shall have provision for measurement and storage of electrical parameters such as voltage, current, frequency, active power, reactive power etc.

7.5.10 The numerical relay shall be able to record faults and events in non-volatile memory.

(i) Fault record – At least 5 recent faults including the protection function operated, operating phase(s), voltages and currents along with date and time stamp.

(ii) Event record – At least 200 events with date and time stamp.

7.5.11 The numerical relay shall have trip circuit supervision facility to monitor the circuit breaker trip circuit both in pre-trip and post-trip conditions. The relay shall also be able to provide circuit breaker monitoring, CT and VT supervision.

7.5.12 The numerical relay shall have self-diagnostic feature with separate output contact for indication of any internal relay failure.

7.5.13 The numerical relay shall have RS-232/RS-485/RJ-45/USB ports on front side for local communication with PC and on rear side for remote communication to SCADA system.

7.5.14 The numerical relay shall have feature for time synchronization through the SCADA System / networking.

7.5.15 The numerical relay shall be provided with backlit alphanumeric LCD to access protection settings, measurement parameters, fault and event records. Read and write access to protection settings shall be password protected.

7.6 Instrument Transformers

7.6.1 Instrument transformers shall be completely encapsulated cast resin type, suitable for continuous operation at the ambient temperature prevailing inside the switchgear enclosure, when the switchgear is operating at its rated load and the outside ambient temperature is 50°C.

7.6.2 Polarity marks shall indelibly be marked on each instrument transformer and at the lead terminals at the associated terminal block.

7.6.3 Voltage transformers shall be single phase units. Bus voltage transformers shall be housed in a separate panel on withdrawable truck.

7.6.4 HRC fuses of suitable rating shall be provided on primary side of voltage transformers. For secondary side, four pole Miniature Circuit Breakers (MCB) shall be provided.

7.7 Earthing

7.7.1 An earth bus made of copper shall be provided throughout the length of the panel. It shall be bolted to the framework of each panel and brazed to each breaker earthing contact bar.

7.7.2 The earth bus shall have sufficient cross section to carry maximum fault current without exceeding the allowable temperature rise.

7.7.3 All non-current carrying conductors of the panel shall be connected to the earth bus. All joints to the earth bus shall be made through at least two bolts. Hinged doors shall be earthed through flexible earthing braid of adequate cross section. Suitable provision shall be provided at each end of the earth bus for connection with Owner's Earth conductor.

7.7.4 Positive earthing of the breaker truck and frame shall be maintained when it is in the connected position and in all other positions whilst the auxiliary circuits are not totally disconnected.

7.7.5 All metallic cases of relays, instruments and other panel mounted equipment shall be connected to earth bus by independent copper wires of size not less than 2.5 sq. mm with green colour insulation.

7.7.6 Instrument transformer secondary neutral point shall be earthed at one place only on the terminal block. Such earthing shall be made through links so that earthing of one circuit may be removed without disturbing the earthing of other circuits.

7.7.7 Separate earthing trucks shall be provided for earthing of busbars and incoming/outgoing feeders. The trucks shall have voltage transformer to indicate presence of voltage prior to earthing. An audible alarm shall also be provided in case of voltage on the earthing terminal. Integral earth switches may also be considered instead of earthing trucks. The earthing truck/switch shall have short circuit withstand capability equal to that of the associated switchgear panel.

7.7.8 The interlocks shall be provided to ensure the following.

(i) It is not possible to rack-in the earthing truck/close the earthing switch when the breaker truck is in SERVICE position.

(ii) It is not possible to rack-in the breaker truck into SERVICE position when earthing truck is connected/earthing switch is in closed position.

7.8 Bus bar

7.8.1 Bus bar shall be made of copper or aluminium with uniform cross section throughout their length. They shall be adequately supported on insulators to withstand electrical and mechanical stresses due to specified short circuit current.

7.8.2 All bus bars joints shall be thoroughly cleaned and anti-oxide grease shall be applied. Plain and spring washers shall be provided to ensure good contacts at the joints and taps. Wherever aluminium to copper connections are required, suitable bimetallic connectors or clamps shall be used.

7.8.3 Bus bars shall be provided with heat shrinkable sleeves of suitable insulation class throughout their length with proper colour coding. All bus bar joints and taps shall be shrouded.

7.8.4 Bus bar support insulators shall be made of non-hygroscopic, arc and track resistant, high strength material suitable to withstand stresses due to over voltage and short circuit current.

7.8.5 The Contractor shall submit busbar sizing calculation for specified continuous and short time current ratings during detailed engineering.

7.9 Measuring Instruments

7.9.1 All the measuring instruments shall be digital, flush mounting type with communication facility.

7.9.2 All feeders except main outgoing feeder shall be provided with digital Multi-Function Meter (MFM). Tri Vector Meter (TVM) shall be provided for the main outgoing feeder (in the HT Panel). Accuracy class of MFM shall be 0.2 and that of TVM shall be 0.2S.

7.9.3 Measuring instruments shall have provision to display the following parameters.

(i) Line and phase voltages
(ii) Line and phase currents
(iii) Active power, Reactive power, Apparent power
(iv) Frequency
(v) Power factor
(vi) Total Harmonic Distortion (THD)

7.10 Wiring and Terminal blocks

7.10.1 All internal wiring shall be done with 650 V grade, 1.5 sq.mm. PVC insulated stranded

flexible copper wire. For CT secondary circuits, 2.5 sq.mm copper wire shall be used.

7.10.2 Wire terminations shall be made with solderless crimping type tinned copper lugs, which shall firmly grip the conductor. Insulation sleeves shall be provided at all the wire terminations.

7.10.3 Printed identification ferrules, marked to correspond with panel wiring diagram shall be provided at both ends of each wire. The ferrules shall be firmly located on each wire so that they cannot move or turn freely on the wire. Wire identification shall be done in accordance with IS 11353.

7.10.4 The Contractor shall be solely responsible for the completeness and correctness of the internal wiring and for the proper functioning of the connected equipment.

7.10.5 All internal wiring to be connected to the external equipment shall terminate on terminal blocks. Terminal blocks shall be rated for 650 V, 10 A and made of non-inflammable material.

7.10.6 CT and VT secondary circuits shall be terminated on stud type, disconnecting terminal blocks.

7.10.7 At least 10% spare terminals shall be provided on each panel and these spare terminals shall be distributed on all terminal blocks.

7.11 Warranty

The HT panel unit shall be warranted for minimum of 5 (five) years against all material/ manufacturing defects and workmanship.

7.12 Testing and Inspection

7.12.1 Type Tests

The switchgear panel shall be of type tested design. The following type test reports shall be submitted during detailed engineering. The tests should have been conducted on the similar equipment by NABL accredited laboratory.

Test	**Standard**	**Relevant IEC Clause**
Switchgear Panel		
Dielectric tests		
Power frequency voltage test	IEC 62271-200	6.2.6.1
Lightning impulse voltage test	IEC 62271-200	6.2.6.2
Dielectric tests on auxiliary and control circuits	IEC 62271-200	6.2.10

Measurement of the resistance of the main circuit	IEC 62271-200	6.4.1
Temperature-rise tests	IEC 62271-200	6.5
Short-time withstand current and peak withstand current tests	IEC 62271-200	6.6
Verification of the IP coding	IEC 62271-200	6.7.1
Verification of making and breaking capacities	IEC 62271-200	6.101
Mechanical operation test	IEC 62271-200	6.102
Internal arc test	IEC 62271-200	6.106
Circuit Breaker		
Mechanical operation test at ambient air temperature (M2 Class)	IEC 62271-100	6.101.2
Basic short-circuit test-duties	IEC 62271-100	6.106
Relays		
Vibration tests	IEC 60255-21-1	
Shock and bump tests	IEC 60255-21-2	
Seismic tests	IEC 60255-21-3	
Electromagnetic compatibility requirements	IEC 60255-26	
Product safety requirements	IEC 60255-27	
Common requirements	IEC 60255-1	
Functional requirements	Relevant parts of IEC 60255-100 series	
Communication requirements	IEC 61850	
Current Transformers		
Temperature-rise test	IEC 61869-2	7.2.2
Impulse voltage withstand test on primary terminals	IEC 61869-2	7.2.3
Tests for accuracy	IEC 61869-2	7.2.6
Short-time current tests	IEC 61869-2	7.2.201
Voltage Transformer		
Temperature-rise test	IEC 61869-3	7.2.2

Impulse voltage withstand test on primary terminals	IEC 61869-3	7.2.3
Test for accuracy	IEC 61869-3	7.2.6
Short-circuit withstand capability test	IEC 61869-3	7.2.301

In case the contractor is not able to submit the test reports during detailed engineering, the contractor shall submit the reports of type/special tests either conducted by NABL accredited laboratory or witnessed by Employer.

7.12.2 Routine Tests

Routine tests and acceptance tests shall be as per the Quality Assurance Plan (QAP) approved by the Employer.

8 AC Cables

8.1 Standards and Codes

All AC Cables shall conform to the following standards and codes.

IS 7098	Crosslinked polyethylene insulated PVC sheathed cables, Part 1: For working voltage up to and including 1100 V
IS 7098	Crosslinked Polyethylene Insulated Thermoplastics Sheathed Cables Part 2: for Working Voltages from 3.3 kV up to and Including 33 kV

8.2 All AC cables shall be flame retardant, low smoke (FRLS) type designed to withstand all mechanical, electrical and thermal stresses develop under steady state and transient operating conditions.

8.3 Only terminal cable joints shall be accepted. No cable joint to join two cable ends shall be accepted. However, cable joints may be allowed if the route length is more than maximum available drum length subject to Employer's approval.

8.4 In addition to manufacturer's identification on cables as per relevant standard, following marking shall also be provided over outer sheath.

(i) Cable size and voltage grade
(ii) Word 'FRLS' at every metre
(iii) Sequential marking of length of the cable in metres at every metre

8.5 Cables shall be sized based on the following considerations:

(i) Rated current the equipment
(ii) Maximum voltage drop in LT cable (from PCU to Transformer) shall be limited to 0.5% of the rated voltage. For HT cables, maximum voltage drop shall be

limited to 0.5 % of the rated voltage. The Contactor shall provide voltage drop calculations in excel sheet.

(iii) Short circuit withstand capability as per design for 1s.

(iv) De-rating factors according to laying pattern

8.6 Warranty

All cables shall be warranted for minimum of 5 (five) year against all material/ manufacturing defects and workmanship.

8.7 Testing

Routine test and acceptance tests requirements shall be as per relevant standards for all cable sizes.

8.8 Installation

8.8.1 Cable installation shall be as per IS 1255.

8.8.2 Cable terminations shall be made with properly crimped lugs and passed through cable glands at the entry & exit point of the cubicles. Bimetallic lugs shall be used for connecting Cu bus bar and Al cables or vice-versa.

8.8.3 All AC cables shall be provided with punched/embossed aluminium tags. The marking shall be done with good quality letter and numbers of proper size so that the cables can be identified easily.

9 Auxiliary Supply System

9.1 Scheme for auxiliary supply system shall be submitted by the Contractor during detailed engineering for the approval by Employer.

9.2 It shall mainly comprise of auxiliary transformer (if required), AC distribution board(s) (ACDB), Battery & battery charger system, emergency lighting network, Uninterrupted power supply (UPS), distribution cables and metering & protective devices.

9.3 Auxiliary system shall be provided with two independent sources for reliable auxiliary power supply.

9.4 Following consideration shall be taken into account while sizing the auxiliary transformer:

(i) 20% future load margin

(ii) 20% design margin

(iii) Total connected load at 0.8 power factor

10 Uninterrupted Power Supply

10.1 Standards and Codes

Standard/Code	Description
IEC 62040-1	Uninterruptible power systems (UPS) - Part 1: General and safety requirements for UPS
IEC 62040-2	Uninterruptible power systems (UPS) - Part 2: Electromagnetic compatibility (EMC) requirements
IEC 62040-3	Uninterruptible power systems (UPS) - Part 3: Method of specifying the performance and test requirements

10.2 General Requirements

10.2.1 The Uninterrupted Power Supply (UPS) system shall be designed to supply power to following loads (but not limited to).

(i) Data logger / SCADA / EMS
(ii) Fire Detection/ Alarm Panel
(iii) HMI of SCADA
(iv) Emergency Lighting
(v) Inverter's Auxiliary supply (if applicable)
(vi) HT panel auxiliary
(vii) CCTV

10.2.2 Sizing of UPS shall be done considering the above-mentioned load at power factor of 0.8 lagging inclusive of 10% design margin at 50 ˚C.

10.3 System Description

10.3.1 The UPS shall automatically provide continuous, regulated AC power to critical loads under normal and abnormal conditions, including loss of input AC power. The UPS system shall consist of the following major equipment.

(i) UPS Module

(a) Insulated Gate Bipolar Transistor (IGBT) Converter
(b) Insulated Gate Bipolar Transistor (IGBT) Inverter
(c) Digital Signal Processor (DSP) using Pulse Width Modulation (PWM) for Direct Digital Control (DDC) of all UPS control and monitoring functions
(d) Static bypass switch

(ii) Battery system for 2 hours
(iii) Battery protective and disconnect device

(iv) Maintenance bypass switch

(v) LCD display panel and LED indications

(vi) Integrated UPS Communications Protocols capable of communicating with SCADA system

10.3.2 The UPS shall meet the following minimum specifications.

Parameter	**Specification**
Topology	Online double conversion UPS
Input	
Voltage	415 V ± 10% AC
Frequency	50 ± 5 Hz
Power factor	0.95
Output	
Voltage	230V ± 1% AC
Frequency	50 Hz
Power factor	0.8
Battery	
Type	Sealed, Maintenance-Free (AGM) battery
Capacity	100% UPS load for 2 hours
Monitoring and communication	
LED Indicators	Load on Inverter, Battery operation, Load on Bypass, Overload, LCD Fault, UPS Fault
Electrical contacts	Closing contacts for each of the following conditions: 1. Unit on Battery 2. Low Battery 3. Summary Alarm 4. UPS On 5. Input Fail
Local Display	LCD/ LED
SCADA communications	RS-232 & RS-485 Interface Port
Overall efficiency	>90%
Electrical Protection	Input/ output under voltage, over temperature, overload, Short circuit, battery low trip

10.3.3 The UPS shall be forced air cooled by internally mounted fans. The fans shall be

redundant in nature to ensure maximum reliability. The fans shall be easily replaceable without the use of special tools.

10.3.4 Contractor shall provide the Operation & Maintenance Manual and mandatory spare parts list along with the equipment

10.4 Warranty

UPS shall be warranted for minimum of 5 (five) years and batteries shall be warranted for a minimum of 2 (two) years against all material/ manufacturing defects and workmanship

10.5 Tests

10.5.1 Routine tests and acceptance tests on final product shall be done as per QAP approved by the Employer.

10.5.2 On completion of installation and commissioning of the equipment on site tests shall be carried out with the max. available load, which does not exceed the rated continuous load. An on-site test procedure shall be submitted by contractor include a check of controls and indicators after installation of the equipment.

11 Battery and Battery Charger

11.1 Standards and Codes

Standard/Code	Description
IEC 60896-22:2004	Stationary lead-acid batteries - Part 22: Valve regulated types - Requirements
IEC 60896-21:2004	Stationary lead-acid batteries - Part 21: Valve regulated types - Methods of test
IS 1652	Specification for stationary cells and batteries, lead acid type (with plante positive plates)
IS 8320	General requirements and methods of tests for lead acid storage batteries.
IS 15549	Stationary Regulated Lead Acid Batteries

11.2 General

110 V DC system (Battery, Battery Charger & DCDB) in accordance with this specification and standards stated herein, shall comprise of the following.

(iv) Sealed Maintenance Free (VRLA) Battery complete with racks & accessories.

(v) One No. Float charger.

(vi) One No. Float cum Boost charger.

(vii) DC Distribution Board (DCDB)

11.3 Battery

11.3.1 Battery shall be used to supply the following loads with back up of two hours in case of complete power failure:

(vii) Trip and closing coil of HT circuit breaker

(viii) Spring charging motors for HT circuit breaker

(ix) Annunciator and Indication circuit of HT panel

(x) Auxiliary supply to protection relays

11.3.2 The battery sizing shall account for suitable temperature correction factors, ageing factors of 1.25, design margin of 1.25 & depth of discharge of 80%.

11.3.3 The design of the battery bank and sizing calculation along with the data sheet for the battery and battery charger shall be submitted for approval.

11.3.4 Battery voltage – 220V dc or 110V dc

11.4 Battery Charger

11.4.1 The Float Charger shall be used to supply normal DC loads and float charging current of charged battery. The Float cum Boost charger shall be designed to supply boost charging current requirement of the associated battery as well as to supply normal DC load. After full discharge of battery bank, the Float Cum boost charger shall be capable of charging the battery to its full capacity in 8 hours duration while supplying normal DC load.

11.4.2 The float charger shall have both auto and manual voltage regulation arrangements with provision of selector switch.

11.4.3 Suitable filter circuits shall be provided in all the chargers to limit the ripple content (peak to peak) in the output voltage and current to 2% and 5% respectively.

11.4.4 Digital Outputs shall be configured for connection to the SCADA to monitor the outputs like charger output current, output voltage, float/boost mode, etc.

11.4.5 The charging equipment shall be housed in a free standing, floor mounted compartmentalized panels. Panel shall have provision for bottom cable entry with removable undrilled cable gland plate of 3.0 mm thickness.

11.4.6 The panel shall be of CRCA sheet steel construction having thickness of at least 2.0 mm. Degree of protection provided by the enclosure to the internals of charger shall be IP-42.

11.4.7 The instruments, switches and indicating lamps shall be flush mounted on the front

panel.

11.5 DC distribution board (DCDB)

11.5.1 DCDB shall be a separate panel but shall form an integral part of a battery charger panel board.

11.5.2 Doors and covers shall be provided with neoprene gaskets to prevent entry of vermin and dust. Also, door shall be provided with lock and key arrangement to prevent unauthorized access to the board.

11.5.3 DCDB shall have adequate number of outgoing feeders with double pole, DC MCBs. At least 20% feeders shall be provided as spare.

11.6 Warranty

Batteries and battery charger shall be warranted for minimum of 2 (two) years against all material/ manufacturing defects and workmanship.

11.7 Tests

Routine tests and acceptance tests shall be as per the Quality Assurance Plan (QAP) approved by the Employer.

12 Earthing

12.1 Standards and Codes

Earthing system shall comply with latest revisions and amendments of the relevant IEC standards and IS codes. In particular, earthing system shall comply with the following standards and codes.

Standard/Code	Description
IS 3043	Code of Practice for Earthing
IEEE 80	IEEE Guide for Safety in AC Substation Grounding
IEC 62561-2	Requirements for conductors and earth electrodes
IEC 62561-7	Requirements for earthing enhancing compounds
IEEE 142	IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems
Indian Electricity Rules	

12.2 General Requirements

12.2.1 Earthing system shall be designed based on system fault current and soil/water resistivity value obtained from geo-technical investigation/hydrography report. Earth

grid shall be formed consisting of number of earth electrodes sufficient enough to dissipate the system fault current interconnected by earthing conductors.

12.2.2 The earth electrode shall be made of high tensile low carbon steel rod, molecularly bonded by high conductivity copper on outer surface with coating thickness not less than 250 micron as per relevant standards. Suitable earth enhancing material shall be filled around the electrode to lower the resistance to earth. Inspection chamber and lid shall be provided as per IS 3043.

12.2.3 Earth conductors shall be made of copper bonded steel or galvanized steel of sufficient cross section to carry the fault current and withstand corrosion.

12.2.4 Earth conductors buried in ground shall be laid minimum 600 mm below ground level unless otherwise indicated in the drawing. Back filling material to be placed over buried conductors shall be free from stones and harmful mixtures.

12.2.5 Earth electrodes shall not be situated within 1.5 m from any building whose installation system is being earthed. Minimum distance between earth electrodes shall be two times the driven depth of the electrode.

12.2.6 All welded connections shall be made by electric arc welding. For rust protection the welds should be treated with red lead compound and afterwards thickly coated with bitumen compound.

12.3 Earthing of Floating Platform

12.3.1 All the conducting parts of floating platform that are not intended to carry current shall be bonded to the earthing system by two distinct connections.

12.3.2 Earth grid may be floating on the reservoir or constructed on the shore connected with the floating platform depending on design, safety and statutory requirements.

12.3.3 Earth electrodes of the DC earth grid shall be uniformly distributed so that optimum earth resistance is offered to leakage current flowing from floating platform.

12.3.4 SCB equipment/SPD earthing point shall be connected to the DC earth grid using flexible copper cable of sufficient cross section as recommended by the manufacturer. The connection with the DC earth grid shall be done using suitable bimetallic lugs and stainless-steel fasteners.

12.4 PCU Earthing

12.4.1 DC negative bus bar of the PCU shall be earthed to avoid Potential Induced Degradation (PID). DC negative bus bar and PCU equipment earth shall be bonded to the PCU earth bus and connected to earth electrodes through flexible copper cable

of sufficient cross section as mentioned by the manufacturer.

12.4.2 In case earthing of DC negative bus bar of PCU is not allowed by the manufacturer, suitable anti-PID device shall be provided with the consent of PV Module and PCU manufacturer. However, PCU equipment earth shall be connected to earth electrodes through flexible copper cable of sufficient cross section as mentioned by the manufacturer.

12.5 Transformer Earthing

12.5.1 Inverter transformer neutral shall be floating, not to be earthed. However, recommendation of inverter manufacturer shall also be taken into account.

12.5.2 Transformer tank, cable box, marshalling box and all other body earth points shall be earthed.

12.5.3 Inverter transformer shield shall be earthed separately using minimum two no. of earth electrodes. Earthing conductor between shield bushing and earth electrodes shall be copper flat of suitable size not less than 25 x 6 mm.

12.5.4 Neutral and body of the auxiliary transformer shall be earthed.

12.6 Main Control Room Earthing

12.6.1 Metallic enclosure of all electrical equipment inside the main control room shall be connected to the earth grid by two separate and distinct connections.

12.6.2 Cable racks and trays shall be connected to the earth grid at minimum two places using galvanized steel flat.

12.6.3 SCADA and other related electronic devices shall be earthed separately using minimum two no. of earth electrodes.

12.7 Switchyard Earthing

The metallic frame work of all switchyard equipment and support structures shall be connected to the earth grid by means of two separate and distinct connections.

Switch yard shall be shielded against direct lightning stroke by provision of overhead shield wire or earth wire or spikes (masts) or combination thereof as per CEA 2010(Technical standards)- 42(2)(c)

12.8 Tests

Type test reports for earthing electrode, earth enhancing compound and its associated accessories shall be submitted during detailed engineering for approval.

On completion of installation, continuity of earth conductors and efficiency of all bonds and joints shall be checked. Earth resistance at earth terminations shall be measured and recorded.

The earth plate shall be provided to facilitate its identification and for carrying out periodical inspection.

13 Lightning Protection System

13.1 Lightning Protection System (LPS) for entire plant (off-shore and on-shore) against direct and indirect lighting strokes shall be provided as per IS/IEC 62305:2010.

13.2 Protection level for the entire plant shall be Level – I.

13.3 Air terminals, down conductors and earth termination system shall be designed as per relevant parts of IS/IEC 62305:2010.

13.4 Necessary foundation/anchoring for holding the air terminals in position to be made after giving due consideration to shadow on PV array, maximum wind speed and maintenance requirement at site in future.

13.5 The product shall be warranted for minimum of 2 (two) years against all material/ manufacturing defects and workmanship.

13.6 Type test reports as per IS/IEC 62305:2010 shall be submitted during detailed engineering for approval.

14 Communication Cables

14.1 Optical Fibre Cables

14.1.1 Optic Fibre cable shall be 4/8/12 core, galvanized corrugated steel taped armoured, fully water blocked with dielectric central member for outdoor/ indoor application so as to prevent any physical damage.

14.1.2 The cable shall have multiple single-mode or multimode fibres on as required basis so as to avoid the usage of any repeaters.

14.1.3 The outer sheath shall have Flame Retardant, UV resistant properties and are to be identified with the manufacturer's name, year of manufacturing, progressive automatic sequential on-line marking of length in meters at every meter on outer sheath.

14.1.4 The cable core shall have suitable characteristics and strengthening for prevention of damage during pulling.

14.1.5 All testing of the optic fibre cable being supplied shall be as per the relevant IEC, EIA

and other international standards.

14.1.6 The Contractor shall ensure that minimum 100% cores are kept as spare in all types of optical fibre cables.

14.1.7 Cables shall be suitable for laying in conduits, ducts, trenches, racks and underground buried installation.

14.1.8 Spliced/ Repaired cables are not acceptable. Penetration of water resistance and impact resistance shall be as per IEC standard.

14.2 Communication Cable (Modbus)

14.2.1 Data (Modbus) Cable to be used shall be shielded type with stranded copper conductor. Cable shall have minimum 2 pair each with conductor size of 0.5 Sq.mm. Cable shall be flame retardant according to IEC 60332-1-2.

14.2.2 Cable shall be tested for Peak working voltage of not less than 300 V and shall be suitable for serial interfaces (RS 422 and RS 485).

14.2.3 Communication cable shall be laid through underground with suitable HDPE ducts.

15 SCADA

15.1 General Requirements

15.1.1 The Contractor shall provide complete SCADA system with all accessories, auxiliaries and associated equipment and cables for the safe, efficient and reliable operation and monitoring of entire solar plant and its auxiliary systems.

15.1.2 The Contractor shall provide all the components including, but not limited to, Hardware, Software, Panels, Power Supply, HMI, Laser Printer, Gateway, Networking equipment and associated Cables, firewall etc. needed for the completeness.

15.1.3 SCADA System shall have the provision to perform the following features and/or functions:

(xi) Web enabled Operator Dashboards: Showing key information on Generation, Performance and Current Status of various equipment in Single Line Diagram (SLD) format with capability to monitor PV array string level parameters.

(xii) Real time Data Logging with Integrated Analytics & Reporting: Logging of all parameters - AC, DC, Weather, System Run Hours, Equipment Status and Alarms as well as derived/ calculated/ integrated values. The SCADA User interface shall be customizable and enable Report Generation and Graphical Analysis.

(xiii) Fault and System Diagnostics with time stamped event logging.

(xiv) Support for O&M Activities: The interface shall allow integration with Surveillance System(s), Module Cleaning System and various other O&M support systems to provide a Data Analysis and Decision Support System for smooth and efficient Plant Operations.

(xv) AI based Distributed Analytics for Predictive Maintenance, trend analysis and Alerts.

(xvi) Generate, store and retrieve user configurable Sequence of Event (SOE) Reports.

(xvii) Interface with different field equipment in the plant and work seamlessly with field equipment supplied by different companies.

(xviii) Transfer of plant data reliably, to an Owner designated server or Cloud (Option: check with client) on any kind of remote network including low bandwidth and wireless links such as 2G/3G/VSAT

(Note: Telecom Lease line connection, if required for transferring data from Plant over internet shall be taken by Contractor in the name of Employer for O&M period)

15.1.4 The Control system shall be designed to operate in non-air-conditioned area. However, the Contractor shall provide a Package/ Split AC of suitable capacity decided by heat load requirement in SCADA room at Main Control Room.

15.2 Architecture

15.2.1 The SCADA System shall be built over Industrial IoT architecture with integrated Analytics, secure web access, enterprise software and Database.

15.2.2 Data acquisition shall be distributed across MCR and LCRs while plant level data aggregation shall be done in both local and remote server (as specified by Owner).

15.2.3 Analog and Digital IO modules shall have integrated processor for distributed IO processing and control.

15.2.4 Data communication system shall be built over fibre optic cables/ wireless network with high bandwidth TCP/IP communication (Fast Ethernet or 802.11a/b/g/n) across all Inverter and Control Rooms with Internet/Intranet access at Main Control Room. Firewall shall be provided for network security.

15.2.5 Plant SCADA Server shall have Industrial Grade server hardware running SCADA & Monitoring Software with data storage (complete plant data) space for 2 years.

15.2.6 Plant data for monitoring and control operations should be accessible without

dependence on external network.

15.2.7 A server running SCADA & Monitoring Software shall be configured at the Owner's office in Hyderabad (HQ Server/Remote Server) having the same specifications as the Plant Server, in parallel with Plant Server to enable easy access to plant data from outside the plant without having to login to plant server. Effectively, the plant data shall be replicated in both places i.e. between systems at the Plant Server and Remote Server to provide data redundancy for critical plant data.

15.2.8 Operator Workstation/PC shall be of Industrial Grade for browser-based access to plant data from Plant or remote server. Plant control & SLDC/Utility related operations shall only be initiated through browser-based interface requiring no client software or database to be installed on the Workstation. All critical software and Plant Data shall be installed/stored on local and remote servers only with user access control for protecting the software and data assets from accidental deletion or corruption.

15.2.9 Internet/Intranet at Plant: Public or private network access shall be provided at the plant through any broadband/VSAT connectivity of 2Mbps or higher bandwidth. In case no broadband/VSAT connectivity can be provided at the plant, a 3G/4G data card from any Internet Service Provider (ISP) may be provided. SCADA system shall be capable of sending all plant data in real time to the Remote Server.

15.2.10 GPS based Time Synchronization System: The SCADA system shall have a Master/Slave Clock system along with antenna, receiver, cabinet and internal interconnection cables. All SCADA controllers, servers, OWS and communicating equipment shall be synchronized to the GPS clock.

15.3 Industrial IoT Controllers & Data Acquisition

The Plant SCADA and Monitoring System may use one or more IIoT Controllers at each Inverter Control Room and MCR for the purpose of data acquisition and data forwarding to the Local and Remote SCADA Servers. The IIoT Controllers shall meet the following minimum requirements:

15.3.1 The IIoT Controllers shall be distributed in nature and work independently of other IIoT Controllers or any central controller in the system.

15.3.2 Shall be capable of supporting wide range of field protocols to communicate with different field equipment (Modbus over RS485/Ethernet, etc.)

15.3.3 Shall have local storage for a minimum of 2 weeks (in case of network failure).

15.3.4 Provide web-based interface to configure the controller for various equipment in the

field.

15.3.5 IO Functionality: Shall support status monitoring of VCBs & Trip relays on RMU/HT & Transformer panels through distributed DI/AI modules.

15.3.6 Controls: Shall be capable of Controlling breakers (ON/OFF). Both ON/OFF and Parameter control of inverters shall be supported.

15.3.7 Data Communication with Servers: Shall send the data collected, from all the equipment at Inverter Control Room and/or Main Control Room, to the Monitoring & Control Server.

15.3.8 Controllers shall be capable of sending data over Internet connections USB data cards.

15.3.9 Shall not require a static public IP address, at the plant for the purpose of remote access.

15.4 Functionalities

15.4.1 The SCADA system shall monitor instantaneous and cumulative electrical parameters from all DC& AC Equipment including inverters, string combiner boxes, weather station, MFM, Transformer and Switchgear (LT & HT Panels) at regular intervals not greater than one minute.

15.4.2 The SCADA system shall monitor Instantaneous and cumulative environment parameters from weather sensors or data loggers at same interval as electrical parameters and provide PR, CUF on the fly.

15.4.3 The SCADA system shall provide Alarms and Alerts on equipment faults and failure in less than 5 seconds. Alarms on status change of hardwired DI shall also be provided.

15.4.4 The SCADA system shall provide configurable alerts on any parameter crossing settable thresholds. The list of such parameters shall be finalised in consultation with the Owner.

15.4.5 The SCADA system shall enable integration with other sub-systems at the plant for supporting O&M activities. The list shall include but not limited to:

(xix) Surveillance Cameras,

(xx) Module Cleaning System – For monitoring of water usage and efficacy of cleaning process.

15.4.6 The SCADA system shall have user-friendly browser-based User Interface for secure access from anywhere, for minimum ten concurrent connections from the Operator

PC or other securely connected laptop/mobile, for plant monitoring, O&M, daily reporting, and analysis. A dashboard providing summary details of total plant generation, day's export, irradiance, Inverter Control Room level generation and performance indicators like PR and CUF.

