

Request for Proposal

For

Selection of EPC Contractor for Design, Engineering, Supply, Construction, Erection, Testing and Commissioning on turnkey basis of 25 MWac Ground Mounted Solar PV Power Projects at Namrup in the state of Assam with Comprehensive Operation & Maintenance for five (5) year's period.

Issued By:



ASSAM POWER GENERATION CORPORATION LIMITED

REGISTERED OFFICE: BIJULEE BHAWAN, PALTAN BAZAR, GUWAHATI-781001, ASSAM

CIN: U40101AS2003SGC007239, TEL NO.: 0361-2739502

E-mail: info@apgcl.org

website: www.apgcl.org





Tender No. APGCL/CGM NRE/PROJ/NAMRUP SOLAR EPC/2023/T4-2570

Date: 01/02/2024

ISSUED BY:

ASSAM POWER GENERATION CORPORATION LIMITED

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Notice Inviting Tender



ASSAM POWER GENERATION CORPORATION LIMITED

**REGISTERED OFFICE: BIJULEE BHAWAN,
PALTANBAZAR, GUWAHATI-781001, ASSAM**

CIN:U40101AS2003SGC007239, TEL.NO.:0361-2739502

E-MAIL: info@apgcl.org, WEBSITE: website: www.apgcl.org/

DOMESTIC COMPETITIVE BID (ONLINE TENDER No. APGCL/CGM NRE/PROJ/NAMRUP SOLAR EPC/2023/T4-2570)

For

e-Tenders are invited from the intending contractors/firms having experience in similar job(s) for **“Selection of EPC Contractor for Design, Engineering, Supply, Construction, Erection, Testing and Commissioning on turnkey basis of 25 MWac Ground Mounted Solar PV Power Projects at Namrup in the state of Assam with Comprehensive Operation & Maintenance for five (5) year’s period.”** required in **Assam Power Generation Corporation Limited under the Department of Power, Govt. of Assam**. An amount of INR 2,00,00,000/- (Rupees Two Crore only) is to be submitted as EMD/Bid Security either online or in the form of Bank Guarantee. The Tender documents can be downloaded from www.assamtenders.gov.in & <https://www.apgcl.org> from 01/02/2024 (15:00 hours). Any addendum/corrigendum/extension etc. will be made available in <https://assamtenders.gov.in> only.

- The last date of submission of tender document is 04/03/2024 (12:00 hours)
- The bids will be opened online on the e-procurement portal on 05/03/2024 (12:00 hours)
- Price bid Opening followed by Reverse Auction: To be intimated later on to the Technically Qualified Bidders.

The TIA reserves the right to accept or reject any bid/tender, and to cancel/ annul the bidding process and reject all bids at any time prior to contract award.

Note: Exemption from submission of EMD – Not Applicable for this tender.

SD/-

The Chief General Manager (NRE),
Assam Power Generation Corporation Limited,
3rd Floor, Bijulee Bhawan,
Paltanbazar, Guwahati-781001

Dated: 31.01.2024

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DISCLAIMER

The information contained in the Bid Documents, or any other information provided to the Bidders, whether in writing or in any other form, by or on behalf of Purchaser and its employees or advisors is provided to Bidders on the terms and conditions set out in the NIT/RFP and such other terms and conditions subject to which such information is provided.

The NIT/RFP is not an agreement and further it is neither an offer nor an invitation by Purchaser to the Bidders or any other Person. The purpose of the Bid Documents is to provide the Bidders with information that may be useful to them in the preparation and submission of their Bids. This document is not an agreement or an offer by Purchaser to Bidders or any third party. The purpose of this document is to provide interested parties with information to facilitate the formulation of their Bid/Offer.

The Bid Documents include statements which reflect various assumptions and assessments arrived at by Purchaser and its PMC for the Ground mounted Solar PV Project at Namrup, Assam of an estimated aggregated capacity of 25 MW with its evacuation infrastructure to be set up by the EPC Contractor. Such assumptions, assessments and statements do not purport to contain all the information that the Bidders may require. The information contained in the Bid Documents may not be appropriate for all Persons and it is not possible for Purchaser, its employees or advisors to consider the investment objectives, financial situation and particular needs of each Person who reads the Bid Documents. The assumptions, assessments, statements, and information contained in the Bid Documents may not be complete, accurate, adequate or correct. Each Bidder should therefore conduct its own investigations/ due diligence, analysis and should check the accuracy, adequacy, correctness, reliability and completeness of the assumptions, assessments, statements, and information contained in the Bid Documents.

Neither Purchaser nor its employees or consultant/transaction advisor shall have any liability towards any Bidder or any other person under the law of contract, tort, the principles of restitution or unjust enrichment or otherwise for any loss, expense or damage which may arise from or be incurred or suffered in connection with this Bid Document, or any matter deemed to form part of this Bid Document, the award of the work, or the information and any other information supplied by or on behalf of Purchaser or its employees, any consultant/transaction advisor or otherwise arising in any way from the selection process for the project.

Though adequate care has been taken while preparing this Bid Document, the Bidder should confirm that the document is complete in all respects. In the event that this Bid Document or any part thereof is mutilated or missing, the Bidder must notify the tender issuing authority of Purchaser immediately at least seven (7) days prior to bid submission deadline.

If no intimation is received by Purchaser, it shall be considered that the Bid Document received by the Bidder is complete in all respect and that the Bidder is fully satisfied with the Bid Document.

No extension of time shall be granted to any Bidder for submission of its Bid on the grounds that the Bidder did not obtain a complete set of the Bid Document.

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The Bid Document and the information contained herein are strictly confidential and privileged and are for the exclusive use of the party to whom it is issued or its direct Subsidiary or Holding Company. This Bid Document must not be copied or distributed by the recipient to third parties (other than, to the extent required by the applicable law or in confidence to the recipient's professional advisors, provided that such advisors are bound by confidentiality restrictions at least as strict as those contained in this Bid Document). In the event that after the issue of Bid Document, the recipient does not continue with its involvement in the bidding process for any reason whatsoever, this document and the information contained herein must be kept confidential by such party and its professional advisors at all times.

Purchaser reserves the right to change, modify, add, alter the Document, or cancel the bidding process without assigning any reasons thereof, at any time during the bidding process. All parties have to monitor e-Portal for any changes made through amendment. The Bidders or its direct Subsidiary or Holding Company or Consortium Members shall not object to such changes/ modifications/ additions / alterations explicitly or implicitly. Any such objection by the Bidder shall make the Bidder's proposal liable for rejection by Purchaser. Further, objection by any third party shall be construed as infringement on confidentiality and privileged rights of Purchaser with respect to this Document.

The Bidder shall not make any public announcements with respect to this bidding process or this Bid Document. Any public announcements to be made with respect to this bidding process or this Bid Document shall be made exclusively by Purchaser. In the event of breach of this clause by any of the Bidder shall be deemed to be non-compliance with the terms and conditions of this Bid Document and shall render the Bid/Offer of that bidder liable for rejection, Purchaser's decision in this regard shall be final and binding upon the Bidder.

It is clarified that the provisions note as stated above shall not apply to information relating to this Document already available in the public domain prior to the issue of this document.

The Bidder shall bear all costs associated with the preparation and submission of their Bid/Offer. Purchaser, its employees and their consultant/transaction advisor shall not under any circumstances be responsible for or liable for any such costs.

Notwithstanding anything contained elsewhere in this document, Purchaser reserves the right to evaluate and award the bids at its sole discretion to any Bidder on any of the terms and conditions and the decision of Purchaser in this regard will be final and binding on the Successful Bidder, consultant/transaction advisor and the parties involved in the transaction. By receiving this Bid Document, it shall be deemed that the persons so receiving the Bid Document have read, understood and accepted the disclaimers and tender terms and conditions.

The information provided in the Bid Documents to the Bidders is on a wide range of matters, some of which may depend upon interpretation of the law. The information given is not intended to be an exhaustive account of statutory requirements and should not be regarded as a complete or authoritative statement of the law. Purchaser, its employees and advisors /consultant accept no responsibility for the accuracy or otherwise for any interpretation or opinion on laws expressed in the Bid Documents.

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Purchaser, its employees and advisors/consultant make no representation or warranty and will have no liability to any Person, including any Bidder, under any law, statute, rules or regulations or tort or otherwise for any loss, damage, cost or expense which may arise from or that may be incurred or suffered on account of anything contained in the Bid Documents or otherwise, including the accuracy, adequacy, correctness, completeness or reliability of the Bid Documents and any assessment, assumption, statement or information contained in the Bid Documents or deemed to form part of the Bid Documents or arising in any way.

Purchaser, its employees and advisors/consultants also accept no liability of any nature, whether resulting from negligence or otherwise, caused arising from reliance of any Bidder upon the content of the Bid Documents.

It will be deemed that by submitting a Bid, each Bidder agrees and releases Purchaser and its employees, agents and consultants/ transaction advisors, irrevocably, unconditionally, fully and finally from any and all liability for any claims, losses, damages, costs, expenses or liabilities in any way related to or arising from the exercise of any rights and/or performance of any obligations under the Bid Documents and/or in connection with the Bid Process, to the fullest extent permitted by applicable law and waives any and all rights and/or claims it may have in this respect, whether actual or contingent, whether present or in the future.

Purchaser may, in its absolute discretion but without being under any obligation to do so, update, amend or supplement the information, assessment, statement or assumptions contained in the Bid Documents.

The issue of the Bid Documents does not imply that Purchaser is bound to qualify any Bidder or to award the project to any Bidder. Purchaser reserves the right to reject all or any of the Bids without assigning any reasons whatsoever.

The statements and explanations contained in this NIT/RFP, the draft EPC Agreement and any other Bid Documents are intended to provide an understanding to the Bidders about the subject matter of this RFP and should not be construed or interpreted as limiting in any way or manner the obligations of the Selected Bidder(s) that will be set out in the Agreement or Purchaser's right to amend, alter, change, supplement or clarify the Units' scope or the terms of this RFP or the EPC Agreement. Consequently, any omissions, conflicts, or contradictions in the Bid Documents (including this RFP) are to be noted, interpreted and applied appropriately to give effect to this intent, and no claims on that account shall be entertained by Purchaser.

The Bidders shall bear their own costs associated with or relating to the preparation and submission of their Bids, including due-diligence, analysis, assessment, copying, postage, delivery charges and expenses associated with any demonstrations or presentations which may be required by Purchaser, or any other costs incurred in connection with or relating to their Bids. All such costs and expenses will be borne by Bidders, and Purchaser and its employees and consultants/ advisors will not be liable in any manner whatsoever for such costs and expenses, regardless of the conduct or outcome of the Bid Process.

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INVITATION FOR BID

Subject: Selection of EPC Contractor for Design, Engineering, Supply, Construction, Erection, Testing and Commissioning on turnkey basis of 25 MWac Ground Mounted Solar PV Power Projects at Namrup in the state of Assam with Comprehensive Operation & Maintenance for five (5) year’s period

APGCL invites bids from the prospective bidders on for the subject item under “Domestic open tender under single stage Two BID system through e-procurement website” complete in all respect in accordance with the following details and enclosed Sections of the Bid Document:

1.0 BRIEF DETAILS:

S. No.	Description of Item	Particulars
i.	Selection of EPC Contractor for Design, Engineering, Supply, Construction, Erection, Testing and Commissioning on turnkey basis of 25 MWac Ground Mounted Solar PV Power Projects at Namrup in the state of Assam with Comprehensive Operation & Maintenance for five (5) year’s period	ASSAM POWER GENERATION CORPORATION LIMITED Registered Office: Bijulee Bhawan, Paltanbazar, Guwahati-781001, Assam CIN: U40101AS2003SGC007239, TEL.NO.: 0361-2739502 E-MAIL: info@apgcl.org WEBSITE: website: www.apgcl.org/
ii.	Period of commissioning	Complete 25 MW within twelve (12) months from the date of contract signing
iii.	Tender No. & Issue Date	Tender No.: APGCL/CGM NRE/PROJ/NAMRUP SOLAR EPC/2023/T4-2570 Date 01.02.2024
iv.	Location of Project	25 MW at existing land available in the premises of Namrup Thermal Power Station, Namrup, Assam
v.	Date of Site Visit by prospective bidders	a. 14.02.24 Office Hrs. b. 15.02.24 Office Hrs.
vi.	Nodal Officer for site visit	Mr. Uzzal Hazarika, DM (Civil) APGCL
vii.	Date for receipt of questions / queries/ clarifications	09.02.2024
viii.	Date and time of pre-bid meeting at APGCL’s HQ office	16.02.24 (1100 hours)
ix.	Venue for pre-bid meeting & opening of bids	3 rd floor, Bijulee Bhawan, Paltanbazar, Guwahati-781001, Assam.
x.	Bid Closing Date & Time	04.03.2024 (12:00 hours)
xi.	Technical Bid Opening Date and Time	05.03.2024 (12:00 hours)

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S. No.	Description of Item	Particulars
xii.	Date & time of opening of Price bid	Will be intimated to the qualified bidders after techno- commercial evaluation and three (3) days prior to Price Bid opening date
xiii.	Mode of Submission of bid	Both Technical and Financial bids shall be submitted online, through Assam e-tender portal. https://assamtenders.gov.in It is mandatory for every bidder to submit their technical and price bids online on e-tender portal. However, bidders must also submit a hard copy of their technical bid documents to CGM(NRE), APGCL on or before technical bid opening date. Hard copy of price bid must not be submitted by Bidder. In case of any discrepancy between the online and offline submitted documents, the documents uploaded online shall prevail.
xiv.	Type / Mode of tendering	Domestic open tender under Single Stage Two BID system through e-procurement portal
xv.	Bid Document	The Bid Document comprises of Sections-I to VII including this Forwarding Letter, all Annexure and Appendix.
xvi.	Bid Processing fee (non-refundable)	Rs.10,000 (Ten Thousand) inclusive of GST.
xvii.	Earnest Money Deposit (EMD) & its validity	Bid Security amount INR 2,00,00,000/- (Rupees Two Crore only) should be deposited online or in the form of Bank Guarantee. In case, the bidder wishes to submit Bid Security in the form of a Bank Guarantee, the bidder is required to submit the same in hard copy (original) in addition to uploading the scanned copy as a part of the online bid submission. Bidder shall provide BG in the form of an unconditional, irrevocable, and on-demand bank guarantee in the prescribed format of APGCL attached with this tender document, issued by any of the scheduled commercial banks as per list issued by Reserve Bank of India (RBI) Validity of BG – Two Hundred and ten (210) days from the date of opening of bid.
xviii.	Duration of Contract	i. EPC contract: Twelve (12) months from date of contract signing.

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S. No.	Description of Item	Particulars
		ii. O&M contract – Five (5) years from the date of acceptance of OAT for complete project capacity of 25 MWac.
xix.	Letter of Award (LoA)	To be communicated later
xx.	Acceptance of LoA	To be accepted within seven (7) days from the receipt of LoA
xxi.	Signing of EPC Contract	To be Signed in prescribed format within thirty (30) days from the acceptance of LoA.
xxii.	Technical Specifications	As given in Section-VI.
xxiii.	Currency of Offer	Indian Rupees
xxiv.	Payment Terms during Construction Period	Payments shall be released against each milestone subject to the compliance of contractual conditions.
xxv.	Payment for Operation & Maintenance	Payment shall be released on a quarterly basis.
xxvi.	Annual CUF Guarantee and Performance Ratio (PR)	Bidder shall quote year wise CUF (%) for five (5) operational years & Performance Ratio
xxvii.	Contract Performance Guarantee (“CPG”)	The Successful Bidder shall furnish, within fifteen (15) days from acceptance of Letter of Award, a Contract Performance Guarantee equivalent to 10% (Ten percentage) of total EPC Contract Value (Including GST) consisting detailed engineering, manufacturing, testing, supply and delivery of equipment at site & erection testing & commissioning in all respect for 25 MWac Ground Mounted solar power project. Proforma of CPG is provided as Annexure-III. The validity of BG shall be 30 months from the date of issue of LOA; if required, the PBG shall have to be extended for further 3 months beyond the due date of successful completion of Performance Guarantee Test.
xxviii.	Evaluation of Bids	Evaluation of Bids of bidders shall be done as per details specified in the Bid Evaluation Criteria.
xxix.	Bid Validity Period	Offers shall be valid for a period of one hundred and Eighty (180) days from Bid Closing Date / Proposal Due Date or extension, if any.
xxx.	Quotation to be on ‘Firm’ price basis	Prices quoted as per Schedule of Prices by the Bidders shall remain ‘Firm’ during the Bidder’s Performance of the Contract and not subject to variation on any account. Quotation submitted with variable price will

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S. No.	Description of Item	Particulars
		be treated as non-responsive and the same shall be summarily rejected.
xxxi.	Customs Duty, CVD, etc.	For goods offered from abroad Customs Duty, CVD and other applicable levies, etc., will be borne by Bidder in totality and shall be inclusive in the tender quoted prices without any separate financial implication to Purchaser
xxxii.	Taxes, duties, levies etc.	<p>In case the Bidder offers goods manufactured in India, GST would apply. The prevailing GST implication shall have to be indicated clearly in the Price bid formats of the tender. It will be paid extra on actual. Any other taxes / duties, if any applicable at present may have to be borne by the bidder. The statutory variation, if any, in the rate of GST or imposition of fresh duty or tax or any levy or abolition of any existing taxes or duties or cess by the Govt. during the contractual period shall be to Purchaser's account subject to documentary evidence.</p> <p>Bidders have been asked to quote prices based on taxes and duties/levies and charges prevailing on the last date of bid submission (as extended if applicable).</p> <p>If there is any delay in commissioning of the Project due to Contractor's default and during that delayed period Change in Law event occurs, then in such cases the Contractor shall be liable to bear the additional cost due to Change in Law with no recovery from the Purchaser.</p>
xxxiii.	Queries regarding Pre- Bid conference	Any queries regarding pre-bid conference may be forwarded in the prescribed format at Annexure - VII to APGCL

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2.0 GUIDELINES FOR PARTICIPATING IN Assam's e-PROCUREMENT.

Bidders are required to get themselves familiarize with the complete bidding process as provided in "Download" and "Bidders Manual Kit" section in the e-Tender Portal <https://assamtenders.gov.in/>.

For further assistance, bidder may contact the Help Desk No. of Assam State Procurement Cell as provided in the "Contact Us" section of e-Tender Portal <https://assamtenders.gov.in/>.

2.1 SUBMISSION OF BIDS

- A) Bidder should log into the site <https://assamtenders.gov.in/> in well in advance for bid submission so that they can upload the bid in time i.e., on or before the bid submission time. Bidder will be responsible for any delay due to other issues.
- B) The bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.
- C) EMD is to be submitted by the bidder either through net banking/RTGS/NEFT and/ or uploading of scanned copy of BG on website at the time of submission of a tender. Bidder has to select the payment option as "Online" to pay the tender fee/EMD and processing Fee "online" as applicable. In case, if bidder is submitting requisite EMD in the form of Bank Guarantee, then bidder has to submit separate envelope containing original documents regarding EMD. This envelope should be properly super-scribed that "EMD of Rs. 2,00,00,000/- (Rupees Two Crore only) in the form of BG against tender No. APGCL/CGM NRE/PROJ/NAMRUP SOLAR EPC/2023/T4-2570 along with due date & time of tender opening as per NIT. This EMD envelope containing the original Bank Guarantee should be submitted in physical form but only after opening of tender, within 07 days thereafter. The T&C bids of such bidders shall be considered for evaluation only after receipt of original BG in physical form & its verification.
- D) Bidders are requested to note that they should submit their financial bids online only in the format provided and no other format is acceptable. If the price bid has been given as a standard Schedule of Prices formats with the tender document, then the same is to be downloaded and to be filled out by all the bidders. Bidders are required to download the BoQ file, open it and complete the colored (unprotected) cells with their respective financial quotes and other details (such as name of the bidder). No other cells should be changed. Once the details have been completed, the bidder should save it and submit it online, without changing the file name. If the BoQ file is found to be modified by the bidder, the bid will be rejected.
- E) The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission.
- F) All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality

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of the bids is maintained using the secured Socket Layer 128-bit encryption technology. Data storage encryption of sensitive fields is done. Any bid document that is uploaded to the server is subjected to symmetric encryption using a system generated symmetric key. Further this key is subjected to asymmetric encryption using buyers/bid openers public keys. Overall, the uploaded tender documents become readable only after the tender opening by the authorized bid openers.

- G) The uploaded tender documents become readable only after the tender opening by the authorized bid openers.
- H) Upon the successful and timely submission of bids (i.e. after Clicking “Freeze Bid Submission” in the portal), the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.
- I) The bid summary has to be printed and kept as an acknowledgement of the submission of the bid. This acknowledgement may be used as an entry pass for any bid opening meetings.

2.2 ASSISTANCE TO BIDDERS

- A) Any queries relating to the tender document and the terms and conditions contained therein should be addressed to the Tender Inviting Authority for a tender or the relevant contact person indicated in the tender.
- B) Any queries relating to the process of online bid submission or queries relating to Assam Tenders Portal in general may be directed to help desk numbers/email id of Assam State Procurement Cell as provided in the “Contact” Section of Assam Tenders Portal. In case of any query related to the Bid, please write us at website: www.apgcl.org

3.0 QUERIES/CLARIFICATIONS ON THE TENDER:

Interested Bidders may contact the following person for any technical clarifications against the tender. Emails should be communicated with a copy to all the three email ids as stated:

- (a) akshay.talukdar@apgcl.org
- (b) harinarayan.hazarika@apgcl.org
- (c) pritam.khanikar@apgcl.org

4.0 IMPORTANT NOTES:

Bidders shall take note of the following important points while participating in APGCL’s e-procurement tender:

- 4.1 Single Stage-Two Envelope Bidding procedure shall be followed through e-tendering for the subject package as under:

- Cover - I / Envelope- I: Techno-Commercial Bid

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➤ Cover - II / Envelope- II: Price Bid

4.1.1 The Cover-I / Envelope-I: "Techno-Commercial Bid" shall be evaluated for completeness and in regard to fulfillment of the qualification requirements and eligibility conditions before opening of the Price bid. The Envelope to contain the following formats for acceptance/ Statements/ Certificates / information as per requirements of Formats -

- Proof of payment tender processing fees.
- Proof of Earnest Money Deposit (EMD).
- Bid Response Sheet No. 1 to 23
- Undertaking towards no deviation as per Annexure XVI
- Undertaking as per Annexure XVII
- Singed NIT Documents along with clarifications, amendments& addendums if any.

4.1.2 Envelope-II: Price Bid

The bid value and prices shall have to be filled online in the Electronic Form provided at the e-tendering portal **only**. Bid has to be encrypted with bidders own digital signature.

4.1.3 Envelop markings

4.1.4 Bidders must also submit a hard copy of their technical bid documents to CGM(NRE), APGCL on or before technical bid opening date. If along with technical bid document Price bid is submitted, then bid shall be rejected. Each envelope shall clearly mark the name of the bidder. The Bid Security must be supplied in original along with the bid. In case of any discrepancy between the online and offline submitted documents, the documents uploaded online shall prevail.

4.1.5 The outer / common envelope shall clearly bear the following identification "Bid Documents for setting up of 25 MW Solar PV Power Plants at Namrup Thermal Power Station in the state of Assam on Turnkey basis"

4.1.6 Envelopes shall be addressed to:

Designation	Chief General Manager (NRE)
Address	3rd Floor, Bijulee Bhawan, Paltan Bazar, Guwahati-781001
E-mail id	akshay.talukdar@apgcl.org
Telephone / Fax No.	0361-2635812

4.1.7 If the envelopes are not sealed and marked as instructed above, the Purchaser assumes no responsibility for the misplacement or premature opening of the contents

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of the Bid submitted. If bids are found in open condition or not in sealed condition, the bids may be rejected and returned in the same condition to the bidder.

- 4.1.8** Bids submitted by fax, telex, telegram or-mail shall not be entertained and shall be rejected.

The tender document can be downloaded from assamtenders.gov.in and also from the APGCL's website (www.apgcl.org); Bidder shall upload the scanned tender document duly signed and stamped on each page of the tender in token of his acceptance along with his bid and also scanned copies of all requisite documents as sought in this tender.

Price bids shall be submitted electronically/ online only.

Submission of Bid:

Technical & Un-priced and Priced part must be submitted in online mode only along with scanned supporting documents (suggested scan in 150 dpi pdf). The Bidder will be required to encrypt & sign its online bid using own Digital Signature Certificate (Class- II or higher with both Signing and Encryption Certificates). Prospective Bidders must procure DSC before participating in the tenders.

IMPORTANT NOTE: -

- A. Bidder fails to complete the Online Bid Preparation & Submission stage on the stipulated date and time, his/her bid will be considered as "bid not submitted". No further correspondence will be made either from Service provider or from tender inviting authority.
- B. Bidders participating in online tenders shall check the validity of his/her Digital Signature Certificate before participating in the online.

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SECTION – I

INTRODUCTION

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SECTION – I

INTRODUCTION

1.1 PROFILE OF ASSAM POWER GENERATION CORPORATION LIMITED (APGCL) & OIL INDIA LIMITED

Assam Power Generation Corporation Limited (APGCL) having its corporate office at Bijulee Bhawan, 3rd floor, Paltanbazar, Guwahati - 781001, Assam, was formed in the year 2004 after restructuring of Assam State Electricity Board to carry out the generation activities of electricity in the state of Assam. The present installed capacity of APGCL is 419 MW comprising of both hydro and thermal power plants.

APGCL owns and operates Namrup Thermal Power Station (NTPS), which is a gas-based Power Station with a total installed capacity of 139.4 MW situated in the district of Dibrugarh, Assam. NTPS is the first gas-based Power Station in South-East Asia.

APGCL is rated A++ by the Power Sector Rating Agency i.e. Rural Electrification Corporation (REC) Limited and Power Finance Corporation (PFC) Limited for the Year 2022-23.

Oil India Limited (OIL) is a fully integrated E&P company having significant presence across the entire value chain in the Hydrocarbon sector, pan-India and globally. A Maharatna CPSE, OIL's main focus is exploration & development and production of crude oil & natural gas in India and overseas. As a part of its strategic intent, OIL over the last few years has diversified into the Alternative (renewable) Energy domain, especially into the wind and solar segments and has so far established renewable energy projects of 188 MW comprising of 174MW Wind and 14MW solar energy projects. OIL intends to develop more renewable energy projects with the objective to provide sustainable green energy to the nation.

APGCL and OIL are in the process of formation of a Joint Venture Company (JVC) with the objective to establish Renewable/ Green Energy Business infrastructure for generation of Renewable / Green power in India.

The JVC intends to develop a 25 MW ground mounted solar plant in the vacant land at Namrup Thermal Power Station (NTPS). The total vacant land area is 107 acres approximately.

The subject job is envisaged to be carried out through Engineering, Procurement and Construction (EPC) Contract basis from concept to commissioning and subsequent Operation & Maintenance (O&M) for a period of 5 years.

1.2 ABOUT PROJECTS

- 1.2.1 Bid Documents may be downloaded from Web site <https://assamtenders.gov.in/> or (for view, down-load and on-line submission). Bid fee & EMD shall be paid/ submitted along with submission of Bid Documents. All the relevant documents of Bid shall be

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submitted online except a few, the original of which should be submitted offline and scan copy should be submitted online.

1.2.2 The Selected Bidder for the Project will be required to sign the Contract Document with the Purchaser. The EPC Agreement sets out further details regarding completion of the projects, after issue of order/ LoA by Purchaser

1.2.3 Power Transmission and Evacuation

EPC Contractor shall be responsible for grid integration of the project to the nearby existing 220/33 kV substation of AEGCL. As per the Project Management Consultant's (PMC) design there would be five numbers of inverter transformer stations to be installed for the proposed solar project and all the IDT stations shall be pooled together at the control room with indoor 33kV HT panel. From HT Panel the 33kV underground cable needs to be laid from the control room to AEGCL's 220/33 kV grid substation. The distance from the proposed solar project to AEGCL substation is around 1.5 KM.

An indicative power evacuation scheme and other related details are further elaborated in Appendix-I. However, the bidder can propose any other scheme for power evacuation suitable for this project subject to approval by the Purchaser.

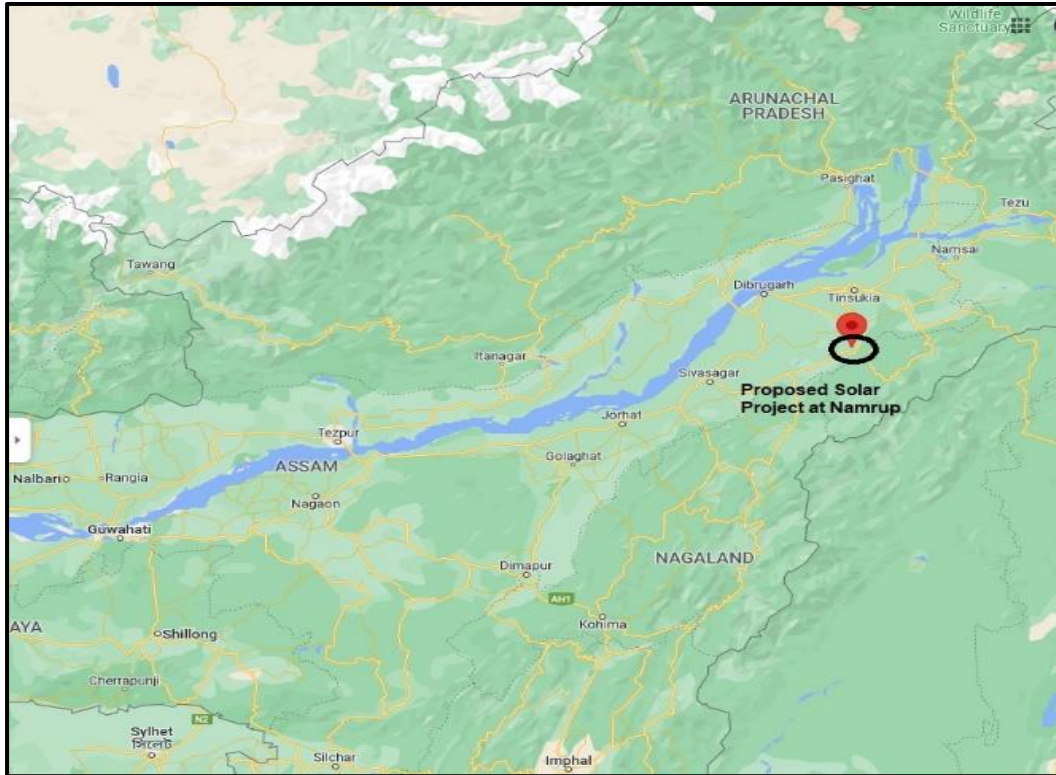
1.2.4 Power Offtake

Energy generated from the Solar PV Project shall be supplied to DISCOM as per tariff approved by Regulator.

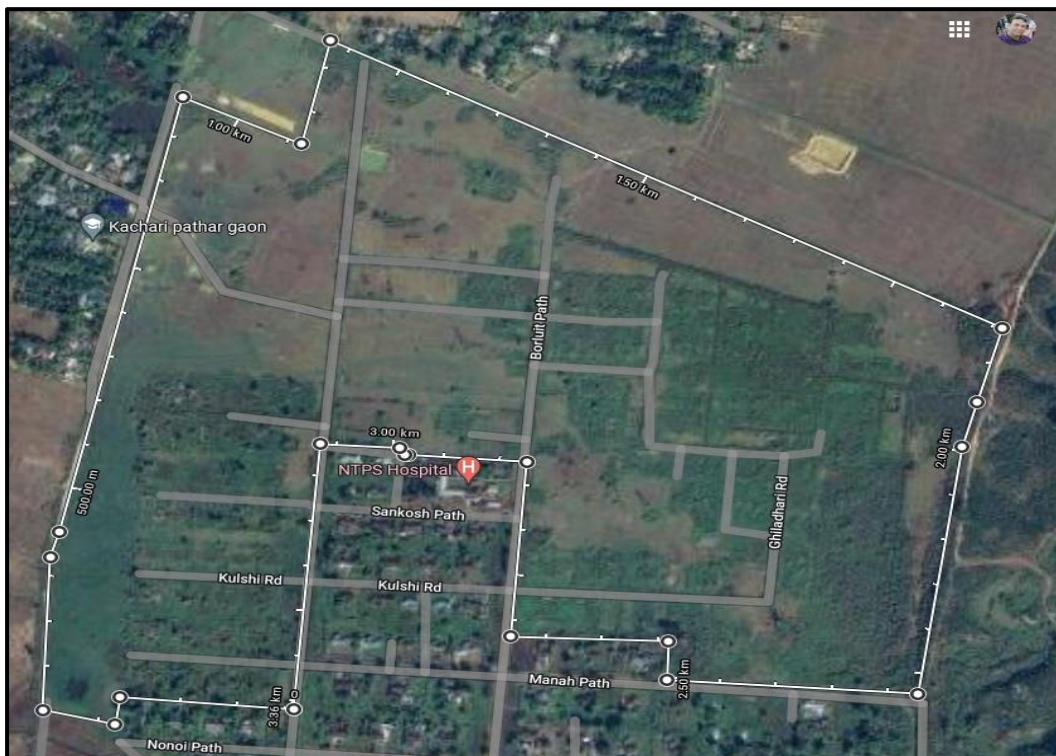
1.2.5 Project Location and Envisaged capacity at respective location:

The proposed land is located inside the boundary of the Namrup Thermal Power Station at Namrup, Assam. The proposed project land is located at the northern part of Namrup Thermal Power Station in Namrup Town of Dibrugarh District in Assam State. The geographical coordinates of the land area are 27.12° N and 95.37° E.

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Google image of project location is shown in above figure. The site is easily accessible through an all-weather metallic road. The road is wide enough and convenient for all sizes of trucks to deliver equipment and construction materials to the project location. The site is located about 4.7 km from Namrup town and 2.5 km from the state highway. It is well connected with the other part of the state through road. The nearest Dibrugarh Airport is at a distance of around 80 km from the proposed project location.



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The Bidders shall bear their own costs associated with or relating to the preparation and submission of their Bids, including copying, postage, delivery charges and expenses associated with any demonstrations or presentations which may be required by Purchaser, or any other costs incurred in connection with or relating to their Bids. All such costs and expenses will be borne by Bidders, and Purchaser and its employees and advisors will not be liable in any manner whatsoever for such costs and expenses, regardless of the conduct or outcome of the Bid Process.

Details of all project location with project specific irradiation, topography, geo technical investigations, conceptual drawings, and layouts are covered in Appendix-I.

The following illustrates the project particulars:

- a. Total proposed land within premises of Namrup thermal power station is **118 Acres approximately**, out of this land suitable land for solar project is envisaged as **107 Acres** and **11** acres is envisaged to be not suitable on account of artificial reservoir, 132kV transmission tower, 132kV transmission line and natural drain passing through proposed land area.
- b. Boundary wall and approach road are in place and not envisaged under EPC scope.
- c. Proposed land area is leveled, and grading have already been done
- d. The Solar Power Project is proposed to be connected to AEGCL's 220/33 kV Substation which is located at distance of 1.5 KM from the proposed location.
- e. Namrup town has connectivity via roads, railways and airways in the range of 60-70 Kilometers.

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SECTION – II

INSTRUCTIONS TO BIDDERS

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



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SECTION – II

INSTRUCTIONS TO BIDDERS

2.1 GENERAL

"Assam Power Generation Corporation Limited" hereinafter referred to as "APGCL" invites bids / offers/ proposals for carrying out supply / works / services on turnkey basis in accordance with the technical specifications & scope of supply / works/ services on turnkey basis for Purchaser.

Bidders to note that till the time of bid submission, all the correspondences, clarifications, amendments, evaluation of bids shall be carried out by APGCL and the same shall be binding upon all concerned.

Post evaluation/award, Owner reserves the right to assign the job/works under the tender to the joint venture company to be formed between APGCL and OIL. Accordingly, the JV company may carry out all actions necessary and incidental for execution of the contract including, amongst others, issuance of LOA, execution of the contract document without prejudice to other term and conditions laid down under the tender document. The Successful bidder must furnish an undertaking as per format attached at Annexure – XVIII.

2.2 BID SUBMISSION

Bidders should submit the bids /offers/proposals strictly in the manner specified in the Instructions to Bidders (ITB) for carrying out the supply/ works/ services on turnkey basis as per the technical specifications & scope of supply / works / services on turnkey basis in accordance with General Conditions of Contract (GCC), within the specified time and date.

2.3 BID DOCUMENTS

The services required, bidding procedures and contract terms are prescribed in the Bid Document. This Bid Document includes the following:

- (i) Notice Inviting Tender - (NIT)
- (ii) Instructions To Bidders - (ITB)
- (iii) General Conditions of Contract (for turnkey contract) - (GCC) and Special Conditions of the Contracts (SCC)
- (iv) Technical specifications & Scope of supply/ works/ services on turnkey basis
- (v) Particular document (if any) as per tender specifications
- (vi) Any Addendum /Corrigendum
- (vii) All Annexures and Appendices

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The bidders are expected to examine all instructions, forms, terms and specifications in the Bid Documents. Failure to furnish all information required in the Bid Documents or submission of a bid not substantially responsive to the Bid Documents in every respect will be at the Bidder's risk & responsibility and may result in the rejection of its bid.

In case of any contradiction in any of the terms & conditions to the extent that the two provisions cannot co-exist, the following shall prevail in order of precedence.

- (i) Contract Document
- (ii) Letter of Acceptance
- (iii) Letter of Technical Bid
- (iv) Letter of Price Bid
- (v) Letter of Award
- (vi) Statement of Agreed Variations
- (vii) Instructions to Bidder
- (viii) Special Conditions of Contract
- (ix) General Conditions of Contract
- (x) Technical Specifications
- (xi) The completed schedules including Bill of Quantities, and
- (xii) Any other document

2.4 TRANSFERABILITY OF BID DOCUMENTS:

2.4.1 Bid Documents are non-transferable. Bids can be submitted only in the name of the bidder in whose name the Bid Document has been issued.

2.4.2 Unsolicited bids will not be considered and will be rejected straightway.

2.5 CLARIFICATION ON BIDDING DOCUMENTS

A prospective bidder requiring any clarification relevant to the bidding document shall contact in writing to the APGCL. Only relevant queries, if considered appropriate shall be replied to. It is not obligatory on the part of APGCL to reply to each and every query. As a result of clarifications, if felt necessary, the amendment in bid documents shall be done by APGCL.

2.6 AMENDMENT OF BID DOCUMENTS:

2.6.1 APGCL may revise or amend the Bidding documents / Technical specifications & Scope of supply / works / services on turnkey basis and same shall be notified on the e-procurement website only, prior to the Proposal Due Date / Bid Closing Date. It is the responsibility of bidders to visit the web site regularly for such revision / amendment, if any.

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2.6.2 Any Amendment / Clarification, if issued, shall form part of the Bidding document.

2.6.3 In case of issuance of any amendment, APGCL at its discretion, may extend the last date for submission of bid / offer and opening of tender and same will be published on the e-procurement website.

2.6.4 The Bidder shall have to visit e-procurement website for any amendment / corrigendum / addendum / notice / clarifications and same will not be published in print media.

2.7 EXTENSION IN DATE OF TENDER SUBMISSION & OPENING

In case of inadequate response or any other reason thereof, Bids / Offers may not be opened on tender opening date. Under such circumstances, bidders will be informed about the extension of bid/ offer submission & opening date and the same will be notified on e-procurement website. APGCL's decision in this regard shall be final. Notice for Extension in date of bid / offer submission and opening shall not be issued in print media.

2.8 PARTICIPATION THROUGH JOINT VENTURE / CONSORTIUM BASIS

Participation of Joint Venture ("JV") / Consortium is not allowed.

2.9 NUMBER OF BIDS

2.9.1 Each Bidder, either directly or through its parent / affiliate is permitted to submit only one Bid.

2.9.2 No Bidder shall submit more than one Bid, either individually or, with or through any other entity(ies), including its Affiliates. The bidder who submits or participates in more than one Bid shall cause all the Bids with the Bidder's participation to be disqualified.

2.10 CURRENCIES OF BID AND PAYMENT:

The currency of the bid is Indian Rupees only and payment will be made accordingly in Indian Rupees.

2.11 BIDDER'S ELIGIBILITY AND QUALIFICATIONS:

The bidding is open to entities who fulfils the Bid Eligibility Criteria (BEC). The basic qualification of the bidder is as under:

2.11.1 The bidder shall be an experienced entity who should have successfully provided the supply, works, services on turnkey basis and meets the Bid Eligibility and Evaluation Criteria as per Section-III of the tender.

2.11.2 The Bidder should not anticipate change in ownership during the proposed period of Contract. If such a change is anticipated, the scope and effect thereof shall be defined.

2.11.3 The Bidder should have adequate financial stability and status to meet the financial obligations pursuant to the scope of the assignments. The Bidders should upload copy

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of Audited Annual Accounts (Balance Sheets, P&L accounts), Income Tax Returns and turnover certificate duly certified by statutory auditor/chartered accountant for the last three financial years, or any other documents as specified in the Pre-Qualifying Requirement of the tender.

- 2.11.4** The Bidder should have adequate resources, credentials and manpower as specified in tender documents to perform the assignment properly and expeditiously within the time period specified. The evidence shall consist of list of works and details of manpower in various categories.
- 2.11.5** The bidder should have established quality assurance systems and organization designed to achieve high levels of reliability regarding supply / works / services on turnkey basis during execution of contract.
- 2.11.6** The Credentials / Bid Eligibility Criteria (if any) of this tender or specified in Commercial portion of the tender, which shall override / supersede such clauses or all of the above basic qualification requirement, as the case may be, and similar related clauses appearing else-where in the tender / bidding documents for opening of bid / offer of the bidder.

Note: -

- (i) The bid / offer of the bidder who is banned or on business holiday (for all activities) / suspended (for specific activities if covered in the tender) for future business dealings with "APGCL" shall be rejected. Bidder shall submit a Notarized Document (BRS 20) with the technical bid solemnly stating that they are not banned or put on business holiday by any Central/State Govt., Central/State PSU, Pvt. Organization, etc.
- (ii) Except principal, no other participating bidder shall be allowed to submit their offer with condition that in the event of qualification of their offer for placement of award, the order be issued on the name of different entity.

2.12 EARNEST MONEY DEPOSIT (EMD)

- 2.12.1** Bid Security amount INR 2,00,00,000/- (Rupees Two Crore only) should be deposited online or in the form of Bank Guarantee.

Online payment of EMD can be made through NEFT/RTGS/etc. In such case, the bidder shall upload EMD payment documentary evidence along with the technical bid.

In case the bidder wishes to submit Bid Security in the form of a Bank Guarantee, the bidder is required to submit the same in hard copy (original) in addition to uploading the scanned copy as a part of the online bid. In such case, EMD in the form of an unconditional, irrevocable, and on-demand bank guarantee in the prescribed format of APGCL attached with this tender document as per Annexure – II, issued by any of the scheduled commercial banks as per latest list issued by Reserve Bank of India (RBI). The validity of the EMD shall be Two hundred and Ten days (210) from the date of opening of bid. The BG shall be payable at Guwahati in favor of:

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Chief General Manager (F&A),
Assam Power Generation Corporation Limited
3rd Floor, Bijulee Bhawan,
Paltanbazar, Guwahati-781001

2.12.2 Bidders are advised to check “download” section of Assam e-procurement portal for details of EMD submission.

2.12.3 The Bidders have to quote for complete package of supply / works / services on turnkey basis covered in the tender and pay earnest money as indicated above.

2.12.4 Bid / offer will not be accepted without Earnest Money Deposit in proper form. No exemption for submission of EMD will be provided for this tender.

2.12.5 The exemption from submission of EMD – Not Applicable for this tender.

2.12.6 The Earnest Money Deposit shall be refunded to unsuccessful bidders (except L1 & L2) within thirty (30) days from the date of issuance of supply / works / services on turnkey basis order to the Successful Bidder. The Earnest Money Deposited by the Successful Bidder and L-2 bidder shall be returned within Thirty (30) days from the date of acceptance of CPG submitted by the Successful Bidder against the awarded contract. No interest shall be paid in case of delay in the release of EMD.

2.12.7 All the Bank Guarantees including BG of EMD issued by the bank must be routed through SFMS platform as per following details:

- i. MT/IFN 760/MT/IFN 760 COV for issuance of Bank Guarantee
- ii. MT/IFN 760/MT/IFN 767 COV for amendment of Bank Guarantee

The above message/intimation may be sent through SFMS to Axis Bank, Paltanbazar Branch, IFS code-UTIB0000375, Branch Address-AXIS Bank Ltd., Commercial Building, A.T. Road, Guwahati-781001, India.

2.12.8 Request for adjustment / appropriation of earnest money / other deposits, if any, already lying with APGCL in connection with other tenders / orders shall not be entertained.

2.12.9 In case the tenderer withdraws offer during Bid Validity Period or issuance of LOA, then EMD amount shall be forfeited.

2.12.10 The EMD shall be forfeited if APGCL finds that the Bidder/ Successful Bidder has been engaged in corrupt or fraudulent practices in competing for contract or has concealed any material information or submitted misleading facts or statements in their bid / offer.

2.12.11 EMD will be refunded / returned to all the bidders if the tender is dropped by APGCL.

2.12.12 EMD will be refunded/ returned to all those bidders who do not fulfil the Credential/Pre-Qualifying Requirement.

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**2.13 BID VALIDITY PERIOD OF BIDS:**

The bids / offers should be valid for acceptance up to One Hundred and Eighty (180) days from the Bid Opening Date or extension, if any otherwise they are liable to be rejected. If necessary, the validity of the bid / offer will have to be extended for a further period as mutually agreed.

2.14 BIDDERS VISIT TO SITE

Wherever applicable, Bidders are advised to visit the Site to familiarize themselves with the nature and quantum of supply / works / services on turnkey basis and site condition and obtain all necessary information such as risks, contingencies and other circumstances which may influence or affect their bid / offer regarding tendered supply / works / services on turnkey basis. No extra charges consequent on any misunderstanding or otherwise shall be allowed. APGCL has carried out basic technical studies and based on the same information have been provided with the documents to facilitate the potential participant and have a basic idea of the proposed project however, bidders are advised to visit the site and quote accordingly. No claim on account of absence of information/inadequate information should be entertained.

2.15 COST OF PREPARATION AND SUBMISSION OF BID / OFFER

The Bidder shall bear all costs associated with the preparation and submission of bid / offer and APGCL or its advisors will in no case be responsible or liable for any costs, regardless of the conduct or outcome of the bidding process including but not limited to cancellation of the tender/ bid process.

2.16 SIGNING OF BID:

2.16.1 Bids are to be submitted online through Assam e-tender portal with digital signature. The bid and all attached documents should be digitally signed by the bidder using “Class 3” digital certificates with Organizations Name [e-commerce application (Certificate with personal verification and Organization Name)] as per Indian IT Act 2000 obtained from the licensed Certifying Authorities operating under the Root Certifying Authority of India (RCAI), Controller of Certifying Authorities (CCA) of India before bid is uploaded. Digital Signature Certificates having “Organization Name” field other than Bidder’s Name are not acceptable. However, aforesaid Digital Signature Certificates having Bidder’s Name in the “Organization Name” field are acceptable.

2.16.2 The bid, including all uploaded documents, shall be digitally signed by duly authorized representative of the bidder holding a Power of Attorney to bind the Bidder to the Contract.

2.16.3 If any modifications are made to a document after attaching digital signature, the digital signature shall again be attached to such documents before uploading the same. The Power of Attorney shall be submitted by the bidder.

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- 2.16.4** The authenticity of the above digital signature shall be verified through authorized CA after bid opening and in case the digital signature is not of “Class-3” with the organization name, the bid will be rejected.
- 2.16.5** Bidder is responsible for ensuring the validity of digital signature and its proper usage by their employees.
- 2.16.6** The original and all copies of the bid shall be typed or written in indelible inks. Since bids are to be submitted ONLINE with digital signature, manual signature is NOT relevant. The letter of authorization shall be indicated by written Power of Attorney accompanying the Bid.
- 2.16.7** Any person signing the Bid or any other document in respect of this Bidding Document or other relevant documents on behalf of the Bidder without disclosing his authority to do so shall be deemed to have the authority to bind the Bidder. If it is discovered at any time that the person so signing has no authority to do so, the APGCL may, without prejudice to any other right or remedy, cancel his Bid or Contract and hold the Bidder liable to the APGCL for all costs and damages arising from the cancellation of the Bid or Contract including any loss which the APGCL may sustain on account thereof.
- 2.16.8** Any physical documents submitted by bidders shall contain no interlineations, white fluid erasures or overwriting except as necessary to correct errors made by the Bidder, in which case such correction shall be initialed by the person or persons who has/have digitally signed the Bid.
- 2.16.9** Any Bid, which is incomplete, ambiguous, or not in compliance with the Bidding process will be rejected.
- 2.17 SUBMISSION OF BIDS**
- 2.17.1** Bidder should log into the site <https://assamtenders.gov.in/> well in advance for bid submission so that they can upload the bid in time i.e., on or before the Bid Closing Date/ Proposal Due Date. Bidder will be responsible for any delay due to other issues.
- 2.17.2** APGCL may, at its discretion and for any reason, including to afford Bidders a reasonable time for taking an Addendum into account in preparing the Proposal, extend the Proposal Due Date for all Bidders by issuing a Corrigendum to the bid document, in which case all rights and obligations of APGCL and the Bidders will thereafter be subject to the Proposal Due Date as extended.
- 2.17.3** The Bidder has to digitally sign and upload the required bid documents one by one as indicated in the tender document.
- 2.17.4** Bidder has to select the payment option as “Online” to pay the tender fee / EMD and Processing Fee “online” as applicable.
- 2.17.5** Bidders are requested to note that they should submit their financial bids in the format provided and no other format is acceptable. If the price bid has been given as a standard Schedule of Price format with the tender document, then the same is to be

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downloaded and to be filled out by all the bidders. Bidders are required to download the BoQ file, open it and complete the colored (unprotected) cells with their respective financial quotes and other details (such as name of the bidder). No other cells should be changed. Once the details have been completed, the bidder should save it and submit it online, without changing the filename. If the BoQ file is found to be modified by the bidder, the bid will be rejected.

- 2.17.6** The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission.
- 2.17.7** All the documents being submitted by the bidders would be encrypted using PKI encryption techniques to ensure the secrecy of the data. The data entered cannot be viewed by unauthorized persons until the time of bid opening. The confidentiality of the bids is maintained using the secured Socket Layer 128-bit encryption technology. Data storage encryption of sensitive fields is done. Any bid document that is uploaded to the server is subjected to symmetric encryption using a system generated symmetric key. Further this key is subjected to asymmetric encryption using buyers/bid openers public keys. Overall, the uploaded tender documents become readable only after the tender opening by the authorized bid openers.
- 2.17.8** The uploaded tender documents become readable only after the tender opening by the authorized bid openers.
- 2.17.9** Upon the successful and timely submission of bids (i.e., after Clicking "Freeze Bid Submission" in the portal), the portal will give a successful bid submission message & a bid summary will be displayed with the bid no. and the date & time of submission of the bid with all other relevant details.
- 2.17.10** The bid summary has to be printed and kept as an acknowledgement of the submission of the bid. This acknowledgement may be used as an entry pass for any bid opening meetings.

2.18 PREPARATION, SUBMISSION, OPENING AND VERIFICATION OF BID PROPOSALS

2.18.1 Purchase of Tender Document

Tender documents are to be purchased online and downloaded from the e-procurement website by making payment of tender document fees. The tender documents fee shall not be refunded.

2.18.2 Exemption for MSEs and START UP of Assam from payment of Tender Fees: -

The exemption shall be given to MSE and Startup of Assam on production of Udyam and MASI registration respectively.

2.18.3 Requirement to Read the Tender Documents by Bidder

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The Bidders are requested to go through all the contents of Tender documents thoroughly before submission of their bids / offers.

2.18.4 Language of Bids / Offers

The Bids / Offers should be prepared in English only.

2.18.5 E-Tendering

- (a) For participation in e-tendering process, it is mandatory for prospective bidders to get themselves registered on e-procurement website. Therefore, it is advised to all prospective bidders to get them registered by completing the requirements for online registration including payment of requisite fee at the earliest.
- (b) The registration fees for the e-procurement website should be borne by the bidders and no exemptions are allowed in registration fees.
- (c) Service and gateway charges as applicable shall be borne by the bidders.
- (d) The bidders are required to sign their bids online using Class-III Digital Signature Certificates (DSC). Bidders are therefore advised to obtain the same at the earliest without waiting for the due date of bid submission.
- (e) The issuance of the Digital Signature Certificate may take up to 7 to 10 working days. In such situations APGCL will not be responsible for the delay in the issue of the Digital Signature Certificate.
- (f) If the bidder is going first time for e-tendering, then it is obligatory on the part of bidder to fulfil all formalities such as registration, obtaining Digital Signature Certificate etc. well in advance.
- (g) Bidders are requested to visit e-procurement website regularly for any clarifications and / or amendments and/or due date extension,
- (h) Bidder must positively complete online e-tendering procedure at e- procurement website.
- (i) APGCL shall not be responsible in any way for delay / difficulties / inaccessibility of the downloading facility from the e-procurement / APGCL website for any reason whatsoever.
- (j) The bidder who so ever is submitting the offer by their Digital Signature Certificate shall invariably upload the scanned copy of the authority letter to submit offer on behalf of the firm.
- (k) DSC once mapped to an account cannot be remapped to any other account. It can only be inactivated.

2.18.6 Documents comprising the Bids

- (a) Proof of payment made towards tender fee as specified in Invitation for Bid
- (b) Earnest Money Deposit as per clause 2.12 of Instruction To Bidders

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- (c) Documentary evidence established in accordance with Bid Eligibility Criteria (SECTION-III).
- (d) Technical bid comprising requisite supporting documents.
- (e) Price Bid without indicating prices (Bid Response Sheets (BRS) P-I to P-IV)
- (f) Bid Response sheets/Undertaking as specified.

2.18.7 Submission Procedure

- (a) Bidder must positively complete online uploading of e-offer (Credential / BEC, EMD, Technical Bid & Price Bid) at the e-procurement website and as per instructions thereon.
- (b) The bidder shall also ensure that prices / rates are given strictly in accordance with the proforma of the price bid of the tender document.
- (c) No alterations / corrections in the bid documents are permitted.

2.18.8 Verification of Earnest Money Deposit

- (a) The EMD as per NIT is to be submitted online through e-payment mode via Net banking/ Real Time Gross Settlement (RTGS)/ National Electronic Fund Transfer (NEFT). The online submission shall be considered for opening of bid/offer. The EMD submitted online will be verified by APGCL.

OR

As indicated in above clause 2.12 Earnest Money Deposit of Rs. 200 Lakh (Rupees Two Hundred Lakh). Bidder shall provide EMD in the form of an unconditional, irrevocable, and on-demand bank guarantee in the prescribed format of APGCL attached with this tender document, issued by any of the scheduled commercial banks as per list issued by Reserve Bank of India (RBI). BG towards EMD shall be valid for Two Hundred and Ten (210) days from date of bid opening and scanned self-certified copy of the same is to be uploaded on e-procurement website. The BG submitted online toward EMD will be verified by APGCL. The BG shall be payable at Guwahati in favor of:

Chief General Manager (F&A),
Assam Power Generation Corporation Limited
3rd Floor, Bijulee Bhawan,
Paltanbazar, Guwahati-781001

- (b) The EMD envelope containing the original Bank Guarantee should be submitted in physical form but only after opening of tender (T&C Bid), within 07 days thereafter. APGCL reserves the right to seek confirmation of a bank guarantee from the issuing bank.
- (c) If on the opening of bid any discrepancy is noticed in the BG towards EMD then it will be indicated for respective bidder on e- tendering web site itself through "short

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fall of document" window and same has to be made good by the bidder and corrected / additional documents be uploaded on e-tendering web site itself on the same window within specified time or otherwise such Bid / offer shall likely to be rejected.

- (d) The offers received without pre-requisite EMD or EMD without SFMS shall be summarily rejected.

2.18.9 Verification of Credentials / BEC

The electronically submitted credentials / BEC documents will be verified. If on the bid opening any discrepancy is noticed in the credential / BEC documents, then it will be indicated for respective bidder on e-tendering web site itself through "short fall of document" window and same has to be make good by the bidder and correct document to be uploaded on e-tendering web site itself on the same window within specified time or otherwise such Bid / offer shall likely to be rejected. Decision of APGCL in this respect shall be final. However, seeking post bid clarification shall be at sole discretion of Purchaser.

2.18.10 Undertaking for successful execution of earlier awarded contracts

The bidder should submit an undertaking as per the format mentioned in BRS-8, that the contracts awarded to them and submitted towards credentials/BEC had been successfully executed by them without any default.

Concealment of facts or submission of false undertaking, if found at any stage, shall render the bidder disqualified and their EMD shall be liable for forfeiture.

2.18.11 Verification of Technical Bid

The electronically submitted Technical Bid Document in the form of questionnaire and schedules downloaded from website and filled as per instructions shall be scrutinized and verified.

Terms & conditions filled in in bid questionnaire shall be treated as final. Requisite documents should only be uploaded.

Documents containing detailed material / works / services description, specifications, if any should not contain any price part.

2.18.12 Performance / Experience Records of Bidder for tendered supply/ works/services on turnkey basis

The bidder should invariably upload their record of performance / Experience for tendered supply / works / services on turnkey basis along with technical bid on e-procurement website.

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**2.18.13 Price bid**

- (a) Bidder shall have to submit the Price bid online only in the format downloaded from website and uploaded as per instructions therein.
- (b) The price bid of technically qualified bidders shall be opened online at the notified date and time. Bidders can view the price bid opening date by logging into e-tendering website.

Instructions for submission of price bid: -

- (i) The bidder's quoted price must strictly be in Indian rupees (INR) and should remain FIRM till successful completion of the Contract including the extension period, if any, of the contract unless otherwise specified in tender specification.
- (ii) It is obligatory that prices are quoted clearly giving a break-up of prices indicating each element in the Price Bid of the tender.
- (iii) The Bidder shall mandatorily fill information of applicable Tax / Cess on various tendered supply / works / services on turnkey basis contract wherein the bidder shall indicate, HSN / SAC Code, their percentages and the Tax / Cess amount considered while quoting for the tender. The bidder shall also consider the applicability of Cess under BOCW Welfare Cess Act 1996.
- (iv) Bidders have to ensure that the values and comments against each and every clause of the Price Schedule is clearly filled in and answered. No clause shall be left blank or unanswered.
- (v) Participating bidder shall submit only one bid against the tender.
- (vi) The offers with prices quoted on a slab basis unless otherwise specified in tender specifications may not be considered. The offers with conditional discount on any account viz. payment, quantity etc. shall be evaluated without considering the discount.
- (vii) The Bidders shall quote the prices only in the unit specified in the Price bid.
- (viii) Price Should be inclusive of all charges for bidder's work staff and labour required during the tenure of the contract, all machines, tools, tackles, approval, liaisoning, travel & accommodation of bidder's staff and work staff and labour, all taxes & duties applicable as per the service provided and all necessary costs for successful completion of the contract.
- (ix) Words like etc. anywhere will not be entertained. Any charges as may be applicable as per laws in force must be clearly specified otherwise any such hidden charges, even if statutory charges, shall not be payable by Purchaser and statutory compliance will be the responsibility of the bidder in the event of any order.

2.19 MODIFICATION AND WITHDRAWAL OF BIDS:

- 2.19.1** The Bidder after submission of Bid may modify or withdraw its Bid prior to Bid Closing Date & Time.

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2.19.2 No Bid can be modified or withdrawn subsequent to the Bid Closing Date and Time for submission of Bids.

2.19.3 No Bid can be withdrawn in the interval between the deadline for submission of Bids and the expiry of the Bid Validity Period. Withdrawal of a Bid during this interval shall result in the forfeiture of its EMD and bidder shall also be debarred for a period of two (02) years from participation in future tenders in Assam Power Generation Corporation Limited.

2.20 ABNORMALLY HIGH / LOW QUOTES BY THE BIDDERS: - APGCL has the right to reject any bid if observed that the quoted prices are abnormally high or low without assigning any reasons.

2.21 REVERSE AUCTION

APGCL will conduct bidding through reverse auction. The process of selection of qualified lowest bidders shall be complete after reverse auction only. The date and time of reverse auction process shall be uploaded on e-tendering website and informed to qualified bidders, if required. The rules regarding Reverse Auction are illustrated in Annexure-X of "Forms & Formats".

2.22 CONTACTING THE APGCL

2.22.1 No Bidder shall contact APGCL on any matter relating to its bid, from the time of the bid opening to the time the Contract is awarded except as required by APGCL.

2.22.2 An effort by a Bidder to influence the APGCL in the bidder's bid evaluation, bid comparison or Contract award decisions may result in the rejection of their bid.

2.23 DOCUMENTS CONSIDERED FOR EVALUATION

The Technical Bid, Price Bid, other documents, if any as issued with tender document and any subsequently issued amendment(s) should be uploaded by the bidders duly filled as per instructions given therein. Please note that the above documents shall only be considered as the offer of the bidder. Any other supporting documents / printed terms & conditions as uploaded by the bidder shall not be given any cognizance for evaluation of the offer.