15.4.7 Reporting: The SCADA system shall provide downloadable reports in Excel/PDF, configurable for equipment parameters across the plant.

15.4.8 The system shall have Configurable Analysis page for self-configured as well as on demand Analytics charts.

15.4.9 The SCADA system shall be extensible to include maintenance of O&M schedules and related activities for plant equipment as per the O&M Manual.

15.4.10 Connectivity shall be provided to Owner's Data Monitoring Centre. Data collected by Plant SCADA shall be replicated in real-time, using industry standard interfaces such as Web Services, OPC-UA, data files, as required – with Owner's Central Monitoring System in Hyderabad. The data recording intervals for different parameters from different devices in the solar plant shall be considered when creating schedules to "push" the data from Plant SCADA to data receivers stationed at Hyderabad.

15.4.11 Mobile User Interface: summary of plant performance and issues should be accessible in a mobile Native UI or browser UI.

15.4.12 Data Communication to SLDC: SCADA system shall provide required interface to integrate with TRANSCO-SLDC, in compliance with grid code, to send any parameters specified by SLDC.

Note: The methodology and specification of SLDC interface will be provided separately by SLDC/TRANSCO and it shall be the responsibility of the Contractor to determine the same.

15.4.13 Power Plant Control: SCADA system shall provide required interface to the local SCADA operator to set various power control modes (active/reactive power/frequency/PF) through the inverters over industry standard communication protocols like Modbus over TCP/IP.

15.4.14 Forecasting and Scheduling: SCADA shall provide day ahead and week ahead forecasting and scheduling for power generation at the plant as per SLDC/Utility stipulations.

15.4.15 Predictive Maintenance: SCADA system shall have in-built or pluggable frameworks to support AI based Predictive Maintenance for all key equipment including inverters, transformers and switchgear at the plant.

15.4.16 All programming functionalities shall be password protected to avoid unauthorized modification.

15.4.17 The Contractor shall provide software locks and passwords to Employer for all operating & application software. Also, the Contractor shall provide sufficient documentation and program listing so that it is possible for the Employer to carry out modification at a later date.

15.5 Earthing

15.5.1 Two isolated electronic earth pits near to SCADA panel at every Inverter and Control Room with < 1 Ohm resistance shall be provided. One earth pit shall be used for protective/body earth and the other to be used for Signal Earth.

15.5.2 Apart from providing separate earth pits, manufacturer specified earthing recommendations shall be followed for all communicating equipment connected to SCADA. This includes but is not limited to SMBs, Inverters, WMS and Switchgear panels.

15.6 Communication Cable Laying

15.6.1 All RS485, IO and CAT6 cables shall be laid in separate conduits with a minimum separation of 1.5ft from AC/DC power cables all along.

15.6.2 Power cables shall be laid deep in the trenches first. Data cables shall be laid in separate conduits after partially filling the trenches to ensure minimum 1.5 ft separation between power and communication cables all along the trench.

15.6.3 IO Cables between switch gear panels and SCADA panel shall be laid on separate cable trays, with a minimum of 1.5ft separation from trays carrying AC Power cables.

15.6.4 RS485 & CAT6 cables between switch gear panels or Inverters and SCADA panel shall be laid on separate cable trays, with a minimum of 1.5ft separation from trays carrying AC Power cables.

15.7 Control Cabinets / Panels / Desks at Main Control Room

15.7.1 The cabinets shall be IP-22 protection class. The Contractor shall ensure that the temperature rise is well within the safe limits for system components even under the worst condition and specification requirements for remote I/O cabinets.

15.7.2 The cabinets shall be totally enclosed, free standing type and shall be constructed with minimum 2 mm thick steel plate frame and 1.6 mm thick CRCA steel sheet or as per supplier's standard practice for similar applications.

15.8 Software Licences

The Contractor shall provide software license for all software being used in Contractor's System. The software licenses shall be provided for the project and shall not be hardware/ machine-specific.

15.9 Hardware at Main Control Room

15.9.1 The Hardware as specified shall be based on latest state of the art Workstations and Servers and technology suitable for industrial application & power plant environment.

15.9.2 The Local Monitoring & Control Server and the Operating Work station, to be deployed in the Plant Control Room, shall have the following server hardware and operating system along with accessories:

Plant Server	
Server Hardware	Hex/Octal Core Xeon, 32GB RAM (expandable to 64 GB RAM), 4 X 2TB SATA hard discs in RAID 5 configuration, 2TB external USB hard disc (for backup), dual power supplies, 2 LAN ports, LCD console, keyboard & mouse. The Server hardware shall be housed in a rugged fan-cooled, and rodent-proof Server Rack.
Operating System	Operating System and Database shall be of enterprise scale (RedHat Linux or equivalent Linux OS, Oracle/MySQL or equivalent DB), with required AMC for 5 years.
Accessories	1. Monitor: Min 22" LED Flat Monitor with non-interfaced refresh rate min. 75 Hz. 2. Keyboard: ASCII type 3. Pointing Device: Mouse 4. Intelligent UPS (on line): Minimum 2 hour battery backup.
Operator Workstation	
Hardware	i7 CPU running at 3.0 GHz or faster with 8GB RAM, 500GB hard disk, 25" LED monitor, keyboard and mouse, 4 USB ports, LAN port

Operating System	Windows operating system with necessary tools, anti-virus software.
Accessories	1. Screen Display Unit: Min 50" LED Flat Monitor with wall mounted arrangement for the display of SCADA screen 2. A4 size monochrome laser printer. 3. UPS of required capacity with 2 hour battery backup.

15.9.3 All network components of LAN and Workstations shall be compatible to the LAN, without degrading its performance.

15.10 Factory Acceptance Test (FAT)

FAT procedure shall be submitted by bidder for approval. SCADA shall communicate with all third devices which are part of solar plant and same shall be demonstrated during the FAT.

16 Control and Relay Panel

16.1 Standards and Codes

All equipment provided under Control and Relay Panel shall comply with latest editions and amendments of the relevant IEC standards and IS codes. In particular, the C&R Panel shall comply with the following standards and codes.

Standard/Code	Description
IS 3231	Electrical relays for power systems protection
IEC 60255	Measuring relays and protection equipment
IEC 61850	Communication networks and systems for power utility automation
IEC 61131-3	Programmable controllers - Part 3: Programming languages
IS 9385	High voltage fuses
IS 9431	Indoor post insulators of organic material for systems with nominal voltages greater than 1000 V up to and including 300 kV
IEC 60099-4	Surge arresters - Part 4: Metal-oxide surge arresters without gaps for A.C. systems
IS 3070-3	Lightning Arresters for Alternating Current Systems - Part 3: Metal Oxide Lightning Arresters Without Gaps

IEC 62052-11	Electricity metering equipment (A.C.) - General requirements, tests and test conditions - Part 11: Metering equipment
IEC 62053	Electricity metering equipment (A.C.) - Particular requirements
IS 14697	AC Static Transformer Operated Watthour and Var-hour Meters, Class 0.2S and 0.5S

16.2 Construction

16.2.1 The control and relay panel shall be free standing, floor mounted, simplex type, metal enclosed construction. The panel enclosure shall be made of CRCA steel sheet. The thickness of load bearing members shall be minimum 3 mm and that of non-load bearing members shall be minimum 2 mm.

16.2.2 All external surface shall be painted with two coats of epoxy-based paint of colour shade RAL 7032. Internal surface shall be painted with epoxy enamel white paint. The minimum dry film thickness (DFT) shall be 100 micron.

16.2.3 Controls, indications, relays, meters and other instruments shall be flush mounted on the front of the panel. Door shall be provided at the rear of the panel. All doors and removable covers shall be provided with neoprene or synthetic rubber gasket.

16.2.4 The panel shall be dust, moisture and vermin proof with degree of protection not less than IP 4X as per IEC 60529.

16.2.5 Cable entry shall be through the bottom of the panel. Gland plate of thickness not less than 3 mm shall be provided.

16.3 Relays

16.3.1 All relays shall be microprocessor based numerical type. However, auxiliary relays can be static or electromechanical type. The relays shall be flush mounted on panel front with connections from the inside.

16.3.2 Auxiliary voltage of the relays shall be 110 VDC and the relays shall be capable of operating continuously between 80 – 120% of auxiliary voltage.

16.3.3 All numerical relays shall have adequate number of freely configurable, optically isolated, Binary Inputs (BI) and potential free Binary Outputs (BO). All I/O's shall have galvanic isolation. Analog inputs shall be protected against switching surges and harmonics.

16.3.4 All numerical relays shall have sufficient number of current and voltage inputs required for all the required protection functions.

16.3.5 The numerical relay shall provide choice of ANSI/IEC/IEEE relay characteristic

curves with wide protection setting ranges through a minimum of two protection setting groups.

16.3.6 Making, breaking and continuous capacity of the relay contacts shall be adequate enough for the circuits in which they are used.

16.3.7 All numerical relays shall have provision for measurement and storage of electrical parameters such as voltage, current, frequency, active power, reactive power etc.

16.3.8 The numerical relay shall be able to record faults and events in non-volatile memory.

(xxi) Fault record – At least 5 recent faults including the protection function operated, operating phase(s), voltages and currents along with date and time stamp.

(xxii) Event record – At least 200 events with date and time stamp.

16.3.9 The numerical relay shall have trip circuit supervision facility to monitor the circuit breaker trip circuit both in pre-trip and post-trip conditions. The relay shall also be able to provide circuit breaker monitoring, CT and VT supervision.

16.3.10 The numerical relay shall have self-diagnostic feature with separate output contact for indication of any internal relay failure.

16.3.11 The numerical relay shall have two serial communication ports, one on front side for local communication with PC and another on rear side for remote communication with SCADA system as per IEC 61850.

16.3.12 The numerical relay shall have feature for time synchronization through the SCADA System / networking.

16.3.13 The numerical relay shall be provided with backlit alphanumeric LCD or LED to access protection settings, measurement parameters, fault and event records. Read and write access to protection settings shall be password protected.

16.3.14 Necessary software and hardware to up/down load the data to/from the relay from/to the PC shall also be provided.

16.4 Protection Scheme

The following protection schemes shall be implemented for the protection of power transformer and its feeder.

(viii) Biased Differential Protection with Second Harmonic Restraint

(ix) Non-directional Over Current and Earth Fault Protection

(x) Restricted Earth Fault Protection

(xi) Under Voltage and Over Voltage Protection

(xii) Buchholz Alarm and Trip

(xiii) OTI Alarm and Trip

(xiv) WTI Alarm and Trip

(xv) PRV Trip

(xvi) MOG Alarm

(xvii) OSR Trip

The above-mentioned protection schemes are indicative only. All the protection schemes required for safe and reliable operation of power transformer and the feeder shall be provided.

16.5 Measuring Instruments

16.5.1 All measuring instruments shall be enclosed in dust proof, moisture resistant cases and flush mounted on the panel.

16.5.2 Analog Ammeter and Voltmeter with selector switch shall be provided. Accuracy class shall be 0.5 or better. Instrument dial shall be with white scale, black pointer and black numerals.

16.5.3 Digital Multi Function Meter (MFM) of accuracy class 0.2 or better shall be provided. It shall have communication capability for integration with SCADA. MFM shall be able to measure line & phase voltages, line & phase currents, active power, reactive power, apparent power, power factor and frequency.

16.6 Control Switches

All control switches shall be rotary operated type with adequate making, carrying and breaking current ratings. The control switches shall be pistol grip type, lockable with spring return to normal position. They shall be flush mounted on the panel with shrouded terminals.

16.7 Indications

All indicating lamps shall be flush mounted LED type with supply voltage of 110 VDC. Lamp covers shall preferably be screwed type and moulded from heat resisting material. Indicating lamps shall be provided for R, Y, B PT supply, Breaker ON & OFF, Auto trip, Spring charged, Trip circuit healthy, etc.

16.8 Annunciation

Flush mounted static type annunciator with sufficient number of windows to accommodate all trip and alarm signals shall be provided. Separate audible annunciation for alarm and trip shall be provided by means of buzzer and hooter. Visual

annunciation shall be by flickering of facia. Push buttons for test, accept and reset shall also be provided.

16.9 Earthing

16.9.1 An earth bus made of copper or aluminium shall be provided throughout the length of the panel and bolted to the framework of the panel. The earth bus shall have sufficient cross section to carry maximum fault current without exceeding the allowable temperature rise.

16.9.2 All non-current carrying conductors of the panel shall be connected to the earth bus. All joints to the earth bus shall be made through at least two bolts. Hinged doors shall be earthed through flexible earthing braid of adequate cross section. Suitable provision shall be provided at each end of the earth bus for connection with earth grid.

16.9.3 All metallic cases of relays, instruments and other panel mounted equipment shall be connected to earth bus by independent copper wires of size not less than 2.5 sq. mm with green colour insulation.

16.9.4 Instrument transformer secondary neutral point shall be earthed at one place only on the terminal block. Such earthing shall be made through links so that earthing of one circuit may be removed without disturbing the earthing of other circuits.

16.10 Mimic Diagram

Coloured mimic diagram made of metal or plastic with symbols to facilitate exact representation of the system shall be fixed on the front of control panel. Semaphore indicators shall be incorporated in the mimic diagram for indicating position of circuit breakers, isolators and earthing switches. The rated control voltage of semaphore indicator shall be 110 / 220 VDC.

16.11 Wiring and Terminal Blocks

16.11.1 All internal wiring shall be done with 1100 V grade, 2.5 sq.mm. PVC insulated stranded flexible copper wire. For CT secondary circuits, 4 sq.mm copper wire shall be used.

16.11.2 Wire terminations shall be made with solderless crimping type tinned copper lugs, which shall firmly grip the conductor. Insulation sleeves shall be provided at all the wire terminations.

16.11.3 Printed identification ferrules, marked to correspond with panel wiring diagram shall be provided at both ends of each wire. The ferrules shall be firmly located on each

wire so that they cannot move or turn freely on the wire. Wire identification shall be done in accordance with IS 11353.

16.11.4 The Contractor shall be solely responsible for the completeness and correctness of the internal wiring and for the proper functioning of the connected equipment.

16.11.5 All internal wiring to be connected to the external equipment shall terminate on terminal blocks. Terminal blocks shall be rated for 1100 V, 10 A and made of non-inflammable material.

16.11.6 CT and VT secondary circuits shall be terminated on stud type, non-disconnecting terminal blocks.

16.11.7 At least 10% spare terminals shall be provided on each panel and these spare terminals shall be distributed on all terminal blocks.

16.11.8 Screw driver operated stud type test terminal block shall be provided.

16.12 Accessories

(xviii) Thermostatically controlled space heater with switch for isolation

(xix) 240 V, 15 A industrial socket with ON/OFF switch

(xx) LED lamp controlled by door switch

16.13 Warranty

The control and relay panel unit shall be warranted for minimum of 5 (five) years against all material/ manufacturing defects and workmanship.

16.14 Testing and Inspection

16.14.1 Type Tests

The Contractor shall submit type test report of the panel for degree of protection as required by the Technical Specifications as per IEC 60529. The test should have been conducted by NABL accredited laboratory.

16.14.2 Routine Tests

Routine tests and acceptance tests shall be as per the Quality Assurance Plan (QAP) approved by the Employer.

17 Illumination

17.1 Standards and Codes

LED luminaires shall be tested at independent laboratory as per the following test standards.

Standard/Code	Description
LM79-08	Electrical and Photometric Measurements of Solid-State Lighting Products
LM 80-15	Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules

17.2 General specification

17.2.1 This specification covers design, supply and installation of White-LED Hight Mast Lighting for illumination of Plant on-shore facilities including installation sites for inverters, Main Control Room and entry points in the plant installation area.

17.2.2 The Contractor shall furnish Guaranteed Technical Particulars of the LED luminaires, from renowned brands available in the market for approval of Employer.

17.2.3 Lighting system shall work on the auxiliary supply and same shall be incorporated in auxiliary loads. The Contractor shall provide minimum 20% of total lighting points as emergency lighting points, fed from UPS DB or DCDB as per scheme adopted by the Contractor. Indoor and outdoor emergency lights shall be provided at each inverter room, main control room, security room and main gate.

17.3 Lighting Levels

17.3.1 The average LUX level of 10 lm is to be maintained in switchyard. However, a lux level of 20 lm ((10+10) additional switchable on requirement only) is to be maintained in switchyard on transformer.

17.3.2 The lighting system for outdoor and indoor areas of solar power plant shall be designed in such a way that uniform illumination is achieved. Average LUX level to be maintained in different areas shall be as under:

Area	LUX
Control Room and equipment rooms	300
Office	300
Battery & other rooms	150
Internal/Periphery Roads	4
Transformer yard/Switchyard	20
H – pole and metering point	10

17.3.3 The lighting level shall take into account appropriate light output ratio of luminaires, coefficient of utilization maintenance factor (of 0.7 or less) to take into account deterioration with time and dust deposition.

17.4 LED Luminaire for Outdoor Applications

17.4.1 LED luminaires shall meet the following parameters.

Parameter	**Specified Value**
Input voltage	170 - 260 V
Input Frequency	50 Hz +/-1 Hz
Power Factor	0.90 (Minimum)
Luminaire efficacy	> 90 lumens per watt
Beam Angle	Minimum 120°
Total Harmonic Distortion	< 10 %
Working Humidity	10% - 90% RH (Preferably Hermetically sealed unit)
Degree of Protection	Minimum IP 65 (for Outdoor fixtures)
Luminaire Casing	Powder coated metal / Aluminium.
Colour Temperature	5700 K (cool day light)
Colour Rendering Index	> 65
Moisture protection in case of casing damage	IP 65 (driver unit shall preferably be totally encapsulated)

17.4.2 The LED luminaire (outdoor) housing, heat sink, pole mounting bracket, individual LED reflectors and front heat resistant tempered glass should be provided.

17.4.3 The LED luminaire (outdoor) housing should be made of non-corrosive, high-pressure, die-cast aluminium and the housing should be power coated grey, so as to ensure good weatherability. Each individual LED source should be provided with an asymmetrical distribution high reflectance aluminized reflector, which should ensure that the light distribution of the luminaire is suitable for road lighting applications (wide beam distribution) and should ensure high pole to pole spacing.

17.4.4 The luminaire should be provided with in-built power unit and electronic driver.

17.4.5 The luminaire should be suitable for standard street light poles and should be suitable for side entry and bottom entry (post top).

17.4.6 GI Lighting pole of suitable diameter capable of withstanding system and wind load, shall be provided with average Zn coating thickness of 80micron. The street light poles shall have loop in loop out arrangement for cable entry and light fixture / wiring protected with suitably rated MCB.

17.4.7 All outdoor lighting system shall be automatically controlled by synchronous timer or photocell. Provision to bypass the timer or photocell shall be provided in the panel.

17.4.8 Lighting panels shall be earthed by two separate and distinct connections with

earthing system. Switch boxes, junction boxes, lighting fixtures, etc. shall be earthed by means of separate earth continuity conductor. Cable armour shall be connected to earthing system at both the ends. Proper earthing of street light poles shall be ensured.

17.4.9 Junction box for lighting shall be made of fire retardant material. The degree of protection shall be IP55 for outdoor JB.

17.4.10 Lighting cables, wherever exposed to direct sunlight, shall be laid through Double Wall Corrugated (DWC) HDPE conduits.

17.5 LED Luminaire/Lamps for Indoor Applications

17.5.1 LED luminaire/lamps shall have minimum 3-star BEE rating.

17.5.2 All indoor LED luminaire/lamps shall be supplied with proper diffuser to avoid direct visibility of LED and suitable heat sink for longer life.

17.6 Warranty

All luminaires shall be warranted for minimum of 2 (two) years against all material/ manufacturing defects and workmanship.

18 Weather Monitoring System

As a part of weather monitoring system, the Contractor shall provide the following measuring instruments with all necessary software and hardware required to integrate with SCADA.

18.1 Pyranometer

18.1.1 The Contractor shall provide secondary standard pyranometers (ISO 9060 classification) along with necessary accessories for measuring the incidental solar radiation at horizontal and inclined plane of array.

18.1.2 Specification of the pyranometer shall be as follows.

Parameter	**Specification**
Spectral Response	0.31 to 2.8 micron
Time response (95%)	Maximum 15s
Nonlinearity	± 0.5%
Temperature Response	± 2%
Tilt error	< ± 0.5%
Zero offset thermal radiation	±7 W/m^2
Zero offset temperature change	±2 W/m^2

Operating temperature range	0°C to +80°C
Non-stability	Maximum ± 0.8%
Resolution	Minimum +/- 1 W/m^2
Output	Analog output: 4 – 20 mA Serial output: RS485

18.1.3 Each instrument shall be supplied with necessary cables. Calibration certificate with calibration traceability to World Radiation Reference (WRR) or World Radiation Centre (WRC) shall be furnished along with the equipment. The Contractor shall provide instrument manual in hard and soft form.

18.2 Temperature Sensor

18.2.1 The Contractor shall provide minimum no. of temperature sensors for ambient temperature measurement with shielding case and module temperature measurement) as per Scope of supply specified in this document. The temperature sensor shall be Resistance Temperature Detector (RTD)/ Semiconductor type with measurement range of 0°C to 80°C. The instrument shall have valid calibration certificate.

18.2.2 Contractor shall provide Built-in wireless modem placed on the Floating Platform for wireless transmission of Module temperature data to the SCADA

18.3 Anemometer

Contractor shall provide minimum one no. ultrasonic wind sensor (no moving parts) for wind speed and direction monitoring.

Parameter	**Specification**
Velocity range with accuracy limit	0 – 60 m/s with +/-2% accuracy @12 m/s; Resolution: 0.01 m/s
Wind direction range with accuracy limit	0 to 360° (No dead band) with +/-2° accuracy @12 m/s; Resolution: 1°
Mounting Bracket	Anodized Aluminium bracket to reduce corrosion, all mounting bolts of SS
Protection Class	IP66
Output	RS232 and RS485

18.4 Data logger and Data Acquisition System

Data logger for the weather monitoring station should have the following features:

18.4.1 Provision for analog, digital and counter type inputs for interfacing with various type

of sensors

(i) Analog Input

- Adequate nos. for all analog sensors with redundancy
- Provision for operation in different current and voltage ranges as per connected sensors
- Accuracy of +/-0.1% of FS

(ii) Digital Inputs

- Adequate no. of Digital inputs and outputs for the application

(iii) Provision for RS232 and RS485 serial outputs

(iv) Built-in battery backup

(v) Connectivity and Data transmission:

- Built-in GSM/ GPRS modem for wireless data transmission to SCADA/ cloud server (procurement of GPRS enabled SIM Card and connection subscription to be the responsibility of Contractor). It should be possible to remotely communicate with the device for configuration settings.
- RS485 MODBUS interface for data collection and storage on SCADA
- Web interface with provision for user login to enable viewing and downloading of weather data in XLS/ CSV format
- Communication protocol should support fast data transmission rates, enable operation in different Frequency bands and have an encryption-based data security layer for secure data transmission

(vi) Display Settings: Graphic LCD screen which should be easily accessible and should display relevant details like all sensor values, battery strength, network strength etc.

(vii) Provision of Time synchronization from telecom time or server time

(viii) Data Storage: Provision for at least 2 MB internal Flash Memory and at least 8 GB Micro SD card (expandable)

(ix) Protection level: IP65

19 CCTV Camera

19.1 CCTV Cameras along with monitoring station and all other accessories required for its proper operation must be installed to have complete coverage of following areas for 24 hours.

(i) PCU Installations

(ii) Main Control Room

(iii) Store Room

19.2 Monitoring station of the CCTV Network shall be installed in Main Control Room.

19.3 The CCTV system shall be designed as a standalone IP based network architecture. System shall use video signals from different cameras at defined locations, process the video signals for viewing on monitors at control room and simultaneously record all video streams using latest compression techniques.

19.4 Camera shall be colour, suitable for day and night surveillance (even under complete darkness) and network compatible.

19.5 It shall be possible to control all cameras i.e., PTZ auto/ manual focus, selection of pre-sets, video tour selection etc. The software shall support flexible 1/2/4 windows split screen display mode or scroll mode on the display monitor for live video.

19.6 The system shall support video analytics in respect of the following:

(i) Video motion detection

(ii) Object tracking

(iii) Object classification

(iv) Camera server shall be provided with sufficient storage space to storage recordings of all cameras at HD mode for a period of 15 days. All recordings shall have camera ID, location, date and time of recording.

20 Fire Alarm System

20.1 Standards and Codes

Standard/Code	Description
IS 2189	Selection, Installation and Maintenance of Automatic Fire Detection and Alarm System Code of Practice
IS 2171	Portable Fire Extinguishers, Dry Powder (Cartridge Type)
IS 8149	Functional requirements for twin CO_2 fire extinguishers (trolley mounted)
IS 2546	Galvanized mild steel fire bucket
National Building code 2005	

20.2 The Contractor shall ensure the compliance of fire detection and alarm system as per relevant standards and regulations. The installation shall meet all applicable statutory requirements and safety regulations of state/central fire department/body or any other

competent authority in terms of fire protection.

20.3 Firefighting system for the proposed power plant for fire protection shall be consisting of but not limited to:

(i) Sand buckets
(ii) Portable fire extinguishers (CO_2 and dry powder type)
(iii) Microprocessor based fire alarm panel
(iv) Multi sensor smoke detectors
(v) Hooter cum strobe
(vi) Manual call points
(vii) Cables from sensor to fire Panel.

20.4 Minimum two numbers of fire extinguishers (CO_2 and Foam type each, of capacity 10 kg having BIS certification marking as per IS: 2171) shall be provided at every building/ enclosure, transformer yard and switchyard. However, the Contractor must comply with existing building code for fire protection and relevant IS codes.

20.5 Four numbers of stand with four sand buckets on each stand shall be provided in the Transformer Yard. Sand buckets inside the building shall be provided at strategic locations as decided during detailed engineering.

20.6 Digital output from the fire detection system shall be integrated with SCADA.

20.7 The Contractor shall submit the plan for fire and smoke detection system for the Employer's approval.

21 Testing Instruments

The Contractor shall provide the following set of instruments for on-site testing.

21.1 Earth resistance tester

Parameter	**Specification**
Display	Backlit LCD or LED display
Range	Earth Resistance: up to 2000 Ω Earth Voltage: 200 V
Accuracy	± (2% + 5)
Safety Ratings	IP 56
Programmable Limits setting	Enabled
Accessories	
Earth Ground Stakes (4 Nos)	

Three cable reels with cable length up to 20 m
Carry Case-1 (capable of handling tester along with accessories)
1 set of spare battery

21.2 Array tester

Parameter	**Specification**
Display	Backlit LCD or LED display
Functionality	All electrical tests required by IEC 62446-1:2016
Memory	Up to 200 records & USB downloadable to Computer
Accessories	
A set of two, 4mm fused leads for extra protection during installation tests.	
Leads which enable the array tester to connect directly to PV arrays	
1 set of spare battery	

21.3 Insulation tester

Parameter	**Specification**
Display	Backlit LCD or LED display
Insulation Test Range	0.1 MΩ to 10 GΩ
Test Voltage	250V, 500V, 1000V, 5000V
Test Voltage accuracy	+20% on positive side only no negative variation is allowed
Insulation Test Current	1 mA nominal
Auto Discharge	Discharge time< 0.5 Second for C = 1
Open Circuit test Voltage	>4 V, <8 V
Accessories	
Heavy duty Test Lead Set – 4 Nos.	
Carry Case with sufficient space for accommodating accessories.	

21.4 Digital Multimeter

Parameter	**Specification**

Display	Backlit LCD or LED display; Minimum resolution: 5 ¾ places for DC, 4 ¾ places for AC
Measuring Category	1000V CAT III as per IEC Standard 61010-1; wave shape independent RMS measurement (True RMS) suitable for operation in the site conditions.
Additional Functions	Resistance (Ω), Temperature (°C), Continuity, Diode, Capacitance, Frequency, Duty cycle measurement
Accessories	
Temperature Probe	
Silicon Test Lead	
Alligator Clip	
Carry Case with sufficient space for accommodating accessories.	

21.5 Clamp meter

Parameter	**Specification**
Display	Backlit LCD or LED display
Measuring Category	1000V CAT III as per IEC Standard 61010-1; wave shape independent RMS measurement (True RMS) suitable for operation in the site conditions.
Current Range	AC & DC Current up to 1000A/400 A
Voltage range	AC & DC Voltage up to 1000V
Additional Functions	Resistance, continuity, diode and non-contact voltage detection, Active, Reactive and Apparent Power, THD, PF
Accessories	
Test leads	
Electrical test leads	
Probe light & extender	
Carry Case with sufficient space for accommodating accessories.	

21.6 Infra-red thermal imaging camera

Parameter	**Specification**

Spectral response	8 µm to 14 µm (LW)
Temperature-sensitivity and calibration range	–20 °C to +120 °C
Atmospheric air temperature	-10 °C to +40 °C
Thermal sensitivity	NETD ≤ 0.1 K at 30 °C
Geometric resolution	640 x 480 pixels
Photo camera resolution	Approx. 30 times of IR camera resolution
Absolute error of measurement	< ± 2 K
Adjustable parameters	Emissivity, ambient temperature
Adjustable functions	Focus, temperature level and span
Measurement functions	Measuring spot, measuring area with average and maximum temperature
Calibration	The measuring system (Camera, lens, aperture and filter): The camera has to be traceably calibrated at least every two years. The calibration has to be documented. If the camera is not compliant, it has to be readjusted by the manufacturer.
Documentation	Storing of the infrared picture with the radiometric data

21.7 Digital lux meter

Parameter	**Specification**
Range	0 – 1000 lux
Accuracy	± (2% + 5)
Resolution	1 lux
Display	3½ digits, Backlit LCD/LED

21.8 All testing equipment shall possess valid calibration certificate issued from approved NABL labs.

21.9 Instruments of superior rating is allowed after seeking consent of the Employer.

21.10 Maintenance, calibration, up keeping, repair & replacement of these tools will be in the scope of the Contractor during 5 years of O&M.

21.11 It is Contractor's responsibility to arrange for tools, tackles, logistics, test kits, manpower, experts etc. required for trouble free operation of Plant.

22 Power evacuation system

22.1 The contractor has to do the power evacuation and integration to and with the designated substation via either overhead transmission line or underground cables at specified grid voltage with all necessary infrastructure such as protection switchgears and metering systems as per the requirement of the STU/Employer.

22.2 The power evacuation system for the plant shall be as per the local DISCOM requirement and appropriate approval. The contractor shall get the route approval from the Employer and TSTRANSCO/TSNPDCL as the case may be prior to start of the construction. Any changes in the route or scheme introduced by DISCOM at any point of the time prior to commissioning shall be complied without any additional cost to the Employer.

22.3 The ROW for the TL/UG cable shall be obtained prior to the construction of the line from the concerned authorities.

22.4 Overhead Transmission Line

In case the power evacuation is planned with overhead transmission line for plant internal and external evacuation, the design of tower and its accessories shall be as per the DISCOM's requirement and the design shall be submitted to Employer for approval/ accord.

22.5 Underground cable

In case the power evacuation is planned with underground cable for plant internal evacuation, the cable shall be approved by the Employer. However, in case of external power evacuation, the evacuation plan shall be as per DISCOM's requirement and the same shall be submitted to Employer for approval/ accord.

C Civil Works

1 General

1.1 This section of Technical Specifications describes detailed technical and functional requirements of all civil and structural works included in the scope.

1.2 This excludes design, supply and installation of Galvanised 220 kV and 132 kV Transmission Line towers, Tower extensions & accessories and 11 kV, 22 kV, 22kV & 33 kV transmission poles & accessories which shall be designed following latest guidelines of respective SEB (State electricity board) and got approved before execution. In absence of SEB/ STU guidelines REC (Rural electrification corporation)

standards may be followed. Poles at corner with angle > 10^0 shall be provided with 4-pole structure or lattice tower. Use of PCC spun poles is not acceptable. Approved copies of these designs & drawings shall be submitted to the Employer for reference and record.

1.3 Standards & Codes

1.3.1 All design and construction of civil works shall conform to relevant Indian standards such as BIS, IRC, MORTH, NBC etc.

1.3.2 Design of steel structures shall conform to IS: 800, 801 or 802 as applicable. Design of concrete structures shall conform to IS: 456. For design of liquid retaining structure IS: 3370 shall be followed. Only in case of non-availability of Indian standard, equivalent American or British standard may be used for design with prior approval of the Engineer and the contractor shall submit proper justification for the same along with his request to the Engineer for review and approval, and the decision of the Engineer shall be final and binding.

1.3.3 All the design/ drawings shall be prepared/ approved either by in-house Engineering Team of the contractor (or by his Engineering Consultant) with qualified engineering staff with relevant experience in successful design of solar SPV plants.

1.3.4 The design calculations for MMS, RCC structure, Steel structure, Foundation system including piling, Road work, Drainage work, etc. shall be submitted for prior approval of Engineer before commencement of construction.

1.3.5 As per project requirements, the Employer may ask for approval of all civil designs and drawings by a Chartered Civil/ Structural Engineer.

1.4 The design calculations shall be supplemented with a neat sketch showing the structure geometry, node and member nos., lengths of various typical members, support points and type of supports, types of materials & type of sections with properties considered in analysis & design. The report shall also include back-up calculations for various loads adopted in design, brief write-up on primary load cases and design load combinations considered and conclusions on design results (with supporting sketches) for easy reference and clarity. Where a computer program (other than STAAD) is used for analysis and design, the contractor shall include a write-up on the computer program used along with examples for validation check. Design Input (format suitable to the programme used and also in STAAD format) and output file shall also be given in the design report and in soft copy to facilitate its review and approval by the Engineer.

1.5 The methodology for construction of MMS and its foundations, Road & drainage works and Procedure for pile load test shall also be submitted for prior approval of Engineer before start of these works.

2 Survey Works

2.1 The contractor shall carry out detailed Topographical (on-shore) and Hydrographic survey of the proposed water body for floating solar project site. The work shall be carried out through an agency with relevant experience and qualified survey team. The Contractor shall submit the credentials of the proposed agency along with relevant certificates and in support thereof and the names of the key personnel with details of their qualification, designation and relevant work experience for verification/ approval of the Agency by the Employer.

2.2 All survey equipment shall be tested for their accuracy before use. Only calibrated instruments with valid certification shall be used for conducting the survey.

3 Topographical Survey

3.1 The Contractor shall be responsible for detailed Topographical Survey of the proposed project site (on-shore).

3.2 The Topographical survey shall be conducted at 20m x 20m grid, or as directed by the Engineer, with the help of digital surveying instruments like Total Station.

3.3 The Contractor shall carry the Bench Mark from nearest Greatest Trigonometric Survey (GTS) Bench mark or any other established source like Railway station, Permanent PWD/ WRD structure etc. as approved by the Engineer by fly-levelling and establish 4 Permanent Bench Marks (PBM) (2 on each bank) at site with an accuracy of 0.005m. All subsequent transfer of levels shall be carried out with respect to these PBMs. The work shall also include constructing permanent reference pillars (RP) at suitable locations as directed by the Engineer. These reference pillars shall be labelled permanently with their respective coordinates and reduced levels for future use. The PBMs and RPs shall be shown on the survey drawings.

3.4 While carrying bench mark to the project site, levels shall also be established on the permanent objects like culverts etc. at least on one object in every 1 (one) km if available along with route with adequate description about the objects. These levels shall be maintained at site & also mentioned in the survey report to facilitate locating these objects later on.

3.5 The survey work shall be carried out based on WGS 84 reference ellipsoid and UTM

grid system. The contractor shall also establish the latitudes and longitudes of all the corners of the project site. At least 50m width of the adjoining plots and surrounding areas shall also be covered in the survey for correlation with adjoining plots and facilities. The grids for the survey work shall be established in N-S & E-W direction (corresponding to Geographical North or Plant North) as directed by the Engineer.

3.6 Positions, both in plan and elevation, of all natural and artificial features in the area like waterways, railway tracks, trees, cultivation, houses, fences, pucca and kutcha roads including culverts and crossings, foot tracks, other permanent objects like telephone posts and transmission towers etc. are to be established and subsequently shown on survey maps by means of conventional symbols (preferably symbols of survey of India Maps). All hills and valleys within the area/areas are to be surveyed and plotted on maps by contours. Any unusual condition or formation on the ground, locations of rock outcrops (if visible on the surface) and springs/falls, sand heap/dune, possible aggregate deposits, water bodies etc. shall also be noted and plotted on contour maps.

3.7 The record of measurement of all Reduced Levels (RL) shall be submitted in digital format, (in x, y z coordinate system) along with preliminary contour plan of the site, for Engineer's review before submission of final contour map. The contour interval shall be as required for proper representation of the topography however it shall not be more than 0.5m. The Contractor shall submit survey maps of the site in 1:10,000 scale indicating grid lines and contour lines, demarcating all permanent features like roads, railways, waterways, buildings, power lines, natural streams, trees, sand dunes etc. Present use of the site i.e. mining, quarrying, agriculture etc., existing drainage pattern of the site, possibility of water logging and high flood level of the area shall also be captured in the document. The project plot boundary with coordinates of all corner points along with coordinate grid of 50m x 50m interval shall be marked on the contour map.

4 Hydrographic Survey

4.1 The Contractor shall be responsible for detailed hydrographic survey of the proposed project site. He shall mobilize all required number of survey equipment and survey vessel with all necessary equipment including equipment for collecting water samples etc.

4.2 The contractor shall visit the site to collect all required information like depth of water in the reservoir, access to survey vessel etc. to decide the requirement of manpower and equipment to be mobilised for hydrographic survey work

4.3 The Contractor shall be responsible for establishing horizontal control (accuracy ± 1m) and vertical control (accuracy ± 0.1m) & establishing peg marks at survey grid interval along the shore.

4.4 The hydrographic survey shall be conducted at 20 m x 20 m grid (compatible with on shore topographic survey) or as directed by the Engineer using Automated Hydrographic Survey System (AHSS) (using digital single beam echo sounder for depth measurement, GPS/DGPS for position fixing and Hypack (or) equivalent hydrographic survey software for data logging).

4.5 The soundings shall be reduced to Chart Datum (CD) / Sounding Datum (SD) to assess the bed profile. All co-ordinates to be shown in the report shall be based on WGS, 1984 reference ellipsoid and UTM, relevant zone with WGS 84 co-ordinates and MSL.

4.6 The Contractor shall be responsible for collecting and testing water sample at surface (at min. 9 strategic locations to be decided during the survey as per project needs) at 0.5 d & at 0.2 d from sea bed (d = Depth of Water).

4.7 The Contractor shall install water level gauges at critical locations (to be established during the survey) for recording daily & seasonal water level variations, low water level (LWL), high water level (HWL). The Contractor shall also collect data for daily water levels for preceding 10-15 years, LWL, HWL, High and Low tide etc. from Central water commission (CWC), state and local authorities. The contractor shall evaluate mean yearly values of MWL & LWL for 25 years return period using proven statistical data analysis software.

4.8 The Contractor shall measure water flow/ current velocity at designated depths from the water surface for 30 days at the time of survey work. The Contractor shall also collect data for daily flow/ current velocity over preceding 10-15 years from CWC, State and local authorities.

4.9 Submission of Hydrographic survey Report

4.9.1 The survey charts shall be prepared on scale of 1:10000 (for width more than 500m) and 1:5000 (for width less than 500m) with contours at interval not more than 0.5m shall be indicated on the charts. The charts/ drawings shall also include cross sectional and longitudinal profiles of the bed surface surveyed showing LWL (Chart Datum) and HWL with respect to MSL

4.9.2 Records (values) of measurement of Current Velocity and their positions shall be plotted on the chart and details shall be mentioned in the report. The report shall also include reports of water sample tests and the positions of sampling points shall be

shown on the charts.

4.9.3 Information regarding any prominent under water obstructions, large coral formations etc. which may affect the design of maroon/ anchor supports shall be recorded and included in the report.

4.9.4 The existing conditions of the banks, whether protected or unprotected are to be collected and indicated in the report including recommendations (as required to ensure stable slopes) for proposed protection works etc. shall be included in the report.

4.9.5 The survey data shall also be submitted in digital format for record and future reference

5 Geotechnical Investigations

5.1 The Contractor shall be responsible for detailed Geotechnical investigations at the proposed project site (on-shore) for the purpose of foundation design for various structures and other design/ planning requirements. The investigation work shall be carried out through any Govt. approved/ NABL accredited agency. The Contractor shall submit the credentials of the proposed agency along with relevant certificates in support thereof for verification/ approval of the Investigation Agency by the Engineer.

5.2 The scope of work includes execution of complete soil exploration including boring and drilling, standard penetration test (SPT), collecting disturbed (DS) and undisturbed samples (UDS), collecting ground water samples, electrical resistivity tests (ERT), conducting laboratory tests on collected samples of soil/ rock & ground water and preparation and submission of report. SPT shall be carried out in all types of soil deposits and in all rock formations with core recovery up to 20% met within a borehole. SPT test shall be conducted at every 1.5 m interval or at change of strata. The starting depth of SPT shall be 0.5 m from ground level. UDS shall be collected at every 1.5 m interval or at change of strata.

5.3 The field investigations shall mainly include drilling of min. 7m deep borehole, conducting SPT and collecting Disturbed (DS) and Undisturbed samples (UDS) and Electrical Resistivity Test. Number and location of bore holes and Trial pits shall be decided as per the project layout, site topography and soil conditions in consultation with the Employer. There shall be minimum 2 nos. of Boreholes per patch of land (however, total number of boreholes shall not be less than 5 at each location) 1 no. of Trial pit, 2 nos. of ERT per patch of land and 1 no. of Ground water sample for laboratory investigations. The soil/ rock samples for laboratory investigations shall be collected from each borehole and trial pit in sufficient nos.

5.4 The proposed Geotechnical investigation plan indicating proposed locations of Trial pits, Boreholes & ERT shall be submitted to the Employer for review and approval before start of work.

Laboratory tests shall be conducted on DS & UDS samples and ground water samples in sufficient no. & shall include, Soil classification, Grain size analysis including Hydrometer analysis, determination of Bulk and dry density, Specific gravity, Natural moisture content, Atterberg limits, Tri-axial shear tests (UU), Undrained shear test, Consolidation tests, Unconfined compression tests, Free swell index, chemical analysis of soil and water samples to determine the carbonates, sulphates, chlorides, nitrates, pH, Organic matter and any other chemicals harmful to concrete and reinforcement/ steel. Laboratory tests on rock samples shall be carried out for Hardness, Specific Gravity, Unit Weight, Uniaxial Compressive Strength (in-situ & saturated), Slake Durability etc

5.5 After completion of field and laboratory work, the contractor shall submit a Geotechnical Investigation Report for Employer's approval. All bore log details and lab test results shall be presented in the report as per provisions of relevant BIS standards indicating BH coordinates, Existing GL, Depth of water table, Method of drilling etc. The report shall include a Map showing the locations of various field tests including coordinates, calculations and recommendations for foundation type, min. depth and safe bearing capacity (SBC) for various Plant buildings (MCR etc.) and Open installations, Switchyard structures & Sub-Station, Transformer foundation, HT lines etc. corresponding to settlement of 25mm & 40mm.

5.6 The report shall include the study for "Liquefaction potential assessment of the ground and suggestions for any ground improvement measures" as required.

5.7 The report shall also include ground water analysis (water sample collected from bore well) to ascertain its suitability for construction purposes, recommendations for type of cement, grade of concrete & minimum cement content as per prevalent soil characteristics with respect to presence of aggressive chemicals and environment exposure conditions as per relevant BIS specifications. However, minimum grade of concrete shall be M25 (M30 in coastal areas/ marshy soil) for all RCC works except liquid retaining structures like underground water tank etc. where minimum grade of concrete shall be M30 (M35 in coastal areas/ marshy soil). Cement higher than 43 Grade, shall not be used in construction.

5.8 All buildings/ Open installations, Switchyard and Sub-station area shall have levelled

ground. No foundation for Buildings, Switch yard equipment & structures, Sub-stations, HT Line Towers, Transformer etc. shall rest on filled up ground. However, minor structures like cable trench, cable rack, pipe pedestal etc. may rest in filled up soil with max. safe bearing capacity for design consideration not more than 3 T/m^2.

6 Other Investigations

6.1 The contractor shall also obtain and study other input data at proposed project site for design of the project from metrological department/ local govt. authorities. This shall include data related to Rainfall (max. 24hour rainfall for 25 years return period), Maximum & Minimum ambient temperature, Humidity, HFL etc.

6.2 The Contractor shall also identify potential quarry areas for coarse and fine aggregates to be used for concrete and shall carry out the concrete mix design for different grades of concrete to be used before start of work. The concrete mix shall be designed for each source of cement and aggregates as per provisions of relevant BIS Standard. The concrete mix design shall be carried out through NABL accredited Laboratory or any Govt. agency approved by the Engineer. In case the contractor proposes to use RMC, he shall submit the Concrete mix design report from the RMC supplier for review and approval by the Engineer. (In case of RMC, reports for periodic cube tests from the supply batch shall also be submitted for review and record).

7 Roads & Access Pathways:

7.1 <u>Approach Road:</u>

7.1.1 Suitable approach road (as applicable) from nearest public road up to plant Main gate (on-shore), and access pathways from Main gate to MCR, Store Room and other facilities shall be provided for safe and easy transportation of men, material and equipment.

The Approach road connecting nearest public road and the Main gate shall be of 2.5m wide carriage way. The access pathways connecting Main gate and MCR, Store Room & other facilities shall be 1.5m wide. The top elevation of approach road (TOR) and access pathways shall be minimum 200 mm above FGL to avoid flooding during rains. The roads shall be provided with alongside drains as per design requirements of drainage system to avoid flow of storm water over the road.

7.1.2 Following minimum road section details shall be followed for approach road:

1. Topping: wearing course of 100 mm thick PCC (1:2:4) laid in alternate concrete blocks of size not more than 3.5m x 5m
2. WBM (CBR>100%): compacted 75 mm thick, Grade III
3. WBM (CBR>100%): compacted 100 mm thick, Grade II
4. Granular sub-base (CBR>15%): compacted 350 mm thick,

Note - A drainage layer of 100 mm over the entire formation width shall be provided conforming to the gradation given in Chapter 6 of IRC SP-20. This layer will form a part of the designed thickness of sub-base.

7.1.3 The construction of road shall conform to relevant IRC/ MORST standards.

7.1.4 Drain, cable or any other crossing shall be provided with RCC box or precast concrete pipe culvert. The culvert design shall conform to relevant IRC standard. Except for module cleaning system the pipes for road culverts shall be of minimum class NP3 conforming to IS 458 with min. soil cover of 750mm above the pipe. In case of soil cushion less than 750mm suitable concrete (M20) bedding/ encasement shall be provided. Water supply pipe for module cleaning and service/ drinking water (over ground) shall be taken through Medium class GI steel pipe conforming to IS: 1161. Minimum dia. of casing pipe to be used for crossing any facility like electric cable, water pipe line etc. shall be 150mm.

7.2 Access Pathway:

7.2.1 All access pathway shall be of concrete block paving constructed by providing and laying 60mm thick factory made cement concrete interlocking paver block of M -30 grade made by block making machine with strong vibratory compaction, of approved size, design & shape, laid in required colour and pattern over and including 50mm thick compacted bed of coarse sand and filling the joints with fine sand; over well compacted granular sub-base of 250mm thickness

7.2.2 Factory made precast kerb stones of M-25 grade cement concrete shall be provided along both sides of the pathway to the required line, level and curvature, jointed with cement mortar 1:3 (1 cement: 3 coarse sand), including making joints with grooves (thickness of joints except at sharp curve shall not to more than 5mm), including making drainage opening wherever required.

7.2.3 Pre-cast RCC Drainage pipes, 100 dia. & of Class NP-2 shall be provided for smooth flow of rain water as per design requirements

7.3 The design and drawings for approach road, access pathways shall be submitted to the Employer for approval before execution.

8 Area Grading and Land Development

8.1 The Finished Grade Level (FGL- minimum 350mm average above NGL/EGL) of the entire area of both patches of land at each location of project site shall be fixed with reference to the highest flood level (HFL) and surrounding ground profile at proposed site to avoid flooding of plant site. The data regarding HFL at proposed site shall be obtained from the metrological department by the Contractor. In case of absence of this data, the Contractor shall assess the required information through local site reconnaissance. The minimum plinth level of all buildings/ open installations shall be 450 mm above FGL.

8.2 A detailed drawing for site levelling and grading (if necessary) shall be submitted by the Contractor before commencement of grading and area development works. The estimated volume of cutting and filling shall also be marked on the grading drawings for reference. The final grade levels to be adopted for different blocks shall be clearly marked on the on-shore Plant Layout

8.3 The Contractor is responsible for making the site ready and easily approachable by clearing bushes, felling of trees (mandatory permissions/ licenses/ statutory clearances from competent authorities if required for cutting of trees, blasting or mining operations, disposal of waste material etc. shall be obtained by the Contractor), cutting, filling with selected excavated earth or borrowed earth including identifying borrow areas. Except in exceptional cases (with approval of the Employer), filling shall be made up of cohesive non-swelling material. The filling for levelling/ reclaiming the ground/ area shall be done in layers not more than 150mm of compacted thickness in case of cohesive (clayey) soils and 250mm compacted thickness in case of granular (sandy) soils with compaction up to 95% (of modified proctor density) and 80% (of relative density) respectively. The slope at edge of graded areas shall not be steeper than 1:1.5 (1 Vertical: 1.5 Horizontal) in cutting and 1:2 (1 Vertical: 2 Horizontal) in filling. In case of filling with rock material, the edges shall be provided in line with provisions of relevant BIS standard.

8.4 It shall be ensured that the land is graded or levelled properly for free flow of surface

run-off. All existing drains passing through the patch of project land shall be re-routed along the periphery outside boundary fence for smooth flow of diverted surface run-off to natural drainage channel. It is advisable to follow the natural flow of water at the ground as far as possible for drainage design.

8.5 In case the filled up earth is brought from outside the plant or borrow areas (when the material inside plant area is not found suitable for grading work or if directed by the Employer), the Contractor shall carry out all required soil investigations to ascertain the suitability of the borrowed soil for land development and filling purposes. Contractor's scope shall also include arranging land lease, getting all necessary statutory approvals for mining, payment of necessary challan etc. Excess earth, if any, shall be disposed of properly at location as directed by the Employer.

9 Peripheral boundary Wall/Fence

9.1 The plant peripheral boundary of each patch of land (on shore equipment area) shall be provided with Chain link wire fencing.

9.2 The fence/ wall shall be provided with Main entry gate. The fencing/ wall shall be with 2.5m height above grade level including 400mm dia. GI concertina wire along with 3 no. of barbed wires on either arm to be fixed on Y shape GI angle brackets. The main gate shall be min. 3.5m wide (clear), double leaf with one leaf of width 1.5m for pedestrian movement

9.3 Chain link fencing

9.3.1 The fencing shall be of Chain link of poly coat GI mesh fabric with internal, corner and stay posts of RCC (min 200mm x 200mm size, M30 grade) along with 150mm height 230 thick brick/ 300 thick RR masonry toe wall, with 100mm thick PCC (1:3:6) foundation.

9.3.2 The brick masonry toe wall shall be plastered with 15thick CM (1:4) plaster on both faces. In case of RR masonry, the joints shall be properly raked and pointed with CM (1:3). The toe wall shall have min. 50 thick PCC (1:2:4) coping finished smooth and projecting 25mm on either side of the wall with top sloping inwards. The depth (below NGL) and width of toe wall foundation shall not be less than 450mm and 500mm respectively.

9.3.3 Spacing of intermediate posts shall not be more than 2.5m. Every 10^{th} intermediate post shall be provided with a stay post while every corner post shall be provided with two stay posts on either side.

9.3.4 At pond or drain area suitable grid of MS solid SQ bar of min. Size 25 mm x 25 mm (spacing of vertical bars not more than 125mm) shall be provided in place of toe wall for smooth flow of water.

9.3.5 Poly coat GI chain link mesh (50x50mm) shall conform to ASTM 668 and fencing shall conform to ASTM 567.

9.3.6 Each fence panel, in lieu of tie wire, shall be provided with 35x35x3mm GI edge angle at top and bottom with mesh fabric firmly secured to them and to intermediate and corner posts

9.3.7 All MS sections shall be painted with 2 coats of epoxy paint of approved make and shade over 2 coats of suitable primer. GI edge angles shall be hot dip galvanised with min. average zinc coating of 80 microns on each face

9.4 Main Gate

9.4.1 The Main entry gate (2.5m height) shall of rugged design with solid MS steel sections (20x20mm). The spacing of vertical members shall not be more than 125 mm.

9.4.2 The gate shall be complete with MS flat guide track, castor wheel(s), GI fittings & fixtures like hinges, aldrop, locking arrangement, posts etc.

9.4.3 The main gate shall be of 2.5m height.

9.4.4 The gate shall be provided with the Project name plate (2.5mx 1m, 3mm thick MS plate). The gate shall be painted with 2 coats of epoxy paint over 2 coats of suitable primer.

9.4.5 The gate shall be painted with 2 coats of epoxy paint of approved make and shade over 2 coats of suitable primer.

9.4.6 All design and drawings for peripheral boundary fence/ Wall and Main gate shall be submitted for Engineer's approval before execution.

9.5 Floating fence

9.5.1 Floating fence with floating buoys (with durable UV resistant material suitable to withstand the aqueous environment and be eco-friendly to bio diversity) shall be formed around every floating platform

8.3.2 Concept design and drawings shall be submitted for approval prior to execution

10 Plant Layout:

10.1 The contractor shall submit drawing showing proposed layout of On-shore plant facilities and floating SPV modules. The layout drawing shall show various requirements of the project like, Reference coordinate grid, Geographical and Plant

North, Layout of boundary fence including coordinates of all corner points, Location of main entrance gate, Layout of main approach road to main gate, Internal pathways, Security cabin (s), MCR and Open installations with coordinates, Lightening arrester, UG/Over ground water Tank(s), Storm water drains, Corridor for buried cables etc. All the facilities and buildings shall be presented with suitable Legend. The drawing shall be in suitable scale to have proper representation of the information.

10.2 The On-shore plant facilities & floating SPV module layout drawing shall be submitted by the contractor for review/ approval by the Employer.

11 Design Loads

11.1 Unless otherwise specified elsewhere, Dead load, Live load, Wind load and Seismic load for buildings and structures shall be considered as per provisions of relevant BIS standards.

11.2 The following minimum imposed load as indicated for some of the important areas shall, however be considered for the design. If actual expected load is more than the specified minimum load, then actual load is to be considered.

S. No.	Area	Minimum Imposed (Live) Load
1	Roof	1.50 kN/ Sqm
2	Building floors (GF) & Grade Slab	10.00 kN/ Sqm
3	RCC Floors (General)	5.00 kN/ Sqm
4	Outdoor platforms, Stairs, Landing and Balconies, Walkway, Chequred plate & Grating (except cable trench cover)	5.00 kN/ Sqm
5	Road culverts & allied structures over drain & pipe crossings subjected to vehicular traffic	Design for Class – 'A' loading (Wheeled & Tracked both) as per IRC Standard
6	Underground structures such as Sump, Pit, Trench, Drain, UG tank etc.	In addition to Earth pressure and Ground water table at FGL, a surcharge of 10kN /Sqm shall also be considered. The structure shall be designed for following criteria – (a) Inside empty with outside fill+ surcharge and water table at

		GL & (b) Inside water with no fill & water table outs side
7	Pre-cast and chequred plate cover over cable trench	4.00 kN/ Sqm
8	a) Main access & Internal Roads b) Peripheral Road	a) As per IRC SP 20 corresponding to vehicular traffic of 150 commercial vehicles per day and critical in-field CBR b) As per IRC SP 20 corresponding to vehicular traffic of 45 commercial vehicles per day and critical in-field CBR (however, if peripheral road also serves as access to plant buildings/ facilities, the criteria under 'a' shall be followed for design)

11.3 Primary Loads

(i) Dead Load (DL)

(ii) Live Load (LL)

(iii) Snow Load (SnL), if applicable

(iv) Wind Load (WL) – Both along X & Z horizontal direction

(v) Seismic Load (EL) – Both along X & Z horizontal direction

11.4 Basic wind speed (V_b) at project site shall be taken as per IS 875 (part-3) unless otherwise specified elsewhere.

11.5 To calculate the design wind speed (V_z), the factors K_1 (probability factor or risk coefficient), K_2 (terrain roughness and height factor) and K_3 (topography factor) shall be considered as per IS 875 (Part-3). (However, minimum values for K_1, K_2 and K_3 shall be 1.0, 1.05 and 1.0 respectively)

11.6 The importance factor for cyclonic region, 'k_4' shall be taken as 1.15. Provisions of IS: 15498 shall also be followed to ensure general safety of the structure.

11.7 For MMS placed on Floating structures, the influence of wind speed off the coast shall be taken as 1.15 times the basic wind speed (Vb) in the absence of any definite wind data. This factor 1.15 shall be used in addition to k4.

11.8 To calculate the design wind pressure 'p_d', factors 'k_a' (area averaging factor) and 'k_c'

(combination factor) shall be taken as 1.0. (The factor 'k_d' shall be taken as 1.0 in case of plant site within 60km of sea coast).

11.9 The Seismic Load shall be considered corresponding to Earth quake zone at site as per IS: 1893 (Part- 4) with Importance factor 1.5.

11.10 Notes for WL on MMS

WL shall be considered as detailed below for estimation of WL (±X, ±Z direction) under primary loads.

Load due to wind on side (exposed) face of respective MMS members (Drag force) for wind acting in (±) X & Z direction shall also be considered along with (i) & (ii) below.

(i) Load due to fair (positive pressure) wind direction on design tilt angles of MMS members for wind acting in (±) X, Z direction

(ii) Load due to adverse (negative pressure) wind direction on design tilt angles of MMS members for wind acting in (±) X, Z direction

(iii) Load due to wind on side (exposed) face of respective MMS members (Drag force) for wind acting in X & Z direction to be considered along with (i) & (ii) above.

11.11 Design Load combinations

11.11.1 Appropriate Load factors in LSM design for concrete structures and appropriate Factor of safety in WSM design (ASD) for all steel structures including MMS shall be considered as per relevant BIS standard. No increase in permissible stress is permitted in design of MMS

11.11.2 Following load combinations shall be considered in design:

(i) DL + LL
(ii) DL + LL ± WLx
(iii) DL + LL ± WLz
(iv) DL + LL ± ELx
(v) DL + LL ± ELz

11.11.3 All buildings, structures and foundations shall be designed to withstand loads corresponding to worst design load combination.

12 Foundations (General)

12.1 Contractor shall design all foundations for buildings, equipment, HT line Towers, Switch yard structures, Transformer and all other structures as per relevant BIS standards and recommendations of Geotechnical investigation report. The depth of foundation (below

NGL) shall not be less than 1m except in case of chain link fencing post (for boundary & transformer yard fencing) where it shall not be less than 800mm (below NGL).

12.2 Min. thickness of PCC below brick wall shall be 150mm.

12.3 All foundations of one building shall be founded at same RL (Reduced level) with respect to foundation depth below lowest NGL (Natural ground level) in the building area. The Levels shall be obtained with reference to the already established TBM using digital survey instrument such as Total Station.

12.4 All design & drawings shall be submitted to the Engineer for approval before execution.

13 Concrete Works

1. The project site is along the sea shore with environment exposure conditions classified as 'severe' as per IS:456 and the ground water may have high level of dissolved salts containing sulphates and chlorides. Considering this, Ordinary Portland cement – 43 grade with C3A contents<5% conforming to IS: 8112 or Portland slag cement with slag>50% conforming to IS:455 shall be used in all concrete works.

13.1 Construction of all RCC works shall be done with approved design mix as per IS 456 and the materials used viz. Cement, coarse & fine aggregate, Reinforcement steel etc. shall conform to relevant BIS standards.

13.2 The minimum grade of RCC shall be as specified under Cl. No. 5.7 above. Unless otherwise specified elsewhere, PCC shall be of min. grade M10 (nominal mix 1:3:6) except for mud mat, back filling of ground pockets or leveling course which shall be of grade M7.5 (nominal mix 1:4:8).

13.3 Reinforcement steel shall be of high strength TMT bars of grade Fe500 D conforming to IS: 1786 with anti-corrosive coating to withstand aqueous environment. Ductile detailing in accordance with IS: 13920 shall be adopted for superstructure and sub-structure of all RCC buildings and structures.

13.4 Unless specified otherwise for grouting works anti shrink ready mix grout of approved make or cement mortar (CM) grout with non-shrink compound shall be used. The grout shall be high strength grout having min. characteristic strength of 35 N/mm^2 at 28 days.

14 Miscellaneous Steel Works

14.1 Unless otherwise specified elsewhere, all structural steel work shall be designed as per provisions of IS: 800 with working stress method of design (WSD).

14.2 Structural steel hot rolled sections, flats and plates shall conform IS: 2062, structural

Pipes shall be medium (M)/ high (H) grade conforming to IS: 1161, chequered plate shall conform to IS: 3502 and Hollow steel sections for structural purposes shall conform to IS: 4923.

15 Plinth protection and drain

15.1 750mm wide plinth protection with min. 75mm thickness of PCC (1:3:6) over 75 mm thick bed of dry brick ballast, 40mm nominal size well rammed and consolidated and grouted with fine sand, shall be provided around all the buildings.

15.2 A peripheral drain (except for Security room/ cabin) of min. internal size 250mm x 250mm with brick walls in CM 1:6 over 75mm thick PCC (1:3:6) bedding with 12mm thick plaster in CM 1:5 and 25thk PCC (1:3:6) coping at top shall be provided along the periphery of the plinth protection for collection and disposal of rain water from building roof. The drain shall be provided with 12mm thick plaster in CM 1:5 on inside face and 25mm thick PCC (1:3:6) coping at top

16 Plinth filling for buildings

Plinth beam, when provided, shall be taken minimum 200mm below FGL. The plinth filling below Ground floor (GF) for all buildings shall be provided with following specifications.

(i) Well compacted sub-grade
(ii) Well compacted bounder soling with interstices filled with sand over compacted sub-grade
(iii) 75mm thick PCC 1:3:6 over (ii)
(iv) 100mm thick PCC 1:2:4 over (iii)

17 Fire Extinguishers

17.1 All buildings shall be installed with required no. of fire extinguishers as per relevant BIS standard and NBC. Liquefied CO_2/ foam/ ABC type fire extinguisher shall be upright type of capacity 10kg conforming to IS: 2171, IS: 10658.

17.2 The fire extinguisher shall be suitable for fighting fire of Oils, Solvents, Gases, Paints, Varnishes, Electrical Wiring, Live Machinery Fires, and all Flammable Liquid & Gas.

18 Sand buckets

18.1 Sand buckets shall be wall mounted made from at least 24 SWG sheet with bracket fixing on wall conforming to IS 2546.

18.2 All buildings shall be provided with required number of sand buckets as per relevant

BIS standard and NBC. 4 (four) number of bucket stands with four buckets on each stand shall be provided in the transformer yard.

19 Sign Boards and Danger Boards

19.1 The sign board containing brief description of major components of the power plant as well as the complete power plant in general shall be installed at appropriate locations of the power plant as approved by Engineer.

19.2 The Signboard shall be made of steel plate of not less than 3 mm. Letters on the board shall be with appropriate illumination arrangements.

19.3 Safety signs, building evacuation plan and direction signs, assembly points shall also be placed at strategic locations.