2.24 CORROBORATION OF CREDENTIAL / BEC / BG & OTHER DOCUMENTS / BIDS

APGCL reserve the right to corroborate the credential / BEC / BG & other documents / bids submitted by bidder / contractor from concern respective authority / firm / company / organization / statutory entity during tender evaluation stage, till award & post award also and Purchaser' s decision in this regard shall be final & binding on participant bidder / contractor.

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**2.25 DELAYED / LATE SUBMISSION OF BID / OFFER**

The Bidder shall have to ensure that bid / offer is submitted as per APGCL's Schedule and APGCL shall not assume any responsibility for any unforeseen delays like delay in getting registration on e-procurement website of APGCL or problem in uploading documents on website due to internet problem etc. No extension of time shall be granted on such grounds.

2.26 ALTERNATIVE BIDS / OFFERS

Bids / offers should be submitted as per the requirement of tender specifications. The alternative bids / offers are liable to be rejected. APGCL reserves the right to reject all such alternative bids / offers and may not discuss merits / demerits of such bids / offers.

2.27 DEVIATIONS FROM TERMS AND CONDITIONS / TENDER ACCEPTANCE LETTER

Deviation from terms and conditions shall not be permitted.

2.28 PRINTED TERMS & CONDITIONS OF BIDDERS

Any printed terms and conditions, if uploaded / submitted by the bidder in the bid / offer, will not be considered as part of the bid / offer and shall also not be considered for evaluation.

2.29 REQUISITE CERTIFICATE FOR GST / OTHER TAXES

Wherever applicable, the bidder should submit a valid GST Registration Certificate and type of registration i.e., registered dealer & non-registered dealer or composite scheme registered dealer & HSN / SAC code for the tendered supply / works / services.

2.30 DISQUALIFICATIONS OF BIDDER

2.30.1 Notwithstanding anything to the contrary contained herein and without prejudice to any of the rights or remedies of APGCL, a Bidder shall be disqualified, and its Bid Proposal shall be dropped for further consideration if any of the following is observed in the bid / offer: -

- (a) Misrepresentation in the Bid Proposal
- (b) Failure to provide necessary and sufficient information as required and asked for in the Bid Document
- (c) A winding up / insolvency or other proceedings of a similar nature against the bidder is pending.
- (d) Ceases to fulfil the prescribed qualification criteria as per terms of the Tender Document at any point during the Bidding process.

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- (e) If any such information, which would have entitled APGCL to reject or disqualify the relevant bidder, becomes known to it even after the bidder has been qualified and their bid has been opened.
- (f) Have breached any terms of the bid document which could result in rejection of their bids at any point during the Bidding process.
- (g) Bidder is not banned / blacklisted / delisted on the date of bid submission by any of the Central / State Departments / PSUs / APGCL / Successor Companies of ASEB / Department of Energy, Government of Assam for any reason. Notwithstanding to above, if the bidder is banned / blacklisted / delisted during processing of tender and before award of LOA / Order (whichever is earlier) then the offer of such bidder shall be rejected.

2.30.2 After necessary corroboration the bidder may be disqualified, and its Bid Proposal shall be dropped for further consideration if any of the following is observed in the bid / offer:

- (a) Contracts of Bidder is / are terminated or foreclosed in the last three years due to their inability to perform the tender milestones for contracts awarded from Government Agency or any Public Sector Undertakings including APGCL / successor companies of ASEB.
- (b) If past performance has not been found satisfactory against previous orders of APGCL and / or successor companies of ASEB. Satisfactory performance shall mean that the bidder should not have a history of poor performance in the last three years. Poor performance would mean:
 - (i) Termination of contract due to default of Contractor.
 - (ii) Forfeiting of full or partial Security Deposit for poor performance.

Note: -

The bidder has to upload the duly notarized affidavit on stamp paper worth Rs.100 or as applicable in the format mentioned in BRS-20 regarding no banning / blacklisting / delisting.

2.31 INCOMPLETE BIDS / OFFERS

Bid / Offer, which is incomplete, obscure or inconsistent is liable for rejection.

2.32 RIGHTS FOR ACCEPTANCE OR REJECTION OF PART / WHOLE OF BIDS / OFFERS

APGCL reserves the right to accept / reject wholly or partly, any or all bids / offers without assigning any reason whatsoever. No Correspondence in this respect shall be entertained by APGCL.

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**2.33 AMBIGUITIES IN BID / OFFER**

In case of ambiguous or self-contradictory terms / conditions mentioned in the bid / offer, interpretation as may be, advantageous to the APGCL will be considered, without any reference to the bidder. The bidder shall be solely responsible for this.

2.34 PRE-BID MEETING

2.34.1 APGCL will organize a pre-bid meeting with the prospective Bidders to clarify the tender specification related issues and to respond to the Bidder's queries which may arise from the Bidding Documents, site visit etc. APGCL will give notice of the pre-bid conference to the Bidders at least seven (7) days prior to the said pre-bid conference unless otherwise fixed or informed in the NIT/Tender Specification.

2.34.2 The Bidders are required to submit their questions/ clarifications /queries etc. in writing as per Annexure - VII including by way of email from the registered email id so as to reach APGCL at least three days before the pre-bid conference. It may not be practicable at the conference to answer the questions which are received late.

2.34.3 Record notes of the pre-bid conference including the APGCL' s response to the queries raised by the Bidders in writing may be prepared and transmitted to all the prospective Bidders by APGCL. Further, any modification to the Bidding Documents which may become necessary as a result of the pre-bid conference shall be made by APGCL exclusively through an amendment to the Bidding Documents. The recorded notes of the pre-bid conference shall not be treated as an amendment to the Bidding Documents.

2.34.4 Non-attendance of the pre-bid conference will not be a cause for disqualification of a Bidder or his bid, it would however be in the interest of the bidder to attend the pre-bid conference.

2.34.5 If, the pre-bid conference has been scheduled on e-procurement website itself, then all the prospective bidders have to follow the procedure and time limits as laid down on e-procurement website for respective tender.

2.35 VISIT TO BIDDER'S OFFICE BY APGCL

APGCL reserves the right to visit and inspect the bidder's office/premises/facilities during evaluation of bid/offer and /or before the award of contract. In such case, the bidder shall make all necessary arrangements as per the requirement of APGCL.

2.36 COLLUSION / CONFLICT OF INTEREST

A Bidder shall submit only one Bid. It is further clarified that any of the "Associate/Subsidiary/Firms/Companies with common management/Director" of the Bidder shall not separately participate directly or indirectly in the same bidding process. A Bidder shall not have "Collusion /Conflict of Interest that affects the Bidding Process. Further, if any Bidder is having a "Collusion /Conflict of Interest" with other Bidders participating in the same bidding process, the Bids of all such Bidders shall be rejected.

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A Bidder shall be deemed to have a “Collusion /Conflict of Interest” affecting the Bidding Process in the event of any of the followings:

- (a) Such Bidder, or any Associate thereof, receives or has received any direct or indirect subsidy, grant, concessional loan or subordinated debt from any other Bidder, or any Associate thereof or has provided any such subsidy, grant, concessional loan or subordinated debt to any other Bidder, its members or any Associate thereof.
- (b) Such Bidder or any associate thereof having common management control in other participating bidding company or any of its associate participating in the same bid.
- (c) Such Bidder has the same legal representative for purposes of their offer as any other participating Bidder for the Bidding process in consideration.
- (d) Such Bidder or any Associate thereof has participated as a consultant to the APGCL for the purpose of preparation of any documents, design and/or technical specifications for the tender in which that bidder is participating.
- (e) If any legal, financial or technical consultant/adviser of the APGCL in relation to the bid for which bidders are submitting their offers, is engaged by any participating Bidder, its member or any Associate thereof, as the case may be, in any.

2.37 TENDER OPENING

- 2.37.1** Tender shall be opened on the due date and time as notified. The bidders or their authorized Representative possessing necessary authority letter will be allowed to witness the tender opening.
- 2.37.2** If the due date of opening of tender is declared a holiday by the Government or Local Administration, it will automatically be shifted to the next working day, for which no prior intimation shall be given.
- 2.37.3** The tender opening shall be continued on subsequent days in case the opening of all the tenders is not completed on the day of opening.
- 2.37.4** It may please be noted that the due date/time of opening can be altered/extended, if desired by APGCL, without assigning any reason thereof. However, in such a case, due intimation shall be given manner, for matters related to or incidental to its Bid.

2.38 EVALUATION OF TECHNICAL BID

- 2.38.1** After opening of technical bid, the desired clarification/ confirmations shall be communicated to all the bidders and shall be notified. The bidders shall be required to submit the desired clarification / confirmation within the time stipulated and before the opening of the price bid. The clarifications/ confirmations shall be obtained by tender processing authority on the website itself by “Short fall of documents” window or otherwise by issuing clarification/confirmation letters in physical form to respective bidders.

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2.38.2 APGCL reserves the right to seek any clarification regarding the technical bid of the bidder.

2.38.3 In case clarifications are not submitted by the bidders within the specified time APGCL reserves the right to refuse to open the price-bid.

2.38.4 The evaluation criteria (if any) specified in NIT or Bid Eligibility and Evaluation Criteria of tender shall over-ride/supersede above and other similar related clauses appearing else-where in the tender documents.

2.39 OPENING OF PRICE BID

Price bids of those bidders whose technical bids are found to be technically and commercially acceptable shall only be opened on the date of opening of the "Price Bid". The date of opening of the price bid shall be uploaded on website /shall be intimated to the bidders whose bids are found to be technically and commercially acceptable. Reverse Auction shall be conducted on the E-Tender Portal as per Annexure X.

2.40 DISCREPANCY IN PRICE BID

2.40.1 In the price structure quoted, if there is discrepancy between the unit price and total price (which is obtained by multiplying the unit price by the offered quantity), the unit price shall prevail and the total price shall be corrected accordingly. If, there is an error in a total corresponding to addition or subtraction of sub totals, the sub total shall prevail and the total shall be corrected. If there is a discrepancy between words and figures, the correct amount shall prevail.

2.40.2 If only the lump sum price is to be quoted by the bidders and any discrepancy is found in prices between words and figures, the amount as indicated in words shall prevail.

2.40.3 Such discrepancy in an offer shall be conveyed to the bidder asking him to respond by a target date and if the bidder does not agree with the observations of the procuring entity, the offer is liable to be rejected.

2.41 EVALUATION OF PRICE BID

2.41.1 Unless otherwise specified separately in the tender document, evaluation of prices shall be done on total package wise. The evaluated price shall be taken for deciding the lowest bidder. It may be noted that in case of ambiguity, the rates of taxes/duties and other charges as confirmed during techno-commercial stage shall be considered as final for evaluation of prices. Decision of the APGCL in this respect shall be final.

2.41.2 In supply/works/services on turnkey basis tenders, in which minimum number of manpower deployment is indicated, Bidders have to ensure that while arriving at the quoted rate the applicable minimum wages including EPF contribution, labour insurance and other statutory provision of labour law confirming to the Minimum wages Act-1948 and subsequent amendment thereof have been considered. The

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bid/tender of those bidders quoting less than minimum workable rates as prescribed in applicable laws shall not be considered for bid evaluation and award of contract.

- 2.41.3** The Evaluated Bid Value shall be considered for evaluation purpose. The same shall be rounded upto three (3) decimal place only. If the fourth decimal place is 5 (five) or above, then the third decimal shall be rounded up and if the fourth decimal place is below 5 (five), the third decimal place shall not change.

The method of evaluation of Price Bid shall be carried out by methodology illustrated in Clause No. 3.2 of Section-III "Bid Eligibility and Evaluation Criteria".

2.42 AWARD CRITERIA:

The Owner will award the Contract to the Successful Bidder whose bid has been determined to be substantially responsive and eligible as per clause 3.1 and has been determined as the lowest evaluated bid as per clause 3.2, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.

2.43 LETTER OF AWARD / DETAILED ORDER

- 2.43.1** Prior to the expiry of the bid validity, Owner will issue a Letter of Award to the Successful Bidder containing reference of the documents which form the Contract, Scope of supply/ works/ services on turnkey basis, Contract Price, period of completion of the Contract, terms of payment and other important aspects.

- 2.43.2** This Letter of Award will constitute the formation of the Contract.

- 2.43.3** Upon the Successful Bidder's furnishing of Contract Performance Security pursuant to relevant Clause, the Purchaser will promptly notify each un-successful Bidder and will discharge their EMD, pursuant to Clause 2.12 herein above.

2.44 SIGNING OF CONTRACT

- 2.44.1** After placement of LoA, the successful Bidder will submit the detailed draft contract agreement (in line with the format appended with the tender documents) duly incorporating, the prices agreed, major terms & conditions as finalized till date. This draft Contract Document will be reviewed by Purchaser and discussed mutually for finalizing and signing by both the parties on NJS paper of appropriate value.

- 2.44.2** Till the contract is signed, the LOA issued to the Successful Bidder shall remain binding between the two parties.

- 2.44.3** In the event of failure on the part of the Successful Bidder to sign the contract, Purchaser reserves the right to terminate the LOA issued to the Successful Bidder and invoke the EMD or the Contract Performance Security if submitted by the Successful Bidder. The party shall also be debarred for a period of two (2) years from the date of default.

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2.44.4 A single contract shall be entered between the parties for the entire scope of the work under this tender i.e., for the Supply portion, Services portion (including civil works) & O&M for 5 years' period. A breach in any one portion shall automatically be construed as a breach of the entire contract and will confer a right to the Purchaser to terminate the entire contract at the risk and cost of the contractor.

2.44.5 The contract constitutes the entire agreement between the Purchaser and the contractor with respect to subject matter of the contract and shall supersede all communications, negotiations and agreements of parties with respect thereto made prior to date of contract.

2.45 SITE CONDITIONS

2.45.1 The Bidders are also advised to visit the site and familiarize themselves with the on-ground conditions. Bidders are free to visit the site on their own by informing APGCL or to participate in the site visit facilitated by APGCL on the date indicated in the Bid Schedule as may be amended with due intimation to all entities that register themselves with the E-bidding Portal for participation in the Bid Process.

2.45.2 Bidders are encouraged to submit their respective Bids after visiting the project site and ascertaining for themselves the site conditions, location, surroundings, climate, availability of power, water and other utilities for construction, access to site, handling and storage of materials, weather data, applicable laws and regulations, and any other matter considered relevant by them. If a Bidder wishes to visit the site, then it will be required to, at least 7 (seven) days prior to the visit, send an e-mail request to APGCL, specifying the date and time of such visit and the names of the people who will be conducting the site visit. Unless any clarification or concern is raised by APGCL, Bidders will be deemed to have been granted permission by APGCL to access the site during the site visit. The cost of visiting the site and verifying other information shall be borne solely by the Bidder. The deemed permission granted to a Bidder and any of its personnel or agents is subject to the express condition that the Bidder, its personnel, and agents will: (a) release and indemnify APGCL and its personnel, agents and advisors from and against all liability in respect thereof; and (b) be responsible for loss of or damage to property, and any other loss, damage, costs and expenses incurred, including death or personal injury, as a result of such inspection.

2.45.3 It will be assumed that Bidders will have accounted for all relevant factors, including technical data, site conditions, climate, weather conditions, availability of power, water and other utilities for construction, access to the site, handling and storage of materials and applicable laws and regulations, while submitting their Bids. Bidders will be deemed to have full knowledge of the Solar Projects, including their rights, duties and obligations under the EPC Agreement.

2.45.4 Failure to visit the Site or failure to study the RFP document shall in no way relieve the successful Bidder from furnishing any material or performing any work in accordance with the RFP document. In no case the date of Time for Completion of

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the project shall be extended, due to the failure of the Bidder to visit the site and it shall be in line with the timeline under this RFP.

- 2.45.5** The Bidder must conduct its own inspection of the Project Site, access to the Project Site and surroundings at its own cost in order to make a proper estimate of the works to be performed under consideration of site-specific constraints. This applies in particular to the transportation of equipment to the Project site and the scope of site works. The Bidder shall also inspect the site and the access to site to make sure that its equipment is suitable for the available access and the site terrain.
- 2.45.6** The APGCL shall not be liable for any omission, mistake or error on the part of the Bidder in respect of any of the above or on account of any matter or thing arising out of or concerning or relating to the RFP document or the Bidding Process, including any error or mistake therein or in any information or data given by the Purchaser.
- 2.45.7** It shall be imperative for each Bidder to fully inform itself of all local conditions, laws and factors which may have any effect on the execution of the Contract as described in the Bidding Documents. The APGCL shall not entertain any request for clarification from the Bidder regarding such local conditions.
- 2.45.8** It is the responsibility of the Bidder that such factors have properly been investigated and considered while submitting the Bid proposals and that no claim whatsoever including those for financial adjustment to the Contract awarded under the RFP document shall be entertained by the APGCL and that neither any change in the time schedule of the Contract nor any financial adjustments arising thereof shall be permitted by the APGCL.
- 2.45.9** It shall be deemed that by submitting a Bid, the Bidder has:
- Made a complete and careful examination of the RFP document.
 - Received all relevant information requested from the APGCL;
 - Acknowledged and accepted the risk of inadequacy, error or mistake in the information provided in the RFP documents or furnished by or on behalf of the APGCL relating to any of the matters referred to in RFP.
 - Satisfied itself about all matters, things and information including matters referred to in the Bid Info at a glance, necessary and required for submitting an informed Bid, execution of the Project in accordance with the RFP document and performance of all of its obligations there under;
 - Acknowledged and agreed that inadequacy, lack of completeness or incorrectness of information provided in the RFP document or ignorance of any of the matters referred to in the RFP herein shall not be a basis for any claim for compensation, damages, extension of time for performance of its obligations, loss of profits etc. from the Purchaser, or a ground for termination of the Contract Document; and
 - Agreed to be bound by the undertakings provided by it under and in terms hereof.

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2.45.10 Bidder is deemed to have acquainted himself of Government taxes, law's structure, regulations, levies and other charges relating to the tendered work at site.

2.45.11 Bidder shall obtain all the necessary clearances / permission / NOCs etc. for development of the site for Solar power project.

2.45.12 Any neglect or omission or failure on the part of the bidder in obtaining necessary clearances and reliable information upon the forgoing or any other matter affecting the bid shall not relieve him from any risks or liabilities or the entire responsibility for completion of the work in accordance with the bid.

2.46 POOL RATE

The Bidders are advised to quote their own individual rates. It may please be noted that if the same rate is quoted by more than one bidder, suggestive of a cartel, then such offers may not be considered by APGCL and EMD of participating bidders may be forfeited.

2.47 FAKE DOCUMENTATION

EMD shall be forfeited if documents submitted are found fake. Besides this, action to the extent of suspension/banning the bidder from future business with APGCL may also be resorted.

2.48 ARBITRARY SUBMISSION BY THE BIDDER

After commencement of bid opening process any correspondence by Bidder in arbitrary manner which may affect the sanctity of tender will not be accepted and may lead to rejection of bid of such bidder.

Note: - The unsolicited/ Suo motu discounts/rebates offered by bidder after opening of tender shall not be considered for evaluation and comparative ranking of offer but if such bidder does become L1 at its original offer, then unsolicited/suo motu discounts/rebates shall be considered for placement of order/contract.

2.49 AVAILABILITY OF SUFFICIENT FUNDS

The Contractor should ensure availability of sufficient funds to carry out the supply/works/services on turnkey basis as per contract even if their bills are not paid by APGCL for whatsoever reason.

2.50 CANVASSING OF BIDS

Tenders shall be deemed to be under consideration after opening of the offer/bid and until such time official announcement of order is made. During this period the Bidders or their authorized Representatives or other interested parties are advised strongly in their own interest, to refrain from contacting by any means any of the APGCL's personnel or representative on matters relating to tender under evaluation.

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**2.51 SUSPENSION / BANNING OF BUSINESS DEALINGS**

APGCL has its policy for Suspension/ Banning of Business Dealings which is attached as Annexure-XIV. Business dealings may be suspended or banned with the Bidder on account of any of the grounds as laid down in the said Policy following the procedures thereof. For any appeal to be made by aggrieved bidder/ contractor, CMD APGCL will be the Appellate Authority. Decision of Appellate Authority shall be final in all respect and binding on all concerned.

2.52 CORRUPT PRACTICE / FRAUDULENT PRACTICE

Bidders are expected to observe the highest standard of fair practices and ethics. In pursuit of this policy, APGCL will reject the offer / bid if it determines that the bidder being considered for opening of offer/ for award has engaged in corrupt or fraudulent practices in competing the contract. The bidder shall submit an undertaking as per the format enclosed as BRS-7 indicating their commitment for fair practices with ethical standard during bidding stage and also during execution of the contract if awarded to them.

2.53 CONCEALING OF ANY MATERIAL INFORMATION OR SUBMISSION OF MISLEADING FACT OR STATEMENT BY THE BIDDER

If the bidder conceals any material information or makes a wrong statement in their bid/offer or during execution of contract in any manner whatsoever, APGCL reserves the right to reject such bid/offer and/or cancel the Letter of Award if issued and EMD as submitted up to that stage shall be forfeited. The bidder shall be solely responsible for disqualification based on any submission as above in their bid/offer or during execution of contract.

2.54 VITAL CLAUSES

The following clauses in the tender documents are critical/vital provisions and bidders are not expected to take deviations against these provisions. If deviations are taken on these clauses, such bids would be liable for rejection: -

1. JURISDICTION (Clause No.4.67)
2. Statutory Requirements (Clause No. 2.55, 4.34, 4.35, 4.36, 4.37, 4.38, 4.39 & 4.58)
3. SETTLEMENT OF DISPUTES (Clause No.4.65)
4. TERMS OF PAYMENT (Clause No.4.75)
5. CONTRACT PERFORMANCE GUARANTEE (Clause No.4.73)
6. TAXES & DUTIES (Clause No.4.9)
7. TIME SCHEDULE (Clause No.4.74)
8. COMPENSATION FOR DELAY & AGAINST POOR PERFORMANCE (Clause No.4.76 & 4.105)
9. LIMITATION OF LIABILITY (Clause No.4.106)

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**2.55 RESTRICTIONS ON PROCUREMENT UNDER RULE 144(XI) OF THE GENERAL FINANCIAL RULES (GFRS), 2017 -CONTRACTOR OF A COUNTRY WHICH SHARES A LAND BORDER WITH INDIA: -**

Ministry of Finance of Govt. of India, Department of Expenditure, Public procurement Division vide office memorandum F. No. 6/18/2019-PPD dated 23rd July, 2020 (order-Public Procurement no.1) has proclaimed the insertion of Rule 144 (xi) in the General Financial Rules (GFRs), 2017 w.e.f. 23rd July, 2020 regarding restrictions on procurement from a bidder of a country which shares a land border with India on the grounds of defense of India on matters directly or indirectly related thereto including national security. Clause on applicability of above restriction is furnished as ANNEXURE XVII of the tender document. Bidders are requested to take note of the clauses and submit their offers accordingly, wherever applicable.

“Any bidder from a country which shares a land border with India will be eligible to bid in any procurement whether of goods, services or works, only if the bidder is registered with the competent authority” Bidders must submit duly sealed & signed undertaking as per format provided vide, “ANNEXURE XVII (a) (b) & (C)” along with the technical bid.

2.56 Public Procurement (Preference to Make in India) to provide Purchase Preference (linked with local content): -

Public Procurement (Preference to Make in India), Order 2017 issued by Department for Promotion of Industry and Internal Trade (DPIIT), Government of India vide notification no. No. P-45021/2/2017-PP (BE-II) dated 16.09.2020 (Available in public domain) and as amended time to time shall be applicable for procurement. Bidders are required to go through details of the Policy while submitting their bid.

2.56.1 MOP&NG vide Notification No File No.FP-20013/2/2017-FP-PNG-Part (4) (E-41432) dated 26.04.2022 has modified Para 14 of the PPP-MII Order as below:

- i. Limit for exemption of small purchase under Para 4 of the PPP-MII Order, 2017 shall be Rs. 1 crore.
- ii. Local value addition through services such as transportation, insurance, installation, commissioning, training and after sales services support like AMC/CMC etc. shall continue to be considered in local content calculation.

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SECTION – III

BID ELIGIBILITY AND EVALUATION CRITERIA

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SECTION – III

BID ELIGIBILITY AND EVALUATION CRITERIA

3.1 BID ELIGIBILITY CRITERIA

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.

3.1.1 General Eligibility Conditions:

The Bidder should be a body incorporated in India under the Companies Act, 1956 or 2013 including any amendment thereto, who are registered and incorporated in India and Limited Liability Companies engaged in the business of Power/Infrastructure. Limited Liability Partnerships, Proprietorships, Partnerships, NGOs, Charitable Trusts, and Educational Societies; are not allowed to participate in the bidding process (either individually or in JV/ Consortium).

Documents to be furnished:

- i. A copy of the Certificate of Incorporation shall be furnished in the bid.
- ii. A Copy of Goods and Service Tax Registration.
- iii. A Copy of registration with Employees' Provident Fund Organization.
- iv. Document as specified at ITB clause 4.1.1

3.1.2 Technical Eligibility Conditions:

Bidders are required to meet each of the following:

- a. The Bidder should have executed cumulative EPC contracts of design, procurement, supply, installation, testing and commissioning including at least one year of operation & maintenance satisfactory for grid connected ground mounted PV solar power plant in India of cumulative installed capacity of minimum 25 MWac, in last 7(seven) financial years as on last date of bid submission.
- b. The bidder having experience of minimum one year O&M of grid connected ground mounted solar PV project at least 10 MW capacity at single location shall be eligible to participate in this tender.
- c. The bidder should have executed EPC contract(s) of design, procurement, supply, installation, testing and commissioning for grid connected ground mounted PV solar power plant in India in the past 7(seven) years for any of the following:

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- i. One number of grid connected ground mounted solar project having capacity of 20 MWac at single location

OR

- ii. Two numbers of grid connected ground mounted solar projects each having a minimum capacity of 12.5 MWac.

OR

- iii. Three numbers of grid connected ground mounted solar projects each having a minimum capacity of 10 MWac.

3.1.3 Financial Eligibility Conditions

The Minimum Average Annual Turnover (MAAT) of the bidder in the last three financial years (i.e. FY 2020-21,2021-22,2022-23) should be INR 60,00,00,000/- (Indian Rupees Sixty Crores only). MAAT shall mean Revenue from Operations as incorporated in the profit & loss statement excluding other income, e.g. sale of fixed assets, interests income, dividends etc. This must be the bidder's turnover on standalone basis and not the consolidated amount at group level. 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 10,00,00,000/- (Indian Rupees Ten Crore 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 10,00,00,000/- (Indian Rupees Ten Crore only) to meet the working Capital requirement of this particular Project.

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.

Documents to be furnished:

- (a) The documentary evidence in the form of certificate from the Statutory Auditor of the Bidder/ practicing Chartered Accountant, certifying the revenues for the last three financial years (i.e. FY 2020-21,2021-22,2022-23) net worth, working capital of the last financial year shall need to be provided.

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- (b) The Bidder shall submit an audited annual report for the last three financial years (i.e. FY 2020-21,2021-22,2022-23) for ascertaining their turnover for the purpose of verification.

3.1.4 JOINT VENTURE & CONSORTIUM CONDITIONS

Bids from JV & Consortium shall not be considered.

3.2 BID EVALUATION METHODOLOGY AND SELECTION OF BIDDER

3.2.1 Evaluation of techno-commercial bids and price bids shall be done separately.

3.2.2 APGCL will examine the Bid to determine whether they are complete, whether any computational errors have been made, whether required sureties have been furnished, whether the documents have been properly signed, and whether the Bid is generally in order.

3.2.3 Prior to the detailed evaluation, APGCL will determine the substantial responsiveness of each Bid. A responsive Bid is one which conforms to all the terms and conditions of the Tender Documents without material deviations. Deviations from or objections or reservations to critical provisions such as those concerning EMD, Applicable Law and Taxes and Duties will be deemed to be a material deviation. APGCL's determination of a Bid's responsiveness is to be based on the contents of the Bid itself without recourse to extrinsic evidence.

3.2.4 If the Bid is not responsive, it will be rejected by APGCL and APGCL will evaluate and compare Bids which have been determined to be responsive.

3.2.5 Price bids shall be opened only of qualified and techno-commercially acceptable bidders.

3.2.6 Evaluated Bid Value (EBV) will be worked out by the APGCL.

3.2.7 Evaluation of the bids shall be carried out by Computation of EBV considering the following:

- (a) Total Cost of Supply of Equipment quoted by bidder in Bid Response Sheet P-II.
- (b) Total Cost for Construction, Erection & Commissioning quoted by bidder in Bid Response Sheet P-III
- (c) Present Value of Comprehensive O&M charges for 5 years determined based on the price quoted by the bidder in Bid Response Sheet P-IV.
- (d) Discount factor of 10% (assumed constant) shall be applied on O&M charges quoted by bidder from 2nd Year onwards upto 5th Year for evaluation of each Bidder:
- (e) Rebates (discounts) offered, in any form of bid proposal or on the forwarding letter shall not be taken cognizance under any circumstances.
- (f) If there is a discrepancy between the unit price and the total price, which is obtained by multiplying the unit price and quantity, or between sub totals and the total price,

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(even in case of carry forward of prices) the unit or subtotal price shall prevail and the total price shall be corrected accordingly. If there is a discrepancy between words and figures, the amount in words will prevail. If the Bidder does not accept such correction of errors, its bid will be rejected, and the EMD will be forfeited. The financial bids shall be evaluated at portal automatically without any human intervention however, Purchaser shall reserve rights to correct the same suitably.

(g) EBV will be calculated based on CAPEX and OPEX as quoted by the bidder for the works specified under the tender by the APGCL. The following methodology will be used for calculating the EBV.

(h) The EBV shall be calculated using the following parameters:

S. No.	Symbol	Details of Parameters
1	X1	Quoted Total Cost of Supply of Equipment, Spares, Construction, Erection & Commissioning by Bidder inclusive of all taxes / duties etc. as per Bid Response Sheet (BRS)/ Schedule of Price P-II & P-III (in Rs.)
2	X2	Present Value of Quoted Comprehensive O&M charges (Bid Response Sheet (BRS) / Schedule of Price P - IV) for five (5) years considering discount factor as given above (in Rs.)
	EBV	(X1 + X2)

(i) All the bids shall be arranged in ascending order for the EBV. APGCL shall consider the lowest EBV as base value for conducting reverse auction. Order shall be placed on the bidder whose EBV is found to be the lowest for total project up to three decimal points by APGCL / its PMC, whose decision in this regard will be final.

(j) Based on the Price discovery and Bid evaluation, APGCL will further work out IRR, tariff, cut off capacity etc. APGCL will decide placement of orders based on the outcome of the Bid evaluation. Purchaser will be in no compulsion to issue a LOA either for complete 25 MWac capacity or part of the capacity of solar power projects.

(k) Purchaser reserves the right to cancel a site or part of the capacity without describing any reason based on its own assessment and can accordingly modify the capacity of the project to be awarded but awarded capacity shall not be less than 25 MWac.

(l) Bidders to quote prevailing GST rate (%), as applicable, on the last day of bid submission. In case, bidder quotes GST rate (%) less than the applicable rate and emerges L-1, the discrepancy shall be adjusted in the “basic rate”, maintaining the same discovered ‘total amount with taxes’. Alternatively, in case, bidder quotes GST rate (%) higher than the applicable rate and emerges L-1, the actual GST rate shall be paid without any alteration in the “basic rate”.

(m) The total amount of O&M for the 5(five) years and for each individual year should not be less than 3.5% and 0.7% of the total EPC value respectively (Sr 1.1 + Sr

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1.2 of BRS P-1). In case of any discrepancy, the minimum O&M shall be loaded without any change in the total contract price for the successful bidder after eRA.

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SECTION – IV

GENERAL CONDITIONS OF CONTRACT

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



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ASSAM POWER GENERATION CORPORATION LIMITED

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



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SECTION-IV

GENERAL CONDITION OF CONTRACT

4.1 DEFINITIONS & INTERPITATION

Acts/Codes shall mean, but not limited to the following, including the latest amendments, and/or replacements, if any: -

1. Electricity Act, 2003 with amendments thereto, if any.
2. A.I.E.E Test Codes
3. American Society of Testing of Materials (ASTM Codes).
4. Relevant standards of the Bureau of Indian Standards (IS Codes)
5. Arbitration and Conciliation Act, 1996, and Rules made there under.
6. Environment (Protection) Act, 1986 and Rules made there under.
7. Other approved standards and/or Rules and Regulations touching the subject matter of the Contract.

Applicable Laws means any statute, law, regulation, ordinance, rule, judgment, order, decree, restriction, directive, governmental authorizations, requirements of Applicable Permits and any agreements, decisions, acts, instructions, requirements, directions and notifications of the competent authority having jurisdiction over the matter in question, whether in effect as on Bid Closing Date and Time.

Agreement means the Contract Document (entitled "Contract Document") executed between the Owner and the Successful Bidder to which these Conditions are annexed and also includes supplements & amendments to the Contract.

ABT Meter means meter for measurement power and energy as per CEA/IEGC/SERC or appropriate rules.

AEGCL means 'Assam Electricity Grid Corporation Limited.'

AERC means 'Assam Electricity Regulatory Commission.'

APGCL means 'Assam Power Generation Company Limited'

APDCL means 'Assam Power Distribution Company Limited.'

ASEB means 'Assam State Electricity Board.'

Bid / Bid Document shall mean the proposal submitted by the Bidder in response to this ITB in accordance with the terms and conditions hereof.

Bidder shall mean the Bidding Entity or the Bidding Consortium which has submitted a proposal, in response to this ITB to Purchaser.

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Bidding Entity shall mean a single entity or consortium, whether a firm or a Company.

BIS shall mean Bureau of Indian Standards.

Bidding Consortium shall mean a consortium of entities, being firms, companies or Governmental entities, which have submitted a proposal in response to this ITB.

Company shall mean a body incorporated in India under the Companies Act, 1956 or 2013.

Completion Certificate shall mean as defined in 4.82 of this Section.

Commissioning shall mean the commissioning of complete 25 MWac Ground Mounted Solar PV Power Project including its interfacing with State Grid, commencement of export of electrical energy to the grid and acknowledgment of the same by AEGCL/APDCL.

CT means current transformer meant for measurement of current.

C&R Panel means relay & control panel.

CEIG means Chief Electrical Inspector of State Government.

CRM means customer relations manager.

CAPEX Total capital cost of solar project excluding annual Operation & Maintenance charges.

DISCOM means concerned Distribution Company of the State.

DSM means deviation settlement mechanism.

Date of Completion means the date of issue of completion.

EBV shall mean Evaluated Bid Value.

Effective Date shall mean the date of issue of Letter of Award.

Engineer-in-charge means the officer nominated by the Purchaser.

EPC (Engineering, Procurement and Construction) Contractor or Contractor shall mean the Successful Bidder i.e., firm/ company or party to whom the Letter of Award for faithful execution of the work mentioned herein is placed and shall include his/her/their heirs, legal representatives and successors and permitted assigns.

Final Acceptance shall mean completion of project activities in all respect including performance Guarantee test or any other test required as per contract.

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Facility means land developed as required, Solar Modules, Inverter / cables, step up sub-station, power evacuation system including Pooling substation and HT line up to metering point.

GHI means Global Horizontal Irradiation.

Inter-connection Point shall mean a point at HV switchyard of AEGCL Sub Station, where the electricity produced from the solar generating station is injected into the system.

Inverter / PCU means device for conversion of direct current to alternating current.

Irradiation means solar insolation (GHI) i.e., Global Horizontal Irradiation.

JVC means Joint Venture Company formed by OIL and APGCL

kW means Kilo Watt

kWh means Kilowatt Hours

LCS means local control system

LID means Light Induced Degradation

Metering Point means the point at which the State Power Utility / Electricity Board measures the quantity of energy supplied to its grid.

MBD means Machine Break Down for insurance purpose.

MNRE means 'Ministry of New & Renewable Energy' Government of India'.

MW means Mega Watt.

NODAL AGENCY means 'Renewable Energy Corporation/Agency of the State'.

OAT shall mean Operational Acceptance Test for Solar Project.

Owner shall mean APGCL or Oil India Limited or a JVC formed for the project purpose.

O&M shall mean Operation & Maintenance of Solar power project which inter alia, includes provisions of manpower, spares, special tools, cranes or such materials / equipment that may be required for maintaining the solar system in operation.

Operator shall mean the person or the persons, firm or Company or corporation whose tender has been accepted for operation & maintenance by the Purchaser and includes the Operator's legal representatives, his successors and permitted assigns. In this case, Contractor shall be the Operator for Five (5) years from the acceptance of the OAT.

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OPEX Total Operation & maintenance cost of project for Five (5) Years from the acceptance of the OAT.

OIL means 'OIL India Limited'

PCU means Power Conditioning Unit

Project shall mean the Land Development, Design, Engineering, Supply, Procurement and Construction, Commissioning and Comprehensive Operation and Maintenance of the proposed 25 MWac ground mounted Solar PV Power Plant capacity connected to 33/220 kV substation of AEGCL.

Project Life means the operational life of solar project and all associated equipment and the same shall not be less than 25 years from the acceptance of the OAT.

PT means potential transformer meant for measurement of voltage.

PPA means Power Purchase Agreement.

Prudent Utility Practice means accepted international/ Indian practice(s), standard(s), engineering and operation considerations, taking into account the conditions prevalent at Site including manufacturer's recommendations generally followed in the operation and maintenance of facilities similar to the power plant.

PR or Performance Ratio means the ratio of actual plant output versus Calculated, nominal plant output in kWh annual.

PGT means Performance Ratio Guarantee Test.

Purchaser means APGCL or the JV company to be formed between APGCL and OIL

QAP means Quality Assurance Plan.

QCA means Qualified Coordinating Agency.

Reactive Power shall mean the Reactive Power drawn from the grid and charged by the power utility from the Purchaser and measured in KVARh.

SMB means String Monitoring Box.

Time Schedule shall mean the period by which the work shall be completed as agreed herein between the Purchaser and the Contractor as per clause no. 4.74 of this section.

VAR means Voltage Ampere Reactive Power

VCB means Vacuum Circuit Breaker

WMS means Weather Monitoring Station

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Note: - Terms and expressions not herein defined shall have the same meaning as assigned to them in Indian Contract Act 1872, failing that in General Clauses Act 1897 and failing that in GST Acts 2017 read with amendments thereto.

4.2 LOCATION OF SITE

The proposed location of Project site is defined in Appendix-I.

4.3 ACCESS BY ROAD

Contractor, if necessary, shall build access roads to the actual site of construction and comprehensive O&M of the Project at his own cost with due permission from the Purchaser/ concerned authority. 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. Non-availability of access roads 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 Purchaser.

4.4 SCOPE OF WORK

The scope of work is defined in Section V, Scope of Work of the RFP 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 RFP Document.

4.5 LAND FOR RESIDENTIAL ACCOMMODATION

Residential accommodation for supervisory staff of the Contractor may be provided on a chargeable basis on an As-Is-Where-Is basis. Whereas the Contractor will have to make arrangements of accommodation for his labourers at his own.

4.6 TENDER DOCUMENTS

The Notice Inviting Tenders (NIT), Instructions to Bidders (ITB), General Conditions of Contract (GCC) and the Technical Specifications & scope of supply/ works/ services on turnkey basis of respective tender and any corrigendum / amendment / clarification / addendum for above shall be part of tender documents.

4.7 SUBMISSION OF TENDERS / OFFERS

Bids/ Offers from Bidder/ contractor/ service provider/ firm must be uploaded/ submitted within the specified time and date, in the manner specified in Instructions to Bidders (ITB) for providing supply/ works/ services on turnkey basis to Purchaser as per the technical specifications & scope of supply/ works/ services on turnkey basis and in accordance with the General Conditions of Contract (GCC) and Special Conditions of Contract.

Bids / Offers received late or delayed on any account will not be considered.

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4.8 CONTRACT DOCUMENT

Subject to the order of precedence set forth in the Contract Document, all documents forming the Contract (and all parts thereof) are intended to be correlative, complementary, and mutually explanatory. The term Contract document shall mean and include the following, which shall be deemed to form an integral part of the Contract:

- (a) The Notice Inviting Tenders (NIT), Instructions to Bidders (ITB), General Conditions of Contracts (GCC), Special Terms & Conditions (if any), Technical Specifications & scope of supply/ works/ services on turnkey basis of respective tender and any amendment, clarification, addendum etc. for above.
- (b) Bidder's bid / offer including the letters of clarification thereto between the bidder and Purchaser prior to the award of Contract.
- (c) All the data and information of any sort given by the bidder along with his bid/offer subject to the approval of Purchaser.
- (d) Any mutually agreed variation to the conditions of the tender documents, specifications and terms & conditions of Contract, if any, must be in writing.
- (e) Letter of Award issued by Purchaser.
- (f) All documents, data and information of any sort provided by Purchaser in line with terms & conditions of Letter of Award issued by Purchaser.

4.9 TAXES & DUTIES

4.9.1 Except as otherwise specifically provided in the Contract, the Contractor shall bear and pay all taxes, duties, levies and charges assessed on the Contractor, its Sub-contractor or their employees by all municipal, state or national government authorities in connection with the facilities in and outside of the country where the Site is located.

4.9.2 The Purchaser shall only bear and reimburse to the Contractor GST and any other Taxes, Duties, Levies etc. applicable in respect of direct transaction between the Contractor and the Purchaser including the bought-out items (dispatched directly from the sub-vendor's/ OEM's place of dispatch to Purchaser's site) to the extent quoted in the price schedule BRS P-II to P-IV (as applicable). Except as otherwise specifically provided in the Contract, the Contractor shall bear and pay all other taxes, duties, levies, labour welfare cess and charges including all customs and import duties, assessed on the Contractor, its subcontractors, or their Employees by all municipal, state or national government authorities in connection with the Facilities in the country where the Site is located, not specifically indicated in the price schedule.

4.9.3 The Bidder shall clearly indicate the applicable charges of GST/ cess/ other taxes & duties (other taxes & duties are applicable on the goods and services which are not included in the GST Act 2017). The payment of GST shall be made against presentation of documentary evidence along with the invoice/Bills.

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- 4.9.4** For items outside the ambit of GST laws, if any, Contractor shall bear and pay all Taxes & Duties, Cess, Levies and Charges etc. to the extent not specifically indicated in the price schedule. Any liability of BOCW cess in accordance with BOCW Act 1996 or BOCW Welfare Cess Act 1996 in respect of subject work, if any, shall have to be borne by the contractor and the employer may effect TDS, as may be applicable. However, the successful bidder shall be required for assessment of the labour welfare cess with the Taxation Authority.
- 4.9.5** Wherever applicable, the Bidder should invariably submit documentary evidence such as valid GST Registration Certificate and type of registration i.e., registered dealer, non-registered dealer or composite scheme registered dealer & HSN/SAC code for the tendered items. In case of applicability of other taxes and duties, the bidder should submit the relevant registration certificate.
- 4.9.6** The payment of statutory levies such as GST/ Cess/ other applicable taxes against the Contract shall be made on the basis of rates prevailing during the contractual period only.
- 4.9.7** Any other Taxes/ Duties/ Cess imposed or increase/ decrease in Taxes/ Duties/ Cess by the Government during currency of Contract shall be to Purchaser's.
- 4.9.8** Apart from tax deducted at source, payment of income tax on the income generated from the Contract shall be the liability of the Contractor and Contractor shall submit the relevant documents if so desired by Purchaser.
- 4.9.9** Purchaser shall deduct GST, Labour Welfare Cess and Income Tax at source at the applicable rates as per respective statute in force.
- 4.9.10** Unless expressly stated otherwise, a common mechanism for reconciliation of input credit mismatch, to be followed by both Purchaser and Contractor, shall be mutually agreed so that both parties follow the same procedure for disclosing the transactions in their respective returns. Notwithstanding anything in the contract, penalty / damages shall be recovered in case the Contractor makes a default in following the agreed procedure.
- 4.9.11** The Contractor shall issue tax invoices, file appropriate returns, and deposit the applicable GST to the account of the appropriate Government within the time limit prescribed under the relevant GST Law. In case any penalty demand is raised on Purchaser due to default by the Contractor, same shall be recovered from the Contractor to make good the loss.
- 4.9.12** Issuance of e-way bills shall be done by the Contractor/ his sub-vendor, as per applicable rules ensuring all compliances as per relevant GST law.
- 4.9.13** In line with the "Anti Profiteering" clause [No 171 of the CGST Act of 2017], the Bidder shall ensure that the benefit of input tax credit, has been considered by the Bidder in the prices quoted against the tender.

4.10 APPLICABILITY OF TAXES/ DUTIES/ CESS BEYOND CONTRACTUAL PERIOD

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In case supply/ works/ services against the turnkey contract are not completed within the contractual completion period due to delay on account of Contractor and the rate of applicable Taxes/ Duties/ Cess undergoes upward revision during the extended period then the payment will be continued to be made on the rates prevailing during the actual Contractual period for completion of the works. However, in case the rates of applicable Taxes/ Duties/ Cess undergo downward revision, then the delayed supply/ works/ services beyond contractual period will attract reduced rates.

4.11 EXECUTION OF AGREEMENT

4.11.1 Unless and until a formal Contract Document is executed, the Letter of Award read in conjunction with the Bidding Documents will constitute a binding Contract.

4.11.2 The Successful Bidder must assign & submit the acceptance to LOA within seven (7) days from the date of issuance by Purchaser.

4.11.3 The Successful Bidder should present himself or his duly authorized representative in person within fifteen (15) days from the issuance of LOA along with draft Contract Document, as per the prescribed proforma in Annexure-XII, for mutually finalizing a Contract Document, which shall be executed on non-Judicial stamp paper of appropriate value in the state of Assam for the due and faithful fulfilment of the Contract. The cost of stamp papers for both the sets of Agreement shall be borne by the Contractor. Contract Documents incorporating all agreements between the parties has to be signed within Thirty (30) Days from the issuance of LOA.

4.11.4 The Contract Document has to be signed in English language in two original copies, one each for Purchaser and Contractor. After signing of Contract Document, the contractor shall make available at least 15 complete sets of the same to Purchaser within 15 days thereafter.

4.11.5 Subject to fulfilment of all clauses, Letter of Award (LOA), incorporating all agreements between the parties shall be issued by the Purchaser to the Successful Bidder inviting him to visit Purchaser Office for finalization & signing of the Contract. In case of any unforeseen circumstances if LOA is not issued within Bid Validity Period, the Successful Bidder has to extend the Bid Validity Period as desired by the Purchaser.

4.11.6 Upon Successful Bidder's furnishing of CPG, Purchaser will promptly notify L-2 bidder and will return their EMD.

4.12 HANDING OVER OF SITE

4.12.1 APGCL shall make available the encumbrance free Site to the Contractor within fifteen (15) days from the execution of the Contract. The Contractor shall not be permitted to enter on (other than for inspection purposes) or take possession of the Site until instructed to do so by the Engineer-in-Charge of APGCL in writing or any other officer deputed on behalf Engineer-in-charge APGCL at the site.

4.12.2 APGCL reserves the right to hand over the Site in parts progressively to the Contractor but all the parts of the Site i.e., land parcel should be handed over within forty-five (45)

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days from the execution of Contract subject to the condition that 50% of the Site should be handed over within fifteen (15) days from the execution of Contract. The Contractor will be required to take possession of the Site without any undue delay and do work on the released fronts in parts without any reservation whatsoever.

4.12.3 However, in case of any delay in handing over of the Site to the Contractor by the APGCL, which delays the performance of the Work, commensurate to the resources mobilized by the Contractor, then the Contractor shall be eligible for suitable extension in time for completion of the Works.

4.12.4 The portion of the Site to be occupied by the Contractor shall be indicated by the Engineer-in-Charge of APGCL at Site and the Contractor shall on no account be allowed to extend his operations beyond these areas. Further, the Contractor shall not hinder in any way the working of other contractors on the Site.

4.12.5 The Contractor shall plan his work as per the available site. The Contractor shall make his own arrangement for movement of men, machinery, other equipment etc. required for carrying out the works included under this Contract.

4.12.6 The Contractor shall provide, if necessary, all temporary access to the work site and shall alter, adapt and maintain the same as required from time to time and shall take up and clear them away as and when ordered by the Engineer-in-Charge of APGCL and make good all damage done to the site.

4.12.7 The Contractor shall be permitted for the usage of facilities like staircase, lifts etc. of the APGCL for the purpose of contract. If any, damage is done to the facilities by the Contractor, the same shall be made good by the Contractor at his own cost, but as may be directed by the Engineer-in-Charge.

4.13 WORKING IN MULTIPLE SHIFTS

4.13.1 To achieve the required rate of progress in order to complete the Works within the Time for Completion, the Contractor may carry out the work, round the clock, in multiple shifts per day, as may be necessary. The Contractor shall however be responsible for complying with all applicable laws in this regard.

4.13.2 No additional payment will be made on account of round the clock working in multiple shifts.

4.13.3 Wherever the work is carried out at night adequate lighting of working areas and access routes for pedestrians or vehicles shall be provided by the Contractor at his cost. Sufficient notice should be given by the Contractor to the Engineer-Incharge of Purchaser regarding the details of works in shifts so that necessary supervision could be provided.

4.14 COOPERATION WITH OTHER CONTRACTOR

4.14.1 The Contractor shall extend all reasonable cooperation to other Contractors, agencies etc. of Purchaser engaged in connection with the Work/ Service or any other Work/

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Service not in the scope of this Contract as may be required by the Engineer-in-Charge of Purchaser.

4.14.2 The Contractor shall attend at his cost, all the meetings with the Engineer-in-Charge of Purchaser, other sub-contractors and the PMC of Purchaser for the purposes of the Contract. The Contractor shall attend such meetings as and when required by the Engineer-in-Charge of Purchaser.

4.15 SECURITY WATCH AND LIGHTING

The Contractor shall provide and maintain at his own expense all lights, guards, fencing and watching when and where necessary or required by the Engineer-in-Charge for the protection of the men and materials, works or for the safety and convenience of those employed on the Works or the public.

The security staff may be organized to work on a suitable shift system; proper checking & recording of all incoming & outgoing materials vehicles shall be maintained. Any occurrence of unlawful activities shall be informed to the Purchaser immediately. A monthly report shall be sent to Purchaser on the security aspects.

4.16 MATERIAL FOR PERFORMANCE OF THE CONTRACT

4.16.1 Material to be provided by the Contractor.

- a) The Contractor shall, at his own expense, provide all materials required for the Works other than those which are to be issued by Purchaser.
- b) All materials to be provided by the Contractor shall be in conformity with the specifications laid down in the Contract and the Contractor shall, if requested by the Engineer-in-Charge of Purchaser, furnish proof to the satisfaction of Engineer-in-Charge that the materials so comply.
- c) The Engineer-in-Charge shall have full powers to require removal of any or all of the materials brought to site by the Contractor which are not in accordance with the Contract specifications or do not conform in character or quality to samples approved by him. In case of default on the part of the Contractor in removing rejected materials, the Engineer-in-Charge shall be at liberty to have them removed by other means. The Engineer-in-Charge shall have full powers to order the Contractor to provide other proper materials to be substituted for rejected materials and in the event of the Contractor refusing to comply, he may cause the same to be supplied by other means. All costs which may attract upon such removal and/or substitution, shall be borne by the Contractor.
- d) The Engineer-in-Charge shall be entitled to have tests carried out as specified in the Contract for any materials supplied by the Contractor other than those for which, as stated above, satisfactory proof has already been furnished, at the cost of the Contractor and the Contractor shall provide at his expense all facilities which the Engineer-in-Charge may reasonably require for the purpose. If no tests are specified in the Contract, and such tests are required by the Engineer-in-Charge,

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the Contractor shall provide all facilities required for the purpose and the charges for these tests including the cost of materials consumed/used in such tests shall be to the account of Purchaser, except if the tests disclose that the said materials are not in accordance with the provision of the Contract, then the same shall be to the account of the Contractor.

- e) All charges on account of GST, other taxes and levies on materials obtained for the Works from any source (excluding materials issued by Purchaser) shall be borne by the Purchaser except Seigniorage Fee or Royal Lies or Cess or other charges payable on the quarried or mined metal, minerals or min or minerals.

4.16.2 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. Purchaser may hold payment against supplies in case same is delivered more than 02 (Two) months before its erection requirement (except for imported items).

4.16.3 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 the shipments, if any and arrange to transport them accordingly.

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 Purchaser and shall be immediately taken into safe storage.

4.16.4 Storage of Equipment

The plant and equipment thus procured under the scope of the Contract must be kept in safe custody till the completion of Comprehensive O&M, 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.

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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 Purchaser and shall make his own arrangement for procuring such materials and for the transport thereof. The Purchaser may give necessary recommendation to the respective authority if so desired by the Contractor but assumes no further responsibility of any nature.

4.17 WORK PROGRESS

4.17.1 Unless already incorporated in the LOA, as soon as possible after the Contract is executed, the Engineer-in-Charge of Purchaser and the Contractor shall agree upon a Work Schedule for the location which will become the Contract Work Schedule. The work Schedule shall be prepared in direct relation to the time stated in the Contract documents for the completion of the Works. The Work Schedule shall indicate the forecast of the dates of commencement and completion of various trades (milestone) or sections of work provided under the Contract.

4.17.2 All the Contractor's activities shall be performed and completed strictly in accordance with the agreed Work Schedule and to achieve the targets, the Contractor shall have to plan adequate mobilization of all resources. The Engineer-in-Charge, shall however, have the right to review the progress and modify the sequence of carrying out the Work suiting the Site conditions and the Contractor shall be required to comply with such modifications and complete his activities in accordance thereof without any extra cost to the Purchaser.

4.17.3 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 workman like 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.

4.17.4 All materials shall be brand new & of the specified 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.

4.17.5 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.

4.17.6 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

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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.

4.18 MOBILIZATION PERIOD

Upon getting the information from Purchaser, the Contractor shall mobilize its' manpower along with tools & tackles etc. to commence the work/ services within fifteen (15) days from LOA.

4.19 PACKING & FORWARDING

4.19.1 The Contractor shall be responsible for the item(s) being properly packed and stored at their expense for transport by Rail, Road or Sea/Air, so as to ensure them being free from loss or damage, due to handling and transport to the destination.

4.19.2 Each package shall be prominently and distinctly marked on at least two faces, indicating the full address of the consignee, destination station, name of equipment, Purchaser's order number, weight & volume of the package, etc.

4.19.3 Each package shall contain a detailed description indicating order reference, date and list of the contents in a waterproof cover. Each item contained in the package or box shall be described sufficiently to enable easy identification. The quantity, weights, etc. shall also be given. The packing shall conform to the specifications, rules and regulations prescribed by the Railways and Transport Agencies. In case of transport by Rail, value of consignment shall also be specified. In case of any loss/damage to the consignment, due to non-standard packing, the same shall be made good, free of all charges to Purchaser by the contractor.

4.20 MODE OF DISPATCH AND FREIGHT CHARGES

The Contractor should indicate mode of dispatch and include the freight charges applicable for respective destination as desired in the price bid of the tender. The material is to be dispatched on Door Delivery basis only. No detention charges shall be paid by Purchaser.

4.21 TRANSIT RISK

4.21.1 Responsibility regarding covering of risk, during transit of item(s), shall entirely be, on the Contractor. It is the responsibility of the Contractor to supply the item(s) safely to site stores and then to the site. In case any damage/ shortage noticed at stores or at site, it shall be the responsibility of the Contractor to repair/ replace/ replenish the item(s) free of cost without any delay.

4.21.2 Transit damages/ shortages / losses shall be reported by the consignees within three (3) days from the date of receipt of the consignments. Such damages/ shortages/ losses shall be repaired/ replaced/ replenished by the Contractor free of cost within

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reasonable time from the date of intimation by the consignee without waiting for settlement from carrier or insurance company etc. if any. If the Contractor fails to do so, the consignee(s) shall be free to get, the repair work done from other sources and they shall be free to recover the cost of such item(s)/expenses of repairs either from the contractor's balance bill of supplies against any Contract or from the security deposit, as deemed fit.

- 4.21.3** The responsibility of replenishment/ replacement of goods lost /broken or damaged including loss due to fire shall rest with the Contractor to immediately make good the shortage/losses/damages, without' any extra cost.

4.22 FALSE INSPECTION CALL

In case after giving the inspection call, any Contractor does not offer the item(s) to the inspecting officer of Purchaser for inspection/ testing, then cost of repeat visit of Inspecting Officer of Purchaser for inspection shall be borne by the Contractor.

4.23 DEFECT LIABILITY PERIOD

12 (Twelve) Months Period of Liability from the date of Operational Acceptance Test

- 4.23.1** 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.

- 4.23.2** If it shall appear to the Engineer In Charge 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 Engineer In Charge 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 Engineer In Charge in its demand aforesaid, the Engineer In Charge 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 Engineer In Charge in this regard shall be final and binding.

- 4.23.3** 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.

- 4.23.4** The Defect Liability Period shall be twelve (12) months from the date of Operation Acceptance, during which the Contractor must repair any defect identified by the Engineer In Charge after commissioning the Plant. All the expenses to repair the defects shall be borne by the Contractor and no additional cost charged to Purchaser.

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4.23.5 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 PURCHASER 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.

4.23.6 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.

4.23.7 The Contractor may, with the consent of the Purchaser, 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.

4.23.8 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 Purchaser 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.

4.23.9 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 not be inferior to what has already been agreed upon by the Purchaser and the Contractor for the original equipment/part of the Facilities.

4.23.10 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 Purchaser may, following a notice to the Contractor, proceed to do such work, and the costs incurred by the Purchaser in connection therewith shall be paid to the Purchaser by the Contractor or may be deducted by the Purchaser from any monies due to the Contractor or claimed under the Performance Guarantee, without prejudice to other rights, which the Purchaser may have against the Contractor in respect of such defects.

4.23.11 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

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the Facilities or such part cannot be used by the Purchaser 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.

4.23.12 In addition, the Contractor shall also provide an extended warranty for any such component of the Facilities and for the period of time. Such an obligation shall be in addition to the defect liability specified.

4.23.13 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.

4.23.14 The Contractor's liability under this contract for any reason, whatsoever, shall be limited to the total Contract Price (Including GST etc.)

4.24 GUARANTEE / WARRANTY

4.24.1 The Contractor warrants and represents to the Purchaser that:

- (a) It has full capacity and authority and all necessary approvals to enter into and to perform its obligations under this Contract Document;
- (b) The Contractor is experienced in managing and providing works similar to the Services and that it will perform the Services with all due skill, care and diligence so as to comply with the requirements of the RFP/NIT.
- (c) The Services will be provided and rendered by appropriately qualified, trained and experienced personnel.
- (d) Contractor has and will have all necessary licenses, approvals, consents of third parties and all necessary technology, hardware and software to enable it to provide the Services;
- (e) the Services will be supplied in conformance with all applicable laws, enactments, orders and regulations;
- (f) if Contractor uses in the course of the provision of the Services components, equipment, software and hardware manufactured by any third party which are embedded in the Deliverables or are essential for the successful use of the Deliverables, it will pass-through third-party manufacturer's warranties relating to those components, equipment, software and hardware to the extent possible. In the event that such warranties cannot be enforced by the Purchaser, the Contractor will enforce such warranties on behalf of the Purchaser and pass on to the Purchaser, the benefit of any other remedy received in relation to such warranties.
- (g) The Purchaser shall promptly notify the Contractor in writing of any claims arising under this warranty. Upon receipt of such notice, the Contractor shall, within the warranty period and with all reasonable speed, repair or replace the defective systems, without any extra costs to the Purchaser and within the time specified and acceptable to the Purchaser.

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4.24.2 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/firms of repute and such OEM/ Sub-Contractor shall furnish guarantees/ warranties for their workmanship to the Purchaser directly in the name of Purchaser only without any deviation. The Contractor shall give the guarantee/ warrantee to the Purchaser directly for other minor Material/ Products/ Spares also.

4.24.3 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 Purchaser at least seven (7) days prior to the Contract is terminated/cancelled & no plea/deviation from the Contractor side will be entertained in this regard.

4.24.4 For works like waterproofing, 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 Purchaser, through the Contractor. In case such a Sub- Contractor is not prepared to furnish a guarantee to the Purchaser, the Contractor shall give that guarantee to the Purchaser directly.

4.24.5 Any material, equipment and/or accessories which prove defective, or which fail to meet the design guarantee or Performance Guarantee during the defect liability period which is Twelve (12) months from the date of Operational Acceptance, the Contractor shall replace / rectify at his own cost, such material, equipment and/or any accessories.

4.24.6 The Contractor shall guarantee solar project and installation work, for a period of 12 (twelve) months from the date of Operational Acceptance. Any damage or defect that may arise or lie undiscovered at the time of issue of completion certificate, connected in any way with the equipment or materials supplied by him or in the workmanship, shall be rectified or replaced by the Contractor at his own expenses, as deemed necessary by the Engineer-in-Charge or in default, the Engineer-in-Charge may cause the same to be made good by other workman and deduct expenses (for which the certificate of Engineer-in-charge shall be final) from any sums that may be then or at any time thereafter, become due to the Contractor or from his CBG.

4.24.7 Guarantee / Warrantee for Solar equipment should as under:

(a) The manufacturer should warrant the solar module(s) to be free from the defects and/or failures specified below for a period not less than ten (10) years from the date of sale to the original customer ("Purchaser")

(i) Defects and /or failures due to manufacturing.