19.4 The Contractor shall provide to the Engineer, detailed specifications of the sign boards.

20 Masonry Work

20.1 The masonry work shall be of bricks, laterite blocks (as per site conditions) or concrete blocks.

20.2 All external walls of buildings shall be 230mm and internal walls shall be 230mm or 115mm as per requirements.

20.3 All concrete block masonry walls shall be min. 200mm thick.

20.4 Brick work shall be in cement mortar (CM) 1:6 & 1:4 for 230 mm and 115 mm thick brick wall respectively unless specified.

20.5 Unless otherwise specified elsewhere, Bricks shall be of class designation 5 conforming to IS: 1077, IS: 2212 & IS: 3495.

20.6 All concrete blocks shall be of min. compressive strength of 7.5 N/mm2 and shall be of Grade-A conforming to IS: 2185.

20.7 The laterite blocks shall conform to IS: 3620.

20.8 All buildings shall be provided with suitable damp-proof course (DPC). The DPC shall be with PCC (1:2:4) using 6 down coarse aggregate and water proofing admixture. The min. thickness of DPC shall be 40mm.

20.9 The construction of brick masonry shall conform to IS: 2212. Construction of Concrete block masonry shall conform to IS: 2572.

21 Plastering, Pointing & Coping Works

21.1 All brick masonry work shall be provided with plaster.

21.2 Wall and ceiling plaster shall be in cement mortar (CM) 1:6 and 1:3 respectively.

21.3 Thickness of plaster shall be 18mm and 12mm respectively for rough and smooth surface of the masonry wall. The ceiling plaster shall be 6mm thick.

21.4 All joints in stone masonry shall be raked and pointed in cement mortar (CM) 1:3 except specified otherwise.

21.5 Exposed top surface of brick or stone masonry shall be provided with 25 mm thick plain cement concrete (PCC) coping (1:2:4) with trawl finish. All exposed coping shall be provided with suitable slope and projection for easy drainage of water.

21.6 All door and window chajja shall be provided with 10mm wide drip course.

22 Building Water Supply & Plumbing Works

22.1 C-PVC pipes shall be used for all internal building water supply works while all external water supply pipes shall be uPVC conforming to relevant BIS standard.

22.2 Rain water pipe shall be of PVC conforming to relevant BIS standard.

22.3 All sewerage, waste water and ventilation pipes shall be of HDPE conforming to relevant BIS standard.

22.4 MCR building and Security room shall be connected to Sewage treatment facility including all associated works like Manholes etc.

23 Sewage Treatment facility

23.1 The Contractor shall design & provide soak pit and RCC Septic tank for treatment of sewage and waste water from MCR. The septic shall be designed as liquid retaining structure conforming to IS:3370 for design loads as specified under Clause No. 6. However, in case of ground water within 1.5 m of finished grade level or the soil strata being of low permeability (permeability ≤ 10^{-6} m/s) where septic tank and soak pit arrangement is not effective, suitable packaged sewage treatment plant of reputed make/manufacture shall be provided. The sewage treatment facility shall be of required capacity and of proven design suitable for total of 15 people.

23.2 The design and drawings shall be submitted for approval prior to execution.

24 Pipe & Cable Trenches

24.1 All trenches inside the building and transformer area shall be of RCC. The min. wall and base slab thickness shall be 100mm for depth ≤ 850mm and 150mm for depths > 850mm.

24.2 The trench shall be designed for lateral load due to external soil fill, ground water table at FGL and 10.0 KN/ Sqm surcharge. External trenches shall be kept min. 100mm

above FGL to avoid entry of rain water. In case of straight length of the trench being more than 40m, suitable expansion joints with PVC water stop shall be provided.

24.3 Internal trenches (inside buildings) shall be provided with chequred plate (min. 8mm thick with angle stiffeners as required) covers while external trench shall have precast concrete covers.

24.4 Min. thickness of precast cover shall be 50mm. Both bearing edges of the cable trench and all edges of pre-cast concrete covers shall be provided with min. 50x50x6 mm edge protection angle with lugs.

24.5 The trench cover (chequered or pre – cast both) shall be provided with suitable lifting hooks.

24.6 As required suitable MS insert plates shall be provided on trench wall to support the cable rack/ pipe.

24.7 The trench bed shall have a slope of approx. 1(V):250(H) along and 1(V):50(H) across the length of the trench. The cable trench shall have a dewatering sump (s) of size 450x450x450 mm depth at suitable location to facilitate collection & pumping out of rain water from the trench.

24.8 The external buried cables shall be laid in excavated trench as specified under specifications for Electrical works. The sand for filling shall be of Grade – IV conforming to IS: 383.

25 Water Supply and Cleaning of Modules

25.1 The Contractor shall design and install the effective module cleaning system.

25.2 A regular supply of suitable quantity of water shall be ensured by the Contractor to cater day-to-day requirement of drinking water and for cleaning of PV modules during entire O&M period.

25.3 The Contractor shall estimate the water requirements for cleaning the photovoltaic modules at regular frequency in order to operate the plant at its guaranteed plant performance. However, minimum consumption of 2 litre / sq.m of surface area of SPV module shall be considered in estimation of required quantity of water storage.

25.4 As the ground water at site may contain high concentration of chlorides and may not be suitable for construction and module cleaning purposes. Suitable water for construction and module cleaning purposes (during plant operation) by providing RO plant of requisite capacity including storage facilities shall be arranged by the bidder.

25.5 Water used for drinking & PV module cleaning purpose shall be of potable quality and

fit for cleaning the modules with TDS generally not more than 75 PPM. In case of higher salt contents, the water shall be thoroughly squeezed off to prevent salt deposition over module surface. However, water with TDS more than 200 PPM shall not be used directly for module cleaning without suitable treatment to control the TDS within acceptable limits. The water must be free from any grit and any physical contaminants that could damage the panel surface.

25.6 If required, for settlement of any grit/ unacceptable suspended particles in the water a settling tank shall be installed before the inlet of the storage tank. Suitable arrangement for discharge/ disposal of sediment/ slush shall be provided in silting chamber by gravity disposal in surface drain or with provision of sludge sump and pump of adequate capacity.

25.7 The Contractor shall propose a suitable module cleaning system which shall include installation of ground mounted polyethylene tank (s) of required storage capacity, pumps (including 1 No. standby pump), boats for delivery of water to floating platforms, flexible hose pipes, taps, valves (NRV, Butterfly valve, Ball valve, Gate valve, PRV, scour valve etc.), Water hammer arrester(s), pressure gauge, flow meter etc. as per the planning & design.

25.8 The Polyethylene storage tank shall conform to IS 12701. The valves shall conform to IS 778. A suitable metal sheet canopy for protection from direct sunlight shall be provided over the tank area.

25.9 Module cleaning procedure and pressure requirement at discharge point shall be as per the recommendation of PV module manufacturer. However, discharge pressure at outlet shall not be less than 50 kg/cm^2 (5 MPa).

26 Miscellaneous Structures:

26.1 Structure for weather monitoring device & Lightening Arrestor:

Weather monitoring device shall be mounted on tubular steel pole of required height.. The pole shall be secured to an independent RCC foundation structure through Base plate and Anchor bolt assembly. 200 long 20 dia. rods shall be welded to the pole at 300 mm C/c for access to the device for maintenance purpose. The support structure shall be hot dip galvanized.

27 Floating System

27.1 Standards and Codes

Float materials shall comply with the latest edition of the following standards and codes including amendments.

Codes	Description	Property Values
ASTM D1693	Standard Test Method for Environmental Stress-Cracking of Ethylene Plastics	Resistance, F50 (hrs.) > 500
ASTM D790	Standard Test Methods for Flexural Properties of Unreinforced and Reinforced Plastics and Electrical Insulating Materials	Secant Flexural Modulus at 2% Strain > 1000 MPa
ASTM D 638	Standard Test Method for Tensile Properties of Plastics	Tensile Strength at Yield > 27 MPa`
ASTM D695	Standard Test Method for Compressive Properties of Rigid Plastics	Compressive Stress at Yield > 10 MPa
ASTM D 2565	Standard Practice for Xenon-Arc Exposure of Plastics Intended for Outdoor Applications	More than 50% of its original break elongation after 10,000 hours exposure
ASTM G7/G7M	Standard Practice for Atmospheric Environmental Exposure Testing of Non-metallic Materials	
UL 94 or Equivalent IEC/ISO standards	Standard for Safety of Flammability of Plastic Materials for Parts in Devices and Appliances testing	Classification HB or better

27.2 The floating system shall consist of multiple modular floating units/platforms and connected to the ground using anchoring and mooring system. However, the float unit shall have minimum material thickness of 3 mm, with moisture retention of less than 5%. Floating system/platform shall be fenced with vacant floats to demarcate boundary.

27.3 The Contractor shall consider following factors while designing the floating systems:

i. Buoyancy of the floats shall maintain the minimum clearance and stability of the floating system in the reservoir.

ii. Weight of algae growth: There is a chance of development of algae on the structures including floats. Therefore, while designing the system, sufficient factor of safety shall be considered.

27.4 Floats shall be designed to prevent/mitigate stagnation of water.

27.5 The floating unit shall be manufactured from thermoplastic material with UV stabilizer

(not less than UV24 additive package) and corrosion-resistant additives so that the floating unit shall sustain for 25 years in the aqueous environment.

27.6 The floats may be filled with virgin expanded polystyrene foam to increase the strength of the float and to serve as backup floatation system.

27.7 All the materials used in the floating system shall comply with national and international environment laws and regulations.

27.8 The materials used for manufacturing the floating unit shall be tested at ILAC accredited testing laboratory for ensuring the suitability of the material for use in aqueous applications.

27.9 All the modules shall be accessible for maintenance once multiple floating units are connected together.

27.10 All fasteners used in the floating system shall be made of SS 316.

27.11 Aluminium alloy, if used in the floating system, should be of 5052 grade or higher, suitable for aqueous applications.

27.12 The Floating system shall be able to support the load of O&M Personnel (at least 2 personnel 80 kg each) and equipment like String Combiner Box etc.

27.13 The floating units shall be re-processable and recyclable at the end of its useful life.

27.14 The Contractor shall get the design of the modular floating platform vetted and the prototype validated by IITs or NIOT, Chennai having Multi Element Wave Maker or other methodology as per the recommendation of the Institute and submit it for Employer's approval during detailed engineering.

27.15 The floating system, or sections thereof, shall be anchored using concrete blocks. Sea floor drilling is not permitted for anchoring/tethering.

27.16 Tethering hawser for mooring/anchoring system shall be stranded steel (with protective Zinc coating)/steel reinforced polyester/ rubber type to withstand abrasion, UV radiation and chemical weathering for the plant design life.

27.17 The mooring system shall be designed to keep the floating platform in position during fluctuation in water level.

27.18 The complete system (floating, anchoring & mooring system) shall be designed to withstand maximum wind speed of the location as per IS 875 – Part 3, worst-case waves, tides (regular and random) and water currents prevailing at the proposed reservoirs.

27.19 The Contractor shall propose an Erection and Construction methodology with a minimum of following details:

i. Float Assembly Plan
ii. Equipment required for Assembly
iii. Mooring and Anchoring methodology
iv. Safety Plan for Installation

27.20 **Warranty:** The Floating System including floats, mooring and anchoring mechanism shall be warranted for 10 years.

28 Buildings

The specifications provided below apply to MCR, ICR and Store Room.

28.1 General Requirement

28.1.1 Plant buildings/ open installations are required to be constructed for housing the electrical equipment/ panel (Local Control Room Building - LCR) and Control room cum office cum store (Main Control Room Building - MCR).

28.1.2 All buildings shall be Pre Engineered Building type or Portable Cabin as per specifications laid down in this document. The equipment area shall be designed with OEM requirements to ensure all satisfactory operations.

28.1.3 The contractor shall submit the proposed based on manufacturer recommendation, easy passage of O&M persons and cable trench layout required, equipment layout drawings to the Employer for approval before development of Architectural drawings.

28.2 Portable Cabin

28.2.1 Portable cabin shall be of size 15 x 10 x 8.6 feet (clear dimensions i.e. available volume) for MCR and Store Room. For other buildings, appropriate sizes as per available space and design may be proposed.

28.2.2 The main fabrication of the structural frame work shall be integral and all welded (CO_2 welding) type to comprise of the bottom, top, side & overall frame work. Self-draining roof and desired door-window with Insulation & electrical fittings inside the cabin. The structure should be durable, fire proof, light, sturdy, termite and water proof.

28.2.3 The Portable cabin shall have provision for partition walls for a Supervisor/SCADA Room and seating area for 4 O&M personnel.

28.2.4 Detailed Specifications

Component	Description	Reference Standard

Bottom/base frame	100 mm specially formed channel	IS 2062 for MS or IS 808 for Rolled section
Top frame	75 x 75 sq. mm pipes/tubes	IS 4923 (tube) IS 1239 (pipe)
Stiffeners Bottom	100 x 50 mm specially formed channels	IS 2062 or IS 808
Stiffeners Top	45 x 45 x 5 mm & 45 x 45 x 5 mm M.S Tee	IS 2062 or IS 808
Side Post	Specially formed 3.15 mm M.S post section	IS 2062
Side wall stiffeners	Specially formed 2.00 mm M.S channels	IS 2062 or IS 808
Panelling outside	M.S Corrugated sheet (10 gauge)	IS 2062
Internal wall panelling	8 mm Pre-laminated sheet for wall	
Roof outside	M.S Plain sheet (18 gauge) with efficient drain of rain water and to avoid collection of dust leaves etc on the roof	IS 2062
False ceiling	5 mm 100% water proof sheet	-
Bottom flooring	10 mm MS Chequered Plate	IS 2062
M.S door	50 mm insulated M.S Door of size- 3' x 6'6" with hydraulic door closer, locks, handles. Doors shall be fixed with heavy gauge MS hinges Weather shed for door.	IS 2062 For Hinge – IS 1341/1992 For Hydraulic Door Closer – IS 3564/96 Type-2
Insulation	1.At four side walls by 50 mm Glass wool insulation covered with 8 mm pre-laminated sheet. 2. At ceiling by 100 mm Glass wool insulation covered with 5 mm pre-laminated sheet (100% water proof) (All the Glass wool density-24)	Glass wool; IS 8183/93

28.2.5 Accessories

Wiring	Concealed wiring – PVC conduits using fire resistance wires

Electrical Fitting/cabin	1. Tube lights – 02 nos. 2. Door lights – 01 no. 3. Fans – 01 no. 4. Switches & sockets: 6 amps – 01 no. & 16 amps – 01 no.
Furniture (for MCR)	Office Chairs with swivel mechanism, wheels and adjustable height - 6 Nos., 4 seater Round Discussion Table –1 No., Supervisor Desk Table with Drawers for Supervisor – 1 No.,
Painting	Phosphating the cabin internally and painting with coat of epoxy primer (anti corrosive paint) & two coat of epoxy texture paint (corrosion resistant paint) of reputed make. The external surface of the cabin shall be painted with two coats of epoxy texture paint (corrosion resistant paint) of reputed make. The roof of the cabin painted with polyurethane paint.
M.S Racks with shutter OR Storage Cup board	M.S Storage Cupboard - 06 nos. Each Cup board made of M.S with full height door of size-4' 10" (width)x 2'6" (depth) x 6'(ht) comprising with 02 partitions at 2 ft height
Dummy plate	Size- 3'5" x 3'5"

28.2.6 The portable cabin for MCR shall be provided with adequate number of split type air conditioning units and fans.

28.3 Pre-Engineered Building (PEB)

28.3.1 General:

The PEB shall be made of structural steel construction with double skinned metal roofing and wall cladding of appropriate profile. PEB shall be complete with painting, metal fascia, metal gutter, rain water down comers, sun-shades, openings, etc., along with associated structural steel, cladding and roofing work insulation, Trims & Flashings. Each item of PEB like panels, masonry, plastering, flooring, foundation, fittings etc. shall be suitable for complete life of solar plant. The construction methodology for PEB shall also be submitted to the Employer/Owner for approval before start of works.

28.3.2 Structure and material specification

Component	Description	Reference Standard
Primary Structural Members: including the transverse rigid frames, columns, corner columns, end wall wind columns, beams, truss member, base pate.	Steel frame members with minimum thickness 4 mm with minimum yield strength of 345 MPa	IS2062 min Grade E250 Quality BR/ ASTM A572-12 Grade 50
Secondary Members: including the purlins, Girts, eave struts, bracing, flange bracing, base angles, clips, flashings and other miscellaneous structural parts. Suitable wind bracings sag rods to be reckoned while designing the structure.	Minimum thickness 3.15 mm. Secondary members for purlins and Girts shall have minimum yield strength of 345 MPa. Miscellaneous secondary members shall have minimum yield strength of 250 MPa.	IS 811 or ASTM A1003-12 steel sheets conforming to ASTM A1011-12b Grade 50
Wall Cladding	Insulated wall cladding or roofing shall consist of double skin metal cladding with Poly Urethane Foam (PUF). PUF must be made of continuous method PU foam and must be CFC free, self-extinguishing, fire retardant type with density 40 +/-2 kg/m3 and thermal conductivity 0.019-2.2 W/(m.K) at 10°C. The PUF panels shall be a factory made item ready for installation at site.	
Design Parameters and Design Loads:		
Dead Load:	Self-Weight of Structure	

	including Purlins, Sheeting, Girts, Bracings, weight of turbo ventilators to be added as Dead load etc. Imposed Load (Live Loads) Live loads shall be as per IS – 875. For sloped roofs up to 10 deg. it shall be 0.75 KN/M^2.	
Wind Load:	Design wind speed factors shall be as per IS: 875-III, however the minimum value of these factors shall be considered as K1 = 1.0, K2 = 1.0 & K3 = 1.0 for the design of PEB.	
Earthquake Load:	All PEB structures shall be designed for Seismic forces. Vertical Deflection and Horizontal Sway Limits: a) Limiting Deflection: The limiting permissible vertical deflection for structural steel members shall be as per IS 800 2007. b) The limiting permissible horizontal deflection for as per IS 800 2007 code where 'h' is height of building at eaves.	
Paint and Coating:	Steel shall be colour coated with total coating thickness of 25 microns (nominal) dry film thickness (DFT) comprising of silicon modified polyester (SMP with silicon content of 30% to 50 %) paint or Super Durable Polyester(XRW) paint of 20 microns	

	(nominal) on one side (exposed face) on 5 micron (nominal) primer coat and 10 microns (nominal) SMP or Super Durable Polyester paint over 5 micron (nominal) primer coat on other side. SMP and polyester paints system shall conform to Product type 4 as per AS/ANZ 2728. The structural steel shall be hot-dipped galvanized, conform to IS: 4759 or relevant Indian standard
Plinth Protection:	750mm wide plinth protection minimum 75 mm thick of cement concrete 1:3:6 (1cement : 3 coarse sand : 6 graded stone aggregate 20 mm nominal size) over 75 mm bed of dry brick ballast 40 mm nominal size well rammed and consolidated and grouted with fine sand including finishing the top smooth, shall be provided around the Pre-Engineered Building.
Rolling shutter:	Rolling shutter (Hand operated) shall be fabricated from 18 gauge steel and machine rolled with 75 mm rolling centres with effective bridge depth of 12 mm lath sections, interlocked with each other and ends locked with malleable cast iron clips to IS:2108 and shall be designed to withstand a wind load without excessive deflection. Metal rolling shutters and rolling grills as IS: 6248.
Windows Frame:	Aluminium black powder coated section, frame shall be of 92x31 mm, minimum 16G thick as per approved design. Tinted glass and aluminium grill shall be provided.
Roof Insulation and type	Both metal sheets shall have an under insulation of minimum 70 mm thick PUF with density 40 +/- kg/m3 and thermal conductivity 0.019-2.2 W/(m.K) at 10°C with gutters and down take pipes along with Flashing & Top cap of required size and colour complete with all necessary hardware.

	Roof shall be projected at-least 300 mm from the wall. Stiffening ribs / subtle fluting for effective water shedding and special male / female ends with full return legs on side laps for purlin support and anticapillary flute in side lap shall be provided. Both upper and lower sheets shall be separated through spacers and fastened through zinc /zinc-tin coated self-drilling screws. The fastener size shall be calculated as per the design or manufacturers recommendations. Contractor may also alternatively made the PEB roofing with composite slab (RCC slab with permanent formwork). The composite slab scheme, design and drawings shall be subject to approval from Employer/Owner before start of work.
Wall Insulation	All voids of external and internal metalled walls shall have an under insulation of minimum 60 mm thick PUF with density 40 +/- kg/m3 and thermal conductivity 0.019-2.2 W/(m.K) at 10°C with proper supports etc. as approved. Both the walls should be separated by spacers system made up of cold formed steel bars and fastened through zinc /zinc-tin coated self-drilling screws.

D Performance Measurement Procedure

1 Performance Ratio (PR)

Performance Ratio (PR) test for Operational Acceptance shall be performed as per the procedure attached in Annexure-C. PR shall be measured separately for each land plot.

2 Capacity Utilization Factor (CUF)

Capacity Utilization Factor of the plant shall be calculated as per the procedure attached in Annexure-C.

SECTION – VII

C. SPECIAL TECHNICAL CONDITIONS

1.1 The Contractor is advised to inspect the site and study the nature of soil, topography, hydrography and other conditions to decide the extent of scope of area grading, ground compaction, and foundation system to be provided before submission of the Bid. The Employer shall not be responsible for any variations in soil characteristics and other conditions, between those observed during preliminary site visit and detailed investigations to be carried out by the Contractor during contract execution and there shall be no compensation what so ever in the contract price on this account.

1.2 The Contractor is advised to ascertain the availability of good quality ground water at site for construction, drinking and module cleaning purpose. In case of non-availability of ground water source, the contractor shall explore the option of supply of water through water tankers. In case the water quality is not suitable for drinking or module cleaning purpose, the Contractor shall install suitable water treatment facilities.

1.3 PV Modules (TS Clause 1.3)

1.3.1 Only Glass-glass PV Modules with or without frame shall be allowed.

1.4 Power Conditioning Units (Clause 3)

1.4.1 Power Conditioning Unit shall be outdoor type.

1.5 HT Switchgear (Clause 7)

1.5.1 HT Switchgear shall be Outdoor Type.

1.6 Module Mounting Structures (MMS)

1.6.1 The MMS shall be made from aluminum alloy grade 54300 (N8) conforming to IS 8147: 1976 with minimum member thickness of 2 mm. The Contractor can also propose other material. However, structural steel shall not be used, in any case, as a material for the MMS.

Note: The details of the MMS design along with project details where it has been deployed shall be submitted along with the bid.

1.6.2 PV Modules shall be fastened to the MMS with adequate no. of fasteners as per the recommendation of PV Module manufacturer for the design wind speed. All fasteners and washers - both for MMS connections and fixing of PV Module shall be adequately protected from atmosphere and weather prevailing in the area.

1.6.3 The module mounting structure design shall allow transverse movement of Float blocks to allow for waves to pass through.

1.6.4 The structure shall be designed to allow easy replacement of any module and shall be in line with site requirements.

1.6.5 Welding of structure at site shall not be allowed and only bolted connections shall be used.

1.7 Boundary Wall (TS Clauses 9.1-9.3)

1.7.1 The specifications for construction of boundary wall / fence are as below (Please refer to the drawing for details.)

a) Pre-stressed concrete post with M 25 grade concrete
b) Concrete mix : M 25 grade design mix finished smooth
c) Reinforcement : 7 Nos 4 mm dia high tensile carbonized steel
d) Size of post : 150 mm x 150 mm with suitable groove on both sides to accommodate 50 mm thick RCC panel.
e) Length of post 2.70 m, of which 0.90 m shall be below GL and 1.80 m shall be above GL
f) Spacing of posts 2.15 m c/c, one extra post for every corner and one extra post at every 15th post and at change of level.

1.7.2 Pre-stressed concrete panels with M 25 grade concrete

a) Concrete mix : M 25 grade design mix finished smooth
b) Reinforcement : 4 Nos 3 mm dia high tensile carbonized steel
c) Size of each panel : 2.13 m X 0.30 m X 0.05 m

1.7.3 Concertina wire fencing:

50 x 50 x 6mm 86 micron HDG MS angle U post above top of compound wall fixing of the same to the posts with 50x6 mm MS flat 300mm long both sides and fixed in the groove of the post.(as shown in the drawing)

1.7.4 SPECIFICATIONS FOR 450mm DIA. CONCERTINA COIL

Diameter of the coil : 450mm
Number of rounds : 50 no. rounds per 5meter length
Galvanization : Up to 20 microns
Spring core : 2.5mm thick; tensile strength @ 165 Kg/Sqmm
Tape : 0.52mm thick and weight 43.478 gm/Meter
Blade profile : Minimum length of 11mm and width before crimping 18mm
Blade pitch : 25mm c/c
Clips : 5 nos per 2 spirals

1.7.5 SPECIFICATIONS FOR GALVANISED STEEL BARBED WIRE

No. of strands : 12 nos
Type : Type-A (IOWA type)
IS code : IS 278-1978 (Sl.No.5)

Details

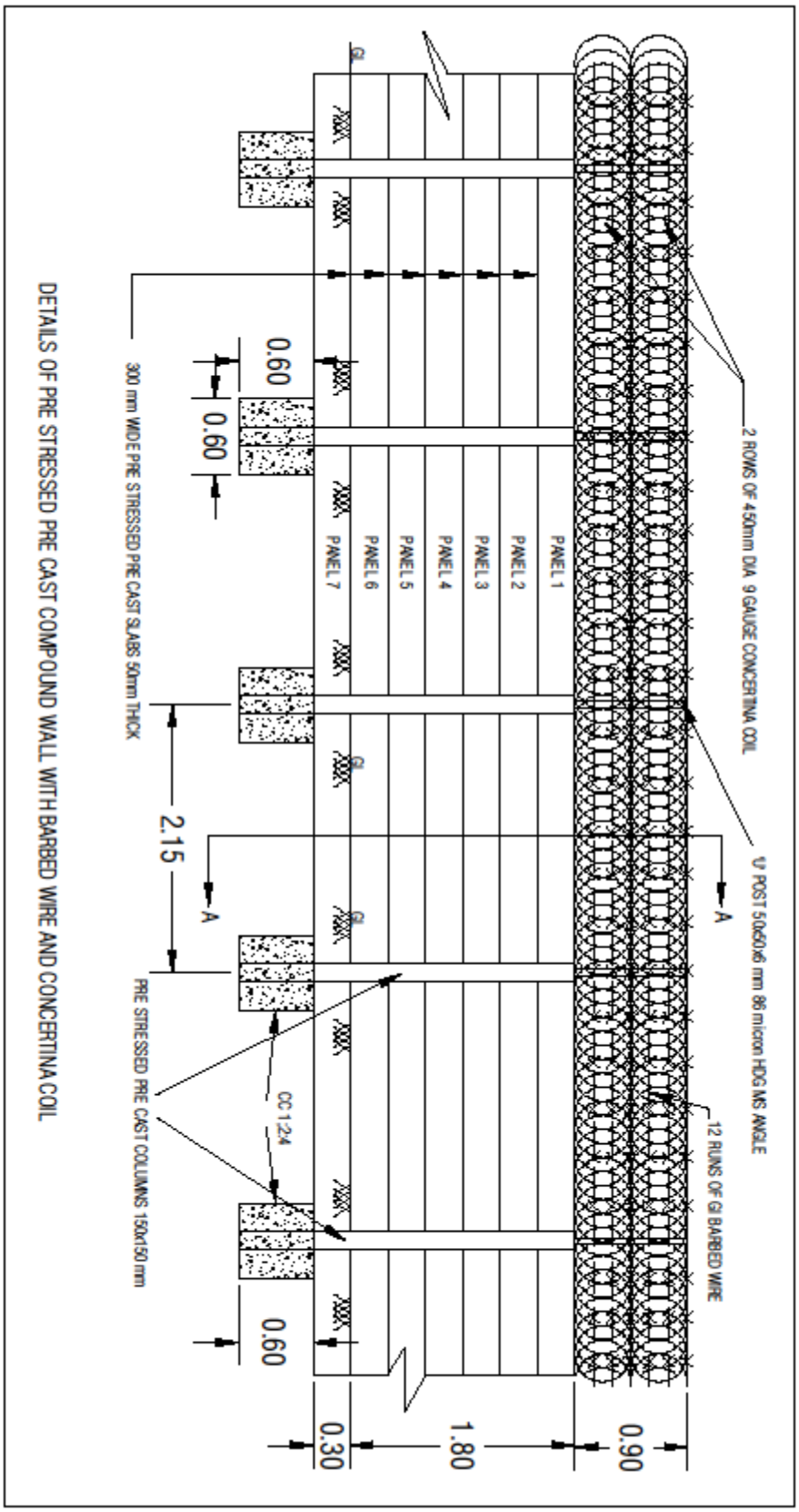
line wire : 2.25mm
point wire : 2.00mm
Spacing of barbs : 75mm
Mass : 106 to 97 gr/Meter

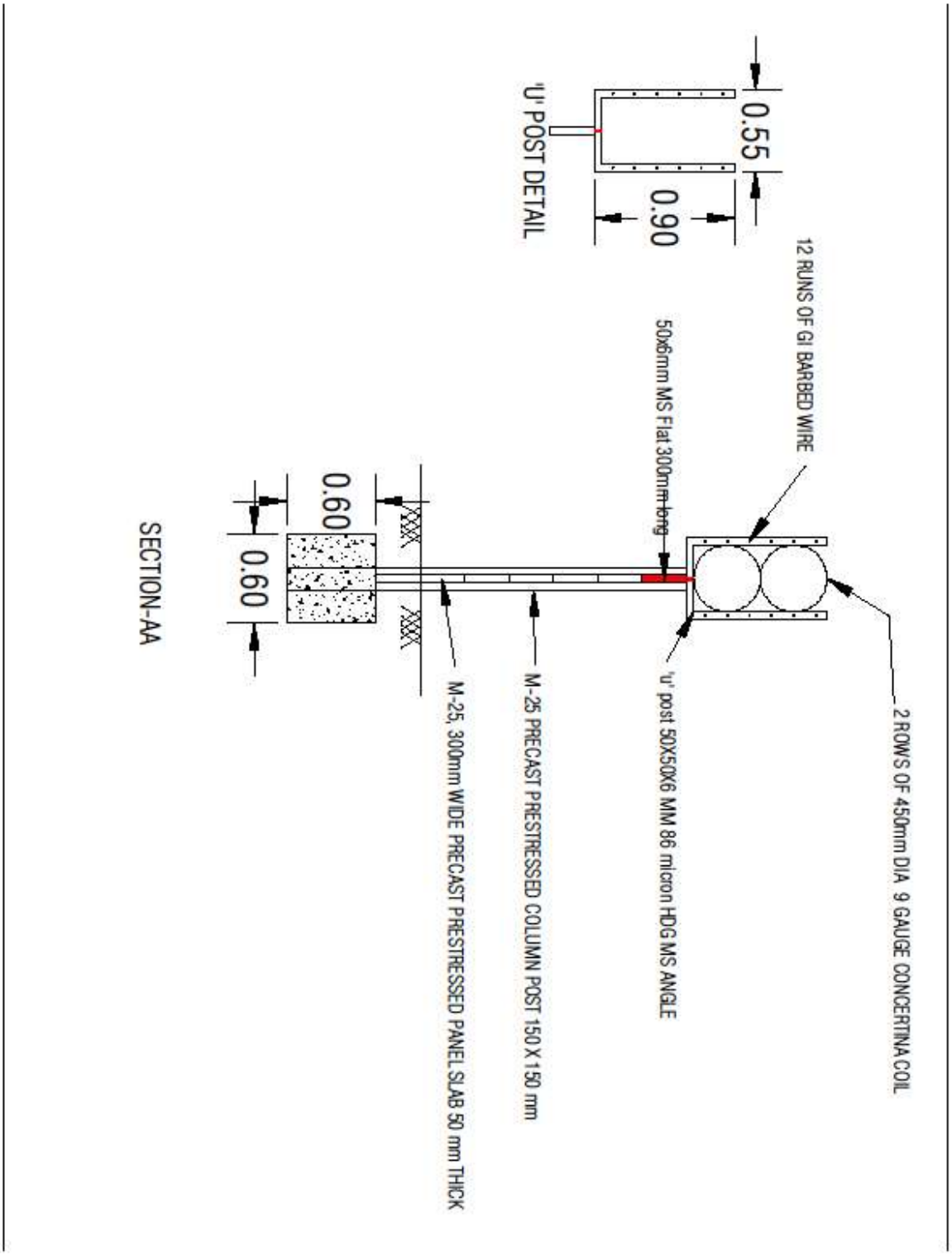
1.7.6 Erection:

a) Earth work 0.60x0.60x0.90m for columns and 2.10x0.30x0.30m for panels in all types of soils and ordinary rock not requiring blasting.
b) Posts shall be erected in the pits of 0.60x0.60x0.90m with 0.60x0.60x0.60m CC 1:2:4 concrete.
c) 1 panel shall be inserted below ground level.
d) 6 panel shall be inserted between the columns above ground level
e) The panels shall be suitably grouted at column joints in CM (1:4) to prevent removal.

1.7.7 Finishing:

a) The gaps in earth work shall be filled back properly and surrounding shall be leveled to bring back to original condition.
b) Acrylic exterior emulsion Grade-II 2 coats over one coat primer shall be provided to entire wall.


DETAILS OF PRE STRESSED PRE CAST COMPOUND WALL WITH BARBED WIRE AND CONCERTINA COIL
300 mm WIDE PRE STRESSED PRE CAST SLABS 50mm THICK
2 ROWS OF 450mm DIA 9 GAUGE CONCERTINA COIL
'U' POST 50x50x6 mm 86 micron HDG MS ANGLE
12 RUNS OF GI BARBED WIRE
PRE STRESSED PRE CAST COLUMNS 150x150 mm
CC 1:2:4
PANEL 1
PANEL 2
PANEL 3
PANEL 4
PANEL 5
PANEL 6
PANEL 7
A
A
0.60
0.60
2.15
0.60
0.30
1.80
0.90


'U' POST DETAIL
0.55
0.90
12 RUNS OF GI BARBED WIRE
50x6mm MS Flat 300mm long
0.60
0.60
SECTION-AA
M-25, 300mm WIDE PRECAST PRESTRESSED PANEL SLAB 50 mm THICK
M-25 PRECAST PRESTRESSED COLUMN POST 150 X 150 mm
'u' post 50X50X6 MM 86 micron HDG MS ANGLE
2 ROWS OF 450mm DIA 9 GAUGE CONCERTINA COIL

Design Considerations

1.1 The basic wind speed 'V_b' = 44 m/sec

1.2 Seismic zone – III as per IS: 1893

1.3 Design rainfall intensity for storm water drainage – 65 mm/hr

1.4 Security cabin(s) required at strategic locations shall be decided in consultation with Employer.

Note – For detailed technical specifications of various works under the Scope, please refer Section -VII B, "Technical Specifications"

Annexure – A

Pre-dispatch Inspection Protocol for Crystalline PV Modules by Employer or Employer Deputed Agency

Contents

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5. Scope of Inspection:....3
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8. Inspection Process....5
9. Re-inspection and review....6
10. Inspection Summary:....6
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Pre-dispatch inspection procedure

1. Objective:

The objective of this document is to establish General inspection protocol with objectivity for verification of Quality Parameters of Solar Modules by the customer (or its authorised inspection agency) prior to dispatch. The decision rules and procedure specified herein seek to uphold quality standards based on industry best practices and technical specifications laid out in tender documents as well as to control risks associated with item procurement.

2. Standard:

Sampling for determining Acceptance Quality Level (AQL) shall follow ISO 2859-1: 1999.

3. Definitions:

1. Lot: All products/items manufactured in one batch.
   Notwithstanding the aforementioned definition, the customer or authorized inspection agency can lay down alternate/additional criteria for determining a lot.
2. Major Defect: A defect that reduces the usability or causes the product to fail to fulfil its nominal characteristic function.
3. Minor Defect: A defect that does not reduce the usability of the product, but does not meet the quality standard.

4. Inspection Schedule:

Customer representative shall propose the schedule for Pre-despatch Inspection of Finished Goods to the Customer well in advance, and in no case less than 3 working days prior to commencement of Inspection at a location within India and 7 days in case of a foreign country.

5. Scope of Inspection:

Supplier representative will accompany the Inspector while doing the inspection which shall typically consist of 2 steps for clearance of each Lot:

BOM verification: To be conducted prior to the commencement of production.

The details of materials used will be verified from the ERP/Manufacturing data and corroborated with the Construction Data Form (CDF). This shall include verification of following:

Item	Method of Verification
Shelf life of the following BOM items: • EVA • PV Module Back sheet • Sealant and potting material (Silicone)	Verify the expiry date/shelf life and storage conditions *The PV Module manufacturer shall submit all required information to prove that materials being used are within their shelf life.*

Note: Supplier shall provide the necessary documents for approval of BOM as per IEC standards and tender Technical Specifications.

Witness Tests:

Manufacturer shall assist the Inspecting agency to witness following checks, the details of which are provided elsewhere in this document:

I. Flash test- As per sampling Plan

II. Visual Inspection- As per sampling Plan

III. EL Inspection-As per Sampling Plan

IV. Electrical Characteristics (Other than Flash Test)- As per Sampling Plan

Note: The Supplier shall furnish soft and hard copy of the Production Quality Plan prior to commencement of the Inspection.

6. Sampling Process:

a. Supplier shall provide the list of modules in a lot ready for despatch, along with flash test data (Measured Electrical Data, P_{max}) prior to commencement of Inspection tests.
Note: Smallest lot size for Inspection: 20% of the capacity as per the PO.

b. Supplier will arrange to move the PV Modules from FG to Inspection area.

c. Same samples shall be used for all Witness Tests stated at 5.2 above.

d. Inspector shall commence Inspection process by randomly selecting samples from the list of serial nos. (pallet-wise) provided by Supplier as per ISO 2859: Single Sampling Plan for Normal Inspection, General Inspection plan level-II. However, the Inspector shall reserve the right to switch to tightened or reduced level of Inspection as per the lot quality.

7. Decision Rules for Acceptance/Rejection

Following is a summary of Decision Rules for Acceptance/Rejection of a given Sample in a lot offered for Inspection:

Table 1: AQL Levels

Defect Type	AQL (%)
Major (Ma)	2.5
Minor (Mi)	4

Table 2: Inspection Levels

Inspection steps	Inspection item	Inspection level
1	Flash Test	General inspection level I
2	Visual	General inspection level I
3	EL	General inspection level I
4	EC (Other than Flash Test)	10 Nos. per lot

8. Inspection Process

a. Electrical Inspection – Flash Tests

For Electrical inspection following preparation will be done:

- Module Temp Stabilisation: Modules will be kept in controlled environmental condition till it reaches 25 ±2ºC
- Calibration of Sun-simulator: Sun-simulator will be calibrated as per Calibration Reference. Reference should calibrated against Calibration Reference tested from reputed testing lab TUV / Fraunhofer etc. Testing of modules will be done at STC condition, AM=1.5

Note:

(i) All modules selected for sampling inspection will be re-tested in the sun-simulator. A P_{max} retest (repeatability test) variation of ± 2 % on actual flash P_{max} value will be acceptable.

(ii) The Supplier shall provide a valid calibration certificate of the apparatus used.

b. Visual Inspection:

- Customer representative will verify the module visual characteristics as per the Visual Acceptance norms.
- The Visual Inspection shall be carried out in a well-lit room. It shall be the responsibility of the Supplier to ensure adequate brightness in the room.

c. Electroluminescence (EL) Inspection:

- The EL image shall have sufficient resolution for analysis of defects.
- Hi-pot test shall be done as per IEC procedure. The Supplier shall provide a valid calibration certificate of the apparatus used.

9. Re-inspection and review

In case of minor non-conformities like cleaning issues, label mismatch, etc. which can be easily reworked, Supplier shall rework/replace the modules and offer them for re-inspection to Inspector.

10. Inspection Summary:

Once the inspection is completed Customer Representative will compile his Inspection Summary Report and share with Supplier and give necessary recommendation on despatch depending upon the audit findings based on the observations made. This report shall be provided within same day of inspection (Format Attached).

11. Disclaimer:

Inspection by SECI/ Employer does not absolve the responsibility of the Supplier/vendor to ensure quality during production of the material and its transport to site. Any damages during transport/ handling shall be replaced before erection at site as directed by Engineer-in-charge without any extra cost to the purchaser.

Sampling Plan

(Sampling Plan as Per ISO 2859) -1

Table 1 - Sample size code letters (see 10.1 and 10.2)

Lot size		Special inspection levels				General inspection levels		
		S-1	S-2	S-3	S-4	I	II	III
2 to	8	A	A	A	A	A	A	B
9 to	15	A	A	A	A	A	B	C
16 to	25	A	A	B	B	B	C	D
26 to	50	A	B	B	C	C	D	E
51 to	90	B	B	C	C	C	E	F
91 to	150	B	B	C	D	D	F	G
151 to	280	B	C	D	E	E	G	H
281 to	500	B	C	D	E	F	H	J
501 to	1 200	C	C	E	F	G	J	K
1 201 to	3 200	C	D	E	G	H	K	L
3 201 to	10 000	C	D	F	G	J	L	M
10 001 to	35 000	C	D	F	H	K	M	N
35 001 to	150 000	D	E	G	J	L	N	P
150 001 to	500 000	D	E	G	J	M	P	Q
500 001 and over		D	E	H	K	N	Q	R

(Sampling Plan as Per ISO 2859) – 2 – Normal, Tightened and Reduced)

Table 2-A — Single sampling plans for normal inspection (Master table)

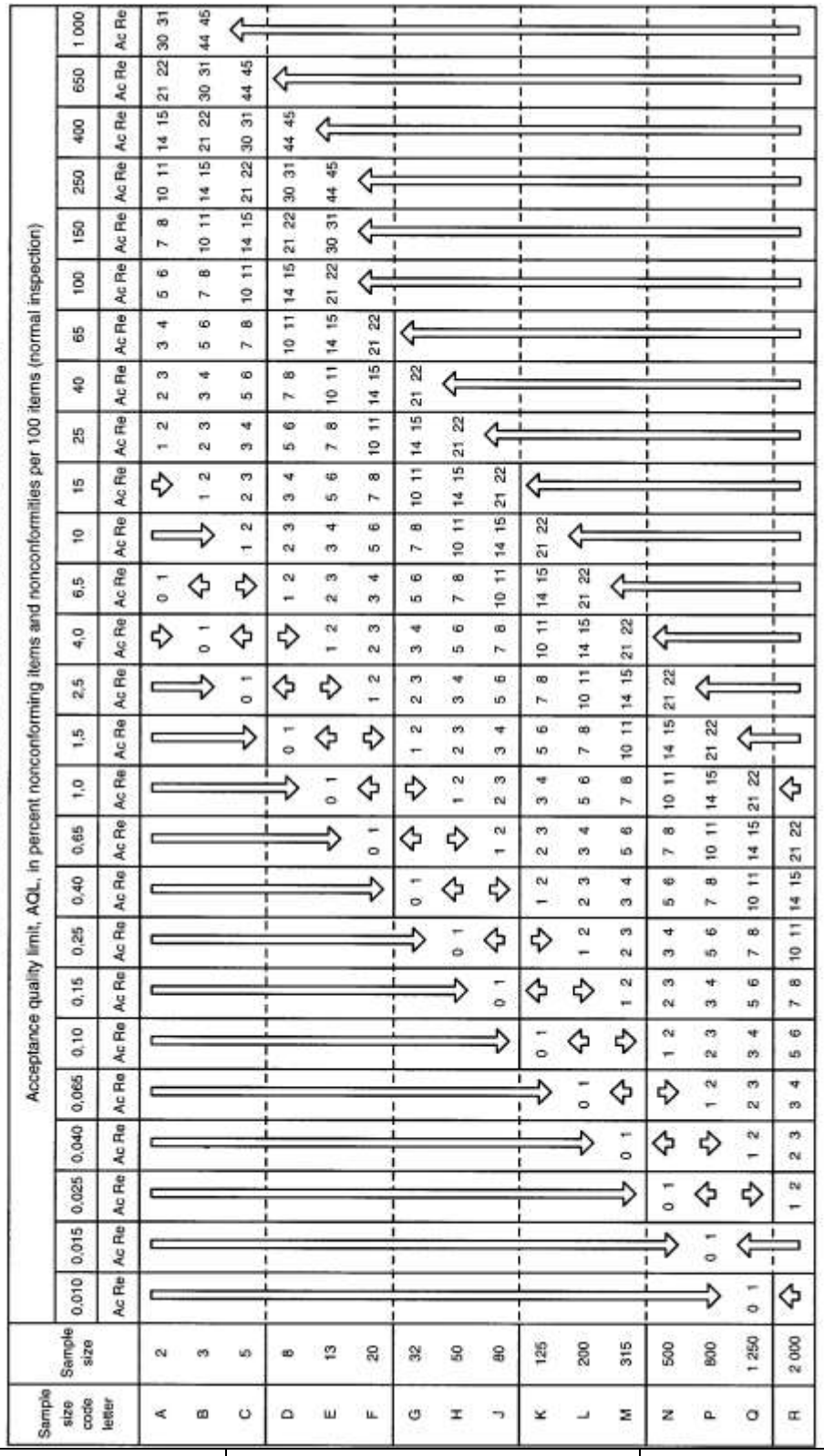


Table 2-B — Single sampling plans for tightened inspection (Master table)

Sample size code letter	Sample size	Acceptance quality limit, AQL, in percent nonconforming items and nonconformities per 100 items (tightened inspection)																								
		0,010	0,015	0,025	0,040	0,065	0,10	0,15	0,25	0,40	0,65	1,0	1,5	2,5	4,0	6,5	10	15	25	40	65	100	150	250	400	650	1 000
		Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re	Ac Re
A	2																⇩	0 1	⇩	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28
B	3															⇩	0 1	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42
C	5														⇩	0 1	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇩
D	8													⇩	0 1	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇩	
E	13												⇩	0 1	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇩		
F	20											⇩	0 1	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇩			
G	32										⇩	0 1	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇩				
H	50									⇩	0 1	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇩					
J	80								⇩	0 1	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇩						
K	125							⇩	0 1	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇩							
L	200						⇩	0 1	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇩								
M	315					⇩	0 1	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇩									
N	500				⇩	0 1	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇩										
P	800			⇩	0 1	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇩											
Q	1 250		⇩	0 1	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇩												
R	2 000	0 1	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇩														
S	3 150	⇧	1 2	2 3	3 4	5 6	8 9	12 13	18 19	27 28	41 42	⇩															

⇩ = Use the first sampling plan below the arrow. If sample size equals, or exceeds, lot size, carry out 100 % inspection.

⇧ = Use the first sampling plan above the arrow.

Ac = Acceptance number

Re = Rejection number

Table 2-C — Single sampling plans for reduced inspection (Master table)

Sample size code letter	Sample size	Acceptance quality limit, AQL, in percent nonconforming items and nonconformities per 100 items (reduced inspection)																														
		0,010		0,015		0,025		0,040		0,065		0,10		0,15		0,25		0,40		0,65		1,0		1,5		2,5		4,0		6,5		10		15		25		40		65		100		150		250		400		650		1 000	
		Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re	Ac	Re
A	2		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	⇩	0	1	⇩	1	2	1	2	1	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31
B	2		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	⇩	0	1	⇩	1	2	1	2	3	3	4	5	6	7	8	10	11	14	15	21	22	30	31		
C	2		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	⇩	0	1	⇩	1	2	2	3	3	4	5	6	7	8	9	10	11	14	15	21	22						
D	3		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	⇩	0	1	⇩	1	2	1	2	2	3	3	4	5	6	7	8	9	10	11	14	15	21	22						
E	5		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	⇩	0	1	⇩	1	2	1	2	2	3	3	4	5	6	7	8	9	10	11	14	15	21	22								
F	8		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	0	1	⇩	1	2	1	2	2	3	3	4	5	6	7	8	9	10	11	14	15	21	22									
G	13		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	⇩	0	1	⇩	1	2	1	2	2	3	3	4	5	6	7	8	9	10	11	14	15	21	22									
H	20		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	0	1	⇩	1	2	1	2	2	3	3	4	5	6	7	8	9	10	11	14	15	21	22									
J	32		⇩		⇩		⇩		⇩		⇩		⇩		⇩		⇩	0	1	⇩	1	2	1	2	2	3	3	4	5	6	7	8	9	10	11	14	15	21	22									
K	50		⇩		⇩		⇩		⇩		⇩		⇩		⇩	⇩	0	1	⇩	1	2	1	2	2	3	3	4	5	6	7	8	9	10	11	14	15	21	22									
L	80		⇩		⇩		⇩		⇩		⇩		⇩		⇩	0	1	⇩	1	2	1	2	2	3	3	4	5	6	7	8	9	10	11	14	15	21	22									
M	125		⇩		⇩		⇩		⇩		⇩		⇩		⇩	0	1	⇩	1	2	1	2	2	3	3	4	5	6	7	8	9	10	11	14	15	21	22									
N	200		⇩		⇩		⇩		⇩		⇩		⇩	0	1	⇩	1	2	1	2	2	3	3	4	5	6	7	8	9	10	11	14	15	21	22													
P	315		⇩		⇩		⇩		⇩		⇩		⇩	0	1	⇩	1	2	1	2	2	3	3	4	5	6	7	8	9	10	11	14	15	21	22													
Q	500		⇩		⇩		⇩		⇩		⇩	0	1	⇩	1	2	1	2	2	3	3	4	5	6	7	8	9	10	11	14	15	21	22													
R	800		⇩		⇩		⇩		⇩		⇩	⇩	0	1	⇩	1	2	2	3	3	4	5	6	7	8	9	10	11	14	15	21	22													

⇩ = Use the first sampling plan below the arrow. If sample size equals, or exceeds, lot size, carry out 100 % inspection.

⇧ = Use the first sampling plan above the arrow.

Ac = Acceptance number

Re = Rejection number

Customer inspection Report

CUSTOMER INSPECTION REPORT			
Ref. No. & Date:			
Client:	**PMC**: SECI	**EPC Contractor**: PO Ref. No.:	
Place of Inspection:	**Date of inspection:**	**Lot Size**	**Sample Quantity**
Problem Quantity: **Detail:** **Inspection Result (OK/Not OK):**			
Visual Inspection **Problem Quantity:** **Detail:**			
Flash Test **Problem Quantity:** **Detail:**			
EL Inspection: **Problem Quantity:** **Detail:**			
EC Inspection (Hipot,DC Continuity,IR): **Problem Quantity:** **Detail:**			
Any Other Criteria/Remarks:			
Is the shipment qualified to be released? ☐ ☐ **Yes** **No**			
From Client	From EPC Contractor	Solar Energy Corporation of India Limited	

Enclosed: Test Details, Flash Test Report, EL test (images- soft copy), EC Test Report

Disclaimer: *This Inspection by SECI/ Employer does not absolve the responsibility of the vendor to ensure quality during production of the material and its transport to site. Any damages during transport/ handling shall be replaced before erection at site as directed by Engineer-in-charge without any extra cost to the purchaser.*

Details:

Lot :				**Date**
S.No.	**Defect**	**Module Id**	**Type (Ma/Mi)**	**Details**
1				
2				
….				

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Sr.No.**	**Activity & Operation**	**Instruments**	**Class of Check**	**Type of Check**	**Quantum of Check**	**Reference Documents & Acceptance Standard**	**Format of Record**	**D*** (Records identified with (√) shall be issentially included by EPC vender in QA documentation)	**Cheking Agency**			**Remarks**
2								SR - Site Register SECI-SPV-QA-F-XXX SECI-SPV-QA-T-XXX (XXX - Inspection record form No. or Test report format no.)		**M'fr/ Supplier or Sub-Contractor**	**EPC Contractor**	**SECI or Owner**	
3	**1**	**General Requirements**											
4	a	Availability of requisite test set-up and equipment in good working condition with valid calibration at site well before commencement of concerned activity	As required/ agreed	Critical	Physical	Once prior to start of work & Monthly there after	Tech. Specs, Construction Drawings	SR	√		**x**	**x**	**Min. list of equipment** - CTM, Set of Seives for CA & FA, Elcometer (digital), Micrometer, Multimeter, Meggar, Torque Wrench, Moulds for casting of concrete/ mortar test samples, Curing tank of adequate size, SS measuring tape - 50m, Theodolite, leveling staff and associated equipment etc. for day to day work with proper storrage racks. The equipment shall be in adequate no. matching the site progress requirements. Functioning of laboratory equipment in proper working condition to be verified on monthly basis
5	b	Submission of QA & QC manpower deployment schedule based on agreed L-2 network	As required/ agreed	Critical	Verification	Before start of work	Tech. Specs, Construction Drawings	SR	√		**x**	**x**	
6	c	Availability of QA & QC manpower deployment based on agreed deployment schedule, Periodic review for augmentation as per actual progress	As required/ agreed	Critical	Physical	Once prior to start of work & Monthly there after	Tech. Specs, Construction Drawings	SR	√		**x**	**x**	
7	d	Submission of schedule/ programme of tests and inspection of civil works (survey, excavation, concreting, backfilling, brickwork, finishing works, roads, drains etc.) to be done monthly and quarterly based on agreed schedule	As required/ agreed	Critical	Physical	Once prior to start of work & Monthly/ Quarterly there after	Tech. Specs, Construction Drawings	SR	√	**x**	**x**	**x**	
8	e	Submission of actual work programme min. 3 days (72 hours) in advance to facilitate planning for quality checks as per approved QP	As required/ agreed	Critical	Physical	48 hours before start of actual work	Master programme/ schedule	SR	√	**x**	**x**	**x**	
9	f	Stacking and storage of construction materials and components at site	IS: 4062	Critical	Physical	Random	Tech. Specs, Construction Drawings & IS: 4062	SR	√	**x**	**x**	**x**	
11	**2**	**Surveying (Execution phase)**											
12	a	Availability of Calibrated Instruments, qualified & experieced staff at site	As required/ agreed	Critical	Physical	100%	Tech. Specs, Construction Drawings, Agreed deployment schedule	Calibration Report	√	x	x	x	
13	b	Ensure correct Boundary Layout and Latitude-Longitude Coordinates,True North	construction Drawings	Critical	Measurement	100%	Tech. Specs, Construction Drawings	SR	√	x	x	x	
14	c	GL (ground level), FGL (finished ground level) and Plinth Level, Check PBM(permanent bench mark) with Total Station/ Theodolite and after conformation carryout Peg marking	As required/ agreed	Critical	Measurement	100%	Construction Drawings	SR	√	x	x	x	
16	**3**	**Materials**											
17	A	*Cement*											
18	i	Fineness	As per IS: 4031	Critical	Review of MTC/ Physical	One test at Lab to corelate with MTC	IS:456,IS:269,IS:8112, IS:12269,IS:1489, Tech. Specs	Manufacturers Test Certificate (MTC's) and Laboratory Test results	√	**x**	**x**	**x**	Each consignment/ lot of cement shall be duly correlated with MTC If cement stored is more than 60 days in godown the same shall be re-tested for conformation with MTC
19	ii	Compressive Strength											
20	iii	Initial & final setting time											
21	iv	Chemical composition of Cement											
22	B	*Coarse Aggregates (CA)*											

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Sr.No.**	**Activity & Operation**	**Instruments**	**Class of Check**	**Type of Check**	**Quantum of Check**	**Reference Documents & Acceptance Standard**	**Format of Record**	**D*** (Records identified with (√) shall be issentially included by EPC vender in QA documentation)	**Cheking Agency**			**Remarks**
2								SR - Site Register SECI-SPV-QA-F-XXX SECI-SPV-QA-T-XXX (XXX - Inspection record form No. or Test report format no.)		**M'fr/ Supplier or Sub-Contractor**	**EPC Contractor**	**SECI or Owner**	
23	i	Determination of Particle size (Sieve Analysis), Flakiness index, Elongation index	As per IS: 2386	Major	Visual	Once per 100 cum or part thereof (During monsoon moisture content to be checked every day)	IS:383,IS:2386, Tech. Specs	Lab Test results	√	**x**	**x**	**x**	Water content of concrete to be corrected as per results of moisture content
24	ii	Moisture content											
25	iii	Crushing Value, Impact value, Abrasion value		Critical		One test at Lab for each source/ on every change of source			√	**x**	**x**	**x**	These tests shall be carried out while establishing design mix. In case of change of source the design mix shall be re-validated for new source
26	iv	Specific Gravity, water absorption											
27	v	Bulk Density											
28	vi	Soundness											
29	vii	Presence of deleterious materials											
30	C	*Fine Aggregate (FA)*											
31	i	Gradation/Determination of Particle size (Sieve Analysis)	Balance, Oven etc. As per IS: 2386, 383	Major	Visual	Gradation - Once per 1000 cum or part there of Mosture content - Every day	IS:383,IS:2386,IS:456 , Tech. Specs	Lab Test results	√	**x**	**x**	**x**	Water content of concrete to be corrected as per results of moisture content
32		Moisture Content											
33	ii	Specific Gravity and density (for design mix concretes only)	As per IS: 2386, 383	Major	Visual	One test at Lab for each source/ on every change of source							
34	iii	Water absorption (for design mix concretes only)											
35	iv	Presence of deleterious materials											
36	D	*Concrete Admixture*											
37	i	Type of admixture			Review of MTC		IS: 9103, Approved design mix		√	**x**	**x**	**x**	Admixture shall be of brand and type as per approved design mix.
38	ii	Physical & Chemical properties			Review of MTC		IS: 9103, Manufacturer's Brochure						Each lot/ batch of admixurture shall acompany the Manufacturer's Brochure and shall be correlated with MTC
39	iii	Suitability											
40	E	*Bricks*											
41	i	Dimensional Tolerance, shape			Measurement/ Physical	As per relevant IS code/ one sample for 30,000 nos. or part there of	IS: 1077, IS: 13757, IS: 12894, Tech. Specs, Construction Drawings	Lab Test results	√	**x**	**x**	**x**	Efflorescence shall be checked at each source
42	ii	Compressive Strength											
43	iii	Water Absorption											
44	iv	Efflorescence			Visual								
45	E	*Water*											
46	i	Cleanliness - Test for ascertaining limit of solids		Major		One per 3 months for each source	IS:456,IS:3025 (part 18), Tech. Specs, Construction Drawings specification	Lab Test reports	√	**x**	**x**	**x**	Water to be used for concrete shall be of potable quality and shall meet requirements specifed in IS: 456
47	ii	Chemical Tests to ascertain the suitability for construction purposes - pH Value, Sulphate & Chloride content					IS:456,IS:3025 (part 22, 23), Tech. Specs, Construction Drawings	Lab Test reports	√	**x**	**x**	**x**	
48	F	*Reinforcement Steel*											
49	i	Identification & Size		Major	Visual	Each batch of delivery	IS:432,IS:1786,IS:1852, Tech Specs	SR	√	**x**	**x**	**x**	Reinforcement steel shall be stored properly at site to avoid rusting
50	ii	Freedom from cracks, surface flaws, lamination				Random in each shift			√	**x**	**x**	**x**	
51	iii	Tensile Test		Critical	Review of MTC	Each batch of delivery	IS:432,IS:1566,IS:1786, Tech Specs	Manufacturers Test Certificate (MTC's)	√	**x**	**x**	**x**	
52	iv	Yield stress/proof stress											
53	v	Percentage Elongation							√	**x**	**x**	**x**	
54	vi	Bend/Rebend Test											
55	vii	Reverse Bend Test for HDS wire					IS:432, Tec. Specs		√	**x**	**x**	**x**	
57	**3**	**Structural Steel Work {Example: Chequered plate cover, Panel supports, Rungs, Cat lader, Inserts, Fencing gate (MS) etc.}**											
58	i	Strutural Steel (Raw material)-Chemical Properties, Ultimate Tensile Strength(UTS), Yield Strength (YS), Percentage Elongation, Bend test		Critical	Review of MTC	For each batch of each section	IS: 2062, IS: 8500, Tech. Specs, Construction Drawings	Manufacturers Test Certificate (MTC's)	√	**x**	**x**	**x**	MTC to be correlated
59	ii	Dimensional Check - Secition dimensions, thickness		Critical	Measurement	10% of total quanity at Random			√	**x**	**x**	**x**	For Fencing gate - dimensional check 100%

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2								SR - Site Register SECI-SPV-QA-F-XXX SECI-SPV-QA-T-XXX (XXX - Inspection record form No. or Test report format no.)		**M'fr/ Supplier or Sub-Contractor**	**EPC Contractor**	**SECI or Owner**	
60	iii	Visual checks for damages, rusting, pitting, scaling etc.		Major	Visual	100%	IS: 822, Tech. Specs, Construction Drawings, MTC, relevant BIS standards for painting	Manufacturers Test Certificate (MTC's)/ SR	√	**x**	**x**	**x**	
61	iv	Visual checks for welding defects, painting (surface preparation, primer coat, and Finishing coat - make and shade of paint, DFT) as applicable.		Major	Visual/ Measurement/ Review of MTC	10% of total quanity at Random			√	**x**	**x**	**x**	MTC to be correlated
62	v	Acceptance ofStructural steel works		Major	Physical/ Acceptance	Random	Tech. Specs, Construction Drawings	SR	√	**x**	**x**	**x**	
64	**4**	**Foundation System**											
65	**A**	**Bored Cast in-situ Concrete Piling (for MMS support)**											
66	**a**	**Execution**											
67	i	Ensuring correctness of layout		Critical	Physical	100%	Tech. Specs, Construction Drawings	SR	√	**x**	**x**	**x**	
68	ii	Checking of pile making as per drawing	Total Station	Major	Vsual								
69	iii	Checking of Centre line of Pile Group	Total Station	Critical	Physical								
70	iv	Check Pile Location	Total Station										
71	v	GL, Pile depth, diameter and alignment	As required		Measurement								1. During boring of pile, record SPT/ core recovery to ensure socketing length in the hard strata equivalent in terms of pile diameter in hard rock zone as per tech Specs and approved construction drawings. 2. In case of collapse of pile bore during drilling temporary MS lining shall be used. 3. Lines and levels to be checked 4. Each bore shall be cleaned of any loose materail by pressure jet washing/ cleaning by air jet 5.The column section shall pe placed and held in position in true vertical alignment using template/ tripod till initial setting of concrete 6. Concrete garde - as per Construction Drawing
72	vi	Cleaning/ flushing of pile bore	As required	Major	Visual		IS 2911, Tech Specs, Construction Drawings	SR	√	**x**	**x**	**x**	
73	vii	Insertion & positioning of Column post in the bore hole (in case of embeded col. Leg) Placement of reinforcement and foundation bolts with template (inacse of fixing of col. with base plate & foundation bolt assembly)	As required	Critical	Visual/ Measurement								
74	viii	Acceptance of Pile casting - Shape, reinforcement or col. leg embedment (as aplicable), concreting, compacting with use of needle vibrator etc.	As required/ Agreed	Major	Visual								
75	ix	Grouting u/s of base plate	As required/ Agreed	Critical	Visual	100%	Tech. Specs & Construction drawings	SR	√	**x**	**x**	**x**	The type, grade and thickness of grout shall be as per approved drawing
76	**b**	**Testing**											
77	i	Initial pile load test - Compression (Vertical), Lateral (Horizontal), & Pull out (Tension)	Calibrated dial gauges, jack of required capacity, datum bars etc.	Critical	Physical	100% for 3 no. for each type of test or as specified in Tech Specs, Approved test pile layout	IS 2911, Tech Specs, Construction Drawings	Test Report	√	**x**	**x**	**x**	1. The R/F details shall be as per approved drawing for test plie (if applicable), 2. The test load shall be up to 2.5 times of required pile capacity in case of Compression and Lateral load and 2 times in case of Pull out test as per IS: 2911 (Pt. 4), 3. The location shall be as per approved pile test programme/ layout drawing 4. The test shall be carried out as per approved methodology 5. Test report along with test records shall be submitted in standard format as per IS:2911
78	ii	Routine pile tests - Pull out and Lateral		Critical	Physical	100% for 0.5% of total no. of working piles for each type of test	IS 2911, Tech Specs, Construction Drawings	Test Report					1. The piles for routine tests shall be selected at Random to represent total no. of job piles insalled 2. The test load for vertical and pull out shall be 1.5 times the required pile capacity 3. The test shall be carried out as per approved methodology. 4. The Test report along with test records shall be submitted in standard format as per IS:2971 (Pt. 4)