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- (ii) Defects and/or failures due to quality of materials.
- (iii) Non-conformity to specifications due to faulty manufacturing and/ or inspection processes.

Note: If the solar module(s) fails to conform to this warranty, the manufacturer will repair or replace the solar module(s).

- (b) PV modules must be warranted with linear degradation rate of power output except for first year and shall guarantee minimum 80% of the initial rated power output at the end of twenty-five (25) years and 90% after ten (10) year's period of the full rated original output.
- (c) The above warranties shall be backed by third party insurance for twenty-five (25) years in favour of Purchaser.
- (d) Power Conditioning Unit/ Inverters shall be warranted for minimum of five (5) years against all material/ manufacturing defects and workmanship.
- (e) All the mechanical mounting system and structures of the Solar PV plant must be warranted against any manufacturing, design and installation defect for a minimum period of two (2) years from date of Operational Acceptance.

4.25 FORFEITURE OF EARNEST MONEY DEPOSIT

4.25.1 The EMD of the Bidder shall be forfeited if-

- (a) The Bidder withdraws their offer or becomes non-responsive during the Bid Validity Period or after placement of order.
- (b) Fails to submit required CPG.
- (c) Purchaser determines that the Successful Bidder / Contractor has been engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing the Contract or have concealed any material information or submitted misleading facts and statements in their bid/ offer or during execution of the Contract or till completion of guarantee period (if any).

4.25.2 If EMD of the bidders is forfeited due to reason set forth above in clause No. 4.25.1 in such case bidders shall not be allowed to participate in the re-tender of that particular item(s) or any other bid of the Purchaser for next two years.

4.26 REMOVAL OF WORKER / HUMAN RESOURCES

The Engineer-in-Charge of Purchaser may require the Contractor to remove from Site of Works or from any other area of Work related to the Contract, any member of the Contractor personnel or work force who:

- (i) Persists in any misconduct or lack of care
- (ii) Performs his duties incompetently or negligently or otherwise carelessly

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(iii) Fails to conform with any provisions of the Contract or

(iv) Persists in any conduct which is prejudicial to the safety, health or protection of the Work and environment.

If appropriate, the Contractor shall appoint a suitable replacement within fourteen (14) days or within such period as may be agreed between the Engineer-in-Charge and Contractor.

4.27 DESIGN AND INTERCHANGEABILITY

4.27.1 The Contractor shall execute the basic and detailed design and the engineering work in compliance with the Contract, or where not so specified, in accordance with good engineering practice. The Contractor shall be responsible for any discrepancies, errors or omissions in the specifications, drawings and other technical documents as prepared.

4.27.2 All similar material and removable parts of similar item(s) shall be uniform and interchangeable with each other wherever they are asked for.

4.28 WORKS TO BE OPEN FOR INSPECTION

All the works under or in course of execution or executed in pursuance of the Contract, shall be at all-time be open for inspection and supervision by the Engineer-in-Charge and his sub-ordinates and the Contractor shall at all times during the usual working hours and all other times at which notice of the Engineer-in-Charge or his sub-ordinates to visit the work shall have been given to the Contractor, either himself be present to receive order and instructions or make a responsible agent duly accredited in writing be present for the purpose. Order given to the Contractor's agent shall be considered to have the same force as if given to the contractor himself.

4.29 MATERIAL TEST CERTIFICATE

The Contractor shall have to furnish original material test certificate in respect of chemical composition and physical properties etc. from Govt./Govt. approved Laboratory/NABL accredited laboratory corresponding to each batch of supplies. In case of Govt. approved/NABL laboratory, documentary evidence regarding its recognition should be furnished, otherwise material test certificate shall not be accepted.

4.30 TYPE TEST CERTIFICATE

Wherever applicable or called for, photocopies of valid type test certificates from the standard test laboratories in India or of international repute should be submitted.

4.31 PRE-DISPATCH INSPECTION

4.31.1 All item(s) shall conform to provisions of statutory acts, such as the Indian Electricity Act, Indian Factory Act, etc. and corresponding rules & regulations, as may be

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applicable. The Contractor has to ensure supply of Modules confirming to relevant standard and listed in the ALMM list as per MNRE Approved Models and Manufacturers of Solar Photovoltaic Modules (Requirements for Compulsory Registration) Order, 2019 and subsequent Amendments. The other associated equipment including Inverter, Transformer, String Monitoring Box (SMB) and Module Mounting Structures, cables, conductors, relays and associated equipment/ components will be supplied as per Preferred Vendor List given under BRS-21.

- 4.31.2** After the award of work, the Successful Bidder shall furnish a complete list and details of all tests to be conducted on all major components. Inspection for each lot shall be carried for the Category A equipment.

List of major Components under Category A are follows:

- (i) Solar Modules.
- (ii) Inverters.
- (iii) Transformer.
- (iv) Module mounting Structure

- 4.31.3** Inspection shall be carried out on each lot of the ordered major equipment specified in Category A. The sample size shall be as per the relevant standards and approved QAP. However, the Purchaser reserves the right to inspect any item and Contractor will inform the date of inspection at least 10 (ten) days in advance. The Purchaser also reserves the right to waive off the inspection and communicate the same to the Contractor within seven (7) days from the receipt of inspection call from the Contractor.

- 4.31.4** Other associated equipment/ material covered in Category B i.e. All other item like cables, conductors, relays and associated equipment/ components shall conform to relevant international/ national standards, for this the factory test reports should be submitted.

- 4.31.5** Contractor shall arrange and extend necessary cooperation for effectively carrying out inspection / testing. However, this shall not absolve the responsibility of the Contractor in providing the performance guarantee/warranty.

- 4.31.6** The scope of work broadly includes review of manufacturing / fabrication procedures, QA/ QC plans, review of Non-Conformance Report (NCR) issued by the Contractor during fabrication stage, review of documents including Quality Assurance Plan during manufacturing/ fabrication activities.

- 4.31.7** All the standard tests in accordance with applicable Standards adopted, shall be carried out at the manufacturer's works on the entire major component and their accessories, so as to ensure efficient operation and satisfactory performance of all the component/parts.

- 4.31.8** When the factory tests have been completed at the Contractor's or sub-contractor's works, the Purchaser shall issue a certificate to this effect, within the time specified and agreed in the QAP, after completion of tests but if the tests are not witnessed by

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the Purchaser, the certificate shall be issued within as per the time agreed in the approved QAP of receipt of the Contractor's Test Certificate by the Purchaser. The completion of these tests or the issue of the certificates shall not bind the Purchaser to accept the equipment should it, on further tests after erection/ installation, be found not to comply with the Contract.

- 4.31.9** Any special test to be performed shall be mutually agreed upon between the Bidder and Purchaser
- 4.31.10** The work is subject to inspection at all times and at all places by Purchaser . The Contractor shall carry out all instructions given during inspection and shall ensure that the work is carried out according to the relevant codes and practices.
- 4.31.11** Decision of Purchaser in regard to the quality of work and materials and its performance with respect to the specifications and drawings shall be final.
- 4.31.12** If any item is not found conforming to standards during test/inspection, the same shall be replaced / rectified by Contractor without any cost to Purchaser and shall be re-offered for inspection.
- 4.31.13** Purchaser's representatives shall be entitled at all reasonable times during manufacture to inspect, examine and test at the supplier's premises, the item(s) and workmanship of the item(s) to be supplied under the contract. Purchaser, at its option can carry out Stage Inspection (India Only) in full details during the manufacture of item(s) under order.
- 4.31.14** In case of imported components, the same should be inspected at the stock yard warehouse of Contractor for quantity mentioned in above clauses.
- 4.31.15** Test certificates for all major/ critical items (Modules, Inverters, Transformer, String Combiner Box (SCB), Module Mounting Structures shall be submitted to Purchaser and its PMC along with in process checks carried out at time of manufacturing, assembling, pre dispatch with applicable standards at no cost to Purchaser. Copies of test certificates for such inspections in triplicate shall be supplied before dispatch of the equipment
- 4.31.16** As soon as the item(s) are ready for inspection/ testing, the Contractor shall intimate Purchaser, at least ten (10) days in advance so that arrangement can be made for inspection of materials. Purchaser will not be responsible for delays for pre dispatch inspection due to delay in offer of readiness of material for pre-dispatch inspection by the contractor. The item(s) shall not be dispatched unless the item(s) is inspected by the Purchaser's authorized Representative or waiver of inspection is given by Purchaser and dispatch instruction by order issuing authority is given.
- 4.31.17** Contractor will arrange tests at site, wherever necessary.
- 4.31.18** Bidders to engage third party inspection agencies for third party inspections i.e., inspection by NABCB listed agencies for 100% quantity of all the critical equipment Category A. In such cases supplier/contractor shall adhere to the inspection and

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testing procedure as approved in QAP. Inspection fees of third party shall be to Bidder's account

4.31.19 Inspection before dispatch will not, however, relieve the contractor from his responsibility to supply material strictly in accordance with the specifications. The inspection by Purchaser and issue of Inspection Certificate thereon, shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed Quality Assurance Program forming a part of the Contract.

4.31.20 Except fake inspection calls, the date of readiness of item(s) for pre dispatch inspection shall be considered as the date of delivery, subject to the condition that the date of readiness for pre-dispatch inspection is fifteen (15) days in advance of terminal date of scheduled delivery. Based on the satisfactory joint inspection, the order issuing authority will issue the dispatch clearance for the delivery of the items.

4.32 RECOVERIES FOR LIABILITIES AGAINST OTHER CONTRACTS

Any amount recoverable from the Contractor against any other contracts with Purchaser will be adjusted from payment due against the Contract awarded under the provision of this specification.

4.33 EXTENSION OF TIME

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 Purchaser or by the reason of any of occurrence of Force Majeure as provided in the Tender for Force Majeure. The Contractor shall at all times use its reasonable efforts to minimize any delay in the Performance of its obligations under the Contract.

4.34 COMPENSATION UNDER WORKMEN'S COMPENSATION ACT, 1923

In every case in which by virtue of the provisions of Section -12 Sub-section-(1) of the Workmen's Compensation Act-1923, it is obligatory to pay compensation to the workers employed by the contractor in execution of the work, Purchaser will recover from the contractor the amount of compensation so paid without prejudice to the right of Purchaser under Section-121 Sub-section-(2) of the said Act. Purchaser shall be at liberty to recover such amount or any part thereof by deducting it from the CPG or from any sum due to the contractor whether under this contract or otherwise. Purchaser shall not be bound to contest any claim made against it under Section-12 Sub-section (1) of the said act except on the written request of the contractor and upon his having given to Purchaser full security for all cost for which Purchaser might become liable in consequence of contesting such claims.

4.35 IMPLEMENTATION OF EMPLOYEES PROVIDENT FUND & MISC PROVISION ACT, 1952

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The provisions of Employees Provident Fund & Miscellaneous Provision Act, 1952 are applicable in respect of Work Charge and NMR employees. The following instructions are to be followed for statutory compliance and proper implementation of the EPF Act:

- (i) The definition of word EMPLOYEE includes any person employed directly by the establishment on work charge or through the Contractors including daily rated or piece rated employees.
- (ii) Every employee shall have to be enrolled for the membership of Employee Provident Fund from the date of his joining.
- (iii) The Contractor shall be responsible for deductions towards EPF contribution from workers.
- (iv) The Contractor shall be responsible for payment of wages to each worker employed by him as a contract labour in accordance with the law.
- (v) The mode of payment to the worker shall be through bank or as per prevailing rules / circulars issued by Govt. of MP from time to time.
- (vi) In case the Contractor fails to make payment of wages on remittance of EPF contribution in accordance with the provisions of the Jaw, the principal Purchaser shall be liable to make payment of full wages or the unpaid balance due, as the case may be to the labour employed by the contractor or to the EPF Commissioner and recover the amount so paid either by deduction from any amount payable to the contractor under any contract or as debt payable by the Contractor.

4.36 MINIMUM WAGES

4.36.1 The Contractor shall pay not less than minimum wages to the labour engaged by him on the work, Minimum wages means the wages including other statutory provision as per labour law or as prescribed by the State Government or Labour Department of the District or place in which work is done.

4.36.2 The Contractor shall also have to pay minimum wages to the labours indirectly engaged on the work including any labour engaged by his sub-contractors in connection with the said work as if labours have been employed by him.

4.36.3 The Engineer-in-Charge shall have the right to deduct money from the dues payable to the Contractor for any sum to be required for making good the loss suffered by the worker (s) by reason of non-fulfilment of the conditions of the Contract for the benefit of the workers, non-payment of wages or deduction made from his or their wages, which are not justified by the terms of the contract or non-observance of the regulations.

4.36.4 The Contractor shall primarily be liable for all payments to be made under and for the observance of the regulation without prejudice to his right to claim indemnity from his sub-contractors.

4.36.5 The regulations shall be deemed to be a part of the Contract and any breach thereof shall be deemed to as breach of Contract. The Contractor disburses the wages to his

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workers within the time limit prescribed under the provisions of payment of wages as per "Wages Act, 1936" or any similar law in force as amended up to date.

4.36.6 In case of manpower outsourcing job, Aadhar Card details of sub vendors and workers shall be kept with the contractor. The contractor shall take all efforts to collect the Aadhar card of all the employees whether they are his own employees or that of outsourced vendor.

4.37 LABOUR LICENSE [FOR THE WORKS TO BE EXECUTED WITHIN THE POWERHOUSE PREMISES]

4.37.1 Contractor/his sub-contractor(s) are required to have a valid labour license issued by Govt. Labour Officer for engagement of labours for the purpose of subject work. The copy of the said license should be furnished before starting of work to site office as well as to the Labour Welfare Officer, Purchaser, at site.

4.38 SAFETY APPLIANCES

All the safety appliances required for the workers of Contractor and his sub-contractors along with their supervisory staff, with respect to the job and as per provision of the Factory Act/BOCW Act shall be arranged and provided by the contractor. Engineer - In- Charge shall have the authority to stop the work in absence of proper safety appliances or to impose suitable compensation.

4.39 ENVIRONMENTAL LAWS

All applicable codes, laws, rules and regulations relating to actual or potential effect of the activities on and at the project contemplated by executing this project on the environment, the disposal of material, the discharge of chemicals, gases or other substances or materials into the environment, or the presence of such materials, chemicals, gases or other substances in or on the project, shall be followed by the contractor during execution of work as well.

4.40 TEMPORARY / ENABLING WORKS

Temporary / Enabling Works as specified in the Technical Specifications or as directed by the Engineer -in-charge of Purchaser for the proper execution of the Works shall be carried out by the Contractor. These works shall be executed by the Contractor at his own cost.

4.41 COMPREHENSIVE MEDICAL CHECK-UP

The Contractor shall ensure comprehensive health check-up of their workers, to be engaged in the Contract, by registered Medical Practitioner, once in a year during the currency of the contract, as per directives of Hon'ble Supreme Court of India in Assam and furnish the documentary evidence in this regard.

4.42 RECORD KEEPING REGARDING CONTRACT

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As per Factory rules/BOCW rules the following registers should be maintained by the Contractor and on demand same shall be submitted in the office of Engineer-in-charge:

- (i) Muster roles register
- (ii) Register of wages
- (iii) Register of deduction for damages or loss
- (iv) Register of employment card.
- (v) Register of fine
- (vi) Register of over time

4.43 SPECIAL CONDITIONS RELATING TO SAFETY

4.43.1 The Contractor and their workers shall follow provisions of Factories Act, 1948 / BOCW Act 1996 and Rules thereunder (as applicable) for safety & welfare of the workers engaged on time to time. On the other hand, the contractor shall also ensure the safety of Purchaser's personnel & property. In case of any accident, loss or damages to Purchaser's employee or property due to negligence on part of contractor or his workers, Contractor shall be held fully responsible for the same and the recovery shall be made from him.

4.43.2 Before starting of work at site, the Contractor shall compulsorily provide personal protective equipment (confirming relevant IS code) to his employees.

4.43.3 All lifting Tools & Tackles to be used at site shall be tested by Govt. approved agency and Xerox copy of certificate shall be submitted to the Engineer -in- Charge. No such lifting Tools & Tackles will be allowed to be used at site which is not tested by Govt. approved agency.

4.43.4 The Contractor shall not be allowed to store more than 5 (five) Nos. of Acetylene/Argon gas cylinders at a time to store/use inside powerhouse.

4.43.5 Carrying/striking of matches, lighters or smoking or other acts which may cause fire hazards in the restricted area of power station, such as Hydrogen plant, Hydrogen storage area, fuel oil plant/storage areas etc., is strictly prohibited.

4.43.6 In the area of power station as prescribed by the Chief Safety Officer, no hot work such as welding, gas cutting etc. which may cause fire hazards shall be carried out unless necessary precautions are taken to avoid any risk of fire hazards.

4.44 ACCOMMODATION & TRANSPORTATION

Residential accommodation for supervisory staff of the Contractor may be provided on chargeable basis on As-Is-Where-Is basis. Whereas the Contractor will have to make arrangements of accommodation for his labourers at his own.

4.45 POWER STATION SECURITY

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The security rules enforced by Purchaser security department shall be honored by the Contractor and his staff. A list of persons engaged and related to the work will be submitted by the Contractor in order to issue temporary identity cards, which must be returned, if the person leaves the job or the contract gets completed.

4.46 MATERIAL MOVEMENT

Collection, return and transportation of material, any item from Purchaser's stores required for job will be arranged by contractor at his own cost. Un-serviceable items/scrap material shall be transported by the contractor to the scrap yard/ area shown by Engineer-In-Charge with the contractor's own transport.

4.47 DISPOSAL OF SCRAP

The Contractor shall with the agreement of Purchaser promptly remove from the site any 'Scrap' generated during performance or any activities at site in pursuance of the Contract. The term 'Scrap' shall refer to scrap/ waste/ remnants arising for discharge of any contract related activities including fabrication of structural steel work and piping work at the project works 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. GST applicable, if any, shall be to Contractor's account.

The ownership of such Scrap shall vest with the Contractor except in cases where the material belongs to Purchaser. The removal of scrap shall be subject to the Contractor producing the necessary clearance from the relevant authorities (Custom, GST etc.), if required by the law, in respect of disposal of the scrap. The liability for the payment of the applicable taxes/ duties shall be that of the Contractor.

4.48 DISPOSAL OF SURPLUS MATERIAL, PLANT AND EQUIPMENT

Ownership of any material, Plant and Equipment brought by Contractor in excess of the requirements for the Work (i.e. surplus material) shall revert to the Contractor upon Completion of the Work or at such earlier time when Purchaser and the Contractor agree that the materials in question are no longer required for the Work. However, any material, Plant and Equipment specifically stipulated in the Bill of Quantities in the Contract shall be the property of Purchaser whether or not incorporated in the Work.

The Contractor shall remove from the site such surplus material brought by him in pursuance of the Contract, subject to the Contractor producing the necessary clearance from the relevant authorities (Customs, GST etc.), if required by law, in respect of re-export or disposal of the surplus material locally. The liability for the payment of the applicable taxes/duties, if any, on the surplus material so re-exported and/or disposed locally shall be that of the Contractor.

The Contractor shall also indemnify to keep Purchaser 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 surplus material. The Indemnity Bond, if required, shall be furnished by the Contractor as per proforma enclosed (Annexure - XIII). Further, in case the laws require Purchaser to take prior permission of the

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relevant Authorities before handing over the surplus material to the Contractor, the same shall be obtained by the Contractor on behalf of Purchaser.

4.49 WORKMANSHIP & MATERIALS

All material(s)/ item(s) supplied shall be strictly as per specification laid down and strict in accordance with approved standard samples wherever applicable. In case of item(s) of which there are no standard approved sample, the supplies shall be of the best workmanship materials as far as applicable and practicable and confirm to the latest specification of ISI, wherever applicable or IEC codes or equivalent internationally accepted standard.

All materials used in the manufacture of the item(s) shall be of the highest grade, free from defects and imperfection and shall be of recent manufacture and unused. All work shall be performed and completed in accordance with best shop practice. Manufacture of high-grade equipment casting shall be free from blow holes, flaws, cracks or other defects and shall be smooth, close grained and of correct dimensions. All materials, supplies, parts supplied under this contract shall be tested as far as reasonably practical.

The works / services to be executed / provided is according to the technical specification / schedule. The activity which is not specifically mentioned but essential for completion of work/ services shall be carried out without any extra cost.

4.50 LOCAL CONDITIONS

It shall be imperative for each bidder to fully inform himself of all local conditions and all other factors which may have any effect on the execution of the contract covered under these documents and specifications. The bidders shall also make an enquiry and satisfy themselves about the contingencies, risk and other circumstances which may influence or affect the execution of the contract as specified in this tender specification.

Purchaser shall not entertain any request for clarification from the bidders regarding such local conditions.

It is presumed by Purchaser that all such factors, conditions etc. have been properly investigated and considered by the bidders while submitting their bid/offer, neither any change in the time schedule of the contract nor any financial adjustments arising thereof shall be permitted by Purchaser which are based on the lack of such clear information or its effect on the cost of the contract to the bidders.

4.51 NOTICE TO LOCAL BODIES

4.51.1 The Contractor shall comply with and give all notices or support Purchaser in taking all the necessary clearances/ approvals to/from the concerned authorities required under any Governmental authority, instrument, rule or order made under any Act of Parliament, State Laws or any regulation or bye - laws of any local authority relating to the Works/Services. Contractor shall before making any variation from the Contract

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necessitated by such compliance give to the Engineer in-Charge of Purchaser a written notice giving reasons for the proposed variation and obtain the Engineer-in-Charge's instructions thereon, in writing.

4.51.2 The Contractor shall pay and indemnify Purchaser against any liability in respect of any fees or charges payable under any Act of Parliament, State laws or any Government instrument, rule or order and any regulations or byelaws of any local authority in respect of the Works/Services.

4.52 CONTRACTOR'S LIABILITY FOR LOSS, DAMAGE, ACCIDENT, ETC.

4.52.1 The Contractor shall indemnify and save Purchaser and its PMC(s) against all actions, suits, demands, cost of expenses arising in connection with injury suffered prior to the date, when work shall have been taken over by person employed by the contractor/his sub-contractor on the works whether under the general law or under the Workmen's Compensation Act, 1923 or any other statutory provision in law in force, dealing with the question of the liability of the Purchaser and shall take steps to ensure against any claim there under.

4.52.2 On the occurrence of any accident, which may result in death of any such workman (fatal accident), the Contractor within twenty-four (24) hours of happening of such accident intimate in writing to the Engineer-in-Charge, the facts of such accident. The contractor shall indemnify Purchaser against, all loss or damage sustained by Purchaser resulting in direct penalties/fines, if any, payable by Purchaser, as consequence of Purchaser failure to give notice under workmen's Compensation Act or otherwise to confirm the Provisions of the Act in regard to such accidents.

4.52.3 In the event of any claim, being made or action made or action brought against Purchaser and arising out of the matter referred to and in respect of which the contractor is liable under this clause, the Contractor shall be immediately notified thereof and he shall with the assistance of Purchaser (if so required) but at the sole expense of the Purchaser, conduct all negotiations for settlement of the same or/and litigation that may arise there from. In such case, Purchaser shall provide all available assistance for any such purpose, at the expenses of the Contractor.

4.52.4 In the event of an accident, in respect of which compensation may become payable under Workmen's Compensation Act, 1923 read with latest amendment thereof, whether by the contractor or by Purchaser as principal employer, it shall be lawful for the Engineer-in-Charge to retain amount of money from bills of Contractor plus GST if applicable, as may in his opinion shall be final in regard of all matters arising under clause.

4.52.5 The amount of all cost, damage or expenses or other sum, which under this or any Contract, if payable by Purchaser, may be deducted by Purchaser from any money due or becoming due to the Contractor under the same or any other contract, without prejudice to Purchaser's right to recover the same by ordinary process of Law.

4.53 THE CONTRACTOR'S RESPONSIBILITIES

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- 4.53.1** The Contractor shall conduct all Contract activities with due care and diligence, in accordance with the Contract and with the skill and care expected from a competent provider of services, or in accordance with best industry practices.
- 4.53.2** In particular, the Contractor shall provide and employ only such personnel who are skilled and experienced in their respective areas.
- 4.53.3** The Contractor shall assume primary responsibility of execution of the contract for all the jobs in accordance with relevant provisions of the Tender document.
- 4.53.4** 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 agencies in order to get any permission whatsoever, required for successful development & operation of Plant for the life of Project i.e., 25 years from the acceptance of OAT.
- 4.53.5** The Contractor shall acquire, on behalf of Purchaser, in the Purchaser's name, all permits, approvals and/or licenses from all local, state or national government authorities or public service undertakings in the 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 Purchaser's Equipment (if any). In this regard, any document required from Purchaser shall be intimated at least ten (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 Purchaser.
- 4.53.6** 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 Purchaser 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 sub-contractors and their personnel.
- 4.53.7** Any plant, material, spares & spares inventory and services that will be incorporated in or be required for the facilities.
- 4.53.8** Unless otherwise specified in the Contract or agreed upon by the Purchaser and the Contractor, the Contractor shall provide/ deploy sufficient, properly qualified operating and maintenance personnel; shall supply and make available all raw materials, spares,

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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 Contract Document 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 Purchaser and the Contractor.

4.54 CONFIDENTIALITY

4.54.1 The Contractor shall maintain strict confidentiality of all documents, record notes of discussion, drawings, designs and other technical information provided by Purchaser or prepared in respect of the services under this contract and shall not pass on any information to any other agencies/organizations without the written permission of the Purchaser.

4.54.2 The Contractor shall also take necessary steps to ensure that all persons employed for the services shall follow the Indian Official Secrets Act 1923 (XIX of 1923) applies to them and shall continue to follow the same even after the execution of the contract.

4.54.3 After entering into the Agreement with the Purchaser 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 completion or termination of the Contract. Notwithstanding the above, the Successful Bidder may furnish to its Subcontractor such documents, data, and other information it receives from the Purchaser to the extent required for the Subcontractor to perform its work under the Contract, in which event the Successful Bidder shall obtain from such Subcontractor an undertaking of confidentiality similar to that imposed on the Successful Bidder under this Clause.

4.55 PROGRESS REPORT

4.55.1 The Contractor shall prepare and submit to the Engineer-in-Charge of Purchaser weekly progress report showing the progress and status of the works/services being performed by him including such materials as charts, networks and photography (if any) as per the directives of Engineer-in-Charge.

4.55.2 It is understood that submission of such reports and reviews thereof to Purchaser shall not absolve the contractor of his responsibility of timely completion of the assignment as per the time schedule indicated in the document.

4.55.3 The bidders shall include in the proposal its organization chart and the methodology intended to be followed for successful execution of the assignment. This shall include the project leader and key personnel and their CVs having requisite experience in various areas as specified in NIT, who will be associated with the assignment and with whom Purchaser would interact from time to time in connection with this assignment. The contractor shall get the methodology approved by E.I.C.

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- 4.55.4** The work shall be executed strictly as per the Time Schedule specified in Contract. The Timeline for Commissioning of the 25 MW (AC) Solar PV Project including Land handover/ Development to Contractor for the Contract Period & with all other associated equipment as per this tender document in total shall be 12 (Twelve) Months from the contract signing.
- 4.55.5** 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.
- 4.55.6** The progress report shall be in a form acceptable to the, Purchaser and shall indicate, among other things: (a) percentage completion achieved compared with the planned percentage completion for each activity including a graphic representation in the form of 'S' curves, and (b) where any activity is behind the program schedule, giving comments, reasons for delay and likely consequences & impact on overall project schedule and stating the corrective action being taken to catch-up and make good the delay.
- 4.55.7** To review the progress of work and to resolve various outstanding issues, Contract Review Meetings (CRM) shall be held periodically at the office of Purchaser or the office of the Contractor or mutually agreed place. Both Purchaser and the Contractor shall depute their key personnel for the CRM including the PMC. During the review meetings the progress of work will be reviewed, constraints & their corrective action will be identified. The contractor shall use his best endeavor to implement the corrective action so identified.

4.56 SUB-LETTING OF ASSIGNMENT

- 4.56.1** The Contractor shall not sub-let, transfer or assign whole part of the contract on back-to-back basis or the core activity as specified in pre-qualifying requirement for which the Contractor has been judged before award of contract. In case if Contractor sublets, transfers or assign the contract as stated above then Purchaser shall have the right to cancel the Contract and to get works/services done from elsewhere and Contractor shall be liable to Purchaser for any loss or damage along with overheads upto twenty-four percent (24%) which Purchaser may sustain in consequence or arising out of such services and the Contractor shall indemnify such loss or damage to Purchaser.
- 4.56.2** Engaging workers through labour contractor and statutory compliances thereof to this effect does not come under the purview of sub-letting. However, in such case, prior permission shall have to be obtained from Purchaser.

4.57 FORECLOSURE OF CONTRACT

- 4.57.1** Purchaser reserves the right to foreclose the Contract at its discretion, if required. Order issuing authority of Purchaser shall give fifteen (15) days' notice in this regard in writing. The Contractor shall have no claim for any payment of compensation whatsoever on account of any profit or advantage which he might have derived from

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the execution of the contract in full but could not derive in consequence of the foreclosure of the whole or part of the contract.

4.57.2 The Contractor shall be paid at contract rates for the works (including supply) successfully executed at the time of foreclosure of the contract.

Reasonable compensation claimed by the Contractor towards expenses in respect to the contract shall be reimbursed after due diligence. Purchaser's decision in such case shall be final and binding on the Contractor.

4.58 COMPLIANCE OF LAWS AND REGULATIONS

4.58.1 The Contractor shall be responsible for the compliance of all statutory obligations under the Factory Act, 1948, BOCW Act 1996, Contract Labour (Regulation & Abolition) 1970 M.P. Rule, 1973. Minimum Wages Act or any other law imposed by the Government. It will be the responsibility of the contractor to maintain various registers/record required under various acts and has to produce the same to the Engineer-in-Charge or to the inspection authorities of the government on demand at any time.

4.58.2 The labour engaged by the Contractor shall be bound by the provisions of the legislations, whether Central or State, as in force in the State of Assam. In case of any default on the part of Contractor or his agent of any of the provisions of such laws, if Purchaser requires incurring any expenditure, liabilities arising there from, Purchaser may deduct and recover the same out of any sum due or becoming due to the contractor in respect of this contract. The decision of Purchaser that any sums have become payable hereunder and the amount which has become payable shall be final and binding on the Contractor.

4.58.3 Contractor shall confirm 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. BOCW Act 1996 & BOCW Welfare Cess Act

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j. Employees State Insurance Act 1948.

4.59 CORRUPT / FRAUDULENT / COLLUSIVE / COERCIVE OR OBSTRUCTIVE PRACTICE

The Purchaser determines that successful bidder/ contractor has engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for or in executing the contract, then Purchaser may after giving 15 days' notice to the bidder / contractor shall reject the offer of bidder/terminate the Lol/order placed on the Contractor.

4.60 EVENTS OF DEFAULT

The events but not limited to followings shall be construed as Events of Default on the part of the Contractor and suitable action as per provisions incorporated elsewhere in bid documents will be taken by Purchaser:

- (i) The Contractor is in material breach of any of the terms of this Contract.
- (ii) The Contractor is adjudged bankrupt or insolvent.
- (iii) The voluntary winding up of the Contractor by the shareholders of the Contractor.
- (iv) Any petition for winding up of the Contractor is admitted by a Court of Competent jurisdiction and the Contractor is ordered to be wound up by the Court. This provision shall not apply where the winding up order is pursuant to a scheme of amalgamation or reconstruction and the amalgamated or reconstructed entity has unconditionally assumed the obligations of the Contractor under this Contract.

4.61 TERMINATION OF CONTRACT

4.61.1 Purchaser may by not less than fifteen (15) days written notice of default, terminate the Contract in the circumstances detailed here under: -

If in the opinion of Purchaser, the turnkey Contractor fails to comply with any of the provisions of this Contract including supply/ erection/ commissioning/ demonstration of performance as per Contract/ support during Comprehensive O&M etc. are found not in accordance with prescribed specifications.

4.61.2 In the event of such termination, Purchaser on its sole discretion shall exercise its power as: -

- (a) To forfeit CBG of the Contractor either in whole or part at its absolute discretion;
- (b) To stop making any payment towards the work completed till date;
- (c) To take the control of all the material/ equipment's / components on site;

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(d) To cancel the Contract, reserving, Purchaser right to recover damages from the Contractor for the non-delivered items / works.

4.61.3 In pursuance to Clause No. 4.61 (4.61.1 & 4.61.2) Purchaser shall exercise its discretionary power to suspend/ban the contractor for further business with Purchaser for a declared period and/or for participation in next three tenders issued for that particular contract from Purchaser on breach of the contract.

4.61.4 Notwithstanding that the power under Clause No. 4.61.2 are in addition to the rights and remedy available to Purchaser under the law of contract in India.

4.61.5 In the event of risk purchase of stores/works/services of similar description, the opinion of Purchaser shall be final. In the event of action taken under Clause No. 4.61.1 and 4.61.2 the Contractor shall be liable to pay for any loss, which Purchaser may sustain on that account, but the contractor shall not be entitled for any saving on such purchases/works/services made against the default.

4.61.6 In the event of Purchaser not terminating the Contract as per provisions of Clause No. 4.61.1 and 4.61.2 the turnkey Contractor shall continue execution of the Contract. In such case the turnkey Contractor shall be liable for compensation for the delay as per relevant clauses of SCC until item(s)/ works/ services are accepted.

4.61.7 The Contractor shall discharge duties as per terms & conditions of order during the termination notice period till the final date of termination of Contract.

4.62 DEATH, BANKRUPTCY, BREACH OF CONTRACT

If the Contractor becomes insolvent or bankrupt or receiving order made against him or compound with or make any proposal for carrying on his business under inspection for the benefit of his creditors or commit an act of insolvency or bankruptcy or being a corporation pass a resolution or be ordered to wind up or have a receiver of its business appointed or commit a breach of contract, in such situations Purchaser shall be entitled forthwith by writing to the Contractor or his assigns or legal representative to terminate the Contract and Purchaser may in the event, gather Contract completed in such time and manner and by such persons as Purchaser shall think fit at the risk, cost and under the liability of the Contractor.

4.63 CHANGE IN LAW

"Change in Law" shall mean the occurrence of any of the following after the date of submission of bid/offer, to the extent such occurrence was not reasonably foreseeable by the Parties prior to the date of submission of bid/offer: -

- (i) The enactment of any new Indian law.
- (ii) The repeal modification or re-enactment of any existing Indian law.

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- (iii) Unless otherwise specifically agreed by the bidder, any change in the rates of any of the taxes, or introduction of any new taxes after the date of submission of bid/offer and before placement of order/award shall be in the scope of Purchaser.
- (iv) The above adjustment, however, shall be restricted up to the respective scheduled date of completion stipulated in the Contract.

4.64 FORCE MAJEURE

4.64.1 FORCE MAJEURE INCLUSIONS

- (a) "Force Majeure" shall mean any event beyond the reasonable control of the Contractor or Purchaser or both, as the case may be, and which is unavoidable notwithstanding the reasonable care of the party affected and which substantially affect the performance of the Contract.

Notwithstanding the generality of the above the following events shall be termed as Force Majeure events in respect of the Order:

- (i) Natural phenomena, including but not limited to abnormally bad weather conditions, unprecedented floods, draughts, earthquakes and epidemics/Pandemic.
- (ii) Act of any Government Authority, domestic or foreign, including but not limited to war, declared or undeclared priorities, quarantines, embargoes, licensing control or production or distribution restrictions or Lockdowns.
- (iii) Accidents and disruptions including but not limited to fires, explosions, breakdown of essential machinery or equipment.
- (iv) Strikes and lockouts continuing for more than three (3) weeks affecting the performance of the parties.
- (v) All the provisions of this clause shall apply whether the disrupting cause is total or partial in its effect upon the ability of the contractor to perform. the following events shall be termed as Force Majeure events in respect of the Order:
- (b) If either party is prevented, hindered, or delayed from or in performing any of its obligations under the Contract by an event of Force Majeure, then it shall notify the other in writing of the occurrence of such event and the circumstances there of within fifteen (15) days after the occurrence of such event.
- (c) The party who has given such notice shall be excused by the other party from the performance or punctual performance of its obligations under the Contract for so long as the relevant event of Force Majeure continues and to the extent that such party's performance is prevented, hindered or delayed. The time for completion shall be extended by a reasonable time.
- (d) The party or parties affected by the event of Force Majeure shall use reasonable efforts to mitigate the effect there of upon its or their performance of the Contract and to fulfil its or their obligations under the Contract, but without prejudice to Purchaser's right to terminate the contract.

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- (e) Delay or Non-performance by either party hereto caused by the occurrence of any event of Force Majeure shall not: -
 - (i) constitute a default or breach of the Contract.
 - (ii) give rise to any claim for damages or additional cost or expense occasioned thereby.

If and to the extent that such delay or non-performance is caused by the occurrence of an event of Force Majeure.
- (f) If the performance of the Contract is substantially prevented, hindered or delayed for a single period of more than sixty (60) days or an aggregate period of more than one hundred and twenty (120) days on account of one or more events of Force Majeure during the currency of the contract, the parties will attempt to develop a mutually satisfactory solution, failing which the dispute shall be resolved in accordance with clause No. 4.65 "Settlement of Disputes".
- (g) Any hindrance in work on account of Right of Way (ROW) / Right of Use (ROU) will not be considered as force majeure event during construction as well as O&M period. Contractor before claiming force majeure needs to provide data to substantiate his claim otherwise calculation of Machine availability will be carried as if there is no force majeure.
- (h) Notwithstanding clause above, Force Majeure shall not apply to any obligation of Purchaser to make payments to the Contractor herein.

Note: For extension of Contract period due to force majeure conditions, the Contractor shall submit their representation with full documentary evidence for scrutiny by the Purchaser which may be considered on merit basis.

4.64.2 Force Majeure Exclusions

- (a) Any event or circumstance which is within the reasonable control of the Parties and the following conditions, except to the extent that they are consequences of an event of Force Majeure:
 - (b) Unavailability, late delivery, or changes in cost of the plant, machinery, equipment, materials, spare parts or consumables for the Power Project;
 - (c) Delay in the performance of any Contractor, sub-Contractor or their agents;
 - (d) Non-performance resulting from normal wear and tear typically experienced in power generation materials and equipment;
 - (e) Strikes at the facilities of the Contractor / Affected Party;
 - (f) Insufficiency of finances or funds or the agreement becoming onerous to perform; and
 - (g) Non-performance caused by, or connected with, the Affected Party's
 - (h) Negligent or intentional acts, errors or omissions;
 - (i) Failure to comply with an Indian Law; or
 - (j) Breach of, or default under this Contract Document.

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- (k) Normal rainy seasons and monsoon
- (l) Any Transport strikes not directly affecting the delivery of goods from manufacturer to site.

The decision of the Purchaser with regard to the occurrence, continuation, period or extent of Force Majeure shall be final and binding on the Contractor.

4.65 SETTLEMENT OF DISPUTES

4.65.1 Mutual Dispute Resolution (Amicable Settlement)

If any dispute or difference(s) of any kind whatsoever arise between Purchaser and the Contractor in connection with or arising out of the Contract, including without prejudice to the generality of the foregoing, any question regarding its existence, validity or termination, or the execution of the Contract whether during the progress of the Contract or after its completion and whether before or after the termination, abandonment or breach of the Contract, the parties shall seek to resolve any such disputes or difference by mutual consultation with the CEOs/MDs of both i.e. Purchaser and the Contractor, or their authorized representatives, for amicable settlement of the dispute within a period of ninety (90) days after receipt by one party of the other party's request for such amicable settlement

4.65.2 ARBITRATION

Any dispute, controversy, or claim arising out of or relating to this contract, or the breach, termination or invalidity thereof, that cannot be settled amicably between both the parties, shall be settled by Arbitration.

In any arbitration proceeding hereunder:

- a) Arbitration shall be in accordance with the Arbitration & Conciliation Act 1996, or any statutory amendment thereof.
- b) Arbitration shall be by a sole arbitrator, if agreed upon by the Parties. Failing agreement on the identity of such sole arbitrator, each Party shall appoint one arbitrator, and these two appointed arbitrators shall jointly appoint a third arbitrator, who shall chair the arbitration panel and act as the Presiding Arbitrator.
- c) In an arbitration proceeding consisting of three arbitrators, if a party fails to appoint an arbitrator within 30 days from the receipt of a request to do so from the other party; or the two appointed arbitrators fail to agree on the third arbitrator within thirty days from the date of their appointment, the appointment shall be made upon request of a party by the High Court or by the President, Institution of Engineers (India).
- d) In an arbitration with sole arbitrator, if the parties fail to agree on the arbitrator within 30 days from receipt of a request by one party from the other party to so agree, the appointment shall be made, upon request of a party, by the High Court or by the President, Institution of Engineers (India).
- e) Proceedings shall, unless otherwise agreed by the Parties, be held in Guwahati.

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- f) English language shall be the official language for all purposes.
- g) Decision of the sole arbitrator or of a majority of the arbitrators (or of the third arbitrator if there is no such majority) and the Arbitral Award shall be final and binding on the parties and the persons claiming under them respectively and shall be enforceable in any court of competent jurisdiction, and the Parties hereby waive any objections to or claims of immunity in respect of such enforcement.
- h) The arbitrators and the parties to the arbitration shall maintain confidentiality of all arbitral proceedings except award where its disclosure is necessary for the purpose of implementation, enforcement and setting aside of the award.
- i) The cost of arbitration shall be equally shared among both the parties.

4.66 JURISDICTION

Any dispute or differences arising under, out of, or in connection with this tender/contract, shall be subject to the exclusive jurisdiction of courts at Guwahati only.

4.67 WITHHOLDING OF PAYMENT

Purchaser may withhold the whole or part of any payment for supply/work/services claimed by the Contractor which in the opinion of the order placing authority is necessary to protect Purchaser from loss on account of: -

- (i) Supplied item(s) are not as per the technical specification & scope of supply. Works/Services not rendered as per the technical specification and scope of work / services.
- (ii) Damage to Purchaser or other's property due to reason at (i) above.
- (iii) Compensation if imposed on account of statutory labour laws or by Court of law in case of injuries inflicted on any personnel including those of Purchaser due to reason at (i) above.

4.68 CHANGE IN CONSTITUTION OF CONTRACTOR AND ADDRESS

In case there is any change in partnership or any change in the constitution of the Contractor it shall be forthwith notified by the Contractor to Purchaser for information. Any change in the address of the Contractor shall also be intimated to the Engineer-in-Charge of Purchaser, promptly.

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SECTION – IV (A)
SPECIAL CONDITIONS OF CONTRACT
FOR
SUPPLY, ERECTION & COMMISSIONING

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SECTION – IV (A)

SPECIAL CONDITIONS OF CONTRACT

FOR

SUPPLY, ERECTION & COMMISSIONING

4.69 POWER PLANT

The complete, fully functional and operational solar ground mounted power generating projects including related facilities, substation and controls necessary to enable the plant to deliver electric power to 33 kV outgoing feeders up to interconnection point at AEGCL's 220/33 kV substation.

4.70 SCOPE OF WORK

The scope of work covered in this tender shall be specified under Section-V, Technical Specification as per Section VI as mentioned in this tender document. It is, however, understood and confirmed by the Contractor that the scope as described in the bid document is not limiting in so far as the responsibilities of the Contractor shall include inter-alia, carrying out any and all works and providing any and all facilities those are required in accomplishing an operating system, complying fully with all requirements as are envisaged of it, complete in all respect and satisfying all Performance and guarantee requirements stated or implied from the contents of the tender document. The Contractor shall make all required liaising with all the agencies along with concerned power utilities for interconnection of the solar project to the switchyard of thermal power station, so as to commence exporting the power generated from solar project soon after its commissioning. The Contractor shall get tested all required equipment (like CTs, PTs, ABT meter, etc.) from the power utility (if applicable) well before commissioning the solar project so as to avoid any delay in commissioning of solar project and export of power.

4.71 RESPONSIBILITIES OF THE CONTRACTOR

4.71.1 All expenses towards mobilization at site and demobilization including bringing in equipment, work force, materials, dismantling the equipment, clearing the site(s) after completion of work and liaisoning for interconnection of solar project with the State Grid with concerned departments etc. shall be deemed to be included in the prices quoted and no separate payments on account of such expenses shall be entertained.

4.71.2 Contractor may have to work in energized or partly energized conditions. In such cases, it shall be the responsibility of the Contractor to arrange for necessary permits or shuts downs and provide skilled and responsible persons for the execution of works. Contractor shall organize his works during the shutdown periods properly and complete the programmed works within the time given. Contractor shall not be paid any extra pa above-said working under the above said circumstances.

4.71.3 It shall be entirely the Contractor's responsibility to provide, operate and maintain all necessary construction equipment, scaffoldings and safety gadgets, cranes and other

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lifting tackles, tools and appliances to perform the work in a workman like and efficient manner and complete all the jobs as per time schedules. However, if any equipment/facilities are provided by the Purchaser, the same shall be on a chargeable basis.

4.71.4 Procurement and supply, in sequence and at the appropriate time, of all materials and consumables shall be entirely the Contractor's responsibility and his rates for execution of work will be inclusive of supply of all these items.

4.71.5 In case any material is issued by the Purchaser, then it will be properly used and maintained. Subsequent to completion of its use, it will be returned to Purchaser in good condition. In case of damage or misuse of such stores, Purchaser will recover the cost from the Contractor from the payments due to the Contractor.

4.72 INSURANCE DURING SUPPLY, ERECTION AND COMMISSIONING

4.72.1 Contractor shall at his own expenses effect insurance from IRDA approved agencies to the supplies, transit, personnel and all other related activities to the satisfaction of the Purchaser as follows including all third-party risks. A copy of all such policies will be given to the Purchaser along with. The Purchaser shall be informed of all such insurance policies.

4.72.2 Insurance to cover marine & transit insurance.

4.72.3 Insurance to cover storage cum erection cum commissioning with suitable endorsements in the name of Purchaser. For this: -

(a) Bidder should submit the copy of the comprehensive policy along with the supply/service invoices.

(b) Upon award of the work, the endorsed copy of the insurance should be submitted to the Purchaser.

(c) In case of any claim, if the endorsed insurance cover is not sufficient to meet the claimed amount, the Contractor shall be liable for the shortfall and the same will be recovered as amount due under the Contract.”

4.72.4 Insurance to cover third party liability along with an undertaking indemnifying Purchaser from any such claim.

4.72.5 Workmen compensation and /or group personal accidents Insurance policy covering its employees and workers including Subcontractor.

4.72.6 Contractor shall also affect and maintain any other insurance that may be required under any law or regulation or practice from time to time.

4.72.7 The Contractor shall take all reasonable precautions to prevent fire of any nature in the general area of his operations and he shall be responsible for all damage from fires due directly or indirectly.

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4.72.8 During the continuance of this Contract, the Contractor shall pay all premium and sums of money necessary for keeping this insurance policy in force and submit to the Engineer-in-Charge the receipt of such payments within seven (7) days after the same shall have become due. In the event of the Contractor refusing or neglecting to effect insurance as aforesaid, it shall be lawful for the Purchaser to effect the insurance as aforesaid and pay the premium thereon and deduct the cost of such insurance or the amount of premium so paid from time to time plus 24% overhead charges from any sums payable to the Contractor under this Contract.

4.73 CONTRACT PERFORMANCE GUARANTEE (CPG)

4.73.1 The Contractor shall furnish, within fifteen (15) days of Letter of Award, a Contract Performance Guarantee equivalent to 10% (Ten percentage) of total EPC Contract Value (Including GST) consisting detailed engineering, manufacturing, testing, supply and delivery of equipment at site & erection testing & commissioning in all respect for 25MWac Ground Mounted solar power project. The validity period of BG should be initially for a period of 30 months (Twelve (12) months for construction period + Eighteen (18) months after completion of the date of acceptance of Operational Acceptance Test), as per Annexure III with an additional claim period of three (3) months beyond the validity of BG- Further, the validity of this BG shall be extended to cover a period till successful completion of performance guarantee test. BG must be routed through SFMS platform.

4.73.2 Delay beyond the timeline mentioned above, The BG against EMD submitted by Successful Bidder shall be encashed by Purchaser and the Project shall stand terminated.

4.73.3 For the purpose of calculation of the above delay charges, 'month' shall be considered as a period of thirty (30) days.

4.73.4 In case the performance tests as specified in the document are not successfully completed within the stipulated time period as given at clause 4.74, the bank guarantee shall be extended for a suitable period so as to keep the validity for a period mentioned in above provision.

4.73.5 The CPG shall be liable to be encashed wholly or partly at the sole discretion of the Purchaser, should the Contractor either fail to execute the work within the stipulated period or fail to fulfil the contractual obligations or fail to settle in full his dues to the Purchaser. In case of premature termination of the contract, the CPG will be encashed and the Purchaser will be at liberty to recover the loss suffered by it from the Contractor.

4.73.6 The Purchaser is empowered to recover from the CPG through invocation of bank guarantee for any sum due and for any other sum that may be fixed by the Purchaser as being the amount or loss or losses or damages suffered by it due to delay in Performance and/or non-Performance and/or partial Performance of any of the conditions of the contract and/or non-Performance of guaranteed obligations.

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4.73.7 No interest is payable on the CPG amount.

4.73.8 In the event of full CPG being encashed, the Purchaser at its discretion and without prejudice to its any other rights, can terminate the contract.

4.74 TIME SCHEDULE

4.74.1 The time and the date of completion of the Contract as specified in the contract by the Purchaser with or without modifications, if any, and so incorporated in the Letter of Award, shall be considered to be the essence of the Contract.

4.74.2 The Contractor shall submit a detailed bar chart as specified in BRS 18 with the time frame agreed covering all activities with various key phases of supply and service obligations under the contract such as supply schedule and field erection activities within fifteen (15) days of the date of Letter of Award.

4.74.3 The time period mentioned below shall be reckoned from the date of contract signing.

4.74.4 Commissioning schedule for the Project shall be as follows subject to handing over of the land to the Contractor in line with the clause 4.12:

- (i) The commissioning of solar project (CD) within (ZD + 12) months from date of contract signing (Zero Date i.e. "ZD", Commissioning date i.e. "CD").
- (ii) OAT in one month from date of commissioning (Indicative: CD+1 months)
- (iii) O&M shall start from date of successful OAT (Indicative: CD+1 months)
- (iv) Performance Guarantee Test shall be conducted 12 months from commissioning (CD+12 months).

The date of commissioning of the project; as a whole; shall be the date as mentioned in the certificate of commissioning, as issued by Engineer In Charge of Purchaser.

4.75 TERMS OF PAYMENT

The payment for the performance of the works under the Contract will be made by the Purchaser to the Contractor only as per the guidelines and conditions specified herein. All payments shall be made in Indian Rupees.

4.75.1 Adjustable Advance Payment

4.75.1.1 Supply Portion:

Ten Percent (10%) of Contract Price (excluding GST) for supply portion shall be paid as interest free initial advance on compliance of the following and on submission of claim (Proforma Invoice): -

- (a) Categorical acceptance of Letter of Award (LOA)

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- (b) Submission of the copy of signed Contract Document incorporating all agreed terms and conditions by the contractor and finalization thereof.
- (c) Submission of an unconditional and irrevocable Advance Bank Guarantee for 100% of advance amount made in favour of Purchaser, which shall be initially kept valid upto 90 days beyond the scheduled date of commissioning of the project. However, in case of delay in commissioning, the validity of this Bank Guarantee shall be extended by the period of such delay. Format of BG is given under **Annexure- VI**.
- (d) Submission of an unconditional and irrevocable Bank Guarantee towards Contract Performance guarantee for 10% of total EPC contract value (including GST), which shall be initially kept valid up to 30 months from the date of contract signing (as per **Clause No. 4.73**. The proforma of Bank Guarantee is enclosed in **Annexure- III**.

Note: For the sake of smooth compliance of points under (a) to (d), the following timelines are to be followed:

- i. Acceptance of LOA by contractor-- within 07 days of issuance.
- ii. Submission of signed Contract Document by contractor within 30 days of issuance of LOA.
- iii. Submission of Detailed Bar chart showing time schedule by contractor within 15 days of issuance of LOA.
- iv. Finalization of Contract Document by both the parties and signing thereof – within 30 days of issuance of LOA.
- v. Submission of all the BGs by contractor within 15 days of issuance of LOA.
- vi. Submission of claim by the contractor after compliance of all pre-requisite separately.
- vii. Release of Initial advance payment by Purchaser within 30 days from the date of receipt of commercially clear invoice.

The advance shall be released by the Purchaser within 30 days of submission of complete and correct BGs by Contractor.

4.75.1.2 Services Portion:

Ten Percent (10%) of the total Service component of the Contract Price (excluding GST), including Civil works, Erection, Inland Comprehensive insurance and other charges, if any, along with applicable GST, will be paid to the Contractor as interest free advance payment on fulfillment of the following:

(a) Categorical acceptance of Letter of Award.

- (b) Submission of the signed contract document incorporating all agreed terms and conditions by the contractor and finalization thereof.

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(c) Submission of an unconditional and irrevocable Advance Bank Guarantee for 100% of advance amount made in favour of Purchaser, which shall be initially kept valid upto 90 days beyond the scheduled date of commissioning of the project. However, in case of delay in commissioning, the validity of this Bank Guarantee shall be extended by the period of such delay. Format of BG is given under **Annexure VI**.

(d) Submission of an unconditional and irrevocable Bank Guarantee towards Contract Performance guarantee for 10% of total contract value (including GST), which shall be initially kept valid up to 30 months from the date of LOA (as per Clause No. 4.73). The proforma of Bank Guarantee is enclosed in **Annexure-III**.

(e) Mobilization to site and Establishment of Contractor's office and deployment of project team at Project Site.

4.75.1.3 The advance paid to the contractor shall be adjusted on pro-rata basis while making progressive payments for supplies and for services.

4.75.2 PAYMENT OF SUPPLIES (MAIN)

4.75.2.1 70% of the contract price of each identified equipment along with applicable taxes and duties against issuance of Dispatch Instructions (DI) and upon receipt of equipment from manufacturer's works on pro rata basis on production of invoices and satisfactory evidence of shipment (which shall be original Bill of Lading/RR/LR) and E-way bill issued by the contractor.

Upon receipt of materials/equipment, the contractor will ensure good condition at site and physical verification will be made by Purchaser and thereafter the Purchaser /PMC will issue certification (Material Receipt Certificate) of having received and stored the equipment at site in good condition.

The Contractor shall submit the following documents to the Purchaser:

- 1) Application for Payment
- 2) Contractor's invoice showing LOA reference, Goods description, quality dispatched, unit price, total amount (6 copies)
- 3) Packing List
- 4) Railway receipt/LR & E-Way Bill
- 5) Manufacturer's guarantee certificate of Quality
- 6) Material Inspection Clearance Certificate for dispatch issued by Purchaser /PMC/TPI.
- 7) Insurance Certificate
- 8) Physical Verification certificate of material received at site by Purchaser /PMC site representative

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**9) Certificate of origins from OEM(s)**

4.75.2.2 20% of the Contract Price for main supplies upon successful commissioning of entire project and Operational Acceptance Test (OAT) including submission of As-Built drawings, O&M manual, technical pamphlets and manual of spares, maintenance & testing equipment etc for project.

4.75.2.3 Final 10% of the Contract price for main supplies upon successful Guarantee Tests in respect of the entire project.

4.75.2.4 If Successful Bidder had opted for advance, then, remaining amount of unadjusted advance, if any, shall be adjusted while making payments of this installment. In case the advance of 10% of contract price against BG is not availed by the contractor, then this 10% payment shall be clubbed with first progressive payment of 70% towards supply.

The contractor shall certify the following in each of the supply invoices: -

“Certified that no payment has been claimed and received before, for the components for which payment has been claimed in this invoice”.

Notes: -

Pro-rata payments shall be made for distinctly identifiable items as listed in the Price Schedule / approved billing-cum-dispatch schedule. No pro-rata payment shall be effected under part supplies of a defined item/set under billing schedule.

In case of partial shipment of any item, the payment shall be affected only upon dispatch / receipt at site of the last consignment forming part of the item as described in the price Schedule/ approved billing-cum-dispatch schedule. The Contractor shall, in such case, be required to certify that with the shipment/ receipt at site of the said last consignment, the delivery of the item is complete as per contract. The contractor shall also certify that in case any part if inadvertently not delivered shall be delivered promptly without any additional cost.

4.75.3 Payment for Services Portion (including Civil works): -

4.75.3.1 70% of the contract price (inter-alia including Civil works & inland comprehensive insurance for the entire project) on pro-rata basis along with applicable taxes & duties against progressive works/services of the identified equipment/structure/package and on certification by Engineer in Charge, for the quantum of work/services completed and on successful completion of quality checks points involved in quantum of work completed.

4.75.3.2 20% of the Contract Price for services/works upon successful commissioning of entire project and Operational Acceptance Test (OAT) including submission of As-Built drawings, O&M manual, technical pamphlets and manual of spares, maintenance & testing equipment etc for project.

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4.75.3.3 Final 10% of the Contract price for services/works upon successful Guarantee Tests in respect of the entire project.

4.75.3.4 If Successful Bidder had opted for advance, then, remaining amount of unadjusted advance, if any, shall be adjusted while making payments of this installment. In case the advance of 10% of contract price against BG is not availed by the contractor, then this 10% payment shall be clubbed with first progressive payment of 70% towards services.

The contractor shall certify the following in each of the supply invoices: -

“Certified that no payment has been claimed and received before, for the service components for which payment has been claimed in this invoice”.

4.75.4 Due Dates for Payment: -

Unless otherwise stipulated, payment will become due and be payable by the Purchaser within 30 days from the date of receipt of Contractor’s invoices, provided the documents submitted are complete and correct in all respects. If it is not admissible or deficient, the invoice will be returned to the Contractor stating the reasons for rejection within 14 days from the date of receipt of the same or the contractor will be informed for making up the deficiencies.

4.75.5 Mode of Payment

The Purchaser shall release the initial advance payments to the Contractor within 30 (Thirty days) from the date of signing of Contract subject to fulfilling conditions of payment of advance. The initial advance shall be paid by direct remittance to the Contractor. However, the advance payment shall be subject to the stipulations laid down in the Contract.

All payments shall be made against the invoices submitted by the contractor with supporting documents. Payment shall be either directly released by Purchaser or through the Financial Institution, the methodology for which shall be informed to the successful bidder.

4.75.6 General

4.75.6.1 Purchaser’s Paying Authority: - Purchaser shall inform about the paying authority for payment of all invoices under this contract after award of work to the successful bidder.

4.75.6.2 Within 60 days of signing of contract, the contractor shall furnish detailed billing and dispatch schedules (Hard as well as in editable soft copies) for the purpose of planning of progressive payments, which will be scrutinized and approved by the Purchaser/PMC.

4.75.6.3 All interim/progressive payments shall be regarded as payments by way of advance against the final payment only and not as payment for work actually

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completed and shall not preclude defective/imperfect/incomplete work to be removed. It will not be considered as an admission by the Purchaser of the due performance of the Contract, or any part thereof by the Contractor nor shall it preclude, determine or affect in any way the powers of the Purchaser under these conditions or in any other way vary or affect the Contract.

- 4.75.6.4** Should the Contractor consider that he is entitled to an additional payment due to change in scope, based on written instruction from the Purchaser, he shall forthwith give notice in writing to the Purchaser to that effect. Such notice shall be given to the Purchaser containing full particulars and justification of the additional claim. Irrespective of any provision in the Contract to the contrary, the contractor must intimate his intention to lodge claim within 60 days of the commencement of happening of the event and quantify the additional claim within 90 days of completion of the work, failing which, the Contractor will lose his right to claim any compensation / reimbursement / damages etc. or refer the matter to Arbitration. Failure on the part of the Contractor to put forward any claim as above within the time as specified shall be an absolute waiver thereof. Omission by the Purchaser to reject any such claim and delay in dealing therewith shall not be waiver by the purchaser of any of his rights in respect thereof.
- 4.75.6.5** The purchaser reserves the right to encash Bank Guarantees if sufficiently convinced of negligence and lack of dedication to work on the part of the Contractor.
- 4.75.6.6** After successful Installation of all the packages, if any amount remains unbilled for any reason, except the cases involving deletion of any part of supply(s)/works, shall be treated as balance contract value for Installation portion. Such balance contract value, if any, shall be payable after successful commissioning of all the packages and on Joint reconciliation of materials/works (as the case may be) and the value. A joint protocol shall be drawn duly signed by the Engineer in Charge of the from Purchaser side & shall be submitted along with the Gap-Billing invoice.
- 4.75.6.7** The advance payment shall stand fully recovered/adjusted on release of all the progressive payments. However, if some of the advance payment remains unadjusted beyond the Contractual Completion period, the Contractor shall make his best endeavor to get the balance advance adjusted from any of his pending dues beyond such contractual completion dates.
- 4.75.6.8** If the Contractor chooses to get the balance outstanding advance adjusted from its pending dues, the advance amount adjusted, shall be clubbed & paid, with the milestone claim payment (for supply portion) and with the first progressive payment, in case of work/services.

4.76 COMPENSATION FOR DELAY

- 4.76.1** As commissioning time is the essence of the Contract and the same shall be firm and binding. The Contractor shall complete all activities of the Project viz. land development, design, engineering, manufacture, supply, storage, all civil works, and

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installation, erection, testing, commissioning, and interconnection with AEGCL substation of solar project respectively within the scheduled date.

4.76.2 Compensation for non-conformance of Performance guarantee test shall be separate and shall be in addition to the Compensation for delay. The compensation against poor performance shall be governed as by Clause No. 4.105 of this Section.

4.76.3 Commissioning will be considered for project as a whole when the complete solar Facility has been interconnected with the Substation.

4.76.4 The Contractor shall indicate duration of all the activities in activity chart in conformity with the overall schedule of the commissioning of project. A sample for activity chart is attached for reference at Bid Response Sheet No. 18. Bidder shall submit the activity chart in form of Bar Chart which shall be discussed and finalized and shall be a part of Contract.

4.76.5 In case the project is not commissioned within the scheduled date then the Contractor has to pay the Purchaser compensation, for delay as follows: -

4.76.5.1 If the contractor fails to achieve Commissioning of the project within 12 months from the date of contract signing, the contractor shall pay to the Purchaser as compensation a sum equal to 0.5% (half of one percent) per week or part thereof on total contract value (including GST), subject to maximum 10% of total EPC contract value including GST.

4.76.5.2 The applicable compensation calculated as above Clause No. 4.76.5.1 may be retained from the due payment and shall be reconciled after completion of work(s)/service(s). No interest shall be paid on the retained amount by Purchaser.

4.76.5.3 Compensation towards Contract shall be finalized after commissioning/completion of works/services and due re-conciliation of all liabilities at the time of making payment of last invoice against the contract.

4.76.5.4 Violation of Safety, Welfare, Labour, may also attract compensation as per prevailing practices of Purchaser.

Note: The GST if applicable shall be levied on the compensation amount and shall be recovered from the Contractors only.

4.76.6 The decision of the Engineer-in-Charge about the amount to be recovered from the Contractor will be final and binding on the Contractor.

4.77 NO COMPENSATION FOR ALTERATION IN OR RESTRICTION OF WORK

If at any time from the commencement of the work the Purchaser shall for any reason whatsoever not require the whole work or part thereof as specified in the bid to be carried out or, alteration in the work is required, the Engineer-In charge shall give notice in writing of the fact to the Contractor, who shall have no claim to any payment

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or compensation whatsoever on account of any profit or advantage which he might have derived from the execution of the work in full or prior to alteration.

4.78 CONTRACTOR'S OFFICE AT SITE(S)

During the execution of the Contract, the Bidder shall ensure responsible person with authority to take decisions to be available at site(s). Such person deputed by the Contractor shall report to the Purchaser's Engineer-in-Charge and PMC's Site in-charge, for smooth execution and timely commissioning of the work. The Contractor shall also provide and maintain a site office, at the site, for the use by the Purchaser's / its PMC / representative. Such an office shall be open at all reasonable hours to receive instructions, notices or other communications. The Contractor shall be responsible for any misconduct/indiscipline by his employees or sub-Contractor's employees. The Contractor shall abide by the instructions of the engineer in charge, if given in this regard. The contractor shall construct/provide a dedicated storeroom to maintain minimum spare, tool & tackles as specified in BRS-16 & 17.

EPC Bidder shall submit the Manpower Chart with hierarchy that would be deployed at site.

4.79 USE OF COMPLETED PORTIONS

4.79.1 Whenever, in the opinion of the Purchaser, the work or any part thereof is in a condition suitable for use and in the best interest of the Purchaser requires use, the Purchaser may take possession of the same. The Contractor shall, however, be not relieved of his pending obligations.

4.79.2 Prior to the date of final acceptance of the work by the Purchaser, all necessary repairs or renewals in the work or part thereof so used on account of defective materials or workmanship or due to the operations failure shall be at the expenses of the Contractor. Such use shall neither relieve the Contractor or any of his responsibilities under the contract, nor act as a waiver by the Purchaser of the conditions thereof. However, if in the opinion of the Purchaser the use of the work or the part thereof delays the commissioning of the reminder of the work, the Purchaser may grant such extensions of time as it may consider reasonable. The decision of the Purchaser in the matter shall be final. The Contractor shall not be entitled to claim any compensation on account of such use by the Purchaser.

4.80 POWER OF THE ENGINEER-IN-CHARGE TO ORDER SUSPENSION OF WORK

The Engineer-in-charge may, from time to time by direction in writing and without invalidating the contract, order the Contractor to suspend the work or any part thereof at such time or times and for such reasons as he may consider necessary. After such directions to suspend the work or any part thereof has been given, then proceed with the work or part thereof, directed to be suspended until he receives a written order from the Engineer-in-charge to so proceed. In the event of suspension, the Purchaser may under the provisions of the contract, extend the time for commissioning of the

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work or part thereof by such period as it may find reasonable. The decision of the Purchaser in the matter shall be final and binding on the Contractor.

4.81 OPERATION ACCEPTANCE TEST

Operation Acceptance Test (OAT) of solar plant shall be considered to have been achieved on successful accomplishment of the following activities:

- 4.81.1** Project has been completed in all respect including inter connection with respective switchyard.
- 4.81.2** Plant performance was found satisfactory on real live condition for a period of fifteen (15) days on continuous basis for trouble free operation.
- 4.81.3** Dedicated SCADA has been commissioned and fully operational including connectivity at plant and Purchaser office, QCA and SLDC.
- 4.81.4** Solar plants are free from occurrence of repetitive fault of the same nature for an uninterrupted period of 15 days.
- 4.81.5** Successful PR test as per **Annexure VIII**.
- 4.81.6** OAT will be considered completed after OAT of complete capacity of solar projects at project location defined in the Contract / Bid Document.

4.82 COMPLETION CERTIFICATE

4.82.1 The Contactor shall submit the Completion Report of the project to Purchaser. The Completion Report shall consist of the following documents:

- (a) Copy of the Commissioning Certificate issued by concerned Engineer-In-charge Purchaser/Authority of the state.
- (b) Four sets of all "As-Built" Drawings and documents are submitted.
- (c) Copy of complete layout of the solar plant including Evacuation system
- (d) Copies of test Certificates for type / routine tests performed on major equipment.
- (e) 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.
- (f) Bill of material of the installed Facility is submitted.
- (g) Inventory of recommended and mandatory spares including special tools and tackles at project Site
- (h) All the required approvals and NOC's as required, are submitted
- (i) List of punch points, duly signed, is provided.

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- (j) Settlement of liquidity damages against delay and performance (Liquidity Damages)
- (k) Certificates of tests performed for various Works.
- (l) Material appropriation, Statement for the materials issued by the Purchaser, if applicable for the Work and list of surplus materials returned to the Purchaser's store duly supported by necessary documents.
- (m) Certificates for each equipment are handed over to Purchaser and 'Statutory approvals/ permits/ NOC are handed over to Purchaser
- (n) An undertaking confirming the payment of all statutory taxes & duties, or document (s) having evidence of paying statutory duties, taxes etc. as per the requirement of concerned statutory authorities.
- (o) Supply of all mandatory and recommend spares.
- (p) Certificate / undertaking for making payment of all statutory requirements, labour wages and others and for any such claims.
- (q) Certificate regarding completion of the Facility in all respect including SCADA by the Engineer-In-Charge / PMCs

4.82.2 The Plant Performance Guarantee in accordance with the procedure specified in "Annexure VIII" has been successfully completed and the Functional Guarantees are met.

4.82.3 The milestone payment linked with successful Operation acceptance shall be released subjected to compliance of the requirements as specified in the clause no 4.81 "Completion Certificate."

4.82.4 Final Acceptance after completion

- (a) Final Acceptance shall occur in respect of the Facilities when:
 - (i) The plant has achieved the Operational acceptance; and
 - (ii) Handing over – Taking over of Plant should have been completed; and
 - (iii) Successful demonstration of the performance guarantees
 - (iv) Contractor has provided the list of recommended spares with detailed specification, source and price for further procurement; and
 - (v) The Contractor has paid the liquidated damages, if any, as specified in SCC thereto.
 - (vi) Account reconciliation and NCR/ Punch list closure.
- (b) At any time after the events set out in GCC have occurred, the Contractor may give a notice to the Engineer In Charge requesting the issue of Final Acceptance in the form acceptable to the Purchaser in respect of the Facilities or the part thereof specified in such notice as at the date of such notice.

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- (c) The Purchaser shall, after consultation with the Engineer In Charge, and within thirty (30) days after receipt of the Contractor's notice, issue Final Acceptance.
- (d) If a part of the Facilities comprises facilities such as buildings, for which no Commissioning or Guarantee Test is required, then the Engineer In-Charge shall issue the Operational Acceptance Certificate for such facility when it attains Completion, provided that the Contractor shall thereafter complete any outstanding minor items that are listed in the Operational Acceptance Certificate.

4.83 FUNCTIONAL GUARANTEE

4.83.1 The Bidder shall be required to quote the Capacity Utilization Factor (CUF) for a Five (5) year period at the metering point of the project location. The Bidder shall guarantee CUF (%) per annum and PR Ratio (%) in BRS 10 after considering proposed configuration and all local conditions, solar insolation, wind speed and direction, air temperature & relative humidity, barometric pressure, rainfall, sunshine duration, grid availability and grid related all other factors and losses due to near shading, incidence angle modifier, irradiance level, temperature loss, array loss, module quality loss, module array mismatch loss, soiling loss and various inverter losses etc. To assess/verify feasibility of quoted CUF, Bidders are required to provide computation documents along with considered factors based on which CUF has been computed. CUF shall be quoted considering parameters and limits specified in Appendix I - PARAMETERS FORM ENERGY ESTIMATIONS

4.83.2 Bidders are expected to undertake their own study of solar profile and other related parameters of the area and make sound commercial judgment about power output i.e., capacity utilization factor. It shall be the responsibility of the Bidder to access the corresponding solar insolation values and related factors of solar along with expected grid availability. The Bidder should access all related factors about the proposed site for the Project and then quote the CUF for the proposed Project.

4.83.3 The Contractor shall be responsible for achieving CUF and PR. For any shortfall in CUF corresponding to the offer, compensation shall be recovered from the Contractor as per Clause no. 4.105. The Contractor shall maintain the Plant equipment including its repair, replacement, overhauling, etc., so as to ensure guaranteed CUF per year, for which the Purchaser shall pay the agreed O&M Contract Price and the applicable taxes. CUF guaranteed shall not be construed as limiting value of generation. The Contractor shall maintain such that maximum generation is achieved.

4.83.4 The Bids with CUF percentage of less than CUF as indicated in Annexure-VIII for project site (Considering 365 days a year) for the first year shall be summarily rejected. The Bidder shall submit PVsyst report along with CUF.

4.83.5 The decrease in CUF quoted for any year shall not be more than 0.7% except for the first year, the decrease shall not be more than 1% for first year. If the Bidder anticipates more degradation of the modules during the first year, it shall be taken care of to provide additional capacity of solar PV modules to meet guaranteed generation at the end of first year to avoid liquidated damages/compensation on account of Guaranteed

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CUF. The CUF of consecutive year should not be more than the previous year's CUF. Bids not following these conditions shall be summarily rejected.

4.84 PERFORMANCE GUARANTEE TEST

4.84.1 The test to prove the Performance Guarantee shall be conducted at site by the contractor in presence of Purchaser/PMC representative. This test shall be binding on both the parties of the Contract. Any special equipment, instrumentation tools and tackle required for successful completion of the Performance Guarantee Test shall be provided by the Contractor free of cost.

4.84.2 In case of non-achievement of the desired performance of the plant, the Contractor, in its own interest, takes adequate measures, such as providing additional modules etc., to improve the performance of the plant at no additional cost to Purchaser. Otherwise, compensation applicable shall be levied at the end of the year.

4.85 STATUTORY APPROVALS FOR WORKS

4.85.1 All statutory approvals/permissions related to installation of the solar power project and carrying out its operation & maintenance (O&M) as may be required under applicable law; rules shall be obtained by the Contractor.

4.85.2 Inspection and acceptance of the work as above shall not absolve the Contractor of any of his responsibility under this contract.

4.85.3 All fees / charges payable to any statutory authority on account of project execution, registration as applicable shall be borne by the Contractor during the construction period of Contract.

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SECTION – IV (B)
SPECIAL CONDITIONS OF CONTRACT
FOR
OPERATION & MAINTENANCE (O&M)

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SECTION – IV (B)

SPECIAL CONDITIONS OF CONTRACT FOR OPERATION & MAINTENANCE (O&M)

4.86 TERM OF O&M CONTRACT

The Contractor shall be responsible for Comprehensive Operation and Maintenance of the solar power project at proposed location for a period of Five (5) years from the date of acceptance by the Purchaser / successful accomplishment of all the activities of OAT of the solar project as per Clause 4.81.

It is to clarify that for the purpose of this clause, the period of 5 years of O&M shall commence from the date of successful completion of OAT for complete project capacity.

4.87 BATTERY LIMIT

The battery limit for bidder during the period of O&M contract shall cover complete solar energy plant and power evacuation system up to the point of interconnection.

The Contractor shall be responsible for arranging at his own cost all spare parts required for replacement for keeping the solar plant operational, repairs / replacement of any defective equipment(s) at his own cost as required from time to time, schedule and preventive maintenance, major overhauling of the equipment, maintaining log sheets/record for operational detail, deployment of staff for continuous operations and qualified engineer for supervision of O&M work, deployment of security personnel so as to ensure smooth operation for the entire period of O&M. Purchaser shall not pay any other amount except the agreed O&M charges.

Operation & maintenance of evacuation system up to the point of interconnection with 33 kV bay associated with 33 kV bus of AEGCL at 220 kV GSS at Namrup.

4.88 SCOPE OF WORK DURING O&M

The detailed scope of work is given in section V B

4.88.1 The cost of all the above items shall be included in the price quoted for price bid of all the solar power plant.

4.88.2 Contractor shall provide all day-to-day operation and maintenance services for the solar energy project as set forth herein. Contractor shall perform the work and arrange/supply all required spare parts, cranes, special tools & tackles or any other items as may be required, in a prudent and efficient manner and in accordance with manufacturer's and systems designers' specifications, Annual Operating Plan for the Plant and O&M manuals.

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4.88.3 Bidder shall ensure security of the solar plant by deputing of manpower, watch tower, CCTV surveillance etc.

4.88.4 All applicable laws of the land including environmental protection, pollution, sanitary, employment and safety laws, ("Government Rules") shall be complied with.

4.89 PRUDENT UTILITY PRACTICE

4.89.1 Contractor shall use all reasonable and practical efforts:

- (a) To maximize plant capacity utilization
- (b) To minimize plant downtime
- (c) Optimize useful life of all the equipment of the solar energy project.

4.89.2 The Contractor shall perform the following obligations prior to taking over of the O&M activity:

- (a) Prepare Mobilization plan in consultation with the Purchaser.
- (b) Provide the services and personnel set forth in the Mobilization Plan
- (c) Prepare in consultation with the Purchaser, the initial Annual Operating Plan
- (d) Develop and implement plans and procedures including those for firefighting, maintenance planning, procuring and inventory control of stores and spares, plan to meet emergencies, plant safety and security; and such other facilities and systems as may be necessary to commence Contractor's ongoing responsibilities.

4.89.3 After taking over the activity of O&M for the power plant, the Contractor shall be responsible for the operation and maintenance of the plant and shall perform all necessary services including applicable services listed below: -

- (a) Provide all operations and maintenance services necessary and advisable to efficiently operate and maintain the plant, including all associated and appurtenant mechanical and electrical equipment keeping in view the objectives set-forth herein above.
- (b) Maintain at the Plant accurate and up-to-date operating logs, records and Monthly reports regarding the operation and maintenance of the Plant which shall include detail of power output, other operating data, repairs performed and status of equipment, all such records to be maintained for the lifetime of the solar project. Upon expiry of term, the Contractor shall hand over such records to the Purchaser. However, the Purchaser shall have access to all such records at any time.
- (c) Regularly update and implement equipment repair or replacement and preventive maintenance program that meet the specifications of the equipment manufacturers and the recommendations of the original equipment manufacturers.
- (d) Perform periodic preventive maintenance and overhauls required for the Plant in accordance with the recommendations of equipment manufacturers. Attend any

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breakdown in the Plant Facility promptly. Inform time taken in attending to such breakdown shortly after restoration of solar power plant.

- (e) Provide technical & engineering support for resolving operation and maintenance problems.
- (f) Perform the services required to procure all spare parts, or equipment as required, overhaul of parts, tools and equipment, required to operate and maintain the Plant in accordance with the recommendations of individual original equipment manufacturer.
- (g) Operate and maintain the Plant for fire protection and safety of equipment. Fire protection here means that the contractor shall provide all necessary equipment for protection of complete solar power plant & balance of plant against fire.
- (h) Maintain, with the assistance of the Purchaser, records regarding the Facility in accordance with prudent industry practices.
- (i) Arrange spares, consumables, tools & tackles, crane and testing. Cost of these items shall be included in the price quoted for O&M.

4.90 PERSONNEL

The Contractor shall employ adequately qualified and experienced personnel for operating and maintaining the solar energy project. The Contractor shall ensure that such personnel remain on duty at the plant at all times, twenty-four (24) hours a day and seven (7) days a week soon after commissioning of the solar project as the case may be. The detailed site Organogram with name and qualification / experience of the staff should be submitted to Purchaser.

4.91 LEVY OF REACTIVE POWER (KVARH) CHARGES

In the event of levy of any charges by State grid on account of reactive power, such charges at actual amount shall be on Purchaser's account.

4.92 LIAISONING

It shall be the responsibility of the Contractor to liaison with the State Government, concerned Renewable Agency, State Transmission & Distribution Companies, CEIG or any such agency / department which may be required for expediting the project.

4.93 O&M CHARGES

4.93.1 The Contractor shall be responsible for Comprehensive Operation and Maintenance of the solar power project for a period of five (5) years from the date of acceptance by the Purchaser / successful accomplishment of all the activities of OAT of the complete solar project.

4.93.2 Payment will be made after all statutory deductions applicable to such type of contracts. The rate quoted shall be deemed to be inclusive of all salaries and other cost, expenses of employees, cost of spares, cost of repair / replacement / modification of any equipment or system; including all applicable taxes & duties thereon; for the

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entire period of five (5) years so as to guaranteed CUF as quoted/agreed. The rates shall also be inclusive of tools & tackles, etc. and liabilities of every description and all risk of every kind to be taken in operation, maintenance and handing over the plant to the Purchaser by the Contractor. Purchaser shall not be responsible for any such liability on the Contractor in respect of this contract and exclusion of applicable taxes on the Bid Closing Date and Time prescribed rates due to ignorance or otherwise shall not form a reason for claiming anything extra at a later date. If any amount is payable / levied to/by respective utilities, etc., on account of low power factor or any other account of solar plant, the same shall be deducted from the Contractor's remuneration or from other due payments/ bank guarantees.

4.93.3 Subsequent to the date of submission of offer by the Contractor, if there is a change in taxes, regulations, levies, which results in additional cost/ reduction in cost to the Contractor on account of the operation under this contract, the Purchaser shall reimburse to the Contractor such sums, provided the present rates of such taxes, levies etc. are indicated by the contractor in the bid. On the other hand, the contractor shall notify the Purchaser about such reduction in taxes, levies etc., if any, for adjustment from the contract prices. However, as regards new taxes & duties or repeal of any law/regulation, the same shall be dealt with in accordance with Clause No.4.63.

4.94 TERM OF PAYMENT DURING O&M

The payment period shall be on a quarterly basis within 30 days from the date of receipt of Contractor's invoices by the Contractor provided the documents submitted are complete and correct in all respects. The Contractor shall submit bills in respect of each of the quarter in quadruplicate after the end of each quarter. Quarterly payment will be released on production of the following documents:

- (i) Record of major components / sub-systems repaired or replaced during the month.
- (ii) Record of preventive maintenance carried out by the Contractor during the month and preventive maintenance plan for next month.
- (iii) Record of monthly attendance certified by Engineer In charge, details of compliances related to ESIC/PF and insurances.
- (iv) Statement of month wise charges billed by the utility for reactive power drawl along with documentary evidence, as applicable.
- (v) Working of monthly performance for each project with details of schedule and breakdown maintenance hours duly certified by the Engineer- in-charge.
- (vi) Working of monthly performance /solar system availability for solar power plant with details of schedule and breakdown maintenance hours duly certified by the Engineer in-charge.
- (vii) Other reports mentioned in Scope of work like Breakdown details along with remedial actions taken, break up of down times – Technical & Non-Technical, Error trend, Component failure details, ROW – Reasons & remedial actions taken.

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- (viii) Working of Grid availability monthly along with monthly statement of grid failure hours, load shedding hours caused by Purchaser for the month, based on the SCADA / Logbook of switch yard, certified by O&M site in-charge of the contractor.
- (ix) A certificate for compliance to the existing laws for employment of the manpower, and payments for statutory taxes and duties.

4.95 OPERATIONAL PERFORMANCE BANK GUARANTEE

4.95.1 The Bidder shall submit a Bank Guarantee one month prior to commencement of first O&M year for an amount equivalent to 10% (ten percent) of 5 years total O&M charges (inclusive of GST) having validity of thirteen (13) months.

4.95.2 Thereafter, every year a fresh bank guarantee for an amount equivalent to 10% of balance {(Four/Three/Two/One year(s)} total O&M charges (Inclusive of GST) shall be submitted by the Bidder, having validity of 13 months. BG shall be submitted one month prior to expiry of the previous Bank Guarantee or the existing bank guarantee can be extended suitably with revised amount, every year till O&M contract remains with the Bidder.

4.95.3 In case contractor fails to submit fresh bank guarantee or extend the same for balance period prior to expiry of prevailing bank guarantee, Purchaser reserves the right to encash the same.

4.96 INSURANCE FOR SOLAR PLANT

4.96.1 Insurance policy for Fire and allied perils including earthquake, flood, storms, cyclone, tempest, theft and burglary, and any other purpose, shall be taken by Purchaser. However, any required documents will be provided by the contractor to the Owner for onward submission to the Insurance Company for filing the claim and take all necessary measures required to protect the interest of the Purchaser for settlement of such claim.

4.96.2 Contractor shall obtain and maintain in force throughout the period of contract the following insurance coverage:

- (a) Insurance to cover third party liability along with an undertaking indemnifying the Purchaser from any such claim.
- (b) Workmen compensation and /or group personal accidents Insurance policy covering all its employees and works including the sub-contractor.
- (c) Contractor shall also affect and maintain any and all other insurance, which he may be required under any law or regulation or practice from time to time.
- (d) During the continuance of this contract, the contractor shall pay all premium and sums of money necessary for keeping this insurance policy in force and submit to the Engineer in-Charge the receipt of such payments within seven days after the same shall have become due. In the event of the contractor refusing or neglecting to effect insurance as aforesaid, it shall be lawful for the Purchaser to effect the insurance as aforesaid and pay the premium thereon and deduct the cost of such

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insurance or the amount of premium so paid from time to time plus 24% overhead charges from any sums payable to the contractor under this Contract.

- (e) The Contractor may or may not take MBD insurance policy, but it would be the responsibility of the Contractor to operate and maintain the solar project and all the associated equipment at his own cost during the entire O&M period for which Purchaser shall pay the agreed O&M charges only. Any replacement / repair / modification of any item / equipment shall be carried out by the Bidder at his own cost during the entire O&M period, so as to have minimum machine down time. Purchaser shall not be responsible for any break down / failure of any equipment due to any reason thereof except for Force Majeure / Fire & Allied Perils Events or extraneous reasons. In the case of any delay/ lapse on the part of Contractor in restoring the operations beyond the time periods to be finalized with the successful bidder before signing of the O&M contract, the loss in generation would be charged to the Contractor.
- (f) The Contractor shall take all pre-cautions to prevent fire of any nature in the area of jurisdiction of his operations and in case of any losses arising out of such accidents, due to negligence on the part of the Contractor or Sub contractor, has to be borne by the Contractor.
- (g) The Contractor shall replace the damaged equipment without waiting for settlement of insurance claim. In the case of any delay / lapse on the part of Contractor, the loss of energy generation would be made up by them.
- (h) The Purchaser shall be named as co-insured under all insurance policies taken by the contractor except for the Third-Party Liability, Worker's Compensation, Automobile Liability Insurance and Purchaser's Liability Insurance. All insurers' rights of subrogation against such co-insured for losses or claims arising out of performance of the contractor shall be waived under such policies.
- (i) Unless otherwise provided in the contract, the contractor shall prepare and conduct all any claims made under the policies affected by it pursuant to this clause of insurance and all monies payable by the insurers shall be paid to the contractor. The Purchaser shall provide to the contractor all such reasonable assistance as may be required by the contractor. With respect to the insurance claims in which the Purchaser's interest is involved, the contractor shall not forfeit, give up, release or make any compromise with the insurer without the prior written consent of the Purchaser. With respect to the insurance claim in which the contractor's interest is involved the Purchaser shall not forfeit, give up, release or make any compromise with the insurer without the prior written consent of the contractor.
- (j) Wherever damage/loss of equipment/material (partial/full) occurs, the contractor shall be entitled to the payments of all the claims received from the insurance agency. It would be the responsibility of the contractor to repair/replace the damaged/lost equipment/materials with any agreed additional liability to the Purchaser.

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4.97 MEASUREMENT OF ENERGY AND METERING

4.97.1 Metering Systems:

The Contractor shall maintain the Metering System (which shall include ABT / TOD IEGC compliant meter, current and potential transformers and metering equipment). The Metering System will be designed and installed conforming to requirements of State utility so as to measure outgoing energy and power delivered by the solar power project to the delivery point, i.e., point of inter connection and also for the import of energy for any purpose. Metering equipment shall comply with the requirements of State Utility Grid Code but shall not be inferior to 0.2s accuracy Class. Meter reading shall be done jointly with Purchaser's representative and/or Distribution Licensee's representative on monthly basis or at mutually agreed time interval. The meters should be compliant to data transfer to SLDC as per their requirement.

In addition to the above, at the outgoing of plant a separate metering system is required to be installed.

4.97.2 Testing of Meters

The Purchaser shall have the right to carry out inspections of the Metering Systems from time to time to check their accuracy.

All testing and metering equipment shall conform to the relevant IS / AEGCL / DISCOM standards.

If either the Contractor or the Purchaser finds any inaccuracy in the Metering System, the Contractor or the Purchaser, as the case may be, shall notify the other party in writing within 24 hours for a joint inspection and testing from DISCOM/ or other concerned agency.

4.97.3 Sealing and Maintenance of Meters

The Metering System shall be sealed in the presence of both parties or in the presence of DISCOM's Engineer. The calibration of the same shall be done as per the frequency/ requirement specified by AEGCL.

When the Metering System and/or any component thereof is found to be outside the acceptable limits of accuracy or otherwise not functioning properly, it shall be repaired, re-calibrated or replaced by the Contractor on priority.

Breaking of meter seals shall not be done except in case of any requirement by State power utility for testing/calibration. Even in such case the Contractor shall immediately inform the Purchaser of such requirement to enable Purchaser for deputing its representative. All testing/calibration of the metering system shall be done by State power utility officials only.

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**4.98 SUBMISSION OF DAILY & MONTHLY GENERATION DATA STATEMENT**

A daily report comprising energy generation, grid availability, breakdowns, generation hours, low solar insolation hours, performance ratio, solar system availability etc. shall be sent through e-mail and /or made available through Customer Relation Manager (CRM) to Purchaser.

Monthly Generation data statement for net energy delivered to the Utility duly certified by their authorized official shall be furnished to Purchaser by the Contractor not later than 10th day of the following month/ as per state utility practice.

The Contractor shall coordinate with the DISCOM's/required agencies for revenue realization.

4.99 CONTRACTOR'S OFFICE AT SITE

During the execution of the O&M contract, the Bidder shall ensure a responsible person with authority to take decisions to be available at site(s). Such person deputed by the Contractor shall report to the PMC's Site in-charge, for smooth operation and timely addressing of breakdown. The Contractor shall also provide and maintain a site office, at the site, for the use by the Purchaser / its PMC / representative. Such an office shall be open at all reasonable hours to receive instructions, notices or other communications. The Contractor shall be responsible for any misconduct/indiscipline by his employees or sub-Contractor/agent employee's. The Contractor shall abide by the instructions of the engineer in charge, if given in this regard. Contractor shall construct/provide a dedicated storeroom to maintain minimum spare, tool & tackles as specified in BRS-16 & BRS-17.

4.100 POWER OF ENTRY

In case the Contractor does not execute the work in the manner described in the contract documents or if he shall at any time in the opinion of the Engineer-in-Charge:

- (i) Fail to operate & maintain the plant in conformity with contract document or
- (ii) Substantially suspend work or the works for a continuous period of 15 days without permission from the Engineer-in-Charge, or
- (iii) Fail to carry on and execute the works to the satisfaction of the Engineer-in Charge, or
- (iv) Commit or suffer or permit any other breach of any of the provisions of the contract on his part to be performed, or
- (v) If the Contractor abandons the works, or
- (vi) If the Contractor during the continuance of the contract becomes bankrupt.

In any of such events, the Purchaser shall have the power to enter upon the works and take possession of the plant, materials, spares, equipment, tools and stocks thereon, and to revoke the Contractor's license to operate the plant by his agents, other contractors or workmen.

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**4.101 HANDING OVER THE PLANT AFTER EXPIRY OF TERM**

In the beginning of last year of expiry of term & extension of term as the case may be, the Contractor shall hand over the plant to the Purchaser in operationally fit and running condition. The Contractor shall demonstrate performance ratio test along with the associated major & critical equipment to ensure that plant is operational and in good running condition in accordance with the norms of original equipment manufacturer. While handing over the plant, the Contractor shall hand over all technical documents, literature, and instruction manuals, lists of spare parts & tools & tackles. The Contractor will also hand over all the relevant record/documents.

4.102 DEFECTS / NON-ACHIEVEMENT PLANT DEPENDABLE CAPACITY AFTER HANDING OVER

In order that the Contractor could obtain a Handing Over certificate, he shall rectify any defect / non achievement of plant dependable capacity in accordance to the norms of manufacturer arising from the defective Operation & maintenance practices or noncompliance of Prudent Utility Practices or that may have been noticed or developed during/ after the plant has been taken over, the period allowed for carrying out such works will be normally one month. If any defect could not be remedied or plant dependable achievement capacity in accordance with the norms of manufacturer could not be achieved within a reasonable time the Purchaser may proceed to do the work at Contractors' risk and expense and deduct from the final bill such amount as may be decided by the Purchaser.

All the aforesaid safeguards /rights provided for the Purchaser shall not prejudice its other rights/remedies elsewhere provided herein and/or under law.

4.103 ANNUAL CUF GUARANTEE & PERFORMANCE RATIO

4.103.1 Contractors are expected to make their own study of solar profile and other related parameters of the area & make sound commercial judgment about Performance Ratio (PR) to determine the performance ratio. It shall be the responsibility of the bidder to access the corresponding solar insolation values and related factors of solar plant.

4.103.2 The Contractor should quote Performance Ratio (PR) and CUF considering specified monthly/annual irradiance and annual degradation of proposed PV module in BRS 10 for project.

4.103.3 The Contractor shall be required to install energy meters (Import and Export) to record the energy generated and exported from the solar plant and energy imported from the system.

4.103.4 The Contractor shall be responsible for achieving the CUF and Performance Ratio. For any shortfall in achieving the CUF, the compensation shall be recovered from the Contractor on an annual basis. The successful bidder must maintain the Solar Plant equipment(s) including its repair, replacement, overhauling, etc., so as to give the agreed CUF per year, for which Purchaser shall pay the agreed O&M charges only and no other charge / cost is payable by Purchaser.

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4.103.5 In case the net delivered energy recorded is less than guaranteed CUF within first year, then Contractor shall be allowed to relocate the solar modules and install at different places at their own cost ensuring guaranteed CUF . The entire cost including cost of development of land, dismantling and re-erection, etc. shall be borne by the Contractor. To ensure guaranteed CUF, the bidder shall also be allowed to erect an additional number of solar modules without extra cost to the guaranteed CUF.

4.103.6 The performance of the Solar Power Project shall be evaluated on an annual basis. In case of shortfall in guaranteed CUF shall be recovered as per compensation clause no. 4.105

4.103.7 The Purchaser reserves the right to perform random audits of weather monitoring system of the plant anytime during the entire O&M period.

4.104 SHORTFALL IN GENERATION OF SOLAR PROJECT

4.104.1 For each Contract Year, the Contractor shall demonstrate “CUF” at the Metering Point as compared to the guaranteed CUF for the particular year (calculated as per the methodology given in Annexure VIII).

4.104.2 If for any Contract Year, it is found that the Achieved CUF is less than guaranteed CUF for the particular year, the Contractor shall pay the compensation to Purchaser equivalent to tariff fixed by Regulator. The same shall be recovered from payments yet to be made by Purchaser to the Contractor and/or from the bank guarantees available with Purchaser.

4.104.3 In case of any defect in the system after Commissioning, the Contractor shall repair it within forty-eight (48) hours. After 48 hours, The loss of generation shall be calculated with respect to the guaranteed CUF of that particular year.

4.104.4 In event of loss of generation (Guaranteed CUF – Achieved CUF) in kWh shall be charged at the rate of applicable tariff for the project.

4.104.5 In case the Project fails to generate any power continuously for one (1) month any time during the O&M period, it shall be considered as an “Event of Default”.

4.104.6 Upon occurrence of any Event of Default mentioned in Clause 4.104.5 herein above, Purchaser shall have the right to encash the entire amount of CPG/OPB submitted by the Contractor and withheld any other pending payment. The Purchaser reserves the right to perform random audits of the weather monitoring system of the plant anytime during the entire O&M period. If any discrepancy is found between the measured parameters, the difference between the measured parameters by Purchaser from secondary sources and the weather monitoring system installed by the Contractor at the site will be factored in calculating the adjusted CUF during the entire year. However, Purchaser will have the final authority to decide on this matter.

4.105 COMPENSATION AGAINST POOR PERFORMANCE

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4.105.1 Compensation on account of Under Performance

At the time of the Operational Acceptance Test, any shortfall in the Performance Ratio (PR) as determined through the Test Procedure in the **Annexure VIII: “Procedure for Performance Testing”**, will not attract any immediate compensation and contractor shall be allowed for necessary system modification to achieve the guaranteed results. Purchaser shall allow to demonstrate the test again till successful completion of OAT, within maximum period of three months from the date of commissioning.

Upon expiry of three (3) months for the PR demonstration, any shortfall in the Performance Ratio (PR) as determined through the PR Test Procedure shall attract compensation as specified in the Annexure VIII of tender document.

4.105.2 Performance Guarantee Test / Final Acceptance Test

- (a) If the “Achieved CUF” at metering point is less than the Guaranteed Energy (Corresponding to CUF quoted for 1st year of O&M) based on the procedure mentioned in the Annexure VIII, then the compensation as per tariff fixed by the Regulator shall be charged for the shortfall for the first year.

Illustration for Project Capacity: 25 MW

A: Guaranteed Annual CUF

B: Achieved CUF

C: $25 \times 8760 \times 1000 \times A$

D: $25 \times 8760 \times 1000 \times B$

Energy Loss: $(C - D)$

Revenue loss = Energy Loss x Tariff of the project

A: 21% for 25 MW solar project

B: 19.5% for 25 MW solar project

C: 45990000 kWh

D: 42705000 kWh

Energy Loss = 3285000 kWh

Revenue Loss assuming tariff @INR 3.92 = 12877200 Rupees

- (b) Based on the CUF results of the first year of operation, contractor shall have to compensate the Purchaser for the first year’s energy loss and then shall have option either to compensate Purchaser for balance 24 years based on Net Present Value (Discounting rate of 10%) of loss of revenue or addition of DC capacity by the contractor on its own cost to ensure guaranteed CUF for next years. The chosen option has to be exercised within 3 months.
- (c) Similar every year, performance shall be evaluated from second year onwards wherein guaranteed CUF shall be required to be achieved by the end of respective year. In case of non-achievement compensation against poor performance shall be levied as explained (a)above.

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**4.106 LIMITATION OF LIABILITY**

Except in cases of criminal negligence or willful misconduct or except otherwise provided for specifically elsewhere in tender document: -

- a) The contractor shall not be liable to the Purchaser, whether in contract, tort or otherwise for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits, provided that this exclusion shall not apply to any obligation of the contractor to pay liquidated damages/penalty to the Purchaser and;
- b) The aggregate liability of the contractor to the Purchaser, whether under the contract in total or otherwise, shall not exceed the 70% of total O&M contract price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or to any obligation of the contractor to indemnify the Purchaser with respect to patent infringement.

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SECTION – V (A)

SCOPE OF WORK

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SECTION – V (A)

SCOPE OF WORK

(DESIGN, ENGINEERING, SUPPLY, ERECTION & COMMISSIONING)

The Scope of Supply covered under this specification shall be but not limited to the following:

5.1 DESIGN, MANUFACTURING & SUPPLY

Land Development, Design, engineering, manufacture, procurement & supply of equipment, and materials, testing at manufacturers works, inspection, packing and forwarding, supply, unloading at site, associated civil works, services, permits, installation and incidentals, insurance at all stages, erection, testing and commissioning of ground mounted 25 MWac Solar PV Power Project at proposed location of APGCL in the state of Assam with Comprehensive Operation & Maintenance for 5 years.

The equipment and materials for 25 MWac Solar PV Power Plant with associated system (Typical) shall include but not be limited to the Supply, Erection, and Testing & Commissioning of the following:

- (i) Solar PV modules include mounting frames, mounting structures, foundation bolts and nuts for holding structures and module inter connection.
- (ii) Array Junction boxes/ String combiner Box with surge protection and monitoring system, DC Power Interfacing Panel, if applicable
- (iii) Distribution boxes and fuse boxes. MCCBs, Surge Arrestors
- (iv) Inverters with SCADA and monitoring system.
- (v) Weather Monitoring system to check Solar Irradiation, Wind Speed & Module Temperature and humidity.
- (vi) LT (A C) distribution box with LSIG protection, Plant Monitoring Desk, DC Distribution board for DC supply for plant.
- (vii) Digital Voltage and Ammeter, kWh meters. Metering instrument and protection relays along with battery system.
- (viii) DC cable (Copper) for interconnection between equipment including end terminations and other required accessories for DC portion of plant.
- (ix) Control Cables (copper) including end terminations and other required accessories.
- (x) AC Power Cables (Aluminum) including end terminations and other required accessories for AC side of plant.
- (xi) Battery and Battery charger.
- (xii) Data acquisition system with remote monitoring facilities.
- (xiii) Lighting arrestors.

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- (xiv) PVC pipes and accessories/trenches.
- (xv) Metering set and protection /Isolation systems at both ends of line,
- (xvi) Earthing system for PV Array structure, DC power system, Lightning protection system, AC power supply, transformer, SCADA, LT panel, fencing of all equipment.
- (xvii) Adequate number of security equipment such as IP night vision, Industrial grade CCTV cameras, IR motion sensors etc.
- (xviii) Fire protection and firefighting equipment, Fire extinguishers, Danger Plates, Name Plate etc.
- (xix) ABT Metering Set with CT- PT Set having accuracy of 0.2s class (Metering Cubicle) with Main & Check Meter at solar plant and at switch yard in line with Assam Grid code.
- (xx) Suitable number of LED streetlight at periphery boundary of the solar project area.
- (xxi) Transportation of equipment from Works to Site.
- (xxii) Unloading, Loading of all supplied Equipment
- (xxiii) Control room equipment (SCADA & UPS) related to solar system etc.
- (xxiv) Testing, maintenance and condition monitoring equipment.
- (xxv) Mandatory spares & spares for as indicated BRS 16
- (xxvi) Suitable water piping lines to make permanent arrangement for module washing and their drainage,
- (xxvii) Approved Size Name Board to be fixed at Entry point of Solar Plant of approved design.
- (xxviii) Supply and providing of suitable illumination system having LED fixtures for control room, inverters Room, outside to these buildings etc.
- (xxix) Any other equipment / material required to complete the 25 MW Solar Power Plant on a turnkey Basis.
- (xxx) Design of 25 MW Grid Interactive Solar Power Projects and its associated electrical & mechanical auxiliary systems includes preparation of single line diagrams and installation drawings electrical layouts, erection key diagrams, electrical and physical clearance diagrams, design calculations for Earth- mat, Bus Bar & Spacers indoor and outdoor lighting / illumination etc. design memorandum and other relevant drawings and documents required for engineering of all facilities within project area to be provided under this contract, are covered under Bidders scope of work.
- (xxxi) Pooling / main substation of suitable capacity for evacuation of power.
- (xxxii) 33 kV underground cable laying from Pooling / Main Substation to power evacuation substation.

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(xxxiii) 33 kV Bus shall have Sectionalizing scheme having 1 (One) Bus-coupler & 2 (Two) out going feeders (from each Bus section so created) - connected to AEGCL 220/33 kV Grid Substation

(xxxiv) Provision of remote terminal unit.

(xxxv) A bay control unit, similar to those provided in the existing 220/33 kV substation at AEGCL substation needs to be provided by contractor (along with necessary Civil works). The CRP with directional O/C E/F relays shall be used.

(xxxvi) SCADA Server for site and type of server mentioned in specification.

(xxxvii) Main control room shall be provided by the bidder including office room, panel room, SCADA room, battery room, toilets, kitchen, small conference room.

5.2 WEATHER MONITORING STATION (WMS)

One Solar Observatory includes testing facilities at project site is included in the scope. The Solar Observatory with associate system shall include but not be limited to the following: -

- ❖ Pyranometer – Horizontal and Tilted (1 Set).
- ❖ Anemometer (wind speed and wind direction).
- ❖ Ambient Temperature & Relative Humidity sensor.
- ❖ Module temperature sensor.
- ❖ Data logging System

The pyranometer shall be installed at the top of the control room or any other suitable location to avoid discrepancy in data recording. The recording/reading of this pyranometer shall be considered for PR and its compensation calculations.

In addition to the above, the Contractor is required to measure the Solar Radiation and other climatic conditions. The major categories of site-specific assessment required are:

- Annual Cumulative Solar Irradiation
- Global Horizontal Irradiation (“GHI”)
- Diffuse Horizontal Irradiation (“DHI”)
- Sunshine Duration
- Temperature & Humidity
- Wind Speed

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5.3 CIVIL WORKS

Civil Works shall be performed with respect to the following but not limited to:

- Site grading, levelling, clearing of vegetation, or any other civil work.
Design and construction of foundation for module mounting Structures, Modules, all electrical equipment, Transformer platform and allied equipment.
- Internal road and pathways, drains and cable trenches.
- Equipment foundations
- Water treatment plant including tube well for cleaning of Modules Water Storage Tank, Sewage & Drainage System. Treated water quality shall match the potable water quality (IS 10500).
- Provision of drainage system to prevent water logging in the plant premises.
- Civil foundation work of for AC Distribution Board, DC distribution Board
- Switchgears, Solar Road lights
- Chain link Fencing of project boundary (one side only) wherever applicable.
- Watch towers as applicable.
- All foundations should be designed as per seismic Zone and other parameters of the location offered.

5.4 ERECTION WORK

Erection Work shall be performed with respect to the following but not limited to:

- Solar PV Array, Inverters, all associated and allied equipment of solar plant
- Power and control Cables.
- Entire GI cable tray inside control room building.
- Fabrication, supply & erection of cable trays, support, brackets and accessories in case of site fabrication cable tray.
- Galvanized steel rigid/flexible conduits and accessories, Hume pipes, ferrules, lugs, glands, terminal blocks, galvanized sheet steel junction boxes, cable fixing clamps, nuts and bolts etc. as per requirement and site-specific conditions.
- Supply of necessary steel materials for field fabrication of cable trays, supports, brackets, grounding system etc.
- Fencing wall as required and specified in Appendix I.

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**5.5 PRE-COMMISSIONING & COMMISSIONING**

Pre-commissioning & Commissioning of all supplied Equipment. Test running of Grid Connected Solar Power Plant as well as load trials at site, prior to handover and implementation of O&M contract.

5.6 OTHER ASSOCIATED WORKS

Any other items not specifically mentioned in the specification, but which are required for erection, testing and commissioning and satisfactory operation of the solar power plant are deemed to be included in the scope of the specification unless specifically excluded on turnkey basis.

5.7 LAND DEVELOPMENT

The EPC Contractor shall be responsible for making the site ready by clearing bushes, felling of trees (as required), levelling of ground (wherever required) etc. for commencing the project.

5.8 MAIN POWER, UTILITY AND WATER ARRANGEMENT

Construction Power & Water as required for this contract are to be arranged by the Bidder.

5.9 OPERATION AND MAINTENANCE

Please refer Scope of Work specified at Section-V(B).

5.10 MISCELLANEOUS WORKS

This order is on turnkey Basis so all equipment & item which are not specifically mentioned but are required for completion of work including commissioning, of Solar Photovoltaic Power Projects, in every respect and for safe and efficient operation and guaranteed performance are included in scope of supply without any extra cost.

5.11 DOCUMENT AND DRAWINGS

Submission of following documents drawings data design and engineering information to Purchaser or its authorized representative for review and approval in five copies.

- (i) Detailed technical specification of all the equipment
- (ii) Design criteria for civil and electrical.
- (iii) Design calculations.
- (iv) General arrangement an assembly drawing.
- (v) Contour plan for the area.
- (vi) Solar Insolation Data, Solar Generator Area

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- (vii) Schematic diagram for entire electric system
- (viii) G.A. drawings for all types of structures along with requisite document as specified in 6.28.14.
- (ix) Quality assurance plans.
- (x) Test report (for type, acceptance, and routine tests).
- (xi) O&M Instruction's manuals and its drawings.
- (xii) Design calculation for civil and electrical and hydrological
- (xiii) Shadow analysis report
- (xiv) Energy simulation report (Bankable)
- (xv) EHS plan
- (xvi) Master document list
- (xvii) Drawing for the protection and metering for the entire system.
- (xviii) All drawings shall be fully corrected to agree with the actual "as built" site conditions and submitted to Purchaser after commissioning of the project for record purpose.

5.12 PROJECT AND PROGRESS REPORTING

The Contractor shall forward to Purchaser

- (i) The Schedule for various activities in the form of PERT Chart within a week from the date of detailed work order.
- (ii) Fortnightly site work progress report during construction period

5.13 OPERATION & MAINTENANCE MANUAL

O&M manuals are required to be submitted after commissioning along with completion report/certificate of the project as per clause 4.82.

5.14 QUALITY SPARES AND CONSUMABLES

Contractor should establish a system to maintain an inventory of spare parts and tools, equipment, consumables and supplies for the satisfactory execution of Facility's for all time. A separate storeroom/cabin should be provided at the site.

In order to ensure longevity and safety of the core equipment and optimum Performance of the system the Contractor should use only genuine spares of high-quality standards as recommended by manufacturers (OEM) and specified in BRS 16.

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**5.15 TRAINING**

Employ and coordinate the training of personnel who will be qualified and experienced to execute the Facility and to coordinate operations of the Facility with the grid system.

5.16 RECORDS

During the construction period, the Contractor shall keep the measured daily data at regular intervals and provide the same to Purchaser in electronic form. The right use of the data shall remain with Purchaser. Records of foundation and associated equipment installation are to be maintained at site to vigil by Purchaser and PMC. All related standard operating procedures shall be available on site.

5.17 SCHEDULING AND FORECASTING

Scheduling and forecasting process is now required to be implemented in the Solar Sector as the Central Electricity Regulatory Commission (CERC) have notified a Regulation named Indian Electricity Grid Code Regulations (IEGC), 2010 on April 28, 2010 for helping and maintaining the Grid discipline and also formulate rules related to the operating parameters of the Indian Grid across the country. CERC has also issued IEGC Regulations, 2010 under clause (h) of subsection (1) of Section 79 read with clause (g) of sub-section (2) of Section 178 of the Electricity Act, 2003. As per CERC Order dated 16th January 2013 the implementation date has been fixed as 1st July, 2013. AERC vide their order dated 06.09.2018 has notified that Deviation Charges specified in the Regulations. As specified elsewhere in the Contract documents, to comply with statutory requirements, Regulations, Orders, Bidder would be responsible for developing suitable infrastructure compatible to transfer data to SLDC or any other statutory bodies for this purpose.

The successful bidder shall provide data required for S&F on behalf of Purchaser for entire solar PV capacity however, bidder shall not be responsible for any financial implications on account for DSM charges, QCA fee and Bank Guarantees to SLDC.

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SECTION – V (B)

SCOPE OF WORK (OPERATION & MAINTENANCE)

5.18 OPERATION AND MAINTENANCE SCOPE

- 5.18.1 Purchaser intends to entrust the operation and maintenance (O&M) of the 25 MW solar Project including HT underground cable laying from pooling /Main substation to AEGCL's 220/33kV substation (Power evacuation) on comprehensive basis to the Contractor on turnkey basis for 5 (five) years from operational acceptance test of respective site.
- 5.18.2 Deployment of Engineering and supporting personnel and regulation of their Duties.
- 5.18.3 Deployment of Security personnel and regulation of their Duties.
- 5.18.4 Maintain and monitor security surveillance system.
- 5.18.5 Successful running of Solar Power Plant for optimum energy generation.
- 5.18.6 Monitoring, controlling, troubleshooting, maintaining of records, registers.
- 5.18.7 Supply of all spares, consumables and fixing/application, inverters indoor panels, MCCBs, CTs, PTs, Bus bars, cables terminals kits, Isolators with earth switch, LAs, Flood lights, Street Lights along with battery replacement and all other associated equipment of solar plant etc., for a period of Five (5) years. The cost of these items (including Cost of spares) shall be included in the price quoted for O&M. Purchaser shall pay only O&M charges.
- 5.18.8 Supply & use of consumables throughout the maintenance period as per recommendations of the equipment manufacturers.
- 5.18.9 Conducting periodical checking, testing, overhauling and preventive action.
- 5.18.10 Daily General Check-up keeping includes cleaning of all equipment, building, amenities roads, Solar Photovoltaic land area etc.
- 5.18.11 Submission of periodical reports to Purchaser on the energy generation & Operating conditions of the solar plant.
- 5.18.12 Taking care of the full security aspects of the Solar Power Plant.
- 5.18.13 Replacement of damaged modules immediately during O&M period
- 5.18.14 Replacement of faulty Inverters and all types of Battery used in solar plant time to time if required.
- 5.18.15 Regular module cleaning to achieve desired generation.

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5.18.16 Vegetation cleaning in the project boundary

5.18.17 Insurance claim assistance covering all risks (Fire & allied perils, earthquake, terrorists and Burglary).

5.18.18 Spare of SCADA System, its HMI and all the field instruments.

5.19 GENERAL

5.19.1 To maintain at the Facility accurate and up-to-date operating logs, records and monthly reports regarding Operation & Maintenance of the Facility.

5.19.2 To perform or contract for and oversee the Performance of periodic overhauls or maintenance required for the Facility in accordance with the recommendations of the original equipment manufacturer.

5.19.3 To maintain and up-keep the control room, all internal roads, tool room, stores, equipment, etc. in workable condition.

5.19.4 To discharge obligations relating to retirement/ Superannuating benefits to employees (of the contractor) or any other benefit accruing to them in the nature of compensation, bonus / in addition to salary, etc. for the period of service with the Contractor.

5.20 REPORTS OF OPERATION AND PERFORMANCE MONITORING

A daily report comprising energy generation, breakdowns, generation hours etc. shall be sent through e-mail and /or made available through CRM to Purchaser.

Monthly performance of plant on the following parameters shall be prepared and submitted to Purchaser on or before 10th of succeeding month:

- (i) Daily generation data inverter wise and total
- (ii) Details of preventive maintenance activities carried out during the month.
- (iii) Breakdown details along with remedial actions taken.
- (iv) Break up of down times – Technical & Non-Technical
- (v) Error trend
- (vi) Component failure details
- (vii) Weather station data
- (viii) Module cleaning and vegetation cleaning details

Annual report of Solar plant will also be prepared on above points shall be submitted in the month of April every year. Purchaser at its discretion may get the performance checked from an independent technical consultant.

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**5.21 PREVENTIVE MAINTENANCE**

- 5.21.1 The Contractor shall draw the preventive maintenance schedules for daily, monthly and yearly and attend to the breakdowns and a copy of such Preventive Maintenance Schedule shall be submitted to the Purchaser.
- 5.21.2 The Contractor shall carry out the periodic/planned maintenance as given in the manufacturer's service manual and perform a minimum of two certified services per annum. Such program for all the equipment shall be prepared as per operating manuals of manufacturer's and shall be implemented in letter and spirits.
- 5.21.3 Regular periodic checks of the inverter & modules shall be carried out as a part of routine preventive maintenance. In order to meet the maintenance requirements stock of consumables is to be maintained as well as various spares as recommended by the manufacturer at least for 2 years are to be kept for usage.
- 5.21.4 Schedule maintenance shall be as per OEM schedule/instructions.
- 5.21.5 Maintenance record is to be maintained by the Contractor to record regular maintenance work carried out as well as any breakdown maintenance along with the date of maintenance, reasons for the breakdowns, steps taken for attending to the breakdown, duration of the breakdown etc.
- 5.21.6 The Contractor shall deploy enough manpower at solar project site to carryout work instructions and preventive maintenance schedules as specified. The Contractor shall keep following manpower at site:
- i) Skilled and experienced site-in-charge / Engineer – 1 No shall be available at site during power generating hours & 1 No during non-power generating hours.

Site-in-charge / Engineer shall be B.E / B. Tech. degree holder in Electrical / Electronic Engineering
 - ii) Electricians (ITI passed) – 2 Nos during power generating hours & 1 No for rest of the time each day (i.e. non power generating hours).
 - iii) Tradesmen / Helpers – 5 Nos. for cleaning modules & equipment, upkeeping and other associated works at site.
- 5.21.7 The Contractor will attend to breakdown jobs immediately for repair / replacement / adjustments and restore operations at the earliest during the currency of O&M Contract.
- 5.21.8 The Contractor shall immediately report the accidents, if any, to the Engineer In charge & to all the concerned authorities as per prevailing law of the State showing the circumstances under which it happened and the extent of damage and / or injury caused. O&M Contractor would be solely & fully responsible / liable to pay for any losses/damages/claims, etc. and Purchaser will be fully indemnified for such losses / claims.

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- 5.21.9 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;
- 5.21.10 Employer's Liability Act, 1938; Workmen's Compensation Act, 1923; Industrial Disputes Act, 1947; Employees State Insurance Act, 1948; Contract Labour (Regulations & Abolishment), Act 1970 or any other law relating whereto, and rules made there under from time to time.
- 5.21.11 The Contractor shall at his own expense provide all amenities to his workmen as per applicable laws and rules.
- 5.21.12 The Contractor shall ensure that all safety measures are taken at the site(s) to avoid accidents to his or his Co-Contractor or Owner's Workmen.
- 5.21.13 If in the event of negligence or mal operation by the Contractor's Contractor, any failure of equipment takes place such equipment should be repaired / replaced by a Contractor free of cost within a reasonable period of time.

5.22 STATUTORY & OTHER CHARGES

Post commissioning, all statutory charges like CEIG annual charges, annual meter testing charges, joint certification charges, O & M charges for dedicated transmission line, lease rental charges etc. or any other charges as may be required to be paid to such statutory agencies shall be quoted in the bid as applicable 7 days prior to Bid Closing Date. These charges will be paid by the Purchaser from time-to-time post commissioning of project limited to the amount quoted. For such payment's contractor has to inform one month in advance to the Purchaser. Any penalties claimed by the concerned authorities due to delay in providing information to Purchaser about the same, the penalties shall be borne by/recovered from the contractor.

However, in case any of these charges notified till Bid Closing Date is either not shown /quoted or wrongly quoted in the bid, the same will be deemed to have been included in annual O & M charges and differential amount paid by Purchaser on this account shall be recovered from O & M bills. Any changes in these charges after the Bid Closing Date during the period of O & M will be to the account of Purchaser.

5.23 QUALITY SPARES & CONSUMABLES

Contractor should establish a system to maintain an inventory of spare parts and tools, equipment, consumables, and supplies for the satisfactory operation of Facility's for all time. A separate storeroom should be provided at site.

In order to ensure longevity and safety of the core equipment and optimum Performance of the system the Contractor should use only genuine spares of high-quality standards as recommended by manufacturers (OEM). The contractor shall construct a dedicated storeroom to maintain minimum spare, tool & tackles as specified in BRS-16 & 17.

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**5.24 TOOLS AND TACKLES**

The Contractor shall arrange for all the necessary tools and tackles including crane for carrying out all the maintenance work covered under this contract. List of tool tackles available in the stores /site is to be shared with Purchaser on monthly basis.

5.25 SECURITY SERVICES

The Contractor shall arrange proper security system by mean of CCTV (Industrial grade) surveillance including deputation of security personnel at his own cost for the check/ vigil of the solar plant.

5.26 RECORDS

During the O&M period, the Contractor shall keep the measured daily data at regular intervals and provide the same to Purchaser in electronic form. The right use of the data shall remain with Purchaser. Records of project maintenance and associated equipment maintenance are to be maintained at site to vigil by Purchaser and its PMC. All related standard operating procedures shall be available at site.

5.27 ONSITE TRAINING

Providing a detailed training plan for all operation, maintenance procedures, which shall after approval by Purchaser, form the basis of the training program. The contractor shall impart training on site to 6 Purchaser engineers in O&M of solar plant and associated equipment for two weeks. The boarding and lodging expenses of the trainees shall be borne by the Owner.

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SECTION – VI

TECHNICAL SPECIFICATIONS

(The specifications are of general in nature)

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SECTION-VI

TECHNICAL SPECIFICATION

6.1. SOLAR SYSTEM AND POWER EVACUATION

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. These specifications are indicative in nature to guide the successful bidder.

- 6.1.1.** Adequate capacity and numbers 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.
- 6.1.2.** Use of equipment and systems with proven design and performance that have high availability track records under similar service conditions.
- 6.1.3.** Selection of the equipment and adoption of a plant layout to ensure ease of maintenance.
- 6.1.4.** 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.
- 6.1.5.** Proper monitoring of synchronization and recording, to ensure availability of power to the grid.
- 6.1.6.** The plant instrumentation and control system should be designed to ensure high availability and reliability of the plant to assist the Contractors in the safe and efficient operation of the plant with minimum effort.
- 6.1.7.** It should also provide the analysis of the historical data and help the plant maintenance people to take up the plant and equipment on predictive maintenance.
- 6.1.8.** System design shall have intelligent protection mechanisms 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.
- 6.1.9.** The basic and detailed engineering of the plant shall aim at achieving high standards of operational performance especially considering following:
- 6.1.10.** SPV power plants 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.

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- 6.1.11. Fixed tilt/Seasonal tilt of SPV arrays such that SPV arrays produce maximum energy.
- 6.1.12. Shadow free plant layout to ensure minimum losses in generation during the daytime.
- 6.1.13. Higher system voltage and lower current options to be followed to minimize ohmic losses.
- 6.1.14. Selection of PCUs with proven reliability and minimum downtime. Ready availability of requisite spares
- 6.1.15. 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.
- 6.1.16. The designed array capacity 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 in the first-year degradation of the modules.
- 6.1.17. 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 meantime between failures and mean time to restore, such that the availability of complete system is assured. The bidder's recommendation of the spares shall be on the basis of established reliability.
- 6.1.18. The bidder shall design the plant and equipment in order to have a sustained life of 25 years with minimum maintenance efforts.
- 6.1.19. 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 contract signing.
- 6.1.20. The specifications and quality assurance plans provided with this bid document are functional ones; any design, specification and QAP 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.

6.1.21. ELECTRICAL EQUIPMENT AND MATERIAL

The equipment and material for 25 MWac Solar Photovoltaic Power Plant with associate system (typical) shall include the following but not be limited to the following: (Only the technical features of major equipment's are described here under).

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6.2. SPV CRYSTALLINE MODULES

- 6.2.1.** SPV Mono crystalline silicon modules to be supplied shall be of reputed make, confirming to relevant standard and included in the ALMM list as per MNRE Approved Models and Manufacturers of Solar Photovoltaic Modules (Requirements for Compulsory Registration) Order, 2019 and subsequent amendments.
- 6.2.2.** The Contractor may use SPV Mono Crystalline modules of 535 Watt or higher capacity (in Wp) modules in appropriate numbers in order to meet the required capacity. Spacing between rows shall be so designed that shadow of one row to next is avoided.
- 6.2.3.** Peak power point voltage and the peak power point current of any supplied module and / or any module string (series connected module) shall not be more than 3% from the respective arithmetic means for all modules and / or for all module strings, as the case may be.
- 6.2.4.** The solar cell shall have surface anti-reflective coating to help in absorbing more-light in all weather conditions.
- 6.2.5.** Each module shall have low iron tempered glass front for strength & superior light transmission. It shall also have tough multi-layered polymer back sheet for environmental protection against moisture with high electrical insulation.
- 6.2.6.** The module frame shall be made of Aluminum or corrosion resistant material that shall be electrically & mechanically compatible with the structural material to be used for mounting the modules.
- 6.2.7.** The solar modules shall have suitable encapsulation and sealing arrangements to protect the silicon cells from the environment. The arrangement and the material of encapsulation shall be compatible with the thermal expansion properties of the Silicon cells and the module framing arrangement / material. The encapsulation arrangement shall ensure complete moisture proofing during life of the solar modules.
- 6.2.8.** Solar module shall be laminated using lamination technology using established polymer (EVA) and Peddler / Polyester laminate.
- 6.2.9.** The PV modules used must qualify to the latest edition of IEC- The contractor shall provide detailed Technical Data Sheets, certificate of STC as per the latest additional of IEC 61215 and IEC 61730 Ed- 2 and as tested by IEC/MNRE recognized test laboratory.