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80	**B**	**Cable Trench/ Building & Equipment Foundations**											
81	**a**	Before Excavation											
82	i	Ensuring correctness of layout		Critical	Physical	100%	Tech. Specs, Construction Drawings	SR	√	**x**	**x**	**x**	
83	ii	Checking of trench marking & alignment		Major	Visual		Tech Specs, Construction Drawings						
84	**b**	Excavation											
85	i	Dimensional conformity including diagonal check		Ctitical	Visual / Measurement	100%	IS:3764, Tech Specs, Construction Drawings	SR	√	**x**	**x**	**x**	
86	ii	Excavated earth kept away from edges		Minor	Visual	Random		SR	√	**x**	**x**	**x**	
87	**c**	Acceptance of Trench/ Foundation casting - Shape, reinforcement, shuttering, concreting, etc.		Minor	Physical	100%	Tech. Specs, Construction Drawings	SR	√	**x**	**x**	**x**	
89	**5**	**Foundation Bolts / Inserts/ Concrete embedments**											
90	i	Visual check of mechanical damage and galvanising painting if applicable on inserts			Visual / Measurement	100%	As per Tech Specs, Construction Drawings	SR	√	**x**	**x**	**x**	
91	ii	Bolt and assecories, inserts - Dimensions (total & threaded length & dia of bolt, size & thk of embedment and lugs etc.), Nos											
92	iii	Verticality, alignment, levels, pitch distance, embeded and projected length of bolt											
93	iii	Use of template for Alignment and Level checking											
94	iv	Acceptance of foundation bolt assembly / inserts in postion											
96	**6**	**Formwork**											
97	i	Materials & Accessories	As agreed/ required	Major	Visual	Once before start of work	IS :456 , Other relevant BIS Standard, Tech. Specs, Construction Drawings	SR	√	**x**	**x**	**x**	
98	ii	Soundness of staging, shuttering and scaffolding including application of mould oil/ release agent	As agreed/ required	Major	Visual	Once before start of work	Manufacturer's specs, IS :3096, IS:4014, IS: 4990, Tech. Specs, Construction Drawings	SR	√	**x**	**x**	**x**	
99	iii	Dimensional Check, alignment & levels as per drawing and tolerences		Major	Visual/ Measurement	100%	Tech. Specs, Construction Drawings	SR	√	**x**	**x**	**x**	
100	iv	Proper sealing of joints, Acceptance of formwork before concreting		Major	Physical/ Visual	Before start of concreting	As per provisions, tolerences, Tech. Specs, Construction drawings		√	**x**	**x**	**x**	
102	**7**	**Placement of Reienforcement Steel**											
103	i	Check whether Bar bending schedule (BBS) with necessary lap, spacers & chairs is available before start of cutting & bending of bars	As agreed/ required	Major	Visual/ physical	Random in each shift at each work site	Tech. Specs, Construction Drawings, IS: 2502	SR	√	**x**	**x**	**x**	
104	ii	Check whether cutting and bending of bars is as per BBS and placement conforms construction drawings			Visual/ measurement								
105	iii	Check whether all joints and crossing of bars are tied properly with right gauge and annealed wire			Visual								

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106	iv	Check for proper cover,spacing of bars, spacers & chairs after the reinforcement cage has been put inside the foundation			Visual								
107	v	Check whether lapping of bars are tied properly with right gauge and annealed wire			Visual								
109	**8**	**Concrete**											
110	i	Availability of approved Design Mix (for all specified grades)		Critical	Physical	For each specified grade of concrete	IS :456, Tech Specs, Construction Drawings	Approved mix design	√		**x**	**x**	The concrete shall be as per approved design mix and the materials (cement, coarse and fine aggregate shall be from the same source considered during mix trials. The mix design shall be verified and approved in case of change of source of any of the matearials
111	ii	Minimum cement content (as applicable in MMS piling and foundation/ below ground works)		Critical	Physical	For piling and foundation works	IS: 456, Tech. specs, Construction drawings	SR	√		**x**	**x**	The minimum cement content shall correspond to exposure conditions and/ or, suplphate contents in ground water/ soil
112	iii	Trial mixes to ascertain the workability and cube strength	As per recommended mix design from specialist agency	Critical	Physical/ Testing	One for each mix proportion	Tech. Specs, IS: 456	Lab Test Reports	√	**x**	**x**	**x**	Necessary correction for moisture content and water absoption according to mix design recommendations may be carried out during trial mix
113	iv	Mixing of concrete- check for quanities of cement, CA, FA and water used, Concrete shall be homogenous	Mixing shall be done in a approved mixer/ batching plant (conforming to IS: 4926/ 4925)	Major	Physical	Mixer/ Batcher to be calibrated at the time of starting and subsequently once in tree months	IS: 4925, IS: 4926	Calibration Report/ Certificate	√	**x**	**x**	**x**	Review of calibration chart/ Certificate as per IS: 4926 Qty. of materials including cement consumptionshall be available through on line printer
114	v	Handling & trasportation	As required	Major	Physical	100%	As per approved/ agreed construction methodology	SR		**x**	**x**	**x**	Concrete shall be placed within 30 minutes of its removal from mixer
115	vi	Placement of concrete	As required	Major	Visual/ Physical	100%			√	**x**	**x**	**x**	
116	vii	Compacting	As required	Major	Physical	At Random			√	**x**	**x**	**x**	
117	viii	Curing	As required	major	Physical	At Random	IS: 456	SR		**x**	**x**	**x**	
119	**9**	**Concrete Testing & Acceptance**											
120	i	Workability - Slump Test		Critical	Physical	At the time of concrete pouring at site every 2 hrs	IS:456, IS:516,IS:1199, Tech Specs, Construction Drawings	Test Results / SR	√	**x**	**x**	**x**	
121	ii	Crushing strength - (Works test cubes)		Critical	Physical	Testing	IS:456, IS:516,IS:1199, Tech Specs, Construction Drawings	Test Results/ SR	√	**x**	**x**	**x**	**MMS Pile** - 6 cubes (3 for 7 day test & 3 for 28 day strength) per sample for each 5 cum or part there off **Building work and Equipment/ Misc foundations etc.** - 6 cubes (3 for 7 day test & 3 for 28 day strength) per sample for each 25 cum or part there off
122	iii	Acceptance of concrete work - Dimensional check (dimensions, levels etc), placement of bolts, inserts, pockets, pitch distance for bolts etc.	As required & dimensional tolerences	Major	Visual/ Measurement	100%		Joint Protocol between Civil Conractor, EPC Vendor and SECI/ Owner where applicable/ SR	√	**x**	**x**	**x**	
124	**10**	**Acceptance of Hardened Concrete**											
125	i	Dimensional check (dimensions, levels etc), workmanship, finsishing after removal of shuttering	As required & dimensional tolerences	Major	Visual/ Measurement	At Random			√	**x**	**x**	**x**	

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126	ii	Water tightness test for liquid retaining structures/ tanks	As required	Critical	Physical/ Testing	100%	IS: 3370 (Pt.4), Tech Specs, Construction Drawings	SR/ Test Records	√	**x**	**x**	**x**	Water tightness test shall be performed for Under ground (UG) water tank, Septic tank
128	**11**	**Excavation & filling in foundations, trenches, plinth & grading works**											
129		**Excavation**											
130		Nature, Type of soil/ rock before and during excavation		Major	Visual	Random in each shift	Tech. Specs., Construction Drawings	SR		**x**	**x**	**x**	
131		Initial GL before start of excavation		Major	Measurement	100%		SR	√	**x**	**x**	**x**	
132		Final shape/ size & dimensions of excavation		Major	Measurement	100%		SR	√	**x**	**x**	**x**	
133		Final excavation levels		Major	Measurement	100%		SR	√	**x**	**x**	**x**	
134		Side slope of final excavation		Major	Measurement	Random in each shift		SR		**x**	**x**	**x**	
135	**12**	**Fill / Backfill**											
136	i	Suitability of borrowed earth for filling (if applicable) - Grain size analysis, Atterberg limits, Free swell index, Organic matter		Major	Physical	One in every 2000 cum or part there of for each type and source of fill material subject to min. 2 samples	IS: 2720 (Pt. IV), IS: 2720 (Pt. XI), Tech Specs, Construction Drawings	Lab Test Results/ SR	√	**x**	**x**	**x**	The parameter should not be worse than the parameter of the existing soil in plant area
137	ii	Optimum moisture content (OMC), Max. dry density (MDD) before fill		Critical	Visual	At Random	IS: 2720 (Pt. I), IS: 2720 (Pt.VII), Tech Specs, Construction Drawings	Lab Test Results/ SR	√	**x**	**x**	**x**	
138	iii	Layer thickness, Compaction procedure		Major	Visual	At Random	Approved Methodology, Tech. Specs, Construction Drawings	SR	√	**x**	**x**	**x**	The layer thickness, Type & Capacity of roller, No. of passes shall be as per approved methodology, Construction Drawing, Tech. Specs
139	iv	Degree of compaction - 1. Dry density by proctor needle penetration 2. Earth filling - In-situ Dry density (core cutter or sand replacement method) or Sand Filling - In-situ Relative density (Density Index)		Critical	Physical	(i) For foundation fill/ backfill - One for every 10 foundations at Random for each compacted layer (ii) For area grading/ filling - one every 1000 sqm area for each compacted layer	IS: 2720 (Pt. XXIX), IS: 2720 (Pt. XXVIII), IS: 2720 (Pt. XIV), Tech Specs, Construction Drawings	Test Results/ SR	√	**x**	**x**	**x**	
141	**13**	**Brick masonry work**											
142	i	Soaking of Bricks before use		Major	Physical	100%	IS: 2250	SR		**x**	**x**	**x**	
143	ii	Grading of sand, Mortar mix / proportion, Compressive strength, Consistency		Major	Physical/ Test	At Random	IS: 2250, IS: 2116, Tech Specs, Construction Drawings / As per Design Specification	Lab Test Results/ SR		**x**	**x**	**x**	The sand grading shall conform to IS: 2116
144	iii	Workmanship, Verticality (Plumb) / Alignment		Major	Physical/ Measurement	100%	IS: 2212, IS: 1905, Tech Specs, Construction Drawings	SR	√	**x**	**x**	**x**	
145	iv	Check for Bond/closers, joints		Major	Visual	At Random	IS: 2250	SR		**x**	**x**	**x**	
146	v	Curing		Major	Visual	100%	IS: 2250 / As perTech. Specification	SR		**x**	**x**	**x**	
148	**12**	**Cement Plaster**											

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149	i	Quality & Grading of sand, Check for mix proportion, wetting the surface etc		Major	Physical	At Random	IS: 2116, IS: 2386 (Pt. I & II), IS: 1542, Tech Specs	Lab Test Results/ SR		x	x	x	Sand to be used shall be free from deleteriousmaterials, Grading shall conform to Table-I of IS: 2116
150	ii	Plaster & grooves - Thickness, Evenness & Finishing, Trueness os palstering system		Major	Visual/ Measurement	At Random in each shift	Tech Specifications, Construction Drawings	SR	√	x	x	x	Trueness - Deviation not more than 4mm when checked with straight edge of 2m length
151	iii	Hacking, Raking of joints, Cleaning the surface, Removing all loose particles, Wetting the surface etc		Major	Visual	At Random in each shift	IS 1661, Tech Specs	SR		x	x	x	
152	iv	Curing		Minor	Physical	100%	IS 1661, Tech Specs	SR		x	x	x	
154	**14**	**Painting System - Plastered Masonry & Concrete surface**											
155	i	Materials & accessories - Approval for Paint, Color shade and Brand- Dry distemper, Oil Bound Distemeper, Acrylic Emulsion, Chemical resistant, Oil resistant Paint, Weather proof acrylic exterior paint, water proof cement paint etc.	As approved by SECI/ Owner	Critical	Review of MTC	Each batch of delivery	Tech Specs, Construction Drawings	MTC/ SR	√	x	x	x	MTC shall be correlated with the material received
156	ii	Surface preparation	As required	Minor	Physical	Random in each shift	IS: 2935 (Pt.1), Tech Specs, Construction Drawings	SR	x	x	x	x	
157	iii	Number of coats	As required	Major	Physical	Random in each shift	Tech Specs, Construction Drawings	SR	x	x	x	x	
158	iv	Application and Acceptance of painted surface	As required	Major	Physical	Each surface at Random							
160	**15**	**Floor finishes & Alied works**											
161	i	Preperation of Sub-grade			Physical	At Random for each building	Tech. Specs, Construction Drawings	SR	√	x	x	x	
162	ii	Plinth filling in layers (stone agrregates/ rubble with interstices filled with sand), ramming & compaction			Physical	At Random for each building	IS: 2720, Tech. Specs, Construction Drawings		√	x	x	x	Quality Checks as aplicable to Fill/ Back fill
163	iii	Check providing shuttering, reinforcement (if applicable)			Physical	At Random for each building	Tech. Specs, Construcion Drawings			x	x	x	Quality Checks as aplicable to Shuttering/ Reinforcement placement
164	iv	Checking the Panel size (as applicable)			Physical	At Random for each building	IS: 5491, Tech. Specs, Construcion Drawings			x	x	x	The concrete shall be cast in alternate panels in chess board fashion, panel size as specified in Construction Drawing or 25 sqm
165	v	Availability of Design mix (if applicable)			Visual	At Random for each building	Tech. Specs, Construcion Drawings	Mix Design Report/ SR		x	x	x	
166	vi	Clearance for concreting (as applicable)			Physical	100%	Tech. Specs, Construction Drawings	Joint Protocol between Civil Contractor, Eqpt. Supplier/ EPC Vendor & SECI/ Owner SR		x	x	x	
167	viii	Performing concreting ensuring Grade/Mix Proportions, Compaction, Thickness and Finish			Physical	At Random per shift	IS; 456, Tech. Specs, Construction Drawings	SR	√	x	x	x	Quality Checks as aplicabel to Concrete Work
168	viii	Curing			Visual	100%	IS: 456, Tech. Specs	SR		x	x	x	Minimum up to 10 days from date of casting
169	ix	Testing of Concrete Cubes for Flooring			Physical	One sample for every 20 Cum of concreting or part thereof for each days concreting (one sample consists of min 3 test cubes for 28 days strength)	IS:456, IS:516,IS:1199 and Design specification	Lab Test Reports					
170	x	Tiled flooring/ dado											

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171	a	Material - Glazed ceramic Tiles, Vitrified Ceramic Tiles, Mosaic Tailes, Acid alkali Tiles, Heavy duty cement concrete tiles	As agreed/ required	Critical	Review of MTC & Test Reports	Each lot of material received	IS:13755, IS:1237, IS:8042, Tech Specs, Construction Drawings	MTC/ SR	√	x	x	x	MTC shall be correlated for all the parameters specified in Tech. Specs, BIS Standard
172	b	Finishing & Acceptance		Major	Physical	100%	IS: 1443, Tech Specs, Construction Drawings						
173	xi	IPS with or without IRONITE (as aplicable)		Major	Physical	At Random per shift	IS: 5491, Tech. Specs, Construction Drawings	SR	√	x	x	x	
174	xi	Fixing of Panel Dividers for finishing course (3 mm Thk Glass/ 2mm Thk Aluminium strip) (if applicable)		Major	Physical	At Random per shift	Tech Specs, Construction Drawings	SR	√	x	x	x	
175	xii	Anti abrasion/ anti wearing epoxy coating (if aplicable)											
176	a	Material	As agreed/ required	Critical	Approved Make and Type	Each lot of material received	Tech Specs, Construction Drawings, Manufacturer's Brochure/ Recommendations	manufacturer's Brochure/ SR	√	x	x	x	Material specifications to be correlated with Manufacturer's Brochure
177	b	Finishing & Acceptance		Major	Physical	100%	Tech Specs, Construction Drawings	SR	√	x	x	x	
178	xiv	Kota stone flooring and skirting (as aplicable)											
179	a	Material	Quality, Texture, Thickness, Colour fro approved source	Major	Physical	Each batch of delivery	Tech Specs, Construction Drawings	SR	√	x	x	x	
180	b	Finishing & Acceptance		Major	Physical	100%	Tech Specs, Cosntruction Drawings	SR	√	x	x	x	
181	xv	Acid/ Alkali resistant tile flooring/ dado											
182	a	Material -Tiles, Mortar, Sealing, Fillers etc.	Thickness, Quality,	Critical	Approved source, Review of MTC/ Test Report	Each batch of delivery	Tech Specs, Construction Drawings	SR	√	x	x	x	The acid alkali resistant tile flooring nd dado shall be provided in battery room as per approved Arch finishing details
183	b	Finishing & Acceptance	Workmanship	Major	Physical	100%	Tech Specs, Construction Drawings	SR	√	x	x	x	
184	xvi	Interlocking Blocks											
185	a	Materials	Size/ Shape, colour shade, Grade of Concrete	Critical	Approved source, Review of MTC/ Test Report	Each batch of delivery	BS: 6717, Tech Specs, Construction Drawings	SR	√	x	x	x	
186	b	Final finishing & Acceptance	As agreed/ required	Major	Physical	100%	BS: 7533 (Pt.3), Tech Specs, Construction Drawings	SR	√	x	x	x	
188	**16**	**Damp Proof Course**											
189	i	Material - Hot bitumen & water proofing materials etc.	As agreed/ required	Critical	Review of MTC	Each batch of delivery	IS: 702, Tech. Specs, Cosntruction Drawings	SR	√	x	x	x	
190	ii	Acceptance of Damp Proof Course - Thickness, Grade of PCC, Application of Bitumen layer etc.	As agreed/ required	Major		100%	Tech Specs, Construction Drawings	SR	√	x	x	x	
192	**17**	**Grouting of pockets/ underside of base plate**											
193	i	Material	As required/ Agreed	Critical	Review of MTC/ Physical	Each batch of delivery	Tech. specs, Construction Drawings, Manufacturerr's catelogue	SR	√	x	x	x	In case of ready mixed grout MTC to be correlated with Manufacturerr's catelogue
194	ii	Type of Mix	Anti shrink cement grout/ Ready mixed - Fluid mix, stiff mix as required	Major	Physical	At Random prr shift of grout application	Tech. specs, Construction Drawings	SR	√	x	x	x	In case of cement grout anti shrink compound shall be added as per provisions of relevant IS/ Cosntruction Drawing
195	iii	Mixing, placement, application	As required	Major	Visual	At Random prr shift of grout application	Tech. Specs, Construction Drawings	SR	√	x	x	x	
196	iv	Crushing Strength - Test cubes	As required	Major	Physical/ Testing	3 cubes for entire grouting work	IS: 4031 (Pt.6), Tech Specs, Construction Drawings	SR/ Lab Test Report	√	x	x	x	

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197	v	Acceptance of Grouting	Thickness, Finished level etc.	Major	Physical	!00% of 20 % of grout work at Random	Tech. Specs, Construction Drawings	SR	√	x	x	x	
199	**18**	**Precast Concrete**											
200	**a**	**Bought Out Units (Precast boundary wall units - Slab Panels, Column etc., Trench Covers , Manhole Covers, Paver Blocks etc.)**											
201	i	Crushing strength	As required	Critical	Review of MTC/ Test Reports	100% for Each batch of delivery	IS: 456, IS:516, IS: 1199, Tech Specs, Construction Drawings	MTC	√	x	x	x	Sampling as per IS: 456, Vendor record review
202	ii	Workmanship, dimentions, R/F	As require/ agreed	Major	Review of MTC/ Physical	Each batch of delivery at Random	Tech Specs, Construction Drawings	MTC/ SR	√	x	x	x	Vendor record review, Physical check at Random
203	**b**	**Cast at site (if applicable)**											
204	i	Crushing strength - Test Cubes	As required	Critical	Testing		IS: 456, IS:516, IS: 1199, Tech Specs, Construction Drawings	SR	√	x	x	x	1 sample of 6 cubes (3 for 7 days strength, 3 for 28 days strength) for each 5 cum of concrete with minimum 1 sample per shift of concrete work
205	ii	Workmanship, dimentions, R/F	As required/ agreed	Major	Physical	At Random	Tech Specs, Construction Drawings	SR		x	x	x	
206	**c**	**Acceptance of pre-cast concrete units**											
207	i	Bought Out Units - Check for any breakage, damage during handing & trasport, erection at site (levels) etc.	As required/ Agreed	Major	Visual	At Random	Tech Specs, Construction Drawings	SR	√	x	x	x	
208	ii	Cast at site (if applicable) - Check for curing, damage during handling, erection at site (level) etc.	As required/ Agreed	Major	Visual	100% of 10% at Random	Tech Specs, Construction Drawings	SR	√	x	x	x	
210	**19**	**Joints In concrete**											
211	i	Joint Material - Bitumen inpregnataed fiber board, PVC water stop, Sealing compound - Bitumastic/ polysulphide, Hydrophilic strip, Expanded polysterene (thermocol) board etc.	As per manufacturer's standards	Critical	Review of MTC	Each batch of delivery	Tech. Specs, Construction Drawings, IS: 1838, IS:1834, IS:2200	MTC	√	x	x	x	
212	ii	Acceptance of installation	As agreed/ required	Major	Physical	Each installation at Random	Tech. Specs and Construction Drawings	SR	√	x	x	x	
214	**20**	**Underdeck Insulation Works**											
215	i	Insulation material - Mineral/ Glass wool, galvanized wire neting, Aluminium foil, fasteners etc.	As agreed/ required	Critical	Review of MTC/ Test Reports	Each lot received at site	Tech. Specs and Construction Drawings	MTC/ Test Reports/ SR	√	x	x	x	All tests as per Tech. Specifications
216	ii	Acceptance of installation	As agreed/ required	Major	Physical	Each installation	Tech. Specs and Construction Drawings	SR	√	x	x	x	
218	**21**	**False Ceiling**											
219	i	Materials - Gypsum board/ Tiles, Particle board tiles, Al tiles/ Strips, GI hangers, AL/ GI Tee support, AL/ GI Edge angle, Fasteners etc.	As agreed/ required	Critical	Visual/ Physical, Review of MTC	Each lot received at site	IS:2095, IS:8183, Tech. Specs and Construction Drawings	MTC/ SR	√	x	x	x	Compare MTC with Tech. Specifications and requirements
220	ii	Acceptance of Installation	As agreed/ required	Major	Visual/ Physical	Random	Tech. Specs and Construction Drawings	SR		x	x	x	
222	**22**	**Doors, Windows, Ventilators, Glass/ Glazing and Grill**											

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223	i	Door Frame (Hollow steel metal, Aluminium, Wooden etc. including fittings such as hold fasts etc.)	As agreed/ required	Critical	Visual, Physical, Reviewof MTC/ Test Reports	Each lot received at site	Tech. Specs and Construction Drawings	MTC/ Lab Test Reports/ SR	√	**x**	**x**	**x**	
224	**a**	**Steel Doors**											
225	i	Materials (MS sheet & Stiffeners, fasteners,hinges, jambs, lock strike plate, hydraulic door closer, fittings and fixtures etc)	As agreed/ required	Critical	Visual/ Physical/ Review of MTC, Test Report	Each lot received at site	IS:2062, Tech. Specs and Construction Drawings	MTC/ Lab Test Report/ SR	√	**x**	**x**	**x**	Review of MTC/ Test Report
226	ii	Finishing & Acceptance - Surface preperation for painting, primer & finishing coat, DFT	As agreed/ required	Major	Visual/ Physical	Random	Tech. Specs and Construction Drawings	SR	√	**x**	**x**	**x**	
227	**b**	**Flush Doors**											
228	i	Shutters, Teak beading	As agreed/ required	Critical	Review of MTC/ Test Report	Each lot received at site	IS:2202, Tech. Specs and Cosnstruction Drawings	MTC/ Lab Test Report/ SR	√	**x**	**x**	**x**	
229	ii	Acceptance	As agreed/ required	Major	Visual/ Physical	Random	Tech. Specs and Construction Drawings	SR		**x**	**x**	**x**	
230	**c**	**Aluminium doors and Partition works**											
231	i	Materials- Aluminium sections (average thickness, alkali resistant, anodisation, power coating and colour shade etc.), fittings and fixtures. floor spring, hydraulic door closer, hinges, etc.	As agreed/ required	Critical	Visual/ Physical/ Review of Test Report	Each lot received at site	IS:1948, IS;1949, IS:733, IS:1285, IS:1868, IS:11857, Tech. Specs and Construction Drawings	SR/ Lab Test Reports	√	**x**	**x**	**x**	Review of Test Report For anodization check as per Tech. Specs and Construction Drawings Power coating, colour shade as applicable as per Tech. Specs and Construction Drawings
232	ii	Finishing & Acceptance - fabrication & erection, fitting etc..	As agreed/ required	Major	Visual/ Physical	Random	Tech. Specs and Construction Drawings	SR		**x**	**x**	**x**	
233	**d**	**Grill**											
234	i	Materials - Aluminium, MS, Anodization in case of aluminium	As agreed/ required	Critical	Visual/Physical/ Review of Test Report	Each lot received at site	Tech. Specs and Construction Drawings	SR/ Lab Test Reports	√	**x**	**x**	**x**	Review of Test Reports
235	ii	Finishing & Acceptance - erection, fitting, painting in case of MS grill etc.	As agreed/ required	Major	Visual/ Physical	Random	Tech. Specs and Construction Drawings	SR		**x**	**x**	**x**	
236	**e**	**Rolling Shutters**											
237	i	Surface finish, Thickness of plate, mechanically operated	As agreed/ required	Critical	Visual/ Physical/ review of MTC	Random for each lot of delivery	IS:8248, Tech. Specs & Construction Drawings	SR	√	**x**	**x**	**x**	
238	ii	Finishing and Acceptance -Painting , DFT	As agreed/ required	Major	Visual/ Physical	Random	Tech. Specs and Construction Drawings	SR		**x**	**x**	**x**	
239	**f**	**Glass and Glazing**											
240	i	Material - Clear float glass, wired glass, tinted glass, ground glass, figured glass, thickness	As agreed/ required	Major	Review of MTC/ test reports	For each lot received at site	IS: 14900, IS:1081, IS: 3548, IS:5437 Tech Specs and Construction Drawings	SR	√	**x**	**x**	**x**	
241	ii	Installation, finishing and acceptance	As agreed/ required	Major	Visual/ Physical	Random	Tech Specs and Construction Drawings	SR	√	**x**	**x**	**x**	
243	**23**	**Precast Concrete Boundary Wall**											
244		Acceptance of boundary wall- Finising, Alignment Dimensions etc.	As agreed/ required	Major	Physical		Tech Specs and Construction Drawings	SR		**x**	**x**	**x**	For inspection of precast concrte units -refer S.No. 18
246	**24**	**Roof Water Proofing**											
247	i	Methodology for the application of water proofing system	As required	Critical	Review	for each type of treatment	Tech Specs and Const. Drawings						
248	**a**	Materials											

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249	i	Polyurethene based coating, polyester scrim cloth, extruded HD dimpled polyurethene	As agreed / required	Critical	Review of MTC/ test reports	For each lot received at site	ASTM C-836, ASTM C898 and Tech Specs /Const. Drawings	MTC/ SR	√				
250	**b**	Roof											
251	i	Graded under bed - Slope/ Level	As agreed / required	Major	Physical	100%	Tech Specs and Construction Drawings	SR		**x**	**x**	**x**	
252	ii	Elastomaric coatings -Primer coat, Finishing coat	As agreed / required	Major	Review of MTC/ test reports	Each lot of delivery	Tech Specs and Construction Drawings	MTC/ Test Reports/ SR	√	**x**	**x**	**x**	
253	iii	Wearing Course - PCC-Grade, chicken wire mesh, elastomeric sealant	As agreed / required	Major	Visual/ Review of MTC	Each lot of delivery of material/ Review of Test Report	Tech Specs and Construction Drawings	MTC/ Test Reports SR	√	**x**	**x**	**x**	2 samples of 3 no. of test cube each shall be taken for PPC work for testing of crushing strength of concrete mix, Review of MTC for Chicken wire mesh, waterproof sealant
254	c	Acceptance of Water proofing treatment	As agreed/ required	Major	Visual/ Physical	100%	Tech Specs and Construction Drawings	SR		**x**	**x**	**x**	
256	**25**	**Water Supply and Sanitary Installations**											
257	**a**	**Water Supply Fittings and Fixtures**											
258	i	Materials - GI/ MS/ C-PVC/ uPVC/PPR/HDPE pipes and fittings	As agreed / required	Critical	Review of MTC/ test reports	Each lot of delivery as per Specifications	IS:1239, IS:4736, IS:4985, IS:6745, IS: 4984, IS:2633, IS:2629, IS:15778, IS:15801, Tech Specs and Construction Drawings	MTC/ SR	√	**x**	**x**	**x**	
259	ii	Disinfection - Before use	As agreed / required	Major	Physical	Each installation	IS:2065, Tech specs and construction Drawings	SR		**x**	**x**	**x**	
260	iii	Hydraulic test - Before use/ Leakage	As agreed / required	Critical	Physical	Each installation	Tech Specs and Construction Drawings	SR		**x**	**x**	**x**	
261	iv	Acceptance & Working	As agreed / required	Major	Physical	Random	Tech Specs and Construction Drawings	SR		**x**	**x**	**x**	
262	**b**	**Sand Cast Iron/ Cast iron Pipes**											
263	i	Material - SCI / CI pipes and fittings / joints	As agreed / required	Critical	Review of MTC/ test reports	Each lot of delivery (as applicable)	IS: 1729, IS:1536, IS:1538, Tech Specs and Construction Drawings	MTC/ SR	√	**x**	**x**	**x**	
264	ii	Acceptance and leakage	As agreed / required	Major	Physical	Random	Tech Specs and Construction Drawings	SR		**x**	**x**	**x**	
265	**c**	**HDPE Pipes for Sewerage**											
266	i	Material- HDPE pipes and fittings/ joints	As agreed/ required	Critical	Review of MTC/ test reports	Each lot of delivery (as applicable)	IS:14333, Tech. Specs	MTC/SR	√	**x**	**x**	**x**	
267	ii	Acceptance & leakage	As agreed / required	Major	Physical	Random	Tech Specs and Const. Drawings	SR		**x**	**x**	**x**	
268	**d**	**HDPE Pipes for Rain water Downcommer**											
269	i	HDPE pipes and fittings/ joints	As agreed/ required	Critical	Review of MTC/ test reports		IS:4984, Tech. Specs	MTC/SR	√	**x**	**x**	**x**	
270	ii	Acceptance & leakage	As agreed / required	Major	Physical	Random	Tech Specs and Const. Drawings	SR		**x**	**x**	**x**	
271	**e**	**Sanitary fitting and fixtures**											
272	i	Sanitory items and fixtures i.e. water closets, urinals, wash basins, sinks, mirrors, shelves, towel rail, soap containers, geyser, water cooler, etc, water supply / sanitation pipes, manhole cover and frames etc	As agreed / required	Major	Review of MTC/ Test reports	Each lot of delivery as per Specifications	Tech Specs and Const. Drawings	MTC/Test Reports/ SR	√	**x**	**x**	**x**	