STANDARD	DESCRIPTION
IS14286-1:2019 / IEC61215-1: Ed-1	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1: Technical Specification
IS14286-1-1:2019/ IEC61215-1-1: Ed-1	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of Crystalline Silicon photovoltaic (PV) modules
IEC 61730-1Ed. 2	Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction

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STANDARD	DESCRIPTION
IEC 61730-2 Ed.2	Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing
IEC 61701 Ed.2 & IEC 62716	Salt mist corrosion testing of photovoltaic (PV) modules (Applicable for coastal and marine environment)
IS 17210-1:2019 / IEC TS 62804-1:2015 Ed.1	Photovoltaic (PV) modules - Test methods for the Detection of potential-induced degradation - Part 1: Crystalline silicon under conditions of 85oC/85% RH for minimum 192 hours.
IEC TS 63342	Photovoltaic (PV) modules - Light and elevated temperature induced degradation (LETID) test - Detection
IEC 60068-2	Sandstorm Test
IEC 62716	Ammonia Corrosion Resistant Test
EN 13501-1	Fire Resistance Test
<p>As per the Solar Photovoltaic, 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.</p> <p>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 and subsequent amendments.</p>	

6.2.10. Modules shall be PID-free. Bidder to submit Anti PID/PID resistance certificate of modules as per IEC 62804-2015.

6.2.11. Photo conversion efficiency of SPV Module shall not be less than 20%. The module shall be made of high transmittance glass front surface giving high encapsulation gain.

6.2.12. The PV modules should have the lowest temperature coefficient and positive power tolerance. Negative power tolerance shall not be accepted.

6.2.13. Module rating is considered under standard test conditions; however Solar Modules shall be designed to operate and perform under site conditions.

6.2.14. All materials to be used shall have a proven history of reliability, lightweight and stable operation in external outdoor applications and shall have service life of more than 25 years.

6.2.15. Solar PV Module design shall conform to following requirement:

6.2.15.1. Weatherproof DC rated MC connector and a lead cable coming out as a part of the module, making connections easier and secure, not allowing any loose connections.

6.2.15.2. Resistant to water in grace, abrasion, hail impact, humidity & other harsh environmental factors for the worst situation at site.

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6.2.15.3. The bidder shall also specify minimum guaranteed energy output of Solar PV modules as per the site conditions.

6.2.15.4. PV modules used in solar power plants/ systems must be warranted for their output peak watt capacity, which should not be less than 90% at the end of 12 years and 80% at the end of 25 years.

6.2.16. The fill factor of module shall not be less than 0.70 (typical).

6.2.17. The I-V curve of each PV module with Sl. Nos. shall be submitted along with Modules meeting the required specifications.

6.2.18. Component Specifications

6.2.18.1. The PV Modules shall be Mono-PERC Half Cut with 144 cells minimum

(i) For PV Modules with back sheet, toughened low iron glass with minimum thickness of 4.0 mm for 72 cell module and 3.2 mm for 60 cell modules for mono-crystalline modules.

(ii) In the case of glass-glass Modules, glass thickness on each side shall be minimum of 2 mm. It shall be laminated using a laminator with a symmetrical structure, i.e., heating plates on both sides.

(iii) The glass used shall have transmittance of above 90% and with bending less than 0.3% to meet the specifications.

6.2.18.2. 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	Value
Material thickness	≥ 300 microns
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	> 70 N/cm
Interlayer adhesion strength	> 5 N/cm

6.2.18.3. The Purchaser 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.

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6.2.18.4. 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	Value
Gel content	> 75%
Volume resistivity	> $1 \times 10^{15} \Omega \cdot \text{cm}$
Peeling strength with glass	> 60 N/cm

6.2.18.5. 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.

6.2.18.6. The module frame shall be made of anodized Aluminum, which shall be electrically & chemically compatible with the structural material used for mounting the modules.

6.2.19. Identification and Traceability:

Each PV module shall have an RF identification tag. The following information must be mentioned in the RFID used on each module. This can be inside or outside the laminate but must be able to withstand harsh environmental conditions.

- (a) Name of the manufacturer of PV module
- (b) Name of the manufacturer of Solar cells
- (c) Type of the Cell Mono or Poly
- (d) Month and year of the manufacturer (Separately for Solar cell and module)
- (e) Country of origin (Separately for Solar cell and module)
- (f) I-V curve for the module
- (g) Peak Wattage, I_m , V_m and FF for the module
- (h) Unique Serial No and Model No of the module
- (i) Date and year of obtaining IEC PV module qualification certificate.
- (j) Name of the test lab issuing IEC certificate
- (k) Other relevant information on traceability of Solar cell and module as per ISO 9000 series.

6.2.20. Bidder shall provide data sheet for Solar PV Module (Under Standard Testing Condition) along with their offer as per Guaranteed Technical Particular

6.2.21. The 25 MWac Solar PV power plants shall continuously measure solar radiation, ambient temperature, wind speed and other weather parameters, generation of DC power as well as AC power generated from the plant.

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6.2.22. Bidder shall provide data sheet for Solar PV Module (Under Standard Testing Condition) along with their offer as per Guarantee Technical Particular (Bid Response sheet -11

6.2.23. Warranty

6.2.23.1. PV modules must be warranted with linear degradation rate of power output except for first year (up to 0.55%) and shall guarantee minimum 80% of the initial rated power output at the end of 25 years.

6.2.23.2. The modules shall be warranted for a minimum of 10 years against all material/manufacturing defects and workmanship.

6.2.23.3. The above warranties shall be backed by third party insurance for 25 years in favour of Purchaser.

6.2.24. Approval

6.2.24.1. The Contractor shall provide a commercial datasheet and Guaranteed Technical Particulars datasheet.

6.2.24.2. The Contractor shall provide the 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. The Contractor shall also provide complete test reports and certifications for the proposed module type/ BOM combination. For clarity, the BOM proposed shall be the subset of Constructional Data Form (CDF)'s of all the test reports.

6.2.24.3. The Contractor shall submit a detailed QAP of the Module with list of tests performed during Production supervision, Pre-Shipment Inspection, Laboratory Tests.

6.2.24.4. The Contractor shall obtain the approval of the proposed module make & model prior to manufacturing/ inspection call.

6.2.25. Manufacturing and Inspection

6.2.25.1. The Contractor shall inform the module manufacturing schedule to the Purchaser at least 7 (seven) working days before the start of the proposed schedule.

6.2.25.2. The Purchaser shall perform material inspection at the Manufacturer's factory before the start of the 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.

6.2.25.3. The Manufacturing shall start only after the clearance by the Purchaser after the material inspection.

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- 6.2.25.4. 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 cells shall be used.
- 6.2.25.5. The modules shall be uniformly laminated without any lamination defects.
- 6.2.25.6. The current binding of modules shall be employed so that the current mismatch of modules in a pallet does not exceed 0.1 A. Different colour codes shall be provided on the modules as well as pallet for identification of different bins. A maximum of three nos. of bins will be allowed for each Module rating.

6.2.26. Transportation, Handling, Storage and Installation

- 6.2.26.1. 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.
- 6.2.26.2. 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.
- 6.2.26.3. Modules shall be dispatched in line with the Schedule. The stacked modules, in any case, shall be stacked as per the manufacturer's recommendation only and shall be covered with tarpaulin sheet.

6.3. STRING COMBINER BOX OR ARRAY JUNCTION BOXES

Not Used

6.4. POWER CONDITIONING UNIT

6.4.1. Standards and Codes

Power Conditioning Unit (PCU) shall comply with the specified edition of the following standards and codes.

STANDARD	DESCRIPTION
IS 16211- Part-2	Safety of Power converters for use in photovoltaic power system: Requirements for Inverters
IS/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 61000-3-2	Electromagnetic compatibility (EMC) - Part 3-2: Limits – Limits for harmonic current emissions (equipment input current ≤ 16A per phase)

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STANDARD	DESCRIPTION
IEC 61000-3-3	Electromagnetic compatibility (EMC) - Part 6-3: Limits Limitation of voltage changes, voltage fluctuations and flicker in public low – voltage supply systems, for equipment with rated current ≤16A per phase and not subject to conditional connection
IEC 61000-3-11	Electromagnetic compatibility (EMC) – Part 3-11: Limits – Limitation of voltage changes, voltage fluctuations and flicker in public low-voltage supply system – Equipment with rated current ≤ 75A and subject to conditional connection
IEC 61000-3-12	Electromagnetic compatibility (EMC) – Part 3-12: Limits – Limits for harmonic currents produced by equipment connected to public low-voltage systems with input current >16A and ≤75 A per Phase
IEC/TS 61000-3-5	Electromagnetic compatibility (EMC) – Part 3-5: Limits – Limitation of voltage fluctuations and flicker in low-voltage power supply systems for equipment with rated current greater than 75 A
IS 16169 / IEC 62116 Ed. 2	Utility-interconnected photovoltaic inverters - Test procedure of islanding prevention measures
IEC 61727:2004 Ed. 2	Photovoltaic (PV) systems - Characteristics of the utility interface
IEC 60068-2-1	Environmental testing - Part 2-1: Tests - Test A: Cold
IEC 60068-2-2	Environmental testing - Part 2-2: Tests - Test B: Dry heat
IEC 60068-2-78	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state
IEC 60068-2-30:2005	Environmental testing - Part 2-30: Tests - Test Db: Damp heat, cyclic (12 h + 12 h cycle)
CEA Technical Standards for Connectivity to the Grid Regulations 2007 with 2013 Amendment As per the Solar Photovoltaic, 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.	
Contractor compile the MNRE technical requirements for photovoltaic grid tie inverters to be connected to the utility grid in India.	

6.4.2. Technical Requirements

Parameter	Specification
Rated AC power	As per design
Maximum input voltage	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

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Parameter	Specification
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 66/67 (Outdoor)
DC Injection	<0.5% of rated current
Reactive Power Control	Required

6.4.3. The rated / name plate AC capacity of the PCU shall be AC power output of the PCU at 50°C.

6.4.4. 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.

6.4.5. 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.

6.4.6. Construction

6.4.6.1. Power Conditioning Unit (PCU) shall consist of an electronic three phase inverter along with associated control, protection, filtering, measurement and data logging devices.

6.4.6.2. Every DC input terminal of PCU shall be provided with fuse of appropriate rating and current measurement transducer. The combined DC feeder shall have suitably rated isolators for safe start up and shut down of the system.

6.4.6.3. Type-II surge protective device (SPD) conforming to IEC 61643-11 shall be connected between positive / negative bus and earth.

6.4.6.4. In case external auxiliary power supply is required, UPS shall be used to meet auxiliary power requirement of PCU. It shall have a backup storage capacity of 2 hours.

6.4.6.5. Circuit Breaker of appropriate voltage and current rating shall be provided at the output to isolate the PCU from grid in case of faults.

6.4.6.6. The PCU shall be tropicalized, and the design shall be compatible with conditions prevailing at site. A suitable number of exhaust fans with proper ducting shall be provided for cooling, keeping in mind the extreme climatic condition of the site as

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per the recommendations of OEM to achieve desired performance and life expectancy. The Contractor shall submit CFD analysis for ventilation requirement.

- 6.4.6.7. 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.
- 6.4.6.8. Dedicated communication interface shall be provided to monitor the PCU from SCADA.
- 6.4.6.9. 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 current
 - iv) AC output power
 - v) AC output voltage (all the 3 phases and line)
 - vi) AC output current (all the 3 phases and line)
 - vii) Frequency
 - viii) Power Factor

6.4.7. 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.

6.4.7.1. Standby Mode

The PCU shall continuously monitor the input DC voltage and remain on Standby Mode until it reaches the pre-set value.

6.4.7.2. 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.

6.4.7.3. 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.

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6.4.8. 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

6.4.9. Grid Support Functions

6.4.9.1. 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 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.

6.4.9.2. 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.

6.4.9.3. 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.

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6.4.10. Warranty

The complete Power Conditioning Unit shall be warranted for a minimum of 5 (five) years against all material / manufacturing defects and workmanship.

6.4.11. Tests

6.4.11.1. Type Tests

All the type test certificates as per the standards mentioned above shall be submitted for approval. 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 web link 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.

6.4.11.2. Routine Tests

Routine tests and acceptance tests shall be as per the Quality Assurance Plan (QAP) approved by the Purchaser.

6.5. INVERTER TRANSFORMER AND AUXILIARY TRANSFORMER

6.5.1. Standards and Codes

Inverter transformer and auxiliary transformer, wherever applicable, 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	Dry-Type Power Transformers
IS 2099, IEC 60137	Bushings for alternate voltage above 1000 V
IS 335, IEC 60296	Insulating oil
IS 3639	Fittings and Accessories for Power Transformers

6.5.2. Technical Requirements

Parameters	Inverter Transformer	Auxiliary Transformer
VA Rating	As per system design requirement	
Voltage Ratio	33 kV / 0.8 or 0.6 kV	As per system design
Duty, Service & Application	Continuous Solar Inverter application and converter Duty (Outdoor)	Continuous application

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Parameters	Inverter Transformer	Auxiliary Transformer
Winding	As per system design requirement	
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 the SLD and 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)	3 sec. in line with the existing system	
Short Circuit breaking capacity	26.3kA for 1 sec. in line with IS/IEC requirements for 33kV system.	
Termination	As per system requirement	
Bushing rating, Insulation class (Winding & bushing)	36 kV – porcelain bushings 1.1 kV – epoxy bushings	
Noise level	As per NEMA TR-1	
Loading Capability	Continuous operation at rated MVA on any tap with voltage variation of $\pm 3\%$, 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	

6.5.3. Construction

6.5.3.1. The transformer shall be provided with a conservator top shall be provided with Air cell with prismatic toughened glass oil gauge. The top of the conservator shall be

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- connected to the indicating type cobalt free silica gel breather with transparent enclosure. Silica gel shall be isolated from the atmosphere by an oil seal. Inverter transformers shall be provided with Magnetic Oil Gauge (MOG) with low oil level alarm contact.
- 6.5.3.2. It is the responsibility of the Contractor to ensure that the inverter transformer comply with all the requirements of inverter provided by the inverter manufacture 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.
- 6.5.3.3. The transformer shall be suitable for continuous operation with a frequency variation of $\pm 2.5\%$ from nominal frequency of 50 Hz without exceeding the specified temperature rise.
- 6.5.3.4. 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.
- 6.5.3.5. 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.
- 6.5.3.6. 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.
- 6.5.3.7. 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.
- 6.5.3.8. 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.
- 6.5.3.9. Buchholz relay, double float type with alarm and trip contacts, along with suitable gas collecting arrangement shall be provided.

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- 6.5.3.10. Inverter transformer shall be provided with two numbers of spring-operated Pressure Relief Device (with trip contacts) with suitable discharge arrangement for oil. For Auxiliary transformers, diaphragm type explosion vent shall be provided.
- 6.5.3.11. Filter valve at top the tank and drain cum sampling valve at bottom of the tank shall be provided.
- 6.5.3.12. All external surfaces 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.
- 6.5.3.13. LV and HV cable box shall be provided with disconnecting chamber to facilitate the movement of transformer without disturbing cable box and termination.
- 6.5.3.14. 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.
- 6.5.3.15. Rain hoods to be provided on Buchholz, MOG, Marshalling box & PRD. Entry points of wires shall be suitably sealed.
- 6.5.3.16. 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. Fire-protection for inverter transformer shall be provided in accordance with relevant CEA regulations as amended time to time.

6.5.4. Warranty

The transformer shall be warranted for a minimum of 5 (five) years from the date of commissioning against all material / manufacturing defects and workmanship.

6.5.5. Testing and Inspection

6.5.5.1. 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 a similar transformer by NABL accredited laboratory.

a) Type Tests

- i. Lightning impulse (Full & Chopped Wave) test on windings as per IEC 60076-3 / IS2026-3
- ii. Temperature Rise test at a tap corresponding to maximum losses as per IEC 60076-2 / IS2026-2

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**b) Special Tests**

- i. Measurement of zero-sequence impedance as per IEC 60076-1/IS2026-5
- ii. Measurement of harmonics of no-load current as per IEC 600761/IS2026-1
- iii. Measurement of acoustic noise level as per NEMA TR-1
- iv. Short-circuit withstand test as per IEC60076-5 / IS2026-5

In case the contractor is not able to submit the test reports during detailed engineering, the contractor shall perform type/special tests on one transformer of each rating covered under instant contract conducted at NABL accredited laboratory witnessed by Purchaser and submit the reports for approval.

1. Routine Tests

Each completed transformer shall be subjected to the following routine tests as per the latest edition of IEC 60076 / IS2026-1 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) Separate source voltage withstands test.
- viii) Induced over voltage withstand test Measurement of insulation resistance.
- ix) Marshalling box functional test
- x) IR Measurement on wiring of marshalling box
- xi) Breakdown voltage test on transformer oil as per IS 335
- xii) Oil leakage test on completely assembled transformer along with radiators

2. 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
- v) Breakdown voltage test on transformer oil

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.

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6.6. HT SWITCHGEAR

6.6.1. 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

6.6.2. Technical Parameters

Parameter	Specification
System Parameters	
Highest system voltage	36 kV
Rated system voltage	33 kV
Rated frequency	50 Hz
Number of phases	3
Power frequency withstand voltage	70 kV (r.m.s.)

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Parameter	Specification
Lightning impulse withstand voltage	170 kV (peak)
System fault current	(40kA) As per system requirement
Circuit Breaker	
Type	Vacuum type
Operating duty cycle	O – 0.3sec – CO – 3min – CO
Short circuit breaking current	26.3kA for 1 sec. in line with IS/IEC for 33kV
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), PS, 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

6.6.3. Switchgear Panel

- 6.6.3.1. 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.
- 6.6.3.2. The circuit breakers shall be mounted on horizontally withdraw able trucks with locking facility in SERVICE and TEST positions.
- 6.6.3.3. 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.
- 6.6.3.4. 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.
- 6.6.3.5. 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.

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- 6.6.3.6. 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.
- 6.6.3.7. 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.
- 6.6.3.8. 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. For outdoor panels, degree of protection shall not be less than IP 55. Particular to ensure the following.
- The breaker shall be operated only if it is in SERVICE or TEST position.
 - Movement of the breaker truck between SERVICE and TEST positions shall be possible only if the breaker is OFF.
 - It shall be possible to open the door only when the breaker is in TEST position.
- 6.6.3.9. 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 240V, 50 Hz, single phase AC supply through suitable switch and fuse.
- 6.6.3.10. 240 V, 5 A, SPN industrial socket-outlet with ON/OFF switch shall be provided in each panel.
- 6.6.3.11. 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.
- 6.6.3.12. Gapless, metal-oxide surge arrestors shall be provided between line and earth in cable compartment of the switchgear panel. Suitable lifting hooks shall be provided for each panel.

6.6.4. Circuit Breakers

- 6.6.4.1. 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.
- 6.6.4.2. 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.
- 6.6.4.3. 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. The 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.

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- 6.6.4.4. 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. The 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.
- 6.6.4.5. The motor rating shall be such that it requires not more than 30 seconds for full charging of the closing spring. The 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.
- 6.6.4.6. 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.

6.6.5. Relays

- 6.6.5.1. 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.
- 6.6.5.2. Auxiliary voltage of the relays shall be 220/110VDC used in main substation as per existing system voltages, and for Inverter transformer breaker the aux voltage of relay shall be 24VDC - 220VDC and the relays shall be capable of operating continuously between 70 – 120% of auxiliary voltage.
- 6.6.5.3. All numerical relays shall have an adequate number of freely configurable, optically isolated, Binary Inputs (BI) and potential free Binary Outputs (BO).
- 6.6.5.4. 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 the main outgoing feeder shall have three no. of voltage inputs for Under Voltage/Over Voltage protection.
- 6.6.5.5. All I/O's shall have galvanic isolation. Analog inputs shall be protected against switching surges and harmonics.
- 6.6.5.6. Making, breaking and continuous capacity of the relay contacts shall be adequate enough for the circuits in which they are used.
- 6.6.5.7. 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.

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- 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
 - vii. Differential protection for transformer
- 6.6.5.8. 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
- 6.6.5.9. All numerical relays shall have provision for measurement and storage of electrical parameters such as voltage, current, frequency, active power, reactive power etc.
- 6.6.5.10. 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.
- 6.6.5.11. 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.
- 6.6.5.12. The numerical relay shall have self-diagnostic feature with separate output contact for indication of any internal relay failure.
- 6.6.5.13. The numerical relay shall have RS-232/RS-485/RJ-45/USB ports on the front side for local communication with PC and on rear side for remote communication to SCADA system.
- 6.6.5.14. The numerical relay shall have feature for time synchronization through the SCADA System / networking.
- 6.6.5.15. 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.

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**6.6.6. Instrument Transformers**

- 6.6.6.1. 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.
- 6.6.6.2. Polarity marks shall indelibly be marked on each instrument transformer and at the lead terminals at the associated terminal block.
- 6.6.6.3. Voltage transformers shall be single phase units. Bus voltage transformers shall be housed in a separate panel on withdrawable truck.
- 6.6.6.4. 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.

6.6.7. Earthing

- 6.6.7.1. 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.
- 6.6.7.2. The earth bus shall have sufficient cross section to carry maximum fault current without exceeding the allowable temperature rise.
- 6.6.7.3. All non-current carrying conductors of the panel shall be connected to the earth bus.
- 6.6.7.4. 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 AEGCL's Earth conductor.
- 6.6.7.5. 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.
- i. 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.
 - ii. 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.
 - iii. Separate earthing trucks shall be provided for earthing of busbars and incoming/outgoing feeders. The trucks shall have voltage transformer to

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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.

- iv. Interlocks shall be provided to ensure the following.
 - a. It is not possible to rack-in the earthing truck / close the earthing switch when the breaker truck is in SERVICE position.
 - b. It is not possible to rack-in the breaker truck into SERVICE position when earthing truck is connected/earthing switch is in closed position.

6.6.8. Bus Bar

- 6.6.8.1. Bus bar shall be made of copper or Aluminum 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. A bay control unit, similar to those provided in the existing 220/33 kV substation at AEGCL substation needs to be provided by contractor (along with necessary Civil works). The CRP with directional O/C E/F relays shall be used.
- 6.6.8.2. 33 kV Bus shall have sectionalizing scheme having 1 (One) Bus-coupler & 2 (Two) out going feeders (from each Bus section so created) - connected to AEGCL 220/33KV Grid Substation.
- 6.6.8.3. All bus bars joints shall be thoroughly cleaned, and anti-oxide grease shall be applied.
- 6.6.8.4. Plain and spring washers shall be provided to ensure good contacts at the joints and taps. Wherever Aluminum to copper connections is required, suitable bimetallic connectors or clamps shall be used.
- 6.6.8.5. 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.
- 6.6.8.6. Bus bar support insulators shall be made of non-hygroscopic, arc and track resistant, high strength material suitable to withstand stresses due to overvoltage and short circuit current.
- 6.6.8.7. The Contractor shall submit busbar sizing calculation for specified continuous and short time current ratings during detailed engineering.

6.6.9. Measuring Instruments

- 6.6.9.1. All the measuring instruments shall be digital, flush mounting type with communication facility.

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- 6.6.9.2. 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.
- 6.6.9.3. 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)
 - vii. Time Active
 - viii. Time Disabled
 - ix. Time Idle

6.6.10. Wiring and Terminal Blocks

- 6.6.10.1. 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.
- 6.6.10.2. Wire terminations shall be made with solder less crimping type tinned copper lugs, which shall firmly grip the conductor. Insulation sleeves shall be provided at all the wire terminations.
- 6.6.10.3. 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.
- 6.6.10.4. The Contractor shall be solely responsible for the completeness and correctness of the internal wiring and for the proper functioning of the connected equipment.
- 6.6.10.5. 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-flammable material.
- 6.6.10.6. CT and VT secondary circuits shall be terminated on stud type, disconnecting terminal blocks.
- 6.6.10.7. At least 10% spare terminals shall be provided on each panel and these spare terminals shall be distributed on all terminal blocks.

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6.6.11. Warranty

The HT panel unit shall be warranted for minimum of 5 (five) years against all material / manufacturing defects and workmanship.

6.6.12. Testing and Inspection

6.6.12.1. 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 similar equipment by NABL accredited laboratory.

Test	Standard	Relevant IEC Code
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		
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	

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Test	Standard	Relevant IEC Code
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
Electromagnetic Compatibility tests	IEC 61869-3	7.2.5
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 Purchaser.

6.6.12.2. Routine Tests

Routine tests and acceptance tests shall be as per the Quality Assurance Plan (QAP) approved by the Purchaser.

6.7. SOLAR & DC CABLES

6.7.1. Standards and Code

Cable	From	To	Conductor / Insulation	Voltage Rating	Applicable Standard
Solar cable*	Module	SCB	Copper / XLPO	1.5 kV DC / 1.8KV DC	IEC62930 / EN 50618
* Cable used for module interconnection shall also be referred as solar cable.					

Solar cable outer sheath shall be flaming retardant, UV resistant and black in colour.

Solar cable with positive polarity should have marking of red line on black outer sheath.

DC cables shall be single core, Armoured, Flame-Retardant Low smoke (FRLS), PVC outer sheath conforming to IS 7098. DC cable with positive polarity should have a marking of red line on black outer sheath.

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In addition to the 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 meter
- iii. Sequential marking of length of the cable in meters at every meter

6.7.2. Cables shall be sized based on the following considerations:

6.7.2.1. Rated current of module.

6.7.2.2. 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. Maximum voltage drop in a string shall also be as per national electric code.

6.7.2.3. Short circuit withstand capability.

6.7.2.4. De-rating factors according to laying pattern

6.7.3. Warranty

The cables (Solar and DC) shall be warranted for a minimum of 1 (one) year against all material / manufacturing defects and workmanship.

6.7.4. Tests

Routine test and acceptance tests requirements shall be as per IEC 62930/EN 50618 for solar cables and IS 7098 for DC cables.

6.7.5. Installation

6.7.5.1. Cable installation shall be as per IS 1255.

6.7.5.2. Only terminal cable joints shall be accepted. No cable joint to join two cable ends shall be accepted.

6.7.5.3. Solar cables shall be provided with UV resistant printed ferrules and DC cables shall be provided with punched/ embossed Aluminum tags. The marking shall be done with good quality letters and numbers of proper size so that the cables can be identified easily.

6.7.5.4. 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.

6.7.5.5. Solar cables, wherever exposed to direct sunlight and buried underground, shall be laid through Double Wall Corrugated (DWC) HDPE conduits. The size of the conduit or pipe shall be selected on the basis of 40% fill criteria.

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6.7.5.6. Solar cables shall be aesthetically tied to Module Mounting Structure using UV resistant cable-ties suitable for outdoor application.

6.7.5.7. A.C and D.C cables shall be kept in separate trenches. The horizontal and vertical clearances between power and communication cable shall not be less than 300mm.

The Bidder shall provide data sheet for Inverter along with their offer as per Guaranteed Technical Particular (Bid Response Sheet-13).

6.8. AC CABLES

6.8.1. Standards and Codes

6.8.1.1. All AC Cables shall conform to the following standards and codes.

IS 7098	Cross-linked polyethylene insulated PVC sheathed cables, Part 1: For working voltage up to and including 1100 V
IS 7098	Cross-linked Polyethylene Insulated Thermoplastics Sheathed Cables Part 2: for Working Voltages from 3.3 kV up to and Including 33 k

6.8.1.2. 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.

6.8.1.3. 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 Purchaser's approval.

6.8.1.4. In addition to manufacturer's identification on cables as per relevant standard, following marking shall also be provided over outer sheath.

6.8.1.5. Cable size and voltage grade

i. Warranty

All cables shall be warranted for minimum of 1 (one) year against all material / manufacturing defects and workmanship.

ii. Testing

Routine test and acceptance tests requirements shall be as per relevant standards for all cable sizes.

iii. Installation

Cable installation shall be as per IS 1255.

6.8.1.6. LT cable (from inverter-to-inverter transformer) shall laid through RCC cable trench with supports.

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6.8.1.7. 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.

6.8.1.8. 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.

6.9. AUXILIARY SUPPLY SYSTEM

6.9.1. Scheme for Auxiliary supply system shall be submitted by contractor during detailed engineering for the approval by Purchaser.

6.9.2. It shall mainly comprise of auxiliary transformer, AC distribution board(s) (ACDB), Battery & battery charger system, emergency lighting network, Uninterrupted power supply (UPS), distribution cables and metering & protective devices

6.9.3. 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

6.10. LT SWITCHGEAR

6.10.1. 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

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Standard / Code	Description
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

6.10.2. Technical Parameters

System Details	
Rated system voltage	415 V ± 10%, 3 Phase, 50Hz, 4 wire, Neutral Solidly Earthed
Digital Multifunctional Meter (MFM)	
Accuracy class	0.5 class for main distribution board at main control room and 0.5 class for DB at inverter room(s)
Communication with SCADA	RS 485 communication with Modbus RTU
Current transformer (CT)	
Type	Cast Resin Bar Primary
Voltage class and frequency	650 V, 50 Hz
CT Secondary Current	1A
Class of insulation	Class F
Accuracy class & burden	
a) For Protection	5P20, 5VA PS Class for REF and core balance CT (CBCT)
b) For Metering	Class 0.5, 5VA (min)
Minimum primary earth fault current to be detected by CBCT	1A
Instrument Security Factor for metering CT	5
Voltage transformer (VT)	
Type	Cast Resin
Accuracy class	0.5
Rated Voltage factor	1.1 continuous, 1.5 for 30 seconds
Class of insulation	Class F

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Moulded case circuit breaker (MCCB)	
Rated voltage	415 V
Release	Thermal-Magnetic/Microprocessor
Rated current	As per system requirement
Poles	4 poles
Rated insulation level	690 V
Rated ultimate and service short circuit breaking Capacity	As per system requirement
Rated Making capacity (as per system requirement)	2.1 x Short Circuit Breaking Capacity
Utilization category	A

6.10.3. Constructional Details

- 6.10.3.1. The panel shall be metal enclosed, free standing, floor mounted, modular type with compartmentalized construction having degree of protection of IP 2X (Indoor) as per IS/IEC 60529. All doors and covers shall be provided with neoprene gaskets to prevent entry of vermin and dust.
- 6.10.3.2. All switches, push buttons etc. shall be operated front and shall be flush/semi-flush mounted.
- 6.10.3.3. 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.
- 6.10.3.4. 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.
- 6.10.3.5. Earthing bus bar of suitable cross section shall be provided throughout the length of panel.
- 6.10.3.6. The panel shall be duly wired with suitable size of 1.1 kV, 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.
- 6.10.3.7. 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 Purchaser.
- 6.10.3.8. The panel shall be of dead front construction suitable for front operated and back maintained functioning.
- 6.10.3.9. 240 V, 5A, 3 pin industrial socket-outlet with ON/OFF switch shall be provided in each panel

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6.10.3.10. 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.

6.10.3.11. Suitable lifting hooks shall be provided for each panel.

6.10.3.12. 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.

6.10.3.13. 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.

6.10.4. Warranty

Distribution panels (ACDB and DCDB) shall be warranted for minimum of 1 (one) year against all material / manufacturing defects and workmanship

6.10.5. Testing

Routine test and acceptance tests requirements shall be as per relevant standards for all cable sizes.

6.11. UNINTERRUPTED POWER SUPPLY

6.11.1. 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

6.11.2. General Requirements

6.11.2.1. The Uninterrupted Power Supply (UPS) system shall be designed to supply power to following loads (but not limited to).

- i. Data logger / SCADA
- ii. Fire Detection / Alarm Panel
- iii. HMI of SCADA
- iv. Emergency Lighting
- v. Inverter's Auxiliary supply (if applicable)
- vi. HT panel auxiliary

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6.11.2.2. 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.

6.11.3. System Description

6.11.3.1. 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. Integrated UPS Communications Protocols capable of communicating with SCADA system

6.11.3.2. 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	0.80
Battery	
Type	Sealed, Maintenance-Free (AGM) battery
Capacity	100% UPS load for 2 hours
Monitoring and communication	

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Parameter	Specification
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 communication	RS-232 & RS-485 Interface Port
Overall efficiency	>90%
Electrical Protection	Input / output under voltage, over temperature, overload, short circuit, battery low trip

6.11.3.3. 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.

6.11.3.4. Contractor shall provide the Operation & Maintenance Manual and mandatory spare parts list along with the equipment

6.11.3.5. UPS shall comprise of 2X100% Parallel redundant Chargers & Inverters, 1 X 100% Lead Acid Plante Battery bank confirming IS 1652 or Ni-Cd battery bank for two (2) hour duty cycle bank, bypass line transformer and CVCF, Static switch, manual bypass switch and 1 X 100 microprocessor-based Battery health monitoring system, 2X100% AC distribution boards, etc.

6.11.3.6. The UPS shall have an overload capacity of 125 % rated capacity for 10 minutes and 150 % rated capacity for 10 seconds. The inverter shall have sufficient capability to clear fault in the maximum rated branch circuit. The sizing of UPS shall be based on the power factor of the loads being fed subject to a maximum of 0.8.

6.11.4. 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.

6.11.5. Tests

6.11.5.1. Routine tests and acceptance tests on final product shall be done as per QAP approved by the Purchaser.

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6.11.5.2. 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.

6.12. EARTHING

6.12.1. 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	Description
IS 3043	Code of Practice for Earthing
IEEE 80	IEEE Guide for Safety in AC Substation Grounding
IEEE 142	IEEE Recommended Practice for Grounding of Industrial and Commercial Power Systems
Indian Electricity Rules	

6.12.2. General Requirements

6.12.2.1. Earthing system shall be designed based on system fault current and soil resistivity value obtained from geo-technical investigation report. Earth grid shall be formed consisting of number of earth electrodes sufficient enough to dissipate the system fault current interconnected by earthing conductors.

6.12.2.2. 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 Earth conductors shall be made of copper bonded steel or galvanized steel of sufficient cross section to carry the fault current and withstand corrosion.

6.12.2.3. 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. Earthing conductor shall be buried at least 2000 mm outside the fence of electrical installations.

6.12.2.4. Earth electrodes shall not be situated within 1.5m from any building whose installation system is being earthed. Minimum distance between earth electrodes shall be two times the driven depth of the electrode.

6.12.2.5. Transformer yard and switchyard fence shall be connected to the earth grid by GS flat and gates by flexible lead to the earthed post.

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6.12.2.6. 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.

6.12.3. Earthing of PV array field

6.12.3.1. All PV Modules, Module Mounting Structures (MMS) and String Combiner Box (SCB) structures in the PV array field shall be bonded to the earthing system by two distinct connections.

6.12.3.2. Each PV Module frame shall be earthed using copper wire of sufficient cross section.

6.12.3.3. The copper wire shall be connected to the earth hole provided in the module frame using suitable arrangement in line with the manufacturer recommendation. The earthing arrangement shall use stainless washers to prevent galvanic corrosion between Aluminum frame and copper wire in order to achieve effective earthing, serrated washers shall be employed to penetrate the anodization layer of the module frame.

6.12.3.4. Continuous copper earthing wire shall be run to connect a group of modules and both ends of the loop shall be bolted to the DC earth grid using bimetallic lugs and stainless-steel fasteners. The copper earthing wire shall be routed in such a way to avoid physical contact with the module Aluminum frame.

6.12.3.5. The connection between MMS and DC earth grid shall be bolted or welded. Portion of the MMS which undergoes welding at site shall be coated with two coats of cold galvanizing and anti-corrosion paint afterwards.

6.12.3.6. Earth electrodes of the DC earth grid shall be uniformly distributed throughout the PV array field so that optimum earth resistance is offered to leakage current flowing from any module frame or MMS.

6.12.3.7. SCB equipment 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.

6.12.4. PCU Earthing

6.12.4.1. 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.

6.12.5. Transformer Earthing

6.12.5.1. Inverter transformer neutral shall be floating, not to be earthed. However, recommendation of inverter manufacturer shall also be taken into account.

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6.12.5.2. Transformer tank, cable box, marshalling box and all other body earth points shall be earthed.

6.12.5.3. 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

6.12.5.4. Neutral and body of the auxiliary transformer shall be earthed.

6.12.6. Local and Main Control Room Earthing

6.12.6.1. Metallic enclosure of all electrical equipment inside the local and main control room shall be connected to the earth grid by two separate and distinct connections.

6.12.6.2. Cable racks and trays shall be connected to the earth grid at minimum two places using galvanized steel flat.

6.12.6.3. SCADA and other related electronic devices shall be earthed separately using minimum two no. of earth electrodes.

6.12.7. Switchyard Earthing

6.12.7.1. The metallic framework of all switchyard equipment and support structures shall be connected to the earth grid by means of two separate and distinct connections.

6.12.8. Tests

6.12.8.1. 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.

6.12.8.2. The earth plate shall be provided to facilitate its identification and for carrying out periodical inspection.

6.13. LIGHTNING PROTECTION SYSTEM

6.13.1. Lightning Protection System (LPS) for entire plant against direct lightning strokes shall be provided as per IEC 62305:2010 or NFC 17-102:2011.

6.13.2. Protection level for the entire plant shall be Level-I.

6.13.3. LPS as per IEC 62305

6.13.3.1. Location of air terminals shall be designed as per rolling sphere method.

6.13.4. LPS as per NFC 17-102

Lightning Protection System shall consist of following accessories.

1. Early Streamer Emission (ESE) air terminal

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2. Highly insulated poly-plastic adaptor to fix the ESE air terminal with the FRP mast
3. Fiberglass Reinforced Plastic (FRP) mast
4. Coupler to connect FRP mast with GI mast
5. Galvanized Iron mast with base plate and guy wire kit
6. Down-conductor: PVC insulated flexible copper cable of suitable size complying with EN 501642 or equivalent standard. It shall be routed along the mast with suitable fixings and connectors
7. Test joint with each down conductor
8. Lightning event counter complying with EN 50164-6 or equivalent standard. It shall be fixed at suitable height in series with the down conductor
9. Earth termination system in accordance with NFC 17-102. Earth electrodes shall comply with the EN 50164-2 or equivalent standard. Earth enhancing compounds complying with EN 50164-7 or equivalent standard, may be used where soil resistivity is higher and making it impossible to achieve system resistance within specified limit.

6.13.5. Accessories listed above are indicative only and any other fittings or accessories, which are usual or necessary for satisfactory operation of the lightning protection shall be provided by the Contractor without extra charges.

6.13.6. Necessary foundation/anchoring for holding the lightning mast in position to be made after giving due consideration to shadow on PV array, maximum wind speed and maintenance requirement at site in future.

6.13.7. The product shall be warranted for minimum of 2 (two) years against all material/manufacturing defects and workmanship.

6.13.8. Type test reports as per IEC 62305:2010 or NFC 17-102:2011 shall be submitted during detailed engineering for approval.

6.14. COMMUNICATION CABLES

6.14.1. Optical Fiber Cables

Optic Fiber 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.

6.14.2. The cable shall have multiple single-mode or multimode fibres on as required basis so as to avoid the usage of any repeaters.

6.14.3. 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.

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6.14.4. The cable core shall have suitable characteristics and strengthening for prevention of damage during pulling.

6.14.5. All testing of the optic fibre cable being supplied shall be as per the relevant IEC, EIA and other international standards.

6.14.6. The Contractor shall ensure that minimum 100% cores are kept as spare in all types of optical fibre cables.

6.14.7. Cables shall be suitable for laying in conduits, ducts, trenches, racks and underground buried installation.

6.14.8. Spliced / Repaired cables are not acceptable. Penetration of water resistance and impact resistance shall be as per IEC standard.

6.14.9. Communication Cable (Modbus)

6.14.9.1. 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.

6.14.9.2. 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).

6.14.9.3. Communication cable shall be laid through underground with suitable HDPE ducts.

6.15. SCADA

6.15.1. General Requirements

6.15.1.1. 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.

6.15.1.2. 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.

6.15.1.3. SCADA System shall have the provision to perform the following features and / or functions:

- i. Web enabled Contractor 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.
- ii. 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

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- interface shall be customizable and enable Report Generation and Graphical Analysis.
- iii. Fault and System Diagnostics with time stamped event logging.
 - iv. 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.
 - v. AI based Distributed Analytics for Predictive Maintenance, trend analysis and Alerts.
 - vi. Generate, store and retrieve user configurable Sequence of Event (SOE) Reports.
 - vii. Interface with different field equipment in the plant and work seamlessly with field equipment supplied by different companies.
 - viii. Transfer of plant data reliably, to a Purchaser designated server or Cloud on any kind of remote network including low bandwidth and wireless links such as 2G/3G/VSAT.
 - ix. The guidelines / norms issued by CEA and CERT-In shall be incorporated in the SCADA system to ensure Cyber Security.

(Note: Telecom Lease line connection, if required for transferring data from Plant over internet shall be taken by Contractor in the name of Purchaser for O&M period) However, the Contractor shall provide a Package/ Split AC of suitable capacity decided by heat load requirement in SCADA room at Main Control Room.

6.15.2. Architecture

- 6.15.2.1. The SCADA System shall be built over Industrial IoT architecture with integrated Analytics, secure web access, enterprise software and Database
- 6.15.2.2. 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 Purchaser).
- 6.15.2.3. Analog and Digital IO modules shall have integrated processor for distributed IO processing and control.
- 6.15.2.4. Data communication systems shall be built over fiber optic cables/ wireless network with high bandwidth TCP/IP communication (Fast Ethernet or 802.11 a/b/g/n) across all Inverter and Control Rooms with Internet/Intranet access at Main Control Room. A firewall shall be provided for network security.
- 6.15.2.5. Plant SCADA Server shall have Industrial Grade server hardware running SCADA & Monitoring Software with data storage (complete plant data) space for 2 years.
- 6.15.2.6. Plant data for monitoring and control operations should be accessible without dependence on external network.

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- 6.15.2.7. A virtual / cloud server running SCADA & Monitoring Software shall be configured 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.
- 6.15.2.8. Contractor 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.
- 6.15.2.9. 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. The SCADA system shall be capable of sending all plant data in real time to the Remote Server.
- 6.15.2.10. 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 communications equipment shall be synchronized to the GPS clock.
- 6.15.2.11. Processor, Communication module and Power supply card/module shall be redundant.
- 6.15.2.12. Redundancy shall be maintained in the data communication system at each level such as network switches, cards, cables etc.
- 6.15.2.13. SCADA Server shall be redundant Industrial Grade server.

6.15.3. Industrial IoT Controllers & Data Acquisition

- 6.15.3.1. The Plant SCADA and Monitoring System may use one or more IoT Controllers at each LCR and MCR for the purpose of data acquisition and data forwarding to the Local and Remote SCADA Servers. The IoT Controllers shall meet the following minimum requirements:
- 6.15.3.2. The IoT Controllers shall be distributed in nature and work independently of other IoT Controllers or any central controller in the system.
- 6.15.3.3. Shall be capable of supporting a wide range of field protocols to communicate with different field equipment (Modbus over RS485/Ethernet, etc.)
- 6.15.3.4. Shall have local storage for a minimum of 2 weeks (in case of network failure).

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- 6.15.3.5. Provide web-based interface to configure the controller for various equipment in the field.
- 6.15.3.6. IO Functionality: Shall support status monitoring of VCBs & Trip relays on RMU / HT & Transformer panels through distributed DI/AI modules.
- 6.15.3.7. Controls: Shall be capable of controlling breakers (ON/OFF). Both ON/OFF and Parameter control of inverters shall be supported.
- 6.15.3.8. 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. Controllers shall be capable of sending data over Internet connections USB data cards.
- 6.15.3.9. Shall not require a static public IP address at the plant for the purpose of remote access.

6.15.4. Functionalities

- 6.15.4.1. 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) instantaneously.
- 6.15.4.2. 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.
- 6.15.4.3. The SCADA system should provide Alarms and Alerts on equipment faults and failures instantaneously. Alarms on status change of hardwired DI shall also be provided.
- 6.15.4.4. The SCADA system shall provide configurable alerts on any parameter crossing settable thresholds. The list of such parameters shall be finalized in consultation with the Purchaser.
- 6.15.4.5. 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:
- i. Surveillance Cameras or security cameras are video cameras used for the purpose of observing an area. They are often connected to a recording device or IP network and may be watched by a security guard or law enforcement officer.
 - ii. Module Cleaning System – For monitoring of water usage and efficacy of cleaning process.
- 6.15.4.6. The SCADA system shall have user-friendly browser-based User Interface for secure access from anywhere, for minimum ten concurrent connections from the Contractor PC or other securely connected laptop/mobile, for plant monitoring,

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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.

- 6.15.4.7. Reporting: The SCADA system shall provide downloadable reports in Excel / PDF, configurable for equipment parameters across the plant.
- 6.15.4.8. The system shall have Configurable Analysis page for self-configured as well as on demand Analytics charts.
- 6.15.4.9. 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.
- 6.15.4.10. Connectivity shall be provided to the Purchaser'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 Purchaser's Central Monitoring System at Guhawati, Assam. 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 Guhawati, Assam
- 6.15.4.11. Mobile User Interface: summary of plant performance and issues should be accessible in a mobile Native UI or browser UI.
- 6.15.4.12. Data Communication to SLDC: SCADA system shall provide required interface to integrate with AEGCL-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 / AEGCL and it shall be the responsibility of the Contractor to determine the same.
- 6.15.4.13. 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.
- 6.15.4.14. 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.
- 6.15.4.15. 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.
- 6.15.4.16. All programming functionalities shall be password protected to avoid unauthorized modification.

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6.15.4.17. The Contractor shall provide software locks and passwords to Purchaser for all operating & application software. Also, the Contractor shall provide sufficient documentation and program listing so that it is possible for the Purchaser to carry out modification at a later date.

6.15.4.18. In future, the requirement of upgradation if any in the hardware and or software of SCADA system and its HMI system (including Operating system, logic software etc., processor/any modules etc.) for 10 years from the date of commissioning shall be in the scope of contractor.

6.15.5. Cable Specifications

6.15.5.1. RS485 & IO Cables shall meet the following minimum specifications: For RS485: 0.5sq.mm ATC multi-strand (class 5), insulated core, twisted pair, overall screened with ATC drain wire, GI wire Armoured, PVC sheathed, DIN47100 colour standard, FRLS, 1.1 kV grade

6.15.5.2. For IO cabling (between HT/RMU panels and SCADA panels) – 1.0 sq.mm multi-strand, 4/8/12 core screened, armoured, FRLS cable, 1.1KV grade.

6.15.5.3. For Optical Cabling: 6F, Armored, Single/Multi mode laid through HDPE conduits to minimize cable breaks.

6.15.6. Earthing

6.15.6.1. Two isolated electronic earth pits near to SCADA panel at every Inverter and Control Room with <1Ohm resistance shall be provided. One earth pit shall be used for protective / body earth and the other to be used for Signal Earth.

6.15.6.2. 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.

6.15.7. Communication Cable Laying

6.15.7.1. All RS485, I/O and CAT6 cables shall be laid in separate conduits with a minimum separation of 1.5ft from AC/DC power cables all along.

6.15.7.2. 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.

6.15.7.3. I/O Cables between switch gear panels and SCADA panels shall be laid on separate cable trays, with a minimum of 1.5ft separation from trays carrying AC Power cables.

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6.15.7.4. 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.

6.15.8. Control Cabinets / Panels / Desks at Main Control Room

6.15.8.1. 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.

6.15.8.2. The cabinets shall be totally enclosed, free standing type and shall be constructed with a minimum of 2 mm thick steel plate frame and 1.6 mm thick CRCA steel sheet or as per supplier's standard practice for similar applications.

6.15.9. Software Licenses

6.15.9.1. The Contractor shall provide a 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.

6.15.10. Hardware at Main Control Room

6.15.10.1. 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.

6.15.10.2. The Local Monitoring & Control Server and the Operating Workstation, to be deployed in the Plant Control Room, shall have the following server hardware and operating system along with accessories:

6.15.11. Plant Server

Server Hardware	Hex / Octal Core Xeon, 32GB RAM (expandable to 64 GB RAM), 4 X 2TB Solid-state Drives 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, windows OS, Oracle / MySQL or equivalent DB), with required AMC for 10 years.
Accessories	Monitor: Min 22" LED Flat Monitor with on-interfaced refresh rate min. 75Hz.
	Keyboard: ASCII type
	Pointing Device: Mouse
	Intelligent UPS (online): Minimum 2-hour battery backup.
Contractor Workstation	
Hardware	i7 CPU running at 3.0 GHz or faster with 8GBRAM, 500GB hard disk, 25" LED monitor, keyboard and mouse, 4 USB ports, LAN port.

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Operating System	Windows operating system with necessary tools, anti-virus software.
Accessories	Screen Display Unit: Min 50" LED Flat Monitor with wall mounted arrangement for the display of SCADA screen
	A4 size monochrome laser printer.
	UPS of required capacity with 2-hour battery backup.

All network components of LAN and Workstations shall be compatible to the LAN, without degrading its performance.

6.15.12. Factory Acceptance Test (FAT)

FAT procedure shall be submitted by the bidder for approval. SCADA shall communicate with all third devices which are part of solar plant and same shall be demonstrated during the FAT.

6.16. POWER EVACUATION SYSTEM AND GRID CONDITION

Bidder shall ensure compliance with the requirements of “Indian Electric Grid Code” 2010 notified by CERC in general & following operating grid condition in particular:

Frequency	: 50 Hertz plus or minus 0.5 Hertz
Voltage	: +10% to (-) 12.5% variation
Maximum asymmetric voltage	: 2% (Phase to ground) for 60 sec.
Maximum asymmetric current	: ± 10% of nominal current
Short circuit rating	: As a part of the detailed design process, the bidder shall calculate the short circuit rating (minimum and maximum), and furnish the information in the bid

The Solar project shall have adequate protection and control to operate in parallel and synchronized manner with State grid. The tolerance limits indicated may, however, be exceeded in actual conditions and all the equipment shall be protected from damages against such exceeding of limits. Inverter should be compliant to fault ride through (FRT), Low Voltage Ride Through (LVRT) requirements. The contractor must 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 Purchaser.

The power evacuation system shall be as per DISCOM / AEGCL requirement and appropriate approval. The contractor shall get route approval from the Purchaser or concerned authorities prior to the start of the construction. Any changes in the route or scheme introduced by DISCOM / AEGCL at any point of the time prior to commissioning shall be complied without any additional cost to the Purchaser.

6.16.1. Overhead Transmission Line (if applicable)

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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 Purchaser for approval / accord.

6.16.2. Underground Cable

In case the power evacuation is planned with underground cable for plant internal evacuation, the cable shall be approved by the Purchaser. However, in case of external power evacuation, the evacuation plan shall be as per DISCOM's requirement and the same shall be submitted to Purchaser for approval / accord.

6.17. ILLUMINATION

6.17.1. Standards and Codes

LED luminaires shall be tested at an 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

6.17.2. General specification

This specification covers design, supply and installation of uniformly Illumination system along the peripheral & internal roads, main control room & inverter rooms, switchyard and other facilities including entry points/gate(s) inside the plant area.

The Contractor shall furnish Guaranteed Technical Particulars of the LED luminaires, from renowned brands available in the market for approval of Purchaser.

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.

6.17.3. Lighting Levels

The average LUX level of 50 lux is to be maintained in switchyard. However, a lux level of 50 lux ((25+25) additional switchable on requirement only) is to be maintained in switchyard on transformer.

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:

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Area	LUX
Control Room and equipment rooms	300
Office	300
Battery & other rooms	250
Internal/Periphery Roads	20
Transformer yard/Switchyard	50
H – pole and metering point	10

The lighting level shall take into account the 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.

LED Luminaire for Outdoor Applications

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)
Luminous 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.
Color Temperature	5700 K (cool day light)
Color Rendering Index	>65
Moisture protection in case of casing damage	IP 65 (driver unit shall preferably be totally encapsulated)

The LED luminaire (outdoor) housing, heat sink, pole mounting bracket, individual LED reflectors and front heat resistant tempered glass should be provided.

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 weather ability. 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.

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The luminaire should be provided with in-built power unit and electronic driver.

The luminaire should be suitable for standard street light poles and should be suitable for side entry and bottom entry (post top).

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.

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.

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.

Junction box for lighting shall be made of fire-retardant material. The degree of protection shall be IP 55 for outdoor junction box

Lighting cables, wherever exposed to direct sunlight, shall be laid through Double Wall Corrugated (DWC) HDPE conduits.

6.17.4. LED Luminaire / Lamps for Indoor Applications

LED luminaire / lamps shall have minimum 3-star BEE rating.

All indoor LED luminaire / lamps shall be supplied with proper diffuser to avoid direct visibility of LED and suitable heat sink for longer life.

6.17.5. Warranty

All luminaires shall be warranted for minimum of 2 (two) years against all material / manufacturing defects and workmanship.

6.18. 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.

6.18.1. Pyranometer

The Contractor shall provide secondary standard / Class A pyranometers (ISO 9060 classification) along with necessary accessories for measuring the incidental solar radiation at horizontal and inclined plane of array.

Specification of the pyranometer shall be as follows:

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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: RS 485

Each instrument shall be supplied with necessary cables. Calibration certificate with calibration traceability to World Radiation Reference (WRR) or World Radiation Centre (WRC) shall be furnished along with the equipment. The signal cable length shall not exceed 20 m. The Contractor shall provide instrument manual in hard and soft form.

6.18.2. Temperature Sensor

The Contractor shall provide a minimum of 2 (two) temperature sensors (1 (one) for ambient temperature measurement with shielding case and 1 (one) for module temperature measurement. The temperature sensor shall be Resistance Temperature Detector (RTD)/ Semiconductor type with measurement range of 0°C to 80°C. The instrument shall have a valid calibration certificate.

6.18.3. Anemometer

The 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	IP 66
Output	RS 232 and RS 485

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6.18.4. Dust Meter

6.18.4.1. Continuous measurement

Dust meter shall measure the soiling loss with optical technology to measure the transmission loss of nearby PV modules due to soiling. It does not need sunlight to make measurements and updates every minute, night and day.

6.18.4.2. Maintenance free

Dust meter has no external or moving parts and, after a simple initial calibration to match the local dust characteristics, no separate maintenance is required. Just clean it at the same time as the surrounding PV modules, whether that is with robots or done manually.

6.18.4.3. Easy integration

Dust meter shall be made from the same materials, and has similar dimensions to, industry standard silicon PV modules. It installs easily in-between, on the side, or on the top of an array. This provides more reliable measurements than stand-alone solutions. it faces shall be exactly the same conditions and collects the same amount of dust and dirt as the modules around it. Dust meter shall have Modbus® RTU RS-485 serial communication for easy connection to plant SCADA systems.

6.18.4.4. Multiple measurement points

Soiling rates can vary across a PV plant depending on wind direction and module location. The cost-effectiveness of Dust meter encourages the installation of multiple units to provide a soiling map of a plant that can inform decisions on when, and where, to clean.

6.18.4.5. Technical Specifications

Transmission Loss (TL) range: Percentage of sunlight that is blocked or scattered in such a way that it does not reach the actual solar cells	0 to 50 %
Soiling Ratio (SR) range	100 to 50 % (SR = 100 –TL)
Transmission loss measurement accuracy	± 0.1 of reading ± 1% (after local dust calibration)
Ambient working temperature	-20 to +60 °C
PV panel temperature sensor	-20 to +100 °C, ± 1 °C
Tilt X and Y	-180 to 180 degrees ± 1 degree
Communication	Modbus® RTU over 2-wire RS-485
Daisy-chain capability	Up to 3 devices in one chain
Power	12-30 VDC, 200-70 mA at 24 V, 500 mA power supply is advised

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Power consumption	< 2.5 Watt
In rush current	10 A for 50 μ s
Glass type	Glass with anti-reflection coating as used for silicon PV modules
IP Class	IP65

6.18.5. Data logger and Data Acquisition System

Data logger for the weather monitoring station should have the following features:

Provision for analog, digital and counter type inputs for interfacing with various type of sensors

- i) Analog Input
- ii) Adequate nos. for all analog sensors with redundancy
- iii) Provision for operation in different current and voltage ranges as per connected sensors Accuracy of +/-0.1% of FS (ii) Digital Input
- iv) Adequate no. of Digital inputs and outputs for the application
- 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

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6.19. SURVEILLANCE / CCTV CAMERA

CCTV Cameras along with monitoring stations (sufficient numbers) and all other accessories required for its proper operation must be installed to have complete coverage of following areas for 24 hours.

- i) Main entry: Covering all the entry/exit
- ii) Along the Plant Perimeter: Covering complete perimeter of Plant Area to capture all possible intrusion
- iii) Control Rooms: Covering Entry / Exit and Equipment Rooms
- iv) Switchyard

Monitoring stations of the CCTV Network shall be installed in Main Control Room.

The CCTV system shall be designed as a standalone IP based network architecture. System shall use video signals from different cameras at defined location, process the video signals for viewing on monitors at control room and simultaneously record all video streams using latest compression techniques.

Camera shall be colour, suitable for day and night surveillance (even under complete darkness) and network compatible.

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.

CCTV camera shall be industrial Grade IP camera, sensor type 1/2.8" Progressive Scan CMOS or better with resolution 1080p HD @25 FPS or better.

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.

6.20. FIRE ALARM SYSTEM

6.20.1. Standards and Codes

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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 CO2 fire extinguishers (trolley mounted)
IS 2546	Galvanized mild steel fire bucket
National Building code 2005	

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.

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 (CO2 and dry powder type)
- iii) Microprocessor based fire alarm panel
- iv) Multi sensor smoke detectors
- v) Hooter cum strobe

Minimum two numbers of fire extinguishers (CO2 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, contractors must comply with existing building code for fire protection and relevant IS codes.

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.

Digital output from the fire detection system shall be integrated with SCADA.

The contractor shall submit the plan for fire and smoke detection system for the Purchaser's approval.

6.21. TESTING INSTRUMENTS

The Contractor shall provide the following set of instruments for on-site testing.

6.21.1. Earth Resistance Tester

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Parameter	Specification
Display	Backlit LCD or LED display
Range	Earth Resistance: up to 2000 Ω
	Earth Voltage: 200 V
Accuracy	\pm (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	

6.21.2. 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	

6.21.3. Insulation Tester

Parameter	Specification
Display	Backlit LCD or LED display
Insulation Test Range	0.1 M Ω to 10 G Ω
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

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Parameter	Specification
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.	

6.21.4. Digital Multi-meter

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 (oC), Continuity, Diode, Capacitance, Frequency, Duty cycle measurement
Accessories	
Temperature Probe	
Silicon Test Lead	
Alligator Clip	
Carry Case with sufficient space for accommodating accessories.	

6.21.5. 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/400A
Voltage range	AC&DC Voltage upto 1000V

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Parameter	Specification
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	
Carrycase with sufficient space for accommodating accessories.	

6.21.6. 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

6.21.7. Digital Lux Meter

Parameter	Specification
Range	0 – 1000 lux
Accuracy	± (2% + 5)
Resolution	1 lux
Display	3½ digits, Backlit LCD/LED

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All testing equipment shall possess valid calibration certificate issued from approved NABL labs.

Instruments of superior rating is allowed after seeking consent of the Purchaser.

Maintenance, calibration, up keeping, repair & replacement of these tools will be in the scope of the Contractor during O&M.

It is Contractor's responsibility to arrange for tools, tackles, logistics, test kits, manpower, experts etc. required for trouble free operation of Plant.

6.22. DC DISTRIBUTION BOARD (DCDB)

DC distribution board shall be provided in between solar array and Inverter. It shall have MCCB of suitable rating for connection and disconnection of array section. It shall have meters for measuring the array voltage and array current. DCDB can also be integrated into INVERTER for space saving.

6.23. CABLES ACCESSORIES

6.23.1. Only terminal cable joints shall be accepted. No cable joints to join two cable ends shall be accepted.

6.23.2. Cables inside the control room shall be laid in suitable Cable Trays of approved type.

6.23.3. Cable terminations shall be made with suitable cable lugs & sockets etc. crimped properly and passed through brass compression type cable glands at the entry and exit point of the cubicles. The panels' bottoms should be properly sealed to prevent entry of snakes / lizard etc. inside the panel.

6.23.4. The terminal end of cables and wires are to be fitted with good quality letter and number ferrules of proper sizes so that the cables can be identified easily.

6.24. METERING ARRANGEMENT:

The bidder shall install metering arrangement in accordance with the prudent practice and complying with the requirement of Assam Grid are in SEMS. Indicative specification is given hereunder:

	Features	Requirement
	Type:	ABT
	Supply System	3 phases, 4 wire
	Voltage:	110 V
	Class of accuracy:	0.2 S
	CT secondary Current	1 Amp
	Features	With TOD features, completely wire with TTB, as per Assam Grid code. Specification and mounted in the panel.