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273	ii	Acceptance of installations of all sanitory items and fixtures	As agreed / required	Major	Acceptance	100%	Tech Specs and Const. Drawings	SR		x	x	x	
274	**f**	**RCC Pipes**											
275	i	Material - RCC pipes	As agreed / required	Major	Review of MTC/ test reports	Each lot of delivery as per Specifications	IS: 458, Tech Specs and Const. Drawings	MTC/Test Reports/ SR	√	x	x	x	
276	ii	Acceptance and leakage	As agreed / required	Major	Physical	Random	Tech Specs and Const. Drawings	SR		x	x	x	
277	**g**	**Water Storage Tank**											
278	i	Over head / loft type	As agreed / required	Critical	Physical, review of MTC/ test reports	Each lot of delivery as per Specifications	IS:12701, Tech Specs and Const. Drawings	MTC/Test Reports/ SR	√	x	x	x	
279	ii	Aceptance and leakage	As agreed / required	Major	Acceptance	Random	IS:12701, Tech Specs and Const. Drawings	SR		x	x	x	
281	**26**	**Special Items (Switch Yard)**											
282	**a**	**Earthing Mat (Grounding System)**											
283	i	Earthing mat	As agreed / required	Critical	Physical, review of MTC/ test reports	Each lot of delivery as per Specifications	As per relevant IS and Tech. Specs / Manufacturer's, IS 3043	SR/MTC	√	x	x	x	
284	ii	Weld sizes & length	Visual/Tape	Major	Visual/ Measurement	100%	Tech Specs and Const. Drawings	SR		x	x	x	Low hydrogen electrode as per approval shall be used.
285	iii	D P test	DP test Kit	Critical	Physical	10% at random	Tech Specs and Const. Drawings	TR	√	x	x	x	
286	iv	Earth test	Earthing test kit	Critical	Physical	100%	IS:3043, Tech Specs and Const. Drawings, Relevant IS 3043	SR/ Test Report	√	x	x	x	
287	**b**	**Anti Weed Treatment**											
288	i	Anti-weed treatment materials	As agreed / required	Critical	Physical, review of MTC	Each batch of delivery	Tech Specs and Const. Drawings	SR/ MTC	√	x	x	x	
289	ii	Execution of treatment	As agreed / required	Major	Physical	Random check for each treatment	Tech Specs and Const. Drawings	SR		x	x	x	
291	**27**	**Road Work**											
292	**a**	**Construction of Sub-Grade and earthen/hard soulders**											
293	i	Standard proctor Test	As per IS: 2720	Critical	Physical	One in every 2000 cum for each type and source of fill materials	As per Tech Specs and Const. Drawings,Section 900 of MORTH specification, IS 2720 (Pt.VII)	SR	√	x	x	x	In cutting or existing levelled ground - quantum of check shall be one per 1000 SQM
294	ii	Moisture content of fill before compaction	As per IS: 2720	Major	Physical	One in every 2000 cum for each type and source of fill materials	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification, IS 2720 (Pt.II)	SR		x	x	x	In cutting or existing levelled ground - quantum of check shall be one per 1000 SQM
295	iii	Dry density by core cutter method ---- OR---- Dry density in place by sand displacement method	As per IS: 2720	Critical	Physical	One in every 500 SQM area for each compacted layer.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification, IS 2720 (Pt. XXIX)/ IS 2720 (Pt. XXVIII)	SR	√	x	x	x	Both for embankment and cut formation quantum of check - One in every 1000 SQM area for each compacted layer.
296	iv	Lines, grade and cross section	As required / agreed	Major	Physical	One in every 500 SQM area	As per Tech Specs and Const. Drawings	SR	√	x	x	x	Template, straight edge

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297	**b**	**Water Bound Macadam (Non-Bituminous) for base course and sub-base course**											
298	i	Aggregate Impact value	Agrregate Impact value Test Apparatus	Critical	Physical	One test per 200 cum of Test aggregate	As perTech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	**x**	**x**	**x**	
299	ii	Grading	Set of IS Sieves	Major	Physical	One test per 100 cum of aggregate	As perTech Specs and Const. Drawings, Section 900 of MORTH specification	SR		**x**	**x**	**x**	
300	iii	Flakiness index and elongation index	Flakiness test gauge	Major	Physical	One test per 200cun of agregate	As perTech Specs and Const. Drawings, Section 900 of MORTH specification	SR		**x**	**x**	**x**	
301	iv	Atterberg Limits of binding material	Atterberg limits determination	Critical	Physical	One test per 25 cum of binding material	As perTech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	**x**	**x**	**x**	
302	v	Atterberg Limits of portion of agreggate passing 425 micron sieve	Atterberg limits determination	Critical	Physical	One test per 100cum of aggregate	As perTech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	**x**	**x**	**x**	
303	vi	Camber, surface, slope	As required / agreed	Major	Physical	One in every 500 SQM area	As per Tech Specs and Const. Drawings	SR	√	**x**	**x**	**x**	Template, straight edge
304	**c**	**Bituminous Macadam for base and binder course**											
305	i	Quality of binder	Penetrometre with St. needle	Critical	Physical	No. of samples per Lot & tests as per IS:73, IS:217, IS:8887 as applicable	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification, IS 73	SR	√	**x**	**x**	**x**	
306	ii	Aggregate Impact Value / Los angeles abrasion value	Aggregate Impact ValueTest apparatus	Major	Physical	Once per source	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	**x**	**x**	**x**	
307	iii	Flakiness Index and elongation index of aggregates	Flakiness test gauge	Major	Physical	One test per 50 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		**x**	**x**	**x**	
308	iv	Stripping value of aggregate (Immersion tray test)	As required / agreed	Major	Physical	Initialy one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		**x**	**x**	**x**	
309	v	Water sensitivity of mix	As required / agreed	Critical	Physical	Initialy one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	**x**	**x**	**x**	
310	vi	Grading of aggregates	Set of Sieves	Major	Physical	Two test per day per plant both on individual constituents and mixed aggregate from dryer	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR		**x**	**x**	**x**	
311	vii	Water absorption of aggregate	As required / agreed	Major		Initially one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR		**x**	**x**	**x**	

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312	viii	Soundness (Magnesium and Sodium Sulphate)	As required as per IS:2386	Critical	Physical	Once per source by each method and on every change of source	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR	√	x	x	x	
313	ix	Percentage of fractured faces	As required / agreed	Major	Physical	When gravel is used one test per 50cum of aggregates	As per Tech Specs and Const. Drawings, Section 900 of MOSRTH specification	SR		x	x	x	
314	x	Binder content and aggregate grading	Bitumen extractor	Critical	Physical	Periodic, subject to a min of two tests per day per plant	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	x	x	x	
315	xi	Control of Temperature of binder and aggregate for mixing and of the mix at the time of laying and rolling	Thermometer	Major	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		x	x	x	
316	xii	Rate of spread of mixed materials	As required / agreed	Major	Physical	Regular control through checks of layer thickness	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		x	x	x	
317	xii	Density of compacted Layer	As required / agreed	Critical	Physical	One test per 250 sqm of area	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	x	x	x	
318	**c**	**Bituminous Surfacing - Open graded premix carpet and Seal coat**											
319	i	Quality of binder	Penetrometre with St. needle	Critical	Physical	No. of samples per Lot & tests as per IS:73, IS:217, IS:8887 as applicable	IS 73,Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	x	x	x	
320	ii	Aggregate Impact Value / Los angeles abrasion value	Aggregate Impact ValueTest apparatus	Major	Physical	One test per 50 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	x	x	x	
321	iii	Flakiness Index and elongation indexof aggregates	Flakiness test gauge	Major	Physical	One test per 50 cum of aggregate	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		x	x	x	
322	iv	Stripping value of aggregate (Immersion tray test)	As required / agreed	Major	Physical	Initialy one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	x	x	x	
323	v	Water absorption test		Critical	Physical	Initialy one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	x	x	x	
324	vi	Water sensitivity of mix	As required / agreed	Critical	Physical	Initialy one set of 3 representative specimen per source, and on every change of source.	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	x	x	x	
325	vii	Grading of aggregates	Set of Sieves	Major	Physical	One test per 25 cum of aggregates	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	x	x	x	

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326	viii	Soundness (Magnesium and Sodium Sulphate)	As required as per IS:2386	Critical	Physical	Once per source by each method and on every change of source	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	x	x	x	
327	ix	Polished stone value	As required as per BS:812(Part 114)	Major	Physical	As required	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		x	x	x	
328	x	Temperature of binder at application	Thermometer	Major	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		x	x	x	
329	xi	Binder content	Bitumen extractor	Critical	Physical	One test per 500 cum& not less than two tests per day	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	x	x	x	
330	xii	Rate of spread of materials	As required / agreed	Major	Physical	One test per 500 cum and not less than 2 tests per day	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		x	x	x	
331	xiii	Percentage of fractured faces	Bitumen extractor	Critical	Physical	When gravel is used one test per 50cum of aggregates	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	x	x	x	
332	**d**	**Tack Coat/ Prime coat/ fog coat**											
333	i	Quality of binder	Penetrometre with Standard needle	Critical	Physical	No. of samples per Lot & tests as per IS:73, IS:217, IS:8887 as applicable	IS 73,Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	x	x	x	
334	ii	Temperature of binder at application	Thermometer	Major	Physical	At regular close intervals	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		x	x	x	
335	iii	Rate of spread of binder	As required / agreed	Major	Physical	One test per 500 cum and not less than 2 tests per day	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		x	x	x	
336	**e**	**Alignment, Level, Surface regularity and rectification**											
337	i	Horizontal alignment, Surface levels and Surface regularity	As required / agreed	Major	Physical	At Random	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR	√	x	x	x	
338	ii	Rectification	As required / agreed	Major	Physical	Each rectification	As per Tech Specs and Const. Drawings, Section 900 of MORTH specification	SR		x	x	x	
340	**28**	**Geotechnical Investigations**											
341	i	Deployment of approved Geotechnical Investigation Agency - Equipments, Manpower etc	As required / agreed	Critical	Physical	Once before commencement of work	As per technical specifications and relevant IS Codes	SR	√	x	x	x	
342	ii	Execution of Geotechnical Investigation - locations, type etc as per scheme	As required / agreed	Major	Physical	Each Location	As per technical specifications and relevant IS Codes	SR		x	x	x	
343	iii	Collection of disturbed and undisturbed samples , their packing and storage	As required / agreed	Major	Physical	each sampling	As per technical specifications and relevant IS Codes	SR		x	x	x	
344	iv	Conducting filed tests as per investigation scheme- such as, SPT/ERT/SCPT/PLT/PMT etc	As required / agreed	Major	Physical	each field test	As per technical specifications and relevant IS Codes	SR		x	x	x	

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345	v	Submittion of Field Borelogs in approved format	As required / agreed	Major	Review	Within 24 hours after completion of each BH	As per technical specifications and relevant IS Codes	SR		**x**	**x**	**x**	
346	vi	Submittion of laboratory test schedule and selection of samples for laboratory testing	As required / agreed	Critical	Review and acceptance	as per consultation with engineer during dispatch of samples to approved laboratory	As per technical specifications and relevant IS Codes	SR	√	**x**	**x**	**x**	
347	vii	Submission of Final Geotechnical investigation report along with recommendations	As required / agreed	Critical	Physical	After completion of investigation work and review of draft reports	As per technical specifications and relevant IS Codes	SR		**x**	**x**	**x**	
349	**29**	**Topographical Survey Works**											
350	i	Deployment of approved Topographical Surveying Agency - Equipments, Manpower etc	As required / agreed	Critical	Physical	Once before commencement of work	As per technical specifications and relevant IS Codes	SR	√	**x**	**x**	**x**	
351	ii	Transfer of Permanent Bench mark to site from known location	As required / agreed	Major	Physical	Before commencement of work	As per technical specifications and relevant IS Codes	SR		**x**	**x**	**x**	
352	iii	Establishment of boundary pillers and survey grid, Temporary bench Marks, Measurement & recording spot levels	As required / agreed	Major	Physical		As per technical specifications and relevant IS Codes	SR		**x**	**x**	**x**	
353	iv	Recording features like trees, roads, transmission lines, lake, nala, river, temple, house, culverts etc. with coordinate locations	As required / agreed	Major	Physical		As per technical specifications and relevant IS Codes	SR		**x**	**x**	**x**	
354	vi	Submission of final Counter map showing all topographical features, record of spot levels	As required / agreed	Critical	Physical	After completion of investigation work and review of draft reports	As per technical specifications and relevant IS Codes	SR	√	**x**	**x**	**x**	
356	**30**	**Internal Switchyard - Site Leveling & Grading**											
357	i	Leveling Switchyard area	As required / agreed	Major	Visual / Physical	100%	As perTech. Specification and Approved Drawing	SR		**x**	**x**	**x**	
358	ii	Grading of 20/40mm stone / Gravel Spreading in sitchyard area	As required / agreed	Major	Physical	100%	As per Tech. Specification & Approved Drawing	SR		**x**	**x**	**x**	
360	**31**	**Plant Boundary Fencing (if applicable) & Gate (Also refer S.No. 3 for Steel works as applicable)**											
361	i	Fence posts (Intermediate, Stay & Corner Posts etc.) - Section size, Length, Galvanization - Grade/ Thickness, Tensile strength etc.	As agreed/ Required	Critical	Physical/ Measurement/ Review of MTC	Each lot received at site Random	IS:226; IS:2721; IS:278; IS:480; IS:4826 , Tech. Specs & Construction Drawings	MTC/ SR	√	**x**	**x**	**x**	For Structural steel checks refer S.No. 3
362	ii	Barbed wire - Dia. of line wire and barb wire, Grade of galvanization etc, Tensile strength etc.	As agreed/ Required	Critical	Physical/ Measurement/ Review of MTC				√	**x**	**x**	**x**	
363	iii	Tie wire - Diameter, Galvanization-Grade, tensile strength etc.	As agreed/ Required	Critical	Physical/ Measurement/				√	**x**	**x**	**x**	
364	iv	Blade barbed/ Concertina Wire - Thickness/ Diameter, galvanization, Diameter of concertina coil, Tensile strength etc.	As agreed/ Required	Critical	Physical/ Measurement/ Review of MTC				√	**x**	**x**	**x**	

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365	v	Fence Fabric- Mesh size, Wire Diameter, Galvanization-Grade, Selvage, Knuckling, Tensile strength etc.	As agreed/ Required	Critical	Physical/ Measurement/ Review of MTC				√	**x**	**x**	**x**	
366	vi	MS Gate - Caster weels, ball & bearings, Fixtures & fasteners etc.	As agreed/ Required	Major	Visual	100%	Tech. Specs & Construction Drawings	SR		**x**	**x**	**x**	
367	vi	Acceptance of Boundary Fence and gate	As agreed/ Required	Major	Physical	100%	Tech. Specs & Construction Drawings	SR		**x**	**x**	**x**	
369	**32**	**Tranformer Yard Fencing & Gate (Also refer S.No. 3 for Steel Works as applicable)**											
370	i	Fence posts (Intermediate, Stay & Corner Posts), Concertina Wire Support Angles - Section size, Length, Galvanization, Tensile strength etc.	As agreed/ Required	Critical	Physical/ Measurement/ Review of MTC	Each lot received at site Random	IS-226; IS 2721; IS-4948 , IS:480; IS:4826 Tech. Specification and Approved Drawing	MTC/ SR	√	**x**	**x**	**x**	For structural steel checks refer S.No. 3
371	ii	Tie wire (as aplicable) - Diameter, Galvanization, Tensile strength etc.	As agreed/ Required	Critical	Physical/ Measurement/ Review of MTC				√	**x**	**x**	**x**	
372	iii	Fence Fabric (chain link/ welded wire as aplicable)- Mesh size, Wire Diameter, Galvanization, Selvage, Knuckling, Tensile strength etc.	As agreed/ Required	Critical	Physical/ Measurement/ Review of MTC				√	**x**	**x**	**x**	
373	iv	MS Gate - Fixtures and fasteners	As agreed/ Required	Major	Visual	100%	Tech Specs andAproved Drawings	SR		**x**	**x**	**x**	
374	v	Acceptance of Fence & Gate	As agreed/ Required	Major	Physical	100%	Tech Specs and Approved Drawings	SR		**x**	**x**	**x**	
376	**33**	**Installation of Pre Engineered Building (PEB) - Security Cabin**											
377	**a**	**Receipt**											
378	i	Receipt of materials and Checking as per packing list	As agreed/ Required	Major	Visual	100%	As per Approved Drawings & Method Statement, Relevant BIS standards	SR	√	**x**	**x**	**x**	
379	iii	Dimensional Check	As agreed/ Required	Major	Measurement	100%			√	**x**	**x**	**x**	
380	iv	Visual checks for damages, rusting, pitting etc.	As agreed/ Required	Major	Visual	100%				**x**	**x**	**x**	
381	v	Visual checks for defects, primer coating and painting/galvanising as applicable.	As agreed/ Required	Major	Visual	100%				**x**	**x**	**x**	
382	vi	Nut/Bolt/Washers Checks	As agreed/ Required	Major	Visual	100%				**x**	**x**	**x**	
383	**b**	**Pre-Installation**											
384	i	Check that the work area is ready and safe to start installation	As agreed/ Required	Major	Visual / Dimension					**x**	**x**	**x**	
385	ii	Check readiness of Foundations	As agreed/ Required	Major		100%				**x**	**x**	**x**	
386	**c**	**Installation (as aplicable)**											
387	i	Readyness of concrete platform, foundations for installation- Size, Location, Level etc.	As agreed/ Required	Major	Visual					**x**	**x**	**x**	
388	ii	Check PUF side walls/ roof are installed properly	As agreed/ Required	Major	Physical					**x**	**x**	**x**	
389	iii	Check tightening of all Nut/Washers/Bolts	As agreed/ Required	Major	Physical					**x**	**x**	**x**	
391	**34**	**Structural Work for Module Mounting Structure (MMS)**					Tech. Specification, Approved Drawing & Method Statement						
437	a	**Manufacturing**											

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438		**Strucural Steel (Raw Material)** Hot rolled & cold formed sections - Angle, Channel, Z-section, Box section, Plate, rod & bar											
439	i	Ultimate Tensile Strength (UTS), Yield Strength (YS), Percentage Elongation, Bend Test, Chemical Composition, Section dimensions	As agreed/ Required	Critical	Chemical composition, Mechanical, Measurement	1 Sample per 50 MT or part thereoff/ for every heat no.	IS 2062, IS 513, IS 811, IS 1079, IS 808, IS 1852, IS 1730 -Part I	MTC	√				Raw material to be procured from reputed manufacturers - like SAIL, RINL, JSPL, JSW, TISCO, ISSAR
440	ii	Visual Examination - Cracks, Scaling, Rust, Pitting, Lamination etc.	As agreed/ Required	Major	Visual	10% IS 2500, Level II, AQL 1.5	IS 2062, IS 513, IS 811, IS 1079, IS 808, IS 1852, IS 1730-Part I	SR	√	**x**	**x**	**x**	Material shall be free from surface defects like cracks, lamination,roughness, imperfect edges, rust, pitting & other harmful defects. Removal of minor surface defects as per IS;2062 is acceptable. Witness for 10% sample. Record review for every material
441		**Boughtout Items (Hardware - Nuts, Bolts and Washers - plain, spring)**											
442	i	Mechanical & Chemical Properties	As agreed/ Required	Critical	Chemical composition, Mechanical	1 sample per 5 MT or part thereoff	IS 1327 (Part 17) eq./ ASTM standard	MTC/ Lab test Report	√	**x**	**x**	**x**	
443	ii	Dimensional check (Dia., Thickness, Total stem length & Threaded length etc.)	As agreed/ Required	Major	Measurement	IS 1327 (part 17) eq 10 pieces per lot per member type	IS 6639, IS 2016,IS 6610 & IS 3063 / ASTM standard	Vendor Records	√	**x**	**x**	**x**	Witness for sample. Record review for every material
444	iii	Galvanizing - Mass per Sqm, Thickness (DFT)	As agreed/ Required Alcometer	Major	Visual, Measurement	IS 1327 (part 17) eq 10 pieces per lot per member type	For Hot dip galvanizing should be maintained 43 microns (min) and average 54 microns as per IS 1367 (part XIII) eq.	Vendor Records	√	**x**	**x**	**x**	Record review Random sample inspection/ measurement
445	b	**In Process Inspection**											
446		**Structural Item Fabrication**											
447	i	Straightening	As agreed/ Required	Major	Visual	100%	0.2% of total length	Vendor Records	√	**x**	**x**	**x**	Record review
448	ii	Cropping (Cutting)	As agreed/ Required	Major	Visual	100%	Approved drawing	Vendor Records	√	**x**	**x**	**x**	Record review
449	iii	Identification/ Marking	As agreed/ Required	Major	Visual	100%	Approved drawing Marking Shall be done with the help of permanent paint marker using stencil as per Drawing	Vendor Records	√	**x**	**x**	**x**	Record review Random sample inspection
450	iv	Punching/ Drilling of Holes	As agreed/ Required	Critical	Measurement	1 piece per 25 pieces	IS 802/ Approved drawing	Vendor Records	√	**x**	**x**	**x**	Record review
451		Edge Security							√	**x**	**x**	**x**	
452	v	Overall Length	As agreed/ Required	Major	Measurement	1 piece per 25 pieces	IS 802/ Approved drawing	Vendor Records	√	**x**	**x**	**x**	Record review Random sample measureemnt
453	vi	Bending	As agreed/ Required	Critical	Measurement	100%	IS 801, 811/ Approved drawing	Vendor Records	√	**x**	**x**	**x**	
454		Cross Section Dimensions							√	**x**	**x**	**x**	Record review
455	vii	Welding	As agreed/ Required	Major	Visual	100%	Approved Welding Procedure & Welder Qualification	Vendor Records	√	**x**	**x**	**x**	Record review Random sample ispection
456	viii	Visual Examination - Black spots, Porosity, Spatter, Rust bleed points, Weld dimensions	As agreed/ Required	major	Visual	100%	Tech. Specification, Approved Drawing	Vendor Records	√	**x**	**x**	**x**	Record review Raddom sample inspection (The fabricated material shall be free from
457	ix	DP Test (as necessary)	As agreed/ Required	Major	Chemical	Shift wise/ random	As and when required	Vendor Records	√	**x**	**x**	**x**	
458	x	Final Inspection of Fabricated Parts - Cross section dimensions, Thickness (before galvanization)	As agreed/ Required	Critical		10 % in lot size of 100 nos.	IS- 802, IS 807, IS 811 and relevant applicable eq. standards , approved drawings, Tech spec	Vendor Records	√	**x**	**x**	**x**	
459		**Galvanizing**											
460	i	Zinc - Ingot, Molten metal in galvanizing bath	As agreed/ Required	Critical	Chemical	1 sample from each batch of ingot supply	IS 2629	MTC Lab test report	√	**x**	**x**	**x**	Purity of Zn 98.5%, MTC to be correlated. Molten metal in the galvanizing bath ≥ 98.5 % by mass of zinc.
461		**Pre Galvanizing**											

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462	i	Degreasing	Acid base cold degreaser	Major	Chemical	One sample daily	Sp. Gravity 1.1 to 1.2, ph Value 2 to 3	Vendor Records	√	x	x	x	Record review
463	ii	Pickling - Acid & Iron content	Lab test	Major	Chemical	One sample daily	Acid Content-Concentration 18% to 4% min, Sp. Gravity 1 to 1.3 Iron Content -120g/litre (max)	Vendor Records	√	x	x	x	Record review
464	iii	Rinsing	pH meter	Major	Chemical	One sample daily	Rinsing water ph value 5 to 7	Vendor Records	√	x	x	x	Record review
465	iv	Pre-fluxing in ZnCl solution - Specific gravity, pH	pH meter	Major	Measurement	One sample daily	Sp Gr - 1.10 to 1.26 pH - 3 to 5	Vendor Records	√	x	x	x	Record review
466	v	Pre-heating	Pyrometer	Major	Measurement	One sample daily	Above 50^0 C	Vendor Records	√	x	x	x	Record review
467	vi	Dipping - Zinc bath temperature, Imersion & withdrawl time	Continuous recording & verification by Pyrometer	Major	Measurement	Hourly check	Zn bath temp - 440^0 C to 460^0 C Article to be immersed till reaction	Vendor Records	√	x	x	x	Record review
468	vii	Quenching	Plain water	Minor			Bath in plain water for cooling & Cleaning. Temp. Below 65°	Vendor Records	√	x	x	x	Record review
469	viii	Di-chromating	Di-chromate solution	Major	Chemical	One sample daily	strength of the solution to be maintained as 0.7 to 1% of sodium dichromate, temperature of solution should be less than 65°	Vendor Records	√	x	x	x	Record review
470		**Post Galvanizing**											
471	i	Surface Defects/Finish - Dross, Pimples, Black marks, Ash deposition	As agreed/ Required	Major	Visual	100%	IS 2633	Vendor Records	√	x	x	x	Record review Random samples to be inspected during
472	ii	Thickness of Zinc Coating	Alcometer	Critical	Measurement	3 samples per dip	As Per IS 4759 , 6745 , Minimum 80micron or as per spec.	Vendor Records	√	x	x	x	Record review Random samples to be measured during factory visit by Owner/PMC
473	iii	Mass of Zinc Coating		Critical	Chemical	1 sample per shift	As Per IS 6745	Vendor Records	√	x	x	x	Record review
474	iv	Uniformity of Zinc Coating (Preece Test)		Major	Chemical	1 sample per shift	No red stains after 4 dippings	Vendor Records	√	x	x	x	Record review/ Sample test if deemed necessary
475	v	Adhesion of Zinc Coating (Pivote Hammer Test/ Knife Test)		Major	Physical	1 sample per hour	No Removal or lifting in areas between hammer impression/coating should not peel off. As per IS 2629	Vendor Records	√	x	x	x	Record review Random samples to be inspected during factory visit by Owner/PMC. Sample test if deemed necessary
476		**Proto Assembly**											
477	i	Proto Assembly check - Fitment, Dimensions, Alignment, Overall Stability	Prototype of one mounting table with	Critical	Physical/ Measureemnt	100%	Cut lengths of all members, Fitment (dia. of holes, end security, c/c distance between holes etc. shall be checked for correctness wrt permissible tolerence through in postion ispection of assembled proto), Fasteners (bolts, nuts and washers), Cleats, Gussete plates shall be as per Approved drawing/ specifications. The proto assembly shall be checked for overall stability for design verification of various conenctions and col. support system.	IR	√	x	x	x	The general quality of fabrication and galvanization of members, straightness of members, overall stability of prototype etc. shall be checked for design verification. Any suggestions for design changes etc. shall be properly recorded in the inspection report for implimentation in mass production of MMS members
478		**Marking/ Packaging**											
479	i	Marking	As agreed/ Required	Major	Visual	100%	Aprroved drawing/ marking scheme	IR	√	x	x	x	Record review Random sample shall be checked during facroty visit by Vendor and SECI/ Owner representative

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480	ii	Packaging, Storing, Bundling, Handling	As agreed/ Required	Major	Visual	100%	As per IS-802. Packing of Column. Bracing, Rafters and Purlins shall be done by strapping. Packing of smaller items by wires or in gunny bags/ or as per approved procedure	IR	√	x	x	x	Separate packaging for different type of members like Col, Purlin, Rafter, Front/ rear/ diagonal bracings, fasteners, cleats etc. Small members shall be bundled with wire. Damage to galvanization and form (shape) of the member during handling and trasporting shall be controlled
481		**Site Installation**								x	x	x	
482	i	Receipt of materials and Checking as per packing list	As agreed/ Required	Critical	Visual	Random	Tech. Specification, Approved Drawing & Method Statement.		√	x	x	x	
483	ii	Fabricated members - Dimensional Check	As agreed/ Required	Major	Visual	100%				x	x	x	
484	iii	Visual checks for defects/damages, rusting, pitting, galvanising etc.	As agreed/ Required	Major	Visual	Random				x	x	x	
485	iv	Nut/Bolt/Washers	As agreed/ Required	Major	Measurement	100%				x	x	x	
486	v	Mounting of structures & Accessories - Coordinates, Levels, Fitment, Alignment etc.	As agreed/ Required	Critical	Visual /Measurement	100%			√	x	x	x	
487	vi	Torque Checking - Daily calibration check, Bolt installation	As agreed/ Required	Major	Measurement	100%				x	x	x	
489	**35**	**Module Mouting - Pre Installation Check**			Visual	100%							
490	i	Check for site physical layout as per drawing / Design Specification		Major	Physical	100%				x	x	x	
491	ii	Check for Structure, Mounting readiness		Major	Physical					x	x	x	
493	**36**	**String Combiner Boxes (SCB) - Mouting - Pre Installation Check**											
494	i	Check for foundation readyness - location & coordinates, dimensions & levels, foundation bolts etc.		Major	Physical	100%				x	x	x	
496	**37**	**Inverter Panel**					Design Specification, Drawings, Manufacturer Manual Method Statement	SR					
497		**Pre Installation**											
498	i	Check for site physical layout as per drawing.		Major	Visual	100%			√	x	x	x	
499	ii	Ensure that no fouling with civil/structural		Major	Physical	Random				x	x	x	
500	iii	Check for Foundation readiness and level of foundation.		Major	Physical	100%				x	x	x	
502	**38**	**Burried Cables**					Design Specification, Drawings, Manufacturer Catalogue Method Statement (SW-SEPC-MS-CAB-006)						
503	i	Cable Trench - Dimensions, alignment		Critical	Physical	100%	Design Specification, Drawings, Manufacturer Catalogue Method Statement	SR		x	x	x	
504	ii	Sand filling before cable laying, sand filling after cable laying, placing of precast concrete slabs/ bricks, backfilling with soil		Major	Visual	100%				x	x	x	
586													
587													
588													
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591													

	A	B	C	D	E	F	G	H	I	J	K	L	M
1	**Sr.No.**	**Activity & Operation**	**Instruments**	**Class of Check**	**Type of Check**	**Quantum of Check**	**Reference Documents & Acceptance Standard**	**Format of Record**	**D*** (Records identified with (√) shall be issentially included by EPC vender in QA documentation)	**Cheking Agency**			**Remarks**
2								SR - Site Register SECI-SPV-QA-F-XXX SECI-SPV-QA-T-XXX (XXX - Inspection record form No. or Test report format no.)		**M'fr/ Supplier or Sub-Contractor**	**EPC Contractor**	**SECI or Owner**	
592			**LEGEND**: D * Records, indentified with "Tick" (√) shall be essentially included by supplier in QA documentation.							**DOC. NO**.: SECI - XXX - XXX -XXX - FQP & MQP - 001		**REV**: 0	
593			**Legend to be used:**										
594			**Class # : A** = Critical, **B**=Major, **C**=Minor										
595			**Format of Record #** : **SR**=Site Register, **TR**=Lab Test Report, **IR**=Inspection Report, **MTC**=Manufacturer's Test Certificate										
596			All **MTC**'s shall be correlated with batch of material supply, Tech specs and drawings										
597			**Category 'A'** - Sub-contractor/ sub-vendor, EPC Vendor, SECI/ Owner										
598			**Category 'B'** - Sub-Contractor/ Sub-Vendor, EPC Vendor, SECI										
599			**Category 'C'** - Sub-Contractor/ Sub-Vendor										
600										**Reviewed By**	**Approved By**	**Approval Seal**	
601			This document shall be read in conjunction with Tech. Specifications and Drawings										

Annexure – C

PG Test Procedure

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1 INTRODUCTION

This document lays down the procedures and requirements for conducting Functional Guarantee tests including scope of the tests, procedures for the tests, reporting formats and process for determining test results in accordance with the Tender Specifications, applicable standards and industry best practices.

2 FUNCTIONAL GUARANTEE TESTS FOR SOLAR PV PLANT

Functional Guarantee for Solar PV Plant shall comprise of following Guarantees:

(1) Performance Ratio Guarantee test for operational acceptance.