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	Features	Requirement
		Import and Export Energy meter system complete panel
A		1no. complete panel comprising 2 nos. (MAIN + CHECK) Import-Export Energy ABT type meter with TTB's and ABT Meter are in SEMS (Secure Meter, Udaipur) / Equivalent. Panel will be as per Assam grid specification. Meter will be supplied with complete testing and calibration from accredited agency.
C		- Above Package also includes user manual, universal battery charger, RS 432 communication cable, rubber boot, carrying case.
D		Software for meter for downloading of data. (Suitable MRI – Meter Reading Instrument shall be provided.) and also remote monitoring and acquisition of data.

6.25. ERECTION, TESTING & COMMISSIONING

6.25.1. The installation shall be carried out by an electrical contractor holding a valid license as required by the State Government Authorities.

6.25.2. The contractor shall provide necessary drawings and documents required by statutory authorities and obtain the approval before taking up erection. It shall be the sole responsibility of the contractor in obtaining safety certificate / approval from local statutory authorities.

6.25.3. Any modification in the equipment or installation that may be demanded by the inspecting authorities shall be carried out by the contractor at no additional cost to the Purchaser.

6.25.4. In accordance with the specific installation instruction as per the manufacturers drawings or as directed by the Purchaser, the successful Bidder shall unload, assemble, erect, install test, commission and hand over all electrical equipment included in this contract.

6.25.5. Erection materials including all consumables, tools, testing instruments or any other equipment required for successful commissioning shall be arranged by the successful Bidder in a timely manner.

6.25.6. Clearing the site after completion, of erection as well as regular clearance of unwanted materials from site, returning excess materials supplied by the Purchaser back to Purchaser's stores shall also be included under this scope of work.

6.25.7. All equipment and instruments, indoor and outdoor, shall be marked with Numbers and provided with suitable danger boards as per Indian electricity Rules/code etc. before commissioning.

6.25.8. The contractor shall touch up the surface with paint of the same shade for equipment, which are scratched and / or damaged during transportation and erection before commissioning.

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- 6.25.9.** The contractor shall employ skilled and semi-skilled labours for erection, testing and commissioning as required. All the electricians, cable jointers, wiremen, welders and others employed shall possess valid certificates / license recognized by competent authorities.
- 6.25.10.** The contractor shall set up his own facilities at site at the allocated place to undertake fabrication/assembly jobs etc.
- 6.25.11.** The Contractor shall carry out major civil engineering works as called for in scope of work pertaining to electrical equipment's like foundation for modules structures control room rooms for O & M staff etc. as per the latest relevant drawings. For this they may carry out minor civil works such as foundation bolts, cutting holes in walls, chipping of floor and ceiling etc. making good the same after installation of the equipment and any other minor civil works advised by Purchaser for completion of the work has to be carried out without any extra charges.
- 6.25.12.** During erection, care is to be taken to see that painting does not peel off at any place and if so, it has to be given a 'Touch-up' after erection by the contract.

6.26. SPECIFICATION FOR TESTING & COMMISSIONING

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

- 6.26.1.** All electrical equipment shall be tested, installed and commissioned in accordance with the latest relevant standards and code of practices published by Indian Standards Institution wherever applicable and stipulations made in relevant general specifications.
- 6.26.2.** The testing of all electrical equipment as well as the system as a whole shall be carried out to ensure that the equipment and its components are in satisfactory condition and will successfully perform its functional operations. The inspection of the equipment shall be carried out to ensure that all materials, workmanship and installations conform to the accepted design, engineering and construction standards, as well as accepted code of practices and stipulations made in the relevant general specifications.
- 6.26.3.** The contractor in the presence of the representative / PMC of Purchaser shall carry out all tests using his own calibrated instruments, testing equipment as well as qualified testing personnel.
- 6.26.4.** The results of all tests shall conform to the specification requirements as well as any specific performance data, guaranteed during finalization of the contract.

6.27. PREPARATION OF THE EQUIPMENT FOR COMMISSIONING:

- 6.27.1.** After completion of the installation at site and for the preparation of plant commissioning, the contractor shall check all the equipment and installation in accordance with the agreed standards, latest relevant code of practices of Indian

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Standards and specific instructions furnished by the particular equipment suppliers as well as purchaser.

6.27.2. Checking required to be made on all equipment and installations at site shall comprise, but not limited to, the following:

6.27.2.1. Physical inspection Modules for removal of any foreign bodies, external defects, such as damaged, loose connection in Junction Boxes & Inverter etc. loose foundation bolts etc.

6.27.2.2. Check for the free movement mechanism for the circuit – breaker, rotating parts of the rotating machines and devices.

6.27.2.3. Check for tightness of all cable joints and bus bar termination ends as well as earth connections in the main earthing network.

6.27.2.4. Check for clearance of live bus bars and connectors from the metal enclosure.

6.27.2.5. Check for proper alignment of all the modules etc.

6.27.2.6. Continuity checks in case of power and control cables.

6.27.2.7. Checking of all mechanical and electrical interlocks including tripping of breakers using manual operation of relay.

6.27.2.8. Checking of alarm and annunciation circuits by manual actuation of relevant relays.

6.27.2.9. Check and calibrate devices requiring field adjustment/calibration like adjustment of relay setting etc.

6.27.2.10. Check for proper connection to earth network of all non-current carrying parts of the equipment and installation.

6.27.3. The relevant tests shall be carried out in accordance with relevant IS of the latest issue. The tests which are to be carried out on the equipment shall include, but not be limited to, the following:

6.27.3.1. Check for completeness of installation.

6.27.3.2. Each pole to earth insulation resistance test.

6.27.4. Cables

6.27.4.1. Insulation resistance test shall be conducted by Megger for cables rated up to 1.1kV grade.

6.27.4.2. All 1.1 kV cables shall be subjected to high voltage test after joining and terminating but before commissioning as per relevant standards.

6.27.4.3. In each test, the metallic sheath / screen / armour should be connected to earth.

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6.27.4.4. Continuity of all the cores, correctness of all connections as per wiring diagram, correctness of polarity and phasing of power cables and proper earth connection of cable glands, cable boxes, armour and metallic sheath, shall be checked.

6.27.5. Earthing

6.27.5.1. Tests to ensure continuity of all earth connections.

6.27.5.2. Tests to obtain earth resistance of the complete network by using earth tester. The test values obtained shall be within the limits.

CIVIL, MECHANICAL AND PLUMBING WORKS

6.28. GENERAL REQUIREMENT

6.28.1. This section of Technical Specifications describes detailed technical and functional requirements of all civil, structural, mechanical & plumbing works included in the scope.

6.28.2. Standards & Codes

6.28.2.1. All design and construction of civil works shall conform to relevant Indian standards such as BIS, IRC, MORTH, NBC etc.

6.28.2.2. 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.

6.28.2.3. 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.

6.28.2.4. The design calculations for MMS, RCC structure, Steel structure, Foundation system, Road work, Drainage work, etc. shall be submitted for prior approval of Engineer before commencement of construction.

6.28.2.5. As per project requirements, the Purchaser may ask for approval of all civil designs and drawings by a Chartered Civil/ Structural Engineer.

6.28.2.6. 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

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(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.

6.28.2.7. 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.

6.28.3. Topographical Survey

6.28.3.1. The contractor shall be responsible for detailed Topographical Survey of the proposed project site. The work shall be carried out through an agency with relevant experience and a qualified survey team.

6.28.3.2. The Topographical survey shall be conducted at 10m x 10m grid, or as directed by the Engineer, with the help of digital surveying instruments like Total Station.

6.28.3.3. The Contractor shall carry the Benchmark from nearest GTS Benchmark or any other established source like Railway station, Permanent PWD/ WRD structure etc. as approved by the Engineer, by fly-levelling and establish two permanent benchmarks (PBM) at site. 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 Permanent Benchmarks (PBM) and reference pillars (RP) shall be shown on the survey drawings.

6.28.3.4. While carrying benchmark 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.

6.28.3.5. The survey work shall be carried out in 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.

6.28.3.6. 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

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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 etc. shall also be noted and plotted on contour maps.

- 6.28.3.7. 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.

6.28.4. Geotechnical Investigations

- 6.28.4.1. The contractor shall be responsible for detailed Geotechnical investigations at the proposed project site for the purpose of foundation design for various buildings, structures, HT lines, MMS etc. 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.
- 6.28.4.2. 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, trial pits, electrical resistivity tests (ERT), field & laboratory CBR tests, conducting laboratory tests on collected samples of soil & 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 1.5m interval or at change of strata. The starting depth of SPT shall be 0.5m from ground level. UDS shall be collected at every 1.5m interval or at change of strata.
- 6.28.4.3. The field investigations shall mainly include drilling of min. 5m deep boreholes (50% of total No. of boreholes shall be 10m deep), conducting SPT and collecting Disturbed (DS) and Undisturbed samples (UDS), conducting in-situ CBR test for approach road to the plant, internal roads & peripheral road; Trial pits if specified (min 2mx2mx2.5m deep) and ERT s. Number and location of bore holes, CBR tests and Trial pits shall be decided as per the project layout, site topography and soil conditions in consultation with the Purchaser. There shall be a minimum of 1 nos. of Borehole per 5 acres of the area. The soil / rock samples for laboratory investigations shall be collected from each borehole and trial pit in sufficient nos.

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- 6.28.4.4. The proposed Geotechnical investigation plan indicating proposed locations of Trial pits, Boreholes, CBR test & ERT shall be submitted to the Purchaser for review and approval before start of work.
- 6.28.4.5. 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. Laboratory CBR test on soaked samples shall also be conducted on min. 5 no. of soil samples to ascertain the suitability of soil for sub-grade and requirement of any treatment of subgrade soil in case of CBR <2% as per IRC requirements.
- 6.28.4.6. After completion of field and laboratory work, the contractor shall submit a Geotechnical Investigation Report for Engineer'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 and safe bearing capacity (SBC) for various Plant buildings (LCR, MCR etc.) and Open installations, Switch Yard structures & Sub-Station (as applicable), Transformer foundation, HT lines (as applicable), MMS foundation etc. corresponding to settlement of 25mm & 40mm.
- 6.28.4.7. The report shall include the study for "Liquefaction potential assessment of the ground and suggestions for any ground improvement measures" as required.
- 6.28.4.8. 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, the 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).
- 6.28.4.9. In case the contractor wishes to adopt concrete pile foundation for MMS supports the Geo-tech, the report shall also include the calculations for safe pile capacity under direct compression, lateral load and pull out. The report shall include recommendations about the type of pile, its depth and dia. to be used.

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- 6.28.4.10. In coastal areas and in marshy or swelling type soil, under reamed or driven precast concrete pile shall be used. In case the contractor wishes to use helical piles the design, fabrication and installation shall conform to IBC (International building code).
- 6.28.4.11. The contractor shall carry out field trials for initial load test on pile to verify the pile design to confirm the safe load carrying capacity under direct compression, Lateral load and pull out.
- 6.28.4.12. The nos. of piles to be tested under each category shall be finalized corresponding to geotechnical characteristics at site, plot area etc. However, a minimum of 5 nos. of piles shall be tested (min. 3 nos. in each block if the plant site is divided in discrete blocks separated from each other) under each category of load.
- 6.28.4.13. The locations of test piles shall be distributed over the plant site and to be finalized in consultation with the Engineer. In case the MMS column is fixed using base plate-anchor bolt assembly, the adequacy of provided pile reinforcement in job (working) pile corresponding to the set of test loads shall be reviewed by the contractor for any additional requirement of reinforcement and the same shall be provided in the pile to be cast for initial load test.
- 6.28.4.14. In case the Contractor proposes to embed the Column leg in the pile for fixing, the test pile shall be provided with embedded column leg as per approved design and any dowels as required for application of test load. The drawing for the Test pile shall be submitted to Engineer for his approval before casting the test pile. The load test on pile shall be conducted after min. of 28 days from the date of casting. In case the contractor desires to conduct the test earlier than 28 days, he may use suitable higher-grade concrete or if there is substantial evidence from earlier cube test results on design grade concrete to demonstrate the early gain of required compressive strength prior to application of the test load.
- 6.28.4.15. However, under no circumstances the test shall be conducted before 15 days of the date of casting the pile. All the dial gauges and hydraulic jack assembly shall be properly calibrated as per the requirements of relevant BIS standards and valid calibration certificate to this effect from Govt. / NABL accredited Test agency shall be submitted to the Engineer before use.
- 6.28.4.16. The contractor shall submit detailed methodology for conducting the tests in line with IS: 2911 (Part 4) for Engineer's approval before commencement of any test. After completion of these tests the contractor shall compile the test results and submit the report in a proper format as specified in the BIS standard with recommendations/ conclusions for Engineer's approval. The pile work shall start only after approval of the final pile design duly verified/ confirmed with initial load test results.
- 6.28.4.17. All buildings / Open installations (MCR, LCR etc.), Switchyard and Sub-station area shall have levelled ground. No foundation for MMS, Buildings, Switch yard equipment & structures, Sub-stations, HT Line Towers, Transformer etc. shall rest

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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/m².

6.28.5. Other Investigations

- 6.28.5.1. 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, Maximum & Minimum ambient Temperature, Humidity, HFL etc.
- 6.28.5.2. The contractor shall carry out Shadow Analysis at proposed site and accordingly design strings and array layout with optimum use of space, material and manpower. In case of large variations in topography (3° to the horizontal) the study shall also include the effect of topographical variations on array layout and MMS structure design adequacy and stability. The contractor shall submit all the details/ design to the Engineer for review/ approval.
- 6.28.5.3. 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).

6.28.6. Area Grading and Land Development

- 6.28.6.1. The Finished Grade Level (FGL) of the proposed plant 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 the 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 area at and around all buildings/ open installations (LCR, MCR etc.), transformer yard and switchyard shall be uniformly levelled at suitable RL to be finalized considering topography and HFL at site. The minimum plinth level of all buildings/ open installations shall be 450mm above FGL. Module mounting structure foundation/ Pile cap, or any other pedestal shall be min. 200mm above FGL.
- 6.28.6.2. 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 Plant Layout/ Module Layout drawing.

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- 6.28.6.3. 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 Engineer), 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.
- 6.28.6.4. It shall be ensured that the land is graded or levelled properly for free flow of surface run-off and the grade levels shall be fixed with respect to high flood level at site, drainage pattern and system requirements. It shall be ensured that the land is used optimally to have maximum solar power generation considering full utilization of the plot areas. It is advisable to follow the natural flow of water at the ground as far as possible for drainage design.
- 6.28.6.5. 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 Engineer), the contractor shall carry out all required soil investigations to ascertain the suitability of the borrowed soil for land development and filling purposes. The 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 Engineer.

6.28.7. Roads (If applicable)

- 6.28.7.1. Suitable approach road (as applicable) from nearest public road up to Main gate(s), Access road from Main gate(s) to Main Control Room (MCR)/Local Control Room (LCR), Internal roads connecting MCR/LCR and other facilities/ buildings/ open installations like Inverter control room(s) (ICR), Sub-station & Switch yard (as applicable) etc. and Internal peripheral road along the boundary fence/ wall shall be provided for safe and easy transportation of men, material and equipment during construction and maintenance.
- 6.28.7.2. The Approach Road connecting the nearest public road and the Main gate shall be of 5m wide carriage way with 1.0m wide shoulders on either side. The access road connecting Main gate and MCR and internal access road(s) connecting MCR/LCR to various facilities/ buildings shall be of 3.5m wide carriage way with 1.0m wide shoulders on either side while the peripheral road shall be of 2.5m wide carriage way with 1.0m shoulders on either side. The top of road (TOR) elevation shall be

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minimum 200 mm above FGL to avoid flooding of roads 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. The roads shall be designed and constructed as per IRC SP-20 corresponding to design vehicular traffic (150 commercial vehicles per day for approach and internal access roads & 45 commercial vehicles per day for peripheral road) and critical field CBR value of the subgrade. Shoulder shall be of min. 150mm thickness.

6.28.7.3. However, following minimum road section details shall be followed:

6.28.7.4. Approach road from nearest existing public road to Main Gate, Access Road from Main Gate to MCR/LCR and Internal roads connecting MCR/LCR with other facilities / buildings:

- i) Topping: wearing course of 20 mm thick pre-mix carpet or surface dressing, compacted 75mm thick, with murrum blended with WBM Grade-III, as applicable.
- ii) WBM (CBR>100%): compacted 75mm thick, Grade III (iii) WBM (CBR>100%): compacted 100 mm thick, Grade II
- iii) Granular sub-base (CBR>15%): compacted 200 mm thick in two layers of 100mm thickness each,
- iv) Compacted subgrade: top 300mm thick, compacted up to 98% of standard proctor density
- v) Shoulders: compacted 150mm thick, murrum blended with WBM Grade-III
Peripheral Road: -
 - a) Topping: surface dressing, compacted 75 mm thick, murrum blended with WBM Grade-III.
 - b) WBM (CBR>100%): compacted 75 mm thick, Grade III (iii) WBM (CBR>100%): compacted 75 mm thick, Grade-II.
 - c) Granular sub-base (CBR>15%): compacted 150 mm thick in two layers of 75mm thickness each
 - d) Compacted subgrade: top 300mm thick, compacted up to 98% of standard proctor density.
 - e) Shoulders: compacted 150mm thick, murrum blended with WBM Grade-III.

6.28.7.5. Soaked CBR value of sub-grade shall not be less than 2%. Where the CBR of the subgrade is less than 2 % a capping layer of 100 mm thickness of material with a minimum CBR of 10 % is to be provided in addition to the sub-base required for CBR of 2 %. When the subgrade is silty or clayey soil and the annual rainfall of the area is more than 1000 mm, a drainage layer of 100 mm over the entire formation width should 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.

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- 6.28.7.6. In case of no-availability of murrum in the nearby areas of the project site, suitable other screening/ blending material for WBM construction may be used conforming to provisions of IRC SP 20.
- 6.28.7.7. The construction of the road shall conform to relevant IRC/ MORTH standards.
- 6.28.7.8. 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 crossing the road shall be laid through medium class GI steel pipe conforming to IS: 1161.
- 6.28.7.9. Minimum dia. of casing pipe to be used at road/ drain crossing for laying any facility like electric cable, water pipeline etc. shall be 150mm.
- 6.28.7.10. Maintenance pathways of min. 1.0m width shall be provided between SPV arrays for easy movement of maintenance staff, tools, equipment and machinery, washing of modules etc. The pathway area shall be generally levelled and well compacted manually/ mechanically. Areas of depression, valley zones or wherever there is noticeable change in topography, the same shall be levelled by laying & compacting murrum or any other suitable granular material so as to match the top finished surface with ground topography/ grade to avoid accumulation of water in the region and allowing its free flow to keep the area devoid of mud/ sludge.
- 6.28.7.11. The design and drawings for approach road, all internal roads and culverts shall be submitted to the Engineer for approval before execution.

6.28.8. Surface / Area drainage

- 6.28.8.1. The contractor shall design and construct a storm water drainage network for smooth disposal of storm water from the plant to the nearest available drainage outlet.
- 6.28.8.2. The storm water drainage system shall be designed and planned to ensure no water stagnation in the plant.
- 6.28.8.3. The design shall conform to the provisions of IRC SP 42 and best Industry practices. (The design rainfall shall be taken as max. hourly rainfall at 25 years return period at project site as provided in the Isopluvial map of the relevant subzone annexed with Flood Estimation Reports of Central Water Commission (CWC).
- 6.28.8.4. The coefficient of run-off for estimation of design discharge shall be considered as per catchment characteristics, however it shall not be less than 0.6.

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- 6.28.8.5. The drainage scheme shall be designed considering the plant plot area and the surrounding catchment area contributing to the plant area drainage as per the topography.
- 6.28.8.6. The storm water drainage system shall be a network of open surface drains (with rectangular or trapezoidal cross section) and shall generally be designed to follow the natural flow of water and ground contours.
- 6.28.8.7. Suitable size plant peripheral drain as per design (min. bottom width x depth: 500mm x 500mm) along inside of plant boundary wall/ fence shall be provided for smooth channelization of outside storm water and to avoid flooding in the plant. The size of all internal and roadside drains shall not be less than 450mm (bottom width) x 500mm (depth).
- 6.28.8.8. All trapezoidal drains shall be lined with either brick or RR masonry/ concrete or stone slabs as suitable to the site conditions. The min. Thickness of the lining shall be 115mm for brick masonry, 75mm for concrete slabs, 150mm for RR masonry and 100mm for stone slabs. The lining shall be in CM (1:4) and the joints shall be raked and pointed with CM (1:3), however, the joints in lining of plant peripheral drain may be left without pointing.
- 6.28.8.9. In case of rectangular drain, the thickness of the wall shall be checked against structural stability. Min. thickness shall be 230mm for brick wall, 300mm for RR masonry and 125mm for RCC work, except for garland drain around buildings where the min. wall thickness can be 115mm, 200mm and 100mm respectively for brick masonry, RR masonry and RCC work.
- 6.28.8.10. The structural design of drains shall be as per provisions of relevant BIS standards and good industry practice.
- 6.28.8.11. The drain outfall shall be connected to the nearest existing natural drain(s)/ water body outside plant premises, and it shall be ensured that the drainage water shall not re-enter the plant nor encroach/ flood in the adjacent property/ plot.
- 6.28.8.12. The proposed drainage scheme along with design calculations and drawings shall be submitted to the Engineer for review/ approval before start of construction.
- 6.28.8.13. The contractor shall also explore the possibility of providing a rainwater harvesting system for water conservation by constructing suitable collection wells along the drains or through provision of detention ponds etc. The scheme for rainwater harvesting along with design calculations shall be submitted for approval.

6.28.9. Peripheral boundary Wall / Fence

- 6.28.9.1. The plant peripheral boundary shall be provided with either Chain link or masonry boundary wall as specified given below.
- 6.28.9.2. The boundary fence/ wall shall be provided along the Solar PV plant boundary to demarcate the plant boundary and to keep away unauthorized access to the plant.

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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 angle brackets. The main gate shall be min. 5.5m wide (clear) (4 m carriage way + 1.5m wicket gate).

6.28.9.3. Chain link fencing

- i. The fencing shall be of Chain link (GI or poly coat GI as applicable) mesh fabric with internal, corner and stay posts of RCC (min 200mm x 200mm size, M30 grade) or GI angle (min. ISA 75x75x6 mm), as applicable, along with 150mm height 230 thick brick/ 300 thick RR masonry toe wall, with 100mm thick PCC (1:3:6) foundation.
- ii. The brick masonry toe wall shall be plastered with 15 thick CM (1:4) plaster on both faces and 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.
- iii. Spacing of intermediate posts shall not be more than 2.5m. Every 10th intermediate post shall be provided with a stay post while every corner post shall be provided with two stay posts on either side.
- iv. Joints in RR masonry shall be properly raked and pointed with CM (1:3).
- v. 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.
- vi. The GI chain link mesh fabric (40x40 mm with min. wire gauge 3.15mm, both ends twisted) and fencing shall conform to IS: 2721. Poly coat GI chain link mesh (50x50mm) shall conform to ASTM 668 and fencing shall conform to ASTM 567.
- vii. 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 support angles.
- viii. All MS sections shall be painted with 2 coats of epoxy paint of approved make and shade over 2 coats of suitable primer.

6.28.9.4. Boundary wall

The boundary wall structure shall be an RCC beam-column structure with wall of either brick (min. 230mm thick), RR masonry (min. 300mm thick) concrete block (min. 200mm thick) or of Pre-cast RCC wall panels (min. 75mm thick). The top of the wall shall be provided with concrete coping (min. 50mm thick with 40mm projection on either side).

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**6.28.9.5. Barbed wire fencing**

The details of barbed wire fencing shall be same as those for chain link fencing except providing barbed wires (4mm dia.) in place of chain-link mesh. The fence shall have 10 nos. of horizontal barbed wire lines and top 400mm height provided with 3 no. of barbed wire lines fixed to Y shaped angle supports welded to every angle post. Every 5th bay of the fence shall be provided with additional cross barbed diagonal wires.

6.28.9.6. Main Gate

- i. The Main entry gate (2.5m height) shall be of rugged design with solid MS steel sections (20x20mm). The spacing of vertical members shall not be more than 125 mm.
- ii. The gate shall be complete with MS flat guide track, castor wheel(s), GI fittings & fixtures like hinges, aldrop, locking arrangement, posts etc.
- iii. The main gate shall be 2.5m height and shall have 4.5m wide Gate for vehicular movement and an adjacent 1.5m wide wicket gate for pedestrian movement.
- iv. 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.
- v. The gate shall be painted with 2 coats of epoxy paint of approved make and shade over 2 coats of suitable primer.
- vi. All design and drawings for peripheral boundary fence/ Wall and Main gate shall be submitted for Engineer's approval before execution.

6.28.10. Plant Layout

6.28.10.1. The contractor shall submit drawing showing proposed Project Plant and SPV module Layout.

6.28.10.2. The Plant and SPV module layout shall be a comprehensive drawing showing 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 and any other access gates as per project needs, Block wise FGL, Layout of main approach road to the plant, Internal and peripheral roads, Security Room/ cabin (s), all Buildings and Open installations with coordinates, Temporary Storage yard/ facility to be used by the contractor during construction, Contractor's & Engineer's site office, Proposed Array layout, Lightning arrester, UG/Over ground water Tank(s), Storm water drains, Corridor for buried cables etc.

6.28.10.3. The cable corridor shall be laid through a clear gap between arrays and shall not be laid below modules for easy maintenance.

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6.28.10.4. All the facilities and buildings shall be presented with suitable Legend.

6.28.10.5. The drawing shall be in suitable scale to have proper representation of the information.

6.28.10.6. The Plant & SPV module layout drawing shall be submitted by the contractor for review / approval by the Engineer.

6.28.11. Design Loads

6.28.11.1. 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.

6.28.11.2. The following minimum imposed load as indicated for some of the important areas shall, however, be considered for the design. If the actual expected load is more than the specified minimum load, then actual load is to be considered.

S. No.	Area	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, Chequered 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 outside
7	Pre-cast and chequered plate cover over cable trench	4.00 kN/ Sqm
8	a) Main access & Internal Roads	i. As per IRC SP 20 corresponding to vehicular traffic of 150 commercial vehicles per day and critical in-field CBR.
	b) Peripheral Road	ii. As per IRC SP 20 corresponding to vehicular traffic of 45 commercial vehicles per day and critical in-field CBR

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**6.28.11.3. Primary Loads**

- (i) Dead Load (DL)
- (ii) Live Load (LL)
- (iii) Snow Load (SnL)
- (iv) Wind Load (WL) – Both along X & Z horizontal direction
- (v) Seismic Load (EL) – Both along X & Z horizontal direction

6.28.11.4. Basic wind speed (V_b) at project site shall be taken as per IS 875 (Part-3) unless otherwise specified elsewhere.

6.28.11.5. 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)

6.28.11.6. In case of plant site within 60 km of seacoast, 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.

6.28.11.7. 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 seacoast).

6.28.11.8. The Seismic Load shall be considered corresponding to earthquake zone at site as per IS: 1893 (Part- 4) with Importance factor 1.5.

6.28.11.9. The Snow Load shall be considered as per IS:875 (Part-4).

6.28.11.10. Notes for WL on MMS

WL shall be considered as detailed below for estimation of WL ($\pm X$, $\pm Z$ direction) under primary loads.

Load due to wind on side (exposed) face of respective MMS members (Drag force) for wind acting in (\pm) 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 (\pm) X, Z direction
- (ii) Load due to adverse (negative pressure) wind direction on design tilt angles of MMS members for wind acting in (\pm) X, Z direction

6.28.11.11. Design Load combinations

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

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be considered as per relevant BIS standard. No increase in permissible stress is permitted in design of MMS

Following load combinations shall be considered in design:

- (i) DL + LL
- (ii) DL + LL ± WLx
- (iii) DL + LL ± WLz (iv) DL + LL ± ELx
- (iv) DL + LL ± ELz
- (v) DL + SnL ± WLx
- (vi) DL + SnL ± WLz
- (vii) DL + SnL ± ELx
- (viii) DL + SnL ± ELz

All buildings, structures and foundations shall be designed to withstand loads corresponding to worst design load combination.

6.28.12. Foundations (General)

6.28.12.1. Contractor shall design all foundations for buildings, equipment, HT line Towers, Switch yard structures, Transformer, MMS & 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 750mm (below NGL).

6.28.12.2. Min. thickness of PCC below brick wall shall be 150mm.

6.28.12.3. 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.

6.28.12.4. All design & drawings shall be submitted to the Engineer for approval before execution.

6.28.13. MMS Foundation

6.28.13.1. Module mounting structure (MMS) may be supported on isolated/ strip footing or pile foundation.

6.28.13.2. Bored cast-in situ, Driven precast or under reamed Concrete pile.

- (i) In case the contractor proposes to provide concrete pile; the type, dia. and length of pile shall be as per recommendations of Geotechnical investigation

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report corresponding to prevalent soil characteristics at site. However, the min. dia. and depth of the pile shall be 300mm and 1800mm respectively except when very hard strata / rock ($N > 100$) is encountered at a higher level, the pile shall be extended into the hard strata minimum 1.0 times the diameter of the pile with total depth of the pile not less than 1200mm below cut-off level.

- (ii) As specified above, the MMS support shall project minimum 200mm above FGL (Finished grade level) to avoid any damage to the MMS column/sub support due to direct contact of rainwater/ surface run-off. This shall be ensured through either single stage construction of entire pile length including portion above FGL or by providing a collar (to be cast in second stage) which shall project min. 75mm in plan beyond the pile face and shall extend min. 250mm below GL.
- (iii) For proper bonding, the surface of first stage concrete shall be made rough by troweling and cleaning out laitance and cement slurry by using wire brush on the surface of joint immediately after initial setting of concrete. The prepared surface should be clean watered to get saturated dry condition when fresh concrete is placed against it. The prepared surface shall be applied with a suitable bonding agent before construction of pile cap/ collar as required.
- (iv) In case the column post/stub is supported through base plate-anchor bolt assembly, the same shall only be provided through RCC pile cap to be designed as per provisions of relevant BIS standard with min. clear overhang of 75mm. The pile shall be embedded min. 50mm in the pile cap and the pile reinforcement shall be extended into the pile cap for proper anchorage.
- (v) In case of collapse of foundation strata during drilling of the pile bore, removable steel liner shall be used to maintain design depth and diameter of the pile for proper concreting.
- (vi) The design & installation of piles shall conform to IS: 2911.
- (vii) The bore shall be free from water before pouring of pile concrete. For underwater concreting termite shall be used.

6.28.13.3. Helical / Screw Pile

- (i) The design, manufacture, testing and installation of Helical/ Screw pile shall conform to ICB-2009 and Practice Note 28- "Screw Piles: Guidelines for Design, Construction & Installation, ISSN 1176-0907 October 2015 (IPENZ Engineers New Zealand)"
- (ii) The design of pile shall be undertaken and verified by a suitably qualified geotechnical or structural Chartered Engineer with experience in the design of helical/screw piles.
- (iii) The pile shall be designed and manufactured in accordance with accepted engineering practice to resist all stresses induced by installation into the ground and service loads.
- (iv) The steel grade for pile shaft, helix plates and other accessories shall be with min. F_y 350 MPa. Min. thickness (BMT) of shaft and helix plate shall be 6 and

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8mm respectively in case of coastal installations and soils containing aggressive chemicals and at other project site it shall be respectively 5 and 6mm. Cap plate and col base plate shall be min. 12mm thick and of min. grade E-250 conforming to IS:2062.

(v) All materials shall be hot dip galvanized conforming to relevant BIS standard with min. thickness of galvanization 80 microns. However, for Rafter, Purlins and Bracings Galvalume material of minimum yield strength 550MPa may be considered.

(vi) Wherever the pile shaft is required to be infilled with concrete grout, the same shall be of min. grade M30 (anti shrink).

(vii) The allowable axial design load (Direct compression & pull out), Pa, of helical piles shall be the least of the following values:

- Sum of the areas of the helical bearing plates times the bearing capacity of the soil or rock comprising the bearing stratum.
- Capacity determined from well-documented correlations with installation torque.
- Load capacity determined from initial load tests.
- Axial capacity of pile shaft.
- Axial capacity of pile shaft couplings.
- Sum of the axial capacity of helical bearing plates affixed to pile.

6.28.13.4. The lateral allowable load capacity of the pile shall be calculated using P-Y analysis and shall be verified with field trials. The allowable design lateral load shall be equal to the min. of (i) the total lateral load producing max. Lateral deflection of 5mm and (ii) 50% of the total lateral load at which the lateral displacement increases to 12mm.

6.28.13.5. Dimensions of the central shaft and the number, size and thickness of helical bearing plates shall be sufficient to support the design loads.

6.28.13.6. The Design Report shall include following details.

- (i) Design loads
- (ii) Geotechnical Strength Reduction Factors and supporting methodology
- (iii) List of design standards
- (iv) Design methodology and how specific loads such as seismic, lateral and settlement are addressed
- (v) Founding stratum
- (vi) Estimated length
- (vii) Connection design and details between pile shaft & pile cap plate and Col base plate

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(viii) Pre-production and production load testing to support design including acceptance criteria.

6.28.13.7. Helical piles shall be installed to specified embedment depth and torsional resistance criteria as per design. The torque applied during installation shall not exceed the maximum allowable installation torque of the helical pile

6.28.13.8. Special inspections shall be performed continuously during installation of helical pile foundations. The information recorded shall include installation equipment used, pile dimensions, tip elevations, final depth, final installation torque and other pertinent installation data as required.

6.28.13.9. The installation of piles shall be done by an agency having adequate experience in helical pile construction.

6.28.13.10. The method statement for pre-production load testing (initial test) and construction of Helical Pile shall be submitted for review and approval. The method statement shall comply following requirements:

6.28.13.11. Helical pile pre-production load testing

- The Piling Contractor shall provide a method statement for the pre-production load testing. The method statement shall be submitted 2 weeks prior to pile installation for testing and shall contain the following information (as a minimum):
- Programme of the testing, detailing the timing and sequence of each load test including any additional investigations proposed
- The general arrangement of the equipment
- A method for measuring the displacement at the head and toe of each test pile
- Template for the Pile load test report
- Confirming the criteria for determining the acceptability of the compression, tension and lateral load tests
- A contingency plan in the event that a load test is deemed not acceptable
- A procedure for verifying the capacity for each individual pile, this may include correlating the installation torque for each pre-production pile with the load test results
- All pile load tests shall be supervised by suitably experienced personnel, who are competent to operate, monitor and record each test throughout its duration. Each pile load test shall be continuously monitored throughout its duration.

6.28.13.12. Helical Pile Construction

The contractor shall provide a method statement for each piling operation to be undertaken in executing the Works. The method statement shall describe all proposed equipment and detail the construction sequence. The method statement

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shall be submitted with the tender and shall contain the following information (as a minimum):

- Programme of the works, detailing the timing and sequence of individual portions of the works
- Full details of the installation plant to be used, including manufacturer's information and proof of servicing/recent upkeep and calibration
- Proposed phasing of excavation/filling operations such that the design stresses in the piles (and any supporting frames) are not exceeded
- The contingency plan to be adopted, to minimize disruption and delay, in the event of encountering obstructions
- Anticipated noise levels (measured in dB) and vibration levels (measured in mm/sec) arising from piling operations (if applicable)

6.28.13.13. The Piling Contractor shall nominate a suitably experienced, professionally qualified engineer, as the "Piling Supervisor".

6.28.13.14. The Contractor shall also carry out routine tests on 0.5 % of the total no. of working/ job piles as per provisions of IS: 2911 (Part 4). In case of unsatisfactory results, min. no. of routine tests may be increased up to 2% of the total no. of working/ job piles as per the directions of the Engineer.

6.28.14. Module Mounting Structure (MMS)

6.28.14.1. The module mounting structure design shall generally follow the existing land profile. The top of the table shall be in one plane.

6.28.14.2. In MMS analysis the column support shall be assumed at EGL/NGL.

6.28.14.3. In case of topographical variations more than 3°, the contractor shall carry out detailed study of its effect on array layout, shadow analysis and structural stability of MMS.

6.28.14.4. The structure shall be designed to allow easy replacement of any module and shall be in line with site requirements.

6.28.14.5. The MMS stub/ column, rafter, purlin, ties and bracing members shall conform to following Indian standards.

- IS: 2062 – Hot rolled Medium and High tensile structural steel
- IS: 811 – Cold formed light gauge structural steel sections
- IS: 1161 – Steel tubes for structural purposes
- IS: 4923 – Hollow steel sections for structural use
- Minimum grade of steel for sections conforming to IS: 811 & IS: 4923 shall be E350 conforming to IS: 2062 and YSt 310 conforming to IS: 1608 respectively.

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- 6.28.14.6. The contractor can also propose new light gauge structural steel or structural aluminum sections other than specified in IS:811 subject to approval of the Engineer. In this case the contractor shall submit his proposal stating the technical advantages of the proposed sections for Engineer’s review along with supporting literature and sample design calculations conforming to present specifications at the time of bidding.
- 6.28.14.7. Contractor shall submit detailed MMS General Arrangement drawing indicating module, MMS Table configuration, supporting structural arrangement, member sizes and connection details as detailed below:

Type of MMS Structure	Relatively flat terrain - Fixed tilt simply supported type (Preferable)
	Highly undulated terrain - Fixed tilt Cantilever type Optional - MMS tracker
Column posts	Cold formed member - C Section with Lip (CS)
	Minimum yield strength = 345 N/mm ²
	Minimum thickness = 2.50 mm (Non-coastal area)
	Minimum thickness = 3.00 mm (Coastal area)
Rafter members	Cold formed member - C Section with Lip (CS)
	Minimum yield strength = 345 N/mm ²
	Minimum thickness = 2.00 mm (Non-coastal area)
	Minimum thickness = 3.00 mm (Coastal area)
Bracing members	Cold formed member - C Section (CU)
	Minimum yield strength = 345 N/mm ²
	Minimum thickness = 2.00 mm (Non-coastal area)
	Minimum thickness = 3.00 mm (Coastal area)
Purlin members	Aluminium-zinc alloy metallic coated steel section
	In case of relatively flat terrain - Hat purlin/Hat section / Z Section purlin
	In case of highly undulated terrain – C Section with Lip (CS) with C section purlin splice.
	Steel grade = YS 550
	Coating class = AZ 150
	Minimum 0.90 mm base metal thickness (Non-coastal area)
	Minimum 1.20 mm base metal thickness (Coastal area)
Module to purlin and purlin to rafter connection - SS304 - A270	

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Fasteners - Bolts, nuts, plain washers and spring washers	Other structural steel connections - HDG 4.6 or 8.8 based on design requirement
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6.28.14.8. The primary loads and load combinations for design of MMS structure shall be as specified under Clause No. 6.29.11. The design shall be done by Working stress method and no increase in allowable stress shall be permitted.

6.28.14.9. The maximum permissible deflection/ side sway limits for various elements of MMS under serviceability conditions shall be as following:

- Lateral deflection/side sway for Column – Span/240
- Vertical deflection for Rafter and Purlin – Span/180
- Lateral deflection for Purlin – Span/240

6.28.14.10. In case of natural frequency in first mode less than 1 Hz, the design of the MMS structure shall also be checked against dynamic effects of wind as per provisions of IS – 875 (Part-3) using gust factor method.

6.28.14.11. The purlins shall be provided with following min. 10mm dia. GI sag/ tie rods or 30x30x2 GI tie angles:

- 1 no. tie rod in middle of each span
- 1 no. diagonal tie rod at each corner in end spans

6.28.14.12. Lateral restraint to compression flange if any due to PV panels is not permitted in purlin design.

6.28.14.13. The vertical diagonal bracing shall be provided in alternate spans of each unit (table) of MMS.

6.28.14.14. MMS shall support SPV modules at a given orientation & tilt and shall absorb and transfer the mechanical loads to the ground properly.

6.28.14.15. Welding of structure at site shall not be allowed and only bolted connections shall be used.

6.28.14.16. The MMS structure shall be hot dip galvanized with minimum GSM 610 kg/ sqm and/or minimum coating thickness of 80 microns for protection against corrosion. Galvanization shall conform to IS-2629, 4759 & 4736 as applicable.

6.28.14.17. It is to ensure that before application of this coating, the steel surface shall be thoroughly cleaned of any paint, grease, rust, scale, acid or alkali or any foreign material likely to interfere with the coating process.

6.28.14.18. The bidder shall ensure that inner side is also provided with galvanization coating.

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- 6.28.14.19. The galvanization shall be done after fabrication of members and cutting of holes to ensure galvanization of all cut/ exposed edges.
- 6.28.14.20. In case the proposed section is made up of Aluminum, anodized coating shall be Gr. AC25 and shall conform to IS: 1868.
- 6.28.14.21. The array structure shall be so designed that it will occupy minimum space without sacrificing the output from SPV panels at the same time.
- 6.28.14.22. All fasteners and washers (2 round + 1 spring) both for MMS connections and fixing of PV Module shall be adequately protected from atmosphere and weather prevailing in the area.
- 6.28.14.23. Fasteners and washers to be used for erection of mounting structures and those for fixing Module over MMS shall be of stainless-steel grade SS 304 & SS 316 with property class A-70 conforming to relevant ISO standard and must sustain the adverse climatic conditions to ensure the life of the structure for 25 years.
- 6.28.14.24. Min. diameter of bolt for MMS connections shall be 10mm except for column-rafter connection where it shall not be less than 12mm (not less than 16mm with bushing in case of single bolt connection for seasonal tilt)
- 6.28.14.25. Modules shall be clamped or bolted with the structure properly. The material of clamps shall be Al / SS – 316 having weather resistant properties. Clamp/bolt shall use EPDM rubber and shall be designed in such a way so as not to cast any shadow on the active part of a module.
- 6.28.14.26. MMS column post supported with base plate secured to foundation shall be fixed with galvanized high strength “J” bolts conforming to specifications of IS: 4000/ IS: 1367 and relevant IS code Installation of foundation bolts and embedment of column leg in foundation concrete shall be done by using template to ensure proper alignment. The underside of base plate shall be provided with anti- shrink grout.
- 6.28.14.27. In case the contractor proposes to extend the column leg to embed it in the pile as an alternate fixing arrangement, the column member shall be extended for full depth of the pile (100mm cover at tip of the pile) with an end plate of min. 4mm thickness to be fixed at the bottom of column leg. (However, for plants in coastal area or in case of marshy soil the column post shall be supported only with base secured to foundation through base plate and anchor bolt assembly and no embedment of column leg in foundation is permitted)
- 6.28.14.28. The area of c/s of embedded leg shall not be less than 0.8% of pile cross sectional area.
- 6.28.14.29. The array structure shall be grounded properly using maintenance free earthing kit.

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6.28.14.30. The bidder / manufacturer shall specify installation details of the PV modules and the support structures with appropriate diagram and drawings.

6.28.14.31. The Bidder should design the structure height considering highest flood level at the site and the finished grade level. The minimum clearance between the lower edge of the module and the finished grade shall be the higher of (i) Highest flood level + 100mm and (ii) 500 mm, as applicable.

6.28.14.32. The length of one unit (Table) of MMS shall not generally be more than 20m.

6.28.14.33. The contractor shall submit the detailed design calculations and drawings for MMS structure, bill of materials and their specifications/ standards to the Engineer along with STAAD report for approval before start of fabrication work.

6.28.15. Concrete Works

6.28.15.1. 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.

6.28.15.2. Unless otherwise specified elsewhere, PCC shall be of min. grade M25 (nominal mix 1:1:2) except for mud mat, back filling of ground pockets or leveling course which shall be of grade M7.5 (nominal mix 1:4:8).

6.28.15.3. Reinforcement steel shall be of high strength TMT bars of grade Fe500 D conforming to IS: 1786. Ductile detailing in accordance with IS: 13920 shall be adopted for superstructure and sub-structure of all RCC buildings and structures.

6.28.15.4. 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/mm² at 28 days.

6.28.16. Miscellaneous Steel Works

6.28.16.1. Unless otherwise specified elsewhere, all structural steel work shall be designed as per provisions of IS: 800 with working stress method of design (WSD).

6.28.16.2. 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.

6.28.17. Buildings

6.28.17.1. General Requirement

- (i) The following terminologies shall be referred for designating various buildings in the plant.

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- (ii) 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 – MCR) for operation and maintenance of Photovoltaic Solar Power Plant. Security room at main gate & Security cabin(s) (at strategic locations) shall also be provided to secure the plant from any theft / burglary / unauthorized entry.
- (iii) Unless otherwise specified elsewhere, all buildings except Security room/ cabin shall have RCC framed structure. Brick partition walls shall be provided for Kitchen, Pantry, Battery room and Toilet units. For other rooms AL Glass partitions shall be provided. The equipment area shall be designed with OEM requirements to ensure all satisfactory operations. The security room/ cabin(s) shall be of prefabricated structure.
- (iv) All buildings shall have provision of adequate windows for natural light & ventilation, fire safety provisions and shall be designed as per provisions of National building code (NBC).
- (v) The contractor shall submit the proposed equipment layout drawings to the Engineer for approval before development of Architectural drawings. The building layout, exterior elevations shall be aesthetically designed following good architectural practices to get a pleasant look. Horizontal/ vertical bands through projections/ grooves in external plaster may be provided to break the monotony. Roof slab shall have projection of 450mm beyond external walls with RCC parapet wall of 450 mm clear height all-around which shall form a projected band at roof level. For weather protection all doors and windows shall be provided with 450mm wide RCC chajja. However, chajja for rolling shutter shall be 750mm wide.
- (vi) MS staircase shall be provided for access to the roof of all RCC buildings.

6.28.17.2. Functional requirements

(i) MCR Building

For operation & maintenance of SPV Plant, unless otherwise specified elsewhere, Control room cum office area of MCR building shall provide following facilities.

- Air-conditioned area (with provision of split A/C unit of adequate capacity) for SCADA room (min. carpet area 12m), Conference room (min. carpet area 20 m²) & Supervisor cabin and office area (min. carpet area 20 m²)
- Inverter/ Switchgear, equipment room(s) as per OEM requirements
- Store cum record room (min. carpet area 15 m²)
- Battery room as per requirement
- Toilet block with separate Men and Women washroom facilities (min. total carpet area 12m²)

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- Pantry with service platform and utensil washing facilities (min. carpet area 5m²)
- Suitable provision for passage (for smooth movement of O&M personnel), cable trenches, operating area etc. (min. clear width 1500mm)

(ii) LCR Building

- Unless otherwise specified elsewhere, LCR consists of data loggers, battery, Inverter, Electrical panels etc. as per requirement. There shall be suitable provision for easy/ smooth passage for O&M personnel, cable trench, operating area etc.
- The size of LCR shall be provided as per OEM requirements. However, minimum clear height up to soffit of beam shall be 4m.
- In case LCR and MCR building facilities are clubbed in one single building, the Equipment area and Office cum Control room area shall be separated by a brick wall with provision of internal entry door.
- MCR building shall have separate main entry to office area plus a provision of fire exit door.
- Rolling shutters shall be provided for the equipment room and storeroom.

(iii) Security Room / Cabin

- a. The Contractor shall provide required number of security cabins at strategic locations & at corners of the plot and 1 nos. security room at Main entry gate.
- b. The Security room shall be of min. size 4m x 4m x 2.75m height. The Security cabin shall be of min. size 1.2 x 1.8m x 2.5m height.
- c. Security room / cabin shall be a pre-engineered & prefabricated structure. The walls and roof of the building shall be fabricated with double skin insulated sandwiched Al-Zn alloy coated high tensile steel metal panels (BMT- 0.5mm, Al-Zn alloy coating -150 GSM total on both sides). The insulation shall be of PUF with min. density 40 kg/ cum and adequate thickness. Roof shall be provided with suitable slope, not less than 100 to the horizontal (approx. 1V:6H) for proper drainage of rainwater and shall project 300mm beyond the walls. The make and (color) shade of pre-coated metal panels shall be subject to approval by the Engineer. Min. thickness of color coating shall be 20 micron (DFT) excluding prime coat 5 micron (DFT). The coating system shall confirm to IS; 15965.
- d. The Main security room shall be provided with one Aluminum (AL) glazed door (0.75m wide x 2.1m height) on one face and AL glazed sliding windows (1.2m width x 1.0 m height) with AL grill on remaining three sides. Security cabin shall have one AL glazed door (0.75m wide x 2.1m height) and 1 no. AL sliding window (0.8m width x 1.0 m height) with AL (anodized) grill on one side. All glazing shall be of clear float glass with thickness of 4mm for window and 6 mm for door panel.

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- e. The door and windows shall be provided with all necessary fitting and fixtures like handles, tower bolts, mortise lock for door, stays, door stopper etc. All AL sections for doors and windows shall be anodized (min. average thickness 25 microns) or polyester powder coated (min. DFT 50 microns) with approved color shade for protection against weather.
- f. Specially coated/ SS self-drilling screws/ fasteners conforming to class 3 as per ASTM: 3566.1 and 3566.2 shall only be used for all connections.
- g. Anchor / foundation bolts shall conform to IS: 5624 and IS 800.
- h. The Security Cabin may be installed on concrete M15 skid platform (min. 350 thick) with skin reinforcement shrinkage or shall be supported on RCC pedestal & foundations. The concrete platform shall project 200mm beyond the walls.
- i. The Security Room shall be supported on RCC pedestal & foundations.
- j. The Design and drawings shall be submitted for approval prior to fabrication and installation.

6.28.18. Flooring, Skirting and Dado**6.28.18.1. Store area, Equipment Room**

40 mm thick Cement concrete (IPS) flooring (1:2:4), aggregate size 10 mm down, conforming to IS 2571 with 2mm thick Heavy-duty epoxy coating (Industrial grade) of approved make on top as per manufacturer specifications and 10mm thick matching skirting of 100mm height.

6.28.18.2. SCADA Room, Control cum Office Room, Supervisor Room and Lobby

40 mm thick heavy-duty vitrified tile (8mm thick) flooring with matching skirting of 100 mm height.

6.28.18.3. Battery Room

Acid / Alkali resistant tile flooring and 2100 height dado, Floor and dado tiles - 20mm and 12 mm thick respectively. However, in case of maintenance free batteries, vitrified tile (8mm thick) flooring and dado shall be provided.

6.28.18.4. Toilet

- 40 mm thick Ceramic tile (8mm thick) flooring and glazed tile (6mm thick) 2100mm height dado.
- 20mm thick Granite stone finish over platform for wash basin.

6.28.18.5. Pantry

40 mm thick heavy-duty vitrified tile (8 mm thick) flooring and glazed tile (6 mm thick) 2100 mm height dado, 20mm thick Granite stone finish over service platform.

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**6.28.18.6. Passage / Corridor**

40 mm thick heavy-duty vitrified tile (8mm thick) flooring with matching skirting of 100mm height.

6.28.18.7. Steps

Kota stone (20 thick) or 50 thick cement concrete (IPS) flooring conforming to IS 2571.

6.28.18.8. All items shall be of reputable make. Only Items with approved samples by the Engineer shall be used.

6.28.19. Doors and Windows

6.28.19.1. Doors, windows, louvers and ventilators shall be made of AL sections (minimum average thickness 2.5mm), industrial grade, anodized (grade AC25, min. thickness 25 micron conforming to IS: 1868) or with polyester powder coating (Total DFT 50 microns conforming to IS: 13871) and shall be of approved make & colour shade. All sections, fittings and fixtures shall be anodized (min. thickness of coating 20 micron). The window and door shutters shall be of clear float / wired / ground glass as per design/ functional requirements. The doors in the toilet area shall be of steel frame with solid core (MDF) flush shutter, 35mm thick, with laminated finish on both sides conforming to IS: 2202.

6.28.19.2. AL Louvers, duct / ventilation openings shall be provided as per functional requirement.

6.28.19.3. All doors, windows and ventilators shall be provided with all necessary fittings and fixtures like handles, tower bolts, wind stays, hinges etc. of heavy-duty anodized AL. All doors shall be provided with hydraulic door closure of the required capacity.

6.28.19.4. All windows shall be provided with suitable AL grill of anodized sections with adequate thickness for security purposes.

6.28.19.5. Clear float glass for window and door shutter shall be of min 4mm and 6mm thickness respectively. Wired/ ground glass where provided shall be of min thickness 6mm.

6.28.19.6. Entrance door and door in passage shall be min. 1.5m wide (double leaf) x 2.1 m height while door for Conference room and Storeroom shall be min. 1.2m wide x 2.1m height. All other doors shall be min. 1.0m wide x 2.1m height except for WC which may be of 0.8m width.

6.28.19.7. Rolling shutters shall be of the required size and shall be made of cold rolled steel strips with adequate gauge thickness (min. 18 gauge) and shall conform to IS 6248. Rolling shutter shall be provided with all fixtures, accessories, paintings etc. all complete and shall be mechanically operated type.

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**6.28.20. Roofing**

- 6.28.20.1. The roof of all RCC buildings shall be provided with a minimum slope of 1:100 for effective drainage of rainwater. The slope shall be achieved either by application of screed concrete of grade 1:2:4 (with 12.5mm down coarse aggregate) with min. 25mm thick CM 1:4 layer on top to achieve smooth surface to facilitate application of water proofing treatment.
- 6.28.20.2. The water proofing treatment shall be in situ five course water proofing treatment with APP (Atactic Polypropylene) modified Polymeric membrane over roof consisting of first coat of bitumen primer @ 0.40Kg per sqm, 2nd & 4th courses of bonding material @ 1.20 kg/sqm, which shall consist of blown type bitumen of grade 85/25 conforming to IS : 702, 3rd layer of roofing membrane APP modified Polymeric membrane 2.0 mm thick of 3.00 Kg/sqm weight consisting of five layers prefabricated with centre core as 100 micron HMHDPE film sandwiched on both sides with polymeric mix and the polymeric mix is protected on both sides with 20 micron HMHDPE film. The topmost layer (5th layer) shall be finished with brick tiles of class designation 10 grouted with cement mortar 1:3 (1 cement: 3 fine sand) mixed with 2% integral water proofing compound by weight of cement over a 12 mm layer of cement mortar 1:3 (1 cement: 3 fine sand) and finished neat. The water proofing treatment shall be extended over golla/ fillet and inner face of the parapet up to 450mm height.
- 6.28.20.3. The corners of parapet wall and slab shall be provided with 50 thick fillet / golla in CM 1:3 with neat finish.
- 6.28.20.4. Required no. of rainwater down take pipes min. 100mm dia. PVC pipes (UV resistant), with 450mm x 450mm x 15mm deep khurra and MS grill at inlet shall be provided for rainwater disposal.

6.28.21. Plinth protection and drain

- 6.28.21.1. 750mm wide plinth protection with min. 75mm thickness of PCC (1:3:6) over 75mm 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.
- 6.28.21.2. 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 rainwater from building roof.

6.28.22. 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 the following specifications.

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- (i) Well compacted sub-grade
- (ii) Well compacted boulder soling with interstices filled with sand over compacted sub- grade.
- (iii) 75 mm thick PCC 1:3:6 over (ii)
- (iv) 100 mm thick PCC 1:2:4 over (iii)
- (v) 0 mm thick floor finish over (iv)

6.28.23. Anti-termite Treatment

In case of presence of termites at the project site, an anti-termite treatment shall be provided for all foundation pits and building plinth in MCR / LCR building conforming to IS: 6313 to control entry of termites.

6.28.24. Plumbing & Sanitary Works

6.28.24.1. Toilet block shall have following min. fittings:

- Wall mounted WC (Western type) 390 mm high with toilet paper roll holder, low height flushing tank and all fittings
- A set of 2 wall mounted Urinals (430 x 260 x 350 mm size) with flushing tank and all fittings (Men washroom only)
- Wash basin (550 x 400 mm) over concrete platform with all fittings including 2-pillar cocks
- Wall mirror (600 x 450 x 6 mm thick clear float glass) with hard board backing
- CP brass towel rail (600 x 20 mm) with C.P. brass brackets – one each in common area and bathroom (bathroom if applicable)
- Soap holder and liquid soap dispenser one each in common area and bathroom (bathroom if applicable)
- Shower and mixer for hot and cold water in bathroom (if applicable)
- Ventilators – Mechanical exhaust facility of adequate capacity
- Overhead PVC water storage tank – Capacity 1000 litres (common for both washrooms) (2000 litres in case bathroom is to be provided)

6.28.24.2. Pantry room shall be provided with kitchen sink cum drain board and provision for installation of Water Cooler.

6.28.24.3. One toilet room with provision of WC and Wash basin shall be provided at the Security Room near main gate.

6.28.24.4. Necessary plumbing lines for MCR/LCR building and Security Room near main gate.

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6.28.24.5. All sanitary ware, fittings and fixtures shall be of reputed Make and Type and approved by the Engineer. All fittings, fastener, grating shall be of CP brass conforming to relevant BIS standards.

6.28.25. Painting & Other Finishes

Painting and whitewash / colour wash for the buildings shall conform to relevant BIS standards. The make and colour shade of the finish shall be as advised and approved by the Engineer.

Internal Walls except toilets & battery room	Acrylic emulsion (for MCR) & Oil bound distemper (for LCR / Security Room)
Battery room	Acid / Alkali resistant tiled dado of 2100 mm height & Acid resistant resin-based epoxy paint above dado (Vitrified tile flooring and dado with oil bound distemper in case of maintenance free batteries)
Toilet	Oil bound distemper
External Walls	All weatherproof cement based acrylic emulsion paint, exterior grade
MMS foundations / Earth pit Enclosure	Cement paint
Underside of roof slab	Whitewash
Air-conditioned areas	Underside of roof slab- Under deck insulation with 50mm thick mineral wool, min. density 45 kg/m ³ and Gypsum board false ceiling with GI grid/Gypsum tile (600x600 mm x 12 thick) false ceiling with AL grid as per manufacturer's details
Structural steel work	2 coats of synthetic enamel paint over 2 coats of suitable primer

6.28.26. Air conditioning & Ventilation for MCR / LCR

6.28.26.1. In MCR / LCR, SCADA room, Conference room, Supervisor cabin and Office room shall have split type air conditioning units.

6.28.26.2. All other rooms except the equipment room shall be equipped with appropriate numbers of fans for effective heat dissipation.

6.28.27. Fire Extinguishers

6.28.27.1. All buildings shall be installed with the required no. of fire extinguishers as per relevant BIS standard and NBC. Liquefied CO₂ / foam / ABC type fire extinguisher shall be upright type of capacity 10kg conforming to IS: 2171, IS: 10658.

6.28.27.2. 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.

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**6.28.28. Sand buckets**

- 6.28.28.1. Sand buckets shall be wall mounted made from at least 24SWG sheet with bracket fixing on wall conforming to IS: 2546.
- 6.28.28.2. All buildings shall be provided with the required no. of sand buckets as per relevant BIS standard and NBC. 4 No. of Bucket stands with four buckets on each stand shall be provided in the Transformer Yard.

6.28.29. Sign Boards and Danger Boards

- 6.28.29.1. 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
- 6.28.29.2. The Signboard shall be made of steel plate of not less than 3 mm. Letters on the board shall be with appropriate illumination arrangements.
- 6.28.29.3. Safety signs, building evacuation plans and direction signs, assembly points shall also be placed at strategic locations.
- 6.28.29.4. The Contractor shall provide to the Engineer, detailed specifications of the sign boards.

6.28.30. Masonry Work

- 6.28.30.1. The masonry work shall be of bricks, laterite blocks (as per site conditions) or concrete blocks.
- 6.28.30.2. All external walls of buildings shall be 230mm and internal walls shall be 230mm or 115mm as per requirements.
- 6.28.30.3. All concrete block masonry walls shall be min. 200mm thick.
- 6.28.30.4. Brick work shall be in cement mortar (CM) 1:6 & 1:4 for 230 mm and 115 mm thick brick wall respectively unless specified.
- 6.28.30.5. Unless otherwise specified elsewhere, Bricks shall be of class designation 7.5 conforming to IS: 1077, IS: 2212 & IS: 3495.
- 6.28.30.6. All concrete blocks shall be of min. compressive strength of 7.5 N/mm² and shall be of Grade-A conforming to IS: 2185.
- 6.28.30.7. The laterite blocks shall conform to IS: 3620.
- 6.28.30.8. All buildings shall be provided with a 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.

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6.28.30.9. The construction of brick masonry shall conform to IS: 2212. Construction of Concrete block masonry shall conform to IS: 2572.

6.28.31. Plastering, Pointing & Coping Works

6.28.31.1. All brick masonry work shall be provided with plaster.

6.28.31.2. Wall and ceiling plaster shall be in cement mortar (CM) 1:6 and 1:3 respectively.

6.28.31.3. 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.

6.28.31.4. All joints in stone masonry shall be raked and pointed in cement mortar (CM) 1:3 except specified otherwise.

6.28.31.5. 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.

6.28.31.6. All door and window chajja shall be provided with a 10mm wide drip course.

6.28.32. Building Water Supply & Plumbing Works

6.28.32.1. C-PVC pipes shall be used for all internal building water supply works while all external water supply pipes shall be PVC conforming to relevant BIS standard.

6.28.32.2. Rainwater pipe shall be of PVC conforming to relevant BIS standard.

6.28.32.3. All sewerage, wastewater and ventilation pipes shall be of HDPE conforming to relevant BIS standard.

6.28.32.4. MCR / LCR building, and Security room shall be connected to Sewage treatment facility including all associated works like Manholes etc.