(2) Annual Generation Guarantee up to a period of 10 years (O&M Period), starting from the date of Operational Acceptance.

2.1 PERFORMANCE RATIO GUARANTEE TEST

A Performance Ratio Guarantee test shall be commenced within 60 days of the commissioning of Plant Facilities to demonstrate that the plant has achieved the Guaranteed Performance Ratio in line with requirements under section VII of the bidding document. This will be one of the pre-conditions for the Plant Operational Acceptance. Performance Ratio (PR) test period would be continuous measurement of 30 consecutive days. The test shall be conducted in accordance with the IEC-61724 as per the methodology described in Technical Specifications under section VII of the bidding document. The procedure of PR test is described further in Section 2.4. The report shall contain all the measured energy and Met data values, calculations, results and conclusions.

2.1.1 Performance Ratio

The Performance Ratio (PR) of the PV Plant is calculated as follows (according to IEC 61724 Ed.2).

$$PR = \frac{E_{out}}{\sum_k \left(\frac{(C_k \times P_o) \times \left(G_{i,k} \times \tau_k\right)}{G_{i,ref}} \right)}$$

where

PR Temperature Corrected Performance Ratio

E_{out} Cumulative AC energy measured at the injection point (ABT meter) over the duration of reporting period (kWh)

τ_k Duration of the k^{th} recording interval, i.e. (1/60) hour

$\sum_k$ Summation over all recording intervals in the reporting period, (1/4) hour

C_k Power rating temperature adjustment factor and can be calculated as below

$Ck = 1 + \gamma \times (T_{avg_mod,k} - T_{ref})$

γ Temperature coefficient of power with negative sign ($°C^{-1}$)

$T_{avg_mod,k}$ Average PV Module temperature measured at the commencement of time interval 'τ_k'

(°C)

T_{ref} PV Module temperature at which P_o is determined, i.e. 25°C

P_o Installed nominal peak power of PV modules, i.e. Nameplate rating at STC (kW_p)

$G_{i,k}$ Average irradiance measured at the Plane of Array (POA) at the commencement of time interval τ_k (kW/m^2)

$G_{i,ref}$ Irradiance value at which P_o is determined, i.e. 1 kW/m^2

2.1.2 **General Requirement**

- The Functional Guarantee shall comprise of a set of visual/mechanical/Electrical checks followed by a Performance Ratio (PR) test of the Plant Facilities.
- The PR test shall be carried out for a period of 30 consecutive days at site by the Contractor in presence of the Employer/ Employer's Representative/ Owner's Engineer.
- These tests shall be binding on both the parties to the contract to determine compliance of the equipment with the guaranteed performance parameters.
- The test will consist of guaranteeing the correct operation of the Plant Facilities, by way of the performance ratio based on the reading of the energy produced and delivered to the grid (ABT meter) and the Plane of Array incident solar radiation.
- PR is calculated as per the formula given in Clause no. 2.1 and recorded as per the format provided at ***Annexure 1***.
- The filled-in format shall be signed by both the parties (EPC Contractor and SECI) and each party will keep one copy for record. **The same will be recorded for 30 consecutive days.**
- The Functional Guarantee condition for the purpose of Provisional Acceptance of the Plant Facilities shall be considered to have been met if the guaranteed Performance Ratio (PR) is achieved on a daily basis for 30 *consecutive days** as per Clause 2.1.5 of this document.
- During this PR test, equipment failure/interruption of any kind, except for SCADA communication failures, will not be accountable. In case of a breakdown, the test may be resumed once the complete system is rectified and working properly.

  ***** Interruptions due to communication breakdown only may be exempted based on specific approval to the effect that generation is not affected and equipment failure (Refer Clause 2.1.5) is not attributable. In such case, the test shall be extended for affected no. of days (up to 5 days)

2.1.3 **Pre-PR Test**

2.1.3.1 The EPC Contractor shall perform start-up tests after successful completion of visual inspection and functional testing. Such testing shall be conducted under the SECI's / Owner's Engineers supervision and recorded.

2.1.3.2 Preliminary Test Check

The preliminary checks include all the warranty certificates for the major equipment, pre – commissioning test reports, field quality checklists verified through the FQP documents of all equipment and works along with the calibration reports of all the instruments and sensors, wherever applicable.

2.1.3.3 Visual /Mechanical Test

Visual checks shall be done on all the components that form part of the plant including the grid connection equipment in compliance with the field quality plans. The following critical elements as a minimum shall be subjected to visual inspection:

- Module mounting structure and foundations.
- PV module and DC installation.
- Inverters.
- Transformers.
- Switchgear.
- Lightning protection systems.
- Earthing protection systems.
- Electrical protection systems, junction boxes and cabling.
- Grid connection compliance protection and disconnection systems.
- Monitoring systems (including meteorological sensors).

2.1.3.4 Electrical Tests

Subsequent to mechanical completion and visual testing of the plants, following functional electrical tests shall be performed. These tests also referred as start-ups tests shall be the first step for PG guarantee of the plant. These tests shall essentially include:

2.1.3.5 Open circuit voltage (V_{OC}) test.

This test verifies that strings are properly connected (module and string polarity) and that strings are producing the expected voltage according to the module data sheet, as observed in the SCADA. If any abnormality is observed in the DC bus Voltage of SMU in SCADA, the following procedure shall be used:

(a) DC string combiner box is opened; fuses leading to the sub main junction box are removed.
(b) The voltage is measured with a calibrated, industry accepted instrument from the negative bus bar to the string positive lead.

2.1.3.6 Functional Guarantee Test shall commence immediately after all issues arising from the functional/ start-up test have been rectified.

Note:

(a) All measurement(s) procedure should be carried out taking proper safety precaution.

(b) Also it should be ensured that to avoid any loose connection at the terminal points for which measurement procedure is conducted.

(c) Ensure proper functioning (e.g. Multimeters shall be calibrated) of all measuring instruments before conducting above measurement procedure.

(d) The above test procedure shall be conducted in presence of site in-charge.

2.1.4 **PR Test Procedure**

The date of commencement of the PR Test shall be communicated in advance and agreed upon by both parties i.e. SECI and EPC Contractor. Any consecutive 30 days period (excluding interruptions that last entire day on account of grid outage or as per hindrance record maintained at site only) for the purpose of conducting PR test shall be mutually discussed and agreed between SECI and EPC Contractor. It shall comprise of the following procedures.

2.1.4.1 Pre-test Procedure

(1) Before the commencement of Performance Ratio (PR) test, the plant shall have achieved visual/mechanical/Electrical completion as per Clause 2.3 above and SCADA system and WMS shall be fully commissioned and functional.

(2) Trial Run: The PG Test for Plant Facilities shall commence with a trial run for 7 consecutive days. The EPC Contractor shall provide the data in requisite formats (specified elsewhere in the document) to SECI. SECI shall vet the data for any discrepancies and systemic errors and revert within 3 working days. Post the trial run period, the 30 days PR test will commence after communication from SECI in this regard.

(3) Pyranometer Tilt Angle & Cleanness: The pyranometers & Tilt Angle shall be verified before the test commences and **then visually inspected at regular intervals for cleanliness during the tests**.

(4) The average of all the Pyranometers (GTI) shall be considered for the calculation of PR. The average of module temperatures recorded by all the temperature sensors shall be used for calculation of PR. The Pyranometers and Temperature sensors used for the purpose of the PR Test shall have valid calibration certificates.

2.1.4.2 Following the completion of the pre-test procedures, Performance Ratio Test of plant shall commence in accordance with the procedures, conditions and requirements provided in the next section.

2.1.4.3 General Procedure for the PR Test

The PR Test Procedure shall include the following components:

(1) Data Collection: PV Power Plant test related parameters are collected in one-minute and 15 intervals for the 30 (Thirty) days (consecutive) reference period. The data shall consist of the following at a minimum:

- Irradiance at Collector's (i.e. PV Module) POA; (Source: SCADA, Temporal Resolution: 1 minute)
- Other Met Data received from installed WMS; (Source: SCADA, Temporal Resolution: 1 minute)
- Energy generated at Plant (kWh) (Source: Plant MFM Meter from SCADA, Temporal Resolution: 1 minute)
- Energy injected into grid (kWh) (Source: ABT Meter at GSS/injection point, Temporal Resolution: 15 minute)
- PV Module Temperature recorded from the temperature Sensors (^{o}C) (Source: SCADA, Temporal Resolution: 1 minute)

(2) **Data Filtering:** The data shall be filtered so that the data set is free of nuisance data points and bad data that exhibit a high degree of error (such as errors caused by faulty instrumentation). The EPC Contractor shall document data which is to be eliminated along with reasons. The following criteria shall be excluded from the dataset used for this test:

- **Nuisance or bad data** – Nuisance data points or bad data that clearly exhibit a high degree of error including required meteorological measurement equipment that is identified as being out of calibration or requiring adjustment. A 15-minute time-block shall be *explicitly* flagged through a flag parameter on account of this factor after recording reasons thereof (**Note**: no filtration shall be done at site level). The same shall be corroborated/verified by SECI.
- Time blocks with insufficient (less than equal to 10) 1-minute records.
- **Grid Interruptions** – Time periods (in 15-minute time blocks) of the grid interruptions at the utility substation, recorded manually jointly by EPC Contractor and SECI representatives shall be eliminated. Grid outage period, if any, shall be verified from SCADA.
- Any Force majeure conditions
- **Radiation Criteria –** Radiation on Plane of Array (POA) less than 200 W/m^2
- Shutdown explicitly demanded by the Owner/DISCOM/STU.
- As per the hindrance record maintained at site.

Note: Minimum 24 Nos of 15-minute time blocks shall be considered to account the day for PR measurement. Otherwise the PR test shall be extended to another day.

2.1.5 **Determination of PR Test**

Daily PR shall be calculated as the average of the PR calculated for valid 15-minute time blocks (Refer Clause 2.1.4.3) for the 30-day duration. If the ABT Meter data is not available on daily basis, PR shall be calculated based on the MFM data and shared for record. However, at the end of the PR test period, the daily PR shall be re-calculated with the ABT Meter data for sign-off.

If the If the EPC Contractor is not able to demonstrate guaranteed PR during this period, two more chances shall be given to demonstrate the same after incorporation of suitable corrective measures. In case the contractor fails to achieve guaranteed PR even after the two more chances, further action shall be taken as per the provisions of contract.

The test shall be repeated for 30 days in case of any outage of following equipment (as applicable) for more than 7 days.

- Power Transformer/Inverter Duty Transformer
- Power Conditioning Unit
- HT Switchgear Panel
- SCADA and data logger combined
- Tilted pyranometer
- Other WMS sensors.

2.1.6 **Raw Data Formats and Reports**

The EPC Contractor shall submit to SECI the raw data from the Plant SCADA on daily basis in the following format.

Temporal Resolution: 1 Minute

Date & Time dd/mm/yyyy hh:mm:ss format	Wind Speed (m/s)	Module Temp. (°C)	Ambient Temp. (°C)	Horizontal Irradiance (W/m²)	POA Irradiance (W/m²)	POA Radiation (kWh/m²)	Humidity (%)	Wind Direction (°)	Generation (kWh) (Source: TVM)

Temporal Resolution: 15 Minute (Every 15th Min record from the 1 Min Data)

Date & Time Dd/mm/yyyy hh:mm:ss format	Wind Speed (m/s)	Module Temp. (° C)	Ambient Temp. (° C)	Horizontal Irradiance (W/m²)	POA Irradiance (W/m²)	POA Radiation (kWh/m²)	Humidity (%)	Wind Direction (°)	Generation (kWh) (Source: TVM)	Explicit Removal Flag* (0 or1)	Remarks

***** Explicit Removal Flag: 0 indicates time block considered; 1 indicates time block not considered.

PR Test Report shall be generated from the Raw Data (Sample Report provided in the Annexure) after data filtering as per criteria laid out in (2). The Report shall contain the signature of both

representatives (SECI/Employer & EPC Contractor).

2.2 CAPACITY UTILIZATION FACTOR (CUF)

Capacity Utilization Factor for Solar Plant shall be calculated as per the following formula.

$$\mathbf{CUF} = \frac{\mathbf{E_{ac}}}{\mathbf{8760 \times P_{ac} \times (1 - DF \times (N - 1)) x}\ \boldsymbol{RCF}}$$

where,

Eac is the number of units recorded in the plant end ABT meter excluding auxiliary consumption during the operation year, kWh

8760 refers to the number of hours in non-leap year. It shall be replaced by 8784 hours during leap year

Pac is the plant AC capacity, kW

DF is module degradation factor, 0.7% per year

N is the number of years of operation after operational acceptance of the plant

RCF is the Radiation Correction Factor: RCF = $\frac{Measured\ Irradiation}{Reference\ Irradiation}$,

where Reference Irradiation (GHI_{ref}) = 1862 kWh/m^2 and Measured Irraditation (GHI_{mes}) shall be recorded from the Pyranometer installed in horizontal plane at the site location. The radiation data of the Pyranometer shall be compared with the Reference Irradiation mentioned above. The radiation data from the Plant Pyranometer shall be used for computation of CUF, except in case of any discrepancy (i.e. more than ± 10% variation from the Reference Radiation, GHI_{ref}), in which case the radiation data from the nearest available Solar Radiation Resource Assessment (SRRA) station data will be used for computation of CUF. Missing data (GHI_{mes}) from the Plant Pyranometer shall be substituted by average of GHI measured for the same period in the past three (3) days. The plant Pyranometer has to be under CCTV coverage.

CUF shall be calculated on annual basis from the date of operational acceptance of the plant till the end of O&M period. Module degradation factor will not be considered for first year CUF calculation. It is the Contactor's responsibility to envisage and install extra DC capacity to accommodate any degradation during first year. 0.7% per year will be considered from second year of operation.

Grid outage hours shall be subtracted from total number of hours in a year. The Contractor shall submit grid outage certification from competent authority of STU/DISCOM.

Reports

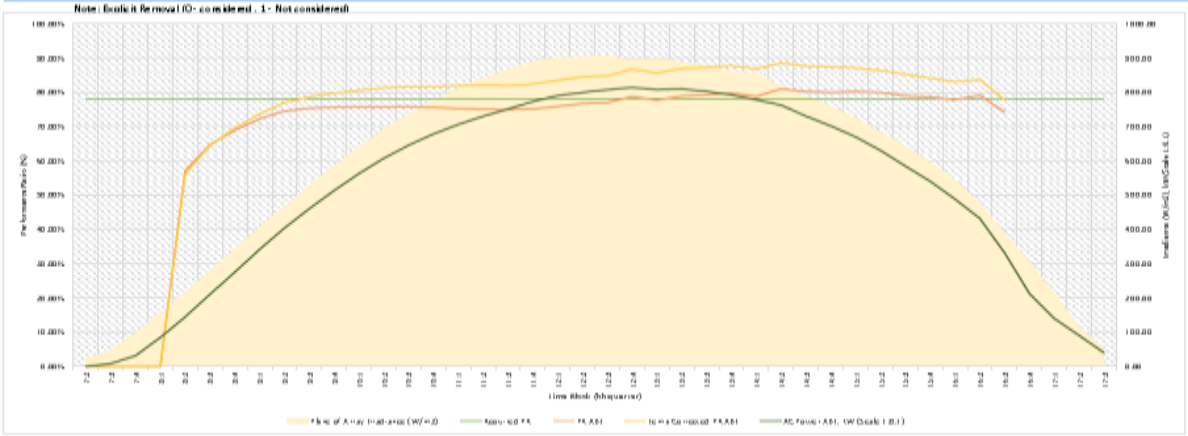
Sample Report for PR Test

PR Guarantee Test Report

Day	20-Nov-2016	Criteria	>200	Average POA Irradiance in a time block in W/m2
No. of Timeblocks considered	36 /42	Tot Gen	53694 kWh	Source: ABT Meter at GSS
Plant PR for the day ABT	80.66%	Average PR (temp corrected) of 15 min. time blocks where POA irradience is greater then 200W/m2 and not explicitly removed		
		(Guaranteed PR: 78%)		

Time Block (hh:Qtr)	Wind Speed (m/s)	Module Temp. (° C)	Ambient Temp. (° C)	POA Radiation (kWh/m2)	Plane of Array Irradiance (W/m2)	GHI (W/m²)	Humidity (%)	Wind Direction (°)	Generation ABT GSS (KWh)	AC Power ABT, kW (Scale 1:0.1)	PR ABT	Temp Corrected PR ABT	Explicit Removal
7:2	1.62	13.91	15.10	2.17	25.25	27.00	45.92	88.10	0.00	0.00	0.00%	0.00%	0
7:3	1.41	14.47	15.25	12.34	47.92	50.47	45.53	38.35	21.00	8.40	14.73%	14.10%	0
7:4	0.57	15.84	15.73	25.08	90.40	92.93	44.41	0.00	79.00	31.60	27.27%	26.24%	0
8:1	0.26	17.73	16.01	39.51	156.11	143.67	44.55	0.00	212.00	84.80	46.45%	45.07%	0
8:2	0.66	20.64	17.01	54.73	216.78	193.67	42.19	0.00	361.00	144.40	57.10%	56.08%	0
8:3	0.43	24.09	17.94	70.40	279.62	245.80	40.17	0.00	526.00	210.40	64.69%	64.45%	0
8:4	0.71	27.22	18.85	86.46	343.62	291.80	38.39	0.00	688.00	275.20	68.90%	69.52%	0
9:1	0.71	29.93	19.74	102.34	407.36	348.47	36.74	0.00	854.00	341.60	72.25%	73.71%	0
9:2	0.71	32.98	20.73	117.25	466.99	398.00	35.17	0.00	1009.00	403.60	74.51%	76.95%	0
9:3	0.80	35.60	21.52	132.29	527.14	445.27	33.94	0.00	1151.00	460.40	75.33%	78.61%	0
9:4	0.74	38.17	22.31	146.86	585.56	486.27	32.98	0.00	1283.00	513.20	75.64%	79.72%	0
10:1	0.87	40.55	23.23	160.77	641.34	516.87	31.86	0.00	1406.00	562.40	75.72%	80.54%	0
10:2	0.93	42.99	24.08	173.62	692.91	540.33	31.13	0.00	1518.00	607.20	75.70%	81.28%	0
10:3	0.99	43.78	24.78	184.38	736.02	559.67	30.67	0.00	1613.00	645.20	75.74%	81.57%	0
10:4	1.18	44.44	25.53	194.12	775.43	576.53	29.87	12.76	1695.00	678.00	75.60%	81.63%	0
11:1	1.05	46.52	26.17	203.12	811.43	593.60	28.97	0.00	1765.00	706.00	75.23%	81.87%	0
11:2	0.89	48.11	26.74	210.57	841.02	609.07	28.28	0.00	1824.00	729.60	75.00%	82.10%	0
11:3	1.51	47.95	27.61	217.05	867.66	624.60	26.97	0.00	1877.00	750.80	74.87%	81.92%	0
11:4	2.03	48.74	28.04	222.77	890.54	642.47	25.69	76.95	1932.00	772.80	75.09%	82.40%	0
12:1	1.61	48.61	28.91	225.54	902.04	656.13	24.24	0.00	1975.00	790.00	75.02%	83.47%	0
12:2	2.03	48.58	29.45	225.55	902.30	664.40	22.97	129.40	1998.00	799.20	76.69%	84.42%	0
12:3	2.34	48.79	29.73	227.09	907.75	672.60	21.62	131.02	2018.00	807.20	76.94%	84.75%	0
12:4	2.48	48.66	29.92	223.65	895.29	671.07	20.71	96.20	2034.00	813.60	78.74%	86.70%	0
13:1	2.10	48.70	30.20	224.96	899.51	670.93	18.75	0.00	2019.00	807.60	77.71%	85.57%	0
13:2	2.32	48.80	30.31	222.11	889.25	665.80	18.11	22.42	2024.00	809.60	78.90%	86.92%	0
13:3	2.59	49.39	30.42	219.07	877.23	649.13	17.75	219.19	2005.00	802.00	79.24%	87.17%	0
13:4	2.22	48.55	30.70	215.00	859.72	630.67	17.39	0.00	1980.00	792.00	79.73%	87.76%	0
14:1	1.87	48.00	30.90	213.62	855.30	620.80	16.27	0.00	1944.00	777.60	78.79%	86.83%	0
14:2	2.27	47.80	31.28	203.86	816.52	584.27	16.13	19.15	1906.00	762.40	80.95%	88.51%	0
14:3	2.30	47.34	30.99	196.95	788.89	548.20	16.46	38.30	1825.00	730.00	80.23%	87.58%	0
14:4	2.05	47.08	31.01	189.95	760.16	520.20	16.53	7.33	1754.00	701.60	79.95%	87.45%	0
15:1	1.75	45.99	31.44	180.73	724.65	484.80	15.75	0.00	1674.00	669.60	80.19%	87.10%	0
15:2	2.30	44.51	31.33	170.69	684.26	442.27	15.51	95.39	1576.00	630.40	79.94%	86.34%	0
15:3	2.10	44.35	31.19	160.33	642.47	402.40	15.57	28.93	1462.00	584.80	78.95%	85.21%	0
15:4	2.33	41.86	31.19	148.67	596.65	358.47	15.41	45.73	1350.00	540.00	78.62%	84.06%	0
16:1	1.91	41.25	31.19	135.70	544.70	311.80	15.33	90.91	1220.00	488.00	77.84%	83.02%	0
16:2	2.37	38.99	31.12	118.23	475.45	255.73	14.96	5.47	1080.00	432.00	79.09%	83.62%	0
16:3	2.57	36.66	30.95	96.68	389.67	195.27	15.01	86.82	829.00	331.60	74.24%	77.79%	0
16:4	1.60	34.83	30.62	70.86	306.83	143.86	15.44	76.91	531.00	212.40	64.88%	67.50%	0
17:1	1.56	32.61	30.19	52.45	212.88	92.47	15.59	63.97	350.00	140.00	57.70%	59.58%	0
17:2	1.75	29.57	29.68	26.61	117.56	48.14	15.94	103.66	226.00	90.40	73.53%	74.91%	0
17:3	0.84	27.22	28.80	4.19	52.66	21.40	16.82	0.00	100.00	40.00	206.71%	208.59%	0

Note : Explicit Removal (0- considered , 1- Not considered)



Remarks: [to be recorded, if any]

SCHEDULE OF RATES [SOR-1]

Tender for Design, Engineering, Supply, Construction, Erection, Testing, commissioning and O&M of 15 MW (AC) Floating Solar PV Power Plant at different sites of SCCL Telangana

Sl. No.	Description of Item	Quantity (Ls)	PRICES (INR)				
			Unit Ex works Price (Excluding GST)	Total Ex works Price (Excluding GST)	Total value of Applicable GST (in figures)	% of GST applied (Ex 5%, 18% etc)	Total Price including GST
1	2	3	4	5 = 3 * 4	6	7	8= 5 + 6
A - SUPPLY							
1	Supply of PV Modules as specified in the Tender Documents	1		INR 0.00			INR 0.00
2	Supply of Inverters as specified in the Tender Documents	1		INR 0.00			INR 0.00
3	Supply of Inverter Transformer as specified in the Tender Documents	1		INR 0.00			INR 0.00
4	Supply of Panels & Switchgears as specified in the Tender Documents	1		INR 0.00			INR 0.00
5	Supply of Floats alongwith Module Mounting Arrangement as specified in the Tender Documents	1		INR 0.00			INR 0.00
6	Spare Modules (As Mandatory Spares, 0.50% of total supply of solar modules)	1		INR 0.00			INR 0.00
7	Mandatory Spares excluding Modules	1		INR 0.00			INR 0.00
8	Spare Floats (with Module Mounting arrangement)	1		INR 0.00			INR 0.00
9	Spare Anchoring & Mooring arrangement (with guy ropes)	1		INR 0.00			INR 0.00
10	Cables (All DC, LT & HT)	1		INR 0.00			INR 0.00
11	Weather Monitoring Station	1		INR 0.00			INR 0.00
12	Manufacture & Supply of Balance of System including all Equipments, Materials, Spares, Accessories, Safety & Fire Fighting System etc. excluded in above Floating Solar Part supply and any other Supplies specified in the Tender Documents	1		INR 0.00			INR 0.00
	Sub Total - A			INR 0.00	INR 0.00		INR 0.00
B - SERVICES							
13	Freight & Insurance including Loading, Unloading, Storage, Handling at Site	1		INR 0.00			INR 0.00

SCHEDULE OF RATES [SOR-1]

Tender for Design, Engineering, Supply, Construction, Erection, Testing, commissioning and O&M of 15 MW (AC) Floating Solar PV Power Plant at different sites of SCCL Telangana

Sl. No.	Description of Item	Quantity (Ls)	PRICES (INR)				
			Unit Ex works Price (Excluding GST)	Total Ex works Price (Excluding GST)	Total value of Applicable GST (in figures)	% of GST applied (Ex 5%, 18% etc)	Total Price including GST
1	2	3	4	5 = 3 * 4	6	7	8= 5 + 6
14	Design, Engineering, Installation, Erection, Testing and Commissioning including Performance Testing in respect of all the Equipments Supplied and any other Services Specified in the Tender Documents	1		INR 0.00			INR 0.00
15	Any kind of Civil and allied works	1		INR 0.00			INR 0.00
	Sub Total - B			INR 0.00	INR 0.00		INR 0.00
	C - OPERATION & MAINTENANCE						
16	Bidder to mention here the NPV of O&M amount for total 10 years in **CELL NO I 31 only** which should match with the NPV of O&M amount for total 10 years in **CELL NO I 23 of SOR 2.** **In case of any varaiation the NPV of O&M amount for total 10 years mentioned at CELL NO I 23 of SOR 2 will be considered for evaluation purpose.**	1					INR 0.00
	Sub Total - C						INR 0.00
	TOTAL EVALUATED BID VALUE (TEBV) (A+B+C)						**INR 0.00**

NOTES

1 **O & M Charges on YoY basis must be in equal or in ascending order only.**

SCHEDULE OF RATES [SOR-2] [OPERATION AND MAINTENANCE]

Tender for Design, Engineering, Supply, Construction, Erection, Testing, commissioning and O&M of 15 MW (AC) Floating Solar PV Power Plant at different sites of SCCL Telangana

Sl. No.	Description of Item	Year	PRICES (INR)				
			Yearly O&M Price (Excluding GST)	Total value of Applicable GST (in figures)	Yearly O&M Price including GST	Present Value Factor (PVF)	NPV of O&M Price
1	2	3	4	5	6=4+5	9.36%	7 = 6* PVF
	OPERATION & MAINTENANCE						
1	Operation and Maintenance of the Floating Solar PV Project for FIRST YEAR	1	INR 0.00		INR 0.00	0.914	INR 0.00
2	Operation and Maintenance of the Floating Solar PV Project for SECOND YEAR	2	INR 0.00		INR 0.00	0.836	INR 0.00
3	Operation and Maintenance of the Floating Solar PV Project for THIRD YEAR	3	INR 0.00		INR 0.00	0.765	INR 0.00
4	Operation and Maintenance of the Floating Solar PV Project for FOURTH YEAR	4	INR 0.00		INR 0.00	0.699	INR 0.00
5	Operation and Maintenance of the Floating Solar PV Project for FIFTH YEAR	5	INR 0.00		INR 0.00	0.639	INR 0.00
6	Operation and Maintenance of the Floating Solar PV Project for SIXTH YEAR	6	INR 0.00		INR 0.00	0.585	INR 0.00
7	Operation and Maintenance of the Floating Solar PV Project for SEVENTH YEAR	7	INR 0.00		INR 0.00	0.535	INR 0.00
8	Operation and Maintenance of the Floating Solar PV Project for EIGHTH YEAR	8	INR 0.00		INR 0.00	0.489	INR 0.00
9	Operation and Maintenance of the Floating Solar PV Project for NINTH YEAR	9	INR 0.00		INR 0.00	0.447	INR 0.00
10	Operation and Maintenance of the Floating Solar PV Project for TENTH YEAR	10	INR 0.00		INR 0.00	0.409	INR 0.00
	TOTAL NPV OF O&M FOR 10 YEARS (1+2+3+4+5+6+7+8+9+10)		INR 0.00		INR 0.00		INR 0.00

NOTES

1 **Bidders are required to mention the GST amount (Column I) on the actual O&M cost of the yearly basis & not on the NPV of O&M cost.**

2 **O & M Charges on YoY basis must be in equal or in ascending order only.**

SECTION - VIII

SCHEDULE OF RATES (SOR)

1. **Bidders are required to quote for the Total Contract Price on Lumpsum basis in cognizance with the Tender Terms & Conditions.**

2. Bidder's quoted prices shall be strictly as per various Formats included under this Section [i.e. Section-VIII, Schedule of Rates (SOR)]. Bidder shall quote Lumpsum (LS) Price for the entire scope of work including Design, Engineering, Manufacture, Supply, Storage, Civil Work, Erection, Testing & Commissioning as per the Technical Specifications (TS) as defined under Section-VII.

3. All the Columns of quoted items in the Schedule of Rates including currency must be filled with required information, as applicable.

4. Bidder must quote the price in enclosed SOR formats only. The formats shall not be changed and/ or retyped.

5. Bidder to note that breakup of Lumpsum price is to be provided for assessment of Total Evaluated Bid Value (TEBV), however total price payable under the Contract shall be restricted to the Lumpsum Price/ Contract Price only.

6. The Lumpsum Price shall be considered as Total Contract Price which Owner agrees to pay and the Contractor agrees to accept as full compensation for the Contractor's full performance of the Work in accordance with the provisions of the Contract Documents. Contract Price shall not be subjected to any adjustment except in case of Change Order or Statutory Variations in accordance with the provisions of the Contract.

7. The price quoted shall be Lumpsum price on Turnkey basis. Unless the basic parameter changes or additional/ extra requirements are made, total payments to be made to the contractor shall be limited to Lumpsum price indicated, irrespective of the progressive payments made during execution based on the split up of price.

8. Obligation of the Contractor is not limited to the quantities that the Contractor may either indicate in the Schedule of Breakup of Lumpsum Prices along with his bid or in further detailed break of Lumpsum prices furnished along with the bid or after award of work. Contractor shall carry entire scope of work/ supplies as detailed in various sections/ volumes of the Tender Document within the quoted Lumpsum Price (Contract Price).

9. Lumpsum Prices quoted by the Bidder shall include cost of any other supplies/ work(s) not specifically mentioned in the Bidding Document but necessary for the efficient, trouble free commissioning & operation of the Plant and to make this package job complete. Quoted price are FIRM and fixed till complete execution of the entire order. Also, variation on account of Foreign Exchange rate is not to be payable extra.

10. Spares for start-up/ commissioning and mandatory spares required are in Contractor's Scope and deemed included in the quoted Lumpsum Prices.

11. Bidder shall furnish following Forms of Schedule of Rates: -

a) SOR -1 is the Schedule and Breakup of Lump sum Price (Supply, Service and NPV of O&M) of the Tender. SOR -2 comprises of the yearly Breakup of the NPV of O&M price for 10 years period.

b) Details of Goods & Service Tax (GST) as included in SOR-1

c) Prices shall be considered for evaluation on NPV basis as per Evaluation Methodology Specified in Section III ITB of the Tender Document.

d) Bidder to mention the NPV of O&M amount for total 10 years in CELL NO I 31 of SOR-1 which should match with the NPV of O&M amount for total 10 years in CELL NO I 23 of SOR 2.

e) In case of any variation of the total NPV of O&M price, the NPV of O&M amount for total 10 years mentioned at CELL NO I 23 of SOR 2 will be considered for evaluation purpose.

12. INR = Indian Rupees

13. Bidder confirms that he has noted the contents of the Preamble to the Schedule of Rates, Schedule of Rate, Bid Document and quoted his Prices accordingly without any deviation.

14. O & M Charges on YoY basis must be equal or in ascending order only.