6.28.33. Sewage Treatment Facility

6.28.33.1. The Contractor shall design & provide soak pit and RCC Septic tank for treatment of sewage and wastewater from MCR/LCR building and Security room. The septic shall be designed as liquid retaining structure conforming to IS:3370 for design loads as specified under Clause No.6.29.11. However, in case of ground water within 1.5m of finished grade level or the soil strata being of low permeability (permeability $\leq 10^{-6}$ 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 the required capacity and of proven design suitable for total of 15 people.

6.28.33.2. The design and drawings shall be submitted for approval prior to execution.

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**6.28.34. Pipe & Cable Trenches**

- 6.28.34.1. All trenches inside the building and transformer area shall be of RCC. The min. wall and base slab thickness shall be 100mm for depth \leq 850mm and 150mm for depths $>$ 850mm.
- 6.28.34.2. The trench shall be designed for lateral load due to external soil fill, ground water table at FGL and 5.0 KN/ Sqm surcharge. External trenches shall be kept min. 100mm above FGL to avoid entry of rainwater. In case of straight length of the trench being more than 40m, suitable expansion joints with PVC water stop shall be provided.
- 6.28.34.3. Internal trenches (inside buildings) shall be provided with chequered plate (min. 8mm thick with angle stiffeners as required) covers while external trench shall have precast concrete covers.
- 6.28.34.4. 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.
- 6.28.34.5. The trench cover (chequered or pre – cast both) shall be provided with suitable lifting hooks.
- 6.28.34.6. As required suitable MS insert plates shall be provided on trench wall to support the cable rack/ pipe.
- 6.28.34.7. 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 rainwater from the trench.
- 6.28.34.8. 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.

6.28.35. Transformer Yard Civil Works

- 6.28.35.1. Transformer and equipment foundations shall be founded on piles/isolated spread footings or block foundation depending on the final geotechnical investigation report and functional requirements.
- 6.28.35.2. In case of transformer oil tank capacity \geq 2000 liters, the transformer foundation shall have its own soak pit which would cover the area of the transformer and cooler banks, so as to collect any spillage of oil in case of emergency. The retention capacity of the soak pit shall be min. 1/3 volume of the transformer oil (excluding free space above gravel) and it shall be filled with granite stone gravel of size 40mm, uniformly graded, with 250 mm free space above gravel fill. The bottom floor of the soak shall have steep slope with a sump pit {not less than 1(v): 5 (h)} for quick drainage of and removal of oil in case of spillage.

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- 6.28.35.3. In case of transformer oil tank capacity more \geq 25000 litres, the soak pit shall be connected to a separate burnt oil pit through discharge pipe and shall be suitably sized to accommodate full oil volume (excluding free board above inlet pipe) of the transformer connected to it, without backflow. In this case the capacity of the soak pit may be reduced to min. 1/3rd of the total transformer oil volume. The burnt oil pit shall be further connected to oily water drainage system. The water shall be discharged into the nearest drain by gravity flow or pumping after suitable treatment as per statutory and code provisions.
- 6.28.35.4. Both, the transformer soak including side walls and the burnt oil pit shall be of RCC.
- 6.28.35.5. The oil collection pit shall be provided with 20mm dia. MS rung ladder with 2 coats of epoxy paint over 2 coats of primer, a manhole & removable RCC cover. The inside of the oil collection pit shall be plastered with 6 mm thick CM 1:6 and painted with 2 coats of epoxy paint over 2 coats of primer.
- 6.28.35.6. The area around the transformer and equipment shall be covered with uniformly graded granite stone gravel of size 40mm.
- 6.28.35.7. The area shall be provided with galvanized chain link fence of height min 1.8m with 3.5m wide gate. The specifications for fencing shall be similar to those specified under Cl. No. 31.3 except fence post which shall be of MS angle (ISA 50x50x6)
- 6.28.35.8. The Gate of size 3.5m shall be of MS pipe (medium class conforming to IS: 1161) frame with hard drawn steel wire fabric mesh (50x50mmx3mm thick conforming to IS: 1566) including all accessories and fittings.
- 6.28.35.9. In addition to main gate a wicket gate of MS pipe (medium class conforming to IS: 1161) frame with 1.0 m width with hard drawn steel wire fabric (50x50x3mm thick conforming to IS: 1566) shall be provided for man entry for maintenance purpose.
- 6.28.35.10. The transformer yard fencing work shall conform to CEIG requirements.
- 6.28.35.11. The requirement of fire barrier wall between transformers shall be as per Electricity Rules and IS: 1646 recommendations. Minimum wall thickness shall be 230mm for RCC wall and 300mm for masonry wall.

6.28.36. Water Supply & Cleaning of Modules

- 6.28.36.1. The contractor shall design and install the effective module cleaning system.
- 6.28.36.2. A regular supply of suitable quantity of water shall be ensured by the contractor to cater to day-to-day requirement of drinking water and for cleaning of PV modules during entire O&M period. For this necessary RO plant with bore well complete with suitable water pumping system shall be installed.

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- 6.28.36.3. The Contractor shall estimate the water requirements for cleaning the photovoltaic modules at least once in two weeks or at closer frequency as per the soiling conditions prevailing at site, in order to operate the plant at its guaranteed plant performance. Also, the contractor is required to plan the water storage accordingly with the provision of a tank of suitable capacity for this purpose. However, min. consumption of 2 Ltr. / Sqm of surface area of SPV module shall be considered in estimation of required quantity of water storage.
- 6.28.36.4. Water used for drinking & PV module cleaning purpose shall generally 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.
- 6.28.36.5. 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.
- 6.28.36.6. The module cleaning system shall include construction of RCC tank or supply and installation of Ground mounted PVC tank (s) of required storage capacity, pumps (including 1 No. standby pump), water supply mains and 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.
- 6.28.36.7. In case of over ground water storage tank, the contractor shall check its effect on plant performance through shadow analysis. The PVC 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.
- 6.28.36.8. The water supply mains could be either of GI, uPVC or HDPE, however, the vertical pipe connecting supply main to the discharge point shall be of GI.
- 6.28.36.9. Masonry chamber shall be provided for Main gate valve at pump end. Whereas, as per requirements, at other locations either a masonry or GI/ HDPE pipe chamber may be provided.
- 6.28.36.10. 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/cm² (5 MPa).
- 6.28.36.11. All the pipes thus laid shall be buried in ground at least 150mm below FGL or laid above ground clamping on suitable concrete support blocks. In case of above ground piping only GI pipes shall be used.

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**6.28.37. Underground Water Tank**

6.28.37.1. A suitable size water tank should be designed and installed.

6.28.37.2. The underground RCC tank shall be designed for following load conditions:

- External earth pressure + hydrostatic pressure due to ground water table (to be considered at FGL for design purposes) + Surcharge of 20 kN/ Sqm and Tank Empty.
- Tank full up to MWL and no external loads.

6.28.37.3. The design shall conform to IS: 3370 with maximum crack width of 0.1mm for wall, bottom slab and roof slab. Min. grade of concrete shall be M30 (M35 in coastal areas, marshy and saturated soils) conforming to IS: 456. Suitable construction joints shall be provided as per provisions of IS: 3370 (Part 1). Waterproofing admixture conforming to relevant BIS standard and of approved make shall be added to concrete as per manufacturer's recommendations.

6.28.37.4. The underground water tank shall be tested for water tightness as per the provisions of IS 3370 (Part-4). In case any leakage is noticed the same shall be repaired by injection of cement grout installing suitable nozzles around affected areas. The outside face of the water tank in contact with water and soil and underside of roof slab shall be painted with 2 coats of epoxy paint.

6.29. STRUCTURES**6.29.1. Transmission Line Structures**

6.29.1.1. Tower extensions & accessories and 11 kV, & 33 kV transmission poles, towers & accessories shall be designed following latest guidelines of respective SEB (State electricity board)/ STU (State transmission utility) and got approved from them before execution. In absence of SEB/ STU guidelines REC (Rural Electrification Corporation) standards may be followed. Support at corner with angle > 100 shall be provided with a 4-pole structure or a lattice tower structure. Use of PCC spun pole and RCC pole is not acceptable.

6.29.1.2. Approved copies of these designs & drawings shall be submitted to the Purchaser for reference and record.

6.29.2. Miscellaneous structures

6.29.2.1. Support structure for weather monitoring device

- i. Weather monitoring device shall be mounted on tubular steel pole of required height. The pole shall conform to IS: 2713.
- ii. The pole shall be secured to an independent RCC foundation structure through Base plate and Anchor bolt assembly.

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- iii. 200 long 20 dia. rods shall be welded to the pole at 300 mm C/c for access to the device for maintenance purposes.
- iv. The support structure shall be hot dip galvanized.

6.29.2.2. Support structures for SCB

- i. SCB shall not be supported by MMS and shall have an independent structural steel supporting frame of galvanized ISMC 75, secured to an independent RCC foundation structure.
- ii. The support structure shall be of adequate height to ensure either min. ground clearance of 1.2m to SCB unit or HFL + 100mm, whichever is higher.
- iii. Lightning Arrester Mast and Foundation
- iv. The LA mast shall be a self-supporting structure with GI tubular pole of required height. The pole shall conform to IS: 2713.
- v. The pole shall be secured to an independent RCC foundation structure through Base plate & Anchor bolt assembly.

6.30. QUALITY ASSURANCE AND INSPECTION OF CIVIL WORKS

6.30.1. Introduction

- 6.30.1.1. This part of the specification covers the sampling, testing and quality assurance requirement (including construction tolerances and acceptance criteria) for all civil and structural works covered in this specification.
- 6.30.1.2. This part of the technical specification shall be read in conjunction with other parts of the technical specifications, general technical requirements & erection conditions of the contract which covers common QA requirements. Wherever IS code or standards have been referred they shall be the latest revisions.
- 6.30.1.3. The rate for respective items of work or price shall include the cost for all works, activities, equipment, instrument, personnel, material etc. whatsoever associated to comply with sampling, testing and quality assurance requirement including construction tolerances and acceptance criteria and as specified in subsequent clauses of this part of the technical specifications.
- 6.30.1.4. The QA and QC activities in all respects as specified in the technical specifications/ drawings / data sheets / quality plans / contract documents shall be carried out at no extra cost.
- 6.30.1.5. The contractor shall prepare detailed construction and erection methodology scheme which shall be compatible to the requirements of the desired progress of work execution, quality measures, prior approvals from statutory authorities etc. if any and the same shall be got approved from the Engineer.

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6.30.1.6. If required, work methodology may be revised/ reviewed at every stage of execution of work at site, to suit the site conditions, work progress commensurate with project schedule by the contractor at no extra cost to the Engineer.

6.30.2. QA and QC Manpower

6.30.2.1. The contractor shall nominate one overall QA coordinator for the contract detailing the name, designation, contact details and address at the time of post bid discussions.

6.30.2.2. All correspondence related to Quality Assurance shall be addressed by the contractor's QA coordinator to the Engineer.

6.30.2.3. Purchaser / PMC shall address all correspondence related to Quality issues to the contractor's QA coordinator. The contractor's QA coordinator shall be responsible for co-ordination of Quality activities between various divisions of the contractor and their sub-vendors on the one hand & with Engineer on the other hand.

6.30.2.4. The contractor shall appoint a dedicated, experienced and competent QA & QC in-charge at site, preferably directly reporting to the Engineer In Charge, supported as necessary by experienced personnel, to ensure the effective implementation of the approved QAP.

6.30.2.5. The contractor shall finalize and submit a deployment schedule of QA & QC personnel along with their details to the Engineer for approval/ acceptance and further shall ensure their availability well before the start of the concern activity.

6.30.3. Laboratory and Field Testing

6.30.3.1. The contractor shall make necessary provisions to provide all facilities required for QA & QC activities by setting up a field laboratory for QA and QC activities in line with the indicative field QA & QC laboratory set-up.

6.30.3.2. The Laboratory building shall be constructed and installed with adequate facilities to meet the requirement of the envisaged test setup. Temperature and humidity controls shall be available wherever necessary during testing of samples.

6.30.3.3. The quality plan shall identify the testing equipment/ instrument, which the contractor shall deploy and equip the field quality laboratory for meeting the field quality plan requirements.

6.30.3.4. The contractor shall furnish a comprehensive list of testing equipment/ instrument required to meet the planned/scheduled tests for the execution of works for Engineer's acceptance/ approval.

6.30.3.5. The contractor shall mobilize the requisite laboratory equipment and QA & QC manpower at least 15 days prior to the planned test activity as per the schedule of tests.

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- 6.30.3.6. In case contractor desires to hire the services of any established laboratory nearby for any field tests then he shall ensure that the subject laboratory is well equipped with all requisite testing facilities and qualified QA & QC staff, and this shall not affect in anyway the work progress.
- 6.30.3.7. All equipment and instruments in the laboratory/ field shall be calibrated before the commencement of tests and then at regular intervals, as per the manufacturer's recommendation and as directed by the Engineer. The calibration certificates shall specify the fitness of the equipment and instruments within the limit of tolerance for use. Contractor shall arrange for calibration of equipment and instruments by an NABL / NPL accredited agency, and the calibration report shall be submitted to Engineer.
- 6.30.3.8. The tests which cannot be carried out in the field laboratory shall be done at a laboratory of repute. This includes selected IITs, NCB, CSMRS, reputed government / autonomous laboratories / organizations, NITs and other reputed testing laboratories. The test samples for such test shall be jointly selected and sealed by the engineer and thereafter these shall be sent to the concerned laboratory through the covering letter signed by Engineer. Test report along with the recommendations shall be obtained from the laboratories without delay and submitted to Engineer.
- 6.30.3.9. Based on the schedule of work agreed with the Engineer and the approved FQP, the contractor shall prepare a schedule of tests and submit them to the Engineer and organize to carry out the tests as scheduled/agreed.

6.30.4. Sampling and Testing of Construction Materials

- 6.30.4.1. The method of sampling for testing of construction materials and work / job samples shall be as per the relevant BIS / standards / codes and in line with the requirements of the technical specifications / quality plans.
- 6.30.4.2. All samples shall be jointly drawn, signed and sealed wherever required, by the contractor and the engineer or his authorized representative.
- 6.30.4.3. The contractor shall carry out testing in accordance with the relevant IS standards/ codes and in line with the requirements of the technical specifications / quality plans. Where no specific testing procedure is mentioned, the tests shall be carried out as per the best prevalent engineering practices and to the direction of the Engineer.
- 6.30.4.4. All testing shall be done in the presence of Engineer or his authorized representative in a NABL accredited / Govt. Laboratory acceptable to Engineer.
- 6.30.4.5. The test samples shall be jointly selected and sealed and signed by the Site-in-charge and thereafter these shall be sent to the concerned laboratory.
- 6.30.4.6. The test report along with the recommendations shall be obtained from the laboratory without delay and submitted to the Engineer.

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**6.31. PURCHASE AND SERVICE**

- 6.31.1.** All structural steel shall be procured only from main steel producers. In case of non-availability of some of the sections with main steel producers, the contractor may propose to procure the sections from the re-rollers of the main steel producers, the name of such re-rollers will have to be cleared by the Engineer for which details such as BIS approval, main steel producer's approval, past experience for production of sections of specified material, details of machines, plant, testing facilities etc.
- 6.31.2.** Confirmation that the process control and manufacturing of steel sections by re-rollers shall be same as that of main steel producers, that billets for re-rolling will only be sourced from main steel producers shall be furnished with regard to re-roller.
- 6.31.3.** For Module Mounting Structures (MMS), sources of steel other than those specified under this clause may also be used subject to the condition that they otherwise meet the requirements of the Technical Specifications / Bid documents. Even after clearance of re-rollers, induction of billets with identified and correlated Mill test certificates (MTC) in the process of re-rolling, sampling of steel, quality checks thereof and stamping of final product for further identification and correlation with MTC prior to dispatch shall be the responsibility of the contractor and these shall be performed in presence of the authorized representative of the main Contractor.
- 6.31.4.** Reinforcement steel shall be procured only from main steel producers and Mill test certificates (MTC) shall be obtained and submitted to the Engineer for correlation.

6.32. FIELD QUALITY PLAN

- 6.32.1.** Well before the start of the work, the contractor shall prepare and submit the Field Quality Plans to Purchaser for approval, which shall detail out for all the works, equipment, services, quality practices and procedures etc. in line with the requirement of the technical specifications to be followed by the contractor at site.
- 6.32.2.** This FQP shall cover all the items / activities covered in the contract / schedule of items required, right from material procurement to completion of the work at site.

6.33. GENERAL QA REQUIREMENTS

- 6.33.1.** The contractor shall ensure that the works, BOIs and services under the scope of Contract, whether manufactured or performed within contractor's works or at his subcontractor's premises or at the project site or at any other place of work, are in accordance with technical specification, applicable standards / codes, approved drawings / data sheets / quality plans and BOQ. All the work, BOIs and services shall be carried out as per the best prevalent engineering practices and to the directions of the Engineer.

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Equipment	UOM	Approx. Qty.
Cube molds for cement testing	nos.	4
Sieve shaker	nos.	1
Sieve for sand, coarse and fine aggregate	set	1
Sieve for coarse aggregate	set	1
Slump testing equipment	nos.	6
Oven	nos.	2
Physical balance	nos.	1
Thermometer	nos.	4
Burret	nos.	2
Measuring cylinder	nos.	9
Measuring flask	nos.	3
Compression testing machine	set	1
Cube mould for concrete	nos.	10
Mechanical weighing machine	nos.	1 (100 kg capacity)
Drum type concrete mixer (for trial mixes)	nos.	1
Proctor testing equipment	set	1

6.33.2. Notes

- The equipment listed above is indicative and minimum required. Additional equipment, if any, required for successful completion of work shall be provided /arranged by the contractor.
- All test reports / inspection reports shall be submitted in soft copy also and shall be available at site for easy access to the Engineer.
- Based on the schedule (L2/L3 Network), Quality control & Quality Assurance Work plan shall be finalized by the contractor and the same shall be submitted to Engineer for acceptance / approval.

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SECTION – VII

FORMS AND FORMATS

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BIDDER'S GENERAL INFORMATION

To

The Chief General Manager (NRE),
Assam Power Generation Corporation Limited
3rd Floor, Bijulee Bhawan,
Paltanbazar, Guwahati-781001

Sub: Bid No. APGCL/CGM NRE/PROJ/NAMRUP SOLAR EPC/2023/T4-2570 for Design, Engineering, Supply, Construction, Erection, Testing and Commissioning on turnkey basis of 25 MWac Ground Mounted Solar PV Power Project at Namrup in the state of Assam with Comprehensive Operation & Maintenance for five (5) year's period

1. Name of the bidder -----

2. Status of Firm/ Company:
[Mark √] ----- Company (Private Limited / Public Limited)

3. Number of years in the business -----

4. Registered Office Address: -----

5. Operational Address: -----
[If different from above] -----

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



6. Telephone No. & Fax No.: -----

7. E-mail ID & Website:

8. Licensed solar capacity to manufacture, if any:

Description of equipment	Size Capacity	Licensed Capacity	No. of MWp manufactured		
			2023-24	2022-23	2021-22

9. Plant Details:

- a) Location
- b) Description

10. Type of the solar equipment manufactured/supplied/installed during last 3 years.

Name of Equipment	Capacity/size/ Model	Nos. manufactured / supplied/ installed	Project to which supplies have been made	No. of orders in hand

11. Details of testing facilities available at works:

- a) List of testing equipment.
- b) Tests, which are carried out on items offered
- c) Details of product certification.

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- 12. Describe Quality Control Organization, if any, and give the organization chart.
 - a) Are goods offered subject to batch test, random sampling, or full 100% test for Quality check?
 - b) Are tests carried out by factory employees or by a separate testing agency?
 - c) Are independent quality Control Organization checks made and certificates issued?

- 13. ISO Certification [If any][If 'Yes', Please Furnish Details]:

- 14. Details of nearest service center to the project site

- 15. Names of three buyers to whom similar equipment have been supplied, installed and commissioned in the past to which reference could be made by us regarding the bidder's technical and delivery ability.

Signature of the Bidder

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**Bid Response Sheet No. 2****CHECKLIST OF FORMATS / DOCUMENTS TO BE UPLOADED / SUBMITTED WITH BID**
/ OFFER

Sr. No.	List of Documents/Formats	Whether Applicable (Yes/No)	Remark /Reference of bidder
1	Proof of payment towards tender processing fees.		
2	Earnest Money Deposit – BG /NEFT/RTGS		
3	Bid Response Sheet No. 1 to 23		
4	Undertaking towards No Deviation Annexure XVI		
5	Undertaking as per Annexure XVII		
6	Singed NIT Documents along with clarifications, amendments& addendums if any.		
7	Scanned copy of authority letter to submit the offer by the Digital Signature Certificate of the authority who have submitted the offer.		

Signature of the Bidder

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FINANCIAL INFORMATION

**FINANCIAL DATA FOR LAST THREE AUDITED FINANCIAL YEAR)
(on letter head of Statutory Auditor / Practicing CA)**

Sl. No.	Description	FY2022-23	FY2021-22	FY2020-21
1	Current Assets			
2	Current Liabilities			
3	Working Capital		Not Applicable	Not Applicable
4	Annual Turnover			
5	Paid up share capital			
6	Free Reserves & Surplus			
7	Net Worth of bidder			
8	Profits after taxes			

The above particulars have to be as per financial eligibility conditions stipulated in clause 3.1.3

Attached are copies of Audited Annual Financial Statements of previous three years including all related notes.

Signature of the Bidder

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Bid Response Sheet No. 4(a)

LETTER OF AUTHORITY FOR ATTENDING SUBSEQUENT 'NEGOTIATIONS' / 'PRE-BID MEETINGS' / 'UN-PRICE BID OPENING' / 'PRICE BID OPENING'

[Performa for Letter of Authority for Attending Subsequent 'Negotiations' / 'Pre-Bid Meetings' / 'Un-price Bid Opening' / 'Price Bid Opening']

Ref:

Date:

To

The Chief General Manager (NRE),
Assam Power Generation Corporation Limited
3rd Floor, Bijulee Bhawan,
Paltanbazar, Guwahati-781001

Sub: Bid No. APGCL/CGM NRE/PROJ/NAMRUP SOLAR EPC/2023/T4-2570 for Design, Engineering, Supply, Construction, Erection, Testing and Commissioning on turnkey basis of 25 MWac Ground Mounted Solar PV Power Projects at Namrup in the state of Assam with Comprehensive Operation & Maintenance for five (5) years period.

Dear Sir,

I/We, -----hereby authorize the following representative(s) for attending any 'Negotiations' / 'Meetings', 'Un-price Bid Opening', 'Price Bid Opening' and for any subsequent correspondence / communication against the above Bidding Documents:

[1] Name & Designation: -----
Signature: -----
Phone/Cell: -----
Fax: -----
E-mail: -----

[2] Name & Designation: -----
Signature: -----
Phone/Cell: -----
Fax: -----
E-mail: -----

We confirm that we shall be bound by all commitments made by aforementioned authorised representative(s).

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



Yours faithfully,

Place:

[Signature of Authorized Signatory of Bidder]

Date:

Name:

Designation & SEAL

Note: This "Letter of Authority for attending subsequent 'negotiations' / 'Pre-bid meetings' / 'Un-price bid opening' / 'Price bid opening'" should be on the "letterhead" of the Firm / Bidder and should be signed by a person competent and having the 'Power of Attorney' to bind the Bidder. Not more than 'two [02] persons per Bidder' are permitted to attend Pre-bid meeting, "Techno-commercial / Un-price" & "Price Bid" Openings.

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PROFORMA OF LETTER OF AUTHORITY

TO

The Chief General Manager (NRE),
Assam Power Generation Corporation Limited
3rd Floor, Bijulee Bhawan,
Paltanbazar, Guwahati-781001

Sir,

Sub: APGCL's Bid No. APGCL/CGM NRE/PROJ/NAMRUP SOLAR EPC/2023/T4-2570

We _____ confirm that Mr. _____ (Name and address) as authorized to represent us to submit bid, negotiate and conclude the agreement on our behalf with you against Bid Invitation No. _____ for hiring of services for _____.

We confirm that we shall be bound by all and whatsoever our said representative shall commit.

Yours Faithfully,

Signature: _____

Name & Designation: _____

For & on behalf of: _____

Note: This letter of authority shall be on printed letter head of the Bidder and shall be signed by a person competent and having the power of attorney (power of attorney shall be annexed) to bind such Bidder.

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DECLARATION

To

The Chief General Manager (NRE),
Assam Power Generation Corporation Limited
3rd Floor, Bijulee Bhawan,
Paltanbazar, Guwahati-781001

Sub: Bid No. APGCL/CGM NRE/PROJ/NAMRUP SOLAR EPC/2023/T4-2570 for Design, Engineering, Supply, Construction, Erection, Testing and Commissioning on turnkey basis of 25 MWac Ground Mounted Solar PV Power Projects at Namrup in the state of Assam with Comprehensive Operation & Maintenance for five (5) years period.

Dear Sir,

We hereby confirm that we are not under any 'liquidation', any 'court receivership' or similar proceedings and 'bankruptcy' and we agree that if any noticed in future, our Bid may be rejected / terminated.

In case the bidder has any dispute in court of law of any kind which can affect the manufacturing, supply, installation, commissioning of solar system & O&M Contract, in such case the bidder shall furnish the status of all cases along with all relevant documents.

Signature of the Bidder

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**TENDER ACCEPTANCE LETTER**

Sub: Bid No. APGCL/CGM NRE/PROJ/NAMRUP SOLAR EPC/2023/T4-2570 for Design, Engineering, Supply, Construction, Erection, Testing and Commissioning on turnkey basis of 25 MWac Ground Mounted Solar PV Power Projects at Namrup in the state of Assam with Comprehensive Operation & Maintenance for five (5) years period.

Tender Issuing Authority of APGCL -

Tender Reference No.-

Name of Tender/work –

Dear Sir,

1. I/We have downloaded /obtained the tender document(s) for the above mentioned 'Tender /works' from the web site(s) namely: <https://assamtenders.gov.in/>
2. I/We hereby certify that I/We have read the entire terms & conditions of the tender documents (including all documents like annexure(s). etc.), which form part of the Contract Document and I/We shall abide hereby by the terms/conditions/clauses contained therein.
3. The corrigendum(s) issued from time to time by your department/organization too have also been taken into consideration, while submitting this acceptance letter.
4. I/We hereby unconditionally accept the tender conditions of above-mentioned tender document(s) /corrigendum(s) in its totality /entirety.
5. I/We offer to provide the Services in conformity with the Bidding Documents.
6. Our Bid shall be valid for a period of One-Eighty (180) days from the date fixed for the submission deadline in accordance with the Bidding Documents, and it shall remain binding upon us and may be accepted at any time before the expiration of that period;
7. I/We confirm that we are financially qualified and compliant to bid for this project in accordance with the minimum requirements for qualification of bidders for this project;
8. I/We are not participating, as Bidders, in more than one Bid in this bidding process in accordance with the Bidding Documents
9. I/We do hereby declare that on the date of bid submission i.e. {indicate date) our Firm has not been banned/blacklisted/delisted by any of the Central/State Departments/PSUs/APGCL/APDCL/AEGCL/Ministry of Power, Govt. of India, any corporation/department of Government of Assam for any reason and nothing have been concealed in this regard.
10. I/We certify that all information furnished by our Firm is true & correct and in the event that the information is found to be incorrect/untrue or found violated, then your department organization shall without giving any notice or reason therefore or summarily reject the bid or terminate the contract, without prejudice to any other rights or remedy including the forfeiture of the full said Earnest Money Deposit absolutely.

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



-
11. I/We understand that this Bid, together with your written acceptance thereof included in your Letter of Acceptance of Bid, shall constitute a binding contract between us, until a formal Contract is prepared and executed.
 12. I/We understand that you are not bound to accept the lowest bid or any other bid that you may receive.

Yours faithfully,

(Signature of the Bidder, with Official Seal)

(This letter shall be duly signed by the bidder and is to be uploaded on e-procurement website.)

Signature of the Bidder

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**UNDERTAKING FOR OBSERVING FAIR AND ETHICAL PRACTICES**

Name of the Bidder –

Tender No. -

Tender Issuing Authority of APGCL -

I/We, the undersigned do hereby confirm that at the time of submission of our offer/bid against above indicated tender we have observed fair and ethical practice, not concealed any material information and have not submitted any misleading facts or statements in our offer. In case, during the tendering process or during execution of the order, if APGCL determines in contrary to above, then APGCL will have right to reject the offer/terminate the contract if awarded and to initiate action as deemed fit as per terms & conditions of contract.

Place:

Date:

Yours faithfully,
Signature of the bidder with seal

(This form shall be duly filled-up and signed by the bidder and to be uploaded on e-procurement website.)

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**UNDERTAKING FOR SUCCESSFUL EXECUTION OF CONTRACTS AWARDED TO
BIDDER EARLIER**

Name of the Bidder –

Tender No.-

Tender Issuing Authority of APGCL -

I / we, the undersigned do hereby declare that the contracts awarded to us, as per the credentials submitted against above indicated tender, had been successfully executed without any default.

In the event of any such information pertaining to the aforesaid matter found to be not correct at any given point of time either during the bidding stage or at the course of the contract my bid/contract shall be liable for cancellation I termination without any notice at the sole discretion of the APGCL and our EMD/Security Deposit shall be liable to be forfeited.

Place:

Date:

Signature of the Bidder

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**Bid Response Sheet No. 9 A**

PROFORMA FOR FURNISHING DETAILS OF PAST EXPERIENCE IN SOLAR ENERGY PROJECTS DURING LAST SEVEN YEARS (TURNKEY PROJECT)

- a) Total Aggregate capacity of all solar projects executed on turnkey basis in India in the last seven years in -----MW.
- b) Number of solar project commissioned in FY 2023-24 in India & in Assam
.....
- c) Attach separate sheet for each solar project as per BEC requirement

Sl. No.	Description	
1	Name of works & Owner's address, contact person with telephone numbers.	
2	Detailed scope of work.	
3	Type of PV technology and Inverters (KW) used	
4	Capacity of the plant (DC/AC), solar module rating (Wp)	
5	Commissioning time as per contract.	
6	Actual commissioning time.	
7	If delayed, then reasons for delay.	
8	Period of successful operation.	
9	Additional information, if any.	

- d) Contract Document/ Work order and completion certificate from the owner shall be required to be submitted along with this BRS for each project as per BEC requirement.

Signature of the Bidder

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Bid Response Sheet No. 9 B

PROFORMA FOR FURNISHING DETAILS OF PAST O&M EXPERIENCE IN SOLAR ENERGY PROJECTS DURING LAST SEVEN YEARS (COMPREHENSIVE)

- a) Total Aggregate capacity of all solar plants maintained on comprehensive basis in India in the last seven years in -----MW.
- b) Attach separate sheet for each solar plant as per BEC requirement

Sl. No.	Description	
1	Name of works & Owner's address, Project location, contact person with telephone numbers.	
2	Detailed scope of work.	
3	Type of PV technology and Inverters (KW)	
4	Capacity of the plant (DC/AC), solar module rating (Wp)	
5	Period of O&M services rendered	
6	Total contract period	
7	Compensation on account of low performance ratio/ Guaranteed generation if any	
8	Additional information, if any.	

- c) Contract Document/ Work order and completion certificate from the owner shall be required to be submitted along with this BRS for each project as per BEC requirement.

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For solar Bid Response Sheet No. 10

Committed CUF for 5 Years Period

1. The Bidder shall provide CUF, based on the Performance Ratio considering offered design configuration and all local conditions, solar insolation, windspeed and direction, air temperature & relative humidity, barometric pressure, rainfall, sunshine duration, grid availability and grid related all other factors and losses due to near shading, incidence angle modifier, irradiance level, temperature loss array loss, Module quality loss, Module array mismatch loss and various inverter losses, etc. To assess/verify feasibility of quoted CUF, bidders are required to provide computation documents along with considered factors based on which CUF has been computed.
2. Bidder shall furnish detailed calculations for CUF FOR 5 YEARS PERIOD of the 25 MWac solar power plant based on solar irradiation

Sl.No.	Year	Capacity Utilization Factor (%)	Annual Degradation (%)
		(A)	(B)
1	1 st		
2	2 nd		
3	3 rd		
4	4 th		
5	5 th		
	TOTAL		-

Note: Bidders are advised to refer Appendix-I of the tender prior to quoting CUF

Minimum CUF requirement is 21% for the first year of O&M.

Minimum PR% requirement is 78%

Signature of the Bidder

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TECHNICAL PARTICULARS OF QUOTED SOLAR PV MODULE FOR 25 MWac GROUND MOUNTED SOLAR POWER PROJECT

Technology offered: Monocrystalline/Bifacial/Monofacial Monocrystalline

Total DC capacity: MWp

Rated Capacity of Solar Module:..... Wp

MMS: Fixed Tilt/ Seasonal Tilt/ Tracking (Single/Dual axis)

Details of offered crystalline PV Modules

S. N.	Particulars	Offered
1.	PV Module Manufacture name & Country	
2.	PV Module type	
3.	Product Code	
4.	No. of PV cells per Module	
5.	Solar Module frame material	
6.	Module dimensions	
7.	Output Cables	
8.	Junction Box	
9.	Construction Front Back	
10.	Max Temperature rise of solar cells under severe working conditions over Max. Ambient Temp.	
11.	Nominal voltage	
12.	Nominal Wattage	
13.	Power Tolerance	

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S. N.	Particulars	Offered
14.	Peak power voltage (Vmp)	
15.	Peak power current (Imp)	
16.	Open circuit voltage (Voc)	
17.	Short circuit current (Isc)	
18.	Weight of each module (Kg)	
19.	Fill Factor	
20.	Standards / Approvals from International Agencies	
21.	Module is suitable to operate at 50° ambient	
22.	Cell efficiency	
23.	Module efficiency	
24.	Temp cycling range	
25.	Maximum System Voltage 600/1000V	
26.	Temp coefficient of Isc	
27.	Temp coefficient of Voc	
28.	Temp coefficient of power	

Signature of the Bidder

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Bid Response Sheet No.12

TECHNICAL DATA FOR TRANSFORMER

(To be submitted for each category of Transformer separately)

SI. No.	Description	Unit	Specification
1.	Service	Outdoor / indoor	
2.	Type	Outdoor / indoor	
3.	Rating	kVA	
4.	Rated frequency	Hz	
5	Number of phases:		
	HV	No	
	LV	No	
	Neutral (separate outside)	No	
6.	Rated Voltage		
	a) HV winding	kV	
	b) LV winding	kV	
7.	Vector group	Star / Delta	
8.	Type of cooling	ONAN/ ONAF	
9.	Insulation level:		
	a) Power frequency withstands (HV/LV)	kV rms	
	b) Impulse withstands voltage (HV/LV)	kV	
	c) Power frequency withstands (neutral)	kV rms	
10.	Method of earthing		
11.	Duty		
12.	Short circuit level	kA	
13.	Off circuit tap changer:		
	a) Range	%	
	b) In steps of		
	c) Tapping provided on HV side		
14.	Tap changer type		
15.	Temperature rise above 40 ⁰ C ambient:		

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ASSAM POWER GENERATION CORPORATION LIMITED
25 MW Solar PV Power Projects at Namrup, Assam



SI. No.	Description	Unit	Specification
	a) Top of oil by thermometer	°C	
	b) Winding by resistance	°C	
16.	Terminal details:		
	a) HV side		
	b) LV side		
17.	Losses (at 75°C and principal tapping):		
	a) No load loss at rated voltage and frequency	kW	
	b) Load loss at rated current (ONAN)	kW	
	c) Total loss maximum rated power	kW	
18.	Efficiency at 75 °C and 0.9 PF:		
	a) At full load (ONAN)	%	
	b) At 75% load (ONAN)	%	
	c) At 50% load (ONAN)	%	
19.	Hot spot temperature in winding limit to	°C	
20.	Shipping dimensions:		
	a) Height	mm	
	b) Breadth	mm	
	c) Length	mm	
21.	Painting		
22.	Reference standards		
23.	Make		
24.	Minimum creep age distance	mm/kV	
25.	Overall dimensions (L x B x H)	mm	
26.	% Impedance (±10% Tolerance)	%	
27.	Quantity of Oil	liters	
28.	Details of Instruments and protection provided with the Transformer (Make & Type)		

Signature of the Bidder

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TECHNICAL PARTICULAR FOR INVERTER

Details	Offered
Make	
Nominal Output AC voltage	
Output Frequency	
Continuous Rating	
AC over/ undervoltage over/ underfrequency protection	
Total Harmonic Distortion	
DC Side	
Continuous Rating	
Maximum DC voltage Range	
MPPT range	
Control Type	
Waveform	
Parallel Operation Power Control	
THD	
Efficiency	
Internal Protection System (Using electronic detection)	
Alarm Signals	
Front Panel Display (LCD)	
Front Panel Controls (via keypad)	
Front Panel Indicators	
RFI	

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



Details	Offered
Circuit Breakers	
Earthing Provisions	
ENVIRONMENTAL Operating Temperature Range Humidity Enclosure	
Parameters Dimensions Weight	
DATA LOGGING Communication Interface	
System Features	
Logging Attributes	

Signature of the Bidder

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Bid Response Sheet No.14

TECHNICAL PARTICULARS OF VCB/SF6

Sl. No.	Particulars	Specification
1.	Service	Outdoor/Indoor
2.	Make & Type	
3.	Rating	
4.	Circuit breaking capacity (KA)	
5.	Short circuit withstand capacity	
6.	Operating time	
7.	Wt. of V.C.B.	
8.	Insulation level	
9.	Impulse withstand voltage	
10.	Overall dimension	

Note: Bidder is required to submit single line diagram of solar projects till metering at point grid integration.

Signature of the Bidder

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SOURCE OF COMPONENTS

Sl. No.	Item Description	Vendor	Type offered	Source country
1	Solar Modules			
2	Module mounting Structure			
3	Invertors			
4	Inverter Transformer and Auxiliary Transformer			
5	HT Switchgear			
6	LT Switchgear			
7	DC cables			
8	AC cables			
9	Communication cable			
10	Auxiliary Supply System			
11	SCADA			
12	Weather monitoring system			
13	CCTV Camera			
14	Fire alarm System			
15	DC Distribution Board			
16	A C Distribution Board			
17	Plant Monitoring Desk			
18	Isolation Transformers			
19	Lighting			
20	Outgoing Feeder Cable			
21	Lightning and Over Voltage Protection			
22	UPS			

Signature of the Bidder

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Bid Response Sheet No.16

MINIMUM SPARES TO BE MAINTAIN AT SITE

S.NO.	ITEMNAME	QUANTITY	UoM
1	Solar PV Module	0.10%	Of the supplied Qty
2	String Inverter	5	No.
3	DC Cable (Solar Module to Inverter) (Red &Black)	1.00%	meter
4	AC Cable (Inverter to ACCB)	2.00%	Of the supplied Qty
5	AC Cable (ACCB to Transformer)	5.00%	Of the supplied Qty
6	MC4Connectors	5.00%	% Of the supplied Qty
		5.00%	% Of the supplied Qty
7	Y Connectors	5.00%	% Of the supplied Qty
8	DC Fuse	5.00%	% Of the supplied Qty
9	HRCFUSE	5.00%	% Of the supplied Qty
10	Surge Protection Device (800VAC)	2	Nos.
11	Cable Lugs (Suitable for Cable Size) (Al/CuTinCoated/BimetallicLugsRingtype)	5.00%	% Of the supplied Qty
12	Cable Glands (Suitable for Cable Size)	5.00%	% Of the supplied Qty
13	Cable Sleeves Red/Yellow/Blue colour	5.00%	% Of the supplied Qty
14	Optical fiber cable connector	5.00%	% Of the supplied Qty
15	Indoor HT Cable Termination Kits	2	Nos.
16	Outdoor HT Cable Termination Kits	2	Nos.
17	HT Cable Jointing Kits	3	Nos.

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



S.NO.	ITEMNAME	QUANTITY	UoM
18	Cable Tie	5.00%	% Of the supplied Qty
19	Nylon Cable Fasteners	5.00%	% Of the supplied Qty
20	Insulation Tape	5.00%	% Of the supplied Qty
21	PU Foam Spray	5.00%	% Of the supplied Qty
22	Zinc Cold Galvanizing Spray	5.00%	% Of the supplied Qty
23	CuCable2.5Sqmm	50	m
24	CuCable1.5SqmmRED	50	m
25	CuCable1.5SqmmYELLOW	50	m
26	CuCable1.5SqmmBLACK	50	m
27	MCB32A,4P415V	4	Nos.
28	MCB10A,2P415V	6	Nos.
29	MCB16A,4P415V	6	Nos.
30	MCB6A,2P415V	10	Nos.
31	Electronic Hooter	1	No.
32	UPS Cooling Fan	1	No.
33	Auxiliary Transformer of same specs supplied	1	No.
34	Danger boards and signages	5.00%	% Of the supplied Qty
35	SCADA System, its HMI and all field instruments	1%	% Of the supplied Qty
36	Other Miscellaneous Items	5.00%	% Of the supplied Qty

Signature of the Bidder

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Bid Response Sheet No.17

TOOL & TACKLES TO BE MAINTAIN AT SITE

S. No.	Tools	Specifications	Qty	UoM
1	Digital Multi Meter	Photovoltaic Voltage measurement, Data logging and Bluetooth, if available, will make for the perfect Digital Multimeter for all technical needs related to solar plants, installations and maintenance. Having a 1500V DC measuring range makes it useful for Solar Applications specifically	2	Set
2	Clamp Meter	It should be able to measure up to 1000A in both ranges through the jaws and up to 3000A through flexible clamp for inverters, breakers, combiner boxes and disconnects. It should also be able to measure up to 1500V AC and 1500V DC for photovoltaic cells as well as the loads and line frequency in the circuits.	2	Set
3	Insulation tester	Digital Insulation Testers able to measure insulation resistance up to 10kV are suitable for Solar technicians and professionals	2	Set
4	Battery Analyzer or Tester	A good Battery Impedance Tester should be capable of accurately measuring internal Resistance, Voltage, Current and Temperature of the battery. A PC interface & software feature will help further to analyses the data collected and get comprehensive trend reports.	2	Set
5	Battery Operated Drill		4	Set
6	Screwdrivers Set		4	Set
7	Wire Stripper / Cutter		4	Set
8	Lugs / MC4 Crimping Tools		4	Set
9	Measuring Tape		4	Set

NOTE: The above tools mentioned in the table are of general use nature. Any general / special tool required for testing and commissioning of the plant / any equipment shall be provided by the contractor. Purchaser if asks to test any equipment, the required tools shall be arranged by the contractor.

Signature of the Bidder

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DRAFT ACTIVITY CHART

Bidder shall furnish Bar Chart for the following activities and his plan to for implementation of the project to meet the commissioning date. This information shall be in addition to the detailed project schedule and other information as required. The activities indicated herein are minimum activities for which bidder shall furnish the required information. Bidders are encouraged to furnish more detailed information in their offer.

Sl. No.	Activity
1	Site grading, levelling, clearing of vegetation
2	Design of structures, foundation, control room and other associated buildings boundary wall, security hut, overall plant design and drawings, submission to Purchaser and arranging approval from Purchaser.
3	Construction of Approach Road & Internal Road, foundations of module structures, transformers, Inverter, construction of control Room Extension of bay and various buildings, Water storage Tank etc.
4	Supply of modules, mounting structures, Inverters associated DC Equipment and Materials
5	Supply of balance materials & items of Solar Plant
6	Transformers, AC Distribution Board, DC distribution Board, 433 V XLPE Power cables, control cables, DC side Cables and Termination of line
7	Permanent Water Supply
8	Commissioning of Plant Erection of Modules, Mounting
9	Approval from Chief Electrical inspector of State Govt
10	Completion of plant in all respect
11	Central Monitoring and Control System SCADA

Signature of the Bidder

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LIST OF COMPONENTS HAVING LIFE LESS THAN 5 YEARS

Sl. No.	Description of Item	Make	Expected Life

Signature of the Bidder

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AFFIDAVIT FOR NO BANNING / BLACKLISTING / DELISTING

(TO BE EXECUTED ON Rs. 100/- NON JUDICIAL STAMP PAPER)

Name of the Bidder -

Tender No.-

Tender Issuing Authority of Purchaser-

1. It is to declare that on the date of bid submission i.e. (indicate date) 13.03.2024. We (Name of the Bidder) are not banned/blacklisted/delisted by any of the Central/State Departments/PSUs/OWNER/Successor Companies of ASEB/Department of Energy, Government of Assam for any reason and nothing has been concealed in this regard.
2. I/We hereby further declare that none of my/our sister-concern/group/partnership concerns/associate concerns are participating in this tender.

AND

I/We have also read and understood the policy on Banning procedure shown at Annexure-XIV.

Place:

Date:

Yours faithfully,

Signature of the bidder with seal

(This form shall be duly filled-up and signed by the bidder and to be uploaded on e- procurement website & the physical copy of the same is to be submitted after opening of the tender.)

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PREFERRED VENDOR LIST FOR ITEMS

Serial	Description of	Preferred manufacturers
SECTION- I - Major Equipment		
1	Solar Modules	1. Mundra Solar PV Ltd.
		2. Vikram Solar Ltd.
		3. Emmvee Photovoltaic Power Pvt. Ltd.
		4. Tata Power Solar Systems Ltd.
		5. RenewSys India Pvt. Ltd.
		6. Goldi Solar Pvt. Ltd.
		7. Waaree Energies Ltd.
		8. Jakson Engineers Ltd.
		9. Premier Energies Limited.
		10. OR ALMM Approved List
2	String Inverter	1. Sungrow
		2. FIMER (ABB)
		3. Polycab
		4. TBEA
		5. Huawei
		6. Sineng
3	STRUCTURAL STEEL	1. TISCO
		2. SAIL
		3. Vizag Steel
		4. IISCO
		5. Jindal
		6. Essar
		7. TATA
		8. JSW
4	Solar Cable	1. LAPP
		2. Apar
		3. Polycab
		4. Leoni
5	Transformers	1. CG Power & Industrial Solutions Ltd
		2. EMCO Ltd
		3. Kanohar Electricals Ltd
		4. Transformers & Rectifiers (I) Ltd
		5. SCHENIDER ELECTRICAL
		7. Raychem RPG Ltd
6	Earthing	1. JMV
		2. True power
		3. Sabo

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ASSAM POWER GENERATION CORPORATION LIMITED
25 MW Solar PV Power Projects at Namrup, Assam



Serial	Description of	Preferred manufacturers
		4. DHEN
		5. VNT
7	Lighting Arrestor	1. JMV
		2. True power
		3. Sabo
		4. Dhen
		5. VNT
8	Weather Stations	1. Kipp and zonen
		2. Meteo Control
		3. Campbell
		4. Lufft
		5. IMT
9	HT Switchgear and accessories	1. Siemens
		2. Schneider
		3. ABB
10	Protection (Numerical) Relays	1. L&T
		2. ALSTOM
		3. SIEMENS
		4. Areva
		5. Universal Electrical
		6. Jyoti
		7. ABB
		8. Easun Reyrolle
11	Measuring Instruments	1. AEP
		2. Rishab
		3. AE
		4. IMP
		5. MECO
		6. Schenider
12	Current Transformers	1. Kappa
		2. Pragati
		3. Indcoil
		4. Precise
		5. AE
		6. G&M
13	Digital Meters	1. Conzerve
		2. Siemens
		3. AE
		4. RISHAB
		5. L&T
		6. SECURE METER
14		1. Comet industries

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



Serial	Description of	Preferred manufacturers
	Non-Flame-Proof Cable Glands	2. HMI
		3. Gripwell
		4. Forward Engineering
		5. Cosmos
15	Optical Fiber Cable & Assoc. items	1. BIRLA ERICSSON OPTICAL LIMITED
		2. FINOLEX CABLES LTD
		3. RPG CABLES LTD
16	RS485 / Ethernet Cable	1. LAPP
		2. KEC (RPG)
		3. Polycab
17	HT and LT Cable	1. Universal Cables Ltd.
		2. Finolex Cables Ltd.
		3. Nicco Corporation Ltd.
		4. Torrent Cables Ltd.
		5. KEI Industries Ltd.
		6. Polycab Wires P.Ltd.
		7. RPG Cables Ltd.
		8. Havells
		9. Apar
18	SCADA	1. GE
		2. ABB
		3. Schneider
		4. Emerson
		5. Rockwell
		6. Siemens
19	PLC	1. ABB
		2. Schneider
		3. Mitsubishi
		4. Emerson
		5. Rockwell
		6. Siemens
20	UPS	1. Hitachi
		2. APC
		3. GE
		4. ABB
		5. VERTIV ENERGY
		6. Luminous
		7. Microtek
21	MC4 & Y Connectors	1. Leoni
		2. LAPP
		3. Staubli
		4. Phoenix

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



Serial	Description of	Preferred manufacturers
22	Fire Fighting System	1. Newage Fire Protection Pvt. Ltd.
		2. HD Fire Protect Pvt. Ltd.
		3. Firetech Equipment & Systems Pvt. Ltd.
		4. Integrated Fire Protection Pvt. Ltd.
		5. Vimal Fire Protection Pvt. Ltd.
23	Security & Surveillance	1. Honeywell
		2. Bosch
		3. Schneider
		4. CP Plus
SECTION- II - OTHER ITEMS		
1	THIRD PARTY INSPECTION AGENCY	1.Bureau Veritas Industrial Services
		2.SGS India Pvt.Ltd
		3.Germanischer Lloyds Industrial Services Pvt. Ltd.
		4. Indian Register of Shipping
		5.Det Norske Veritas
		6.Lloyds Register Industrial Services Ltd.
		7.Engineers India Ltd.
		8.Projects & Development India Ltd.
		9.UL India Pvt. Ltd.
		10.MECON Engineers
		11.TUV

Note: Bidder may opt to choose equipment of any make, other than specified above with prior approval of Purchaser and/or vendor registration as per procedure of Purchaser.

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Bid Response Sheet 22

Format for Declaration on Bidder's relation to Directors (On Bidders' Letter head)

Dated.....

This has reference to our proposed bid / Contract (NIT NO. APGCL/CGM NRE/PROJ/NAMRUP SOLAR EPC/2023/T4-2570) for along with Engineering, Procurement, Construction, Installation, Testing, Interconnection to AEGCL (33 kV) & Commissioning of 25 MW (AC) Solar Photovoltaic Grid Connected Power Plant including associated power evacuation & transmission system on turnkey basis and O&M for 5 (five) years at Namrup Thermal Power Station, District Dibrugarh, Assam 786621, India.

We certify that to the best of my / our knowledge.

- a. I am not a relative of any Director of APGCL.
- b. We are not a firm in which a Director of APGCL or its relative is a partner.
- c. I am not a partner in a firm in which a Director of APGCL, or its relative is a partner.
- d. We are not a private company in which a Director of APGCL is a member or director.
- e. We are not a company in which Directors of APGCL hold more than 2% of the paid-up share capital of our company or vice-versa.

Signature:

Designation:

Name:

Organization:

Address:

Phone:

Email:

Seal of the Bidder

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Bid Response Sheet 23

Format for Execution Timeline (on Bidders' letter head)

DETAILED PROJECT SCHEDULE

**Bidder shall enclose Gantt chart/ PERT chart for the schedule of activities*

1. *Supply of all the items.*
2. *Complete installation plan (in detail)*
3. *Testing of the complete Plant*
4. *Pre-Commissioning of Complete Plant.*
5. *Commissioning of the Plant.*
6. *Performance Guarantee Testing of the Plant.*

NOTE: The Bidder shall ensure that the entire work is completed within 12 months from date of contract signing.

Signature:

Designation:

Name:

Organization:

Address:

Phone:

Email:

Seal of the Bidder

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ASSAM POWER GENERATION CORPORATION LIMITED
25 MW Solar PV Power Projects at Namrup, Assam



Tender No. Bid Response Sheet - P-I (For reference, bidder to refer online portal)

Name of the Bidder/ Bidding Firm / Company:				
PRICE SCHEDULE				
(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevant columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)				
Sl. No.	Item Description	BASIC RATE IN INR	SUB TOTAL AMOUNT With Taxes	SUB TOTAL AMOUNT In Words
1	2	13	54	55
1	PRICE QUOTED BY BIDDER Design, engineering, manufacture, supply & delivery at site(s) of Solar Project consisting of PV modules, inverters, Supporting structure, etc.; Central Monitoring and Control System (CMCS), control panels, power & control cables, LT switch gear , transformers, DC system etc. carrying out required civil work; erection & commissioning of solar Project, internal line to Pooling substation, Pooling Station and Line from Pooling substation to Switchyard of generating power Project ,arranging transit insurance of all equipment; storage at site(s) and other auxiliaries till commissioning and take over, and all other works enabling Solar power project work complete in all respects as per the scope of work inclusive of all types of taxes, duties, levies etc. but exclusive of GST for 25 MW .			
1.1	Total Cost for Supply of Equipment	0.00	0.00	INR Zero Only
1.2	Total Cost for Construction, Erection & Commissioning	0.00	0.00	INR Zero Only
1.3	Comprehensive Charges for Operation and Maintenance	0.00	0.00	INR Zero Only
Total in Figures			0.00	INR Zero Only
Quoted Rate in Words		INR Zero Only		

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



Note:
1. The total amount of the break-up (P-II + P-III + P-IV) should match with the lump sum total amount quoted on turnkey basis in the price bid (Bid Response Sheet No. P-I).
2. The Basic Rate should be written in figures only.
3. Any item of work not mentioned in the above particulars but written elsewhere in the scope of work or in Technical Specification or essentially required for completion of works, proper operation and maintenance of solar project, safety of equipment and operating personnel shall be deemed to have been included in the above particulars.
4. The total amount with GST mentioned at this page shall be taken into consideration for evaluation of bids.
5. The Basic Rates quoted should be inclusive of all taxes, duties and levies but excluding GST.
6. Bidder shall offer firm Basic Rates. The quote by the successful bidder must remain firm during the execution of the contract and not subject to variation on any account.
7. During currency of the Contract, any statutory changes in taxes and duties will be to Purchaser's account on submission of documentary evidence.

signature of the Bidder

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Tender No. Bid Response Sheet - P-II (For reference, bidder to refer online portal)

BREAK-UP OF PRICE FOR SUPPLY OF EQUIPMENT FOR CAPACITY OFFERED

Name of the Bidder/ Bidding Firm / Company:						
<u>PRICE SCHEDULE</u>						
(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevant columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)						
Sl. No.	Item Description	BASIC RATE IN INR	GST %	GST (IN INR)	SUB TOTAL AMOUNT With Taxes	SUB TOTAL AMOUNT In Words
1	Supply of Solar power system complete in all respect (total cost) Break up price					
1.01	Module			0.00	0.00	INR Zero Only
1.02	Inverter			0.00	0.00	INR Zero Only
1.03	MMS			0.00	0.00	INR Zero Only
1.04	Transformer			0.00	0.00	INR Zero Only
1.05	DC Cable			0.00	0.00	INR Zero Only
1.06	AC Cable			0.00	0.00	INR Zero Only
2	Supply of Central Monitoring & Control System (CMCS) complete in all respect with necessary software, hardware, cables etc.			0.00	0.00	INR Zero Only
3	Supply of balance equipment, material and associated electrical work complete in all respects including Power Evacuation			0.00	0.00	INR Zero Only
4	Civil supply within the Solar Project complete in all respect			0.00	0.00	INR Zero Only

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5	Minimum mandatory spares as specified under BRS 19			0.00	0.00	INR Zero Only
6	Any other item not defined in SOR -PII			0.00	0.00	INR Zero Only
Total in Figures					0.00	INR Zero Only
Quoted Rate in Words		INR Zero Only				

Note
1. The Basic Rate and GST should be written in figures only.
2. Any item of work not mentioned in the above particulars but written elsewhere in the scope of work or in Technical Specification or essentially required for completion of works, proper operation and maintenance of Solar Project, safety of equipment and operating personnel shall be deemed to have been included in the above particulars.
3. The total amount Including GST mentioned at this page shall be taken into consideration for evaluation of bids.
4. The Basic Rates quoted should be inclusive of all taxes, duties and levies but excluding GST.
5. Bidder shall offer firm Basic Rates. The quote by the successful bidder must remain firm during the execution of the contract and not subject to variation on any account.
6. During currency of the Contract, any statutory changes in taxes and duties will be to Purchaser 's account on submission of documentary evidence.

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25 MW Solar PV Power Projects at Namrup, Assam



Tender No. Bid Response Sheet - P-III (For reference, bidder to refer online portal)

BREAK-UP OF COST FOR CONSTRUCTION, ERECTION & COMMISSIONING FOR CAPACITY OFFERED

Name of the Bidder / Bidding Firm / Company:						
PRICE SCHEDULE						
(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevant columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)						
Sl. No.	Item Description	BASIC RATE IN INR	GST %	GST (IN INR)	SUB TOTAL AMOUNT With Taxes	SUB TOTAL AMOUNT In Words
1	COST FOR CONSTRUCTION, ERECTION & COMMISSIONING FOR CAPACITY OFFERED					
1.01	Civil service works within the Solar Project complete in all respect			0.00	0.00	INR Zero Only
2	Erection, Testing & Commissioning of Solar power project			0.00	0.00	INR Zero Only
3	Erection, Testing & Commissioning of evacuation system and line extension workup to Grid substation			0.00	0.00	INR Zero Only
4	All fees/charges towards application, approval, clearances etc.			0.00	0.00	INR Zero Only
5	Any other item			0.00	0.00	INR Zero Only
Total in Figures					0.00	INR Zero Only
Quoted Rate in Words		INR Zero Only				

Note:
1. The Basic Rate and GST should be written in figures only.
2. Any item of work not mentioned in the above particulars but written elsewhere in the scope of work or in Technical Specification or essentially required for completion of works, proper operation and maintenance of Solar Plants, safety of equipment and operating personnel shall be deemed to have been included in the above particulars.
3. The total amount including GST mentioned at this page shall be taken into consideration for evaluation of bids.

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25 MW Solar PV Power Projects at Namrup, Assam



- | |
|---|
| 4. The Basic Rates quoted should be inclusive of all taxes, duties and levies but excluding GST. |
| 5. Bidder shall offer firm Basic Rates. The quote by the successful bidder must remain firm during the execution of the contract and not subject to variation on any account. |
| 6. During currency of the Contract, any statutory changes in taxes and duties will be to Purchaser 's account on submission of documentary evidence. |

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Tender No. Bid Response Sheet - P-IV (For reference, bidder to refer online portal)

Comprehensive charges of operation and maintenance of the solar plant Facility after the date of successful OAT.

Name of the Bidder / Bidding Firm / Company:						
PRICE SCHEDULE						
(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevant columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)						
Sl. No.	Item Description	BASIC RATE IN INR	GST %	GST (IN INR)	SUB TOTAL AMOUNT With Taxes	SUB TOTAL AMOUNT In Words
1	Comprehensive charges of operation and maintenance of the solar plant Facility after the date of successful OAT					
1.01	1st year			0.00	0.00	INR Zero Only
1.02	2nd year			0.00	0.00	INR Zero Only
1.03	3rd year			0.00	0.00	INR Zero Only
1.04	4th year			0.00	0.00	INR Zero Only
1.05	5th year			0.00	0.00	INR Zero Only
Total in Figures					0.00	INR Zero Only
Quoted Rate in Words		INR Zero Only				

Note
1. The Basic Rate and GST should be written in figures only.

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2. Any item of work not mentioned in the above particulars but written elsewhere in the scope of work or in Technical Specification or essentially required for completion of works, proper operation and maintenance of Solar Plants, safety of equipment and operating personnel shall be deemed to have been included in the above particulars.
3. The total amount including GST mentioned at this page shall be taken into consideration for evaluation of bids.
4. The Basic Rates quoted should be inclusive of all taxes, duties and levies but excluding GST.
5. Bidder shall offer firm Basic Rates. The quote by the successful bidder must remain firm during the execution of the contract and not subject to variation on any account.
6. During currency of the Contract, any statutory changes in taxes and duties will be to Purchaser's account on submission of documentary evidence.
7. The total amount of O&M for the five years and for each individual year should not be less than 3.5% and 0.7 % of the Total EPC value respectively (Sr. 1.1 + Sr. 1.2 of BRS P-I).

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SCHEDULE OF PRICE – P-V (For reference, bidder to refer online portal)

Evaluated Bid Value (EBV)

Name of the Bidder/ Bidding Firm / Company:			
PRICE SCHEDULE			
<p align="center">(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevant columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name and Values only)</p>			
NUMBER #	TEXT #	NUMBER #	TEXT #
Sl. No.	Item Description	TOTAL AMOUNT Without Taxes in Rs. P	TOTAL AMOUNT In Words
1	Total Cost of Supply of Equipment, Construction, Erection and Commissioning in Rs Lakhs	0.00	INR Zero Only
2	Total O&M Cost per year		
2.01	1	0.00	INR Zero Only
2.02	2	0.00	INR Zero Only
2.03	3	0.00	INR Zero Only
2.04	4	0.00	INR Zero Only
2.05	5	0.00	INR Zero Only
3	NPV Rate (%): 10%		
3.01	NPV of O&M Price	0.000	INR Zero Only
4	EBV - Rs (As per tender clause 3.2)	0.000	INR Zero Only
Total in Figures		0.000	INR Zero Only
Quoted Rate in Words		INR Zero Only	

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BID FORM

The Chief General Manager (NRE),
Assam Power Generation Corporation Limited
3rd Floor, Bijulee Bhawan,
Paltanbazar, Guwahati-781001

Sub: Bid No. APGCL/CGM NRE/PROJ/NAMRUP SOLAR EPC/2023/T4-2570 for Design, Engineering, Supply, Construction, Erection, Testing and Commissioning on turnkey basis of 25 MWac Ground Mounted Solar PV Power Projects at Namrup in the state of Assam with Comprehensive Operation & Maintenance for five (5) years period.

Gentlemen,

Having examined the General and Special Conditions of Contract and the Terms of Reference including all attachments thereto, the receipt of which is hereby duly acknowledged, we the undersigned offer to perform the services in conformity with the said conditions of Contract and Terms of Reference for the total sum as mentioned in price bid BRS-I or such other sums as may be ascertained in accordance with the Schedule of Prices attached herewith and made part of this Bid.

We undertake, if our Bid is accepted, to commence the work within () days calculated from the date of award of Contract.

If our Bid is accepted, we will obtain the guarantee of a bank as per tender requirement for the due performance of the Contract.

We agree to abide by this Bid for a period of 180 days from the Bid Closing Date and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

Until a formal Contract is prepared and executed, this Bid, together with your written acceptance thereof in your notification of award shall constitute a binding Contract between us.

We understand that you are not bound to accept the lowest or any Bid you may receive.

Dated this _____ day of _____ 2024

Signature

(In the capacity of)

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Annexure-II

Format of Bank Guarantee for Bid Security

(BANK GUARANTEE ON NON-JUDICIAL STAMP PAPER OF Rs.100)

(To be on non-judicial stamp paper of appropriate value as per Stamp Act relevant to place of execution.)

Ref.....Bank Guarantee No.....Date:

BID SECURITY, BANK GUARANTEE FORMAT FOR TENDER/ NIT No.....

In consideration of the [Insert name of the Bidder] (hereinafter referred to as 'Bidder') submitting the response to NIT inter alia for (NIT NO.....) for Selection of EPC Contractor for Design, Engineering, Supply, Construction, Erection, Testing and Commissioning on turnkey basis of 25 MWac Ground Mounted Solar PV Power Projects at Namrup in the state of Assam with Comprehensive Operation & Maintenance for five (5) year's period, in response to the NIT No. Dated..... issued by Assam Power Generation Corporation Ltd. (APGCL) 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 APGCL at [Insert Name of the Place from the address of APGCL] forthwith on demand in writing from APGCL or any Officer authorized by it in this behalf, any amount up to and not exceeding Rupees[Insert amount as per Clause 2.12 of Section II] 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 Clause 2.12 of Section II of this 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..... (Rupees in words only). Our Guarantee shall remain in force until[Insert date of validity in accordance with Clause 2.12 of Section II of this NIT].

APGCL 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 APGCL shall have a right to invoke this BANK GUARANTEE in part or in full, as it may deem fit.

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



The Guarantor Bank hereby expressly agrees that it shall not require any proof in addition to the written demand by APGCL made in any format, raised at the above-mentioned address of the Guarantor Bank, in order to make the said payment to APGCL.

The Guarantor Bank shall make payment hereunder on first demand without restriction or conditions and notwithstanding any objection by [Insert name of the selected Contractor] and/or any other person. The Guarantor Bank shall not require APGCL to justify the invocation of this BANK GUARANTEE, nor shall the Guarantor Bank have any recourse against APGCL in respect of any payment made hereunder.

This BANK GUARANTEE shall be interpreted in accordance with the laws of India and the courts at Assam 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 APGCL shall not be obliged before enforcing this BANK GUARANTEE to take any action in any court or arbitral proceedings against the selected Contractor ,to make any claim against or any demand on the selected Contractor or to give any notice to the selected Contractor or to enforce any security held by APGCL or to exercise, levy or enforce any distress, diligence or other process against the selected Contractor.

The Guarantor Bank acknowledges that this BANK GUARANTEE is not personal to APGCL and may be assigned, in whole or in part, (whether absolutely or by way of security) by APGCL to any entity to whom APGCL is entitled to assign its rights and obligations.

Notwithstanding anything contained hereinabove, our liability under this Guarantee is restricted to Rs. (Rupees in words only) and it shall remain in force until We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only if APGCL 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.

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



Dated this day of ..., 20....

Witness:

1.....

Signature

Name and Address

2.....

Signature

Name and Address

Instructions for Furnishing Bank Guarantee

1. The Bank Guarantee by Bidders will be given on non-judicial stamp paper as per stamp duty applicable at the place where the tender has emanated. The non-judicial stamp paper should be in name of the issuing bank.
2. The Bank Guarantee by Bidder will be given from the bank as per Schedule of Schedule Bank list from RBI only.
3. This bank guarantee/ all further communication relating to the bank guarantee should be forwarded to Bidder.
4. The full address along with the Telex/ Fax No. and email address of the issuing bank to be mentioned.
5. The Bank Guarantee Checklist provided in Annexure 5: Bank Guarantee Verification, duly filled in, should be enclosed with The Bank Guarantee.

Note:

- a. Non-submission of BID Security shall result into rejection of bid and no request from bidder, shall be entertained in this regard.

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Annexure-III

Format of Bank Guarantee for Performance Security during EPC

(Note: Performance Guarantee is to be submitted in Bank Guarantee as per the Section IV(A), Clause 4.74 at respective times)

[To be on non-judicial stamp paper of Rupees One Hundred Only (INR 100/-) or appropriate value as per Stamp Act relevant to place of execution, duly signed on each page. Foreign entities submitting Bid are required to follow the applicable law in their country]

Reference No. Bank Guarantee No. Dated: On stamp paper of Rs.100/-)

In consideration of the[Insert name of the Bidder] (hereinafter referred to as 'Contractor') submitting the response to NIT NO. -for Selection of EPC Contractor for Design, Engineering, Supply, Construction, Erection, Testing and Commissioning on turnkey basis of 25 MWac Ground Mounted Solar PV Power Projects at Namrup in the state of Assam with Comprehensive Operation & Maintenance for five (5) year's period, in response to the NIT dated..... issued by Assam Power Generation Corporation Ltd. (APGCL) considering such response to the NIT of[insert the name of the Contractor] (which expression shall unless repugnant to the context or meaning thereof include its executors, administrators, successors and assignees) and selecting the Contractor and issuing Letter of Award No to (Insert Name of Contractor) as per terms of NIT and the same having been accepted by the Contractor. As per the terms of the NIT, the ----- [insert name & address of bank] hereby agrees unequivocally, irrevocably and unconditionally to pay to Purchaser at [Insert Name of the Place from the address of Purchaser] forthwith on demand in writing from Purchaser or any Officer authorized by it in this behalf, any amount up to and not exceeding Rupees .[Insert amount as per Clause 4.73 of Section IV(A)] only, on behalf of M/s[Insert name of the Contractor] This guarantee shall be valid and binding on this Bank up to and including.....[insert date of validity in accordance with Clause 4.73 of Section IV(A) of this 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. (Words) only).

Our Guarantee shall remain in force until [insert date of validity in accordance with Clause 4.73 of Section IV(A)]. Purchaser shall be entitled to invoke this Guarantee till..... until [Insert date which is 30 days after the date in the preceding sentence].

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



The Guarantor Bank hereby agrees and acknowledges that Purchaser 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 APGC made in any format, raised at the above-mentioned address of the Guarantor Bank, in order to make the said payment to Purchaser.

The Guarantor Bank shall make payment hereunder on first demand without restriction or conditions and notwithstanding any objection by [Insert name of the Contractor] and/or any other person. The Guarantor Bank shall not require Purchaser to justify the invocation of this BANK GUARANTEE, nor shall the Guarantor Bank have any recourse against Purchaser in respect of any payment made hereunder.

This BANK GUARANTEE shall be interpreted in accordance with the laws of India and the courts at Assam 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 Purchaser shall not be obliged before enforcing this BANK GUARANTEE to take any action in any court or arbitral proceedings against the selected contractor, to make any claim against or any demand on the selected contractor or to give any notice to the selected contractor or to enforce any security held by Purchaser or to exercise, levy or enforce any distress, diligence or other process against the selected Contractor.

The Guarantor Bank acknowledges that this BANK GUARANTEE is not personal to Purchaser and may be assigned, in whole or in part, (whether absolutely or by way of security) by Purchaser to any entity to whom Purchaser is entitled to assign its rights and obligations.

Notwithstanding anything contained hereinabove, our liability under this Guarantee is restricted to Rs(Rs..... only) and it shall remain in force until We are liable to pay the guaranteed amount or any part thereof under this Bank Guarantee only if Purchaser serves upon us a written claim or demand.

Signature -----

Name-----

Power of Attorney No.-----

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For

---[[Insert Name of the Bank]]-

Banker's Stamp and Full Address.

Dated this -- day of,20.... Witness:

1.....

Signature

Name and Address

2.....

Signature

Name and Address

Instructions For Furnishing Performance Bank Guarantee

1. The Bank Guarantee by Bidders will be given on non-judicial stamp paper as per stamp duty applicable at the place where the tender has emanated. The non-judicial stamp paper should be in the name of the issuing bank.
2. The Bank Guarantee by Bidder will be given from the bank as per Schedule List of Banks from RBI only.
3. This bank guarantee/ all further communication relating to the bank guarantee should be forwarded to Purchaser.
4. The full address along with the Telex/ Fax No. and email address of the issuing bank to be mentioned.
5. The Bank Guarantee Checklist provided in Annexure 5 : Bank Guarantee Verification, duly filled in, should be enclosed with The Bank Guarantee.

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Annexure-IV

Format of Bank Guarantee for Performance during O&M

[To be on non-judicial stamp paper of Rupees One Hundred Only (INR 100/-) or appropriate value as per Stamp Act relevant to place of execution, duly signed on each page. Foreign entities submitting Bid are required to follow the applicable law in their country]

Reference No..... Bank Guarantee No..... Dated:To: WHEREAS [Insert name of the Contractor] with address.....[Insert address of the Contractor] having its registered office at[Insert address of the Contractor] (Herein after, the "Bidder") wishes to participate in NIT document No.....issued by Assam Power Generation Corporation Ltd. (APGCL) (here in after, the "Beneficiary") for Operation and Maintenance of Performance of 25 MWac Solar PV Power Plant along with power evacuation & transmission system at DISCOM's substation at Namrup Thermal Power Station, District Dibrugarh, Assam -786621, India at 33 kV level.

And WHEREAS a Bank Guarantee for Rupees [.....] valid till..... [Insert date 5 years from the date of Operational Acceptance] is required to be submitted by the Contractor as per the terms and conditions of the NIT.

We,[Insert name of the Bank and address of the Branch giving the Bank Guarantee] having our registered office at [Insert address of the registered office of the Bank] hereby give this Bank Guarantee No. [Insert Bank Guarantee number] dated[Insert the date of the Bank Guarantee], and hereby agree unequivocally and unconditionally to pay immediately on demand in writing from the Beneficiary any officer authorized by it in this behalf any amount not exceeding Rupees [..] to the said Beneficiary on behalf of the Bidder.

This agreement shall be valid and binding on this Bank up to and inclusive of..... [Insert the date of validity of the Bank] and shall not be terminable by notice or by Guarantor change in the constitution of the Bank or the firm of the Bidder Or by any reason whatsoever and our liability hereunder shall not be impaired or discharged by any extension of time or variations or alternations made, given, conceded with or without our knowledge or consent by or between the Bidder and the Beneficiary.

NOTWITHSTANDING anything contained hereinbefore, our liability under this guarantee is restricted to Rupees (Rs. (Words) only) Our Guarantee shall remain in force till [Insert date]. Unless demands or claims under this Bank Guarantee are made to us in writing on or before[Insert date], all rights of the Beneficiary under this Bank Guarantee shall be forfeited, and we shall be released and discharged from all liabilities there under.

[Insert the address of the Bank with complete postal branch code, telephone and fax numbers, and official round seal of the Bank]

[Insert signature of the Bank's Authorized Signatory]

Attested:

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



..... [Signature] (Notary Public)

Place: Date:

Signature

Name.....

Power of Attorney No.....

For

---[Insert Name of the Bank]-

Banker's Stamp and Full Address.

Dated this -- day of -,20-

Witness:

1.....

Signature

Name and Address

2.....

Signature

Name and Address

Instructions for Furnishing Bank Guarantee

1. The Bank Guarantee by Bidders will be given on non-judicial stamp paper as per stamp duty applicable at the place where the tender has emanated. The non-judicial stamp paper should be in name of the issuing bank.
2. The Bank Guarantee by Bidder will be given from bank (shall include Nationalized & scheduled banks India).
3. This bank guarantee/ all further communication relating to the bank guarantee should be forwarded to Assam Power Generation Corporation Limited.
4. The full address along with the Telex/Fax No. and email address of the issuing bank to be mentioned.
5. The Bank Guarantee Checklist provided in Annexure 5: Bank Guarantee Verification, duly filled in, should be enclosed with The Bank Guarantee.

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Annexure-V

Checklist for Bank Guarantee Verification

CHECKLIST			Yes	No
I.		Does the bank guarantee Compare verbatim with the format provided for it in this NIT	<input type="checkbox"/>	<input type="checkbox"/>
II.	a)	Has the executing Officer of BG Indicated his name Designation & power of Attorney No./ signing power Number etc. on BG.	<input type="checkbox"/>	<input type="checkbox"/>
	b)	Is each page of BG duly signed/ initialled by the executants, and last page is signed wilful particulars and under the seal of the Bank.	<input type="checkbox"/>	<input type="checkbox"/>
	c)	Does the last page of the BG carry the signatures of two witnesses alongside the signatures of the executing Bank Manager?	<input type="checkbox"/>	<input type="checkbox"/>
III.	a)	Is the BG on non-judicial stamp Paper of appropriate value?	<input type="checkbox"/>	<input type="checkbox"/>
	b)	Is the date of sale of non-judicial stamp paper shown on the BG and the stamp paper is issued not more than six months prior to the date of execution of BG.	<input type="checkbox"/>	<input type="checkbox"/>
IV.	a)	Are the factual details such As Bid Specification No., LOA No., contract price, etc. correct.	<input type="checkbox"/>	<input type="checkbox"/>
	b)	Whether overwriting/cutting of any on the BG authenticated under signature & seal of Executants.	<input type="checkbox"/>	<input type="checkbox"/>
V.		Is the amount and validity of BG in line with terms of the NIT?	<input type="checkbox"/>	<input type="checkbox"/>
VI.	a)	Is the Bank Guarantee Issued from a Bank's Branch located outside India	<input type="checkbox"/>	<input type="checkbox"/>
	b)	If the response to VI. a) Above is yes, has the Bank Guarantee been routed through the correspondent branch in India for due verification of the signature(s)of the executants (s)?	<input type="checkbox"/>	<input type="checkbox"/>
VII.		Whether the BG has been issued by a Bank as per relevant provisions of the bidding documents.	<input type="checkbox"/>	<input type="checkbox"/>

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Annexure-VI

PROFORMA FOR BANK GUARANTEE FOR ADVANCE PAYMENT

[Bank guarantee shall be executed on non-judicial stamp paper of value equivalent to 0.25% of the BG Amount subject to maximum of Rs 25000/-. The bank guarantees shall be furnished in respective Bid currencies.]

Note.

Place:	Bank Guarantee No:	Date:
--------	--------------------	-------

To:
Chief General Manager (F&A),
Assam Power Generation Corporation Limited
3rd Floor, Bijulee Bhawan,
Paltanbazar, Guwahati-781001

Dear Sirs,

Pursuant to the Contract, hereinafter referred to as the "CONTRACT" which M/s _____ hereinafter referred to as the "CONTRACTOR", which expression shall, unless repugnant to the context or meaning, thereof include its successors, administrators, representative and assignees, have concluded with the Assam Power Generation Company Ltd (APGCL) hereinafter referred to as the "Purchaser", which expression shall, unless repugnant to the context or meaning thereof, include its successors, administrators, representatives and assignees, on ____ 202__ vide Letter of Award/Contract No. _____ dated _____, its acceptance by the Contractor vide letter dated ----- as well as 'Contract Documents', valued at Indian Rupees ----- (Rupees ----- only), hereinafter referred to as the "Contract" for for APGCL and the same having been unequivocally accepted by ----- (name of the Contractor) and APGCL having agreed to make an advance payment to the Contractor for performance of the above Contract.

According to the said Contract, the Purchaser has undertaken to make an advance payment of Rs. _____ (Rupees _____) being the payment of ____% for ____ against issuance of an Advance Payment Guarantee equivalent to 110% of advance amount by a Bank.

For this advance payment, we, the undersigned _____ (Name) _____ (Address), and having its Head Office at _____ herein after referred to as the 'Bank', which expression shall unless repugnant to the context or meaning thereof, include its successors, administrators, representatives and assignees, hereby guarantee to the effect that we irrevocably undertake to pay the Purchaser merely on demand without any previous notice and without any demur and without recourse to the CONTRACTOR and without referring to any other source, any and all monies payable by the

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



CONTRACTOR towards the advance or part thereof paid by the Purchaser, but not exceeding Rs _____ (Rupees _____ only) provided the Purchaser advises us that the CONTRACTOR has failed to fulfil his contractual obligations stipulated in the said Contract. Any such demand made by the Purchaser on the Bank shall be conclusive and binding, absolute and unequivocal notwithstanding any difference between the Purchaser and the CONTRACTOR or any dispute or disputes raised/pending before any Court, Tribunal, Arbitrator or any other authority.

The value of Advance Payment Guarantee shall stand progressively diminished is based on the (Supplies FOB/EX-WORKS/ _____ etc.) made on quarterly basis on advice of Purchaser.

This Guarantee will not be discharged due to the change in the constitution of the Bank or the CONTRACTOR(S).

This Guarantee will become invalid _____ months after the completion of the _____ by the CONTRACTOR under this Contract or as soon as this letter of guarantee has been returned to us, at the latest, however, on _____ 202__ unless a claim has been lodged with us under this guarantee before that date.

The Purchaser shall have the fullest liberty without affecting in any way the liability of the Bank under this guarantee from time to time to extend the time of performance by the CONTRACTOR. The Bank shall not be released from its liability under these presents by any exercise of the Purchaser of the liberty with reference to the matter aforesaid.

It shall not be necessary for the Purchaser to proceed against the Contractor before proceeding against the said Bank and the Guarantee herein contained shall be enforceable against the said Bank notwithstanding any other security which the Purchaser may have obtained or obtain from the said Contractor shall at the time when proceedings are taken against the said Bank hereunder, be outstanding or unrealized.

We, the Bank further agree that the decision of the Purchaser as to the failure on the part of the CONTRACTOR to fulfil the contractual obligations stipulated in the said Contract and/or to the amount payable by the Bank to the Purchaser shall be final, conclusive and binding.

This guarantee shall not be affected in any manner by reason of merger, amalgamation, restructuring or any other change in the constitution of the Bank or _____ (name of the Contractor).

Notwithstanding anything contained hereinabove, our liability under this guarantee is restricted to Indian Rupees _____ (Rupees _____ only) and shall remain in force up to and including _____ (date) and shall be extended from time to time for such period as may be desired by _____(name of the Contractor) on whose behalf this guarantee has been given.

It is agreed by the Bank with APGCL that for any reasons / disputes arises concerning the Bank's liability to pay the requisite amount to APGCL, under the terms of this Guarantee, the competent court at Guwahati, Assam, India alone shall have the jurisdiction to determine the

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25 MW Solar PV Power Projects at Namrup, Assam



said dispute and this shall be without prejudice to the liability of the Bank under the terms of this Guarantee being un-equivocal & unconditional, as mentioned above..

Signature :
Name :
Designation :
Staff Code No :
Bank Seal :
Date :

Witness:

1. Signature :
Full name in block letters :
Occupation :
Address :

2. Signature :
Full name in block letters :
Occupation :
Address :

Note:

- i) The Stamp papers should be purchased in the name of Bank issuing the Guarantee.
- ii) Complete mailing address of the Head Office of the Bank, issuing the Guarantee, along with Fax No. shall be given.
- iii) To be executed on non-judicial stamp paper of value to 0.25% of value of bank guarantee subject to minimum of Rs 500/- and maximum of Rs.25000/- and duly affixed for revenue stamp of Rs. 1/-. To be stamped in accordance with Stamp Act, if any, of country of the issuing bank. (For Example: If the bank guarantee is of value Rs. 1,00,000/- then the stamp paper will be of Rs. 500/- only and not $100000 \times 0.0025 = 250/-$).
- iv) The bank guarantee shall be furnished by the Bank directly to the Purchaser through RPAD/Speed Post/Courier.
- v) This is a proposed draft of the bank guarantee. The Purchaser reserves the right to modify the language to its satisfaction. Purchaser's decision in this regard shall be final & binding on the Contractor.

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Format for Pre-Bid Queries

To
The Chief General Manager (NRE),
Assam Power Generation Corporation Limited
3rd Floor, Bijulee Bhawan,
Paltanbazar, Guwahati-781001

Sub: Tender No.:

Dear Sir,

Having examined the General and Special Conditions of Contract and the Terms of Reference including all attachments thereto, the receipt of which is hereby duly acknowledged, we have some queries and the same are submitted as per the format provided in the tender documents.

Sl. no	Section Reference of the Tender document	Clause No. of the Section Reference of Tender document	Clause as given in the Tender document	Description of queries raised	Clarification / changes suggested / amendment
1					
2					
3					

Signature

(In the capacity of)

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PROCEDURE FOR PERFORMANCE TESTING

Part A: Solar PV power plant Net power generation

1. The Contractor shall quote the ‘Guaranteed Annual CUF’ for annual basis considering specified project location and tender conditions.
2. The Contractor shall demonstrate “Achieved CUF” at metering point as compared to the ‘Guaranteed Annual CUF’ for every year from the date of starting of O&M Period.
3. First-year CUF (AC) is estimated as 22%+ for the Namrup project. However, For the purpose of bid consideration 21% CUF for the projects has been kept as minimum CUF requirements. **Bid having CUF below 21% shall be outrightly rejected.**
4. The decrease in CUF quoted for any year shall not be more than 0.7% except for the first year, the decrease shall not be more than 1%. BRS 10 needs to be quoted accordingly.

The Bidder shall clearly mention the technology used i.e., fixed/tilt or seasonal tracker (please specify) as per BRS 10.

Part B- Operational Acceptance Test Procedure

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.

2.1 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 hereunder 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 hereunder. The performance ratio 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).

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$$PR = \frac{E_{out}}{\sum_k \left(\frac{(C_k \times P_o) \times (G_{i,k} \times \tau_k)}{G_{i,ref}} \right)}$$

Where,

- PR Temperature Corrected Performance Ratio
- E_{out} Cumulative AC energy measured at the Plant End (ABT meter) over the duration of reporting period (kWh)
- τ_k Duration of the kth recording interval, i.e. (1/60) hour
- Σ_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
 $C_k = 1 + \gamma \times (T_{avg_mod,k} - T_{ref})$
- 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 (kWp)
- G_{i,k} Average irradiance measured at the Plane of Array (POA) at the commencement of time interval τ_k (kW/m²) (average of all Pyranometers in various sites)
- G_{i,ref} Irradiance value at which P_o is determined, i.e. 1 kW/m²

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 Purchaser'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

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- The filled-in format shall be signed by both the parties (EPC Contractor and Purchaser) 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 78%.
- 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 is not attributable. In such case, the test shall be extended for affected no. of days (up to 5 days)

2.2 PRE-PR TEST

2.2.1 The EPC Contractor shall perform start-up tests after completion of Commissioning and Test Procedure as per approved SOP: Plant Documentation, Commissioning and Test Procedure and recording of punch points.

2.2.2 The Functional Guarantee Test shall commence immediately after all issues arising from the functional/ startup test have been rectified.

Note:

- a) All measurement(s) procedures should be carried out taking proper safety precautions.
- 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 the above measurement procedure.
- d) The above test procedure shall be conducted in the presence of site in charge.

2.3 PR TEST PROCEDURE

The date of commencement of the PR Test shall be communicated in advance and agreed upon by both parties i.e. Purchaser 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 Purchaser and EPC Contractor. It shall comprise of the following procedures.

2.3.1 Pre-test Procedure

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- 1) Before the commencement of Performance Ratio (PR) test, the plant shall have achieved visual/mechanical/Electrical completion as per Clause 2.2 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 Purchaser. Purchaser 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 Purchaser 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 POA radiation of all the Pyranometers ($G_{i,k}$) 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.

2.3.2 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.

2.3.3 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) Average values form all the sites will be considered
 - Other Met Data received from installed WMS; (Source: SCADA, Temporal Resolution: 1 minute)
 - Energy generated at Plant (kWh) (Source: Plant TVM Meter from SCADA, Temporal Resolution: 1 minute)
 - Energy injected into grid (kWh) (Source: Plant End ABT Meter, Temporal Resolution: 15 minute)
 - PV Module Temperature recorded from the temperature Sensors (oC) (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

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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 Purchaser.
- 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 Purchaser’s 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/m²
- Shutdown explicitly demanded by the Purchaser/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.

2.3.4 Determination of PR Test

Daily PR shall be calculated as the average of the PR calculated for valid 15-minute time blocks (Refer Clause 2.3.3) 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 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 (Within 3 months period after commissioning), further action shall be taken as per the provisions of the contract.

The test shall be repeated for 30 days in case of any outage of the 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

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- Other WMS sensors.

2.3.5 Raw Data Formats and Reports

The EPC Contractor shall submit to Purchaser the raw data from the Plant SCADA on a 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/m ²)	POA Irradiance (W/m ²)	POA Radiation (kWh/m ²)	Humidity (%)	Wind Direction (°)	Generation (kWh) (Source: TVM)
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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/m ²)	POA Irradiance (W/m ²)	POA Radiation (kWh/m ²)	Humidity (%)	Wind Direction (°)	Generation (kWh) (Source: TVM)	Explicit Removal Flag * (0 or 1)	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 after data filtering as per criteria laid out in (2). The Report shall contain the signature of both representatives (Purchaser & EPC Contractor).

Note: In case of multiple pyranometer/temperature sensors, the radiation and temperature data for the purpose of calculation of PR shall be derived from the average values from tilted pyranometer/temperature sensors.

2.4 CAPACITY UTILIZATION FACTOR (CUF)

Capacity Utilization Factor for Solar Plant shall be calculated as per the following formula.

$$CUF = \frac{E_{ac}}{8760 \times P_{ac} \times (1 - DF \times (N - 1)) \times RCF}$$

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where,

E_{ac} is the number of units recorded in the plant end ABT meter excluding auxiliary consumption, kWh

8760 refers to the number of hours in non-leap year. It shall be replaced by 8784 hours during leap year

P_{ac} is the plant AC capacity, kW

DF is module degradation factor, 0.55% per year

N is the number of years of operation after operational acceptance of the plant

RCF is the Radiation Correction Factor: $RCF = \text{Measured Irradiation} / \text{Reference irradiation}$

where Reference Irradiation = 1518 kWh/m² and Measured Irradiation (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 $\pm 10\%$ 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. Module degradation factor, as per above 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.

Liquidated Damages for Shortfall in PR

For every 0.01 shortfall in PR below the committed PR value, a penalty of 1% of the total Contract Value (EPC + O&M) including GST 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 0.05 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.

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ANNEXURE –IX

MANDATE FORM FOR ELECTRONIC PAYMENT THROUGH INTERNET & RBI

To

Chief General Manager (F&A),
Assam Power Generation Corporation Limited
3rd Floor, Bijulee Bhawan,
Paltanbazar, Guwahati-781001

Sub: Authorization for release of payment due from APGCL, _____
_____ through Electronic fund transfer (RBI-EFT) / Internet / RTGS.

Refer Order No. dt. and/or Tender/Enquiry/Letter No..... dt.....

(Please fill in the information in CAPITAL LETTERS. Please TICK wherever it is applicable)

1. Name of the Party:
2. Address of the party
.....
.....
City: Pin Code:
E-mail Id:
Permanent Account Number:

3. Particulars of Bank:

Bank Name		Branch Name	
Branch Place		Branch City	
Pin Code		Branch Code	
MICR No			
(9 Digits code number appearing on the MICR Band of the cheque supplied by the Bank. Please attach Xerox copy of a cheque of your bank for ensuring accuracy of the bank name, branch name and code number)			
Account Type	Savings	Current	Cash Credit
Account Number (as appearing in the Cheque Book)			
RTGS / IFSC Code			

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



4. Date from which the mandate should be effective:

I hereby declare that the particulars given above are correct and complete. If any transaction is delayed or not effected for reasons of incomplete or incorrect information, I shall not hold APGCL responsible. I also undertake to advise any change in the particulars of my account to facilitate updating of records for purpose of credit of amount through RBI EFT / Internet / RTGS.

Place:

Date:

Signature of the party/Authorized Signatory

Certified that particulars furnished above are correct as per our records.

Bank's Stamp:

Date:

(Signature of the Authorized Official from the Banks)

N.B.: RTGS charges if any, is to be borne by the contractor.

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**BRIEF INFORMATION OF REVERSE AUCTION****PART A****BUSINESS RULES REGARDING REVERSE AUCTION**

1. Reverse auctions will be carried out on-line at the e-procurement portal of Assam Tenders.
2. The User ID and password of the bidders for online reverse auction shall be same as used in online bidding process.
3. Only the Technically Qualified Bidders shall be allowed to participate in the reverse auction.
4. Reverse Auction shall be carried out under the framework of rules as defined by APGCL hereinafter. Necessary undertaking in this respect (if any, as per PART-B) shall be submitted by the bidders participating in Reverse Auction.
5. Base Price of the Reverse Auction will be the Lowest Evaluated Bid Value (EBV). Bidders would be allowed to reduce their EBV. The Reverse Auction shall be carried out on EBV only.
6. Price bid as received will be used for calculation of EBV without any human interventions in Assam Tender Portal. The Price Bid sheet shall include:
 - Total Cost of Supply of Equipment quoted by bidder in Bid Response Sheet P-II.
 - Total Cost for Construction, Erection & Commissioning quoted by bidder in Bid Response Sheet P-III
 - Present Value of total Comprehensive O&M charges for 5 years quoted by the bidder in Bid Response Sheet P-IV
 - Discount factor of 10% (assumed constant) for evaluation of each Bidder from 2nd year of O&M onwards.
7. The Base Price (Lowest EBV) will be displayed to all the Technically qualified bidders for reverse auction without disclosing the name of bidder.
8. The Start Bid Price (Base EBV) for e-Reverse Auction shall be the Lowest “EBV” determined after the opening of Price Bid.
9. Within one (1) hour after conclusion of e-RA, successful bidder shall furnish confirmation through his registered e-mail id to the Tender Inviting Authority the following:
 - a) Final **EBV** quoted in Reverse Auction and
 - b) Total Price schedule including BRS I: Grand Summary already available with them and revised in line with final **EBV** quoted in Reverse Auction without any new condition other than those already agreed before start of Reverse Auction.

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- c) In case, there is any variation between the final “**EBV**” quoted in Reverse Auction and the document received after Auction, the first i.e. “**EBV**” in Auction will be taken as final discovered “**EBV**” by the bidder.

However, the detailed break-up of final prices as per price format (BRS P- I to III) shall be submitted by the successful bidder on pro rata basis matching with the “**EBV**” determined during e-Reverse Auction and Total Price Schedule (**BRS- I: Grand Summary**) revised in line with “**EBV**”. **No reduction shall be allowed in O&M cost quoted in BRS-PIV**

In case of no response in Reverse auction within the specified time duration, APGCL, at its discretion, shall be at liberty either to consider the lowest Bid Price received through e-tendering for placement of order on qualified bidder or to take any other action deemed fit without assigning any reason whatsoever.

10. Guidelines for Reverse Auction

- I. The initial auction period will be of 1 (one) hour with a provision of auto extension by 10 (ten) minutes from the scheduled/extended closing time if a EBV lower than the prevalent lowest EBV is quoted by any Eligible Bidder in last 10 (ten) minutes of the reverse auction period or extended reverse auction period. If no such bid is received during the last 10 (ten) minutes of the reverse auction period or extended reverse auction period, the Reverse Auction Process will end.
- II. Reverse Auction shall follow the philosophy of English Reverse (No ties).
- III. English Reverse (No ties) is a type of auction where the Auction Ceiling Price, i.e., Base EBV and bid decrement, i.e., a minimum value by which bidder need to decrease its price while participating in the reverse auction, shall be minimum Rs. 10,00,000/- and its multiples for online reverse auction. It is clarified that maximum decrement value allowed at any time during the Reverse Auction Process shall be 1% from prevailing Lowest EBV. The interested bidders can there upon start bidding in an iterative process wherein the lowest bidder at any given moment can be displaced by an even lower bid of a competing bidder, within a given time frame. The bidding is with reference to the current lowest bid in the reverse auction. All bidders will see the current lowest quoted price. The term 'No ties' is used since more than one bidder cannot give an identical price, at a given instant, during the reverse auction. In other words, there shall never be a tie in the bids.
- IV. The Base EBV for Reverse Auction and bid decrement value as specified would be displayed at the start of online reverse auction.
- V. Bidders by offering a minimum bid decrement or the multiples thereof can displace a standing lowest bid and become Lowest EBV, and this continues as an iterative process.
- VI. In the event a bidder is placing his bid in last 10 minutes (Auction Elapse Time) of the normal closure time, the Auction will get extended for next 10 minutes (Auction Auto Extensions time) so as to provide opportunity to other bidders to participate

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and give better offer to win the bid. The aforesaid values may however be changed by APGCL on its discretion.

- VII. However, bidders are advised not to wait till the last moment to enter their bid to avoid complications related to internet connectivity, their network problems, system crash down, power failures, etc.
- VIII. The Auction will be declared closed/ concluded, when no bid is received in Auction Elapse Time or during the auto extension period.
- IX. Bids once made by the bidder, cannot be cancelled/ withdrawn. Bidder's bid in the Reverse Auction will be taken as an offer against aforesaid tender. The bidder shall be bound to execute the order placed on bidder's final bid price in the Reverse Auction. If bidder back out and not accept the Order as per the rates quoted, APGCL shall forfeit the bidder's EMD and shall take action as per guidelines of APGCL.
- X. Any force majeure or other condition leading to postponement of the reverse auction shall entitle APGCL to postpone the reverse auction.
- XI. APGCL, however, reserves the right to reschedule or cancel the Reverse Auction process at any time, before ordering, without assigning any reason, with intimation to bidders.
- XII. Bidders shall be able to view the following on their screen along with the necessary fields during online Reverse Auction:
- Start Price
 - Current Price.
 - Decrement Value.
 - Auction Date (with Auction Start & End time)
- XIII. Bidders are advised to make themselves acquainted with the reverse auction process of e-Procurement portal www.assamtenders.gov.in by way of obtaining required training from the aforesaid portal/Service Provider. Any bidder not acquainting himself with the procedure of reverse auction shall do so at his own risk and it shall not be open for him to make any complaint/ grievance at a later stage.
- XIV. In case of any problem faced by the Bidder during Reverse Auction and for all bidding related queries, bidders are advised to contact the persons indicated in "Contact Us" link of <https://assamtenders.gov.in/> for Complaints/ Grievances, if any.
- XV. APGCL/Service Provider will not be responsible for any PC configuration/ Java related issues, software/hardware related issues, telephone line glitches and

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breakdown/ slow speed in internet connection of PC at bidder's end. Bidder may please note that it may not be possible for APGCL to extend any help, during Reverse Auction, over phone or in person in relation to rectification of PC / Internet /Java related issues and bidder may lose the chance of participation in the auction. No such queries shall, therefore, be entertained by APGCL while Reverse Auction is in progress.

- XVI. Once the Reverse Auction is started any request by a bidder in the reverse auction for time extension for any reason shall not be considered. In order to ward-off any contingent situation, bidders are requested to make all the necessary arrangements/ alternatives whatever required so that they are able to circumvent any contingent situation and still be able to participate in the reverse auction successfully. Failure of power or loss of connectivity at the premises of bidders during the Reverse Auction cannot be considered as a cause for not participating in the reverse auction. Neither APGCL nor service provider (<https://assamtenders.gov.in/>) shall be responsible for such eventualities.
- XVII. APGCL or the service provider/ www.assamtenders.gov.in shall not have any liability to bidders for any interruption or delay in access to the site <https://assamtenders.gov.in/>.in irrespective of the cause. Neither APGCL nor service provider/ <https://assamtenders.gov.in/> in can be held responsible for consequential damages such as no power supply, system problem, inability to use the system, loss of electronic information, power interruptions, UPS failure, etc. APGCL shall, however, entertain any such issues of interruptions, problems with open mind and fair degree of transparency in the process before deciding to stop the auction. In such cases, the decision of APGCL shall be binding on the bidders.
- XVIII. Bidder shall not divulge either his Bids or any other exclusive details of APGCL to any other party. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, APGCL shall disqualify the bidders concerned from the Reverse Auction process and action as per APGCL guidelines shall be initiated by APGCL.
- XIX. Any aggrieved bidder through Reverse Auction process can represent in writing within 24 hours of the Reverse Auction to APGCL, failing which no representation/complaint, etc., shall be entertained.
- XX. Bidders are advised to read the business rules/guidelines/procedure of reverse auction indicating details of Reverse Auction carefully before the commencement of reverse auction event.
- XXI. APGCL's decision on award of contract shall be final and binding on all the Bidders.

11. Definitions:

- I. Auction Elapse Time in minutes : - It is the minute(s) before the "Auction End Time" and acts as a trigger for auto extension of current auction. If a bid is received successfully within these minutes, the auction will be extended.

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- II. Auction Bid Auto Extensions in Minutes: The Auction End Time will be extended by this "Auto Extension Time in Minutes" if a bid is received successfully within "Elapse Time in Minutes". Process will continue till no bid is received in elapse time.

Note: Bidders to note, the procedure and particulars of reverse auction i.e minimum decremental price, maximum decremental price, elapse time, auto extension time etc may be changed and the same shall be communicated to all technically qualified bidders before start of eRA.

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**PART-B****UNDERTAKING FOR ACCEPTANCE OF SPECIFIC TERMS & CONDITIONS FOR THE TENDERS ISSUED WITH REVERSE AUCTION****(can be customized as per tender specific requirement)**

NAME OF THE BIDDER -

TENDER NO.-

TENDR PARTICULARS -

I/We, the undersigned do hereby confirm that at the time of submission of our offer/bid against above indicated tender, it is noted that the process of selection of qualified lowest bidders shall complete in aforesaid tender after Reverse/Forward Auction only as indicated in the RfP/Tender Specifications. To qualify for aforesaid Reverse Auction, I/We hereby confirm our specific un-conditional acceptance for the following at the time of submission of offer/bid itself.

- i) Business Rules for Reverse Auction as enclosed along with RfP/tender Specifications.
- ii) Payment terms, Penalty clause, Guarantee clause, Security deposit clause & Delivery period as per RfP/Tender Specifications.
- iii) Will submit revised cost in BRS P-I, P-II & P-III within three days of reverse auction.

Yours faithfully,

Signature of the Bidder with seal

(This form shall be duly filled up & signed by the bidder and to be uploaded on e-tendering)

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BIDDER INFORMATION

1. Name of the bidder(s)
2. Address:
 - Street
 - City
 - Postal Code
 - State
 - Country
3. Contact numbers:
 - Tel No
 - Mobile
 - Fax No
 - E mail id
4. Currency:
5. Excise Details:
 - ECC No
 - Excise Reg No
 - Excise Range
 - Excise Division
 - Excise Commissioner at
6. Permanent Account Number
7. GST Registration /TIN No
8. Bank Account No

Signature of the Bidder

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PROFORMA FOR EXECUTION OF AGREEMENT

(TO BE EXECUTED ON Rs 500/- NON-JUDICIAL STAMP PAPER)

The agreement is made this (Date and Month) of (Year) between Assam Power Generating Company Limited and (Name & Address of the Contractor) herein after called the contractor which expression shall where the context so admits be deemed to include his heirs, executors, administrators & representatives of one part & Assam Power Generating Company. Limited., Guwahati on the other part.

Whereas in accordance with a (Tender No.) issued by the (officer in charge) of the APGCL the Contractor submitted his bid/offer datedfor the works/services ofmore particularly described, mentioned enumerated of referred to in the general conditions, specification, schedules drawing from of tender covering letters, schedules of prices & further correspondence, a copy of each of which is here to annexed and is proposes of identification, signed by (Authorized Signatory) on behalf of the Contactor and(Engineer in charge) on behalf of Purchaser and all of which shall be deemed to form part of this agreement as through separately set out herein & are included in the expression "Contract" herein used (herein after referred to as the said works.....)

AND WHEREAS, Purchaser has accepted the offer of the Contractor vide (Order No. & Date) for the.....(Works) for the sum of (Rupees in numbers)(Rupees in words) upon the terms & subject to the conditions here-in-after mentioned.

NOW THEREFORE IBIS AGREEMENT WITNESSTH AND IT IS HEREBY AGREED AS FOLLOWS: -

1. The Contractor shall execute the above said works/services & do, perform & carry out all matter's incidental / or ancillary there to within the time specified in the contract and in accordance with the terms & conditions specified in the contract and as modified by Order No.....
2. For the work completed, Purchaser shall pay to the Contractor, (Rupees in numbers) (Rupees in words)
3. In all matters arising under out of or in relation to this agreement, the terms & conditions of the contract including the terms & conditions contained in the aforesaid Order No shall apply and all such matters shall be determined accordingly.

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ASSAM POWER GENERATION CORPORATION LIMITED

25 MW Solar PV Power Projects at Namrup, Assam



4. The agreement shall be deemed to be entered into at (indicate place) ----- & all disputes and claims if any, out of or in respect of this agreement are to be settled at (indicate place) ----- or be triable only in any competent Court situated at (indicate place) -----.

IN WITNESS, where of the parties here to have signed this agreement on the dated and year mentioned against their respective signature.

Signature of Contractor

Signature of Purchaser Authority

Date

Address

NAME & SIGNATURE OF WITNFSS FOR CONTRACTOR

1. Signature
Full Names
Address
2. Signature
Full Names
Address

NAME & SIGNATURE OF WITNESS FOR PURCHASER

1. Signature
Full Names
Address
2. Signature
Full Names
Address

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INDEMNITY BOND

(TO BE EXECUTED ON Rs. 500/- NON-JUDICIAL STAMP PAPER)

Name of the Bidder -

Order No.-

Tender No.-

Tender/Order Issuing Authority of APGCL -

We.....(Name and address of the bidder) shall hold harmless and indemnify the APGCL from and against damage, loss and expenses arising from any claim for infringement of patent, copy right, design and other such rights in existence or to be granted on and application published prior to the completion of the contract with respect to or arising out of the use or supply of design or any work in accordance with the specifications and plans furnished or recommended by ourselves (name & address of the bidder).

We.....(Name and address of the bidder) at our own expense, defend and indemnify the APGCL against all third-party claims of Infringement of Intellectual Property Rights, including patent, trademark, copy right, trade secret or industrial design rules arising from use of the items or any part thereof. The "APGCL shall not pay any compensation to any party resulting from such infringement and we shall be fully responsible for the same, including all expenses and court and legal fees.

Signature: _____

Name: _____

Designation: _____

Official seal:

Place:

Date:

Witness: -

1.

2.

(This form shall be duly filled-up and signed by the bidder and to be uploaded on e-procurement website & the physical copy of the same is to be submitted after opening of the tender.)

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**ANNEXURE-XIV****POLICY FOR SUSPENSION / BANNING OF BUSINESS DEALINGS**

The purpose of this procedure is to prescribe uniform and transparent guidelines for (1) Banning of Vendors for Business Dealings and (2) Suspension of Vendors, due to adverse performance in executing current/past contracts, awarded by the Procuring department at corporate office and Site Offices.

For the purpose of this procedure, the term "vendor" includes any organization or person who is supplying goods and/or providing works and/or services like engineering, construction, erection, commissioning etc. and means 'the same as "contractor" or "supplier."'

Procedure for Suspension/banning of business dealings.

1. For Suspension/ Banning of Business Dealings, the procedure prescribed by the Purchaser from time to time shall be followed.
2. Suspension/ Banning of Business Dealings with vendors may be resorted to for serious lapses in performance/ misdemeanors on the part of the vendor, such as:
 - a) Abandoning the work without completion
 - b) Repeated failures in timely execution of the contracts;
 - c) Resorting to unfair means or unethical business practices, such as:
 - i. Cheating;
 - ii. Forgery;
 - iii. Fraud;
 - iv. Accepting or offering bribe;
 - v. Providing false certification/ information/ documents;
 - vi. Tampering with documents, etc.
 - d) Becoming bankrupt/in solvent;
 - e) Being banned/suspended by the Government of MP or Government of India; and,
 - f) Any other reasons of similar nature.
3. Suspension/Banning of Business Dealings shall only be done with the approval of Competent Authority as per DoP. The recommendation shall come from a duly constituted screening committee after careful evaluation of the performance, facts and circumstances of the case and after approval by the Competent Authority, 'show cause notice' shall be issued to the vendor.
4. Suspension/Banning of Business Dealings should be recommended for approval of the Competent Authority in a transparent manner. The concerned party should invariably be informed of the decision in writing.
5. All serious offences/defaults by the vendor shall be submitted to the Procuring department/Site who will then forward the same to the Screening Committee for review

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and recommendation. The recommendation shall be up to Competent Authority for approval.

6. After approval by the Competent Authority, the Screening Committee shall issue a show cause notice to the vendor. The screening Committee may recommend suspension/banning of the vendor even for a first case of offence/ default and reply to the show cause notice by the vendor. The decision shall be approved by the Competent Authority.
7. In order to execute the contracts within the contractual time schedules and with acceptable quality, it is necessary that undesirable vendors involved in serious lapses in performance/ misdemeanors previously, shall be eliminated at the bidding stage itself.

NOTIFICATION OF BANNING ISSUED BY CORPORATE OFFICE

8. In the process of BANNING, the concerned vendor, irrespective of the vendor's products/works and/or services under consideration is prohibited from any future dealings of any nature with Purchaser if the vendor has been involved in any serious lapses in performance/misdemeanors.
9. The Notification of Banning issued by the procuring department may also provide for banning of:
 - a) All firms in which the proprietor of the banned vendor is associated, either as proprietor or partner; or
 - b) Any associate/subsidiary/affiliate/firm(s) of such vendor.

In such a case, the provisions as mentioned in the Banning Notification issued by the Procuring department shall also be applicable to all such firms described above. However, where no such stipulations are made, the Banning Notification shall be applicable only to the banned vendor.

10. All Notifications for Banning of Business Dealings with any vendor shall be issued by Procuring department for the Purchaser as a whole and not individually by Site offices. Any case noticed by any of the Site shall be processed by the Screening Committee at corporate office after full back up details have been forwarded by the concerned Site through the Procuring department.
11. Based on any reference received from Vigilance, OPERATIONS department, Projects, Quality, Finance & Accounts or any other departments in Purchaser, the concerned officer of Procuring department shall put up the case with all relevant details (including the reference received). The case, thereafter, would be referred to Screening Committee at Corporate Office.
12. The Screening Committee shall examine the case in the context of the details received or may seek more details and discuss with concerned officers in the Procuring department, wherever required. In case the Screening Committee decides on sending a show cause notice to the vendor, after the approval for receiving the approval, the Convener of the Screening Committee shall issue a show cause notice to the vendor seeking explanation

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as to why the vendor should not be banned or further business dealings for the specified period, which shall not be less than three (3) years. The contractor is required to reply to that show cause notice within 30 days.

13. Pending final decision on banning from the issue of show cause notice, the vendor shall be put on holidays (interim suspension) during interim period with the approval of the Competent Authority. However, no formal letter shall normally be issued to the vendor, indicating that the vendor has been put on holidays pending final decision on banning, except in cases where the vendor insists for such letter. In such cases, such letter may be issued with the approval of Competent Authority as per DoP.
14. The Screening Committee shall appropriately consider the response to the show cause notice received from the vendor and shall send its dear opinion within 15 days of receipt of reply. The Screening Committee's recommendation (banning or not banning) shall be put up for approval of the Competent Authority. The Screening Committee's recommendation shall include the list of supply/service/turnkey contracts for which there has been serious lapses in performance/misdemeanors on the part of the vendor. Further, areas for improvement, if any, in case of vendors whose overall performance has otherwise been found to be of acceptable level, shall be also identified by the Screening Committee as part of their recommendations.
15. In case no reply from the vendor is received within 30 days of the date of issue of show cause notice (which shall be either be faxed or send though registered/speed post/courier with confirmation of receipt), suo-moto action shall be taken by the Screening Committee which shall be approved by the Competent Authority.
16. Notification for Banning of the vendor shall be issued by Procuring Authority for implementation uniformly by all Purchaser departments and offices. Such Banning shall automatically extend to all Business Dealings. The Notification for Banning shall include the names of the Directors of the Bidder/Partners of the Firm of the banned vendor. If the associate concerns of the vendor are also included and approved by the Competent Authority, the same also included in the Notification. The concerned Vendor shall also be informed suitably.
17. Where any Notification of Banning of Business Dealings with any vendor is issued by the procuring department at the corporate office after recommendation by the Screening Committee and approval of the Competent Authority, the same would be binding throughout bidding company w.e.f. the date mentioned in such notification and for the period specified therein.
18. In case no specific period is provided in such Notification of Banning issued by Procurement department, such Notification shall remain valid and in force till it is revoked by an order of the Competent Authority that issued the original Notification of Banning, If a specific period is provided in the Notification, three (3) months before completion of notified period, the case shall be reviewed by the Screening Committee and a suitable recommendation on whether to extend or revoke the ban shall be given to the Competent Authority for approval.

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19. For this purpose, the Screening Committee may seek any information or document as considered appropriate from the vendor or even seek an interview with the vendor. In no case after completion of banning period, it shall be presumed that the vendor is automatically eligible for future Business Dealings, until and unless Revocation Notification is issued after approval of Competent Authority.
20. The on-going supply /works /services /turnkey contracts under execution shall not be affected by the Notification of Banning. However, adequate precautions should be taken during execution of ongoing contracts.
21. This Notification of Banning shall be applicable to all tenders for which orders are yet to be placed. No bidding documents shall be issued to such banned vendors or bid/offer of such banned vendors submitted against any tender shall be rejected after issue of Notification of Banning. Where bidding documents have already been purchased by such banned vendors, but bids are yet to be opened, the banned vendors shall be informed that they need not submit the bid and even if the bid is submitted by them, the same shall not be opened and the cost of the bidding documents shall be refunded to them. Where award recommendations have been approved by Competent Authority in favour of such banned vendors, but orders are yet to be placed, the order shall not be placed on such banned vendors and the matter would be placed before the Award Approving Authority for appropriate alternate decision.

NOTIFICATION OF SUSPENSION ISSUED BY CORPORATE OFFICE

22. In the process of SUSPENSION, the concerned vendor is barred from having any future business dealings with Purchaser for the specific products/ services under consideration for a specified period.
23. The Procuring department at Corporate Office shall issue the Notification of Suspension of the vendor, as per the aforesaid Notification, the notified vendor becomes ineligible for participation in all future tenders limited to the nature of supply / works / services as mentioned in the Notification.
24. The aforesaid Notification of Suspension will not be applicable to:
- Procurement of Supply / Works / Services contracts other than those mentioned in Notification; and
 - Contracts of packages under execution.

However, in the above cases, suitable arrangement, after discussion with the vendor, shall be made to ensure avoidance of adverse performance of the vendor in such cases.

25. The procedure for issuing Notification of Suspension shall be similar to that followed for issuing Notification of Burning, as specified under clause 10 to 15 except for suspension of vendor where the contract has been placed by the Site office.
26. For the cases where contracts have been placed by the Site office, the Screening Committee shall put up the case to ED (O&M: Gen)/ED (Project Generation) as the case may be for concurrence and forward the same to the MD after examination of details and

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evaluating the overall performance of the vendor. Thereafter, the usual procedure shall be followed by the Screening Committee for issuing show cause notice after approval of Competent Authority.

27. Notification for Suspension of the vendor shall be issued by procuring authority for implementation uniformly by all Purchaser departments and offices. The concerned vendor shall also be informed suitably.
28. Where any Notification of Suspension of any vendor is issued by the Procuring department at Corporate Office after recommendation by the Screening Committee and approval of the Competent Authority, the same would be binding throughout bidding entity w.e.f. the date mentioned in such notification and for the period specified therein.
29. This Notification of Suspension shall be applicable to all tenders for which orders are yet to be placed and procedure as given in clause no. 21 shall be followed to restrict participation of suspended vendor in the tendering process.
30. The Notification of Suspension shall not be revoked during the period of suspension mentioned in the Notification.

SUSPENSION AND BANNING NOTIFICATION ISSUED BY OTHER ORGANIZATIONS:

- 1.1 Suspension / Banning Notifications issued by other sister organizations or any other successor entity of ASEB will be examined by the Screening Committee of Purchaser on case-to-case basis and after approval by Competent Authority, decision shall be conveyed for implementation or otherwise.
- 1.2 The Procuring department will interact with other successor entity of ASEB and will prepare a list of suspended I banned vendors at the beginning of the financial year. That list will contain the name of vendors, nature of supply I works I services for which ban I suspension have been imposed and the time period applicable. There should be a concurrent communication between successor companies on this subject. The orders for banning I suspension or revocation should be addressed to MDs I CMDs of successor companies.
- 1.3 To withdraw the suspension/ ban from that vendor, written information from of these Companies should be sought and a similar process as specified under Notification of Banning issued by Corporate Office will be followed.
- 1.4 The Suspension Notification issued by other organizations (other than Purchaser and any other Companies may be considered on a case-to-case basis by Purchaser.

APPEAL PROCESS

For any appeal to be made by the aggrieved vendor, MD APGCL will be the Appellate Authority. Decision of Appellate Authority shall be final in all respect and binding on all concerned.

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Evaluated Bid Value (EBV)-Illustration

Bidder	A	Remarks
Total Cost of Supply of Equipment, Construction, Erection and Commissioning (X1) in Rs. Lakhs (Sr. 1+ Sr. 2 of BRS P-I).	55456.18	As Quoted
Total O&M Cost per Year-in Rs lakhs		
1	700.00	As quoted for 5 years
2	735.00	
3	772.00	
4	810.00	
5	851.00	
Discount rate of NPV	10.00%	As specified in tender
Present Value of O&M Price(X2) Rs Lakh	3196.01	Derived
EBV - (As per tender clause 3.2)	58652.191	(X1+X2)

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UNDERTAKING TOWARDS NO DEVIATION

To

The Chief General Manager (NRE),
Assam Power Generation Corporation Limited
3rd Floor, Bijulee Bhawan,
Paltanbazar, Guwahati-781001

Sub: Bid No. ----- Design, Engineering, Supply, Construction, Erection, Testing and Commissioning on turnkey basis of 25 MWac Ground Mounted Solar PV Power Projects at Namrup in the state of Assam with Comprehensive Operation & Maintenance for five (5) years period.

Dear Sir,

We, _____
(Bidder's name), confirm our acceptance to all terms and conditions mentioned in the RFP Document, and all subsequent clarifications, in totality and withdraw all deviations raised by us, if any.

Place:

Date:

(SIGNATURE OF BIDDER)
NAME IN BLOCK LETTERS
RUBBER SEAL OF THE BIDDER

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**ANNEXURE XVII****RESTRICTIONS ON PROCUREMENT FROM A BIDDER OF A COUNTRY WHICH SHARES A LAND BORDER WITH INDIA**

Ministry of Finance of Govt. of India, Department of Expenditure, Public procurement Division vide office memorandum F. No. 6/18/2019-PPD dated 23rd July, 2020 (order-Public Procurement no.1) has proclaimed the insertion of Rule 144 (xi) in the General Financial Rules (GFRs), 2017 w.e.f. 23rd July, 2020 and amended vide O.M. No. F.7/10/2021-PPD (1) dated 23.02.2023 (order public procurement no. 4) from Procurement Policy Division, Department of Expenditure, Ministry of Finance forwarded by Department of Public Enterprises vide O.M. No. F. No. DPE/7 (4)/2017-Fin dated 24.02.2023 regarding restrictions on procurement from a bidder of a country which shares a land border with India on the grounds of defense of India on matters directly or indirectly related thereto including national security. Bidders are requested to take note of the following clauses and submit their offers accordingly wherever applicable.

Bidders must submit duly sealed & signed undertaking as per format provided vide, "Exhibits - I, II & III" along with the technical bid.

1. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority [Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT)]. Further, any bidder (including bidder from India) having specified Transfer of Technology (ToT) arrangement with an entity from a country which shares a land border with India, shall also require to be registered with the same competent authority to be eligible to bid in this tender.
2. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.
3. "Bidder (or entity) from a country which shares a land border with India" for the purpose of this Order means:
 - a) An entity incorporated, established or registered in such a country; or
 - b) A subsidiary of an entity incorporated, established or registered in such a country; or
 - c) An entity substantially controlled through entities incorporated, established or registered in such a country; or
 - d) An entity whose beneficial owner is situated in such a country; or
 - e) An Indian (or other) agent of such an entity; or
 - e) A natural person who is a citizen of such a country; or
 - f) A consortium or joint venture where any member of the consortium or joint venture falls under any of the above
4. The beneficial owner for the purpose of para 3 above will be as under:

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4.1 In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.

Explanation:

- a) "Controlling ownership interest" means ownership of or entitlement to more than twenty-five percent of shares or capital or profits of the company.
- b) "Control" shall include the right to appoint majority of the directors or to control the management: or policy decisions including by virtue of their shareholding or management rights or shareholder's agreements or voting agreements.

4.2 In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership;

4.3 In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person, has ownership of or entitlement: to more than fifteen percent of the property or capital or profits of such association or body of individuals;

4.4 Where no natural person is identified under (4.1) or (4.2) or (4.3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;

4.5 In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

5. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

6. The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

7. Validity of Registration: The registration should be valid at the time of submission of bid and at the time of acceptance of bid. If the bidder was validly registered at the time of acceptance/placement of order, registration shall not be a relevant consideration during contract execution.

8. Undertaking regarding compliance: The bidders are required to provide undertakings as per ANNEXURE XVII (a), (b) & (c) along with their bid towards compliance of the above guidelines for participation in this tender. If the undertakings given by a bidder whose bid is accepted is found to be false, this would be a ground for debarment/ action as per OIL's Banning Policy and further legal action in accordance with law.

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ANNEXURE XVII (a)

Format for Undertaking by Bidders towards compliance of Order No. F.7/10/2021-PPD (1) dated 23.02.2023 issued by Department of Expenditure, Ministry of Finance, Govt. of India

UNDERTAKING TOWARDS COMPLIANCE OF PROVISIONS FOR RESTRICTIONS ON PROCUREMENT FROM A BIDDER OF A COUNTRY WHICH SHARES LAND BORDER WITH INDIA

We, M/s _____, have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; we certify that we are not from such a country/or if from such a country, have been registered with the Competent Authority. We hereby certify that we fulfil all requirements in this regard and are eligible to be considered. (wherever applicable, evidence of valid registration by the Competent Authority shall be attached)

Date: (Signature)
(Printed Name)

Place: Designation)
(Common Seal)

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ANNEXURE XVII (b)

UNDERTAKING FOR WORKS INVOLVING POSSIBILITY OF SUB-CONTRACTING

We, M/s _____, have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such-countries, we certify that we are not from such a country/or if from such a country, have been registered with the Competent Authority and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. We hereby certify that we fulfil all requirements in this regard and is eligible to be considered. (wherever applicable, evidence of valid registration by the Competent Authority shall be attached)

Date: (Signature)
(Printed Name)
Place: Designation)
(Common Seal)

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ANNEXURE XVII (c)

ADDITIONAL UNDERTAKING BY BIDDER IN CASES OF SPECIFIED TRANSFER OF TECHNOLOGY

We, M/s _____, have read the clause regarding restrictions on procurement from a bidder having Transfer of Technology (ToT) arrangement. We certify that we do not have any ToT arrangement requiring registration with the competent authority.

OR

We, M/s _____, have read the clause regarding restrictions on procurement from a bidder having Transfer of Technology (ToT) arrangement. We certify that we have valid registration to participate in this procurement. (Evidence of valid registration by the Competent Authority shall be attached)

Date: (Signature)
(Printed Name)
Place: Designation)
(Common Seal)

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ANNEXURE XVIII

Undertaking towards change in Project Ownership
(To be furnished by Successful Bidder)

To,
The Chief General Manager (NRE),
Assam Power Generation Corporation Limited
3rd Floor, Bijulee Bhawan,
Paltanbazar, Guwahati-781001

Sub: Bid No. APGCL/CGM NRE/PROJ/NAMRUP SOLAR EPC/2023/T4-2570 for Design, Engineering, Supply, Construction, Erection, Testing and Commissioning on turnkey basis of 25 MWac Ground Mounted Solar PV Power Project at Namrup in the state of Assam with Comprehensive Operation & Maintenance for five (5) year's period

Dear Sir,

We have gone through the tender condition laid down under Section II INSTRUCTION TO BIDDER clause 2.1 pertaining to change in ownership of project pre/post award of the project.

We hereby undertake unconditional acceptance towards change in ownership irrespective of status of the tender/award.

Place:

(SIGNATURE OF BIDDER)

Date:

NAME IN BLOCK LETTERS

RUBBER SEAL OF THE BIDDER

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